

PROPOSED HYDROPOWER FACILITY AND ASSOCIATED INFRASTRUCTURE AT BOEGOEBERG DAM ON THE ORANGE RIVER, NEAR GROBLERSHOOP

ENVIRONMENTAL IMPACT ASSESSMENT

Non-Technical Summary of the EIA Report



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Boegoeberg Hydro Electric Power (Pty) Ltd (Boegoeberg Hydro) proposes to construct an 11 Megawatt (MW) hydropower facility at Boegoeberg Dam on the Orange River, near Groblershoop in the Northern Cape to generate energy in a renewable manner. In terms of environmental law¹, an Environmental Impact Assessment (EIA) is required and the national Department of Environmental Affairs have to authorise the project before it can go ahead. Aurecon South Africa (Pty) Ltd (Aurecon) is undertaking this EIA study to investigate the environmental and socio-economic issues to facilitate the authority decision making and to inform the design and operation of the proposed hydropower facility.

HOW DOES THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS WORK?

An EIA evaluates the environmental and socio-economic characteristics of proposed projects and the consequences of the project on the environment and the people that live in the area affected by the project activities. Measures are recommended to avoid or lessen negative impacts to a level which is considered acceptable from an environmental and social perspective. Where positive impacts are likely to result from the project, measures are recommended to increase these impacts. The EIA process also gives Interested and Affected Parties an opportunity to comment on the project and to be kept informed about decisions that may impact on them or the environment. The various stages of the process are shown in Figure 1.

This is a non-technical summary of the Draft EIA Report (EIAR) which includes:

- An introduction to the proposed hydropower facility and an overview of the legislative framework;
- An overview of the approach to the EIA, describing the public participation to date;
- A description of the proposed project and the alternatives considered, as well as the reason for the project;

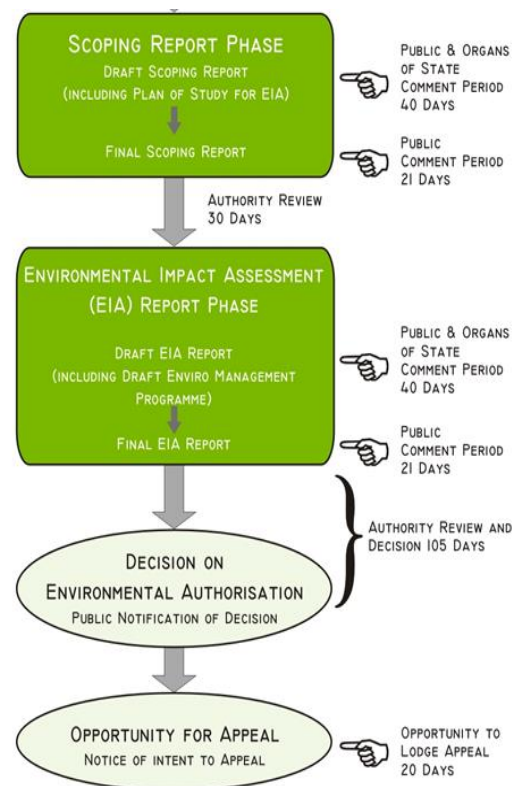


Figure 1 EIA process

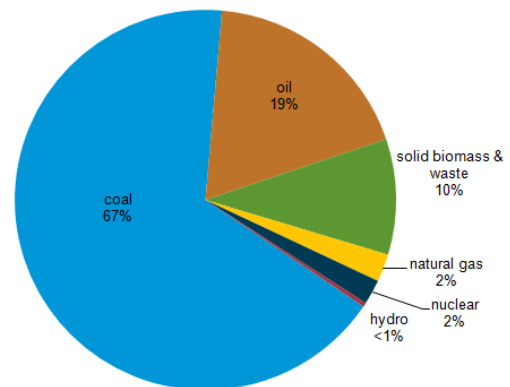
¹ Namely the National Environmental Management Act (Act No 107 of 1998) (as amended) (NEMA)

- An assessment of significance of the predicted impacts assessed from the project;
- Recommendations to manage these impacts; and
- A life cycle Environmental Management Plan to cover the design, construction, operational and decommissioning impacts.

This summary provides a non-technical overview of what is contained in the full EIA Report and cannot replace the comprehensive Draft EIAR which should be reviewed for more detailed information. .

WHY IS THE HYDROPOWER FACILITY NEEDED?

South Africa currently generates most of its required electricity from coal as indicated in Figure 2 and is looking at ways to generate power from a range of sources. This is motivated by concerns about climate change and, on-going use of non-renewable resources. Renewable energy is recognised internationally as a major contributor in reducing the effects climate change. It also provides a range of environmental, economic and social benefits that can contribute towards long-term global sustainability. The project will contribute towards meeting the national energy target as set by the Department of Energy. It would also help South Africa meet some of its international obligations in terms of internationally agreed strategies and standards as set by the Kyoto Protocol and United Nations Convention on Biological Diversity.



Source: U.S. Energy Information Administration

Figure 2 | Total primary energy supply in South Africa during 2010

HOW DOES A TYPICAL HYDROPOWER FACILITY WORK?

The proposed hydropower station as indicated in Figure 3 is run-of-river (i.e. there is no storage of water off-stream). Various structures are required to produce Electricity is produced using the natural flow and drop in elevation of a river and diverting the flow and passing it through turbines that spin generators.

The flowing water spins the turbines, which take the kinetic energy (energy from movement) from the flowing water to generate electricity. The power station would be subject to seasonal river flows, and would not operate during low flow periods. Electricity generated would feed into substations.

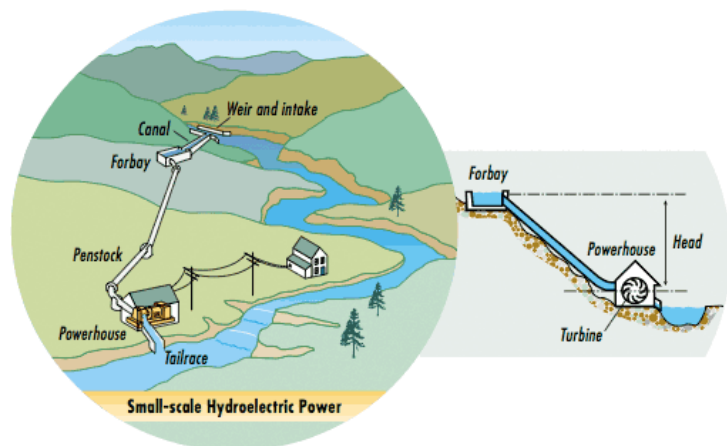


Figure 3 | Illustration of a run-of-river hydropower station [Source: <http://enermed.cres.gr> (Accessed: 28 June 2013)]

WHAT IS PROPOSED AND WHERE?

Boegoeberg Hydro proposes to construct a hydropower facility, with a generation capacity of 11MW on farm Zeekoebaart (Remainder of Farm no. 306 and Portion 1 of Farm no. 306) located approximately 26km south east of the town of Groblershoop. A run-of-river hydropower station, as proposed, would consist of the following:

- Intake infrastructure including the existing Boegoeberg Weir, the offtake weir (below the normal water surface level) and an inlet structure.
- Temporary upstream caisson (coffer dam) will be required in the weir pool to exclude water from the construction works.
- Infrastructure to direct water from the river to the power chamber.

- Head pond/ forebay to temporarily store water to allow for a steady flow to the turbines.
- Power station intake structure/ penstock to help in controlling water going to the power chamber.
- A power chamber to house the turbines and equipment used to generate electricity.
- Outlet works/ tailrace to return the water back into the river, downstream of the power chamber.
- Ancillary infrastructure includes access roads, sediment basins, transmission line(s) for evacuating the energy produced by the hydropower station to the Eskom national grid including a switchroom, and transformer yard.

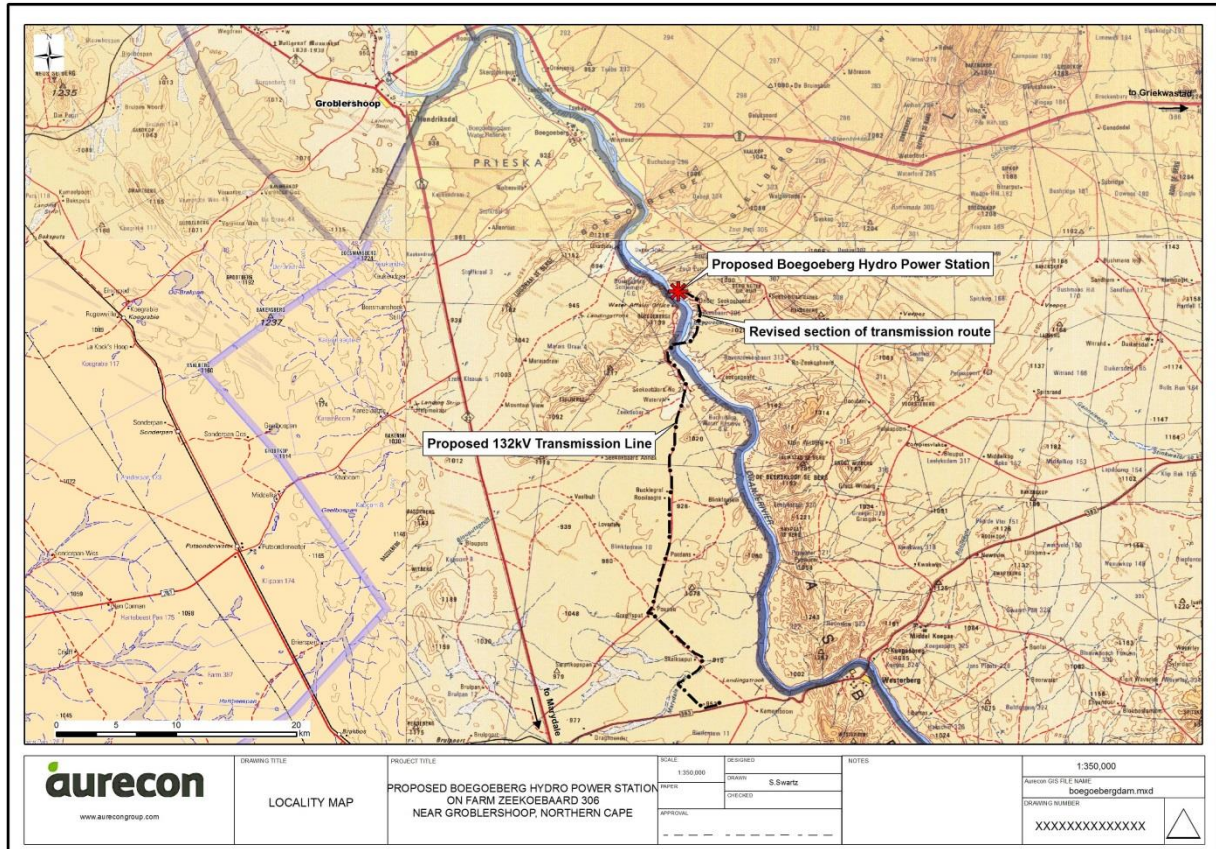


Figure 4 Locality map

WHAT ALTERNATIVES ARE BEING CONSIDERED?

An important part of an EIA is to consider alternatives to achieve the most environmentally and socially responsible development. The following project related alternatives were considered:

- **Location alternatives**
 - Only the current location (Boegoeberg dam, Farm 306 Zeekoebaart)
- **Activity alternatives**
 - Energy generation by means of a hydropower station
 - “No-go” alternative to hydropower energy production
- **Site layout alternatives**
 - Two water conveyance alternatives, tunnel (preferred) or open canal (Figure 4)

Routing Alternatives

Two transmission line and road access alternatives (



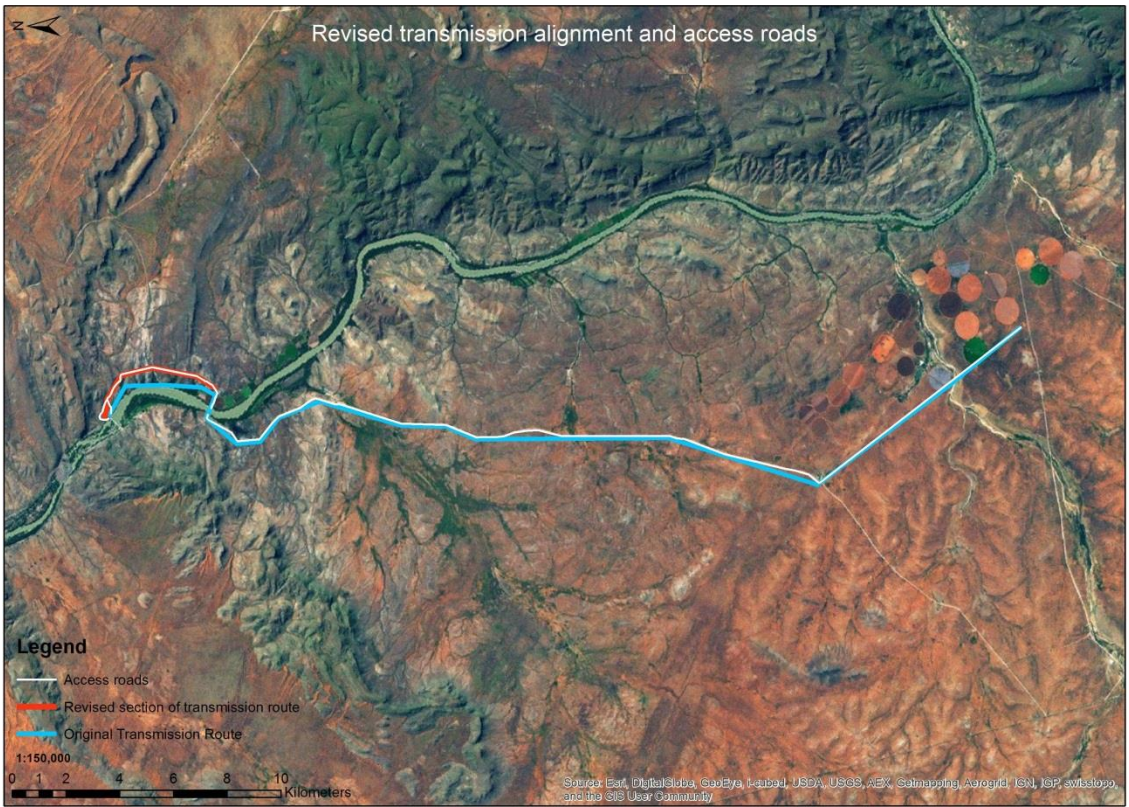


Figure 5 | Water conveyance alternatives- open canal vs. tunnel

- Figure 6)
- **Technology alternatives**
 - Only one technology alternative (Kaplan hydropower turbines) will be considered

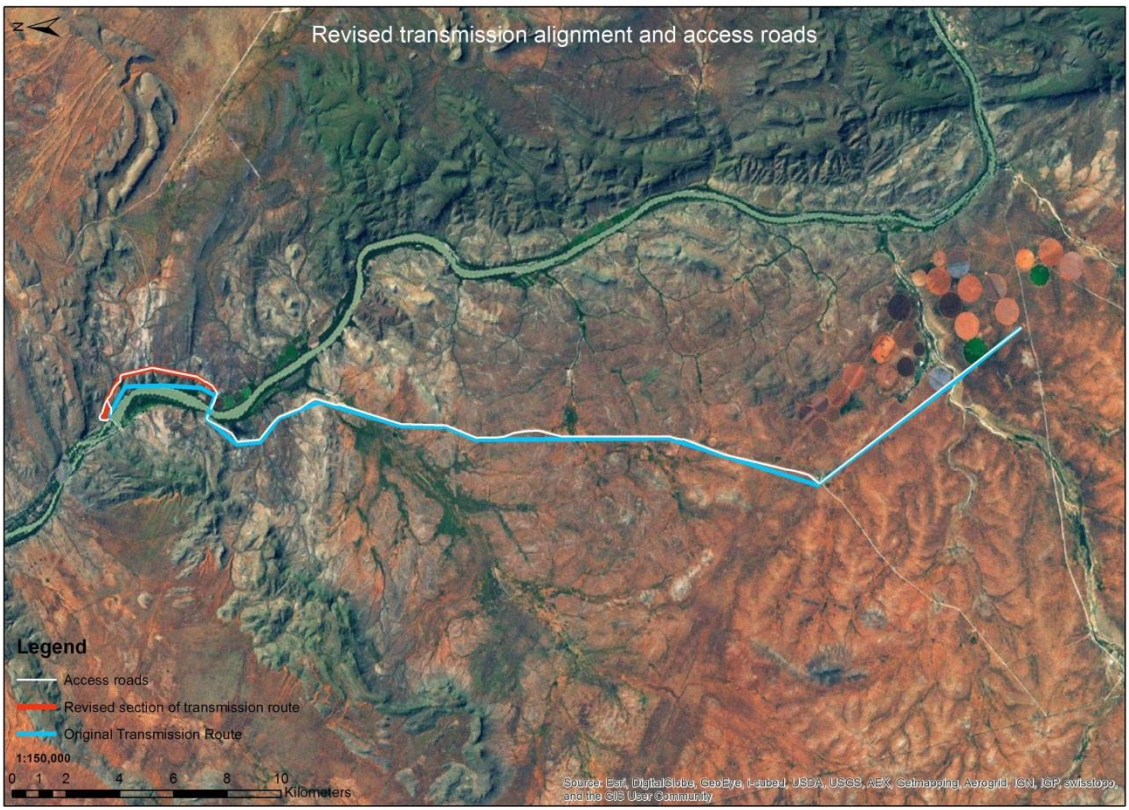


Figure 6 | Transmission line Layout Alternatives

WHAT KIND OF IMPACTS ARE EXPECTED?

The proposed hydropower facility may have a range of environmental and socio-economic impacts. During the EIA, the EIA team, including specialists assessed the significance of the relevant impacts of the alternatives. This was done using the specific methodology developed for assessment of significance of impacts, based on the specific characteristics of the site and the proposed development. The findings are presented in the EIA Report and briefly repeated below.

Table 1 | Significance of impacts

IMPACTS	PROJECT ASPECT	Construction		Operation		Decommissioning	
		No Mitigation	With Mitigation	No Mitigation	With Mitigation	No Mitigation	With Mitigation
Impact on flora	Layout (canal)	Medium (-)	Medium (-)	Low (-)	Low (-)	Low (-)	Low (-)
	Layout (tunnel)	Low - Medium (-)	Low - Medium (-)	Low (-)	Low (-)	Low (-)	Low (-)
	Access Road	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)
	Transmission lines (both alt)	Medium (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)
	Construction site	Medium (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)
	No- Go	Low (-)	-	Low (-)	-	Low (-)	-
Impact on avifauna	Layout Alts	Low - Medium (-)	Low (-)	Low - Medium (-)	Low (-)	Low - Medium (-)	Low (-)
	Transmission 1 and 2 (habitat loss and disturbance)	Low (-)	Very Low (-)	Low - Medium (-)	Low (-)	Medium (-)	Medium-Low (-)
	Transmission 1 and 2 (Mortality)			High (-)	Low - Medium (-)		
Impact on fauna	Layout & Transmission (all alternatives)	Low (-)	Very low (-)	Low (-)	Low (-)	Low (-)	Very low (-)
Impact on agriculture	Layout Alt	Low (-)	Very Low (-)	Very low (-)	Very low (-)	Very Low (-)	Very Low (-)
	Transmission lines & Access roads	Low (-)	Low (-)	Very low (-)	Very low (-)		
Aquatic Ecology	Layout (all alternatives)	Medium (-)	Low (-)	Medium (-)	Low (-)	Low (-)	Very low (-)
	Transmission corridors, roads and pipeline	Low (-)	Very low (-)			Very low (-)	Very low (-)
Palaeontology	Layout Alt.1 and 2	Low (-)	Low (-)				
	Transmission lines	Low (-)	Low (-)				
Impact on heritage	Layout archaeology	Medium (-)	Low (-)				
	Layout graves	High (-)	Low (-)				
	Transmission archaeology	Low (-)	Low (-)				
	Transmission graves	Low (-)	Low (-)				
	Roads archaeology	Medium (-)	Low (-)				
	Roads graves	High (-)	Low (-)				
	No- Go	Very low (-)	Very low (-)				
Visual impacts	Layout (All Alt)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)
	Transmission (All alt)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)

IMPACTS	PROJECT ASPECT	Construction		Operation		Decommissioning	
		No Mitigation	With Mitigation	No Mitigation	With Mitigation	No Mitigation	With Mitigation
Social impacts	Layout All alternatives Direct employment and skills development; Economic Multiplier Effects	Low (+)	Low (+)	Low (+)	Low (+)		
	Layout All alternatives Additional workers on site	Low (-)	Very Low (-)				
	Layout All alternatives Landowner revenue Diversification of the local economy			Low (+)	Low (+)		
Impact on energy production	Layout Alt.1 and 2			Low (+)	Low (+)		
Impact on traffic	Layout Alt.1 and 2	Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Low (-)	Very Low (-)

The impact on all the aspects identified above is low or very low negative after mitigation, with the exception of the impact on flora from the water conveyance system, which reduces to low medium negative if the option of tunnelling, is selected. The impact on avifauna from the transmission lines can also be mitigated to low medium negative with special routing of the power line and by attaching bird flappers to the lines to reduce collisions with the lines. The positive impacts from the project are social as work opportunities are created in the construction phase and development such as this stimulates the local economy. The project also has the positive impact of assisting in producing energy for South Africa.

An environmental management plan has been drawn up to manage the impacts through all phases of the project, including the construction and operational phases. There is a need for an environmental control officer to manage implement this management plan during the construction phase.

PROPOSED WAY FORWARD

Based on the outcome of this EIAR, Aurecon is of the opinion that the proposed hydropower station can be authorised as the local and regional benefits outweigh the negative impacts. The proposed project meets the NEMA principles. The significance of negative impacts can be reduced to acceptable levels with effective and appropriate mitigation.

WHAT IS PUBLIC PARTICIPATION AND HOW DO YOU GET INVOLVED?

Public participation is an important part of the EIA process, as it allows the public to get information about the proposed project, to view documentation, to make input and voice any concerns.

The full Draft EIAR for the proposed hydropower facility is available for review from 2 December 2013 until 29 January 2014 at the following venues:

- Groblershoop Public Library
- Khies Municipality offices in Groblershoop

- Accessible from the Aurecon website (www.aurecongroup.com – please change the current location to “South Africa” and follow the “public participation”- link)

The comments and concerns raised on the Draft and Final Scoping Reports were incorporated into a Comments and Responses Report which is attached to the Draft EIAR. The public is given the opportunity to submit comments and concerns until close of business 29 January 2014. The comments on the Draft EIAR will be used to update this draft document to a final document, which will be submitted to the authorities for authorisation.

Comments can be submitted to the EIA PPP team from 2 December 2013 until 29 January 2014:

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