

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

## ENVIRONMENTAL IMPACT ASSESSMENT

### *Non-Technical Summary of the Final EIA Report*



Boegoeberg Hydro Electric Power (Pty) Ltd (Boegoeberg Hydro) proposes to construct an 11 Megawatt (MW) hydropower facility at Boegoeberg Dam<sup>1</sup> on the Orange River, near Groblershoop in the Northern Cape to generate energy in a renewable manner.

In terms of environmental law<sup>2</sup>, an Environmental Impact Assessment (EIA) is required and the national Department of Environmental Affairs has to authorise the project before it can proceed. Aurecon South Africa (Pty) Ltd (Aurecon) is undertaking this EIA study to investigate and assess environmental and socio-economic issues to facilitate 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 benefits. 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 Final EIA Report (EIR) 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 public participation to date;

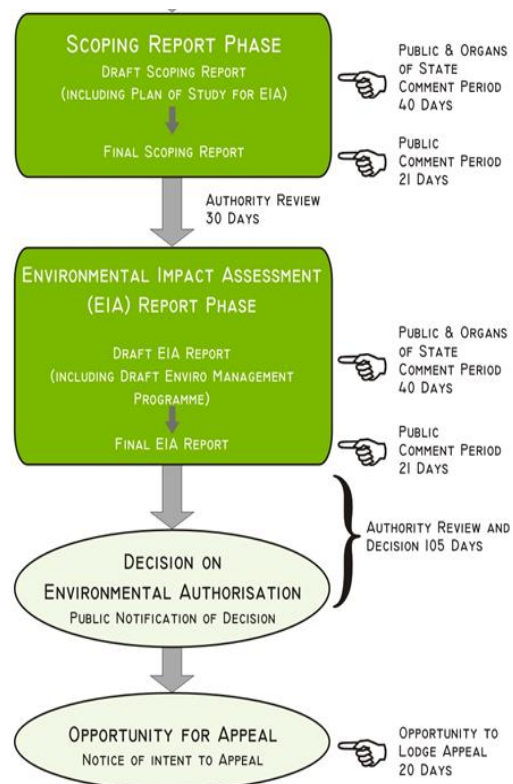


Figure 1 EIA process

<sup>1</sup> The Boegoeberg Dam is actually a weir in the Orange River constructed between 1926 and 1933; however, it is commonly referred to as Boegoeberg Dam, which convention is used in this report.

<sup>2</sup> Namely, the National Environmental Management Act (Act No 107 of 1998) (as amended) (NEMA)

- A description of the proposed project and the alternatives considered, as well as the reason for the project;
- An assessment of significance of the predicted impacts arising from the project;
- Recommendations to manage these impacts; and
- A life cycle Environmental Management Programme 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, importantly, cannot replace the comprehensive Final EIR which should be reviewed for more detailed information. .

## WHY IS THE HYDROPOWER FACILITY NEEDED?

South Africa currently generates most of its electricity from coal as indicated in Figure 2 and is looking at ways to generate power from a range of alternate sources, including renewable energy sources. This is motivated by concerns about climate change and on-going use of non-renewable resources, viz. coal. Renewable energy is recognised internationally as a major contributor in reducing the effects of 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, such as the Kyoto Protocol and United Nations Convention on Biological Diversity.

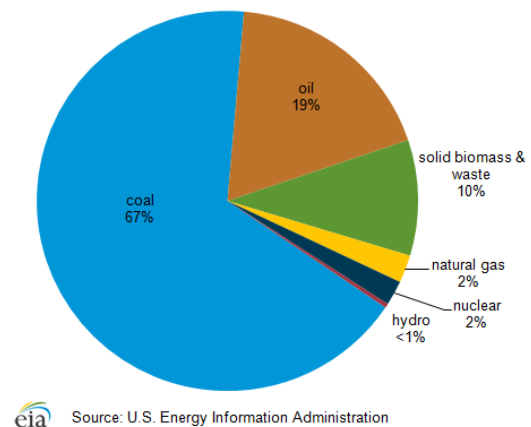


Figure 2 | Total primary energy supply in South Africa during 2010

## HOW DOES A TYPICAL RUN-OF-RIVER 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 using the natural flow and drop in elevation of a river by diverting water 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 the national grid.

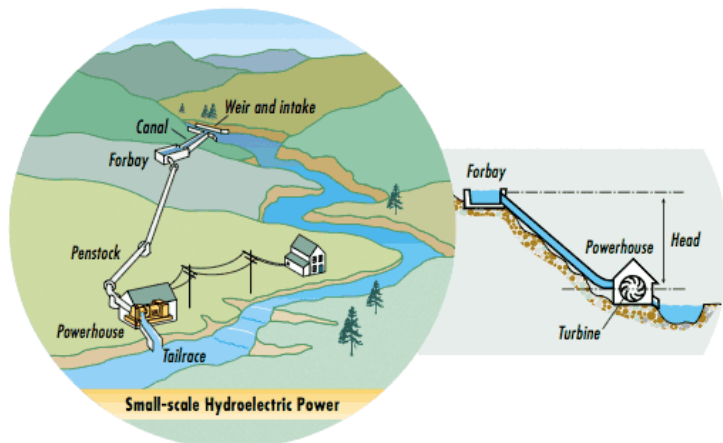


Figure 3 | Illustration of a run-of-river hydropower station  
[Source: <http://enermed.cres.gr> (Accessed: 28 June 2013)]

## WHAT IS PROPOSED AND WHERE?

Boegoeberg Hydro proposes to construct a hydropower facility, with a generation capacity of 11 MW on farm Zeekoebaart (Remainder of Farm no. 306 and Portion 1 of Farm no. 306) located approximately 26 km south east of the town of Groblershoop (Figure 4). A run-of-river hydropower station, as proposed, would consist of the following:

- An off-take structure above the existing Boegoeberg weir to facilitate the abstraction of water;

- A temporary upstream and downstream caisson (cofferdam) to exclude water from the construction works;
- Intake structure;
- Water conveyance infrastructure comprising a combination of either an open canal or a tunnel to convey the water.
- A head pond (associated with the canal alternative only);
- Steel (or other suitable pipeline material) penstocks to transfer the water to the power chamber;
- A power chamber to house the turbines and generation equipment;
- Outlet channel (tailrace) to return the abstracted water back into the river, downstream of the power chamber;
- A switchroom and transformer yard;
- A high voltage (HV) transmission line to evacuate the power to the nearby Fibre Substation;
- Sediment basins (for dredge spoil); and
- Formalised access roads (designed at 6 m wide) to the site and distribution line access tracks (informal tracks across the veld below the centre line of the transmission line).

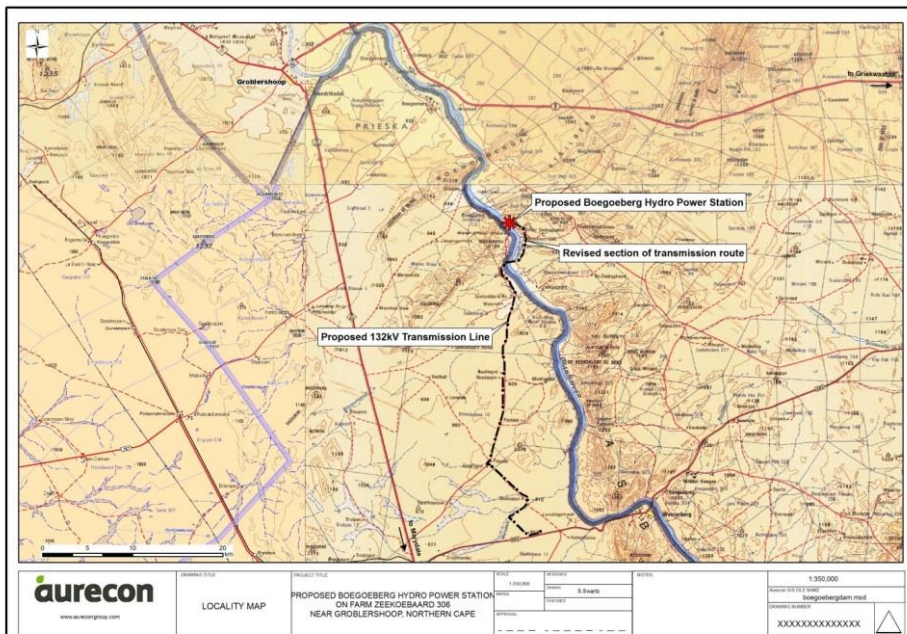


Figure 4 | Locality map

## 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, i.e. no development
- **Site layout alternatives**
  - Two water conveyance alternatives, tunnel (preferred) or open canal (Figure 5)
- **Routing Alternatives**
  - Transmission line (alternative 1) and road tunnel



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



- access; and
- Revised transmission line (alternative 2) and road access alternative to avoid botanically sensitive area (Figure 6).
- **Technology alternatives**
  - Only one technology alternative (Kaplan hydropower turbines) was considered.

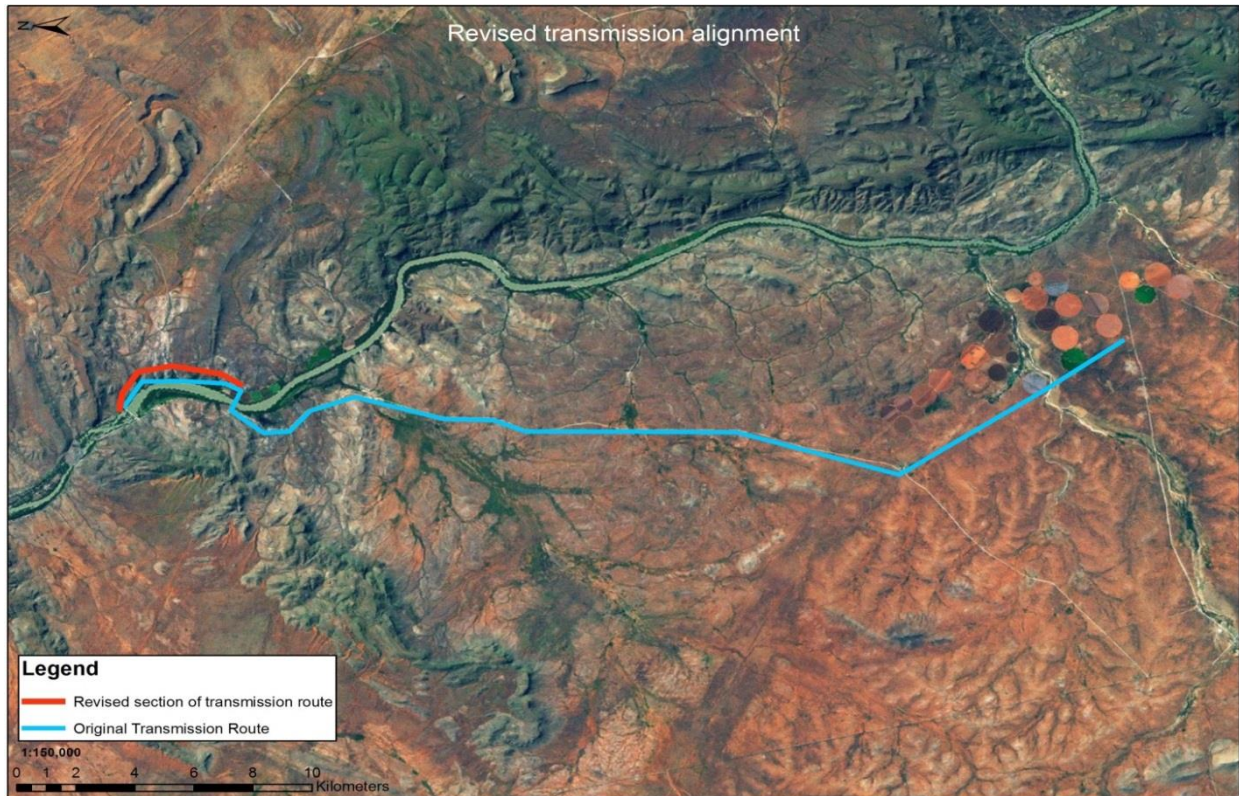


Figure 6 | Revised transmission alignment taking cognisance of environmental sensitivities

## 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 a specific methodology developed for the assessment of the significance of impacts, based on the specific characteristics of the site and the proposed development. The findings are presented in the EIA Report and summarised below.

Table 1 | Significance of impacts

IMPACTS	PROJECT ASPECT	Construction		Operation		Decommissioning activities <sup>3</sup>	
		No Mitigation	With Mitigation	No Mitigation	With Mitigation	No Mitigation	With Mitigation
Impact on flora	Layout 1 (canal)	High (-)	Medium (-)	Low (-)	Low (-)	Low (-)	Low (-)

<sup>3</sup> Decommissioning impacts assessed refer to decommissioning activities. Should the facility and ancillary infrastructure be removed in their entirety, most of the impacts following decommissioning will be low positive, especially in terms of the biophysical environment.

IMPACTS	PROJECT ASPECT	Construction		Operation		Decommissioning activities <sup>3</sup>	
		No Mitigation	With Mitigation	No Mitigation	With Mitigation	No Mitigation	With Mitigation
	Layout 2 (tunnel)	Medium (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)
	Access Road	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)
	Transmission lines (both alternatives)	Medium (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)
	Construction site	Medium (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)
	No- Go	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Impact on avifauna	Both layout alternatives	Low - Medium (-)	Low (-)	Low - Medium (-)	Low (-)	Low - Medium (-)	Low (-)
	Transmission alternatives 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 lines (all alternatives)	Low (-)	Very low (-)	Low (-)	Low (-)	Low (-)	Very low (-)
Impact on agriculture	Both layout alternatives	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 (-) <sup>4</sup>	Low (-)	Medium (-)	Low (-)	Low (-)	Very low (-)
	All transmission corridors and roads	Low (-)	Very low (-)			Very low (-)	Very low (-)
Palaeontology	Both layout alternatives	Low (-)	Low (-)				
	All 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 (-)				
Visual impacts	Both layout alternatives	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)
	All transmission alternatives	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)
Social impacts	Both layout alternatives (direct employment and skills development; economic multiplier)	Low (+)	Low (+)	Low (+)	Low (+)		

<sup>4</sup> Failure to allow environmental flows over the Boegoeberg weir will result in the unmitigated impact being felt for the stretch of river between the existing weir and the tailrace. Thereafter, the EFR would be achieved, as all diverted water would be returned to the system. In low flow periods, the power station would not operate.

IMPACTS	PROJECT ASPECT	Construction		Operation		Decommissioning activities <sup>3</sup>	
		No Mitigation	With Mitigation	No Mitigation	With Mitigation	No Mitigation	With Mitigation
	effects)						
	Both layout alternatives (Additional workers on site)	Low (-)	Very Low (-)				
	Both layout alternatives (landowner revenue, diversification of the local economy)			Low (+)	Low (+)		
<b>Impact on energy production</b>	Both layout alternatives			Low (+)	Low (+)		
<b>Impact on traffic</b>	Both layout alternatives	Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Low (-)	Very Low (-)

During construction, 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. During operations, the impact on avifauna from the transmission line can also be mitigated to low medium negative with special routing of the transmission line and by attaching bird flappers to the lines to reduce collisions. The positive impacts from the project are social as work opportunities are created in the construction phase and a development such as this stimulates the local economy. The project also has the positive impact of assisting in producing energy, from renewable sources, for South Africa.

An environmental management programme has been prepared to manage the impacts through all phases of the project, in particular, construction and operations. There is a need for an environmental control officer to oversee the implementation of this management programme during construction.

## WAY FORWARD

Based on the outcome of this EIA, the Environmental Assessment Practitioner (EAP) (Aurecon) is of the opinion that the proposed hydropower project should be authorised as the incremental local and regional benefits outweigh negative impacts. The proposed project substantially meets the NEMA principles as well as the required Need and Desirability criteria. The significance of negative impacts can be reduced with effective and appropriate mitigation.

## WHAT IS PUBLIC PARTICIPATION AND HOW DO YOU GET INVOLVED?

The current phase of public participation, comprising the public review of this Final EIR, commenced on **17 March 2014** and Interested & Affected Parties (I&APs) are afforded 21 days to provide comments on this report, until **7 April 2014**. The Final EIR is to be lodged in the Groblershoop Public Library, Groblershoop Municipal buildings and on the Aurecon website. I&APs will be notified of the availability of the report.

All comments received on the Final EIR will be forwarded to the Department of Environmental Affairs (DEA) for final decision-making. Therefore, the EAP will not collate the comments into a Comments and Responses Report (CRR) nor will the EAP respond to comments.

Once the 21 day public review period has been completed, the Final EIR, including the CRRs (1, 2 and 3) will be submitted to DEA for review. DEA must, within 60 days, do one of the following:

- Accept the report;
- Notify the applicant that the report has been referred for specialist review;
- Request amendments to the report; or
- Reject the report if it does not materially comply with the regulations.

If the report is accepted, DEA must within 45 days:

- (a) Grant authorisation in respect of all or part of the activity applied for; or
- (b) Refuse authorisation in respect of all or part of the activity.

Once DEA issues their decision on the proposed project, all registered I&APs on the project database will be notified of the outcome of the decision within 12 calendar days of the date of the decision. I&APs will also be informed of the Appeal procedure.

**Comments can be submitted to the EIA PPP team from 17 March 2014 until 7 April 2014:**

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