

**CEN INTEGRATED ENVIRONMENTAL
MANAGEMENT UNIT**



Environmental and Rural Development Specialist

DRAFT BASIC ASSESSMENT REPORT:

**PROPOSED LITTLE FISH (CASCADES)
EMBEDDED SMALL HYDRO POWER FACILITY,
IN THE BLUE CRANE ROUTE LOCAL
MUNICIPALITY, EASTERN CAPE**

2 February 2017

Project Title:

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PROPOSED LITTLE FISH (CASCADES) EMBEDDED SMALL HYDRO POWER
FACILITY, IN THE BLUE CRANE ROUTE LOCAL MUNICIPALITY, EASTERN
CAPE

Project Applicant:

NAVITAS POWER EQUIPMENT (PTY) LTD

Reference Number:

TO BE ADVISED

Environmental Assessment Practitioner:

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Reviewed by: Dr Mike Cohen

Date of Report:

2 February 2017

Executive Summary

1.1 Introduction

CEN Integrated Environmental Management Unit (CEN IEM Unit) was appointed by NAVITAS POWER EQUIPMENT (PTY) LTD to undertake the environmental assessment for the Proposed Little Fish Embedded Small Hydro Power Facility, Blue Crane Route Municipality in the Eastern Cape.

CEN IEM Unit meets the requirements for an independent Environmental Assessment Practitioner (EAP) in terms of the Environmental Impact Assessment (EIA) Regulations of 4 December 2014 (GN R 982) (in terms of the National Environmental Management Act, Act 107 of 1998 as amended).

The proposed Little Fish Embedded Small Hydro Project entails the development of a small hydro power station to generate approximately 3.1MW from hydro power. The proposed Little Fish Embedded Small Hydro Project will be located outside an urban area on Portion 1 of the Farm Langverwacht 131, Portion 32 of the Farm Doornkraal 117 and Farm No. 437. The proposed site falls within the boundaries of Ward 6 of the Blue Crane Route Local Municipality (BCRM), within the Sarah Baartman District Municipality (SBDM) of the Eastern Cape Province. Refer to **Figure 1 – Locality Map**.

1.2 Activity Description

The hydro power unit will utilise water from the Orange River - Fish River – Sundays River Canal Water Transfer Scheme (also referred to as the Orange – Fish – Sundays Canal) which discharges into the Little Fish River. Approximately 8 cumecs of water for the hydro powerhouse will be diverted from the Orange – Fish – Sundays Canal via a new take-off channel located upstream of the Cascades section. The Cascades section is a length of steep natural river drainage between the concrete Orange – Fish – Sundays Canal and the Little Fish River. The majority of the water from the Orange – Fish – Sundays Water Transfer Canal would discharge into the Little Fish River via the hydropower system instead of flowing down the Cascades.

In order to generate hydropower, water will be channelled from the Orange – Fish – Sundays Water Transfer Canal into a pipeline (1800mm diameter), for approximately 690m, which will then flow into an intermediate penstock pool (approximately 90m²). From the intermediate penstock pool the water would enter steel pipelines (1200mm diameter) and be conveyed to the primary penstock pool (approximately 90m²), over a distance of approximately 190m. The water is then conveyed for approximately 140m by steel penstock pipelines (1600mm diameter) from the primary penstock pool to the turbine power house. Anchors along the length of the pipelines would be used to anchor the pipelines from the Canal to the hydro power house. The penstock pipeline from the primary penstock pool to the turbine power house will manipulate a gross head of 53m (net / available head of 50.4m) that can be utilised for hydropower generation.

The hydro power house will be situated at the bottom end of the penstock pipeline where the water will enter the turbines. The hydro power house will be of a nature and size to accommodate multiple turbines and controllers in a parallel system. The hydro power house (approximately 480m²) will be a complete new structure located at the base of a rocky cliff approximately 25m from the Little Fish River.

After driving the hydro power turbines, all the diverted water will be returned via a return slip (approximately 25m in length) into the Little Fish River, approximately 280m downstream of the existing discharge point of the Cascades. Infrastructure, such as sluice-gates and screens, would be constructed in order to regulate the flow of water and prevent debris and fauna from entering the turbines in the hydro power house. A bypass will be provided in order to retain water ecology and aquatic life.

Sluice-gates constructed in the canal outlet structure at the entrance to the take-off channel will regulate the approximately 8 cumecs of water required to operate the hydro power unit. The water exiting the hydro powerhouse into the Little Fish River via the return slipway is anticipated to be free of any contaminants such as hydrocarbons (oil, lubricants) and will be heated by less than 0.5 0C.

The proposed Little Fish Embedded Small Hydro Project will generate approximately 3.1MW electricity from hydro power, i.e. generate electric power from the movement of water. The proposed Little Fish Embedded Small Hydro Project will utilise a parallel Francis Turbine System which is considered to be the most efficient system for this project based on the head and flow at the Orange – Fish – Sundays Water Transfer Canal. The parallel system in which the turbines will be arranged, allows for multiple turbines to utilise the same penstock pipeline. Three 1200kW Francis type hydro generators are proposed for the Little Fish Embedded Small Hydro Project.

In a typical installation, water is fed from a water source, through a pipe into a turbine. The water enters the turbine under immense pressure. The pressure of the flowing water on the turbine blades causes the shaft of the turbine to rotate. The rotating shaft is connected to an electrical generator which converts the motion of the shaft into electrical energy.

A transmission line of 22kV, i.e. power line, of approximately 11km would need to be constructed in order to feed electricity produced into the electricity distribution network of the BCRM. The transmission line would join the Somerset-East Main Substation, and is located to the north of the hydro power site. The transmission line's design will conform to Eskom standards. It is anticipated that the transmission line will follow adjacent to existing roads. Step-up and step-down transformers will be required to accommodate the operating voltages of the hydro power house and the Eskom power line.

Access to the property is from the Bloemhof gravel road. Thereafter access is gained to overall site from an existing gravel road. A new gravel access road would be constructed in order to gain access to the penstock pools. The new access road is approximately 1000m in length and would follow adjacent to the pipelines. The existing gravel road would be utilised to gain access to the hydro power house and discharge point.

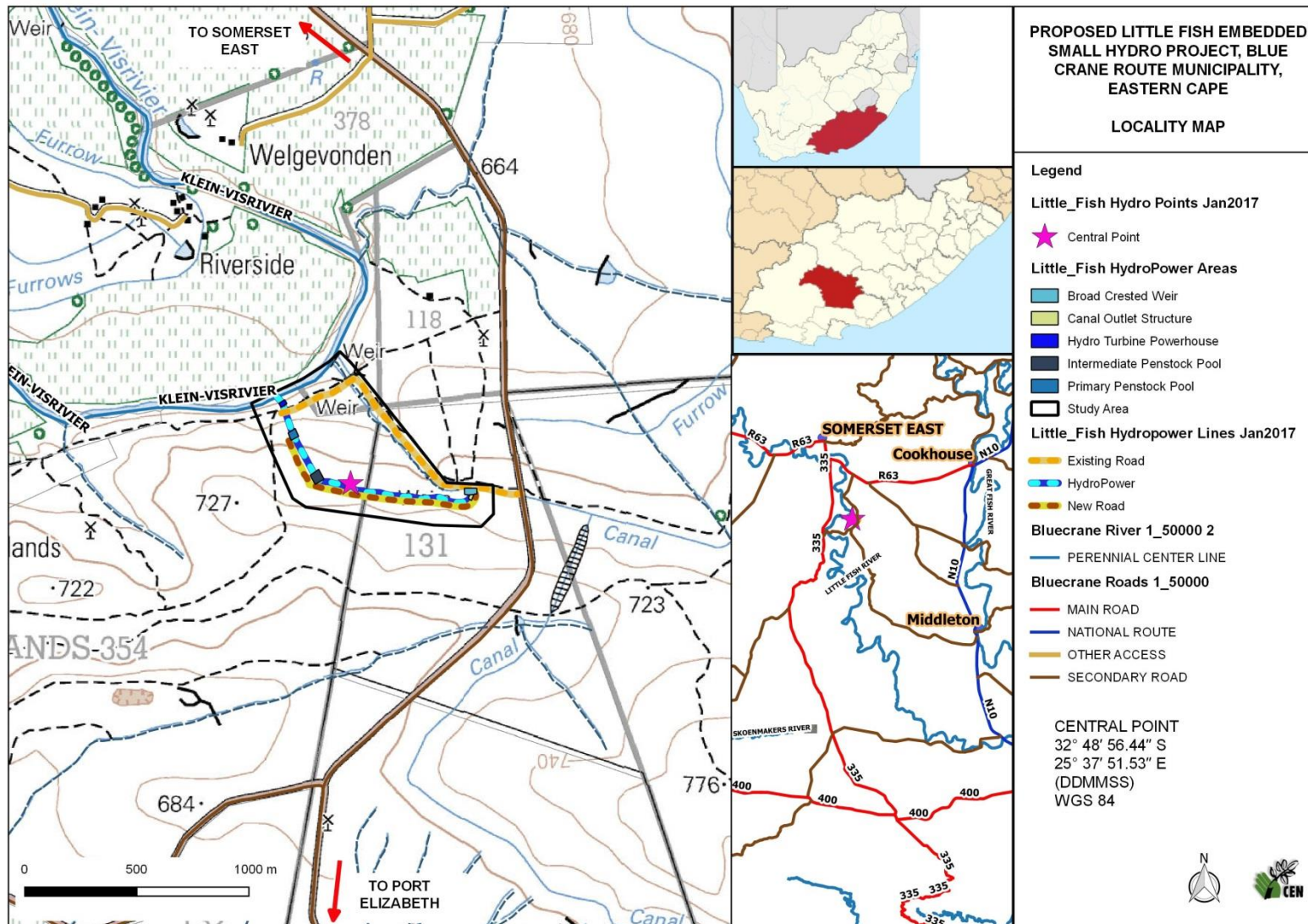


Figure 1: Locality Map

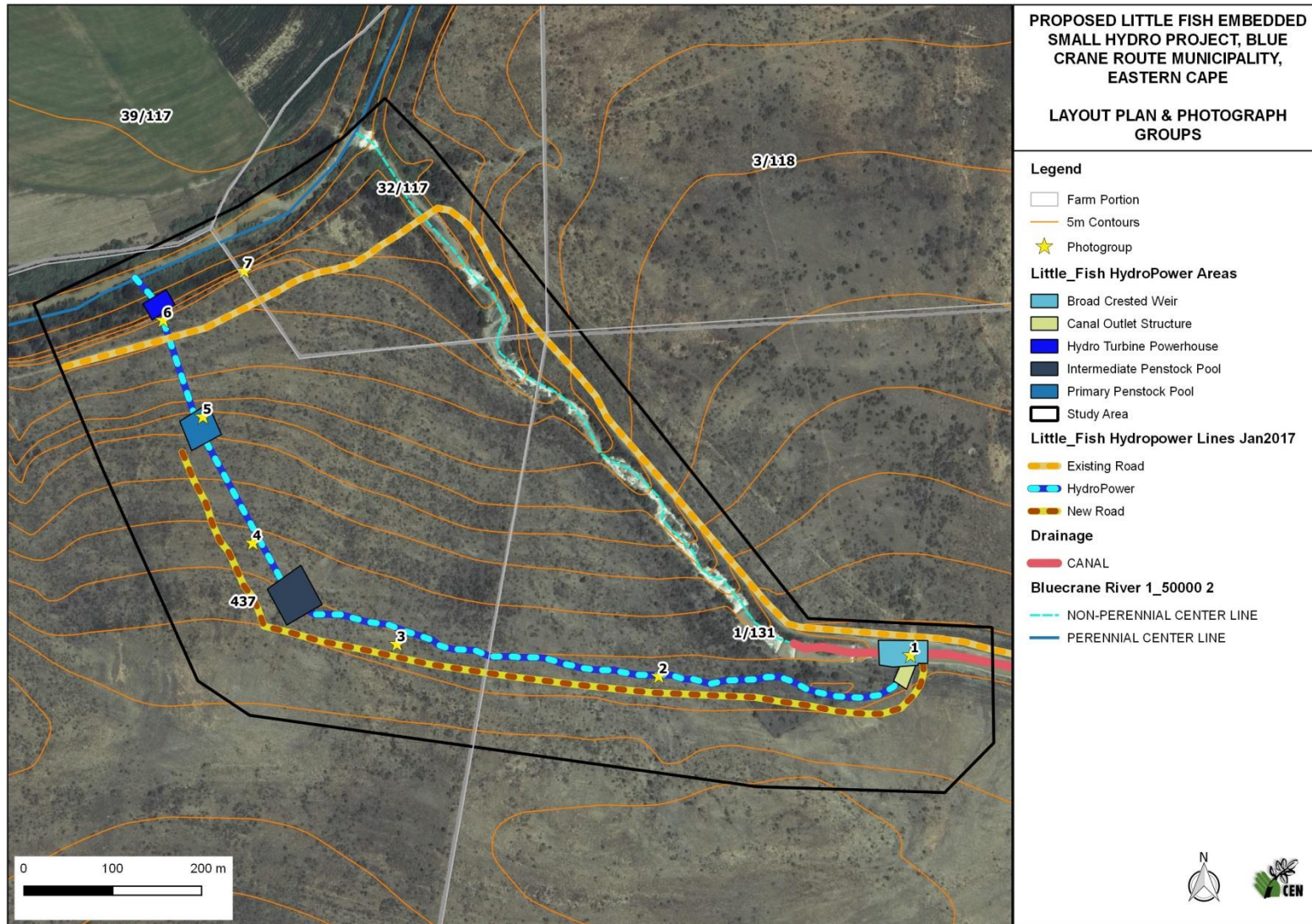


Figure 2: Site Plan

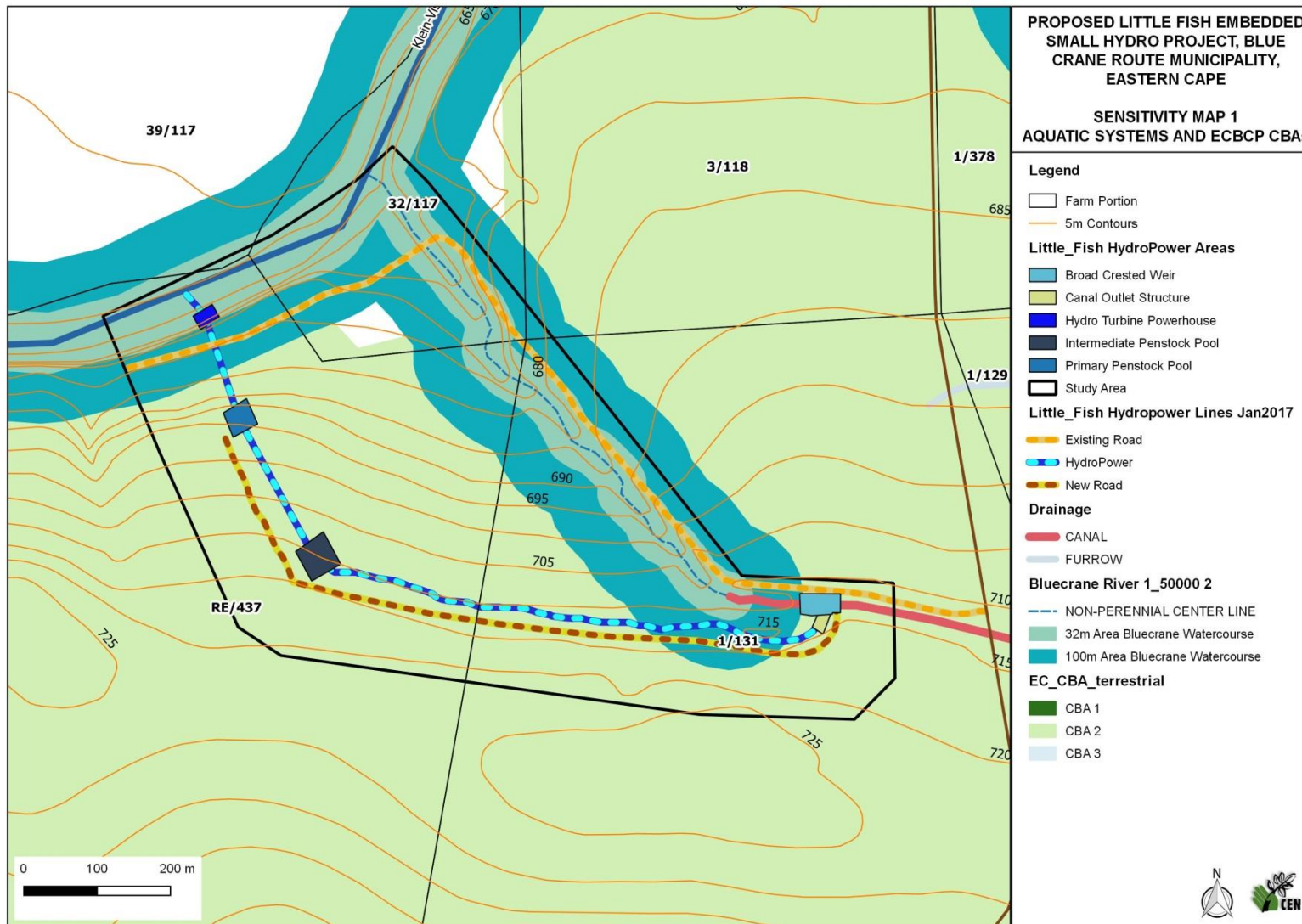


Figure 3: Sensitivity Map

1.3 Legal Framework

1.3.1 EIA Listed Activities

An application for Environmental Authorisation is being submitted simultaneously to the National Department of Environmental Affairs (DEA), in terms of the Environmental Impact Assessment (EIA) Regulations, 2014.

In terms of the EIA Regulations, 2014, made under Section 24(5) of NEMA, the following listed activities (**Table 1**) within Government Notice R. 983, and R 985 (of 4 December 2014) are triggered by the proposed development, thereby requiring environmental authorisation from the DEA.

Table 1: EIA Listed Activities

Listed activity as described in GN 983, 984 and 985	Description of project activity
<p>GNR 983 – Listing Notice 1 Activity 1: The development of facilities or infrastructure for the generation of electricity from a renewable resource where— (ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare; excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area</p>	<p>The proposed Little Fish Embedded Small Hydro Project entails the development of a small hydro power station to generate approximately 3.1MW from hydro power. The site is approximately 10ha in extent (including the linear activities). The activity is applicable.</p>
<p>GNR 983 – Listing Notice 1 Activity 9: The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where— (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve; or (b) where such development will occur within an urban area</p>	<p>The combined length of the pipelines and return slip is approximately 1045m. The pipelines vary in size from 1200mm to 1800mm. The activity is applicable.</p>
<p>GNR 983 – Listing Notice 1 Activity 11: The development of facilities or infrastructure for the transmission and distribution of electricity— outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.</p>	<p>A transmission power line will be required to connect from the small hydro power station to the Eskom grid in order to feed electricity produced into the distribution network. The proposed Little Fish Embedded Small Hydro Project is located outside an urban area. The power line will operate at a voltage of 22kV. This activity is not applicable as the threshold of 33kV is not met.</p>
<p>GNR 983 – Listing Notice 1 Activity 12: The development of— (i) canals exceeding 100 square metres in size; (x) buildings exceeding 100 square metres in size, (xii) infrastructure or structures</p>	<p>Infrastructure for the proposed Little Fish Embedded Small Hydro Project is located within 32m of a watercourse. This includes the following: the powerhouse, approximately 480m² and the return</p>

Listed activity as described in GN 983, 984 and 985	Description of project activity
with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	slip (discharge canal). Discharge outlet into the Little Fish River. The activity is applicable.
GNR 983 – Listing Notice 1 Activity 14: The development of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	“Dangerous goods” that are likely to be associated with the proposed project, include fuel stores for construction purposes. The storage capacity is unknown, but would not exceed 500m ³ . The activity may be applicable.
GNR 983 – Listing Notice 1 Activity 19: The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from— (i) a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving— (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.	The proposed return slip and discharge point is located within a watercourse, i.e. Little Fish River, and more than 5m ³ of material will be removed and deposited. The activity is applicable.
GNR 983 – Listing Notice 1 Activity 27: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The site is approximately 10ha in extent, including the linear routes, i.e. penstock pipelines and access road, for the hydro power system. Clearance of vegetation will be required for the construction of the penstock pools, the hydropower house, the penstock pipelines, the return slip, and the access road. The activity is applicable.
GNR 983 – Listing Notice 1 Activity 28: Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	The site is currently zoned for agriculture and located outside an urban area. The site is approximately 10ha in extent, including the linear routes, i.e. penstock pipelines and access road, for the hydro power system. The activity is applicable.
GNR 985 – Listing Notice 3 Activity 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres. (b) In Eastern Cape, iii. Outside urban areas, in: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	The construction of access roads to the proposed hydro power system. The site is located outside an urban area, within a Terrestrial Critical Biodiversity Area (CBA2) of the Eastern Cape Biodiversity Conservation Plan (ECBCP), as well as in a CBA of the Addo Biodiversity Sector Plan. The activity is applicable.
GNR 985 – Listing Notice 3 Activity 10: The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a	“Dangerous goods” that are likely to be associated with the proposed project, include fuel stores for construction purposes. The site is located outside an urban area, within a

Listed activity as described in GN 983, 984 and 985	Description of project activity
<p>combined capacity of 30 but not exceeding 80 cubic metres.</p> <p>(b) In Eastern Cape: ii. Outside urban areas, in:</p> <p>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>(ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined;</p>	<p>Terrestrial Critical Biodiversity Area (CBA2) of the Eastern Cape Biodiversity Conservation Plan (ECBCP), as well as in a CBA of the Addo Biodiversity Sector Plan. The hydro power house is located within 100m of the Little Fish River.</p> <p>The activity is applicable.</p>
<p>GNR 985 – Listing Notice 3 Activity 12:</p> <p>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan</p> <p>(a) In Eastern Cape,</p> <p>ii. Within critical biodiversity areas identified in bioregional plans</p>	<p>More than 300m² of vegetation will be cleared for the hydro power system.</p> <p>The site is located outside an urban area, within a Terrestrial Critical Biodiversity Area (CBA2) of the Eastern Cape Biodiversity Conservation Plan (ECBCP), as well as in a CBA of the Addo Biodiversity Sector Plan.</p> <p>The activity is applicable.</p>
<p>GNR 985 – Listing Notice 3 Activity 14:</p> <p>The development of— (i) canals exceeding 10 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area exceeds 10 square metres in size; (x) buildings exceeding 10 square metres in size, (xii) infrastructure or structures with a physical footprint of 10 square metres or more where such development occurs — (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; (c) In Eastern Cape: ii. Outside urban areas, in: (ff) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p>	<p>Infrastructure for the proposed Little Fish Embedded Small Hydro Project is located within 32m of a watercourse. The footprint of the associated infrastructure will exceed 10m². This includes the following: the powerhouse, approximately 480m², and the return slip (discharge canal). Discharge outlet into the Little Fish River.</p> <p>The site is located outside an urban area, within a Terrestrial Critical Biodiversity Area (CBA2) of the Eastern Cape Biodiversity Conservation Plan (ECBCP), as well as in a CBA of the Addo Biodiversity Sector Plan.</p> <p>The activity is applicable.</p>

1.3.2 Water Use Activities in terms of the National Water Act

Activities for the water uses in terms of Section 21 of the National Water Act (Act No 36 of 1998) [NWA] associated with the proposed project, include the following:

Section 21 (c) impeding or diverting the flow of water in a watercourse

Section 21 (i) altering the bed, banks, course or characteristics of a watercourse

Section 21 (c) and (i) water use activities are applicable due to infrastructure for the hydro power system being located within 100m of watercourses.

Proof of the Water Use Licence Application (WULA) submission will be provided in the Final Basic Assessment Report as the submission is being undertaken simultaneously with the submission of the EIA Application and Draft Basic Assessment Report.

1.4 Need and Desirability

The proposed activity is in line with the Blue Crane Route Municipality's (BCRM) Integrated Development Plan (IDP, 2016) regarding renewable energy sources within the BCRM. The Blue Crane Route Municipality's (BCRM) Integrated Development Plan (IDP, 2016) acknowledges a potential for renewable energy in terms of hydro power generation and lists renewable energy as an objective for local economic development.

The proposed activity is in line with the Cacadu (Sarah Baartman) District Municipality's (CDM) SDF (2013) as an alternative and sustainable source for energy. The proposed activity is in line with alternative energy sources as identified in the Eastern Cape Provincial Development Framework (ECPDF, 2014).

Although the proposed activity is located within a terrestrial CBA 2 as well as an aquatic CBA 2 in terms of the Eastern Cape Biodiversity Conservation Plan (ECBCP), it does not fall within a core biodiversity area (CBA 1), as identified in the PSDF and ECBCP.

The Eastern Cape Province is reliant on electricity imports from other provinces yet houses significant industrial and rural development potential. Power from the national grid is largely generated from coal power stations, and transmitted considerable distances to the Eastern Cape. This leads to significant transmission losses and local grid instabilities.

Additionally, the BCRM's IDP (2015/16) identified electricity supply as a priority and an objective of service delivery and infrastructure development.

Although only 3.1MW will be fed into the electrical grid, the surrounding community will benefit from the additional electrical supply. Further benefits are the limited employment opportunities during construction and operation.

The proposed project in itself does not form part of a national programme, e.g. the Department of Energy's Small Projects REIPPP Programme.

The proposed project will however contribute to the sustainable renewable energy industry and thereby would contribute to meeting the overall renewables target within the Integrated Resource Plan (2010).

1.5 Public Participation

All registered Interested and Affected Parties and other stakeholders were sent a copy of the Executive Summary and notified of the availability of the Draft Basic Assessment Report.

All I&APs were given a 30 day period to review the Draft Basic Assessment Report and submit comments. Comments received during this period will be incorporated into Final Basic Assessment Report.

Draft Basic Assessment Report Review Period

The Draft Basic Assessment Report available for a 30 day review period to state departments and registered I&APs, from **8 February – 10 March 2017** (excluding public holidays).

A copy of the Draft Basic Assessment Report was available on CEN's website:

<http://www.environmentcen.co.za>

Summary of Main Issues and Responses

Table 2 presents a summary of the main issues raised and response. Please refer to **Appendix E** for the Comments and Response Report that details the full comments and responses provided.

Table 2: Summary of Main Issues and Response

Summary of main issues raised by I&APs	Summary of response from EAP
WESSA is not concerned that this project may have significant detrimental impacts. It seems to involve the generation of 'green' electricity, with minimal net water loss to the river system. I caution that the discharge point back into the river may cause local scouring, if water flow is not diffused; and potential for erosion along the pipeline route mitigated.	Your positive comments are noted. Mitigation measures (e.g. gabion protection works) have been included in the impact assessment and in the Environmental Management Programme.
Query regarding the applicable environmental authority.	The competent authority is the National Department of Environment, as indicated in Government Gazette No. 779 of 1 July 2016.

1.6 Environmental Impact Statement

Alternative 1 (Preferred Alternative)

The footprint size of the activity is approximately 10ha in extent, including the linear routes for the pipelines. The construction phase would have the greatest impact on the vegetation. Clearance of vegetation will be required for the construction of the penstock pools, the hydropower house, the penstock pipelines, the intake channel, and the expansion of the access roads. The operational phase of the project would have a limited impact on vegetation regrowth within the footprint area of the hydropower system. A total of 67 plant species were identified on site, of which one i.e. *Opuntia ficus-indica*, is listed as a declared weed i.e. Category 1 under the Conservation of Agricultural Resources Act No. 43 of 1983, and Category 1b under the National Environmental Management: Biodiversity Act 10 of 2004 – National Invasive Terrestrial and Fresh-water Plant Species List (published July 2016). Vegetation of the Little Fish small hydro project footprint appears largely intact, given the arid climate, gravelly soils, north-facing hillslopes, and often sparsely-vegetated nature of the site. However, the past grazing and fire management history of the project site is unknown. There is also a very low presence of exotic and alien invasive plant species on site. Given that vegetation appears to be largely intact, except in disturbed areas i.e. along gravel roads and embankments of the Little Fish irrigation canal, vegetation can be considered to be of a moderate to high conservation value. Though Bedford Dry Grassland

vegetation enjoys very little formal protection / conservation, and is listed as Not Protected, but Least Threatened – vegetation clearing along the relatively small development footprint of the Little Fish small hydro project is not anticipated to result in a significant negative impact on conservation targets for this vegetation type, or result in significant negative impacts on biodiversity and ecosystem functioning in this area. With the mitigation measures in place, the impact on the loss of vegetation would remain localised resulting in a low impact.

The Eastern Cape Biodiversity Conservation Plan (ECBCP) (2007) indicates that the footprint of the Little Fish small hydro project falls entirely within a Terrestrial Critical Biodiversity Area (CBA) 2. Terrestrial CBA 2 areas are included under Biodiversity Land Management Class (BLMC) 2: Near-natural landscapes. The recommended land use objectives for BLMC 2 areas are to 'maintain biodiversity in near natural state with minimal loss of ecosystem integrity. No transformation of natural habitat should be permitted'. According to the Biodiversity Sector Plan (BSP) for the Blue Crane Route Municipality (2012) the proposed hydropower system falls within a CBA, Ecological Support Area (ESA) and Other Natural Area (ONA). The management objective for the CBA and ESA is to 'maintain natural land, rehabilitate degraded to natural or near natural and manage for no further degradation'. The land use activity for infrastructure installations has a 'Restricted' classification, where land use is possible under strict controls in order to avoid impacts on biodiversity. Nine species of protected plants listed under the Eastern Province Nature and Environmental Conservation Ordinance of 1974 and the Draft Eastern Cape Environmental Conservation Act of 2003 were identified on site. Protected plants require permits from the relevant authorities i.e. DEDEAT, prior to their disturbance, removal, and / or transplantation. No species listed as threatened on the Red List of South African Plants (version 2015.1) was identified on site. No protected tree species listed under the National Forests Act No. 43 of 1983 were identified on site. With the mitigation measures in place, the impact on the loss of habitat would remain localised resulting in a medium impact.

A low level of alien plant invasion is scattered across the site. One plant species (*Opuntia ficus-indica*) identified on site are listed as declared weeds i.e. Category 1 under the Conservation of Agricultural Resources Act (CARA) (No. 43 of 1983), and Category 1b under the National Environmental Management: Biodiversity Act (No. 10 of 2004) – National Invasive Terrestrial and Fresh-water Plant Species List. The potential of alien plants spreading is likely if not managed during the site establishment, construction and operational phases. With the mitigation measures in place, the impact on the indigenous vegetation would remain localised, with natural re-vegetation happening within a short time period, resulting in a low risk and low impact significance.

The operational phase of the proposed Little Fish Hydro Power project is considered to pose an insignificant risk to the current ecological functioning of the aquatic habitats or to the associated aquatic biota downstream, for the following reasons:

1. The volume and flow patterns currently being discharged from the Canal into the Little Fish River will not be altered by being diverted through the hydro power facility and back to the river.
2. The water exiting from the hydro turbines will be discharged down a return slipway into the Little Fish River about 285m downstream of the current discharge point at

the lower end of the Cascades. The river channel and riparian zones downstream of the Cascades have been “re-set’ by over 30 years of almost constant discharge of about 8 cumecs of water from the canal. Riparian and marginal vegetation have become established and have stabilised the river banks to accommodate these unnaturally elevated flows. Therefore, no threat of additional erosion of the river channel at the discharge point or further downstream is anticipated.

3. According to the project proponents, the quality of the water passing through the hydro power scheme and discharged back to the river will not deteriorate or be changed in any way. However, it will be necessary that all infrastructure and machinery be kept in prime condition to prevent any risk of contamination of the water discharged back to the river.
4. If necessary for maintenance and repair, the water flow to the hydro power unit could easily be closed off at the sluice gates located in the canal off-take structure. The excess water will then flow over the existing gauging weir into the Cascades and into the Little Fish River, as is currently the situation. This will ensure that water transfer from the canal into the Little Fish River is not interrupted during maintenance and repair work to the hydropower infrastructure.

The site does not fall within an Important Bird Area (BGIS). Construction activities may disturb any fauna located within the immediate location; however this will be limited to the construction phase. Fauna will need to remain out of the construction area; as a result the construction site will need to be fenced. Overhead transmissions lines may present a potential collision risk or electrocution to avifauna during the operational phase. No fauna impacts are anticipated during the operational phase. Increased sediment input and raised turbidity levels in the river due to disturbance and erosion of riparian zones and adjacent areas, as well as river bed and banks, could have serious negative impacts on aquatic habitats and biota; during the construction and operational phases. With appropriate mitigation this is reduced to a low or insignificant impact.

Dust and air pollution impacts relate to the generation of dust during construction related activities, poorly maintained construction vehicles and burning materials for warmth during winter by contraction staff. In relation to operational phase activities, the impact relates mainly to dust from cleared areas, e.g. the gravel access. The operation of Hydropower system does not produce any emissions. The impact can be mitigated to a low negative impact significance, from a medium negative impact.

The loss of heritage resources relates to the possible loss of cultural heritage resources, including archaeological artefacts. The area is of low cultural sensitivity and it is highly unlikely that any archaeological remains of any significance will be found in situ or exposed during the development. There are no known graves or historical buildings older than 60 years on the site. Impact on heritage resources would occur only in the construction phase, with no impact anticipated in the operational phase. The impact can be mitigated to a very low negative impact significance, from a low negative impact.

Agricultural potential of the site is low as it is classified as non-arable agricultural land (CDM SDF, 2013). As such, the site is not suitable for cultivation purposes. The site is currently utilised partially as a grazing area for game / livestock, and historically has been utilised as

a grazing area for livestock. The proposed hydro power site is currently zoned as Agriculture. The construction related impact can be mitigated to a low negative impact, from a moderate negative impact. No mitigation measures are identified for the operational phase.

Soil exposed by the clearing of vegetation during construction will have substantially elevated erosion levels. The risk of soil erosion increases in areas where vegetation and rocks are removed in order to cater for linear infrastructure and access roads. Areas that may require clearing include the hydro power house, penstock pools, penstock pipelines, and construction and laydown areas in order to undertake the required construction. Some of these areas may not be required for operational phase. The impact can be mitigated to a low negative impact significance, from a moderate negative impact.

Hydropower technology generates electricity by utilising the flow of water. Renewable energy technology produces zero greenhouse gas emissions, air pollutants and waste. Impacts relating to ineffective waste management procedures may lead to the dumping of building rubble, littering and pollution of the surrounding areas as well as unsanitary (toilet) conditions and an increase in vermin. Construction waste will be removed from site by the appointed contractor to a registered waste disposal site. Where possible, excavated material and inert construction waste material will be used as fill material or in site levelling. Domestic and construction waste will increase the amount of waste disposed to landfill, including cleared vegetation. No vermin will be attracted during the operational phase. Debris (vegetation and animal carcasses) in the canal would need to be collected prior to the canal water flowing through the hydropower system. Maintenance procedures may result in the disposal of equipment. This waste will be removed from site by the operational contractor and disposed of at a registered landfill site during the operational phase, unless it is able to be recycled or reused. During the construction phase chemical toilet facilities will be provided at construction areas and secured to the ground, and cleaned at least weekly. During the operational phase, the operational contractor will not be on site full time, and toilet facilities will not be required. The impact can be mitigated to a low negative impact significance, from a moderate negative impact.

Given that the proposed site is located outside an urban area, no sensitive receptors in close proximity and provided that mitigation measures are implemented, a negligible impact from noise generation is anticipated during construction. During the operational phase, the noise impact will be low as there are no sensitive receptors within 500m of the site.

General safety of persons is a concern due to construction activities, e.g. open excavations and machinery, resulting in potential injury to construction staff; health and safety aspects relate to the potential spread of HIV and STDs. Strict adherence to health and safety regulations during construction is vital. Security aspects relate to potential theft of construction materials and theft of neighbouring farmers livestock or equipment. The presence of workers on the site for construction related activities, irrespective of whether or not they are local, may create an increased safety and security risk to local households in the area. In addition, any changes in the local crime rates are likely to be attributed to the influx of construction workers, whether such changes can be attributed to their presence or not. The security risks would be higher during the construction phase. The contractor would have security on-site full time during the construction phase. During the operational phase

the operational contractor would check the site periodically and it is anticipated that some security checks will be made on a regular basis. Fire is a potential risk with any electrical system. Veld fires are a potential risk considering the vegetation types occurring within and adjacent to the site. During construction the risk may be attributed to inappropriate construction activities (e.g. hot work, welding) on dry, windy days. During the operational phase, fire risks may be associated with incorrect or loose wiring within the powerhouse or transmission lines, or when wiring is inadequate and cannot withstand electricity generation. The impact can be mitigated to a low negative impact significance, from a moderate negative impact.

Approximately 65 and 8 employment opportunities will be created during the construction and operational phases respectively. An adverse effect on this impact may occur in that high expectations are formed regarding construction employment opportunities and that these expectations cannot be sustained. The impact can be mitigated to a medium positive impact.

A transmission line of 22kV, i.e. power line, of approximately 11km would need to be constructed in order to feed electricity produced into the electricity distribution network of the BCRM. The transmission line would join the Somerset-East Main Substation, and is located to the north of the hydro power site. The transmission line's design will conform to Eskom standards. A step-up transformer would be required at the powerhouse along with a grid voltage stabiliser in order to maintain a constant voltage level. Disruption of or damage to existing services and infrastructure, e.g. Eskom transmission line, can be mitigated to a low negative impact.

The Bloemhof Road presently carries low traffic volumes related to the farms situated along the road. During the construction phase, the additional daily traffic will increase with construction vehicles. During the operational phase, the additional daily traffic is anticipated to be low. The impact can be mitigated to a low negative impact.

Renewable energy infrastructure relates to the production of cleaner energy from renewable sources, and moving to a less carbon-intensive electricity production (i.e. reducing carbon emissions associated with coal power stations). The impact relates to the operational phase only. The Eastern Cape Province is reliant on electricity imports from other provinces yet houses significant industrial and rural development potential. Power from the national grid is largely generated from coal power stations, and transmitted considerable distances to the Eastern Cape. This leads to significant transmission losses and local grid instabilities. Electricity supply to the Eastern Cape Province is further constrained by transmission infrastructure. The Eastern Cape Province will need to import more power from the national grid, as well as increase local generation capacity. Although only 3.1MW will be fed into the electrical grid, the proposed project forms a source of zero carbon electricity generation and contribution to the renewable energy targets. The impact remains at a high positive impact significance.

No-Go Alternative:

No indigenous vegetation will be cleared, and impact remains at a moderate positive significance.

No protected or endangered species will be physically removed; however a risk remains that these species will be lost to animals as a food source. Impact remains at a moderate negative significance.

The risk remains that the current alien vegetation may spread into surrounding areas, if not controlled. Impact can be reduced to a low negative significance.

No change is expected to occur in the Aquatic Health of the site.

The site would be continued to be used for grazing. The significance remains at a moderate positive impact as no loss of agricultural land would be undertaken.

Debris (vegetation and animal carcasses) in the canal is removed and discarded prior to the canal water flowing through the weirs and Little Fish River. The impact significance remains at moderate negative.

Employment opportunities will not be created during the construction and operational phases. The significance is a moderate negative impact.

Other renewable energy sources will need to be sourced to contribute to the renewable energy targets, and reduction of carbon-intensive electricity production. The impact remains at a high negative significance.

Table 3: Summary of Impacts

Phase	Alternative 1 (Preferred)			No Go
	Planning & Design	Construction & Decommission	Operational	
Ecological: Loss of vegetation				
Significance before mitigation	None	Moderate (-)	Moderate (-)	Moderate (+)
Significance after mitigation	None	Low (-)	Low (-)	Moderate (+)
Ecological: Loss of habitat containing species of special concern				
Significance before mitigation	Moderate (-)	Moderate (-)	Moderate (-)	Moderate (-)
Significance after mitigation	Low (-)	Low (-)	Low (-)	Moderate (-)
Ecological: Potential Spread of Alien Vegetation				
Significance before mitigation	None	Moderate (-)	Moderate (-)	Moderate (-)
Significance after mitigation	None	Low (-)	Low (-)	Low (-)
Ecological: Potential Loss of Aquatic Health				
Significance before mitigation	None	Moderate (-)	Moderate (-)	No change in status
Significance after mitigation	None	Low (-)	Low (-)	No change in status

Phase	Alternative 1 (Preferred)			No Go
	Planning & Design	Construction & Decommission	Operational	
Ecological: Soil, surface and groundwater pollution				
Significance before mitigation	None	Moderate (-)	Moderate (-)	No change in status
Significance after mitigation	None	Low (-)	Low (-)	No change in status
Ecological: Impacts to Fauna and Avifauna				
Significance before mitigation	None	Moderate (-)	Moderate (-)	No change in status
Significance after mitigation	None	Low (-)	Low (-)	No change in status
Air Quality: Dust and Air Pollution				
Significance before mitigation	None	Moderate (-)	Low (-)	No change in status
Significance after mitigation	None	Low (-)	Low (-)	No change in status
Heritage Resources: Loss of heritage resources				
Significance before mitigation	None	Low (-)	None	No change in status
Significance after mitigation	None	Very Low (-)	None	No change in status
Land use: Loss of Agricultural Land				
Significance before mitigation	None	Moderate (-)	Moderate (-)	Moderate (+)
Significance after mitigation	None	Low (-)	Moderate (-)	Moderate (+)
Land use: Soil Erosion				
Significance before mitigation	None	Moderate (-)	Moderate (-)	No change in status
Significance after mitigation	None	Low (-)	Low (-)	No change in status
Waste Management: Liquid and solid waste				
Significance before mitigation	None	Moderate (-)	Moderate (-)	Moderate (-)
Significance after mitigation	None	Low (-)	Low (-)	Moderate (-)
Social: Noise Pollution				
Significance before mitigation	None	Moderate (-)	Low (-)	No change in status
Significance after mitigation	None	Low (-)	Low (-)	No change in status

Phase	Alternative 1 (Preferred)			No Go
	Planning & Design	Construction & Decommission	Operational	
Social: Health, safety and security				
Significance before mitigation	None	Moderate (-)	Moderate (-)	No change in status
Significance after mitigation	None	Low (-)	Low (-)	No change in status
Social: Employment opportunities				
Significance before mitigation	None	Moderate (+)	Moderate (+)	Moderate (-)
Significance after mitigation	None	Moderate (+)	Moderate (+)	Moderate (-)
Social: Existing services & infrastructure				
Significance before mitigation	Moderate (-)	Moderate (-)	Moderate (-)	No change in status
Significance after mitigation	Low (-)	Low (-)	Low (-)	No change in status
Traffic Impact				
Significance before mitigation	None	Moderate (-)	Moderate (-)	No change in status
Significance after mitigation	None	Low (-)	Low (-)	No change in status
Renewable energy: Production of cleaner energy				
Significance before mitigation	None	None	High (+)	High (-)
Significance after mitigation	None	None	High (+)	High (-)

1.7 Recommendations

CEN IEM Unit recommends that the application be authorised by the DEA, with the following conditions:

1. All mitigation measures in the Environmental Management Programme (EMPr, Appendix G) are followed.
2. An experienced Environmental Officer is appointed by the Contractor and an experienced independent ECO is appointed by the developer to monitor compliance with the EMPr during construction.
3. Alien plant regrowth is to be monitored and managed during the construction phase by the Contractor and operational phases by the developer.
4. Only indigenous plant species must be used in the re-vegetation process.
5. Permits must be obtained from the DEDEAT prior to the removal of protected and SSCs.
6. A Water Use License in terms of Section 21 of the NWA must be obtained by the developer prior to the commencement of the activity.
7. Sedimentation must be minimised through the effective stabilisation (e.g. gabions and Reno mattresses) and the re-vegetation of cleared areas.
8. To prevent scouring and erosion during heavy rains via surface run-off, appropriate (best practice) gabion protection works and rehabilitation of all disturbed areas, including the pipeline trench with appropriate indigenous vegetation will be necessary.
9. Strict use and management of all hazardous materials used on site, as well as strict management of potential sources of pollution (hydrocarbons from vehicles & machinery, cement during construction, etc.).

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Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Specialist reports (including terms of reference)

Appendix E: Public Participation

Appendix F: Impact Assessment

Appendix G: Environmental Management Programme (EMPr)

Appendix H: Details of EAP and expertise

Appendix I: Specialist's declaration of interest

Appendix J: Additional Information



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

(For official use only)

File Reference Number:

Application Number:

Date Received:

Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2014, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2014 and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.
2. This report format is current as of **08 December 2014**. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been published or produced by the competent authority
3. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
4. Where applicable **tick** the boxes that are applicable in the report.
5. An incomplete report may be returned to the applicant for revision.
6. The use of “not applicable” in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.
7. This report must be handed in at offices of the relevant competent authority as determined by each authority.
8. No faxed or e-mailed reports will be accepted.
9. The signature of the EAP on the report must be an original signature.
10. The report must be compiled by an independent environmental assessment practitioner.
11. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.
12. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.
13. Should a specialist report or report on a specialised process be submitted at any stage for any part of this application, the terms of reference for such report must also be submitted.

BASIC ASSESSMENT REPORT

14. Two (2) colour hard copies and one (1) electronic copy of the report must be submitted to the competent authority.
15. Shape files (.shp) for maps must be included in the electronic copy of the report submitted to the competent authority.

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?

YES	NO ✓
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 If YES, please complete the form entitled “Details of specialist and declaration of interest” for the specialist appointed and attach in Appendix I.

1. PROJECT DESCRIPTION

a) Describe the project associated with the listed activities applied for

Introduction

The proposed Little Fish Embedded Small Hydro Project entails the development of a small hydro power station to generate approximately 3.1MW from hydro power.

Location

The proposed Little Fish Embedded Small Hydro Project will be located outside an urban area on Portion 1 of the Farm Langverwacht 131 (SG ID: C0660000000013100001), Portion 32 of the Farm Doornkraal 117 (SG ID: C0660000000011700032) and Farm No. 437 (SG ID: C0660000000043700000).

The proposed site falls within the boundaries of Ward 6 of the Blue Crane Route Local Municipality (BCRM), within the Sarah Baartman District Municipality (SBDM) of the Eastern Cape Province. The proposed site is currently zoned for agriculture.

Proposed Project Description

Layout

The hydro power unit will utilise water from the Orange River - Fish River – Sundays River Canal Water Transfer Scheme (also referred to as the Orange – Fish – Sundays Canal) which discharges into the Little Fish River. Approximately 8 cumecs of water for the hydro powerhouse will be diverted from the Orange – Fish – Sundays Canal via a new take-off channel located upstream of the Cascades section. The Cascades section is a length of steep natural river drainage between the concrete Orange – Fish – Sundays Canal and the Little Fish River. The majority of the water from the Orange – Fish – Sundays Water Transfer Canal would discharge into the Little Fish River via the hydropower system instead of flowing down the Cascades.

In order to generate hydropower, water will be channelled from the Orange – Fish – Sundays Water Transfer Canal into a pipeline (1800mm diameter), for approximately 690m, which will then flow into an intermediate penstock pool (approximately 90m²). From the intermediate penstock pool the water would enter steel pipelines (1200mm diameter) and be conveyed to the primary penstock pool (approximately 90m²), over a distance of approximately 190m. The water is then conveyed for approximately 140m by steel penstock pipelines (1600mm diameter) from the primary penstock pool to the turbine power house. Anchors along the length of the pipelines would be used to anchor the pipelines from the Canal to the hydro power house. The penstock pipeline from the primary penstock pool to the turbine power house will manipulate a gross head of 53m (net / available head of 50.4m) that can be utilised for hydropower generation.

The hydro power house will be situated at the bottom end of the penstock pipeline where the water

will enter the turbines. The hydro power house will be of a nature and size to accommodate multiple turbines and controllers in a parallel system. The hydro power house (approximately 480m²) will be a complete new structure located at the base of a rocky cliff approximately 25m from the Little Fish River.

After driving the hydro power turbines, all the diverted water will be returned via a return slip (approximately 25m in length) into the Little Fish River, approximately 280m downstream of the existing discharge point of the Cascades. Infrastructure, such as sluice-gates and screens, would be constructed in order to regulate the flow of water and prevent debris and fauna from entering the turbines in the hydro power house. A bypass will be provided in order to retain water ecology and aquatic life.

Sluice-gates constructed in the canal outlet structure at the entrance to the take-off channel will regulate the approximately 8 cumecs of water required to operate the hydro power unit. The water exiting the hydro powerhouse into the Little Fish River via the return slipway is anticipated to be free of any contaminants such as hydrocarbons (oil, lubricants) and will be heated by less than 0.5 °C.

Francis Turbine System

The proposed Little Fish Embedded Small Hydro Project will generate approximately 3.1MW electricity from hydro power, i.e. generate electric power from the movement of water. The proposed Little Fish Embedded Small Hydro Project will utilise a parallel Francis Turbine System which is considered to be the most efficient system for this project based on the head and flow at the Orange – Fish – Sundays Water Transfer Canal. The parallel system in which the turbines will be arranged, allows for multiple turbines to utilise the same penstock pipeline. Three 1200kW Francis type hydro generators are proposed for the Little Fish Embedded Small Hydro Project.

In a typical installation, water is fed from a water source, through a pipe into a turbine (Figure 1). The water enters the turbine under immense pressure. The pressure of the flowing water on the turbine blades causes the shaft of the turbine to rotate. The rotating shaft is connected to an electrical generator which converts the motion of the shaft into electrical energy.



Figure 1: Examples of the turbines (spiral casings in orange) in a parallel manifold with generators (on top of the spiral casings, also orange) and turbine system controllers (grey boxes) inside the hydro power house

Electrical and Transmission

A transmission line of 22kV, i.e. power line, of approximately 11km would need to be constructed in order to feed electricity produced into the electricity distribution network of the BCRM. The transmission line would join the Somerset-East Main Substation, and is located to the north of the hydro power site. The transmission line's design will conform to ESKOM standards. It is anticipated that the transmission line will follow adjacent to existing roads. Step-up and step-down transformers will be required to accommodate the operating voltages of the hydro power house and the Eskom power line.

Landowners

The proposed Little Fish Embedded Small Hydro Project will be located on private property, i.e. Portion 1 of the Farm Langverwacht 131, Portion 32 of the Farm Doornkraal 117 and Farm No. 437.

A long term lease agreement between the landowner and developer would be required, and is in the process of being developed.

Access Roads

Access to the property is from the Bloemhof gravel road. Thereafter access is gained to overall site from an existing gravel road. A new gravel access road would be constructed in order to gain access to the penstock pools. The new access road is approximately 1000m in length and would follow adjacent to the pipelines. The existing gravel road would be utilised to gain access to the hydro power house and discharge point.

Construction Phase

The construction phase can be broadly divided into three phases, namely: preparation, construction and testing and commissioning.

Phase 1: Preparation of the site for construction, surveying and mapping the foundation points with GPS co-ordinates, on-site secured storage facilities, site camp and toilets. Clearing of vegetation. Areas that require clearing include penstock pipelines, hydro power house, construction and laydown areas, and new access road.

Phase 2: Construction of all civil activities. This phase includes the construction of the proposed new access road, penstock pools, equipment housing structures, delivery and installation of equipment. This phase also entails the execution of the power transmission equipment installation.

Phase 3: Testing and Commissioning of equipment. This entails the installation and connection of the control equipment to the generating equipment and safety systems. This phase entails the final inspection and dry testing of the complete installation with reference to civil works, construction finishes, mechanical equipment, electronic equipment and electrical circuits.

Operational and Maintenance Phase

The operational phase consists of monitoring, inspections and regular maintenance of the hydro power equipment. Clearance of vegetation may also be required for maintenance purposes. Reactive repairs – measures are taken to restore the operation and safety of the hydro power plant immediately after becoming aware they have been affected by a malfunction.

BASIC ASSESSMENT REPORT

b) Provide a detailed description of the listed activities associated with the project as applied for

Listed activity as described in GN 983, 984 and 985	Description of project activity
<p>GNR 983 – Listing Notice 1 Activity 1: The development of facilities or infrastructure for the generation of electricity from a renewable resource where— (ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare; excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area</p>	<p>The proposed Little Fish Embedded Small Hydro Project entails the development of a small hydro power station to generate approximately 3.1MW from hydro power. The site is approximately 10ha in extent (including the linear activities). The activity is applicable.</p>
<p>GNR 983 – Listing Notice 1 Activity 9: The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where— (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve; or (b) where such development will occur within an urban area</p>	<p>The combined length of the pipelines and return slip is approximately 1045m. The pipelines vary in size from 1200mm to 1800mm. The activity is applicable.</p>
<p>GNR 983 – Listing Notice 1 Activity 11: The development of facilities or infrastructure for the transmission and distribution of electricity— outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.</p>	<p>A transmission power line will be required to connect from the small hydro power station to the Eskom grid in order to feed electricity produced into the distribution network. The proposed Little Fish Embedded Small Hydro Project is located outside an urban area. The power line will operate at a voltage of 22kV. This activity is not applicable as the threshold of 33kV is not met.</p>
<p>GNR 983 – Listing Notice 1 Activity 12: The development of— (i) canals exceeding 100 square metres in size; (x) buildings exceeding 100 square metres in size, (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</p>	<p>Infrastructure for the proposed Little Fish Embedded Small Hydro Project is located within 32m of a watercourse. This includes the following: the powerhouse, approximately 480m² and the return slip (discharge canal). Discharge outlet into the Little Fish River. The activity is applicable.</p>
<p>GNR 983 – Listing Notice 1 Activity 14: The development of facilities or infrastructure, for the storage, or for the storage and handling,</p>	<p>“Dangerous goods” that are likely to be associated with the proposed project, include fuel stores for construction purposes. The storage</p>

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<p>of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.</p>	<p>capacity is unknown, but would not exceed 500m³. The activity may be applicable.</p>
<p>GNR 983 – Listing Notice 1 Activity 19: The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from— (i) a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving— (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.</p>	<p>The proposed return slip and discharge point is located within a watercourse, i.e. Little Fish River, and more than 5m³ of material will be removed and deposited. The activity is applicable.</p>
<p>GNR 983 – Listing Notice 1 Activity 27: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<p>The site is approximately 10ha in extent, including the linear routes, i.e. penstock pipelines and access road, for the hydro power system. Clearance of vegetation will be required for the construction of the penstock pools, the hydropower house, the penstock pipelines, the return slip, and the access road. The activity is applicable.</p>
<p>GNR 983 – Listing Notice 1 Activity 28: Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.</p>	<p>The site is currently zoned for agriculture and located outside an urban area. The site is approximately 10ha in extent, including the linear routes, i.e. penstock pipelines and access road, for the hydro power system. The activity is applicable.</p>
<p>GNR 985 – Listing Notice 3 Activity 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres. (b) In Eastern Cape, iii. Outside urban areas, in: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans</p>	<p>The construction of access roads to the proposed hydro power system. The site is located outside an urban area, within a Terrestrial Critical Biodiversity Area (CBA2) of the Eastern Cape Biodiversity Conservation Plan (ECBCP), as well as in a CBA of the Addo / Blue Crane Route Biodiversity Sector Plan. The activity is applicable.</p>
<p>GNR 985 – Listing Notice 3 Activity 10: The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.</p>	<p>“Dangerous goods” that are likely to be associated with the proposed project, include fuel stores for construction purposes. The site is located outside an urban area, within a Terrestrial Critical Biodiversity Area (CBA2) of the Eastern Cape Biodiversity Conservation Plan</p>

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<p>(b) In Eastern Cape: ii. Outside urban areas, in: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined;</p>	<p>(ECBCP), as well as in a CBA of the Addo / Blue Crane Route Biodiversity Sector Plan. The hydro power house is located within 100m of the Little Fish River. The activity is applicable.</p>
<p>GNR 985 – Listing Notice 3 Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan (a) In Eastern Cape, ii. Within critical biodiversity areas identified in bioregional plans</p>	<p>More than 300m² of vegetation will be cleared for the hydro power system. The site is located outside an urban area, within a Terrestrial Critical Biodiversity Area (CBA2) of the Eastern Cape Biodiversity Conservation Plan (ECBCP), as well as in a CBA of the Addo / Blue Crane Route Biodiversity Sector Plan. The activity is applicable.</p>
<p>GNR 985 – Listing Notice 3 Activity 14: The development of— (i) canals exceeding 10 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area exceeds 10 square metres in size; (x) buildings exceeding 10 square metres in size, (xii) infrastructure or structures with a physical footprint of 10 square metres or more where such development occurs — (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; (c) In Eastern Cape: ii. Outside urban areas, in: (ff) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p>	<p>Infrastructure for the proposed Little Fish Embedded Small Hydro Project is located within 32m of a watercourse. The footprint of the associated infrastructure will exceed 10m². This includes the following: the powerhouse, approximately 480m², and the return slip (discharge canal). Discharge outlet into the Little Fish River. The site is located outside an urban area, within a Terrestrial Critical Biodiversity Area (CBA2) of the Eastern Cape Biodiversity Conservation Plan (ECBCP), as well as in a CBA of the Addo / Blue Crane Route Biodiversity Sector Plan. The activity is applicable.</p>

2. FEASIBLE AND REASONABLE ALTERNATIVES

“alternatives”, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

- (a) the property on which or location where it is proposed to undertake the activity;
- (b) the type of activity to be undertaken;
- (c) the design or layout of the activity;
- (d) the technology to be used in the activity;
- (e) the operational aspects of the activity; and
- (f) the option of not implementing the activity.

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Describe alternatives that are considered in this application as required by Appendix 1 (3)(h), Regulation 2014. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity (NOT PROJECT) could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed.

The determination of whether site or activity (including different processes, etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. After receipt of this report the, competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

The identification of alternatives should be in line with the Integrated Environmental Assessment Guideline Series 11, published by the DEA in 2004. Should the alternatives include different locations and lay-outs, the co-ordinates of the different alternatives must be provided. The co-ordinates should be in degrees, minutes and seconds. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

a) Site alternatives

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
The proposed Little Fish Embedded Small Hydro Project will be located on: Portion 1 of the Farm Langverwacht 131, Portion 32 of the Farm Doornkraal 117, and Farm No. 437 Division of Somerset East, Ward 6, Blue Crane Route Local Municipality, Sarah Baartman District Municipality, Eastern Cape.	32° 48' 56.44" S	25° 37' 51.53" E
Hydropower Areas		
Broad Crested Weir and Canal Outlet Structure	32° 48' 57.79" S	25° 38' 12.24" E
Intermediate Penstock Pool	32° 48' 55.40" S	25° 37' 45.82" E
Primary Penstock Pool	32° 48' 49.31" S	25° 37' 41.71" E
Hydro Power House	32° 48' 44.87" S	25° 37' 39.94" E
Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)
The proposed activity is site specific and no alternative sites have been assessed.		
Alternative 3		
Description	Lat (DDMMSS)	Long (DDMMSS)

In the case of linear activities:

Alternative:

Latitude (S):

Longitude (E):

Alternative S1 (preferred)

New Access Road (approx. 1000m)

- Starting point of the activity

32° 48' 57.89" S	25° 38' 13.06" E

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• Middle/Additional point of the activity	32° 48' 58.39" S	25° 37' 55.41" E
• End point of the activity	32° 48' 50.24" S	25° 37' 40.85" E

Hydropower Canals / Pipelines (approx. 1045m combined length)

• Starting point of the activity	32° 48' 57.79" S	25° 38' 12.24" E
• Middle/Additional point of the activity	32° 48' 57.55" S	25° 37' 54.07" E
• End point of the activity	32° 48' 43.97" S	25° 37' 38.90" E

Alternative S3 (if any)

• Starting point of the activity		
• Middle/Additional point of the activity		
• End point of the activity		

Advantages:

- The site is located outside the urban edge on private land.
- The site is easily accessed by a gravel road which intersects with the Bloemhof Road.
- The proposed site already has the existing civil structures in the Orange – Fish – Sundays Water Transfer Canal, which can be utilized to divert the water into a pipeline to generate hydro power.
- The area where the proposed hydro power system will be located has a relatively steep slope which is considered to be favourable for the generation of hydro power.
- The hydro power facility will not alter the volume and flow patterns currently being discharged into the upper Little Fish River.

Disadvantages:

- The proposed site falls within a Terrestrial CBA 2 in terms of the Eastern Cape Biodiversity Conservation Plan (ECBCP). This places it within Terrestrial Biodiversity Land Management Class 2: 'maintain near natural state'. A portion of the site is located within a CBA of the Addo / Blue Crane Route Biodiversity Sector Plan.
- A transmission line of 22kV, i.e. power line, of approximately 11km would need to be constructed in order to feed electricity produced into the electricity distribution network of the BCRM. The transmission line would join the Somerset-East Main Substation, and is located to the north of the hydro power site.
- A long term lease agreement between the landowner and developer would be required.

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

Please refer to Appendix J-1 for additional route co-ordinates.

In the case of an area being under application, please provide the co-ordinates of the corners of the site as indicated on the lay-out map provided in Appendix A of this form.

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b) Lay-out alternatives

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
Hydropower Areas		
Broad Crested Weir and Canal Outlet Structure	32° 48' 57.79" S	25° 38' 12.24" E
Intermediate Penstock Pool	32° 48' 55.40" S	25° 37' 45.82" E
Primary Penstock Pool	32° 48' 49.31" S	25° 37' 41.71" E
Hydro Power House	32° 48' 44.87" S	25° 37' 39.94" E
Hydropower Canals / Pipelines (approx. 1045m combined length)		
Starting point of the activity	32° 48' 57.79" S	25° 38' 12.24" E
Middle/Additional point of the activity	32° 48' 57.55" S	25° 37' 54.07" E
End point of the activity	32° 48' 43.97" S	25° 37' 38.90" E
New Access Road (approx. 1000m)		
• Starting point of the activity	32° 48' 57.89" S	25° 38' 13.06" E
• Middle/Additional point of the activity	32° 48' 58.39" S	25° 37' 55.41" E
• End point of the activity	32° 48' 50.24" S	25° 37' 40.85" E

<p>Advantages:</p> <ul style="list-style-type: none"> • The proposed site already has the existing civil structures in the Orange – Fish – Sundays Water Transfer Canal, which can be utilized to divert the water into a pipeline to generate hydro power. • The area where the proposed hydro power system will be located has a relatively steep slope which is considered to be favourable for the generation of hydro power. • The hydro power facility will not alter the volume and flow patterns currently being discharged into the Little Fish River. <p>Disadvantages:</p> <ul style="list-style-type: none"> • The proposed site falls within a Terrestrial CBA 2 in terms of the Eastern Cape Biodiversity Conservation Plan (ECBCP). This places it within Terrestrial Biodiversity Land Management Class 2: 'maintain near natural state'. A portion of the site is located within a CBA of the Addo / Blue Crane Route Biodiversity Sector Plan.
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Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)
No additional alternatives have been considered for the layout as it is specific for requirements of the hydropower system.		
Alternative 3		
Description	Lat (DDMMSS)	Long (DDMMSS)

c) Technology alternatives

Alternative 1 (preferred alternative)
The Parallel Francis Turbine System being considered for the hydro power generation consists of 3 x 1200kW Francis type hydro generators in parallel with microprocessors and settable wicket gate vanes.
<p>Advantages:</p> <ul style="list-style-type: none"> • A parallel system can cope efficiently with flow variation. • Smaller equipment are installed and maintained more easily and in shorter time. • Francis turbines are the most efficient turbines for the given head at the proposed Little Fish hydro system.

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<ul style="list-style-type: none"> •Parallel turbines can utilize the same penstock line with the addition of a manifold. •Francis turbines working parts are all above ground level. •Should one turbine fail, it does not cause total power failure but only a percentage loss. •All units are identical and spare parts that come with system can be utilised on any unit.
Alternative 2
No additional alternatives have been considered.
Alternative 3

d) Other alternatives (e.g. scheduling, demand, input, scale and design alternatives)

Alternative 1 (preferred alternative)
No other alternatives have been identified and assessed.
Alternative 2
Alternative 3

e) No-go alternative

<p>The No-Go Alternative entails that the site remains in its current, i.e. used for agricultural practices namely sheep farming.</p> <p>Advantages: No vegetation (including protected or endangered plant species) will be physically removed; however a risk remains that these species will be lost to animals as a food source. No loss of area for farming. No disturbance to the Orange - Fish– Sundays Canal Water Transfer Scheme or the Little Fish River.</p> <p>Disadvantages: The socio-economic benefits associated with this project would not be realised, i.e. an alternative energy source and limited employment opportunities during construction and operations.</p>

Paragraphs 3 – 13 below should be completed for each alternative.

3. PHYSICAL SIZE OF THE ACTIVITY

a) Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Alternative:		Size of the activity:
Alternative A1 ¹ (preferred activity alternative)	(power house and penstock pools)	660 m ²
Alternative A2 (if any)		m ²
Alternative A3 (if any)		m ²

or, for linear activities:

¹ "Alternative A.." refer to activity, process, technology or other alternatives.

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Alternative:

Alternative A1 (preferred activity alternative)

(pipelines and canal = 1045m)
(new access road = 1000m)

Length of the activity:

2045 m	
m	
m	

Alternative A2 (if any)

Alternative A3 (if any)

b) Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

Alternative:

Alternative A1 (preferred activity alternative)

(linear routes, penstock pools and power house)

Size of the site/servitude:

100000m ² (10ha)	
m ²	
m ²	

Alternative A2 (if any)

Alternative A3 (if any)

4. SITE ACCESS

Does ready access to the site exist?

Access to the property is from the Bloemhof Road. Thereafter access is gained to overall site from an existing gravel road.

If NO, what is the distance over which a new access road will be built

YES ✓	NO
1000 m	

Describe the type of access road planned:

A new gravel access road would be constructed in order to gain access to the penstock pools. The new access road is approximately 1000m in length and would follow adjacent to the pipelines.

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

5. LOCALITY MAP

An A3 locality map must be attached to the back of this document, as Appendix A. The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.). The map must indicate the following:

- an accurate indication of the project site position as well as the positions of the alternative sites, if any;
- indication of all the alternatives identified;
- closest town(s);
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and

- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection).

Please refer to **Appendix A** for the locality map.

6. LAYOUT/ROUTE PLAN

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as Appendix A to this document.

The site or route plans must indicate the following:

- the property boundaries and numbers of all the properties within 50 metres of the site;
- the current land use as well as the land use zoning of the site;
- the current land use as well as the land use zoning each of the properties adjoining the site or sites;
- the exact position of each listed activity applied for (including alternatives);
- servitude(s) indicating the purpose of the servitude;
- a legend; and
- a north arrow.

Please refer to **Appendix A** for the layout map.

7. SENSITIVITY MAP

The layout/route plan as indicated above must be overlain with a sensitivity map that indicates all the sensitive areas associated with the site, including, but not limited to:

- watercourses;
- the 1:100 year flood line (where available or where it is required by DWS);
- ridges;
- cultural and historical features;
- areas with indigenous vegetation (even if it is degraded or infested with alien species); and
- critical biodiversity areas.

The sensitivity map must also cover areas within 100m of the site and must be attached in Appendix A

Please refer to **Appendix A** for the sensitivity maps.

8. SITE PHOTOGRAPHS

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under Appendix B to this report. It must be supplemented with additional photographs of relevant features on the site, if applicable.

Please refer to **Appendix B** for the site photographs.

9. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of at least 1:200 as Appendix C for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity.

Please refer to **Appendix C** for the facility illustrations.

10. ACTIVITY MOTIVATION

Motivate and explain the need and desirability of the activity (including demand for the activity):

1. Is the activity permitted in terms of the property's existing land use rights?	YES	NO ✓	Please explain
<p>The current land use (zoning) is Agricultural and the footprint / project site will require rezoning for the life span of the proposed hydro power system.</p> <p>The application for rezoning falls outside the EIA process, however Environmental Authorisations (if required) are needed to finalise any rezoning application.</p>			
2. Will the activity be in line with the following?			
(a) Provincial Spatial Development Framework (PSDF)	YES ✓	NO	Please explain
<p>The proposed activity is in line with alternative energy sources as identified in the Eastern Cape Provincial Development Framework (ECPDF, 2014).</p> <p>Although the proposed activity is located within a terrestrial CBA 2 in terms of the Eastern Cape Biodiversity Conservation Plan (ECBCP), it does not fall within a core biodiversity area (CBA 1), as identified in the PSDF and ECBCP.</p>			
(b) Urban edge / Edge of Built environment for the area	YES ✓	NO	Please explain
<p>The proposed activity is located outside of the urban edge / edge of built environment.</p>			
(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).	YES ✓	NO	Please explain
<p>The proposed activity is in line with the Blue Crane Route Municipality's (BCRM) Integrated Development Plan (IDP, 2016) regarding renewable energy sources within the BCRM. The Blue Crane Route Municipality's (BCRM) Integrated Development Plan (IDP, 2016) acknowledges a potential for renewable energy in terms of hydro power generation and lists renewable energy as an objective for local economic development.</p> <p>The proposed activity is in line with the Cacadu (Sarah Baartman) District Municipality's (CDM) SDF (2013) as an alternative and sustainable source for energy.</p>			
(d) Approved Structure Plan of the Municipality	YES ✓	NO	Please explain
<p>The proposed activity is in line with the Blue Crane Route Municipality's (BCRM) Integrated Development Plan (IDP, 2016) regarding renewable energy sources within the BCRM. The Blue Crane Route Municipality's (BCRM) Integrated Development Plan (IDP, 2016) acknowledges a potential for renewable energy in terms of hydro power generation and lists renewable energy as an objective for local economic development.</p> <p>The proposed activity is in line with the Cacadu (Sarah Baartman) District Municipality's (CDM) SDF</p>			

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(2013) as an alternative and sustainable source for energy.			
(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	YES✓	NO	Please explain
<p>The proposed activity is located within a terrestrial CBA2 in terms of the ECBCP; however it does not fall within a core/critical biodiversity area, i.e. CBA 1 identified in the ECBCP.</p> <p>According to the Addo / Blue Crane Route Biodiversity Sector Plan for the BCRM (BSP) (2012) the proposed hydropower system falls mainly within a CBA, Ecological Support Area (ESA) and Other Natural Area (ONA). Approximately 90m of the hydropower system (i.e. pipeline, hydropower house, return slip and discharge point) falls within a degraded CBA (Little Fish River with buffer).</p> <p>The proposed hydro power project will contribute to the sustainable renewable energy industry.</p>			
(f) Any other Plans (e.g. Guide Plan)	YES✓	NO	Please explain
<p>The proposed activity is located within a terrestrial and aquatic CBA2 in terms of the ECBCP; however it does not fall within a core/critical biodiversity area, i.e. CBA 1 identified in the ECBCP..</p> <p>According to the Biodiversity Sector Plan (BSP) for the Blue Crane Route Municipality (2012) the proposed hydropower system falls within a CBA, Ecological Support Area (ESA) and Other Natural Area (ONA). Approximately 90m of the hydropower system (i.e. pipeline, hydropower house, return slip and discharge point) falls within a degraded CBA (Little Fish River with buffer).</p> <p>The management objective for the CBA and ESA is to 'maintain natural land, rehabilitate degraded to natural or near natural and manage for no further degradation'. The land use activity for infrastructure installations has a 'Restricted' classification, where land use is possible under strict controls in order to avoid impacts on biodiversity.</p> <p>According to the National Freshwater Ecosystem Priority Areas (NFEPA) there are no wetlands present at or within 500m of the hydro project footprint. The Little Fish River, located to the north, falls within the freshwater ecosystem priority areas (NFEPA, 2011).</p>			
3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	YES	NO✓	Please explain
<p>The proposed activity in itself is not identified as a priority project in terms of the BCRM's IDP (2015/16). However the proposed activity does fall within the overall objective of renewable energy sources to grow a green economy for the BCRM.</p>			
4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.)	YES✓	NO	Please explain
<p>The Eastern Cape Province is reliant on electricity imports from other provinces yet houses significant industrial and rural development potential. Power from the national grid is largely generated from coal power stations, and transmitted considerable distances to the Eastern Cape. This leads to significant transmission losses and local grid instabilities.</p> <p>Additionally, the BCRM's IDP (2015/16) identified electricity supply as a priority and an objective of</p>			

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<p>service delivery and infrastructure development.</p> <p>Although only 3.1MW will be fed into the electrical grid, the surrounding community will benefit from the additional electrical supply. Further benefits are the limited employment opportunities during construction and operation.</p>			
<p>5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development? (Confirmation by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)</p>	<p>YES ✓</p>	<p>NO</p>	<p>Please explain</p>
<p>There is currently adequate service capacity available:</p> <p>There are existing access roads and the developer would expand the access roads on the site. A transmission line of 22kV, i.e. power line, of approximately 11km would need to be constructed in order to feed electricity produced into the electricity distribution network of the BCRM. The transmission line would join the Somerset-East Main Substation, and is located to the north of the hydro power site. The transmission line's design will conform to Eskom standards. It is anticipated that the transmission line will follow adjacent to existing roads. Step-up and step-down transformers will be required to accommodate the operating voltages of the hydro power house and the Eskom power line. The developer would provide for the connecting transmission line and transformers. The Orange – Fish – Sundays Water Transfer canal has sufficient water flow in order to generate hydro power. No water loss is expected to occur.</p>			
<p>6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)? (Comment by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)</p>	<p>YES</p>	<p>NO ✓</p>	<p>Please explain</p>
<p>The developer is Navitas Power Equipment (NAVITAS), a private developer, and no infrastructure planning is required by the BCRM.</p> <p>The proposed project in itself is not prioritised in the BCRM's IDP (2015/16); however, the BCRM's IDP speaks to renewable energy as an objective for local economic development as well as service delivery and infrastructure development.</p>			
<p>7. Is this project part of a national programme to address an issue of national concern or importance?</p>	<p>YES</p>	<p>NO ✓</p>	<p>Please explain</p>
<p>The proposed project in itself does not form part of a national programme, e.g. the Department of Energy's Small Projects REIPPP Programme.</p> <p>The proposed project will however contribute to the sustainable renewable energy industry and thereby would contribute to meeting the overall renewables target within the Integrated Resource Plan (2010).</p>			
<p>8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)</p>	<p>YES ✓</p>	<p>NO</p>	<p>Please explain</p>
<p>The proposed Little Fish Embedded Small Hydro Project will be located adjacent to the Orange – Fish – Sundays Water Transfer Canal on Portion 1 of the Farm Langverwacht 131, Portion 32 of the Farm</p>			

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<p>Doornkraal 117 and Farm No. 437.</p> <p>The Orange – Fish – Sundays Water Transfer Canal has a sufficient flow of water in order to generate hydropower.</p> <p>The Orange – Fish – Sundays Water Transfer Canal already has the existing civil structures, which can be utilized to divert the water into a pipeline to generate hydro power.</p> <p>The area where the proposed hydro power house and associated infrastructure will be located, has a relatively steep slope which can be used to manipulate a gross head of 53m (net / available head of 50.4m) that can be utilised for hydropower generation.</p>			
9. Is the development the best practicable environmental option for this land/site?	YES ✓	NO	Please explain
<p>Agricultural potential of the site is low as it is classed as non-arable agricultural land (CDM SDF, 2013), with a land capability class of VIII. As such, the site is not suitable for cultivation purposes.</p> <p>The proposed activity is located within a terrestrial CBA2 in terms of the ECBCP; however it does not fall within a core/critical biodiversity area, i.e. CBA 1 identified in the ECBCP.</p> <p>According to the Biodiversity Sector Plan (BSP) for the Blue Crane Route Municipality (2012) the proposed hydropower system falls within a CBA, Ecological Support Area (ESA) and Other Natural Area (ONA). The management objective for the CBA and ESA is to 'maintain natural land, rehabilitate degraded to natural or near natural and manage for no further degradation'. The land use activity for infrastructure installations has a 'Restricted' classification, where land use is possible under strict controls in order to avoid impacts on biodiversity.</p> <p>No critically endangered or endangered vegetation types occur within the proposed hydro power project footprint.</p>			
10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?	YES ✓	NO	Please explain
<p>The negative impacts identified can be mitigated to a lower negative significance or positive significance if all mitigation measures identified are implemented. The positive impacts include the production of cleaner energy and employment opportunities, although limited.</p>			
11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	YES ✓	NO	Please explain
<p>The proposed development is for a small hydro power station to generate approximately 3.1MW. There is a possibility that similar small scale hydro projects could be proposed within the broader area.</p>			
12. Will any person's rights be negatively affected by the proposed activity/ies?	YES	NO ✓	Please explain
<p>The proposed activity will not negatively affect any person's rights.</p> <p>The private landowners will enter into a long term lease agreement with the developer.</p> <p>The hydropower operation will not affect water quality. Therefore, no person's constitutional right to a healthy environment will be impeded on.</p>			
13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?	YES	NO ✓	Please explain
<p>The proposed activity is located outside of the urban edge / edge of built environment.</p>			
14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?	YES	NO ✓	Please explain
<p>The proposed activity could potentially fall within the SIP 8 category of green energy in support of the South African economy, but does not form part of the Department of Energy's Small Projects REIPPP</p>			

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Programme.	
15. What will the benefits be to society in general and to the local communities?	Please explain
<p>Although only 3.1MW will be fed into the electrical grid, the surrounding community will benefit from the additional electrical supply. Further benefits are the limited employment opportunities during construction and operation.</p> <p>The proposed project forms a source of sustainable, zero carbon electricity generation, and thereby reduces carbon emissions associated with coal power stations.</p>	
16. Any other need and desirability considerations related to the proposed activity?	Please explain
None	
17. How does the project fit into the National Development Plan for 2030?	Please explain
<p>A long term priority of the National Development Plan is to procure at least 20,000MW of renewable energy. This forms part of the move to a less carbon-intensive electricity production.</p> <p>The proposed project will contribute to the renewable energy target, and forms a source of zero carbon electricity generation.</p>	
18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.	
<p>Impacts on the environment, socio-economic conditions and cultural heritage have been identified, considered and assessed. Mitigation measures have been recommended in order to minimise negative impacts and to maximise positive impacts. These mitigation measures have been carried over to the Environmental Management Programme (EMPr), which is a management tool for the developer and contractors who will be appointed to undertake the required work. The EMPr, which includes compliance procedures, ensures that environmentally acceptable practices are followed during all phases of the project.</p> <p>Opportunities for public participation are provided throughout the assessment process. These include an initial 30 day comment and registration period at the project announcement, and a 30 day review period of the draft basic assessment report.</p>	
19. Please describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.	
<p>The environmental management principles have been taken into account through the assessment of biophysical and socio-economic impacts, thereby considering impacts on the physical environment as well as impacts on the social, cultural and economic environments. Mitigation measures have been recommended in order to minimise negative impacts and to maximise positive impacts.</p> <p>The EMPr, which includes the recommended mitigation measures, ensures the implementation of environmental practices that are aimed at the best form of environmental protection. The aim is to ensure that the Applicant and the Contractor take reasonable measures to protect the environment and to remedy impacts on the environment, as required by NEMA. Other objectives of the EMPr are to:</p> <ol style="list-style-type: none"> a) avoid, minimise or correct the disturbance of ecosystems and loss of biodiversity; b) avoid, minimise or correct pollution and degradation of the environment; c) avoid or minimise waste, to reuse or recycle waste where possible and to dispose of waste in a responsible manner; d) apply a risk-averse and cautious approach; and e) anticipate and prevent negative impacts on the environment and on people's environmental 	

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rights. Where impacts cannot be prevented, such impacts are minimised and mitigated.
The EMP is attached as **Appendix G**.

11. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
National Environmental Management Act (NEMA, No. 107 of 1998, as amended)	In terms of Section 24 of NEMA the impacts associated with listed activities must be considered, investigated, assessed and reported on to the competent authority. This is required in order to obtain an Environmental Authorisation for the undertaking of the proposed activities.	Department of Environmental Affairs (DEA) – Competent Authority Eastern Cape Department of Economic Development, Environmental Affairs & Tourism (DEDEAT) – Commenting Authority	1998
GNR 983 of the EIA Regulations (2014)	Listed activities 1, 9, 11, 12, 14, 19, 27, and 28 per GNR 983, require a basic assessment to be undertaken.	DEA – Competent Authority DEDEAT – Commenting Authority	2014
GNR 985 of the EIA Regulations (2014) promulgated in terms of NEMA	Listed activities 4, 10, 12, and 14 per GNR 985, require a basic assessment to be undertaken.	DEA – Competent Authority DEDEAT – Commenting Authority	2014
National Environmental Management: Air Quality Act [NEM:AQA] (Act No. 39 of 2004) and Regulations	The listed activities promulgated under NEM:AQA are not applicable to the proposed project. Sections 32 and 34 regarding dust and noise control may be applicable during the construction phase.	DEA	2004
National Heritage Resources Act, 1999 (Act No. 25 of 1999) [NHRA]	Section 38 of NHRA refers to the following activities that require correspondence with the heritage authorities: 38(a) The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length 38(c)(i) Any development or other activity which will change	South African Heritage Resource Agency (SAHRA) Eastern Cape Provincial Heritage Resources Authority (ECPHRA)	1999

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Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	the character of a site exceeding 5 000 m ² in extent 38(d) The re-zoning of a site exceeding 10 000 m ² in extent. A heritage impact assessment has been undertaken. No objects or artefacts were identified that require a heritage permit for removal or destruction.		
National Environmental Management: Biodiversity Act (Act No. 10 of 2004) [NEMBA]	NEMBA provides for the management and conservation of South Africa's biodiversity within the framework of NEMA. This involves the protection of species and ecosystems that warrant national protection. NEMBA also regulates alien and invader species. No threatened ecosystems will be affected.	DEA	2004
National Forest Act (Act 84 of 1998) [NFA]	The NFA recognises that natural forests and woodlands form an important part of the environment and need to be conserved and developed according to the principles of sustainable management. The NFA in this regard protects indigenous trees from destruction, damage or removal, and require permits prior to their removal, etc. No forest area or protected trees are located on site.	Department of Agriculture, Forestry and Fisheries (DAFF)	1998
Nature & Environmental Conservation Ordinance (No. 19 of 1974) [NECO]	These provide for the protection of species and require permits prior to the removal thereof.	Eastern Cape DEDEAT	1974
National Environmental Management: Waste Act No. 59 of 2008 (NEM:WA)	The NEM:WA regulates waste management in order to protect human and environmental health, by providing reasonable measures for the prevention of pollution and ecological degradation, and for securing ecologically sustainable	National DEA, Eastern Cape DEDEAT	2008

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Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	<p>development. It also provides for national norms and standards for regulating the management of waste by all spheres of government, providing for specific waste management measures for licensing and the control of waste management and remediation activities associated with contaminated land. This legislation provides for compliance and enforcement of the above requirements. No person may commence, undertake or conduct a waste management activity, except in accordance with the requirements or standards prescribed and a waste management licence issued in respect of that activity, if a licence is required. There are no activities listed in the waste management listed activities that are applicable to the proposed development.</p>		
National Water Act, 1998 (Act No. 36 of 1998)	<p>Provides for tiered regulatory control over 11 water uses, as identified in Section 21 of the NWA. A person who wishes to use or who uses water in a manner that is not covered under Schedule 1, General Authorisations, or in a manner that is not regarded or declared as an existing lawful use, may only use that water under the authority of a Water Use Licence. Section 21 (c) and (i) water use activities are applicable.</p>	Department of Water and Sanitation	1998
Conservation of Agricultural Resources Act (No 43 of 1983) and regulations [CARA]	<p>CARA provides for the implementation of control measures for alien and invasive plant species.</p>	DAFF	1983
Fertilisers, Farm Feeds, Agricultural Remedies and	<p>Sections 3 to 10 relates to the control of the use of registered</p>	DAFF	1947

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Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
Stock Remedies Act (No 36 of 1947) and regulations	pesticides, herbicides (weed killers) and fertilisers. Special precautions must be taken to prevent workers from being exposed to chemical substances in this regard.		
Occupational Health and Safety Act (No 85 of 1993) and regulations	Sections 8 and 9 relates to general duties of employers and employees. The construction regulations would be applicable during the construction phase.	Department of Labour	1993

12. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?

YES ✓	NO
Approx. 30 m ³	

If YES, what estimated quantity will be produced per month?

How will the construction solid waste be disposed of (describe)?

Construction waste will be removed from site, with trucks, by the appointed contractor to a registered waste disposal site. Where possible, excavated material or inert construction waste material to be used as fill material or in site levelling.

Where will the construction solid waste be disposed of (describe)?

Solid waste that cannot be reused or recycled will be disposed of (within 14 days) at the closest licensed waste disposal (landfill) site, i.e. Somerset East

Will the activity produce solid waste during its operational phase?

YES	NO ✓
N/A m ³	

If YES, what estimated quantity will be produced per month?

How will the solid waste be disposed of (describe)?

The proposed Little Fish Embedded Small Hydro Project will not produce waste directly from its operations. Debris from the Orange – Fish – Sundays Water Transfer Canal would be collected and disposed of at a registered landfill site.

If the solid waste will be disposed of into a municipal waste stream, indicate which registered landfill site will be used.

Somerset East

Where will the solid waste be disposed of if it does not feed into a municipal waste stream (describe)?

N/A

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

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Can any part of the solid waste be classified as hazardous in terms of the NEM:WA?

YES	NO✓
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 If YES, inform the competent authority and request a change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

Is the activity that is being applied for a solid waste handling or treatment facility?

YES	NO✓
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 If YES, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?

YES	NO✓
-----	------------

 If YES, what estimated quantity will be produced per month?

N/A m ³	
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 Will the activity produce any effluent that will be treated and/or disposed of on site?

YES	NO✓
-----	------------

If YES, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Will the activity produce effluent that will be treated and/or disposed of at another facility?

YES	NO✓
-----	------------

If YES, provide the particulars of the facility:

Facility name:		
Contact person:		
Postal address:		
Postal code:		
Telephone:	Cell:	
E-mail:	Fax:	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

None.

c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere other than exhaust emissions and dust associated with construction phase activities?

YES	NO✓
-----	------------

 If YES, is it controlled by any legislation of any sphere of government?

YES	NO
-----	----

If YES, the applicant must consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If NO, describe the emissions in terms of type and concentration:

Dust will occur during the construction phase as a result of clearing of vegetation, construction vehicles and/or equipment movement. Dust will also occur during the rehabilitation phase until vegetation has been established. Dust levels are not to exceed 1200mg/m²/day (30 day average) for industrial and rural areas (non-residential areas).
 Standard emissions from construction vehicles and generators will be at low levels during construction.

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d) Waste permit

Will any aspect of the activity produce waste that will require a waste permit in terms of the NEM:WA?

YES	NO ✓
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If YES, please submit evidence that an application for a waste permit has been submitted to the competent authority

e) Generation of noise

Will the activity generate noise?

YES ✓	NO
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If YES, is it controlled by any legislation of any sphere of government?

YES	NO ✓
-----	------

Describe the noise in terms of type and level:

During the construction phase noise will be generated. Sources of noise will be: construction vehicles; generators; construction machinery; etc. This will, however, be limited to daylight hours and will be temporary, i.e. occurring only during the construction period. Given that the proposed site is located outside an urban area and provided that mitigation measures are implemented, a negligible impact from noise generation is anticipated.

Limited noise impacts are anticipated during the operational phase.

13. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es):

Municipal	Water board ✓ Orange – Fish – Sundays Water Transfer Canal	Groundwater	River, stream, dam or lake	Other ✓ Orange – Fish – Sundays Water Transfer Canal	The activity will not use water
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If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month:

N/A litres

Does the activity require a water use authorisation (general authorisation or water use license) from the Department of Water Affairs?

YES ✓	NO
-------	----

If YES, please provide proof that the application has been submitted to the Department of Water Affairs.

A Water Use Licence Application (WULA) has been submitted to the DWS in terms of Section 21 of the National Water Act (NWA) 1998 (Act No. 36 of 1998). A person who wishes to use or who uses water in a manner that is not covered under Schedule 1, General Authorisations, or in a manner that is not regarded or declared as an existing lawful use, may only use that water under the authority of a Water Use Licence.

Section 21 (c) and (i) water use activities are applicable due to infrastructure for the hydro power system being located within 100m of watercourses.

Proof of the WULA submission will be provided in the Final Basic Assessment Report as the submission is being undertaken simultaneously with the submission of the EIA Application and Draft

Basic Assessment Report.

14. ENERGY EFFICIENCY

Describe the design measures, if any, which have been taken to ensure that the activity is energy efficient:

The proposed activity is to generate electricity from a renewable energy source, i.e. hydropower

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

Additional alternative energy sources have not been considered as the proposed activity is to utilise a renewable energy source for the production of electricity.

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

1. For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section B and indicate the area, which is covered by each copy No. on the Site Plan.

Section B Copy No. (e.g. A):

2. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section? **YES**✓ NO
 If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed and attach it in Appendix I. All specialist reports must be contained in Appendix D.

Property description/physical address:

Province	Eastern Cape
District Municipality	Sarah Baartman District Municipality
Local Municipality	Blue Crane Route Local Municipality
Ward Number(s)	6
Farm name and number	Farm Langverwacht 131 (Portion 1) Farm Doornkraal 117 (Portion 32) Farm No. 437
Portion number	Portion 1 of the Farm Langverwacht 131 Portion 32 of the Farm Doornkraal 117 Portion 0 of the Farm No. 437
SG Code	C06600000000013100001 C06600000000011700032 C06600000000043700000

Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application including the same information as indicated above.

Current land-use zoning as per local municipality IDP/records:

Agriculture

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to, to this application.

Is a change of land-use or a consent use application required? **YES**✓ NO

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15. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1:

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 1:7,5✓	–	1:7,5 1:5✓	–	Steeper than 1:5
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Alternative S2 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
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Alternative S3 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
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16. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site:

2.1 Ridgeline	<input type="checkbox"/>	2.4 Closed valley	<input type="checkbox"/>	2.7 Undulating plain / low hills	<input checked="" type="checkbox"/>
2.2 Plateau	<input type="checkbox"/>	2.5 Open valley	<input checked="" type="checkbox"/>	2.8 Dune	<input type="checkbox"/>
2.3 Side slope of hill /mountain	<input checked="" type="checkbox"/>	2.6 Plain	<input type="checkbox"/>	2.9 Seafront	<input type="checkbox"/>
2.10 At sea	<input type="checkbox"/>				

17. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on any of the following?

	Alternative S1:		Alternative S2 (if any):		Alternative S3 (if any):	
	YES	NO✓	YES	NO	YES	NO
Shallow water table (less than 1.5m deep)	YES	NO✓	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	YES	NO✓	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	YES✓	NO	YES	NO	YES	NO
Little Fish River						
Unstable rocky slopes or steep slopes with loose soil	YES	NO✓	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	YES	NO✓	YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)	YES	NO✓	YES	NO	YES	NO
Any other unstable soil or geological feature	YES	NO✓	YES	NO	YES	NO
An area sensitive to erosion	YES	NO✓	YES	NO	YES	NO

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. Information in respect of the above will often be available as part of the

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project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted.

18. GROUND COVER

Indicate the types of groundcover present on the site. The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Natural veld - good condition ^E	Natural veld with scattered aliens^E✓	Natural veld with heavy alien infestation ^E	Veld dominated by alien species ^E	Gardens
Sport field	Cultivated land✓	Paved surface	Building or other structure✓	Bare soil✓

If any of the boxes marked with an “E” is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn’t have the necessary expertise.

19. SURFACE WATER

Indicate the surface water present on and or adjacent to the site and alternative sites?

Perennial River	YES✓	NO	UNSURE
Non-Perennial River	YES✓	NO	UNSURE
Permanent Wetland	YES	NO✓	UNSURE
Seasonal Wetland	YES	NO✓	UNSURE
Artificial Wetland	YES	NO✓	UNSURE
Estuarine / Lagoonal wetland	YES	NO✓	UNSURE

If any of the boxes marked YES or UNSURE is ticked, please provide a description of the relevant watercourse.

There are no wetlands within 500m of the proposed site.

A non-perennial drainage line is located to the east of the proposed hydropower system. The drainage line starts at the end of the Orange – Fish – Sundays Water Transfer Canal and flows in a north-easterly direction to flow into the Little Fish River. The drainage line section is known as the Cascades section. The Little Fish River is located to the north of the proposed hydropower system. Refer to **Appendix A, Sensitivity Maps**.

The Little Fish River in the affected reach, has been moderately transformed and modified by the almost constant inflow of the relatively large volume (8 cumecs) of water from the Fish – Sundays Canal. In addition, the water quality in the river has been seriously impacted by the discharge of poor-quality sewage effluent from upstream Somerset East and irrigation return flows contaminated with chemicals from large-scale pivot irrigation in the catchment. In addition, the introduction of fish alien to this system via the Orange – Fish – Sundays Canal has also modified and degraded the

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ecological functioning of the river to the detriment of endemic species (Bok, 2016; **Appendix D-2**).

In terms of the National Freshwater Ecosystem Priority Areas (NFEPA) study, this reach of the Little Fish River is considered to have very limited value in terms of fish biodiversity or freshwater ecosystem conservation. This reach of the Little Fish River has a C- Category Present Ecological Status (PES), and Moderate Ecological Importance (EI) and Moderate Ecological Sensitivity (ES) (Bok, 2016; **Appendix D-2**).

Other surface water (man-made structures) occurring within the site is the Orange – Fish – Sundays Water Transfer Canal, which is located towards the east and flows from east to west. Refer to **Appendix A2, Layout Map and Appendix B, Photographs**.

20. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

Natural area ✓	Dam or reservoir	Polo fields
Low density residential	Hospital/medical centre	Filling station ^H
Medium density residential	School	Landfill or waste treatment site
High density residential	Tertiary education facility	Plantation
Informal residential ^A	Church	Agriculture ✓ Agricultural fields are located to the north west Goat and sheep grazing
Retail commercial & warehousing	Old age home	River, stream ✓ or wetland A non-perennial drainage line is located to the east and the Little Fish River is located to the north of the proposed hydropower system
Light industrial	Sewage treatment plant ^A	Nature conservation area
Medium industrial ^{AN}	Train station or shunting yard ^N	Mountain, koppie or ridge ✓
Heavy industrial ^{AN}	Railway line ^N	Museum
Power station	Major road (4 lanes or more) ^N	Historical building
Office/consulting room	Airport ^N	Protected Area
Military or police base/station/compound	Harbour	Graveyard
Spoil heap or slimes dam ^A	Sport facilities	Archaeological site
Quarry, sand or borrow pit	Golf course	Other land uses ✓ (describe) Other surface water (man-made structures) occurring within the site is the Orange – Fish – Sundays Water Transfer Canal, which is located towards the east of the proposed hydropower system.

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If any of the boxes marked with an "N" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

If any of the boxes marked with an "H" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

Does the proposed site (including any alternative sites) fall within any of the following:

Critical Biodiversity Area (as per provincial conservation plan) The site is located within a Terrestrial CBA 2 of the Eastern Cape Biodiversity Conservation Plan According to the Biodiversity Sector Plan (BSP) for the Blue Crane Route Municipality (2012) the proposed hydropower system falls within a CBA, Ecological Support Area (ESA) and Other Natural Area (ONA). Approximately 90m of the hydropower system (i.e. pipeline, hydropower house, return slip and discharge point) falls within a degraded CBA (Little Fish River with buffer).	YES✓	NO
Core area of a protected area?	YES	NO✓
Buffer area of a protected area?	YES	NO✓
Planned expansion area of an existing protected area?	YES	NO✓
Existing offset area associated with a previous Environmental Authorisation?	YES	NO✓
Buffer area of the SKA?	YES	NO✓

If the answer to any of these questions was YES, a map indicating the affected area must be included in Appendix A.

Please refer to **Appendix A4 and A5, Sensitivity Maps.**

21. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including Archaeological or paleontological sites, on or close (within 20m) to the site? If YES, explain:

YES	NO✓
Uncertain	

If uncertain, conduct a specialist investigation by a recognised specialist in the field (archaeology or palaeontology) to establish whether there is such a feature(s) present on or close to the site. Briefly explain the findings of the specialist:

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No archaeological sites/materials were observed and in general it would appear unlikely that any archaeological remains of significance will be found in situ or exposed during the development. There are no known graves or buildings older than 60 years on the site (Binneman and Reichert, 2016; **Appendix D-3**).

Will any building or structure older than 60 years be affected in any way?

YES	NO ✓
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Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?

YES	NO ✓
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If YES, please provide proof that this permit application has been submitted to SAHRA or the relevant provincial authority.

22. SOCIO-ECONOMIC CHARACTER

a) Local Municipality

Please provide details on the socio-economic character of the local municipality in which the proposed site(s) are situated.

Level of unemployment:

The Blue Crane Route Municipality's Integrated Development Plan (BCRM IDP, 2015) indicates that 15.2% of the potential workforce is unemployed and 50.5% are not economically active. The remaining 34.3% of the labour force is employed.

Economic profile of local municipality:

Agriculture dominates the district's economy, contributing 28% of all value added and amounting to 41% of formal employment. The primary economic activity in the BCRM is Agriculture, divided into (BCRM IDP, 2015):

- Intensive Farming Operations: cash crops / Lucerne production, dairy's, etc.
- Extensive Farming Operations: cattle and goat farming, game farming.

Level of education:

The BCRM IDP (2015) indicates the following levels of education for persons over 20 years of age:

- No schooling: 8.24%
- Some primary schooling: 34.65%
- Complete primary schooling: 8%
- Some secondary schooling: 30.46%
- Matric (Grade 12): 14.06%
- Higher Education: 4.43%
- Unspecified: 0.16%

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b) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R 91 000 000	
What is the expected yearly income that will be generated by or as a result of the activity?	R 60 000 000	
Will the activity contribute to service infrastructure?	YES ✓	NO
Is the activity a public amenity?	YES	NO ✓
How many new employment opportunities will be created in the development and construction phase of the activity/ies?	65	
What is the expected value of the employment opportunities during the development and construction phase?	R 3 200 000	
What percentage of this will accrue to previously disadvantaged individuals?	84%	
How many permanent new employment opportunities will be created during the operational phase of the activity?	8	
What is the expected current value of the employment opportunities during the first 10 years?	R 10 800 000	
What percentage of this will accrue to previously disadvantaged individuals?	75%	

23. BIODIVERSITY

Please note: The Department may request specialist input/studies depending on the nature of the biodiversity occurring on the site and potential impact(s) of the proposed activity/ies. To assist with the identification of the biodiversity occurring on site and the ecosystem status consult <http://bgis.sanbi.org> or BGIShelp@sanbi.org. Information is also available on compact disc (cd) from the Biodiversity-GIS Unit, Ph (021) 799 8698. This information may be updated from time to time and it is the applicant/EAP's responsibility to ensure that the latest version is used. A map of the relevant biodiversity information (including an indication of the habitat conditions as per (b) below) and must be provided as an overlay map to the property/site plan as Appendix D to this report.

Please refer to **Appendix A6, Biodiversity Map**.

a) Indicate the applicable biodiversity planning categories of all areas on site and indicate the reason(s) provided in the biodiversity plan for the selection of the specific area as part of the specific category)

Systematic Biodiversity Planning Category				If CBA or ESA, indicate the reason(s) for its selection in biodiversity plan
Critical Biodiversity Area (CBA) ✓	Ecological Support Area (ESA) ✓	Other Natural Area (ONA) ✓	No Natural Area Remaining (NNR)	The Eastern Cape Provincial Biodiversity Conservation Plan (2007) classes the site as falling within Terrestrial Critical Biodiversity Area 2 (Corridor 1). This places it within Terrestrial Biodiversity Land Management Class 2: 'maintain near natural state' i.e. with minimal loss in ecosystem integrity and functioning.

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Systematic Biodiversity Planning Category	If CBA or ESA, indicate the reason(s) for its selection in biodiversity plan
	<p>According to the Biodiversity Sector Plan (BSP) for the Blue Crane Route Municipality (2012) the proposed hydropower system falls within a CBA, Ecological Support Area (ESA) and Other Natural Area (ONA). The management objective for the CBA and ESA is to 'maintain natural land, rehabilitate degraded to natural or near natural and manage for no further degradation'. The land use activity for infrastructure installations has a 'Restricted' classification, where land use is possible under strict controls in order to avoid impacts on biodiversity.</p>

b) Indicate and describe the habitat condition on site

Habitat Condition	Percentage of habitat condition class (adding up to 100%)	Description and additional Comments and Observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing, harvesting regimes etc).
Natural	7%	The narrow band of riparian vegetation along the banks of the Little Fish River is dominated by dense <i>Acacia karroo</i> thornveld, with a tall grassy understory i.e. <i>Panicum spp.</i> , and Thicket-type trees present and <i>Phragmites australis</i> (Common Reed). (Louw, 2016; Appendix D-1).
Near Natural (includes areas with low to moderate level of alien invasive plants)	83%	<p>Consists predominantly of: dry grassland with <i>Acacia karroo</i> thornveld along the south-eastern section of the Orange – Fish – Sundays Water Transfer Canal, becoming karroid shrubland with 'bands' of Sweet Thorn (<i>Acacia karroo</i>, now <i>Vachellia karroo</i>) and <i>Aloe ferox</i> (Bitter Aloe) trees along the southern 'hilltop' and western gravelly terraced 'hillslopes'. There is also a very low presence of exotic and alien invasive plant species on site (Louw, 2016; Appendix D-1). These areas are utilized for grazing.</p> <p>The edge of riparian vegetation along the Little Fish River, consists of <i>Aloe ferox</i> and Thicket-type shrubs, climbers and succulents. Invasive Prickly Pear (<i>Opuntia ficus-indica</i>) is also present along the edge of riparian vegetation (Louw, 2016; Appendix D-1).</p>
Degraded (includes areas heavily invaded by alien plants)	0 %	N/A
Transformed (includes cultivation, dams, urban,	10%	Transformed areas on the project site include: existing gravel roads, the Orange – Fish – Sundays Water Transfer Canal and embankments (Louw, 2016; Appendix D-1)

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plantation, roads, etc)		
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c) Complete the table to indicate:

- (i) the type of vegetation, including its ecosystem status, present on the site; and
- (ii) whether an aquatic ecosystem is present on site.

Terrestrial Ecosystems		Aquatic Ecosystems						
Ecosystem threat status as per the National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	Critical	Wetland (including rivers , depressions, channelled and unchannelled wetlands, flats, seeps pans, and artificial wetlands)			Estuary		Coastline	
	Endangered							
	Vulnerable							
	Least Threatened ✓	YES ✓ Little Fish River	NO	UNSURE	YES	NO ✓	YES	NO ✓

d) Please provide a description of the vegetation type and/or aquatic ecosystem present on site, including any important biodiversity features/information identified on site (e.g. threatened species and special habitats)

A total of 67 plant species were identified on site, of which one i.e. *Opuntia ficus-indica*, is listed as a declared weed i.e. Category 1 under the Conservation of Agricultural Resources Act No. 43 of 1983, and Category 1b under the National Environmental Management: Biodiversity Act 10 of 2004 – National Invasive Terrestrial and Fresh-water Plant Species List (published July 2016) (Louw, 2016; **Appendix D-1**).

Nine species of protected plants listed under the Eastern Province Nature and Environmental Conservation Ordinance of 1974 and the Draft Eastern Cape Environmental Conservation Act of 2003, were identified on site. No species listed as threatened on the Red List of South African Plants (version 2015.1) was identified on site. No protected tree species listed under the National Forests Act No. 43 of 1983 were identified on site (Louw, 2016; **Appendix D-1**).

According to Mucina and Rutherford (2006) the Little Fish Embedded Small Hydro site is located within three vegetation types. The Bedford Dry Grassland, within the Grassland Biome, is assigned a conservation status of Least Threatened, and a protection status of Not Protected [Conservation target: 23%; Protected: 0% (+1.1%); Remaining habitat: 96.8%]. The Southern Karoo Riviere vegetation, an Azonal vegetation biome, is assigned a conservation status of Least Threatened, and a protection status of Hardly Protected [Conservation target: 24%; Protected: 1.4% (+1.6%); Remaining habitat: 88.2%]. The south-eastern portion of the project site is mapped as Great Fish Thicket vegetation (Albany Thicket Biome) though, if at all present on site, only small patches of Great Fish Thicket vegetation occur near the Little Fish River, and not in the southern section of the project site, as mapped. Great Fish Thicket vegetation is assigned a conservation status of Least Threatened, and a protection status of Poorly Protected [Conservation target: 19%; Protected: 6.1% (+4.5%); Remaining habitat: 96%] (Louw, 2016; **Appendix D-1**). Refer to **Appendix A** for the vegetation map.

The greatest portion of the Little Fish small hydro project site can be described as Bedford Dry Grassland, with a strong presence of karroid dwarf shrubs on flats and along riparian slopes, and small patches of Great Fish Thicket vegetation occurring close to the Little Fish River, amongst *Acacia karroo*-dominant thickets typical of riparian areas in Bedford Dry Grassland and Southern

Karoo Riviere vegetation (Louw, 2016; **Appendix D-1**).

The embankments of the Little Fish irrigation canal and the general south-eastern portion of the project site are dominated by tall grasses, with low forbs and scattered *Acacia karroo* trees. Tree density increases with increased proximity to the Little Fish River / riparian areas, and towards the western section of the project site. Refer to **Figures 2 to 3** below (Louw, 2016; **Appendix D-1**).



Figure 2: Embankments of the Little Fish River irrigation canal in the south-eastern portion of the project site, dominated by grasses, with sparse, stunted *Acacia karroo* trees. (Louw, 2016)



Figure 3: Dry grassland, or *Acacia karroo* thornveld, the in south-eastern section of project site. Density of *Acacia karroo* trees increases towards the Little Fish River. (Louw, 2016)

The greatest portion of the site consists of sparse, dry and gravelly karroid shrubland, with 'bands' of varying densities of *Acacia karroo* and *Aloe ferox* trees, running east-west and parallel with the contours of the hillslope, and the Little Fish River. This north-facing hillslope along which the project site is largely located, appears to form 'stepped' terraces down towards the Little Fish River, with the edges of stepped terraces usually dominated by aforementioned 'bands' of *Aloe ferox* and / or *Acacia karroo* thornveld. The presence of these 'stepped' terraces is likely due to the geology of the site, and local variation in soil depth and degree of rockiness, creating 'bands' of suitable conditions for the establishment and persistence of *Acacia karroo* and / or *Aloe ferox*-dominated thornveld. Grass cover in the karroid shrubland matrix appears to increase along these bands of *Acacia karroo* thornveld,

and towards the Little Fish River. Refer to **Figures 4 and 5** (Louw, 2016; **Appendix D-1**).



Figure 4: Karroid shrubland in the southern portion of the project footprint, with a relatively sparse band of *Acacia karroo* trees growing along the 'stepped' edge of a hillslope in the background – facing south (Louw, 2016)



Figure 5: Karroid shrubland with much exposed gravelly soil, with *Rhigozum obovatum* shrubs in the foreground. 'Band' of *Acacia karroo* and *Aloe ferox*-dominant thornveld growing on stepped edge of a hillslope, shown in background. (Louw, 2016)

The edge of riparian vegetation along the Little Fish River, particularly in the north-western section of the project site, is delineated by a steep rock face. The rock face houses *Aloe ferox* and Thicket-type shrubs, climbers and succulents. The narrow band of riparian vegetation along the banks of the river is dominated by dense *Acacia karroo* thornveld, with a tall grassy understory i.e. *Panicum spp.*, and Thicket-type trees present i.e. *Searsia longispina*, *Lycium spp.*, *Diospyros lycioides* and *Grewia robusta*. Invasive Prickly Pear (*Opuntia ficus-indica*) is also present along the edge of riparian vegetation. The banks of the Little Fish River, which consists of a very steep drop-off from the embankment to the flowing river channel in most areas, is dominated by *Acacia karroo* trees, with

Phragmites australis growing along the very edge, and *Phragmites australis* and *Typha capensis*, growing in stabilised areas with reduced stream flow in the river channel itself. Refer to **Figures 6 and 7** (Louw, 2016; **Appendix D-1**).



Figure 6: Riparian vegetation i.e. *Acacia karroo* thornveld in foreground, with *Phragmites australis* along river banks – facing north. Cultivated fields shown in background (Louw, 2016).



Figure 7: Riparian vegetation, including Thicket-type trees, along the upper banks of the Little Fish River – facing west (Louw, 2016)

There are no wetlands within 500m of the proposed site.

A non-perennial drainage line is located to the east of the proposed hydropower system. The drainage line starts at the end of the Orange – Fish – Sundays Water Transfer Canal and flows in a north-easterly direction to flow into the Little Fish River. The drainage line section is known as the Cascades section. The Little Fish River is located to the north of the proposed hydropower system. Refer to **Appendix A, Sensitivity Maps**.

The Little Fish River in the affected reach, has been moderately transformed and modified by the almost constant inflow of the relatively large volume (8 cumecs) of water from the Fish – Sundays Canal. In addition, the water quality in the river has been seriously impacted by the discharge of poor-quality sewage effluent from upstream Somerset East and irrigation return flows contaminated with chemicals from large-scale pivot irrigation in the catchment. In addition, the introduction of fish alien to this system via the Orange – Fish – Sundays Canal has also modified and degraded the ecological functioning of the river to the detriment of endemic species (Bok, 2016; **Appendix D-2**).

In terms of the National Freshwater Ecosystem Priority Areas (NFEPA) study, this reach of the Little Fish River is considered to have very limited value in terms of fish biodiversity or freshwater ecosystem conservation. This reach of the Little Fish River has a C- Category Present Ecological Status (PES), and Moderate Ecological Importance (EI) and Moderate Ecological Sensitivity (ES) (Bok, 2016; **Appendix D-2**).

SECTION C: PUBLIC PARTICIPATION

24. ADVERTISEMENT AND NOTICE

Publication name	The Herald and Die Burger	
Date published	11 May 2016	
Site notice position	Latitude	Longitude
	32° 48' 57.44"S	25° 38' 20.85"E
Date placed	11 May 2016	

Include proof of the placement of the relevant advertisements and notices in Appendix E1.

Please refer to Appendix E1 for copies of the advertisements and site notices.

25. DETERMINATION OF APPROPRIATE MEASURES

Provide details of the measures taken to include all potential I&APs as required by Regulation 41(2)(e) and 41(6) of GN 733.

Initial notifications were disseminated to Interested and Affected Parties (I&APs) together with a Background Information Document (BID). A BID provides background information on the proposed project, the processes to be followed and a registration / comment sheet. Contact details of the Environmental Consultant were included in the BID to ensure on-going interaction with I&APs. Refer to **Appendix E2** for a copy of the BID.

A 30 day comment and registration period was provided from 11 May – 10 June 2016.

Notifications are distributed to I&APs indicating the availability of the Draft Basic Assessment Reports for public and state department review.

The Draft Basic Assessment Report was made available for a 30 day review period to state departments and registered I&APs from 8 February – 10 March 2017.

Key stakeholders (other than organs of state) identified in terms of Regulation 41(2)(b) of GN 733

Title, Name and Surname	Affiliation/ key stakeholder status	Contact details (tel number or e-mail address)
Mr Z Jordaan	Landowner	Available on request
Mr EE Greeff	Landowner	Available on request
Cllr Phandulwazi Sonkwala	Ward 6 Councillor	042 243 1333
Mr T Monama	SKA	temonama@ska.ac.za
Mr A Tiplady	SKA	atiplady@ska.ac.za
Mr M Griffiths	WESSA	morgan@wessaep.co.za
Ms S Matthews	AgriEC	sharlene.matthews@agriec.co.za
Ms M Sithole	Eskom	sitolerm@eskom.co.za
Mr X Wana	Eskom	WanaXS@eskom.co.za
Ms L Shaw	Telkom	ShawLS@telkom.co.za
Mr J Sithole	Telkom	SitholJ@telkom.co.za

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Include proof that the key stakeholder received written notification of the proposed activities as Appendix E2. This proof may include any of the following:

- e-mail delivery reports;
- registered mail receipts;
- courier waybills;
- signed acknowledgements of receipt; and/or
- or any other proof as agreed upon by the competent authority.

Please refer to Appendix E2 for copies of the notifications to stakeholders.

26. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summary of main issues raised by I&APs	Summary of response from EAP
WESSA is not concerned that this project may have significant detrimental impacts. It seems to involve the generation of 'green' electricity, with minimal net water loss to the river system. I caution that the discharge point back into the river may cause local scouring, if water flow is not diffused; and potential for erosion along the pipeline route mitigated.	Your positive comments are noted. Mitigation measures (e.g. gabion protection works) have been included in the impact assessment and in the Environmental Management Programme.
Query regarding the applicable environmental authority.	The competent authority is the National Department of Environment, as indicated in Government Gazette No. 779 of 1 July 2016.

27. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments received from I&APs and respond to each comment before the Draft BAR is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to the Final BAR as Appendix E3.

Please refer to Appendix E3 for the Comments and Response Report.

28. AUTHORITY PARTICIPATION

Authorities and organs of state identified as key stakeholders:

Authority/Organ of State	Contact person (Title, Name and Surname)	Tel No	Fax No	E-mail	Postal address
Department of Economic Development, Environmental Affairs and	Mr Andries Struwig Mr Jeff Govender	041 508 5800	041 508 5865	Andries.Struwig@dedea.gov.za Dayalan.Govender@dedea.gov.za	Private Bag X5001, Greenacres, 6057

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Authority/Organ of State	Contact person (Title, Name and Surname)	Tel No	Fax No	E-mail	Postal address
Tourism					
Department of Agriculture	Ms Anneliza Collet	012 319 7508	012 329 5938	annelizac@nda.agric.za	Private Bag X120, Pretoria, 0001
Department of Environmental Affairs (DEA)	Mr Ishaam Abader	012 399 9330	012 322 1936	iabader@environment.gov.za	Private Bag X447, Pretoria, 0001
Sarah Baartman District Municipality	Mr B Makedama Mr T Pillay Ms S Harrington	041 508 7111	041 508 7000	bmakedama@cacadu.co.za bmakedama@sbdm.co.za tpillay@cacadu.co.za tpillay@sbdm.co.za sharrington@cacadu.co.za	P.O. Box 318, Port Elizabeth, 6000
Blue Crane Route Municipality	Mr Thabiso Klaas	042 243 1333	042 243 2250	mmanager@bcm.gov.za	P.O. Box 21, Somerset East, 5850
Department of Agriculture, Forestry and Fisheries (DAFF)	Mr Thabo Nokoyo	041 484 2725	041 484 2785	NokoyoD@daff.gov.za	Private Bag X 3917, North End, 6056
Department of Water and Sanitation (DWS)	Ms Marisa Bloem Mr Joseph Jacobs	041 501 0717	086 537 4689	BloemM@dwa.gov.za JJacobs@dwa.gov.za	Private Bag X6041, Port Elizabeth 6000
Department of Roads and Public Works	Mr Randall Moore	041 403 6029	041 456 1666	Randall.moore@dpw.ecape.gov.za	PO Box 11100, Algoa Park, 6005
Eastern Cape Provincial Heritage Resource Authority	Mr S Mokhanya	043 642 2811	043 745 0889	smokhanya@ecphra.org.za info@ecphra.org.za	P.O. Box 16208, Amathole Valley, 5616

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Authority/Organ of State	Contact person (Title, Name and Surname)	Tel No	Fax No	E-mail	Postal address
SKA	Mr T Monama Mr A Tiplady	011 442 2434		temonama@ska.ac.za atiplady@ska.ac.za	
Eskom	Ms M Sithole Mr X Wana			sitolerm@eskom.co.za WanaXS@eskom.co.za	

Include proof that the Authorities and Organs of State received written notification of the proposed activities as Appendix E4.

Please refer to Appendix E4 for copies of the notifications to Authorities and Organs of State.

In the case of renewable energy projects, Eskom and the SKA Project Office must be included in the list of Organs of State.

Eskom and SKA Project Office have been included in the Key Stakeholder List as well as the Authorities and Organs of State.

29. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for any activities (linear or other) where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that sub-regulation to the extent and in the manner as may be agreed to by the competent authority.

Proof of any such agreement must be provided, where applicable. Application for any deviation from the regulations relating to the public participation process must be submitted prior to the commencement of the public participation process.

A list of registered I&APs must be included as appendix E5.

Please refer to Appendix E5 for the Registered Interested and Affected Parties Database.

Copies of any correspondence and minutes of any meetings held must be included in Appendix E6.

Please refer to Appendix E6 for copies of correspondence with registered I&APs.

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014 and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

1. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

Provide a summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed. This impact assessment must be applied to all the identified alternatives to the activities identified in Section A(2) of this report.

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
ALTERNATIVE 1 (PREFERRED ALTERNATIVE)			
Infrastructure for the generation of electricity, i.e. Hydro Power Project, 3.1MW, access road and distribution and transmission line . GNR 983 – 1, 9, 11, 14 GNR 985 – 4, 10	PLANNING & DESIGN PHASE: DIRECT IMPACTS		
	Disruption of or damage to existing services and infrastructure, e.g. Eskom transmission line	Before Mitigation: Moderate (-) After Mitigation: Low (-)	Eskom approval per requirements for work in or near Eskom servitudes or infrastructure. Implementation of the DEA's Generic Environmental Management Programme Overhead Powerline Construction.
CONSTRUCTION & DECOMMISSIONING PHASES: DIRECT IMPACTS			
	Air Pollution; Dust and emissions from construction works	Before Mitigation: Moderate (-) After Mitigation: Low (-)	Prompt rehabilitation and wetting down of recently cleared areas to minimize dust creation. Until vegetation used in rehabilitation efforts has established, temporary stabilization methods must be used (e.g. protecting exposed soils with coarse granular materials, mulches, or straw). Construction should be undertaken in a phased manner, so as to limit the size of the area to be exposed at any one time. Dust levels are not to exceed 1200mg/m ² /day (30 day average) for rural areas. Dust suppression techniques (e.g. wetting of areas) to be used on all dust generating surfaces. Potable and contaminated water not to be used as a dust-suppressing agent. All work must stop during high wind conditions (i.e. when wind speeds exceed 35km/h). Construction vehicles must adhere to speed limits. No materials shall be burnt. Trucks transporting any form of soil or waste should be covered with a tarpaulin. Vehicles and machinery will be maintained in good running condition.

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			<p>No waste may be buried. Contact details (e.g. telephone number) should be located at the entrance of the site for reporting of excessive dust after hours.</p>
	<p>Loss of Heritage Resources : Loss/damage to heritage / archaeological artefacts during construction</p>	<p>Before Mitigation: Low (-) After Mitigation: Very Low (-)</p>	<p>Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the find brought to the immediate attention of the Resident Engineer or his representative who will report it to the Eastern Cape Provincial Heritage Resources Authority (043 6422811). The area will be fenced off with a radius of 20m around the unearthed item, demarcated as a no-go area and access will be prohibited. Human remains confirmed younger than 60 years (to be confirmed by the police forensic unit or archaeologist) are to be reported directly to the nearest police station. Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51.(1).</p>
	<p>Disturbance to Fauna and Avifauna from construction activities. Run-off from newly- cleared areas and earth-moving activities increasing sediment and turbidity affecting aquatic biota.</p>	<p>Before Mitigation: Moderate (-) After Mitigation: Low (-)</p>	<p>Work areas must be clearly demarcated, so that construction workers limit their impact to these areas alone. All construction vehicles must stay on single demarcated access tracks to avoid small fauna. The site camp to be located in an already disturbed area with existing access. Fires are to be prohibited on and adjacent to the site. Vegetation that was cleared may provide useful fauna habitat. Logs, limbs and stumps should be cleared and stockpiled separately to the topsoil stripping operation. Gabion protection works and rehabilitation of all disturbed</p>

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			<p>areas, including the pipeline trench with appropriate indigenous vegetation will be necessary. Sedimentation must be minimised through the effective stabilisation (e.g. gabions and Reno mattresses) and the re-vegetation of cleared areas.</p>
	<p>Waste management: Liquid and solid waste generated by construction activities</p>	<p>Before Mitigation: Moderate (-) After Mitigation: Low (-)</p>	<p>Cleared vegetation to be mulched or disposed of at the Somerset East licensed landfill site. Stockpiles of vegetation not to be left on site due to fire hazard. Good housekeeping to be undertaken at all times. No illegal dumping or burning of waste allowed. Waste is not to be buried. Where possible, the contractor must register with the local waste exchange programme for re-use and recycling of construction rubble. Awareness training to be undertaken with the construction workers regarding health and environmental impacts from illegal dumping. Any excavated material not reused on site, to be disposed of at the Somerset East licenced landfill site. Waste bins are to be located at the construction camp and construction site. Bins are to have secured lids to prevent waste from being blown into the surrounding area and to prevent animals scavenging in the bins. Domestic and general construction waste to be disposed of at the Somerset East licensed landfill site. The Contractor may not utilise the municipal waste collection services. Proof of disposal must be kept at the site office by the Contractor. Chemical Toilet facilities to be provided at construction areas and secured to the ground, cleaned at least weekly. Water should be provided for washing and sanitary bins for women. Waste to be disposed of at a wastewater treatment works.</p>

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			<p>No hazardous waste material to be disposed of as general waste. Hazardous waste (e.g. old oil) to be stored separately in impermeable (i.e. leak proof) containers, and sent for recycling.</p> <p>Proof of waste disposal must be kept on site.</p> <p>A Waste Management Method Statement must be submitted by the appropriate contractor to the Resident Engineer or his representative for approval.</p>
	Noise pollution from construction activities and works	Before Mitigation: Moderate (-) After Mitigation: Low (-)	<p>Limit intrusive construction activity to daylight hours and normal working days; i.e. weekdays between 07:00 and 17:00; and Saturdays until 13:00.</p> <p>No construction staff to be housed on site.</p> <p>All construction vehicles must be in sound working order with the prescribed mufflers and silencers.</p>
	Disruption of or damage to existing services and infrastructure, e.g. Eskom transmission line	Before Mitigation: Moderate (-) After Mitigation: Low (-)	<p>Eskom approval per requirements for work in or near Eskom servitudes or infrastructure.</p> <p>Implementation of the DEA's Generic Environmental Management Programme Overhead Powerline Construction.</p>
CONSTRUCTION & DECOMMISSIONING PHASES: INDIRECT IMPACTS			
	Skilled and Unskilled Employment Opportunities	Before Mitigation: Moderate (+) After Mitigation: Moderate (+)	<p>Local labour from the surrounding community to be used for unskilled positions.</p>
	Health, Safety, and Security	Before Mitigation: Moderate (-) After Mitigation: Low (-)	<p>Health and Safety:</p> <p>A general STD and HIV/AIDS awareness programme should be provided to all workers prior to the commencement of the construction phase.</p> <p>Construction vehicles must adhere to speed limits and must be made aware of the possibility of people walking and living in close proximity to the site.</p> <p>Signage is to be displayed regarding construction activities.</p> <p>General risks associated with the construction activities should be addressed through compliance with the relevant</p>

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			<p>health and safety procedures and regulations. Installation of hydropower equipment should be undertaken by a trained professional.</p> <p>Security: No construction workers, apart from security personnel, should be allowed to overnight at the construction site. Access to and from the construction site(s) should be closely monitored and contractors should be required to make the necessary arrangements for the transport of workers to and from the site on a daily basis. The construction area must be demarcated and access controlled for the duration of the construction period. Visitors to report to the Site Office, and appropriate Protective Personal Equipment to be worn by visitors. Discuss the safety and security issues, as well as construction schedule with the local community policing forum and local SAPS. Adjacent landowners are to be notified 14 days prior to construction commencement.</p> <p>Fire: Fire-fighting equipment in proportion to the fire risk that is presented by the type of construction and other on-site activities and materials used on site is to be available and kept in good operating order at all times. Any welding or other sources of heating of materials must be done in a controlled environment, under appropriate supervision, in such a manner as to minimise the risk of fires and/or injury to staff. No “hot work” is to be undertaken on days where the Fire Danger Index is “orange” or “red”.</p>

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			Smoking will not be permitted in those areas where there is a fire hazard. These areas include the fuel storage areas and any area where the vegetation or other material may support the rapid spread of an initial flame. Where possible, these areas (e.g. at the chemical and hazardous substances storage area) are to be demarcated with no-smoking signs.
	Increase in traffic and traffic safety from construction vehicles	Before Mitigation: Moderate (-) After Mitigation: Low (-)	Flagmen to be posted when construction works are being undertaken adjacent to roads. Signage is to be displayed regarding construction activities at the intersection with the Bloemhof Road. Construction vehicles are to keep to the speed limits. Regular maintenance of road during construction phase.
OPERATIONAL PHASE: DIRECT IMPACTS			
	Liquid and solid waste	Before Mitigation: Moderate (-) After Mitigation: Low (-)	Decommissioned, faulty or broken equipment is to be taken off site and recycled. If items are unable to be recycled, to be disposed of at an appropriate landfill site. No illegal dumping, burying or burning of waste allowed. Waste is not to be buried. No hazardous waste material to be disposed of as general waste. Proof of waste disposal must be kept.
	Impacts to Fauna and Avifauna: Flood damage and bank erosion could occur resulting in elevated sediment input into the river thereby affecting aquatic biota. Overhead transmissions lines may present a potential collision risk or electrocution to avifauna	Before Mitigation: Moderate (-) After Mitigation: Low (-)	All overhead power lines to include bird deflectors. To prevent scouring and erosion during heavy rains via surface run-off, appropriate gabion protection works and rehabilitation of all disturbed areas, including the pipeline trench with appropriate indigenous vegetation will be necessary. Maintenance of the erosion protection works and ensure areas remain stabilised.
	Air Quality: Dust from cleared areas and gravel roads	Before Mitigation: Low (-) After Mitigation: Low (-)	Vehicles must adhere to speed limits on gravel roads. No waste materials shall be burnt.

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			Maintaining re-vegetated areas to limit exposed soils. No waste may be buried.
	Noise pollution from operation and maintenance activities	Before Mitigation: Low (-) After Mitigation: Low (-)	No mitigation measures. The noise impact will be low as there are no sensitive receptors within 500m of the site.
	Disruption of or damage to existing services and infrastructure, e.g. Eskom transmission line	Before Mitigation: Moderate (-) After Mitigation: Low (-)	Eskom approval per requirements for work in or near Eskom servitudes or infrastructure. Implementation of the DEA's Generic Environmental Management Programme Overhead Powerline Construction.
	Production of renewable energy; Production of cleaner energy from renewable sources	Before Mitigation: High (+) After Mitigation: High (+)	Implementation of identified mitigation measures and EMPr.
OPERATIONAL PHASE: INDIRECT IMPACTS			
	Health, Safety and Security	Before Mitigation: Moderate (-) After Mitigation: Low (-)	<p>Health and Safety: Maintenance to be undertaken by trained personnel only. Trained personnel shall wear appropriate electrically insulating Personal Protective Equipment (PPE) during inspection operations.</p> <p>Security: Adjacent landowners are to be notified 14 days prior to operational commencement.</p> <p>Fire: Fire-fighting equipment in proportion to the fire risk that is presented by the type of materials used on site is to be available and kept in good operating order at all times. Maintenance procedures to include regular inspection of electrical connections. Faulty wiring to be replaced immediately. Proper grounding of the electrical system to reduce the risk of fire. Maintenance to be undertaken in accordance with the</p>

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			manufacturer's guide.
	Increase in traffic and traffic safety from operational vehicles	Before Mitigation: Moderate (-) After Mitigation: Low (-)	Vehicles are to keep to the speed limits. Maintenance of road immediately after construction period.
	Skilled Employment Opportunities	Before Mitigation: Moderate (+) After Mitigation: Moderate (+)	Up skilling of local labour to skilled positions.
CONSTRUCTION & DECOMMISSIONING PHASES: DIRECT IMPACTS			
Development of canals and associated infrastructure for the diversion from and use of water from the Orange – Fish – Sundays Canal for generation of hydropower. Related watercourse activities. GNR 983 – 12 & 19; GNR 985 - 14	Potential Loss of Aquatic Health Increased sediment input and turbidity during construction.	Before Mitigation: Moderate (-) After Mitigation: Low (-)	The design of the powerhouse and return slipway should ensure that high flows are not impeded, ensuring that scouring and flood damage does not occur; Appropriate (best practice) gabion or other erosion and flood protection works should be constructed for the powerhouse and slipway; Appropriate erosion-protection works to be constructed and suitable indigenous vegetation re-established on all disturbed areas along the new water channel, penstock pipes and penstock pools. Silt fences to be installed.
	Potential pollution of soils, surface and groundwater from construction activities. Accidental spillage of chemical pollutants, hazardous materials, cement and construction activities	Before Mitigation: Moderate (-) After Mitigation: Low (-)	Strict use and management of all hazardous materials used on site. Strict management of potential sources of pollution (hydrocarbons from vehicles & machinery, cement during construction, etc.). Containment of all contaminated water before it can enter the adjacent watercourse Chemicals must be stored safely on site, on an impermeable lined surface and surrounded by lined bunds. Chemical storage containers must be regularly inspected so that any leaks are detected early. MSDS for hazardous materials must be kept on site. Littering and contamination of water sources during

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			<p>construction must be prevented by effective construction camp and site management.</p> <p>Emergency plans must be in place in case of spillages onto road surfaces and drainage lines.</p> <p>All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised. Stormwater must be directed around the stockpiles.</p> <p>The topsoil layer (300mm of the top surface layer, including organic matter) must be stockpiled separately from the subsoil layers and used during reinstatement thus allowing plants to rapidly re-colonise the bare soil areas.</p> <p>Spill kits for small spills to be kept on site.</p>
OPERATIONAL PHASE: DIRECT IMPACTS			
	<p>Potential Loss of Aquatic Health</p> <p>Increased sediment input and turbidity during operations</p>	<p>Before Mitigation: Moderate (-)</p> <p>After Mitigation: Low (-)</p>	<p>Maintenance of the erosion protection works and ensure areas remain stabilised.</p> <p>Sedimentation must be minimised through the effective stabilisation (e.g. gabions and Reno mattresses) and the re-vegetation of cleared areas.</p> <p>An effective long-term operational and management plan should be drawn up and submitted by the Applicant.</p>
	<p>Soil, surface and groundwater pollution (water quality) from construction activities.</p> <p>Potential pollution of soils, surface and groundwater from operational activities.</p> <p>Malfunction / Breakdown of machinery resulting in hydrocarbon contamination.</p>	<p>Before Mitigation: Moderate (-)</p> <p>After Mitigation: Low (-)</p>	<p>Broken, or damaged or equipment are to be replaced/ repaired immediately.</p> <p>A strict operation and maintenance programme for the hydro power facility should be implemented.</p>

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
<p>Clearance of vegetation activities for construction and operation of Hydro Power plant and associated infrastructure</p> <p>GNR 983 – 27 GNR 985 – 12</p>	PLANNING & DESIGN PHASE: DIRECT IMPACTS		
	<p>Loss of habitat containing species of conservation concern; Removal of SCCs within footprint area</p>	<p>Before Mitigation: Moderate (-) After Mitigation: Low (-)</p>	<p>SCCs and Protected Plants identified on site should be removed from the pipeline footprint, once surveyed and pegged, and replanted in the same general area, but outside the pipeline footprint, as part of search and rescue efforts. Permits must be obtained from the DEDEAT prior to the removal of protected and SCCs.</p> <p>Where feasible, development of linear structures should be restricted to existing cleared/transformed areas and gravel roads / pathways. The power line and pipeline footprints should be kept to a minimal width and length.</p>
	CONSTRUCTION & DECOMMISSIONING PHASES: DIRECT IMPACTS		
	<p>Loss of vegetation from the clearing of vegetation for construction activities</p>	<p>Before Mitigation: Moderate (-) After Mitigation: Low (-)</p>	<p>Where feasible, development of power lines, pipelines and associated structures should be restricted to existing cleared areas and gravel roads / pathways.</p> <p>The power line and pipeline footprints should be kept to a minimal width and length.</p> <p>Topsoil and subsoil should be conserved and returned once development is complete, to encourage recruitment from the soil-stored seed bank.</p> <p>Reseeding of disturbed soil with grass species i.e. <i>Cynodon dactylon</i> (Quick Grass), or any other indigenous grass species suitable to the soil and climate of the area, will likely be required as part of rehabilitation efforts in order to restrict soil erosion, and encourage succession in areas that will not be actively replanted or landscaped as part of the development.</p> <p>The site camp to be located in an already disturbed area with existing access, to minimise additional disturbance and clearing of vegetation.</p> <p>Work areas must be clearly demarcated, e.g. with droppers</p>

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			<p>and/or orange netting but not with danger tape, so that construction workers limit their impact to these areas alone. All construction vehicles must stay on single demarcated access tracks to avoid compaction of soil and roots. Limit any disturbance to the vegetation only to that which is essential for the development. All remaining indigenous vegetation to be left intact.</p> <p>Rehabilitation should be undertaken in a progressive manner. Re-vegetation of the disturbed areas with indigenous material should be undertaken as soon as construction activities at an individual site have been completed.</p>
	<p>Loss of habitat containing species of conservation concern and removal of SCCs.</p>	<p>Before Mitigation: Moderate (-) After Mitigation: Low (-)</p>	<p>Topsoil and subsoil should be conserved and returned once development is complete, to encourage recruitment from the soil-stored seed bank.</p> <p>The site camp to be located in an already disturbed / transformed area with existing access, to minimise additional disturbance to habitat and SSCs.</p> <p>Only shrubs are to be removed for the construction camp area and laydown areas. Grass is to be left in place.</p> <p>Work areas must be clearly demarcated, e.g. with droppers and/or orange netting but not with danger tape, so that construction workers limit their impact to these areas alone. All construction vehicles must stay on single demarcated access tracks to avoid creep into surrounding areas. Limit any disturbance to the vegetation only to that which is essential for the development. All remaining indigenous vegetation to be left intact.</p> <p>Rehabilitation should be undertaken in a progressive manner. Re-vegetation of the disturbed areas with indigenous material should be undertaken as soon as</p>

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			<p>construction activities at an individual site have been completed.</p> <p>Reseeding of disturbed soil with grass species i.e. <i>Cynodon dactylon</i> (Quick Grass), or any other indigenous grass species suitable to the soil and climate of the area, will likely be required as part of rehabilitation efforts in order to restrict soil erosion, and encourage succession in areas that will not be actively replanted or landscaped as part of the development.</p>
	<p>Potential spread of alien vegetation</p>	<p>Before Mitigation: Moderate (-) After Mitigation: Low (-)</p>	<p>Disturbed areas should be kept to a minimum, keeping the width and length of the earth works to a minimum. Rehabilitation should be undertaken in a progressive manner. Re-vegetation of the disturbed areas with indigenous material should be undertaken as soon as construction activities at an individual site have been completed.</p> <p>The shallow topsoil layer to be stockpiled separately from the subsoil layers, should the excavation exceed 0.5m. When the construction has been completed, then the topsoil layers, which contain seed and vegetative material, should be reinstated last thus allowing plants to rapidly re-colonise the bare soil areas.</p> <p>Alien plant regrowth is to be monitored during construction on-site by the Contractor's Environmental Officer and any such species to be removed either by physical (preferable) or chemical means by the Contractor.</p>
OPERATIONAL PHASE: DIRECT IMPACTS			
	<p>Loss of vegetation due to clearing of vegetation for operational activities, i.e. maintenance</p>	<p>Before Mitigation: Moderate (-) After Mitigation: Low (-)</p>	<p>Vegetation regrowth within the access roads, penstock pipelines and transmission lines to be controlled, i.e. removed physically or through chemical means by operational contractor.</p>

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	Loss of habitat containing species of conservation concern	Before Mitigation: Moderate (-) After Mitigation: Low (-)	Shrubs and trees located on the boundary of the site should be left intact and not removed. DEDEAT Permits to be obtained for any removal of SCCs and Protected Plants within the hydropower system due to maintenance requirements.
	Potential spread of alien vegetation	Before Mitigation: Moderate (-) After Mitigation: Low (-)	Alien plant growth to be monitored and area to be kept free of alien invasive plants and declared weeds by the operational contractor.
Transformation of agricultural land outside an urban area. GNR 983 – 28	CONSTRUCTION & DECOMMISSIONING PHASES: DIRECT IMPACTS		
	Construction areas leading to additional loss of agricultural land	Before Mitigation: Moderate (-) After Mitigation: Low (-)	Where feasible, development of power lines, pipelines and associated structures should be restricted to existing cleared areas and gravel roads / pathways. The power line and pipeline footprints should be kept to a minimal width and length. Work areas must be clearly demarcated, e.g. with droppers and/or orange netting but not with danger tape, so that construction workers limit their impact to these areas alone.
	CONSTRUCTION & DECOMMISSIONING PHASES: INDIRECT IMPACTS		
	Soil Erosion: Construction activities and vegetation clearance leading to soil erosion	Before Mitigation: Moderate (-) After Mitigation: Low (-)	It is important that adequate soil conservation measures are in place during both construction phase. Compaction of clayey soil should be kept to a minimum during the construction phase, particularly in wet areas, in order to optimise the successful rehabilitation of disturbed soil. Topsoil and subsoil should be conserved and returned once development is complete, to encourage recruitment from the soil-stored seed bank. This is particularly important for the project site, as the soil layer is likely extremely limited due to the presence of gravel, and shallow bedrock. Soil level / landscape contours should be restored to its

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			original state, in order to encourage encroachment of neighbouring into disturbed areas, and allow wind-blown seed establishment i.e. all topsoil, subsoil and gravel stockpiles should be levelled to blend into the landscape upon completion. Anti-erosion measures to be included to disperse run-off so as to reduce the volume and velocity of surface
OPERATIONAL PHASE: DIRECT IMPACTS			
	Loss of agricultural land	Before Mitigation: Moderate (-) After Mitigation: Moderate (-)	No mitigation Measures
OPERATIONAL PHASE: INDIRECT IMPACTS			
	Soil Erosion from increased run off due to cleared areas	Before Mitigation: Moderate (-) After Mitigation: Low (-)	Maintenance of erosion control structures.

Alternative 2
No feasible alternatives.

Alternative 3
No feasible alternatives.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
NO-GO OPTION			
Infrastructure for the generation of electricity, i.e. Hydro Power Project, 3.1MW, access road and distribution and transmission. GNR 983 – 1, 9, 11, 14 GNR 985 – 4, 10	DIRECT IMPACTS		
	Impacts to fauna and avifauna	No impact as there is no change in status	No change in status
	Air Quality	No impact as there is no change in status	No change in status
	Loss of heritage resources	No impact as there is no change in status	No change in status
	Noise Pollution	No impact as there is no change in	No change in status

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
		status	
	Disruption of or damage to existing services and infrastructure	No impact as there is no change in status	No change in status
	Production of energy reliant on coal power stations	Before Mitigation: High (-) After Mitigation: High (-)	No Mitigation Measures
	INDIRECT IMPACTS		
	Waste Management: Debris (vegetation and animal carcasses) in the canal is removed and discarded	Before Mitigation: Moderate (-) After Mitigation: Moderate (-)	No Mitigation Measures
	Health, Safety and Security	No impact as there is no change in status	No change in status
	Employment opportunities will not be created during the construction and operational phases	Before Mitigation: Moderate (-) After Mitigation: Moderate (-)	No Mitigation Measures
Traffic impacts	No impact as there is no change in status	No change in status	
Development of canals and associated Infrastructure for the diversion from and use of water from the Orange – Fish – Sundays Canal for generation of hydropower. GNR 983 – 12 & 19 GNR 985 - 14	DIRECT IMPACTS		
	Loss of aquatic health	No impact as there is no change in status	No change in status
	Potential Soil, surface and groundwater pollution	No impact as there is no change in status	No change in status
Clearance of vegetation activities for construction and operation of Hydro Power plant and associated infrastructure GNR 983 – 27	DIRECT IMPACTS		
	Loss of vegetation: No clearing of vegetation	Before Mitigation: Moderate (+) After Mitigation: Moderate (+)	No mitigation measures.
	Loss of habitat for species of conservation concern from grazing	Before Mitigation: Moderate (-) After Mitigation: Moderate (-)	No mitigation measures.
	Potential Spread of Alien Vegetation	Before Mitigation: Moderate (-)	Alien plant growth to be monitored

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ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
GNR 985 – 12		After Mitigation: Low (-)	and area to be kept free of alien invasive plants and declared weeds by the landowner.
Transformation of agricultural land outside an urban area.	DIRECT IMPACTS		
	Loss of Agricultural Land: Area will be continued to be used for grazing	Before Mitigation: Moderate (+) After Mitigation: Moderate (+)	No mitigation measures
	INDIRECT IMPACTS		
GNR 983 – 28	Soil erosion	No impact as there is no change in status	No change in status

A complete impact assessment in terms of Regulation 19(3) of GN 733 must be included as Appendix F.

Please refer to **Appendix F** for the full Impact Assessment

2. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

Please refer to **Appendix F** for the full Impact Assessment

Alternative A (preferred alternative)

The footprint size of the activity is approximately 10ha in extent, including the linear routes for the pipelines. The construction phase would have the greatest impact on the vegetation. Clearance of vegetation will be required for the construction of the penstock pools, the hydropower house, the penstock pipelines, the intake channel, and the expansion of the access roads. The operational phase of the project would have a limited impact on vegetation regrowth within the footprint area of the hydropower system. A total of 67 plant species were identified on site, of which one i.e. *Opuntia ficus-indica*, is listed as a declared weed i.e. Category 1 under the Conservation of Agricultural Resources Act No. 43 of 1983, and Category 1b under the National Environmental Management: Biodiversity Act 10 of 2004 – National Invasive Terrestrial and Fresh-water Plant Species List (published July 2016). Vegetation of the Little Fish small hydro project footprint appears largely intact, given the arid climate, gravelly soils, north-facing hillslopes, and often sparsely-vegetated nature of the site. However, the past grazing and fire management history of the project site is unknown. There is also a very low presence of exotic and alien invasive plant species on site. Given that vegetation appears to be largely intact, except in disturbed areas i.e. along gravel roads and embankments of the Little Fish irrigation canal, vegetation can be considered to be of a moderate to high conservation value. Though Bedford Dry Grassland vegetation enjoys very little formal protection / conservation, and is listed as Not Protected, but Least Threatened – vegetation clearing along the relatively small development footprint of the Little Fish small hydro project is not anticipated to result in a significant negative impact on conservation targets for this vegetation type, or result in significant negative impacts on biodiversity and ecosystem functioning in this area. With the mitigation measures in place, the impact on the loss of vegetation would remain localised resulting in a low impact.

The Eastern Cape Biodiversity Conservation Plan (ECBCP) (2007) indicates that the footprint of the Little Fish small hydro project falls entirely within a Terrestrial Critical Biodiversity Area (CBA) 2. Terrestrial CBA 2 areas are included under Biodiversity Land Management Class (BLMC) 2: Near-natural landscapes. The recommended land use objectives for BLMC 2 areas are to 'maintain biodiversity in near natural state with minimal loss of ecosystem integrity. No transformation of natural habitat should be permitted'. According to the Biodiversity Sector Plan (BSP) for the Blue Crane Route Municipality (2012) the proposed hydropower system falls within a CBA, Ecological Support Area (ESA) and Other Natural Area (ONA). The management objective for the CBA and ESA is to 'maintain natural land, rehabilitate degraded to natural or near natural and manage for no further degradation'. The land use activity for infrastructure installations has a 'Restricted' classification, where land use is possible under strict controls in order to avoid impacts on biodiversity. Nine species of protected plants listed under the Eastern Province Nature and Environmental Conservation Ordinance of 1974 and the Draft Eastern Cape Environmental Conservation Act of 2003 were identified on site. Protected plants require permits from the relevant authorities i.e. DEDEAT, prior to their disturbance, removal, and / or transplantation. No species listed as threatened on the Red List of South African Plants (version 2015.1) was identified on site. No protected tree species listed under

the National Forests Act No. 43 of 1983 were identified on site. With the mitigation measures in place, the impact on the loss of habitat would remain localised resulting in a medium impact.

A low level of alien plant invasion is scattered across the site. One plant species (*Opuntia ficus-indica*) identified on site are listed as declared weeds i.e. Category 1 under the Conservation of Agricultural Resources Act (CARA) (No. 43 of 1983), and Category 1b under the National Environmental Management: Biodiversity Act (No. 10 of 2004) – National Invasive Terrestrial and Fresh-water Plant Species List. The potential of alien plants spreading is likely if not managed during the site establishment, construction and operational phases. With the mitigation measures in place, the impact on the indigenous vegetation would remain localised, with natural re-vegetation happening within a short time period, resulting in a low risk and low impact significance.

The operational phase of the proposed Little Fish Hydro Power project is considered to pose an insignificant risk to the current ecological functioning of the aquatic habitats or to the associated aquatic biota downstream, for the following reasons:

1. The volume and flow patterns currently being discharged from the Canal into the Little Fish River will not be altered by being diverted through the hydro power facility and back to the river.
2. The water exiting from the hydro turbines will be discharged down a return slipway into the Little Fish River about 285m downstream of the current discharge point at the lower end of the Cascades. The river channel and riparian zones downstream of the Cascades have been “re-set” by over 30 years of almost constant discharge of about 8 cumecs of water from the canal. Riparian and marginal vegetation have become established and have stabilised the river banks to accommodate these unnaturally elevated flows. Therefore, no threat of additional erosion of the river channel at the discharge point or further downstream is anticipated.
3. According to the project proponents, the quality of the water passing through the hydro power scheme and discharged back to the river will not deteriorate or be changed in any way. However, it will be necessary that all infrastructure and machinery be kept in prime condition to prevent any risk of contamination of the water discharged back to the river.
4. If necessary for maintenance and repair, the water flow to the hydro power unit could easily be closed off at the sluice gates located in the canal off-take structure. The excess water will then flow over the existing gauging weir into the Cascades and into the Little Fish River, as is currently the situation. This will ensure that water transfer from the canal into the Little Fish River is not interrupted during maintenance and repair work to the hydropower infrastructure.

The site does not fall within an Important Bird Area (BGIS). Construction activities may disturb any fauna located within the immediate location; however this will be limited to the construction phase. Fauna will need to remain out of the construction area; as a result the construction site will need to be fenced. Overhead transmissions lines may present a potential collision risk or electrocution to avifauna during the operational phase. No fauna impacts are anticipated during the operational phase. Increased sediment input and raised turbidity levels in the river due to disturbance and erosion of riparian zones and adjacent areas, as well as river bed and banks, could have serious negative impacts on aquatic habitats and biota; during the construction and operational phases. With appropriate mitigation this is reduced to a low or insignificant impact.

Dust and air pollution impacts relate to the generation of dust during construction related activities, poorly maintained construction vehicles and burning materials for warmth during winter by contraction staff. In relation to operational phase activities, the impact relates mainly to dust from cleared areas, e.g. the gravel access. The operation of Hydropower system does not produce any emissions. The

impact can be mitigated to a low negative impact significance, from a medium negative impact.

The loss of heritage resources relates to the possible loss of cultural heritage resources, including archaeological artefacts. The area is of low cultural sensitivity and it is highly unlikely that any archaeological remains of any significance will be found in situ or exposed during the development. There are no known graves or historical buildings older than 60 years on the site. Impact on heritage resources would occur only in the construction phase, with no impact anticipated in the operational phase. The impact can be mitigated to a very low negative impact significance, from a low negative impact.

Agricultural potential of the site is low as it is classified as non-arable agricultural land (CDM SDF, 2013). As such, the site is not suitable for cultivation purposes. The site is currently utilised partially as a grazing area for game / livestock, and historically has been utilised as a grazing area for livestock. The proposed hydro power site is currently zoned as Agriculture. The construction related impact can be mitigated to a low negative impact, from a moderate negative impact. No mitigation measures are identified for the operational phase.

Soil exposed by the clearing of vegetation during construction will have substantially elevated erosion levels. The risk of soil erosion increases in areas where vegetation and rocks are removed in order to cater for linear infrastructure and access roads. Areas that may require clearing include the hydro power house, penstock pools, penstock pipelines, and construction and laydown areas in order to undertake the required construction. Some of these areas may not be required for operational phase. The impact can be mitigated to a low negative impact significance, from a moderate negative impact.

Hydropower technology generates electricity by utilising the flow of water. Renewable energy technology produces zero greenhouse gas emissions, air pollutants and waste. Impacts relating to ineffective waste management procedures may lead to the dumping of building rubble, littering and pollution of the surrounding areas as well as unsanitary (toilet) conditions and an increase in vermin. Construction waste will be removed from site by the appointed contractor to a registered waste disposal site. Where possible, excavated material and inert construction waste material will be used as fill material or in site levelling. Domestic and construction waste will increase the amount of waste disposed to landfill, including cleared vegetation. No vermin will be attracted during the operational phase. Debris (vegetation and animal carcasses) in the canal would need to be collected prior to the canal water flowing through the hydropower system. Maintenance procedures may result in the disposal of equipment. This waste will be removed from site by the operational contractor and disposed of at a registered landfill site during the operational phase, unless it is able to be recycled or reused. During the construction phase chemical toilet facilities will be provided at construction areas and secured to the ground, and cleaned at least weekly. During the operational phase, the operational contractor will not be on site full time, and toilet facilities will not be required. The impact can be mitigated to a low negative impact significance, from a moderate negative impact.

Given that the proposed site is located outside an urban area, no sensitive receptors in close proximity and provided that mitigation measures are implemented, a negligible impact from noise generation is anticipated during construction. During the operational phase, the noise impact will be low as there are no sensitive receptors within 500m of the site.

General safety of persons is a concern due to construction activities, e.g. open excavations and machinery, resulting in potential injury to construction staff; health and safety aspects relate to the potential spread of HIV and STDs. Strict adherence to health and safety regulations during construction is vital. Security aspects relate to potential theft of construction materials and theft of neighbouring farmers livestock or equipment. The presence of workers on the site for construction

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related activities, irrespective of whether or not they are local, may create an increased safety and security risk to local households in the area. In addition, any changes in the local crime rates are likely to be attributed to the influx of construction workers, whether such changes can be attributed to their presence or not. The security risks would be higher during the construction phase. The contractor would have security on-site full time during the construction phase. During the operational phase the operational contractor would check the site periodically and it is anticipated that some security checks will be made on a regular basis. Fire is a potential risk with any electrical system. Veld fires are a potential risk considering the vegetation types occurring within and adjacent to the site. During construction the risk may be attributed to inappropriate construction activities (e.g. hot work, welding) on dry, windy days. During the operational phase, fire risks may be associated with incorrect or loose wiring within the powerhouse or transmission lines, or when wiring is inadequate and cannot withstand electricity generation. The impact can be mitigated to a low negative impact significance, from a moderate negative impact.

Approximately 65 and 8 employment opportunities will be created during the construction and operational phases respectively. An adverse effect on this impact may occur in that high expectations are formed regarding construction employment opportunities and that these expectations cannot be sustained. The impact can be mitigated to a medium positive impact.

A transmission line of 22kV, i.e. power line, of approximately 11km would need to be constructed in order to feed electricity produced into the electricity distribution network of the BCRM. The transmission line would join the Somerset-East Main Substation, and is located to the north of the hydro power site. The transmission line's design will conform to Eskom standards. A step-up transformer would be required at the powerhouse along with a grid voltage stabiliser in order to maintain a constant voltage level. Disruption of or damage to existing services and infrastructure, e.g. Eskom transmission line, can be mitigated to a low negative impact.

The Bloemhof Road presently carries low traffic volumes related to the farms situated along the road. During the construction phase, the additional daily traffic will increase with construction vehicles. During the operational phase, the additional daily traffic is anticipated to be low. The impact can be mitigated to a low negative impact.

Renewable energy infrastructure relates to the production of cleaner energy from renewable sources, and moving to a less carbon-intensive electricity production (i.e. reducing carbon emissions associated with coal power stations). The impact relates to the operational phase only. The Eastern Cape Province is reliant on electricity imports from other provinces yet houses significant industrial and rural development potential. Power from the national grid is largely generated from coal power stations, and transmitted considerable distances to the Eastern Cape. This leads to significant transmission losses and local grid instabilities. Electricity supply to the Eastern Cape Province is further constrained by transmission infrastructure. The Eastern Cape Province will need to import more power from the national grid, as well as increase local generation capacity. Although only 3.1MW will be fed into the electrical grid, the proposed project forms a source of zero carbon electricity generation and contribution to the renewable energy targets. The impact remains at a high positive impact significance.

Alternative B

No feasible alternatives

Alternative C

No feasible alternatives

No-go alternative (compulsory)

No indigenous vegetation will be cleared, and impact remains at a moderate positive significance.

No protected or endangered species will be physically removed; however a risk remains that these species will be lost to animals as a food source. Impact remains at a moderate negative significance.

The risk remains that the current alien vegetation may spread into surrounding areas, if not controlled. Impact can be reduced to a low negative significance.

No change is expected to occur in the Aquatic Health of the site.

The site would be continued to be used for grazing. The significance remains at a moderate positive impact as no loss of agricultural land would be undertaken.

Debris (vegetation and animal carcasses) in the canal is removed and discarded prior to the canal water flowing through the weirs and Little Fish River. The impact significance remains at moderate negative.

Employment opportunities will not be created during the construction and operational phases. The significance is a moderate negative impact.

Other renewable energy sources will need to be sourced to contribute to the renewable energy targets, and reduction of carbon-intensive electricity production. The impact remains at a high negative significance.

SECTION E. RECOMMENDATION OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?

YES ✓	NO
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If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment).

N/A

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application.

<p>It is recommended that that the activity (Alternative 1) is granted with the following recommendations:</p> <ul style="list-style-type: none"> a) All mitigation measures in the Environmental Management Programme (EMPr, Appendix G) are followed. b) An experienced Environmental Officer is appointed by the Contractor and an experienced independent ECO is appointed by the developer to monitor compliance with the EMPr during construction. c) Alien plant regrowth is to be monitored and managed during the construction phase by the Contractor and operational phases by the developer. d) Only indigenous plant species must be used in the re-vegetation process. e) Permits must be obtained from the DEDEAT prior to the removal of protected and SSCs. f) A Water Use License in terms of Section 21 of the NWA must be obtained by the developer prior to the commencement of the activity. g) Sedimentation must be minimised through the effective stabilisation (e.g. gabions and Reno mattresses) and the re-vegetation of cleared areas. h) To prevent scouring and erosion during heavy rains via surface run-off, appropriate (best practice) gabion protection works and rehabilitation of all disturbed areas, including the pipeline trench with appropriate indigenous vegetation will be necessary. i) Strict use and management of all hazardous materials used on site, as well as strict management of potential sources of pollution (hydrocarbons from vehicles & machinery, cement during construction, etc.).
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Is an EMPr attached?

YES ✓	NO
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The EMPr must be attached as Appendix G.

Please refer to Appendix G for the EMPr.

The details of the EAP who compiled the BAR and the expertise of the EAP to perform the Basic Assessment process must be included as Appendix H.

Please refer to Appendix H for the details of the EAP.

If any specialist reports were used during the compilation of this BAR, please attach the declaration of interest for each specialist in Appendix I.

Please refer to Appendix I for the declarations of interest.

Any other information relevant to this application and not previously included must be attached in Appendix J.

Please refer to Appendix J for additional information.

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LUCILLE BEHRENS

NAME OF EAP

SIGNATURE OF EAP

DATE

SECTION F: APPENDIXES

The following appendixes must be attached:

Appendix A: Maps

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Specialist reports (including terms of reference)

Appendix E: Public Participation

Appendix F: Impact Assessment

Appendix G: Environmental Management Programme (EMPr)

Appendix H: Details of EAP and expertise

Appendix I: Specialist's declaration of interest

Appendix J: Additional Information

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