SANGASDRIFT TRUST: PROPOSED CONSTRUCTION OF "HUT DAM" AND WEIR REHABILITATION, A BEE AGRICULTURAL INITIATIVE

Portion 3 & 5 of Farm Van der Wattskraal No. 394 and Remaining Extent of farm 234, Swellendam, Western Cape

ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR COMMENT

April 2018

DEA&DP Ref No.: 16/3/3/2/E3/10/1005/17

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CONTENTS

APPENDICES

APPENDIX 1:	**LOCALITY MAPS**
APPENDIX 2.1:	**LAYOUT MAPS & PRELIMENARY DESIGN FOR DAM AND WEIR**
APPENDIX 2.2:	**LAYOUT MAP FOR 55HA ORCHARDS**
APPENDIX 3:	**SENSITIVITY MAPS**
APPENDIX 4:	**SITE PHOTOGRAPHS**
APPENDIX 5:	**PUBLIC PARTICIPATION**
APPENDIX 6:	**CORRESPONDENCE WITH THE DEPARTMENT**
APPENDIX 7:	**SPECIALIST REPORTS**
APPENDIX 8:	**IMPACT SIGNIFIGANCE RATING**
APPENDIX 9:	**DOCUMENTS FROM SAREL BESTER INGENIEURS BK**
APPENDIX 10:	**EAP CV**
APPEMNIX 11:	**EMPr**
APPENDIX 12:	**MMP**
APPENDIX 13:	**SIGNED DECLARATIONS**

ACRONYMS

BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act (Act No. 73 of 1989)
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Programme
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
I&APs	Interested and Affected Parties
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NID	Notice of Intent to Develop
NWA	National Water Act
OESA	Other Ecological Support Area
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
WULA	Water Use Licence Application

1. INTRODUCTION

1.1 BACKGROUND

Agriculture is the main economic driver of the Overberg and mainly responsible for the socio-economic stability of the area. The current owner (and applicant for this application) of Portion 3 and 5 of the Farm van der Wattskraal 394 proposes the cultivation of a variety of nuts as part of Broad-Based Black Economic Empowerment (BBBEE) project. For the project to prove feasibility irrigation will be required for approximately 55ha orchards (nut and vineyards, 50/50).

This application for the proposed dam is a continuation or revision of the previous Sangasdrift Trust application submitted by the late Mr Adolf Jonker in 2003 on behalf of Sangasdrift Trust. The current applicant is Mrs Olivia Jonker who is the current trustee for the trust. Sangasdrift trust still forms part of a BBBEE vision (submitted in 2010). The trust is in the process of joining the Witzenberg PALS (Partnership in Agri Land Solutions) project, which is a land reform initiative that expedite successful land reform, economic growth, job creation and social cohesion in a unique manner.

Thus, consideration is being given to the construction dam on Portion 3 & 5 of Farm van der Wattskraal No. 394, about 16 km east of Riviersonderend and 46 km west of Swellendam. The proposed dam wall will be 14 m high and will have a capacity of approximately 330 000 cubic meters. The area to be inundated will be approximately 7 ha.

The water requirements will be met with the use of water abstracted from a natural watercourse at the Eksteenskloof weir located on the adjacent property (remaining extent of Farm 234). The Eksteenskloof weir requires reconstruction following a flood event in 2008. The water will be piped from the weir to the Hut dam that will be constructed approximately 300m south east of the Eksteenskloof weir within a natural watercourse. Water will only be abstracted during winter, which will ensure downstream aquatic habitat will receive adequate water volumes during the remainder of the year. Sarel Bester Ingenieurs BK is applying for the Water Use License for the new taking of water of 120 000 m^3. the WULA reference number is **16109WULA-W2**. Refer to **Appendix 9.1** for the WULA Application document.

A new pipeline, approximately 300 – 350 metres in length and 300 mm in diameter, will be constructed to feed water from the weir to the storage dam. No pump station will be required as water will flow with gravitational force.

The applicant is Sangasdrift Trust who will undertake the activity should it be approved. EnviroAfrica CC has been appointed as the independent environmental assessment practitioner (EAP) responsible for undertaking the relevant EIA and the Public Participation Process required in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA).

This Draft Environmental Impact Report (EIR) for comment, which will be submitted to the Department of Environmental Affairs and Development Planning (DEA&DP) for consideration, forms part of the EIA process. The purpose of this Draft EIR for comment is to describe the proposed project, the process followed to date, to present alternatives and to list the effect of the proposed development on the receiving environment as well as recommendations and mitigation measures as suggested by the specialist.

1.2 DESCRIPTION OF THE PROPOSED ACTIVITY

It is proposed that zoned earth dam be constructed on Portion 3 & 5 of Farm van der Wattskraal No. 394. Water will be used for the irrigation of proposed 55ha of orchards (nut and vineyard, 50/50) on Portion 5 of Farm van der Wattskraal No 394. It should be noted that these orchards will be developed on previously ploughed cow pastures (Please refer to **Appendix 2.2** for layout plans of the planned 55ha orchards).

The water requirements will be met with the use of water abstracted from a natural watercourse at the Eksteenskloof weir located on the adjacent property (remaining extent of Farm 234). The Eksteenskloof weir requires reconstruction following a flood event in 2008. The water will be piped from the weir to the Hut dam that will be constructed approximately 300m south east of the Eksteenskloof weir within a natural watercourse. Water will only be abstracted during winter, which will ensure downstream aquatic habitat will receive adequate water volumes during the remainder of the year.

Reconstruction of the weir (Remaining extent of Farm 234):

It is recommended that the existing weir on the neighbouring farm, Remaining extent of farm 234 be rehabilitated with a steel enforced concrete weir and piped outlet works. The weir will have a maximum height of +- 2,2m, a total length of +-35m and top width of +-300mm. It will be based on a foundation of about 3,6m wide and will be equipped with a downstream flush valve. The construction site will include the total footprint of the weir including related small works on the side, as well as a maximum 2m wide workspace along the length of the weir. Since the size of the works is relatively small, not much area outside the 2m construction strip would be necessary. The total footprint of the weir with construction is thus 296m² (0,0295 ha). Please refer to **Appendix 2.1** for layout plans **Figure 4 of Appendix 2.1** for preliminary design of the weir.

Maximum height of weir	2,2 m
Total length	35 m
Top width	300 mm
Foundation	3,6 m
Total footprint of weir with construction area:	295 m²

It is suggested that an area be made available where operators can park their vehicles as close as possible to the site where the weir will be rehabilitated. An area of 10m x 10m is suggested. Thus, having a total footprint of 100m² (0,01 ha). As per the method statement for the weir (Attached as **Appendix 9.4**) all concrete will be imported from a local supplier, no concrete will be mixed on site Concrete will be transported on wheelbarrows to the weir site through alien vegetation and disturbed land. No vehicles will be allowed in the watercourse. Please refer to **Appendix 2.2 Figure 2** for a map indicating the area suggested for vehicles to park and turn around. This area has already been disturbed and no clearing of vegetation will be required. Please also refer to **Figure 17 & 18** of **Appendix 4** for site photographs showing disturbed land that can be used for parking/ working area near the weir site.

Construction of “Hut Dam” (portion 3 & 5 of Farm van der Wattskraal 394):

It is proposed that a zoned earth dam be constructed. According to the engineer design the proposed dam will have a maximum dam wall height of 14 m, a dam wall length of approximately 519m, and will

have a capacity of approximately 330 000 cubic meters. The bulk of the embankment earth fill would come from inside the dam basin below the full supply level. The construction site will include the total footprint of the dam, borrow areas and related works as well as 10m wide workspace surrounding the site. As per the method statement for the dam. As per the method statement for the dam (Attached as **Appendix 9.3**) all concrete will be imported from a local supplier. No concrete will be mixed on site. The total dam footprint with construction footprint will total approximately 7 ha (70000 m²). Please refer to **Appendix 2.1** for layout plans and **Figure 3 of Appendix 2.1** for the preliminary design of the dam.

Dam capacity	330 000 m³
Maximum dam wall height	14 m
Dam wall length	519 m
Dam wall footprint	2.3 ha
Dam footprint (without wall)	4.5 ha
Total Dam Footprint	6.8 ha
Total Dam Footprint with construction footprint	7 ha

Pipeline:

A new pipeline, approximately 300 – 350 metres in length and 300 mm in diameter, will be constructed to feed water from the weir to the storage dam. No pump station will be required as water will flow with gravitational force. A construction footprint of 5 metres on both sides of the pipe can be calculated with the pipe line which gives a total footprint of 3605 m² (0.3605 ha) for the pipeline. Please refer to **Appendix 2.1** for layout plans.

Total construction footprint:

The total construction footprint is expected to be: 0,0295 ha (weir) + 0,01 ha (parking area) + 7 ha (dam) + 0.3605 ha (pipeline) = 7,4 ha.

The dam will be located on existing agricultural land (Please refer to **Appendix 3** for the Crop census map) The location was chosen to ensure the project life cycle costs are minimised (gravity feed vs. pumping cost etc.). Access to the dam and weir will be from existing farm roads. Please see **Appendix 1** for locality maps and **Appendix 2** for preliminary designs for the proposed dam and weir.

Figure 1: Google image indicating the two properties (van der Wattskraal 3/394 & 5/94) on which the dam will be developed (in red) in proximity to surrounding towns

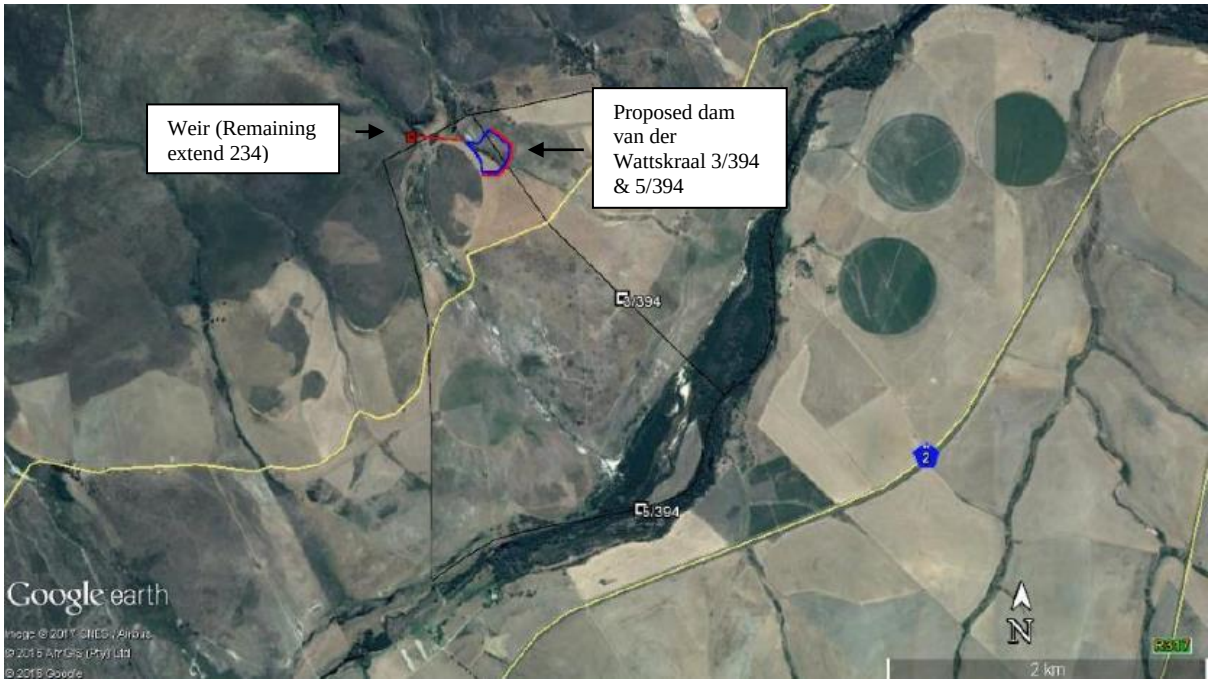

Figure 2: Google image indicating the design layout of the proposed dam on van der Wattskraal 3/394 & 5/394, as well as the pipeline, and where the weir (which is to be rehabilitated) is located on Remaining extent 234.

2. NEED AND DESIRABILITY

In terms of the National Environmental Management Act, and EIA 2014 regulations, as amended, the Scoping/EIA report must provide a description of the need and desirability of the proposed activity. The consideration of "need and desirability" in EIA decision-making requires the consideration of the strategic context of the development proposal along with the broader societal needs and the public interest.

While the concept of need and desirability relates to the *type* of development being proposed, essentially, the concept of need and desirability can be explained in terms of the general meaning of its two components in which *need* refers to *time* and *desirability* to *place* – i.e. is this the right time and is it the right place for locating the type of land-use/activity being proposed? Need and desirability can be equated to *wise use of land* – i.e. the question of what is the most sustainable use of land.

2.1 NEED

The owner, Sangasdrift Trust is planning to develop a BEE project of about 55ha of orchards (nut and vneyards, 50/50) on Portion 5 of van der Wattskraal 394. The development of a dam for irrigation purposes is required to ensure the long term economic viability and sustainability of this project. The success of this project is expected to create a number if permanent jobs within the agricultural industry.

2.2 DESIRABILITY

The following factors determine the desirability of the area for the proposed Hut dam.

2.2.1 Location and Accessibility

The proposed location of the dam site is considered ideally suited for the construction of the dam.

From an engineering point of view, the location was chosen to ensure the project life cycle costs are minimised (gravity feed vs. pumping cost etc.). The site is also in close proximity to the source of water (Eksteenskloof) and the orchards will be developed on the same property as the proposed dam.

Access to the farm will be via the N2 and the dam can be accessed via existing farm roads, no additional roads will need to be constructed.

Location and layout plans are included in **Appendix 1 and 2** with site photographs in **Appendix 4.**

2.2.2 Compatibility with the Surrounding Area

The site is largely surrounded by agricultural activities, in particular planted pastures. This is evident in the aerial image, Figure 1 above and site photographs in **Appendix 4**.

The proposed activity will therefore not be "out of character" with the surrounding land use and is expected to have a negligible impact on the visual character of the area.

3. LEGAL REQUIREMENTS

The current assessment is being undertaken in terms of the National Environmental Management Act (Act 107 of 1998, NEMA), to be read with section 24 (5): NEMA EIA Regulations 2010. However, the provisions of various other Acts must also be considered within this EIA.
The legislation that is relevant to this study is briefly outlined below.

3.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA

The Constitution of the Republic of South Africa (Act 108 of 1996) states that everyone has a right to a non-threatening environment and that reasonable measures are applied to protect the environment. This includes preventing pollution and promoting conservation and environmentally sustainable development, while promoting justifiable social and economic development.

3.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT 107 OF 1998)

The National Environmental Management Act (Act 107 of 1998) (NEMA), as amended, makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorisation from the relevant authorities based on the findings of an environmental assessment. NEMA is a national act, which is enforced by the Department of Environmental Affairs (DEA). These powers are delegated in the Western Cape to the Department of Environmental Affairs and Development Planning (DEA&DP).

On the 4 December 2014 the Minister of Environmental Affairs promulgated regulations in terms of environmental impact assessments, under sections 24(5) and 44 of NEMA, namely the EIA Regulations 2014 (GN No. R 326) these regulations were amended in April 2017,and include:

- GN No. R. 327 (Listing Notice 1);
- GN No. R. 325 (Listing Notice 2); and
- GN No. R. 324 (Listing Notice 3).

Listing Notice 1 and 3 are for a Basic Assessment and Listing Notice 2 for a full Environmental Impact Assessment.
According to the 2014 EIA regulations, as amended in 2017, the following potentially listed activities may be triggered (refer to Table 1)

Table 1: Summary of 2014 EIA regulations triggered

GN R327	Short description of relevant Activity(ies) in terms of Listing Notice 1	Description of specific portion of the development that might trigger the listed activity.
12	The development of (iv) dams, where the dam, including infrastructure and water surface area exceeds 100 square metres in size	The development of the dam and infrastructure is expected to be approximately 7,4 ha
19	Moving more than 10 m³ of material from a water course.	Development of infrastructure with surface measurement of approx. 7,4 ha is expected to be in the upper reaches of a small stream.
27	The clearance of an area of 1 ha or more, but less than 20 ha of indigenous vegetation	
GN R325	**Short description of relevant Activity(ies) in terms of Listing Notice 2**	**Description of specific portion of the development that might trigger the listed activity.**
16	Development of a dam, with a dam wall higher than 5m, or where the high-water mark if the dam will be increased with 10 ha.	The proposed dam wall is 14 m
GN R324	**Short description of relevant Activity(ies) in terms of Listing Notice 3**	**Description of specific portion of the development that might trigger the listed activity.**
12	Clearance of more than 300 m² of indigenous vegetation within critical biodiversity areas	The proposed activity will enable the clearance of approximately 7,4 ha of vegetation within a critical biodiversity area
14	The development of (iv) dams, where the dam, including infrastructure and	Development of infrastructure with surface measurement of approx. 7,4 ha is expected to be within

	water surface area exceeds 10m² in size	a critical biodiversity area

The principles of environmental management as set out in section 2 of NEMA have been taken into account. The principles pertinent to this activity include:

- People and their needs will be placed at the forefront while serving their physical, psychological, developmental, cultural and social interests. The activity seeks to provide additional employment and economic development opportunities, which are a local and national need – *the proposed activity is expected to have a beneficial impact on people, especially developmental and social benefits, as well providing additional employment and economic development opportunities.*
- Development will be socially, environmentally and economically sustainable. Where disturbance of ecosystems, loss of biodiversity, pollution and degradation, and landscapes and sites that constitute the nation's cultural heritage cannot be avoided, are minimised and remedied. The impact that the activity will potentially have on these will be considered, and mitigation measures will be put in place - *potential impacts have been identified and considered, and any further potential impacts will be identified during the public participation process. Mitigation measures will be included in the EMP*.
- Where waste cannot be avoided, it will be minimised and remedied through the implementation and adherence of the Environmental Management Programme (EMP) – *this will be included in the EIR*.
- The use of non-renewable natural resources will be responsible and equitable.
- The negative impacts on the environment and on people's environmental rights will be anticipated, investigated and prevented, and where they cannot be prevented, will be minimised and remedied.
- The interests, needs and values of all interested and affected parties will be taken into account in any decisions through the Public Participation Process.
- The social, economic and environmental impacts of the activity will be considered, assessed and evaluated, including the disadvantages and benefits.
- The effects of decisions on all aspects of the environment and all people in the environment will be taken into account, by pursuing what is considered the best practicable environmental option.

3.3 NATIONAL HERITAGE RESOURCES ACT

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act (Act No. 25 of 1999). South African National Heritage Resources Agency (SAHRA) is the enforcing authority and in the Western Cape, SAHRA have, in most cases, delegated this authority to Heritage Western Cape (HWC).

In terms of Section 38 of the National Heritage Resources Act, SAHRA and/or HWC will require a Heritage Impact Assessment (HIA) where certain categories of development are proposed. Section 38(8) also makes provision for the assessment of heritage impacts as part of an EIA process and indicates that if such an assessment is found to be adequate, a separate HIA is not required.

The National Heritage Resources Act requires relevant authorities to be notified regarding this proposed development, as the following activities are relevant:

- *any development or other activity which will change the character of a site exceeding 5 000 m² in extent;*

Furthermore, in terms of Section 34(1), no person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the SAHRA, or the responsible resources authority. Nor may anyone destroy, damage, alter, exhume or remove from its original

position, or otherwise disturb, any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority, without a permit issued by the SAHRA, or a provincial heritage authority, in terms of Section 36 (3). In terms of Section 35 (4), no person may destroy, damage, excavate, alter or remove from its original position, or collect, any archaeological material or object, without a permit issued by the SAHRA, or the responsible resources authority.

3.4 EIA GUIDELINE AND INFORMATION DOCUMENT SERIES

The following are the latest guidelines that form part of the DEA&DP's *Environmental Impact Assessment Guideline and Information Document Series (Dated: October 2011)*:

- ✓ *Guideline on Transitional Arrangements*
- ✓ *Guideline on Alternatives*
- ✓ *Guideline on Public Participation*
- ✓ *Guideline on Exemption Applications*
- ✓ *Guideline on Appeals*
- ✓ *Guideline on Need and Desirability*
- ✓ *Information Document on the Interpretation of the Listed Activities*
- ✓ *Information Document on Generic Terms of Reference for EAPs and Project Schedules*

3.5 NATIONAL WATER ACT

Besides the provisions of NEMA for this EIA process, the proposed dam also requires authorizations under the National Water Act (Act N0. 36 of 1998). The Department of Water Affairs, who administer that Act, will be a leading role-player in the EIA.

Existing water extraction rights of 40 ha (240 000 m3) from the Eksteenskloof will be used. Additional water rights might have to be obtained for which a WULA application process will be launched.

In terms of Chapter 12 of the National Water Act, the proposed dam is considered a dam with a safety risk. The dam therefore requires a permit to construct from the Dam Safety Office of the Department of Water Affairs. The design and construction must conform to the conditions of the Dam Safety Regulations as set out in Government Notice R139 in Government Gazette No. 35062 of 24 February 2012. Regulations 10 and 15 will be applicable to the proposed dam. A licence to construct application will only be submitted after an application for the safety classification of the proposed dam has been submitted, and only after the NEMA process has been concluded.

3.6 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) is part of a suite of legislation falling under NEMA, which includes the Protected Areas Act, the Air Quality Act, the Integrated Coastal Management Act and the Waste Act. Chapter 4 of NEMBA deals with threatened and protected ecosystems and species and related threatened processes and restricted activities. The need to protect listed ecosystems is addressed (*Section 54*).

4. ALTERNATIVES

Alternatives have been considered during the Scoping phase and these are described below.

4.1 SITE ALTERNATIVES FOR THE PROPOSED DAM

Two site locations for the proposed dam have been considered and investigated. Two locations on the were identified as possible locations, and referred to as:

- Alternative A (preferred site alternative)
- Alternative B

These are indicated in Figure 3 below:

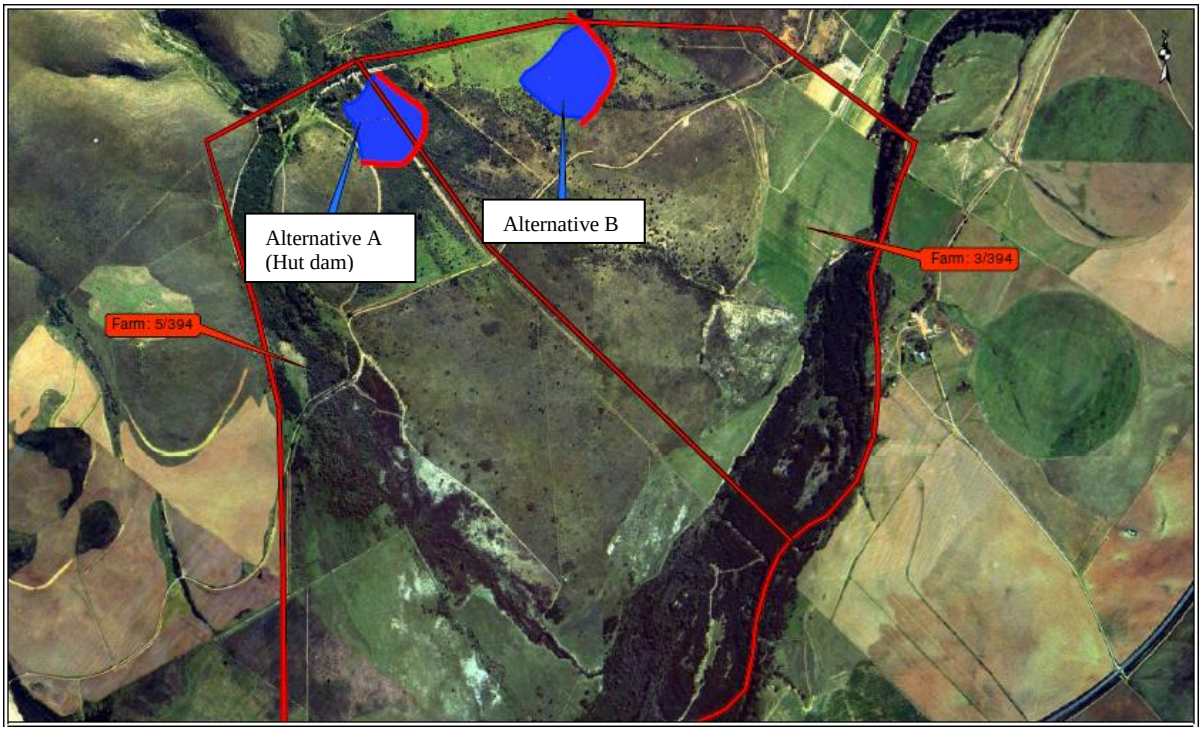

Figure 3: Figure indicating Site Alternatives, Alternative A is the preferred site alternative.

4.1.1 Alternative B (Not Preferred)

Alternative B, or the off-stream dam is not quite feasible in terms of technical and design aspect. By studying the farming unit, it terms of contours, the topography at alternative B is rather flat. This implies that the dam basis in scarce also in terms of soil types when considering sealing the dam wall, which will increase the dam costs (Please refer to **Appendix 5.4.5.1** for email correspondence between the EAP. Sarel Bester Ingenieurs and BGCMA regarding dam alternatives).

4.1.2 Alternative A (Hut dam/ Preferred alternative)

Alternative A is the preferred alternative as the storage to earthworks ratio for Alternative B (not preferred) is more expensive. Alternative A is more preferred when considering contour lines, soil type and dam basin. Alternative A is also mush closer to the water source where water will be extracted. Thus, the proposed pipeline that will be constructed to feed water to dam located at site Alternative A will be much shorter, with a less smaller footprint on the environment. As a result, dam Alternative A is the preferred site alternative.

4.2 ACTIVITY ALTERNATIVES

The purpose of the proposed dam is to provide the farm with enough water for its future irrigation requirements. No activity alternatives were considered.

4.3 NO-GO ALTERNATIVE

This is the option of not developing the proposed dam. Although this might result in no potential negative environmental impacts, the direct and indirect socio-economic benefits of not constructing the storage dam will not be realised. As described in *Section 2.1*, it is of critical importance to the success and feasibility of the business proposal for developing new orchards (nut and vineyards) on the farm, which is expected to create jobs in the area, that there be sufficient supply and storage of irrigation water.

5. SITE DESCRIPTION

5.1 LOCATION

The proposed dam is located on Portion 3 & 5 of Farm van der Wattskraal No. 394. The weir, which will be rehabilitated is located on Remaining extent of farm 234. The proposed site is located about 16 km east of Riviersonderend and 46 km west of Swellendam in the Western Cape (See Figure 1 above). The dam will be located on existing agricultural land.

The site coordinates for the dam wall are: S 34° 5'34.48", E20° 02'20.31".
The coordinates for the weir to be rehabilitated are: S 34° 4'57.01", E20° 1'10.19".
The codes of all proposed sites: C073 0000 00000394 00003 (Proposed Hut Dam)
C073 0000 00000394 00005 (Proposed Hut Dam)
C073 0000 00000234 00000 (Existing Weir)

Access to the farm is from the N2, the sites can be accessed via existing access roads on the property.

Pease refer to Figure 1 and 2 above for an aerial image of the proposed development as well as **Appendix 1** for Locality maps.

5.2 VEGETATION

According to the vegetation map the vegetation that can be expected at the proposed dam will be located within the Fynbos Biome which includes Greyton shale fynbos, with majority of the area already transformed for cultivation (Please refer to **Appendix 4** for site photographs). The vegetation that can be expected where the existing weir (which is to be rehabilitated) is located is North Sonderend Sandstone Fynbos.

Please refer to **Appendix 3** for sensitivity map, **Figure 4 of Appendix 3** for the Vegetation map.

A full botanical assessment was conducted (**Appendix 7.3)** and findings is discussed in Section 10 of the EIR.

5.3 FRESHWATER

The proposed Hut-Dam is located within the H60K quaternary catchment, in a smaller catchment of a tributary to the Riviersonderend River which forms part of the larger Breede River. Sarel Bester Ingenieurs BK is doing the WULA Application (Please refer to **Appendix 9.1**). The volume of water applied for is 'new' water, both from the Eksteenskloof as well as the adjacent kloof. The water will be diverted via a contour furrow to the dam

Please refer to **Appendix 3** for sensitivity maps, **Figure 1 & 2 of Appendix 3** for the CBA and ESA Maps

A full Freshwater impact assessment was conducted (**Appendix 7.4**), and findings is discussed in Section 10 of the EIR.

5.4 CLIMATE

The area normally receives about 307mm if rain per year and because it receives most of its rainfall during winter it has a Mediterranean climate. It receives the lowest rainfall (10 mm) in December and the highest (40mm) in August. The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Riviersonderend (the closest town) range from 16.7°C in July to 27.8°C in January. The region is the coldest during July when the temperature drops to 4.8°C on average during the night. (www.saexplorer.co.za).

5.5 SOCIO-ECONOMIC CONTEXT

According to the Swellendam Municipality IDP Review of 2017, socio-economic upliftment of previously disadvantaged communities remains one of the main challenges faced by the municipality.

Agriculture accounts for 13 % of the total employment of the municipalities working population. There has been a negative GDPR growth in for the Agricultural sector as well as a net job loss on the sector.

A 2014-15 farmworker survey show that the overall 62,63% of individuals living in farmworker households have permanent jobs both on and off the farms they live on, 18.1% are unemployed while 19.27% have either temporary or seasonal work. This means that 37% of those living on farms are at some point in the next 12 months at risk of not being employed.

The official unemployment rate of 12.5% is only half of that of the national employment rate and the lowest in the Overberg District. Employment opportunities have not increased, and there is a definite need for economic development, and subsequent employment opportunities.

5.6 HERITAGE FEATURES

The National Heritage Resources Act requires relevant authorities to be notified regarding this proposed development, as the following activities are relevant:

- *any development or other activity which will change the character of a site exceeding 5 000 m² in extent;*

A Heritage impact assessment was conducted as per the National Heritage Resources Act as the total footprint of the proposed dam and associated infrastructure is expected to be approximately 7,4ha. Please refer to Section 9 of the EIR.

6. ENVIRONMENTAL ISSUES AND POTENTIAL IMPACTS

From a baseline study it is suggested that the following specialist be appointed for the project:

- Botanical Specialist
- Fresh Water Specialist
- Heritage Specialist

From a baseline study the following issues were raided:

6.1 BIODIVERSITY

6.1.1 Botanical

The following information was taken from the Freshwater Impact Assessment (attached as **Appendix 7.2**) and own research:

Existing weir:
According to the vegetation map the vegetation that can be expected where the existing weir (which is to be rehabilitated) is located is North Sonderend Sandstone Fynbos. Based on the findings of the Fresh Water Report, conducted by EnviroSwift (Attached as **Appendix 7.2**), the weir is located within a floodplain wetland, which is within a moderately modified condition. The watercourse in which the weir is located is associated with an encroachment of alien vegetation. Lack of vegetation with good soil binding capability resulted in erosion of the banks. Indigenous vegetation is only identified up stream of the weir with an abundance of alien vegetation downstream.

Proposed Hut Dam:
According to the vegetation map from Cape Farm Mapper the proposed dam is located within the Fynbos Biome. Vegetation that can be expected at the proposed site is Greyton shale fynbos which is classified as endangered although majority of the area has already been transformed for cultivation. The area is also mostly associated with woody aliens like *Hakea sericea*, various *Pinus* species and *Acacia cyclops*. The area directly east of the proposed dam location was cultivated in the past and the area to the west in still under cultivation

Pipeline:
The proposed route of the pipeline will be located on already disturbed areas dominated with invasive alien grass species. The route was proposed by the freshwater specialist, so it does not transverse any additional natural or artificial freshwater features. The proposed route for the pipeline will transverse already disturbed areas, currently dominated by invasive grass species.

Please refer to **Appendix 2** for layout plans and **Appendix 3 figure 3** for the Vegetation map.

A full botanical impact assessment was conducted, and findings are discussed in Section 10 of the report.

6.2.2 Fauna

Because of the proximity to intensive cultivated areas it is not expected that the proposed dam location will have a significant impact on fauna species. Avi-fauna (water species) may even benefit from the dam. The impact on reptiles and amphibian will be much localised and may result in species being displaced (snakes and lizards) but not significant permanent impact on species is expected.

6.2 FRESHWATER

A fresh water impact assessment wasproposed. This is due to the fact that the proposed Hut-Dam is located within the H60K quaternary catchment, in a smaller catchment of a tributary to the Riviersonderend River which forms part of the larger Breede River.

A Fresh Water Impact assessment was conducted by EnviroSwift (Attached as **Appendix 7.2**). The following information was taken from the Freshwater Impact Assessment:

Existing weir:
The weir, which is to be rehabilitated is located within a floodplain wetland, which is within a moderately modified condition, as per the Fresh Water report conducted by EnviroSwift (Attached as **Appendix 7.2**). The watercourse in which the weir is located is associated with an encroachment of alien vegetation. Lack of vegetation with good soil binding capability resulted in erosion of the banks. Indigenous vegetation is only identified up stream of the weir, with an abundance of alien vegetation downstream.

Proposed Hut Dam:
The watercourse in which the proposed Hut Dam will be located has not been identified as a wetland habitat. The catchment in which the dam and weir fall has not been selected as an Upstream Management Area or River Freshwater Ecosystems Priority Area (FEPA), which would have increased the conservational importance of the catchment.

According to the Fresh Water Report conducted by EnviroSwift (**Appendix 7.2**), the proposed dam will intersect an Ecological Support Area 2 (ESA 2). Category 2 ESAs are areas that are likely severely degraded or have no natural cover remaining and therefore require restoration. These areas are not essential for meeting biodiversity targets but play an important role in supporting the functioning of Critical Biodiversity Areas (CBAs) or protected areas, and are often vital for delivering ecosystem services. The management objectives for Category 2 ESAs is to restore or manage the features to minimize impacts on ecological processes and ecological infrastructure functioning, especially soil and water related services, and to allow for faunal movement. It is therefore necessary that that good environmental control measures be implemented during construction and operations of the dam.

Proposed Pipeline:
According to the Fresh Water Report (**Appendix 7.2**), only one wetland seepage area was identified directly north to the northern portion of the route and is currently dominated by Acacia mearnsii and invasive alien grass species. Wetland indicators according to DWAF are ill-defined at present, this can be due to the volume of water used by alien vegetation and the ongoing drought, the pipeline route is located 50m from the wetland temporary zone and is not likely to have a significant impact on the wetland seep.

Please refer to **Appendix 3 Figure 1 & 2** for the CBA and ECA Map

6.3 HERITAGE

The possible impact on heritage resources has been identified as a possible environmental impact because of the construction of the dam. The dam with associated infrastructure is expected to have a footprint of approximately 7.4 ha.

CTS Heritage conducted a Heritage Screener and submitted a NID to Heritage Western Cape, HWC provided comments in April 2017 (**Appendix 7.1, 7.1.1 - 7.1.3**). Findings are discussed in Section 10 of the report.

6.4 VISUAL IMPACT

The potential impact on the sense of place of the proposed dam has also been considered. The surrounding area is characterised by agricultural activities, as well as a number of farm dams in the local area, and the proposed dam will therefore not be uncharacteristic for the area.

The sense of place is not expected to be altered by the proposed dam, and no further studies are suggested.

6.5 SAFETY

Due to the size of the dam and dam wall, the proposed dam is a safety risk in terms of Chapter 12 of the National Water Act and will require authorisation from the Department of Water Affairs. Please refer to **Appendix 9.2** for the Preliminary Design Report of the proposed new Hut dam conducted by Sarel Bester Ingenieurs BK, which includes the Dam Safety Application.

6.6 LOSS OF AGRICULTURAL LAND

Due to the location of the proposed dam, part of the dam will inundate existing agricultural lands. The total footprint of the dam with associated infrastructure is expected to be approximately 7,4 ha. An area of approximately 7 ha of agricultural land will this be lost in order to establish the dam.

6.7 SOCIO-ECONOMIC IMPACT

Although the construction of the proposed dam will create jobs during the construction phase of the activity, the dam will indirectly create additional jobs during the operational phase. As indicated in *Section 2.1*, the proposed dam is of critical importance to the success to establish the orchards (nut and vineyard), which is expected to create permanent job opportunities in the agricultural sector.

Ms Olivia Jonker and her son the two trustees for Sangasdrift Trust and are in the process of joining the Witzenberg PALS project. Witzenburg is a land reform initiative that expedite successful land reform, economic growth, job creation and social cohesion in a unique manner.

6.8 OTHER ISSUES IDENTIFIED

Any further issues raised during the public participation process or by the Competent Authority not mentioned in this section, will be dealt with during the EIA phase.

7. DETAILS OF THE PUBLIC PARTICIPATION PROCESS

Interested and Affected Parties (I&APs) were identified throughout the process. Landowners adjacent to the proposed site, relevant organs of state, organizations, ward councillors and the Local and District Municipality were added to this database. A complete list of organisations and individual groups identified to date is shown in **Appendix 5.**

Public Participation was conducted for this proposed dam in accordance with the requirements outlined in Regulation 41, 42, 43 and 44 of the NEMA EIA Regulations 2014 as amended, as well as the Department of Environmental Affairs and Development Planning's guideline on Public Participation 2011. The issues and concerns raised during the scoping phase will be dealt with in the EIA phase of this application.

As such each subsection of Regulation 54 contained in Chapter 6 of the NEMA EIA Regulations will be addressed separately to thereby demonstrate that all potential Interested and Affected Parties (I&AP's) were notified of the proposed development.

Table 2: Summary of the public participation process

8. PLAN OF STUDY FOR THE EIA

8.1 TASKS TO BE UNDERTAKEN

In terms of the NEMA EIA process the Scoping process must follow certain prescribed process or steps

8.1.1 Pre-Application Phase

In terms of the 2014 EIA requirements, this application is now in what is termed the "Pre-Application Phase", which included the following steps:

- Project preparation, site visits and meetings with client;
- Preparation of draft background information document;
- The National Application process does not require a "Notification of Intend" to develop and as a result no pre-application meeting was scheduled with the Department of Environmental Affairs (DEA).
- Initial public participation was done (Refer to **Appendix 5**);
- Register of interested and affected parties was compiled (Refer to **Appendix 5.1.5**):
- A comments and response report was established (**Appendix 5.1.6**):
- Specialist were appointed;
- Preparation of Scoping Report for comment (this document).

The Scoping Report was advertised for a 30-day comment period. Comments received during the Public Participation Process have been incorporated into this Draft Environmental Impact Report for comment.

8.1.2 Application Phase

The process will now enter the formal application process. The NEMA EIA (2014) as amended, process prescribes the following tasks:

Table 3: Summary of the NEMA EIA (2014) process that will be followed

TASKS	NUMBER OF DAYS	PROJECTED DATES
1. PRE-APPLICATION PHASE	90	
• ***Notice of Intent*** **(NoI): Prepare & Submit**		9 June 2017
• Appoint Specialists		9 June 2017
• ***PPP*** (1st round): Advertisement, Posters, mail drops, Register I&AP's	30	9 June 2017
NB: Post-App SR*: Prepare for comment + update EMP and C&R report*		
2. APPLICATION PHASE	**43**	
2.1. Application document: Prepare & Submit to competent authority (*CA have 10 days to respond*)	**10**	**22 September 2017**
2.2. Submit ***Post-App SR*** to CA + IAP's for comments	30	**22 September 2017**
2.3. Submit *Post-App SR* to CA for approval	**43**	**3 November**
3. IMPACT REPORT (*Timeframe start on decision from CA on SR*)	**106**	
3.1. Submit ***IR*** to CA & IAP's for comment (PPP on IR)	30	~~February 2018~~ 09 February 2018
3.2. Submit *Final IR* to CA for approval	**20**	~~March 2018~~ 24 April 2018
CA to provide decision within 107 days		
Total for NON-SUBSTANTIVE EIA Application (90 + 43 +44 + 106 + 107 days)		

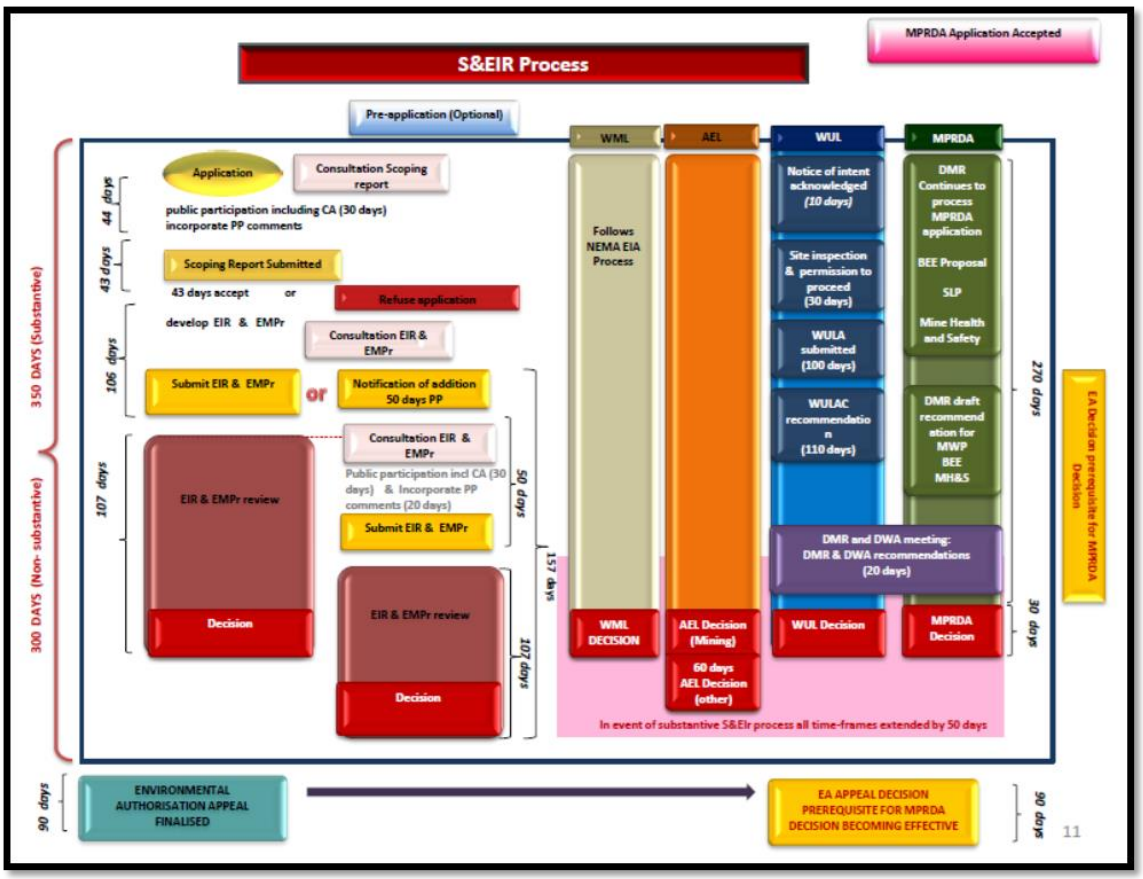

Figure 4: Summary of the Scoping and EIA 2014 Process

8.2 PUBLIC PARTICIPATION AND INTERESTED AND AFFECTED PARTIES

Please refer to Figure 5 to see where the public participation process is present in the environmental impact assessment. The Interested and Affected Parties will have a chance to view and comment on all the reports that are submitted. The figures also indicated what timeframes are applicable to what stage in the process. If required, meetings with key stakeholders will be held.

At the end of the comment period, the Scoping report (for comment) was be revised in response to feedback received from I&APs. All comments received and responses to the comments was incorporated into Scoping report for decision. This report was sent to DEA&DP for decision. The department accepted the Scoping report and the acknowledgment letter was sent out on 9 January 2018 (Please refer to **Appendix 6** for correspondence with the Department).

This report, the Draft EIR for comment will include all the outstanding specialist report as well as further comments from DEA&DP. The Draft Environmental Impact Report (for comment) will be sent out to I&APs for a commenting period of 30 days, after which the report will be reviewed and comments from all I&APs will be included. The EIR will then go out for a second round of public participation, for a commenting period of 30 days. The report will be reviewed, and comments will be included and submitted to DEADP for final decision.
Correspondence with I&APs will be via post, fax, telephone, email and newspaper advertisements.

Should it be required, this process may be adapted depending on input received during the on-going process and as a result of public input. DEA&DP will be informed of any changes in the process.

9. SPECIALIST STUDIES

As a result of the environmental issues and potential impacts identified in Section 6, the need for the following specialist studies has been identified. Cape Nature suggested in their comments dated 2017-10-26 on the Scoping report (Refer to the updated C&Rr **Appendix 5.3**), that a fish study in the area will be required. As a result, the following specialist have been appointed:

- Archaeological Impact Assessment
- Botanical Assessment
- Freshwater Assessment
- Freshwater Fish Assessment

The specialists are provided with set criteria for undertaking their assessments, to allow for comparative assessment of all issues. These criteria are detailed in the Terms of Reference to each specialist and summarised below.

9.1 CRITERIA FOR SPECIALIST ASSESSMENT OF IMPACTS

The impacts of the proposed activity on the various components of the receiving environment will be evaluated in terms of duration (time scale), extent (spatial scale), magnitude and significance. These impacts could either be positive or negative.

The magnitude of an impact is a judgment value that rests with the individual assessor while the determination of significance rests on a combination of the criteria for duration, extent and magnitude. Significance thus is also a judgment value made by the individual assessor. Each specialist has their own methodology to determine significance.

9.2 BREIFS FOR SPECIALIST STUDIES

9.2.1 Heritage Impact Assessment

Cedar Towers Services (CTS) Heritage conducted a Heritage Screener. Please find the report attached **Appendix 7.1**

The terms of reference for the heritage study will be as follows:

- To determine whether there are likely to be any important archaeological sites or remains that might be impacted by the proposed development;
- To identify and map archaeological sites/remains that might be impacted by the proposed development;
- To assess the sensitivity and conservation significance of archaeological sites/remains in the inundation area;
- To assess the status and significance of any impacts resulting from the proposed development, and
- To identify measures to protect any valuable archaeological sites/remains that may exist within the estimated inundation area.

9.2.2 Biodiversity Impact Assessment

Dave Mc Donald completed the Biodiversity Impact Assessment. Please find the report attached as **Appendix 7.3**

- Describe the broad ecological characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size, relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.
- In terms of biodiversity pattern, identify or describe:
  Community and ecosystem level:

- The main vegetation type, its aerial extent and interaction with neighbouring types, soils or topography;
- The types of plant communities that occur in the vicinity of the site
- Threatened or vulnerable ecosystems.
  Species and ecosystems level:
- Red List species (give location if possible using GPS;
- The viability of an estimated population size of the Red List species that are present (include the degree of confidence in prediction based on availability of information and specialist knowledge, i.e. High=70-100% confident, Medium 40-70% confident, low 0-40% confident)
- The likelihood of other Red List species, or species of conservation concern, occurring in the vicinity (include degree of confidence).
  Other pattern Issues:
  - Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
  - The extent of alien plant cover of the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites).
- The condition of the site in terms of current or previous land uses.

- In terms of the process, identify or describe:
  - The key ecological “drivers” of ecosystems on the site and in the vicinity, such as fire.
  - b. Any mapped spatial component of an ecological process that may occur at the site or in its vicinity (i.e. corridors such as watercourses, upland-lowland gradients, migration routes, coastal linkages or inland-trending dunes, and vegetation boundaries such as edaphic interfaces, upland-lowland interfaces or biome boundaries)
  - c. Any possible changes in key processes, e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.
  - d. Would the conservation of the site lead to greater viability of the adjacent ecosystem by securing any of the functional factors listed in the first bullet?

- Would the site or neighbouring properties potentially contribute to meeting regional conservation targets for both biodiversity pattern and ecological processes?

9.2.3 **Freshwater Impact Assessment**

Natasha van Haar from EnviroSwift completed the Freshwater Impact Assessment. Please find the report attached as **Appendix 7.2.**

The terms of reference for the Freshwater assessment are as follows:

- Literature review and assessment of existing information
- Site Assessment of the proposed activities and impact on the associated freshwater systems This will include an assessment of the freshwater ecological condition, using river health indices such as in-stream and riparian habitat integrity, aquatic macro-invertebrates and

riparian vegetation to determine set back lines and geomorphological condition of the streams, which will then determine the overall Ecostatus of the streams and provide data that will inform the Water Use Licence Application of the project. This will include both the stream to be impacted by the dam development and the pump station establishment.

- Describe ecological characteristics of freshwater systems and compile 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.
- Evaluate the freshwater issues on the site and propose mitigation measures and measures for the rehabilitation of the site as well as setback lines for future development.
- Compilation of the documentation for submission of the water use authorisation application (WULA) to the Department of Water Affairs (if deemed necessary).

9.2.4 Freshwater Fish Assessment

Bruce Paxton from the Freshwater Research Centre conducted the freshwater fish study. Please find the report attached as **Appendix 7.4**

The terms of reference for the freshwater fish study are as follows:

- Undertake a fish survey of the watercourses likely to be affected by the proposed development;
- Include in the survey at least one site below and one site above the proposed weir by means of electrofishing;
- Assess the condition of the non-perennial watercourse to confirm whether there is habitat for fish and if so, include a third survey site;
- Based on the above assessments, advise on what the likely impact of the weir will be on native fish populations.

10. ASSESSMENT OF ENVIRONMENTAL IMPACTS

The specialist studies detailed in **Appendix 7** were undertaken to determine significance of the impact that may arise from the proposed development. The findings of the specialist studies are summarised here. Full copies of the studies are included in **Appendix 7**.

The following studies were undertaken:

10.1 Heritage Impact Assessment

A heritage screener was conducted by CTS Heritage (Please see **Appendix 7.1**). Key findings included:

10.1.2 Key findings

- There are no declared heritage sites within a 10km radius of the proposed development site.
- Archaeological material does occur in the region, but the location of this development on previously cultivated land makes any discovery if *in situ*, significant archaeological heritage resources unlikely
- In terms of the palaeontology of the study area, the underlying deposits are of low fossil sensitivity, comprising scree, talus and alluvium as well as light grey to red sandy soils. The proposed developments will, therefore, have no impact on significant palaeontological resources.

10.1.3 Impact Assessment

- The heritage resources in the area proposed for development are sufficiently recorded - There are no known sites which require mitigation or management plans, nor any significant heritage resources known in the immediate vicinity, and the proposed development is unlikely to impact on heritage resources.

10.1.4 Mitigation Measures

- Should any heritage resources, including graves and human burials, archaeological material and paleontological material be discovered during the development, all works must be stopped immediate and HWC must be notified without delay.

10.1.5 Conclusion

CTS Heritage conducted a Heritage Notice of Intend to Develop (NID) (**Appendix 7.1.1**) and submitted it to Heritage Western Cape (HWC) for comments (Please refer to **Appendix 7.1.3 or 5.2.3.5**. for comments). Comments from HWC dated 11 August 2017 stated that since there is no reason to believe that the proposed dam expansion will impact on heritage resources, no further action under Section 38 of the National Heritage Resources Act (Act 25 of 1999) is required. Precautionary mitigation measures as stated above should be implemented.

10.2 Botanical Impact Assessment

The Botanical Impact Assessment was conductive by Dr Dave Mc Donald from Bergwind Botanical Surveys & Tours cc who has a sound knowledge of the area. Please refer to **Appendix 7.3** for the full report.

10.2.1 Key findings

Hut dam (Alternative A – preferred)

- Only one vegetation type was originally found at the proposed Hut Dam (alternative A) and alternative dam sites (alternative B), as mapped and classified in the national classification of the vegetation of South Africa (Rebelo et al. 2006 in Mucina & Rutherford, 2006) (VEGMAP). The vegetation would have been Greyton Shale Fynbos. (Please refer to Figure 5 below).
- Greyton Shale Fynbos is not listed in the National List of Threatened Ecosystems (Government Gazette, 2011) which implies that it is Least Threatened. However, Greyton Shale Fynbos is rated as Endangered A1 (A1 = irreversible loss of natural habitat). This means that there should be no further loss of this vegetation type otherwise the national conservation target may not be met. This immediately raises the need for caution when encountering this vegetation type.
- The area on the west side of the stream of the proposed Hut Dam (alternative A) has been completely transformed by cultivation and the establishment of pastures. Apart from the pasture grasses, *Athanasia trifurcata* (Klaaslouwsbos) that is known for indicating disturbance, is common. This area consequently has negligible botanical sensitivity. No Greyton Shale Fynbos remains here apart from an isolated remnant as shown in Figure 5 below. However, this remnant would not be affected by the dam at all since it lies west of the dam footprint.
- The area east of the stream was historically significantly disturbed by invasion by *Acacia saligna.* The subsequent clearing of the invasive trees and more recently by re-establishment of *A. saligna* again added another layer of disturbance. The use of this area for livestock grazing has added further disturbance. Ultimately this has left the area east of the stream in the Hut Dam footprint (and outside) in poor, degraded condition with low botanical sensitivity.
- The Hut Dam site (preferred) has a small area of critical Biodiversity Area 1 (CBA1), minimal areas of Ecological Support Areas 1 (ESA1) and a larger area of ESA21 (Figure 19). The ESA2 is related mainly to the stream and denotes that the area has conservation merit but is not essential for meeting conservation targets.

Alternative site (Alternative B – not preferred)

- The alternative dam site has clearly been subject to significant and ongoing disturbance over more than a decade and the site no longer supports any Greyton Shale Fynbos. It is highly degraded from a botanical viewpoint and has negligible botanical sensitivity even in the watercourse (Figure 5).
- The alternative dam site has an ESA2 area running through it. This ESA2 is related to the watercourse. This watercourse is extremely degraded and now has very little ecological value. The specialist questions the application of ESA2 status to this watercourse.

[1] ESA 2 areas are defined as: *"Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning protected areas or critical biodiversity areas and are often vital for delivering ecosystem services."*
ESA 2 conservation objectives are: *"Restore and/or manage to minimize impact on ecological processes and ecological infrastructure functioning, especially soil and water-related services, and to allow for faunal movement."*

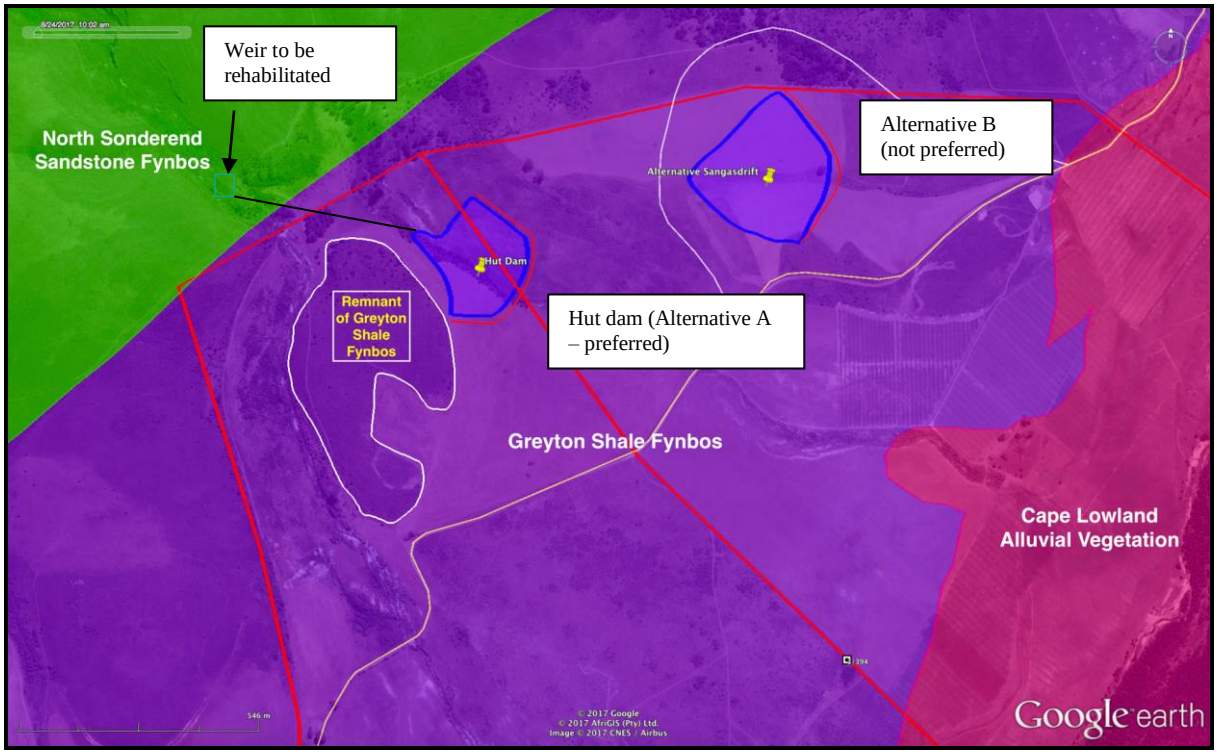

Figure 5: Vegetation Map taken from the Botanical Impact Report. The proposed Hut Dam (alternative A – preferred) and Alternative B (not preferred) are both located in an area formally with Greyston Shale Fynbos. The weir to be rehabilitated falls within an area with North Sonderend Sandstone Fynbos.

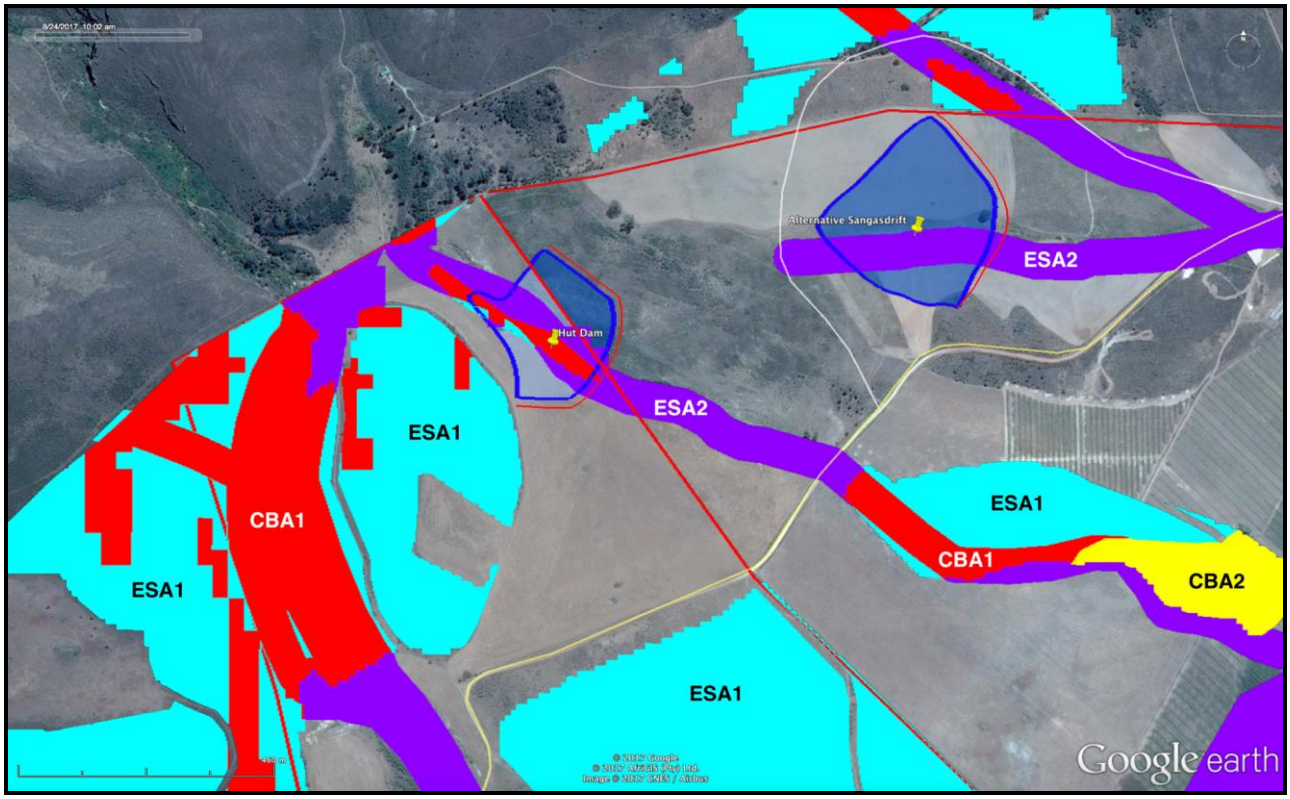

Figure 6: Image taken from the Botanical Assessment report indicating the CBA map in relation to the proposed dam locations (Hut dam and Alternative B). According to the map the weir does not fall within a CBA/ ESA. The pipeline will fall within a ESA2.

- No Red List species (i.e. species of conservation concern) were encountered during the survey. This is not surprising since the habitat is generally extremely degraded and compared with undisturbed Greyton Shale Fynbos, is a 'botanical desert'.

Weir

It was noted that the botanical assessment conducted by Dr D McDonald (**Appendix 7.3)** focussed mainly on the proposed sites suggested for the development of the dam (Alternative A and B) on Portion 3 & 5 of the farm van der Wattskraal No 394. The EAP noticed this and did further enquiries on why the weir site was not evaluated. Please refer to Appendix 7.3.1 for email correspondence between Dr D McDonald and the EAP. Dr McDonald informed the EAP in the email that the weir was difficult to find and that he could not find it but must have walked passed the site. This is understandable as the weir is almost entirely destroyed and overgrown. Please refer **to Figure 15 & 16 of Appendix 4** for site photographs indicating what remains of the weir. The statement from Dr McDonald is as follow: The area is **heavily overgrown** with vegetation and there is a lot of alien trees. Dr McDonald believes that the reconstructing of the weir will not result in any significant negative impact, seeing that the site is already to heavily invaded by trees and so disturbed by erosion and wash-aways. He suggests that the reconstruction of the weir should not have too much influence on the stream either, as long as some water is allowed to continue to flow downstream.

As a precautionary principle the EAP conducted a visit to the weir site with Botanical Specialist, Mr Peet Botes. Mr Peet Botes conducted an impact report focusing the botanical elements encountered at the weir and its immediate surroundings. Please refer to **Appendix 7.3.2** for the full report.

Key findings can be summarised as:

- According to the vegetation map (Figure 5 above) the weir would be located within North Sonderend Sandstone Fynbos, which is not classified as threatened. Greyton Shale Fynbos (endangered) is expected just south of the weir in the more open valley.
- Vegetation encountered within the banks of the stream where the weir will be located is typical hardy azonal vegetation as one would expect in lower mountain streams.
- The stream itself is still in relative good condition, although it seems to be slowly eroding its eastern banks. This is probably the result of earlier flood events combined with the impact from invasive alien plant species, which generally have poor soil binding capacity (suppressing indigenous plants with good soil binding capability). This has resulted in the eastern riverbank slowly being eroded into already disturbed areas, such as the picnic / camping site.
- Fortunately, there is evidence of recent alien clearance on Farm 234, which includes the area in the vicinity of the weir. However, alien invasive species has left its mark.
- .About 50m downstream of the weir, the in-stream vegetation has been severely compromised and almost replaced with dense Port Jackson (*Acacia saligna*) stands. Slightly north of the weir, dense patches of Black Wattle *(Acacia mearnsii*) were observed, which extends to the lower slopes of the mountains to the east and south of the weir. Pine trees (Pinus species) are also common along the lower slopes of the mountain and also within the stream. Dense stands of bramble (*Rubus cf. fruticosus*) were also observed on the eastern banks of the stream in the vicinity of the picnic area.
- Indigenous species was also observed, *Carpobrotus edulis*, *Cassytha ciliolate, Chrysanthemoides monilifera*, *Elegia capensis, Empleurum unicapsulare, Psoralea pinnata, Pterocelastrus rostratus* (Red candlewood), *Stoebe plumose, Searsia angustifolia (=Rhus angustifolia).*
- A number of trees were planted in the vicinity of the picnic area which although they are indigenous to South Africa, is unlikely to have been found in this area. They includes at least

one *Ficus natalensis,* one, *Ficus sur,* two *Podocarpus latifolius (Yellowwood),* 3-4 *Searsia lancea* (=*Rhus lancea*), one *Syzygium cordatum* and a number of *Vachellia karroo* (=*Acacia karroo*). These trees were probably planted as shade trees.

- In general the western banks of the stream seems to be botanically still in very good condition (apart from a few alien invader species). The in-stream vegetation show signs of alien infestation, but with good alien control could easily be reverted back to almost original status. The western bank of the stream (vicinity of the weir) is, however, in much poorer shape and was clearly disturbed in the past (used as a picnic or camping spot). Still with alien control it should also be able to revert back to a more natural status over time.

10.2.2 Impact Assessment

As per the specialist report the impact of the proposed Dasberg Dam development on the vegetation and habitat are considered with respect to:

- Loss of vegetation type and habitat including plant species due to construction and operational activities;
- Loss of ecological processes due to construction and operational activities.

Impact 1 - Loss of vegetation type and habitat including plant species due to construction and operational activities:

If the **Hut Dam** development option is followed there would be **Very Low Negative impact** on the stream as well as on the cultivated areas. No mitigation would be necessary to compensate for loss of natural vegetation, habitat or ecological processes, refer to the Table 4. The same would apply to **the alternative site** where the negative impacts would be **even less.**

Impact 2 - Loss of ecological processes:

Ecological processes are highly compromised in the area at both the preferred and alternative sites. There would be no further net loss of ecological processes due to dam construction and operation and the impact is thus **Very Low Negative** (Table 4).

Table 4.1 Impact rating from Botanical specialist – Loss of natural vegetation (Greyton Shale Fynbos), habitat and ecological processes during the construction and operational phase

CRITERIA	'NO GO' ALTERNATIVE		PREFERRED ALTERNATIVE Construction of Hut Dam		ALTERNATIVE Construction of Alternative Sangasdrift Dam	
Nature of direct impact (local scale)	Loss of Greyton Shale Fynbos, habitat and ecological processes					
	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION
Extent	Local	Local	Local	Local	Local	Local
Duration	Long-term	Long-term	Long-term	Long-term	Long-term	Long-term
Intensity	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Probability of occurrence	Probable	Probable	Probable	Probable	Probable	Probable
Confidence	High	High	High	High	High	High
Significance	Negligible	Negligible	Very Low Negative	Very Low Negative	Very Low Negative	Very Low Negative
Nature of Cumulative impact	Loss of Greyton Shale Fynbos, habitat and ecological processes					
Cumulative impact prior to mitigation	Very Low negative		Very Low Negative		Very Low Negative	
Degree to which impact can be reversed	Not reversible		Not reversible		Not reversible	
Degree to which impact may cause irreplaceable loss of resources	Very low		Very low		Very low	
Degree to which impact can be mitigated	Not required		Not required		Not required	
Proposed mitigation	None advised		None advised		None advised	
Cumulative impact post mitigation	Very low negative		Very low negative		Very low negative	
Significance of cumulative impact (broad scale) after mitigation	Very low negative		Very low negative		Very low negative	

10.2.3 Mitigation Measures

Dr McDonald believes that the development option would have a high physical impact. However, the preferred and alternative sites are so badly degraded (with Greyton Shale Fynbos already having been lost many years ago) that no mitigation is advocated. No further loss of Endangered Greyton Shale Fynbos would result from construction of a dam at either of the sites. No mitigation for loss of ecological processes is proposed.

Botanical specialist, Mr Peet Botes suggest the following impact minimization recommendations should be considering as part the construction phase:

- A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase.
- Cement mixing should be done on disturbed areas to the east of the weir (the old picnic site, or preferably further east on the agricultural land – aiming to be at least 50m away from the river bank, if possible).
- Before any work is done the site and access routes must be clearly demarcated (with the aim at minimal width/smallest footprint).
- Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO.
- Indiscriminate clearing of areas must be avoided.
- All alien plants must be removed from within the construction footprint and immediate surroundings.
- All areas impacted as a result of construction must be rehabilitated on completion of the project.
- An integrated waste management approach must be implemented during construction.

10.2.4 Conclusion

According to the botanical specialist, the study area at Sangasdrift has been subject to intensive disturbance over a long period. The disturbance has resulted from intensive agriculture; ploughing and planting of pastures for livestock production, as well as invasion by woody alien invasives. The area of the proposed 'Hut Dam' (preferred) has parts that are classified as CBA1, ESA1 and ESA2. The specialist is of the opinion that there is no justification for this conservation status mapping in this area. The area is extremely disturbed and degraded and has very low botanical and ecological value. The specialist recommends that the mapping of CBAs and ESAs in the area should be checked and changed to reflect the actual situation 'on the ground'. The same applies to the 'alternative dam site'. The ESA2 classification of the watercourse is, in the opinion of the specialist, only tenuously valid since the watercourse is extremely degraded and not ecologically functional.

Dr McDonald suggest that the two dam sites are some of the most degraded and ecologically compromised sites he has surveyed and the negative impacts of the proposed dam at either site would be Very Low Negative. Construction of a dam at either of the sites is therefore unconditionally supported from a botanical perspective.

Botanist, Peet Botes stated that the restoration of the weir is certain to have an impact on the vegetation within the stream during the construction period. However, the impact will be temporary and must take into account the current status of the stream (alien infestation, existing disturbances and erosion). Botanically speaking, the construction of the weir is not expected to have any significant long-term impacts on vegetation, since the species encountered at the site is mostly hardy and relatively common species, which will re-establish themselves quite easily (as a result impact is considered low). However, the disturbance associated with the construction will very likely stimulate alien plant germination in the construction footprint, which will have a negative long-term impact. It is thus essential that an ongoing alien eradication program is implemented at the weir and its immediate surroundings (e.g. a 20-50m boundary surrounding the weir location and all area impacted by construction footprint – including mixing and laydown areas). Preferably, or over time, it should also include the removal of the dense stands of alien invasive species upstream of the weir location.

10.3 Freshwater Impact Assessment

10.3.1 Key findings

Figure 7 below was taken from the Freshwater Impact assessment (**Appendix 7.2**) and indicates the freshwater habitat in relation to the proposed weir rehabilitation, pipeline and Hut dam (alternative A), depicted in red. Watercourse 1 is presented in blue, watercourse 2 is presented in yellow and the wetland seep is presented in green.

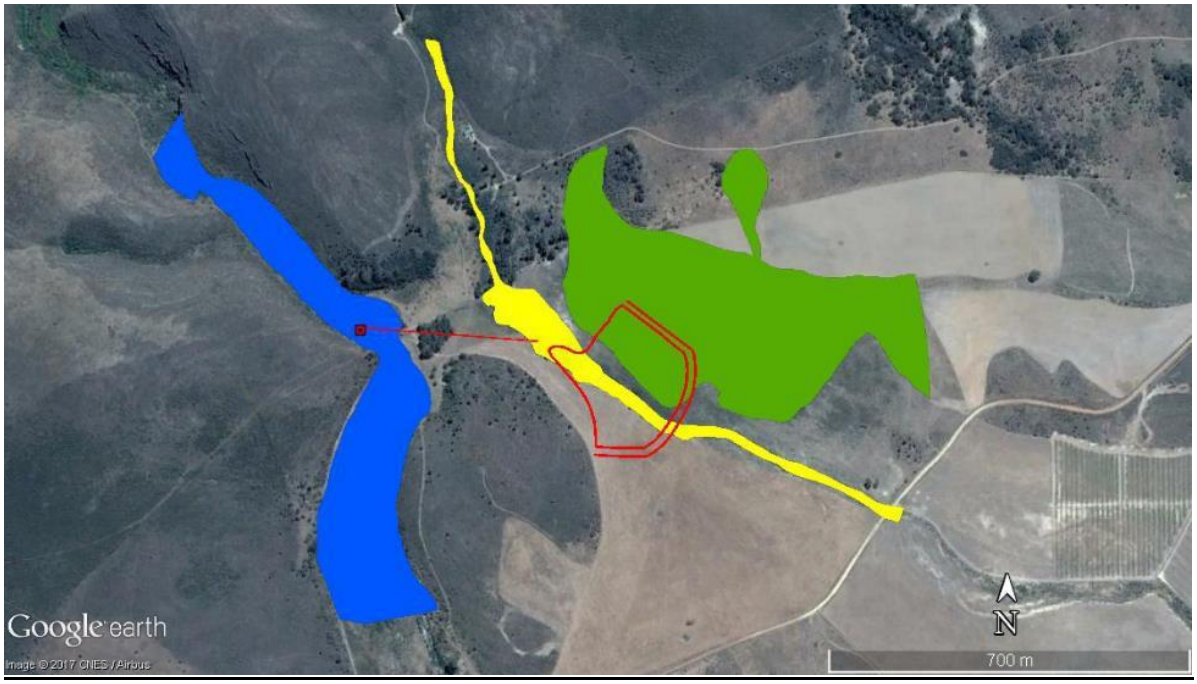

Figure 7: Image taken from the Freshwater Impact Assessment delineating the freshwater habitat in relation to the weir, pipeline and proposed Hut dam (depicted in red). Watercourse 1 represented in blue, Watercourse 2, represented in yellow, Wetland seep represented in green.

- The watercourse in which the repairs of the weir needs to be undertaken falls within the Southern Coastal Belt Ecoregion and the watercourse wherein the dam is proposed falls within the Southern Folded Mountains Ecoregion. Both watercourses do however fall within the Breede Water Management Area (WMA) and the Riviersonderend sub-Water Management Area (sub-WMA) as defined by the National Freshwater Ecosystem Priority Area project (2011). The quaternary catchment indicated for the project footprint is H60K and the applicable wetland vegetation unit is the Southwest Shale Fynbos which is listed as 'critically endangered' (NFEPA, 2011).
- The weir and Hut Dam are proposed in separate watercourses (referred to as watercourse 1 and watercourse 2, respectively) (Figure 7 above). An extensive wetland seep is located to the east of the area earmarked for the dam and will be partially flooded (Figure 3 above). No additional aquatic features were identified along the route proposed for the pipeline. Watercourse 1 and watercourse 2 are minor tributaries of the Riviersonderend River, which located approximately 1km to the south east of the proposed dam.
- The watercourse in which the repair of the weir is required (watercourse 1) has been indicated as a floodplain wetland within a moderately modified condition, according to the National Freshwater Ecosystems (NFEPA) database (2011).
- The watercourse in which the dam is proposed (watercourse 2) has not been identified as wetland habitat. The perennial Riviersonderend River is located approximately 1km to the south east of the proposed dam, however the catchment in which the proposed dam and weir fall has not been selected as a River Freshwater Ecosystem Priority Area (FEPA), which would have increased conservational importance of the catchment significantly.
- The proposed dam will intersect an Ecological Support Area 2 (ESA 2). Category 2 ESAs are areas that are likely severely degraded or have no natural cover remaining and therefore require restoration. These areas are not essential for meeting biodiversity targets but play an important role in supporting the functioning of Critical Biodiversity Areas (CBAs) or protected areas, and are often vital for delivering ecosystem services. The management objectives for Category 2 ESAs is to restore or manage the features to minimize impacts on ecological

processes and ecological infrastructure functioning, especially soil and water related services, and to allow for faunal movement.

- Several wetland indicators as defined by the then Department of Water Affairs and Forestry (DWAF, 2008) were encountered at watercourse 1 and 2. Therefore, both were classified with the use of the Classification System for Wetlands and other Aquatic Ecosystems in South Africa (Ollis et al. 2013) as channelled valley bottom wetlands rather than rivers with riparian habitat.
- The structure and function of all three features decreased substantially from their predicted natural reference condition due to decades of agricultural related activities. Consequently, watercourse 1 was determined to be within a Category C (Moderately modified) Present Ecological State (PES) and watercourse 2 as well as the wetland seep were determined to be within a Category D (Largely modified) PES.
- The South African Scoring System (SASS5) macroinvertebrate-based assessment method is specifically designed for the assessment of the ecological integrity of perennial river systems. Watercourse 2 is non-perennial and therefore the method could only be applied to. Out of the 22 families recorded at watercourse 1, 5 of the taxa have high SASS sensitivity ratings, indicating that the stream has fairly good water quality. The site falls within Southern Coastal ecoregion and it was concluded that the site falls within Category C, indicating a moderately modified condition.
- Watercourse 1 was determined to be of a High EIS (Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers).
- Watercourse 2 and the wetland seep were determined to be of a Moderate EIS (Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers).
- The pipeline route was proposed by the Freshwater specialist so that it does not transverse any additional natural or artificial freshwater features. The proposed route will transverse already disturbed areas, currently dominated by invasive grass species. Only one wetland seepage area was identified to the north of the northern portion of the route. This wetland seepage area is currently dominated by a combination of invasive grass species and the wetland indicators are considered to be ill defined. The pipeline route is located approximately 50m from the wetland temporary zone and considered highly unlikely that the development of the pipeline will result in the impact on the wetland seep.

10.3.2 Impact Assessment

The following direct impacts are expected to occur during the construction and operational phase of the proposed dam and reconstruction of the weir, should it be authorised, taken from the specialist report.

Impacts identified for Watercourse 1 (reconstruction of the weir), Watercourse 2 & Wetland Seep (area proposed for construction of Hut dam/ Alternative A).

Direct impact considered probable during the (a) *construction phase* of the weir and dam:

- Loss of aquatic habitat
- Disturbance of aquatic habitat
- Alternation of the hydrology
- Increased runoff, erosion and sedimentation
- Water quality impairment

- Loss of aquatic macroinvertebrate habitat and communities associated with Watercourse 1 and watercourse 2

Direct impact considered probable during the (b) *operational phase* of the weir and dam:

- Alternation od the hydrological regime and vegetation characteristics
- Erosion and sedimentation of watercourse 1 and watercourse 2
- Loss of aquatic macroinvertebrate habitat and communities associated with watercourse 1 and 2

(a) ASSESSMENT OF DIRECT CONSTRUCTION PHASE IMPACTS

Impact 1 - Loss of aquatic habitat associated with Watercourse 1, Watercourse 2 & Wetland seep:

Habitat associated with watercourse 1 was found to be of high EIS and is within a PES Category C. The habitat associated with watercourse 2 and wetland seep was found to be if moderate EIS and both to be within a PES Category D. The reconstruction of the weir will result in the direct loss of approximately 10.5m², which is considered to be minimal. The development of the dam will result in the direct loss of approximately 442m² aquatic habitat in watercourse 2 and 3 354m² wetland habitat in the wetland seep.

Although the aquatic habitat is already considered disturbed, the loss of habitat of a medium and high EIS is considered to be of high intensity (natural, cultural or social functions or processes are altered to the extent that they will temporarily or permanently cease) and the impact will be permanent. The **overall impact** is therefore rated to **have a high (negative) significance** and will occur regardless of the implementation of mitigation measures

Table 5.1 Impact assessment results from Freshwater specialist – loss o f aquatic habitat

Alternatives	Intensity	Extent	Duration	Probability of impact occurring	Significance
Watercourse 1, watercourse 2 and the wetland seep					
Without mitigation	High	Local	Permanent	Definite	High (-ve)
With mitigation			Not applicable		

Impact 2 - Disturbance of aquatic habitat due to edge effects:

Edge effect of construction activities refers to indiscriminate movement of vehicles and personnel and dumping of excavated material which can result in the disturbance of instream and bank vegetation as well as compaction of soils downstream of the proposed dam and weird. This may result in the further proliferation of alien invasive species.

The habitat in Wetland 1 has already been impacted as a result of alien invasive species and erosion. The habitat in Wetland 2 and wetland seep, has been impacted as a result of historical and current cultivation as well as alien species invasion. These impacts have decreased the PES of all features involved which reduces the intensity of the impact.

However, watercourse 1 is measured to be of high EIS and watercourse 2 and wetland seep is measured to be of moderate EIS. The intensity of the impact on **watercourse 1** is considered to be **medium (negative) significance**. The intensity of the impact on **watercourse 2 and wetland seep** is measured to be **low (negative) significance**. With the implementation of mitigation measures the

intensity and duration of the impact can be decreased, decreasing the **overall impact** significance to **very low (negative)**.

Table 5.2 Impact assessment results from Freshwater specialist – Disturbance of aquatic habitat due to edge effect

Alternatives	Intensity	Extent	Duration	Probability of impact occurring	Significance
Watercourse 1					
Without mitigation	Medium	Local	Long term	Probable	Medium (-ve)
With mitigation	Low	Local	Short term	Probable	Very Low (-ve)
Watercourse 2					
Without mitigation	Low	Local	Long term	Probable	Low (-ve)
With mitigation	Very Low	Local	Short term	Probable	Very Low (-ve)
Wetland seep					
Without mitigation	Low	Local	Long term	Probable	Low (-ve)
With mitigation	Very Low	Local	Short term	Probable	Very Low (-ve)

Impact 3 - Alteration of the hydrology:

The repair of the weir and construction of the dam will entail stripping off and removing of topsoil as well as unsuitable material within the footprint of all the works before construction. This will result in removal of vegetation and disturbance of aquatic habitat within areas upstream and downstream of the weir and dam.

Surface water in the watercourses will be collected and diverted through or around the construction site by temporary works like cut-off and bypass channels, a small coffer dam, temporary pumps if necessary, etc, to collect and contain the water in order to ensure safe and acceptable working conditions. The development of a coffer dam within the watercourses and the diversion of surface water will result in the temporary alteration of aquatic habitat and hydrological flow patterns through the watercourse. The disturbance of soils during excavation activities may also result in the sedimentation of portions of the watercourse downstream of the coffer dam.

Watercourse 1 is a perennial system and the intensity of the impact associated with the hydrological alterations during construction is therefore considered to be medium. Watercourse 2 and the wetland seep are ephemeral features which are likely to be dry during the construction period which is planned for summer. The intensity of the impact to the hydrology of these features is therefore considered to be low.

The overall impact associated with **watercourse 1** is considered to be of a **medium (negative) significance** and the overall impact associated with **watercourse 2 and the wetland seep** is considered to be of a **low (negative) significance** prior to the implementation of mitigation measures. With the implementation of the **mitigation measures** the **overall impact** may be reduced to a **very low (negative) significance** for all of the features assessed.

Table 5.3 Impact assessment results from Freshwater specialist – Alteration of hydrology

Alternatives	Intensity	Extent	Duration	Probability of impact occurring	Significance
Watercourse 1					
Without mitigation	Medium	Local	Long term	Definite	Medium (-ve)
With mitigation	Low	Local	Short term	Definite	Very Low (-ve)
Watercourse 2					
Without mitigation	Low	Local	Long term	Probable	Low (-ve)
With mitigation	Low	Local	Short term	Probable	Very Low (-ve)
Wetland seep					
Without mitigation	Low	Local	Long term	Probable	Low (-ve)
With mitigation	Low	Local	Short term	Probable	Very Low (-ve)

Impact 4 - Increased runoff, erosion and sedimentation

An increase in stormwater runoff from cleared, disturbed and compacted areas may result in an increase in stormwater flows and flow velocities into watercourse 1, watercourse 2 and the seep wetland which may result in the erosion and incision of the features. Although these areas are already considered severely eroded, the implementation of adequate erosion control measures at construction can mitigate the impact of long-term erosion. Earth moving activities will also result in an increase in sedimentation loads carried by the stormwater. House-keeping measures as set out in the Methodstatements from Sarel Bester Ingenieurs BK (**Appendix 9.3 & 9.4**) should be followed as methods to intercept sediment laden stormwater.

Wetland 2 and the wetland seep are ephemeral features, meaning the wetland only exists for a short period following a precipitation event. Therefore, if construction of the dam is undertaken, specifically during the dry summer months as suggested in the method statements (**Appendix 9.3 & 9.4**) together with the listed mitigation measures below, as specified by the freshwater specialist, the impact as a result of erosion and sedimentation is considered to be of low probability. The overall impact to **watercourse 2** and the wetland seep is therefore considered to be of **a low (negative) significance**.

Watercourse 1 is a perennial system and the probability of erosion and sedimentation is therefore increased. The impact to **watercourse 1** is considered to be of a medium intensity and an overall **medium (negative) significance** prior to the implementation of mitigation measures. However, with the implementation of the **mitigation** measures as listed below the **overall impact** to all features may be reduced to a very **low (negative) significance**.

Table 5.4 Impact assessment results from Freshwater specialist – increased runoff, erosion and sedimentation

Alternatives	Intensity	Extent	Duration	Probability of impact occurring	Significance
Watercourse 1					
Without mitigation	Medium	Local	Long term	Highly probable	Medium (-ve)
With mitigation	Low	Local	Short term	Probable	Very Low (-ve)
Watercourse 2					
Without mitigation	Low	Local	Long term	Probable	Low (-ve)
With mitigation	Very Low	Local	Short term	Low likelihood	Very Low (-ve)
Wetland seep					
Without mitigation	Low	Local	Long term	Probable	Low (-ve)
With mitigation	Very Low	Local	Short term	Low likelihood	Very Low (-ve)

Impact 5 - Water quality impairment

The main threat is considered to be the pollution of surface water with cement and other construction related materials which are toxic to aquatic life. Extreme caution must be taken with these materials in the vicinity of the watercourses and wetland seep in order to prevent accidental spillage.

Watercourse 1 will likely contain surface water during construction. The spillage of cement into surface water will result in the contamination of areas downstream of the weir and the impact is therefore considered to be local in extent and of a high intensity. Watercourse 2 and the wetland seep are likely to be dry at the time of the construction of the dam. Although the spillage of cement or other construction related materials into the features will be detrimental, the spillage is not likely to be transported downstream by surface water and the impact will therefore most likely be site specific.

Prior to the implementation of mitigation measures the impact associated with **watercourse 1** is considered to be of a **high (negative) significance** and the impact associated with **watercourse 2** and the wetland seep is considered to be of a **medium (negative) significance**. With the implementation of the **mitigation measures** as recommended by the specialist, the intensity and duration of the impact can be reduced and the overall impact may be reduced to a **low (negative) significance for watercourse 1** and to a very **low (negative) significance for watercourse 2** and the wetland seep.

Table 5.5 Impact assessment results from Freshwater specialist – Water quality impairment

Alternatives	Intensity	Extent	Duration	Probability of impact occurring	Significance
Watercourse 1					
Without mitigation	High	Local	Long term	Highly probable	High (-ve)
With mitigation	Medium	Local	Short term	Probable	Low
Watercourse 2					
Without mitigation	Medium	Site specific	Long term	Low likelihood	Medium (-ve)
With mitigation	Very Low	Site specific	Short term	Low likelihood	Very Low
Wetland seep					
Without mitigation	Medium	Site specific	Long term	Low likelihood	Medium (-ve)
With mitigation	Very Low	Site specific	Short term	Low likelihood	Very Low

Impact 6 - Loss of aquatic macroinvertebrate habitat and communities associated with watercourse 1 and watercourse 2:

Impacts associated with construction include the reduction of invertebrate abundance and diversity due to loss of habitat and aquatic vegetation. Movement through the watercourses can result in the alternation of the substratum which is likely to reduce food such as algae, periphyton, organic material etc preyed on by invertebrates. Flow alternations and sedimentation can also impact the substratum and invertebrate community.

Sensitive aquatic macroinvertebrates were encountered within watercourse 1 and the SASS5 assessment, conducted by the specialist, indicate that the aquatic invertebrate habitat is within a moderately modified condition. The impact as a result of the disturbance of aquatic macroinvertebrate communities and loss of habitat associated with **watercourse 1** is considered to be of a high intensity and of an **overall high (negative) significance**.

The extent of transformation along watercourse 2 has resulted in the loss of aquatic habitat and most likely sensitive aquatic species. The species currently sustained within watercourse 2 are expected to be generalists which are common within disturbed aquatic habitat and would most likely re-establish during the operational phase of the dam. Watercourse 2 is ephemeral in nature and will likely be dry during the construction period. The watercourse will therefore contain a very limited diversity and abundance of aquatic species.

The impact associated with **watercourse 2** is considered to be of a **medium intensity** and aquatic habitat loss will be permanent. The **overall impact** is therefore considered to be of a **medium (negative) significance.**

Table 5.6 Impact assessment results from Freshwater specialist – Loss of macroinvertebrate habitat and communities

Alternatives		Intensity	Extent	Duration	Probability of impact occurring	Significance
	Watercourse 1					
Without mitigation		High	Local	Permanent	Definite	High (-ve)
	With mitigation			N/A		
	Watercourse 2					
Without mitigation		Medium	Local	Permanent	Definite	Medium (-ve)
	With mitigation			N/A		

(b) ASSESSMENT OF DIRECT OPERATION PHASE IMPACTS

Impact 1 - Alteration of the hydrological regime and vegetation characteristics

The development of the dam will result in the flooding of the upstream aquatic habitat associated with watercourse 2 and the seep wetland. Seasonal and temporary vegetation removed during construction will not recover during operations. Vegetation communities will likely recolonise the shallower fringes of the dam. Temporary and seasonal habitat associated with watercourse 2 and the wetland seep has been significantly degraded which reduces the intensity of the impact.

The development of the weir will result in the flooding of upstream aquatic habitat within watercourse 1. Watercourse 1 is perennial and the inundation of the portion directly upstream of the weir is not considered as significant as the transformation of seasonal and temporary zones to extensive permanent zones at watercourse 2 and the wetland seep. Increased water depth upstream of the weir will result in the transformation of fast flowing stoney substrate, presently providing niche habitat to aquatic invertebrates. The vegetation assemblage will most likely also change due to the increase in water depth.

The development of the dam will also result in the obstruction of flow which in turn would impact the hydrological regime and vegetation structure downstream of where the water is impeded. However, regular instream releases from the dam will be catered for in order to ensure the release of the Ecological Reserve into watercourse 2. This decreases the intensity of the impact to some degree; however, it is not considered possible to entirely avoid impact. Furthermore, the dam will not impede flow throughout the wetland seep as the remainder of the wetland seep is fed by flows from upslope of the development.

The proposed weir and abstraction from watercourse 1 will reduce the volumes of surface water reaching areas downstream of the weir which may impact on the downstream vegetation structure. However, abstraction will only take place during winter (summer low flows will be allowed to pass through the weir unobstructed) and will involve the removal of surplus water which is not required to meet the Ecological Reserve. All remaining water will be released into the watercourse downstream of the weir. The allowance for continuous flow during summer and for the release of the Ecological Reserve during winter decreases the intensity of the impact substantially.

The impact associated with watercourse 1 and 2 is considered to be of a medium intensity and the impact associated with the wetland seep is considered to be of a low intensity. All impacts will be of a permanent duration. The **overall impact prior** to the implementation of **mitigation** measures is therefore considered to be of a **medium (negative) significance for watercourse 1 and 2** and of a

low (negative) significance for the wetland seep. The implementation of **mitigation** measures will **reduce the severity of impact downstream of the dam and weir**, however, the implementation of mitigation measures will **not prevent the flooding of areas upstream of the dam and wei**r and the impact to the **watercourses and the wetland seep will therefore remain the same regardless.**

Table 5.7 Impact assessment results from Freshwater specialist – Alternation of hydrological regime & vegetation

Alternatives	Intensity	Extent	Duration	Probability of impact occurring	Significance
Watercourse 1					
Without mitigation	Medium	Local	Permanent	Definite	Medium (-ve)
Without mitigation	Medium	Local	Permanent	Definite	Medium (-ve)
Watercourse 2					
Without mitigation	Medium	Local	Permanent	Definite	Medium (-ve)
Without mitigation	Medium	Local	Permanent	Definite	Medium (-ve)
Wetland seep					
Without mitigation	Low	Local	Permanent	Definite	Low (-ve)
Without mitigation	Low	Local	Permanent	Definite	Low (-ve)

Impact 2 - Erosion and sedimentation of watercourse 1 and watercourse 2

An increase in the velocity and turbulence of flows below the dam and weir structures will result in the erosion of aquatic habitat immediately downstream of the structures. In addition, the dam and weir will trap sediments from upstream areas thereby starving downstream wetland areas of sediment and preventing the replenishment of eroded areas downstream of the structures. The fluctuating water levels at the dam and weir (as a result of abstraction) will also restrict the re-establishment of a stable vegetation community on the banks. Should a permanent vegetation community not establish, soil will be left exposed and will be more prone to erosion which could result in the further sedimentation of the wetlands.

The impact is considered to be of a **medium (negative) significance** for both **watercourse 1 and watercourse 2 prior** to the implementation of **mitigation measures**. However, the implementation of **mitigation measures** and the **promotion of diffuse flow below the dam and weir will reduce the overall impact to a very low (negative) significance.**

Table 5.8 Impact assessment results from Freshwater specialist – Erosion and sedimentation of watercourse 1 and 2

Alternatives	Intensity	Extent	Duration	Probability of impact occurring	Significance
Watercourse 1					
Without mitigation	Medium	Local	Permanent	Highly probable	Medium (-ve)
With mitigation	Low	Local	Permanent	Low probability	Very Low (-ve)
Watercourse 2					
Without mitigation	Medium	Local	Permanent	Highly probable	Medium (-ve)
With mitigation	Low	Local	Permanent	Low probability	Very Low (-ve)

Impact 3 - Loss of aquatic macroinvertebrate habitat and communities associated with watercourse 1 and watercourse 2

The construction of the dam and weir, and abstraction from above the weir will result in the alteration of flow patterns through watercourse 1 and 2 during the operational phase which will affect macroinvertebrate habitat, will shift the community structure, and will affect the upstream and downstream movement of aquatic macroinvertebrates.

The weir and dam will trap sediment during the operational phase. This will result in sedimentation upstream of the dam and weir and will starve downstream areas of sediment thereby impacting on habitat complexity for aquatic invertebrates.

The results of the SASS5 assessment suggest that the section of watercourse 1 associated with the weir had a moderately high diversity and availability of stones (stones in current) and very limited diversity of aquatic vegetation, bedrock and mud. Invertebrate habitat (diversity and availability) has already been altered by modifications in the stream including channel morphological alteration e.g. bank degradation and bank modification and alien vegetation. The aquatic habitat is therefore already transformed and the intensity of the impact is therefore considered to be medium.
The aquatic macroinvertebrate community associated with watercourse 2 is less sensitive and is likely to re-establish after the development of the dam which reduces the intensity of the impact for watercourse 2 to low.

The **overall** impact is therefore considered to be of a **medium (negative) significance for watercourse 1 and of a low (negative) significance for watercourse 2**. No mitigation measure will prevent the alteration of flow patterns through the watercourses and the subsequent alteration of macroinvertebrate habitat. The impact significance therefore remains medium (watercourse 1) and low (watercourse 2) regardless of the implementation of mitigation measures.

Table 5.9 Impact assessment results from Freshwater specialist – loss of aquatic macroinvertebrate habitat communities associated with wetland 1 and 2

Alternatives	Intensity	Extent	Duration	Probability of impact occurring	Significance
Watercourse 1					
Without mitigation	Medium	Local	Long term	Definite	Medium (-ve)
With mitigation			N/A		
Watercourse 2					
Without mitigation	Low	Local	Long term	Definite	Low (-ve)
With mitigation			N/A		

10.3.3 Mitigation Measures

The following section will discuss the mitigation measures as recommended by the specialist for the mitigation of direct (a) construction and (b) operational phases of the proposed project on the receiving environment.

(a) MITIGATING DIRECT CONSTRUCTION ACTIVITIES

Impact 1 - Loss of aquatic habitat during construction phase:

No mitigation measures are suggested as with the construction of the dam and reconstruction of the weir, loss aquatic habitat will occur regardless of the implementation of mitigation measures.

Impact 2 - Disturbance to aquatic habitat due to edge effects:

- Physically demarcate the construction footprint area prior to the commencement of any activity and strictly prohibit any vehicles or construction related activities outside the demarcated footprint area. This can be done with danger tape, which should be removed once the construction activities have been completed.
- Access roads to the dam should be limited to a single circular route in and out.
- Access roads to the weir should be limited to a single road through alien vegetation to an area located as close as possible to the watercourse. Vehicles should not be permitted to drive through the watercourse.
- Construction camps should be located at least 32m from the delineated extent of watercourse
- Stockpiles should be located at least 32m from the delineated extent of watercourses.
- Should any accidental disturbance to portions outside of the demarcated construction footprint take place, immediately rip compacted soil to a depth of 300mm and reprofile the area according to natural terrain. If the disturbed area will be prone to erosion (sheet runoff or formation of gullies), straw bales (not Lucerne or hay) should be used to intercept bulk of the runoff. The bales should be placed strategically along contour lines and pegged. Disturbance and removal of vegetation within the immediate vicinity of the area where the bales are placed should be kept to a minimum. Sediment should be cleared manually as needed and disposed of at a registered waste facility.
- Prohibit the dumping of excess excavated material within the wetland features.
- Once construction has been completed all construction waste, rubble, and equipment must be removed from the construction area.

- Once construction of the dam and weir has been completed, remove alien and invasive individuals, manually as far as practically possible, from the construction footprint as well as any areas accidentally disturbed. These areas should be monitored in monthly intervals and seedlings removed as needed. The use of herbicides should be avoided. However, if necessary, only herbicides which have been certified safe for use in wetlands/aquatic environments by an independent testing authority may be considered. Cover removed alien plant material properly when transported, to prevent it from being blown from vehicles, and burn on a bunded surface where no stormwater runoff is expected.

Impact 3- Alteration of hydrology:

- Physically demarcate the cut-off and bypass channels, the small coffer dam as well as areas where temporary pumps will be placed if needed prior to the commencement of any activity and strictly prohibit any vehicles or construction related activities outside of the demarcated footprint area. This can be done with danger tape, which should be removed once the construction activities have been completed.
- Vegetation removal should be limited as far as practically possible in order to ensure soil remains stable.
- Any surface water conveyed by watercourses must be collected upstream of the construction site and rerouted to areas downstream of the construction site. Rerouted surface flow must be returned at a similar rate as the rate that it enters the diversion
- Remove and stockpile topsoil and subsoil separately.
- Stockpile topsoil within an area where no stormwater runoff is expected.
- Replace soil in the correct order e.g. subsoil below and topsoil above, as soon as possible after construction activities has been completed.
- During the completion of construction within the watercourse natural material (coarse in the case of watercourse beds) should be used to re-surface the bed of the watercourse to re-instate habitat.
- Compact subsoil while in a moist state and spread the topsoil as evenly as possible over the subsoil. The areas where soil has been replaced should be at the same level as the immediate surroundings.
- Rip compacted areas, manually, within the immediate vicinity of the construction footprint to a depth of approximately 300mm and cover with topsoil or mulch (depending on what is available) and seed with *Cynodon dactylon*. The use of fertilizers and other chemical soil enhancers should be avoided, as far as possible.
- Limit sedimentation at the outflow side (downstream of the works) by way of ponding or cascading with stone formed berms and filters made up of hay bales in combination with bidum to suite. Implement additional erosion control measures where required within the disturbance footprint.
- Should any accidental disturbance to portions of wetlands falling outside of the demarcated construction footprint area take place, immediately rip compacted soil to a depth of 300mm and reprofile the area according to natural terrain units. If the disturbed area will be prone to erosion (sheet runoff or formation of gullies), it is recommended that straw bales (not Lucerne or hay) are used to intercept the bulk of the runoff. The bales should be placed strategically along contour lines and pegged. Disturbance and removal of vegetation within the immediate vicinity of the area where the bales are placed should be kept to a minimum. Sediment should be cleared manually as needed and disposed of at a registered waste facility.

Impact 4 - Increased runoff, erosion and sedimentation

- Any surface water conveyed by watercourses must be collected upstream of the construction site and rerouted to areas downstream of the construction site. Rerouted surface flow must be returned at a similar rate as the rate that it enters the diversion.
- Surface water removed from the construction area during the dewatering process must be passed into sediment ponds or other sediment trapping devices prior to it being released into downstream areas of the watercourses.
- Implement erosion control measures (e.g. ponding or cascading with stone formed berm, strategically placed straw bales, diverting stormwater away from areas susceptible to erosion etc.) in order to prevent erosion and sedimentation of downstream wetland areas.
- Strategically divert runoff from areas where earth moving activities are undertaken in the direction of pegged straw bales where required, in an attempt to intercept sediment-laden runoff before it reaches downstream wetland habitat. Check straw bales weekly to ensure these are still intact and cleared of sediment as needed.
  Stockpiles should be located at least 32m from the delineated extent of watercourses. Protect stockpiles, if required, from erosion using tarp or erosion blankets.
- Mitigation to be implemented as part of the construction of the pipeline:
  o Keep the width of the disturbance footprint of the area where the pipeline is placed to the absolute minimum, preferably not more than 3m.
    - Before excavation commences all alien vegetation should be removed from the construction footprint and disposed of at an appropriately licenced facility or burnt.
    - Remove and stockpile topsoil and subsoil separately.
    - Stockpile topsoil within an area where no stormwater runoff is expected.
    - Replace soil in the correct order e.g. subsoil below and topsoil above, as soon as possible after construction activities has been completed.
    - Compact subsoil while in a moist state and spread the topsoil as evenly as possible over the subsoil. As far as practically possible the creation of a permanent depression or raised areas along the excavated area should be avoided.
    - Rip compacted areas, manually, within the immediate vicinity of the construction footprint to a depth of approximately 300mm and cover with topsoil or mulch (depending on what is available) and seed with *Cynodon dactylon*. The use of fertilizers and other chemical soil enhancers should be avoided, as far as possible.
    - The disturbed areas at watercourse 1 and watercourse 2 should be monitored by the environmental control officer every second month until at least 70% vegetation cover has been established. Additional *Cynodon dactylon* seed can be hand sown in areas where needed. Agricultural weeds should be hand pulled and control measures implemented for any erosion or sedimentation noted.
- The contractor or proponent must check the dam, weir and pipeline for erosion damage and sedimentation after every heavy rainfall event. Should erosion or sedimentation be noted, immediate corrective measures must be undertaken. Rehabilitation measures may include the manual removal of accumulated sediment, the filling of erosion gullies and rills, and the stabilization of gullies with silt fences.
- Seed the dam wall after construction with indigenous grass that has a good soil binding capacity such as *Cynodon dactylon* or stabilised with geotextiles in order to prevent erosion.

Impact 5 - Water quality impairment

- Construct temporary bunds around areas where cement is to be cast in-situ.
- Prohibit the use of infill material or construction material with pollution / leaching potential.
- Clean up any spillages (e.g. concrete, oil, fuel), immediately. Remove contaminated soil and dispose of it appropriately.
- Fuel, chemicals and other hazardous substances should preferably be stored offsite, or at least 32m away from the edge of all delineated watercourses in suitable secure weather-proof containers with impermeable and bunded floors to limit pilferage, spillage into the environment, flooding or storm damage.
- Dispose of concrete and cement-related mortars in an environmental sensitive manner (can be toxic to aquatic life). Washout should not be discharged into watercourses.

Impact 6 - Loss of aquatic macroinvertebrate habitat and communities associated with watercourse 1 and watercourse 2

No mitigation measures are recommended. The loss of aquatic macroinvertebrate habitat from the direct construction footprint will occur regardless of the implementation of mitigation measures.

(b) MITIGATING DIRECT OPERATIONAL ACTIVITIES

Impact 1 – Alteration of the hydrological regime and vegetation characteristics

- Adequate water must be released from the dam and weir to allow for the maintenance of the PES of watercourse reaches immediately downstream of the dam and weir. The method for achieving this must be illustrated in the detailed design of the dam and weir.
- The weir should be designed in such a way that subsurface flow is not impeded.
- Outlet structures and spillways should be monitored regularly in order to ensure that any blockages are detected. Any blockages which are detected must be removed immediately.
- As far as possible, the dam should be allowed to spill in winter, when the watercourse would naturally have carried surface water.
- The height of the weir should allow for higher flood flows to spill over the wall during winter.
- The detailed design of the dam and weir structures must show how the Ecological Reserve will be released.

Impact 2 - Erosion and sedimentation of watercourse 1 and watercourse 2

- Promote diffuse flow at the dam and weir outlets. Diffuse flow may be promoted with the use of perforated pipes at outlets or with the use of spreaders or rip-rap mattresses at discharge points.
- If vegetation does not establish after construction, revegetate banks of the dam and weir reservoir with wetland species indigenous to the area. The roots of vegetation will aid in binding and stabilising the soil and will prevent erosion of the banks and sedimentation of the wetlands.
- Monitor areas below the dam and weir for erosion and incision on a quarterly basis (for two growing seasons or until 90% vegetation cover has established) and after heavy rainfall events. Should erosion and incision be noted, immediate corrective measures must be undertaken. Rehabilitation measures may include the filling of erosion gullies and rills, and the stabilization of gullies with silt fences.

Impact 3 - Loss of aquatic macroinvertebrate habitat and communities associated with watercourse 1 and watercourse 2

No mitigation measure will prevent the alteration of flow patterns through the watercourses and the subsequent alteration of macroinvertebrate habitat.

Please refer the Maintenance and Management Plan (MMP) Appendix 13 for the methodstatement addressing alien invasive plant species eradication, mitigating wetland disturbance and compaction of soil due to construction activities and stormwater runoff, erosion and sedimentation control as well as monitoring guidelines. Please note that these Methodstatement are merely guidelines and that changes to the Methodstatement need to be communicated to the Department of Environment and Development Planning.

10.3.4 Conclusion

The freshwater impact assessment suggest that all three freshwater features have been impacted as a result of decades of agricultural activities. The disturbance has reduced the overall PES of watercourse 1 to a Category C (Moderately modified) and watercourse 2 and the wetland seep to Category D (Largely modified). However, all three features can still be considered of moderate to high EIS and continues to provide important wetland functions and services.

Following the assessment of direct impacts, it can be surmised that the significance of the majority of the impacts associated with the proposed project can be reduced with the implementation of effective mitigation measures. The exception would be the permanent loss of approximately 3 806m2 aquatic habitat as well as the loss of aquatic macroinvertebrate habitat and communities during the construction phase, and alteration of the hydrological regime and vegetation characteristics of approximately 2.3ha37 of wetland habitat and loss of aquatic macroinvertebrate habitat and communities during the operational phase.

It is the opinion of the specialist that although impact cannot be avoided it is practically possible to restrict the extent of the above mentioned high (negative) and medium (negative) impacts to the construction footprint and immediate surroundings with the strict adherence to provided method statements as well as additional essential mitigation measures and follow-up monitoring requirements specified within the freshwater specialist report. In addition, it is expected that allowance will be made for approximately 15-35% instream flow release in line with best practice, at both the dam and weir in order to meet the Ecological Reserve determined by the Department of Water and Sanitation (DWS). It is therefore the opinion of the specialist that authorisation of the proposed repair of the Eksteenskloof weir and development of the Hut dam be granted.

The restoration of the weir is certain to have an impact on the vegetation within the stream during the construction period. However, the impact will be temporary and must take into account the current status of the stream (alien infestation, existing disturbances and erosion). Botanically speaking, the construction of the weir is not expected to have any significant long-term impacts on vegetation, since the species encountered at the site is mostly hardy and relatively common species, which will re-establish themselves quite easily (as a result impact is considered low). However, the disturbance associated with the construction will very likely stimulate alien plant germination in the construction footprint, which will have a negative long-term impact. It is thus essential that an ongoing alien eradication program is implemented at the weir and its immediate surroundings (e.g. a 20-50m boundary surrounding the weir location and all area impacted by construction footprint – including mixing and laydown areas). Preferably, or over time, it should also include the removal of the dense stands of alien invasive species upstream of the weir location.

10.4 Freshwater Fish Assessment

As per recommendations from Cape Nature, an Ichthyological Specialist was appointed to conduct a Freshwater fish survey be conducted in the stream where the weir is proposed. Dr. Bruce Paxton from Freshwater Research Centre was appointed to conduct the Freshwater fish assessment (please refer to **Appendix 7.4** for the full report).

10.4.1 Key findings

Figure 8 below was taken from the Freshwater fish assessment report and indicates the location of the surveyed sites (EK01 – EK06) as well as the sites of the proposed weir to be rehabilitated and Hut dam location. The key findings will be discussed below referring to Figure 8.

Figure 8: Area image taken from the Freshwater fish assessment report, showing the location of the surveyed sites with the sites of the proposed weir rehabilitation and dam site.

- A total of 52 Cape kurper (Sandelia carpensis) and 48 Cape galaxias (Galaxias zebratus) were collected in watercourse 1 (the Eksteenskloof river).
- No alien invasive fish species were recorded along the surveyed reach.
- The highest relative abundances of Cape kurper were collected from the reservoir behind Weir A (Site EK01-A) (Figure 7).
- Relative abundances of Cape galaxias increased from downstream of the Eksteenkloof Weir A (Site EK01-A) to Weir B (EK03) where highest relative abundances in the reach were recorded.

- Only Cape kurper were recorded from the most downstream site (Site EK06) where temperatures were higher and water quality conditions were impaired as a result of farming activities along the banks.
- The assumption can be made that both species collected in Watercourse 1 have a narrow distribution within the Riviersonderend system and that they have a moderately-high conservation value.
- The loss of both species from watercourse 1 would not represent an existential threat to the lineages,but would reduce the overall resilience of the species to further environmental change if additional population loss occur.
- Of the two species, Cape kurper are more tolerant of impaired water quality conditions and higher temperatures, hence their presences in the lower, more impacted reaches of Watercourse 1.
- Cape galaxias on the other hand are Gondwanan relicts and more sensitive to higher temperatures and poor water quality and are likely also sensitive to changes in flow – hence their absence from the back-up waters of Weir A – the upper weir in Eksteenkloof.
- No alien fish species were present in the Watercourse 1, possibly due to the absence of suitable habitat and the fact that the river may become disconnected from the main channel during certain parts of the year.
- **Watercourse 1 should be considered of moderate conservation importance.** The absence of other indigenous species (e.g. redfin minnow, Pseudobarbus) is likely attributable to the fact species belonging to this genus require higher flows and larger water volumes than are available in in this watercourse.

10.4.2 Impact Assessment

(a) ASSESSMENT OF DIRECT CONSTRUCTION ACTIVITIES

Impact 1 – Loss of aquatic habitat associated with Watercourse 1

Minimal loss of aquatic habitat (10.5m2) is expected in Watercourse 1 with very **low significance** for indigenous fish populations

Alternatives	Intensity	Extent	Duration	Probability	Significance
Watercourse 1					
Without mitigation	Low	Local	Permanent	Definite	Very Low (-ve)
With mitigation	NA	NA	NA	NA	NA

Impact 2 – Disturbance of aquatic habitat due to edge effects

Edge effects of construction related activities on fish populations are likely to be **low significance** with and without mitigation since fish populations are mobile and will likely move away from the area immediately impacted by construction. Any mortality as a direct result of construction are likely to be compensated for by immigration from up- or downstream areas. Mitigation measures recommended as recommended by the Freshwater specialist apply.

Alternatives	Intensity	Extent	Duration	Probability	Significance
Watercourse 1					
Without mitigation	Medium	Local	Permanent	Highly probable	Medium (-ve)
With mitigation	Low	Local	Permanent	Low probability	Very Low (-ve)

Impact 3 – Alteration of the hydrological regime

Alteration of the hydrological regime in Watercourse 1 during the construction phase is expected to have **medium intensity and significance (-ve) without mitigation** and **low intensity and significance with mitigation.** In both instances the duration will be short term and populations are likely to stabilize fairly quickly after the completion of construction. Mitigation measures recommended in van de Haar (2017) apply.

Alternatives	Intensity	Extent	Duration	Probability	Significance
Watercourse 1					
Without mitigation	Medium	Local	Short term	Probable	Medium (-ve)
With mitigation	Low	Local	Short term	Probable	Low (-ve)

Impact 4 – Increased runoff, erosion and sedimentation

The impact of increased runoff as a result of **compaction** is expected to be very **low significance** due to being localized and affecting only a small proportion of the catchment. The impacts associated with increased **erosion, the mobilization of sediments and sedimentation** in the river bed of Watercourse 1 are expected to be **medium**. The agreement to undertake construction activities during the summer low-flow period should mitigate against most impacts, in all other instances, the mitigation measures recommended in van de Haar (2017) apply.

Alternatives	Intensity	Extent	Duration	Probability	Significance
Watercourse 1					
Without mitigation	Medium	Local	Short term	Probable	Medium (-ve)
With mitigation	Low	Local	Short term	Probable	Low (-ve)

Impact 5 – Water quality impairment

The intensity of the impacts associated with water quality impairment are likely to be of a **high significance** and long term without mitigation. Cement slurry is toxic to fish as a result of its high pH value and indigenous fish populations in the Western Cape are adapted to very low pH values. The **significance is rated as medium** since, in the event of a cement spill, recolonization from fish upstream will occur and in the long term, populations will recover to previous levels.

Alternatives	Intensity	Extent	Duration	Probability	Significance
Watercourse 1					
Without mitigation	High	Local	Long term	Highly probable	Medium (-ve)
With mitigation	Medium	Local	Short term	Probable	Low

Impact 6 – Loss of aquatic habitat

The intensity of the impacts associated with habitat loss (riffle and aquatic vegetation) as a result of construction activities is expected to be **high significance** but the **significance** is expected to be **medium since the impacts will be localized** and subsequent flooding and baseflows – if these are maintained throughout the operational phase – are likely to re-sort bed elements post-construction phase.

Alternatives	Intensity	Extent	Duration	Probability	Significance
Watercourse 1					
Without mitigation	High	Local	Long term	Definite	Medium (-ve)
With mitigation	NA	NA	NA	NA	NA

(c) ASSESSMENT OF DIRECT OPERATIONAL PHASE IMPACTS

Impact 1 – Alteration of hydrological regime

The intensity of the impacts associated with the alteration of the hydrological regime during the operational phase is expected to be of **very high significance** without effective mitigation, since the river downstream of the weir is likely to be dewatered over the summer low-flow period. Should this occur, approximately 55% and 56% respectively of the downstream Cape Galaxias and Cape kurper populations in Watercourse 1 is expected to be lost. Reduced summer flow volumes will also contribute to water quality impairment and reduce the capacity of the river to buffer fish populations against high temperatures.

Without mitigation, no recovery of populations will occur and the loss will likely be permanent. Minor loss of lotic (flowing-water) habitat will occur upstream of the weir which will negatively impact Cape Galaxias, but will benefit Cape kurper. **Even with mitigation (i.e. Ecological Water Requirement releases), impacts are likely to manifest.** The significance of these impacts will depend on the volumes of the proposed abstraction, the percentage of the Mean Annual Runoff (MAR) allocated for the Ecological Reserve and on the degree to which the provisions for summer releases are observed and monitored.

Alternatives	Intensity	Extent	Duration	Probability	Significance
Watercourse 1					
Without mitigation	Very high	Local	Permanent	High	High (-ve)
With mitigation	High	Local	Permanent	High	Medium (-ve)

Impact 2 – Erosion and sedimentation

The significance of the impacts associated with increases in velocity and turbulence immediately downstream of release structures during the operational phase and consequent erosion and sedimentation is expected to be **medium significance** because of the localized nature of the impact and the likely recovery of the river downstream

Alternatives	Intensity	Extent	Duration	Probability	Significance
Watercourse 1					
Without mitigation	Medium	Local	Permanent	Highly probable	Medium (-ve)
With mitigation	Low	Local	Permanent	Low probability	Very Low (-ve)

Impact 3 – Loss of aquatic habitat

The proposed weir will reduce flood peaks which will reduce the flushing of fines from stones-in-current. Scouring flows will be reduced, the onset of winter flows will be delayed and the frequency intensity and duration of high flows will be reduced. These changes will negatively impact the quality and quantity of aquatic habitat. Fish populations will be affected by the loss of habitat complexity, i.e.

feeding, spawning, rearing and predation cover habitats. The significance of these impacts to the indigenous fish populations is deemed **Medium (-ve).**

Alternatives	Intensity	Extent	Duration	Probability	Significance
Watercourse 1					
Without mitigation	Medium	Local	Long term	Definite	Medium (-ve)
With mitigation	NA	NA	NA	NA	NA

Impact 4 – Alien invasive species

The risks of increasing the lentic (standing water) habitat in both Watercourse 1 and Watercourse 2 is that it provides suitable habitat for the introduction and spread of alien fishes such as bass and bluegill sunfish which predate on indigenous fish populations. Every effort should be made to reduce the risk of such introductions. Impact **significance** can be reduced from **high to medium with** the implementation of **mitigation measures** discussed below.

Alternatives	Intensity	Extent	Duration	Probability	Significance
Watercourse 1					
Without mitigation	Very high	Local	Long term	Medium	High (-ve)
With mitigation	Medium	Local	Long term	Medium	Medium (-ve)

10.4.3 Mitigation Measures

(a) MITIGATION OF DIRECT CONSTRUCTION PHASE IMPACTS

Impact 1 – Loss of aquatic habitat associated with Watercourse 1

No mitigation measures suggested.

Impact 2 – Disturbance of aquatic habitat due to edge effects

Mitigation measures as suggested by the freshwater specialist in 10.3.3 apply

Impact 3 – Alteration of the hydrological regime

Mitigation measures as suggested by the freshwater specialist in 10.3.3 apply

Impact 4 – Increased runoff, erosion and sedimentation

The agreement to undertake construction activities during the summer low-flow period should mitigate against most impacts. In addition to this, the mitigation measures recommended by the freshwater specialist in section 10.3.3 apply.

Impact 5 – Water quality impairment

Mitigation measures as suggested by the freshwater specialist in 10.3.3 apply

Impact 6 – Loss of aquatic habitat

Mitigation measures as suggested by the freshwater specialist in 10.3.3 apply

(b) MITIGATION OF DIRECT OPERATIONAL PHASE IMPACTS

Impact 1 – Alteration of hydrological regime

In addition to the mitigation measures recommended by the freshwater specialist in section 10.3.3, the following mitigation measures should be applied as recommended by the Ichthyological specialist:

- An accurate estimate of the natural MAR (nMAR) for Watercourse 1 must be calculated and Ecological Reserve allocations be based on this value.
- Abstraction and downstream release volumes from the weir must be monitored and these figures must be made available for review by the relevant authorities (DWS/BGCMA) upon request
- Operating rules should be determined on the natural hydrology of the catchment i.e. months of peak flow, outside of which no abstraction is to take place. These should be balanced against irrigation needs and available for review.

Impact 2 – Erosion and sedimentation

Mitigation measures as suggested by the freshwater specialist in 10.3.3 apply.

Impact 3 – Loss of aquatic habitat

Mitigation measures as suggested by the freshwater specialist in 10.3.3 apply.

Impact 4 - Alien invasive species

- As a mitigation, farm managers and owners need to be made aware of these risks and discourage the introduction of alien fishes into the new water bodies through signage discouraging the introduction of alien fish species particularly at the proposed weir on Watercourse 1.

10.4.4 Conclusion

Watercourse 1 on remaining extent of Farm 234, provides habitat for two lineages of Cape galaxias (*Galaxias* sp. “zebratus Riviersonderend”) and Cape kurper (*Sandelia* sp. “capensis Riviersonderend”). As a result of the uncertainty around their taxonomic status, their conservation status is still unclear. They are limited to the Riviersonderend catchment and therefore have a limited distribution range. Populations are threatened elsewhere in the catchment by the dewatering of rivers over the summer period for irrigation and by habitat modification for flood attenuation.

The populations present in Watercourse 1 are relatively healthy and unimpacted by alien fish species invasions. It is the view of the specialist that the most severe impacts that may result from the dewatering of the river downstream of Weir B during the summer months can be avoided by implementing the Ecological Reserve – provided that flows are monitored and the provisions of the Ecological Reserve are strictly adhered to.

11. SUMMARY OF IMPACTS AND CUMMULATIVE EFFECT

11.1 Summary of Impacts

Please refer to **Appendix 8** for the impact and significance rating tables for the different phases of the proposed project as well as mitigation measures. The following table is a summary of all the impacts assessed, taking in consideration the risk assessment of the EAP (**Appendix 8**) as well as the risk assessments conducted by the various specialists.

Study	Impact	Significance No Mitigation	Significance With Mitigation
Water	Loss of wetland habitat	Medium Significance	Medium Significance
	Disturbance of aquatic habitat due to edge effects	Low to Significance	Very Low Significance
	Increased runoff, erosion and sedimentation	Low Significance	Very Low Significance
	Alternation of hydrology	Low Significance	Low Significance
	Increased stormwater runoff and erosion	Low Significance	Very Low Significance
	Water quality impairment	Medium Significance	Low Significance
Botanical	Loss of greyton shale fynbos and North Sonderend Sandstone Fynbos	Very Low Significance	Very Low Significance
	Loss of Ecological Processes	Low Significance	Very Low Significance
	Soil Contamination	Very Low Significance	Very Low Significance
Freshwater Fish	Impact of construction activities on freshwater fish	Medium Significance	Low Significance
	Alternation of hydrological regime to impact fish populations	High Significance	Medium Significance
Heritage	Heritage resources	Very Low Significance	Very Low Significance
Dust	Dust from topsoil removal, construction and rehabilitation	Very Low Significance	Very Low Significance

11.2 Cumulative effect

Cumulative effect in relation to the activity means the past, current and reasonably of future impact of an activity, considered together with the impact of activities associated with that activity, that itself may not be significant but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

The botanical specialist is of the opinion that even though Greyton Shale Fynbos is an endangered vegetation type, there will be no further loss of this vegetation type as a result of the proposed dam project. The construction of the dam will not result in any cumulative impact on Greyton Shale Fynbos.

The freshwater specialist is of the opinion that the development of the dam and weir within the wetlands may result in the additional transformation of the critically endangered wetland vegetation associated with Greyton Shale Fynbos. However, that the transformation of a relatively small area (2.77ha) of already disturbed seasonal and temporary wetland habitat to artificial standing water habitat will not result in a significant cumulative impact to the critically endangered wetland habitat within the region.

In addition, watercourse 1 has been selected as a Category 2 ESA. These areas are not essential for meeting biodiversity targets but play an important role in supporting the functioning of Critical Biodiversity Areas (CBAs) or protected areas, and are often vital for delivering ecosystem services. The management objectives for Category 2 ESAs is to restore or manage the features to minimize impacts on ecological processes and ecological infrastructure functioning, especially soil and water related services, and to allow for faunal movement. Although the development of the weir will result in unavoidable impact of the ESA, it is not considered detrimental for meeting regional biodiversity targets.

Foothill rivers such as the Eksteenkloof are heavily impacted by water abstractions and habitat modifications throughout the Riviersonderend and Breede River catchments. As a result of these impacts and the presence of alien fishes in the main stem rivers, indigenous fish populations have been lost from up to 80 % of their former distribution ranges. The proposed development, if not properly mitigated, will likely contribute cumulatively to the impacts on fish populations elsewhere in the catchment.

12. CONCLUSION AND RECOMMENDATIONS

Mitigation measures as recommended by the specialists must be enforced if the proposed development were to be approved. These mitigation measures and recommendations are discussed in Section 10 of this report and have been included in the Section 6 of the Environmental Impact Report (EMPr) attached as **Appendix 11**. Mitigation measures with regards to any activities in the watercourses are discussed in the river Maintenance and Management Plan (MMP) with method statements. This MMP should be read in conjunction with the EMPr. Please also refer to the method statements from Sarel Bester Ingenieurs in **Appendix 9.3 & 9.4.**

The following specialist studies were undertaken as part of the Environmental Impact Assessment:

- Heritage Screener
- Botanical Assessment
- Freshwater Assessment
- Freshwater Fish Assessment

The specialist studies and information provided in the EIA Report, indicate that the proposed development does not pose any significant impact to the environment and can be implemented with strict adherence to the recommended mitigation measures.

In terms of the need and desirability of the proposed development, the need exists for a storage dam that would provide sufficient supply of irrigation water which would be of a critical importance to the success and feasibility of the BEE business proposal to establish 55ha of orchards nut and vineyards, 50/50). The success of this project is expected to create a number if permanent jobs within the agricultural industry.

Access to the farm will be via the N2 and the dam can be accessed via existing farm roads, no additional roads will need to be constructed. Alternative A is the preferred alternative as the storage to earthworks ratio for Alternative B (not preferred) is more expensive. Alternative A is more preferred when considering contour lines, soil type and dam basin. Alternative A is also mush closer to the water source where water will be extracted. Thus, the proposed pipeline that will be constructed to feed water to dam located at site Alternative A will be much shorter, with a less smaller footprint on the environment. As a result, dam Alternative A is the preferred site alternative.

The “no-go” option, which is the option of not going ahead with the proposed developemt. Although the no-go development might result in no potential negative environmental impacts, especially on the vegetation on the development site, the direct and indirect socio-economic benefits of not constructing the dam will not be realised and the need for employment opportunities in the Overberg will not be met.

The potential impact on the sense of place of the proposed dam has also been considered. The surrounding area is characterised by agricultural activities, as well as a number of farm dams in the local area, and the proposed dam will therefore not be uncharacteristic for the area. The sense of place is not expected to be altered by the proposed dam, and no further studies are suggested.

According the Heritage Screener conducted and comments from Heritage Western Cape, the proposed development not have any negative significant impacts on the heritage resources of the area.

According to the botanical specialist, the study area at Sangasdrift has been subject to intensive disturbance over a long period. The disturbance has resulted from intensive agriculture; ploughing and planting of pastures for livestock production, as well as invasion by woody alien invasives. The area of the proposed 'Hut Dam' (preferred) has parts that are classified as CBA1, ESA1 and ESA2. The specialist is of the opinion that there is no justification for this conservation status mapping in this area. The area is extremely disturbed and degraded and has very low botanical and ecological value. The specialist recommends that the mapping of CBAs and ESAs in the area should be checked and changed to reflect the actual situation 'on the ground'. The same applies to the 'alternative dam site'. The ESA2 classification of the watercourse is, in the opinion of the specialist, only tenuously valid since the watercourse is extremely degraded and not ecologically functional.

The specialist suggest that the two dam sites are some of the most degraded and ecologically compromised sites he has surveyed and the negative impacts of the proposed dam at either site would be Very Low Negative. Construction of a dam at either of the sites is therefore unconditionally supported from a botanical perspective.

The restoration of the weir is certain to have an impact on the vegetation within the stream during the construction period. However, the impact will be temporary and must take into account the current status of the stream (alien infestation, existing disturbances and erosion). Botanically speaking, the construction of the weir is not expected to have any significant long-term impacts on vegetation, since the species encountered at the site is mostly hardy and relatively common species, which will re-establish themselves quite easily (as a result impact is considered low). However, the disturbance associated with the construction will very likely stimulate alien plant germination in the construction footprint, which will have a negative long-term impact. It is thus essential that an ongoing alien eradication program is implemented at the weir and its immediate surroundings (e.g. a 20-50m boundary surrounding the weir location and all area impacted by construction footprint – including mixing and laydown areas). Preferably, or over time, it should also include the removal of the dense stands of alien invasive species upstream of the weir location.

The freshwater impact assessment suggest that all three freshwater features have been impacted as a result of decades of agricultural activities. Following the assessment of direct impacts, it can be surmised that the significance of the impacts associated with the proposed project can be reduced with the implementation of effective mitigation measures. The exception would be the permanent loss of approximately 3 806m2 aquatic habitat as well as the loss of aquatic macroinvertebrate habitat and communities during the construction phase, and alteration of the hydrological regime and vegetation characteristics of approximately 2.3ha of wetland habitat and loss of aquatic macroinvertebrate habitat and communities during the operational phase.

It is the opinion of the freshwater specialist that the proposed pipeline route will not transverse any additional natural or artificial freshwater features. The proposed route will transverse already disturbed areas, currently dominated by invasive grass species. The pipeline route is located approximately 50m from the wetland temporary zone and considered highly unlikely that the development of the pipeline will result in the impact on the wetland seep.

The freshwater specialist believes that although impact cannot be avoided it is practically possible to restrict the extent of the above mentioned high (negative) and medium (negative) impacts to the construction footprint and immediate surroundings with the strict adherence to provided method statements as well as additional essential mitigation measures and follow-up monitoring requirements specified within the freshwater specialist report. In addition, it is expected that allowance will be made for approximately 15-35% instream flow release in line with best practice, at both the dam and weir in order to meet the Ecological Reserve determined by the Department of Water and Sanitation (DWS).

It is therefore the opinion of the specialist that authorisation of the proposed repair of the Eksteenskloof weir and development of the Hut dam be granted.

From the freshwater fish impact assessment, the conclusion can be drawn that Watercourse 1 on Remaining Extent of Farm 234, Riviersonderend, where rehabilitation of the weir is proposed provides habitat for two lineages of Cape galaxias (Galaxias sp. “zebratus Riviersonderend”) and Cape kurper (Sandelia sp. “capensis Riviersonderend”). As a result of the uncertainty around their taxonomic status, their conservation status is still unclear. They are limited to the Riviersonderend catchment and therefore have a limited distribution range. Populations are threatened elsewhere in the catchment by the dewatering of rivers over the summer period for irrigation and by habitat modification for flood attenuation. The populations present in Watercourse 1 are relatively healthy and unimpacted by alien fish species invasions. It is the view of the specialist that the most severe impacts that may result from the dewatering of the river downstream of the proposed weir during the summer months can be avoided by implementing the Ecological Reserve – provided that flows are monitored, and the provisions of the Ecological Reserve are strictly adhered to. The risk of standing water in Watercourse 1 and 2 provides a suitable habitat for the induction of alien fishes which can impede on indigenous fish populations. Every effort should be made to reduce this risk. Farm owners and managers should be made aware of these risks and discourage the introduction of alien fishes into the new water bodies through signage discouraging the introduction of alien fish species, particularly at the weir site, watercourse 1.

Considering all the information, it is not envisaged that the development of Hut dam (Alternative A) and the rehabilitation of the weir, will have a significant negative impact on the environment, if mitigation and monitoring measures, as advised by the specialist and Cape Nature are strictly adhered to.

The implementation of the ecological reserve will be detrimental to the existing fauna within the ecosystem. As per email correspondence with BGCMA it was agreed that the suggested 50% ecological reserve will be enough, but the exact percentage will be received once the reserve is received from Water Ecosystems (**Appendix 5.4.5.4**.). Only winter surplus water is to be abstracted. The engineers would have to invent an abstraction method at the weir, which cannot be tampered with, which will maintain the ecological flow, as per Cape Nature’s suggestion, as well as allow for the release of summer flows, as per recommendations from the ichthyologist (Please refer to **Appendix 5.4.5.4**). The engineers provided BGCMA with a letter (**Appendix 5.4.5.4.1**) where they confirm that the weir and dam designs will only be finalised as per the conditions set out in the Environmental Authorisation / Water Use License (should it be granted) to ensure that the ecological reserve is adhered to

It is therefore recommended that the proposed Hut dam development (Alternative A) be supported and be authorised with the necessary conditions of approval, subject to the implementation of the recommended enhancement and mitigation measures contained in Section 10 of this report, Section 6 of the EMPr (**Appendix 11**) and the MMP (**Appendix 12**).

13. DETAILS AND EXPERTISE OF THE EAP

This Environmental Impact Report (for comment) was prepared by Inge Erasmus who has a BA Honours in Geography and Environmental Studies from Stellenbosch University. Before completing her honours degree Inge gained practical experience as a junior environmental consultant at Hatch Goba in Johannesburg from 2014 until 2015. Inge acted as an environmental control officer on a variety of projects in the Northern Cape, conducting environmental compliance audits, as well as being part of a project team working on a major resettlement project for Kumba Iron ore. Inge joined Enviro Africa in February 2017, generally performing duties as an environmental assessment practitioner with regards to NEMA EIA applications.

The entire process and report was supervised by Bernard De Witt who has more than 10 years experience in environmental management and environmental impact assessments. After qualifying with a B. Sc. in Forestry and a B. A. (Hons) in Public Administration at the University of Stellenbosch Bernard joined the Department of Forestry as an Indigenous Forest Planner in 1983, going on to become Manager of the Table Mountain Reserve with the Cape Town Council. He then joined Cape Nature Conservation (CNC) and headed its Conservation Planning Section before taking up the position of District Manager of the Boland area (inc. the Hottentots Holland and Kogelberg). As a Regional Ecologist, he co-ordinated managerial and scientific inputs into Provincial Nature Reserves in the Boland, Overberg and West Coast regions. For the last four years of his employment he assessed and evaluated development applications, from an environmental perspective, on behalf of CNC (now DEA&DP). Since he left DEA&DP 10 years ago he has been involved in environmental consulting in the private sector as a member of **EnviroAfrica**.

Please refer to **Appendix 10** for the CV's of the EAPs.

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