

KRUISVALLEI HYDROELECTRIC POWER GENERATION SCHEME

Free State Province

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Final Basic Assessment Report

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EXECUTIVE SUMMARY

Background

Zevobuzz (Pty) Ltd propose to develop a hydroelectric power generation scheme in the Ash River in the Free State Province. The Scheme comprises the previously authorised Lower Kruisvallei (LK) Scheme and the previously authorised Middle Kruisvallei (MK) Scheme. The project is located on the farm Kruisvallei 190 and farm Middelvelei 130 (referred to as the project site²) situated within the Dihlabeng Local Municipality and within the greater Thabo Mofutsanyane District Municipality approximately 13km north west of Clarens (refer to **Figure 1.1** and **Figure 1.2**). The project will be known as the Kruisvallei Hydroelectric Power Generation Scheme.

Two separate Environmental Impact Assessment (EIA) processes were previously undertaken for the LK and MK Schemes. Environmental Authorisation (EA) for LK (DEA reference no. 12/12/20/1876) and MK (DEA reference no. 12/12/20/1875) were issued under the 2006 EIA Regulations in September 2011. Both projects were bid as one single project in the Department of Energy's Renewable Energy Independent Power Producer Procurement (REIPPP) Programme in Round 4 and the project was selected as a Preferred Bidder. Through the modelling and analyses undertaken in the final design for the Scheme, a number of changes have been identified as being required for the project. These changes would result in changes to the currently authorised projects. After consultation with the competent authority, the Department of Environmental Affairs (DEA), it was confirmed that a new Basic Assessment (BA) process will be undertaken for the Scheme, which will consist of all infrastructure, on agreement that the DEA would not lapse the previous EAs until a positive decision has been issued on this current

application. This new application will include all infrastructure associated with the Kruisvallei Hydroelectric Power Generation Scheme, including infrastructure previously authorised.

The proposed project will involve the construction of two Power Houses, one each at Lower Kruisvallei (LK) and Middle Kruisvallei (MK), resulting in a total generating capacity of 4.7MW. Electricity generated by the project will feed into and supplement the national electricity grid. The proposed project will include the construction of a new 22kV overhead power line ~12,6km in length to connect the project to the existing Node Substation and an internal power line ~3,4km in length to connect LK Scheme to the on-site substation.

The following infrastructure will be associated with each power generation plant:

Lower Kruisvallei (LK):

- » Canal³ approximately 590m in length, consisting of:
 - Inlet sill ~170m in length and 15m in width;
 - Headrace canal of 380m in length and 33m in width (including the embankment),
 - Powerhouse (24m in length, 10m in height, 24m in width) which will include the turbine, control room, office and ablution facilities; and
 - Tailrace canal 16m in length and 30m in width (including the embankment).
- » New access road approximately 90m in length and 4m in width to be constructed from the existing Farm Road on Middelvelei 130 to the banks of the Ash River.
- » Temporary Cofferdam.

² The project site includes two affected properties including the farm Kruisvallei 190 and the farm Middelvelei 130 within which the project is being proposed.

³ The length of the canal includes the length of the inlet sill, headrace, tailrace and powerhouse.

Middle Kruisvallei (MK):

- » Canal⁴ approximately 445m in length, consisting of:
 - Intake canal of 30m in width;
 - Headrace canal of 240m in length and 50m in width (including the embankment),
 - Powerhouse (45m in length, 10m in height, 30m in width); and
 - Tailrace canal 160m in length and 50m in width (including the embankment).
- » New access road approximately 750m in length and 4m in width to be constructed from the existing Farm Road on Kruisvallei 190 to the banks of the Ash River.
- » Temporary Cofferdam.

The main infrastructure associated with the Scheme includes the following:

- » Laydown area at each Scheme.
- » Batching plant at each Scheme.
- » A short 22kV power line connecting the LK Scheme to the on-site substation situated on the farm Kruisvallei 190.
- » A 22kV power line to connect the Kruisvallei Hydroelectric Power Generation Scheme to the national grid for the evacuation of the generated electricity.
- » Temporary and permanent access road approximately to be constructed from the banks of the Ash River to the existing farm roads (gravel roads).
- » On-site construction offices in the form of containers.

Potential impacts associated with the development of the Kruisvallei Hydroelectric Power Generation Scheme are expected to occur during both the construction and operation phases. The following provides a summary of the findings of the specialist studies undertaken:

- » *Ecology:* The proposed footprint area of the Kruisvallei Hydroelectrical Power Generation Scheme is situated within Eastern Free State Sandy Grassland which is classified as Endangered according to Mucina & Rutherford (2006), but is not listed within the List of Threatened Ecosystems (NEM:BA Act No 10 of 2004). This area is included within the Free State Biodiversity Plan as an Ecological Support Area 2 (ESA 2). During the assessment it was determined that very little of this vegetation type remained within the study area, and most of the valleys are cultivated. Other disturbances included fallow lands and historically cultivated lands which now have been reinstated with general grasses and weedy forbs. Small fragmented patches of Eastern Free State Sandy Grassland within the Ash River valley persist between these cultivated and transformed areas and are subjected to intense grazing with livestock (cattle). This has resulted in some of the naturally occurring species being replaced with more resilient and unpalatable grasses and weeds. It is highly unlikely that this development will have any significant impact on the status of the remaining natural extent of this vegetation type as well as the ability of this area to function as an ESA 2 area. There are no highly ecological sensitive features impacted by the development footprint. The layout for the LK and MK Schemes infringes on a small section of back flooded pools and some impacts are likely to occur within this area.

Only one Red Data flora species was recorded within the study area namely *Boophone disticha* (Declining). This species was however recorded outside of the development footprint for the LK and MK Schemes as well as their associated infrastructure.

⁴ The length of the canal includes the length of the headrace, tailrace and powerhouse.

The development of the Scheme is considered acceptable in terms of the loss of the area to development. Overall, and with the suggested mitigation measures implemented, the **ecological impacts** of the development are likely to be of **moderate significance** and no impacts of high significance are likely.

- » *Aquatic Systems:* In terms of the hydrological character of the study area as well as potential wetlands, it was determined that the proposed location of the Kruisvallei Hydroelectric Power Generation Scheme is located within a highly altered and transformed habitat due to the implementation of the Lesotho Highlands Water Project. Any seasonality that would have existed in the river has been removed. Instream habitat has also been negatively impacted due to very high velocities and depths in the channel. These alterations have exposed the channel and banks to severe erosion altering the channel bed and bank morphology. This in turn has resulted in the deepening of the channels leading to a decrease in lateral flow into surrounding wetlands with some of the wetlands becoming desiccated. Other disturbances within the Ash River include numerous existing weirs resulting in damming of water and the creation of artificial wetlands within the back flooded areas. The installation of a small run-of-river hydro scheme such as the Kruisvallei Hydroelectric Power Generation Scheme provides an opportunity to positively impact the hydrological regime along small localised portions of the river by promoting continued growth of indigenous riparian vegetation. Although mitigation flows are set for the dewatered sections to allow continuity of the system and provide localised improvement of the ecology it is to be noted that when turbine maintenance occurs and the river flow is returned to the existing channel, any potential ecological improvements that may have occurred in the system, will be negatively impacted.

Overall, and with the suggested mitigation measures implemented, the impacts of the development are likely to be of **low to moderate significance**. As a result, there are no fatal flaws or impacts that cannot be mitigated that should prevent the development from being approved.

- » *Soil and Agricultural Potential:* The Kruisvallei Hydroelectric Power Generation Scheme will be situated within areas that are currently being utilised for agricultural purposes. The overall impacts of the proposed Kruisvallei Hydroelectric Power Generation Scheme on agriculture potential and soil conditions will be of **low significance** with the implementation of mitigation measures. This is as a result of the impacts for the construction and operation phase being mostly confined to the project site.
- » *Heritage Resources:* No significant archaeological, cultural landscape or built environment heritage resources were found during the field surveys. No impacts on archaeological, palaeontological, built environment, cultural landscape, living heritage or other cultural heritage are expected to occur due to the development of the Kruisvallei Hydroelectric Power Generation Scheme. Based on the findings of the Heritage Assessment the site is considered to be of low archaeological significance. The impact of the development of the Kruisvallei Hydroelectric Power Generation Scheme on the archaeological nature of the site is considered to be of a **low significance** with the implementation of the appropriate mitigation measures.

Most of the project site falls within an area which is considered to be highly sensitive to palaeontological resources. Due to a lack of outcrops of the mudstones, no fossils were identified. The river flows in a channel cut in Quaternary deposits namely mud and silt. A

few lenses of ferruginous conglomerate rest directly on the bedrock. No fossils were identified in the Quaternary deposits. No significant impacts are expected on fossil heritage based on the Palaeontological Impact Assessment conducted by Look (2010). Based on the absence of fossil heritage at the proposed development, the impact of the Kruisvallei Hydroelectric Power Generation Scheme on palaeontological resources is considered to be of **low significance**.

- » *Social aspects:* Positive and negative social impacts have been identified. Many of the social impacts are unavoidable and will take place; therefore the management of social impacts is paramount. The assessment of the key issues indicated that there are no negative impacts that can be classified as fatal flaws and which are of such significance that they cannot be successfully mitigated.

Positive impacts could be enhanced by implementing appropriate enhancement measures and through careful planning. The most significant impact are considered to be the impact on tourism activities related to white water rafting and slalom canoeing.

The overall social impact of the project is likely to be of a **medium significance** in terms of **positive impacts**, and of **low to medium significance** in terms of the negative impacts (with the implementation of mitigation measures). From a social perspective it is concluded that the project is supported, but that mitigation measures should be implemented and adhered to. No fatal flaws were identified for the project from a socio-economic impact perspective.

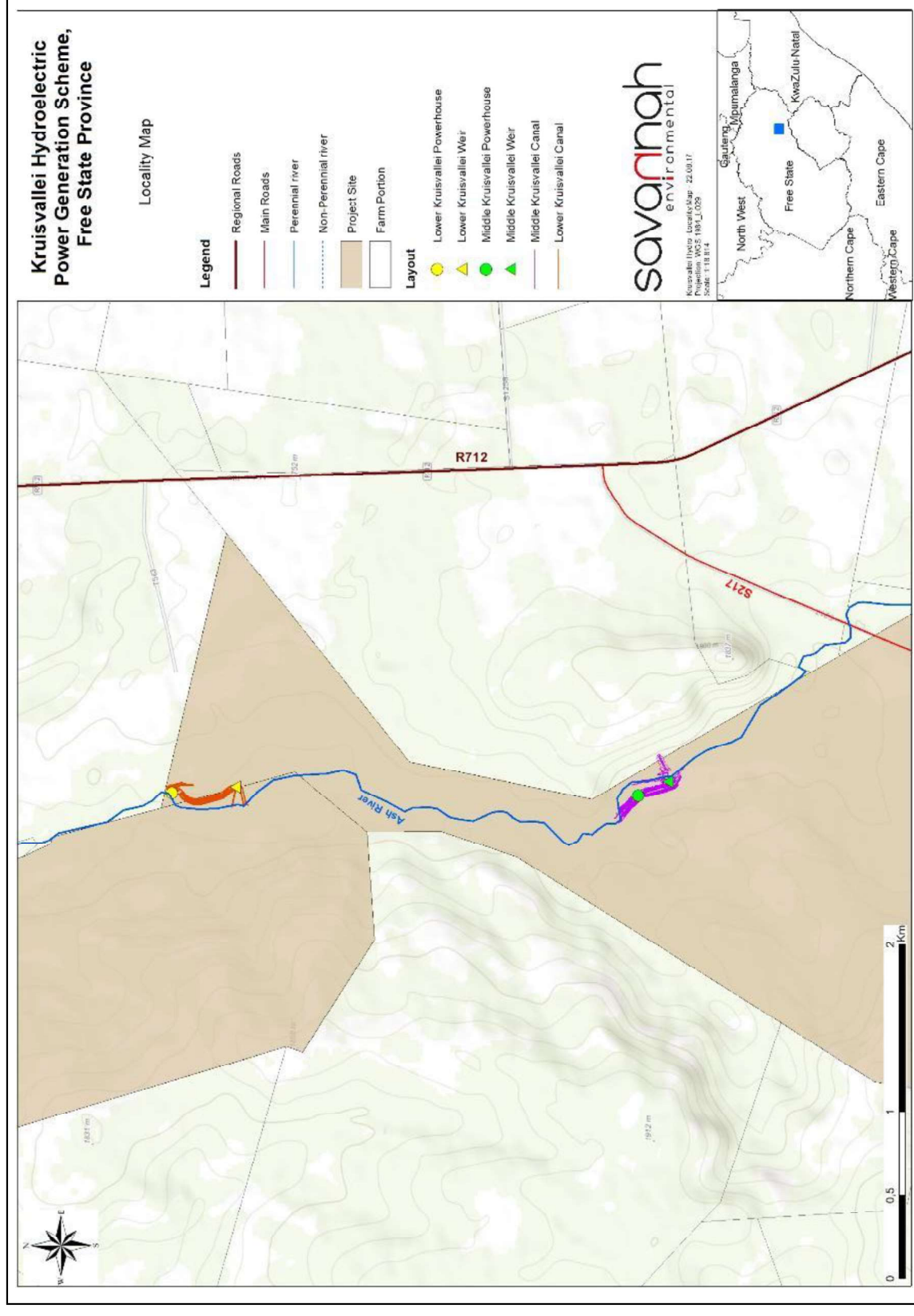


Figure 1.1: Locality map showing the area proposed for the establishment of the Kruisvallei Hydroelectric Power Generation Scheme.

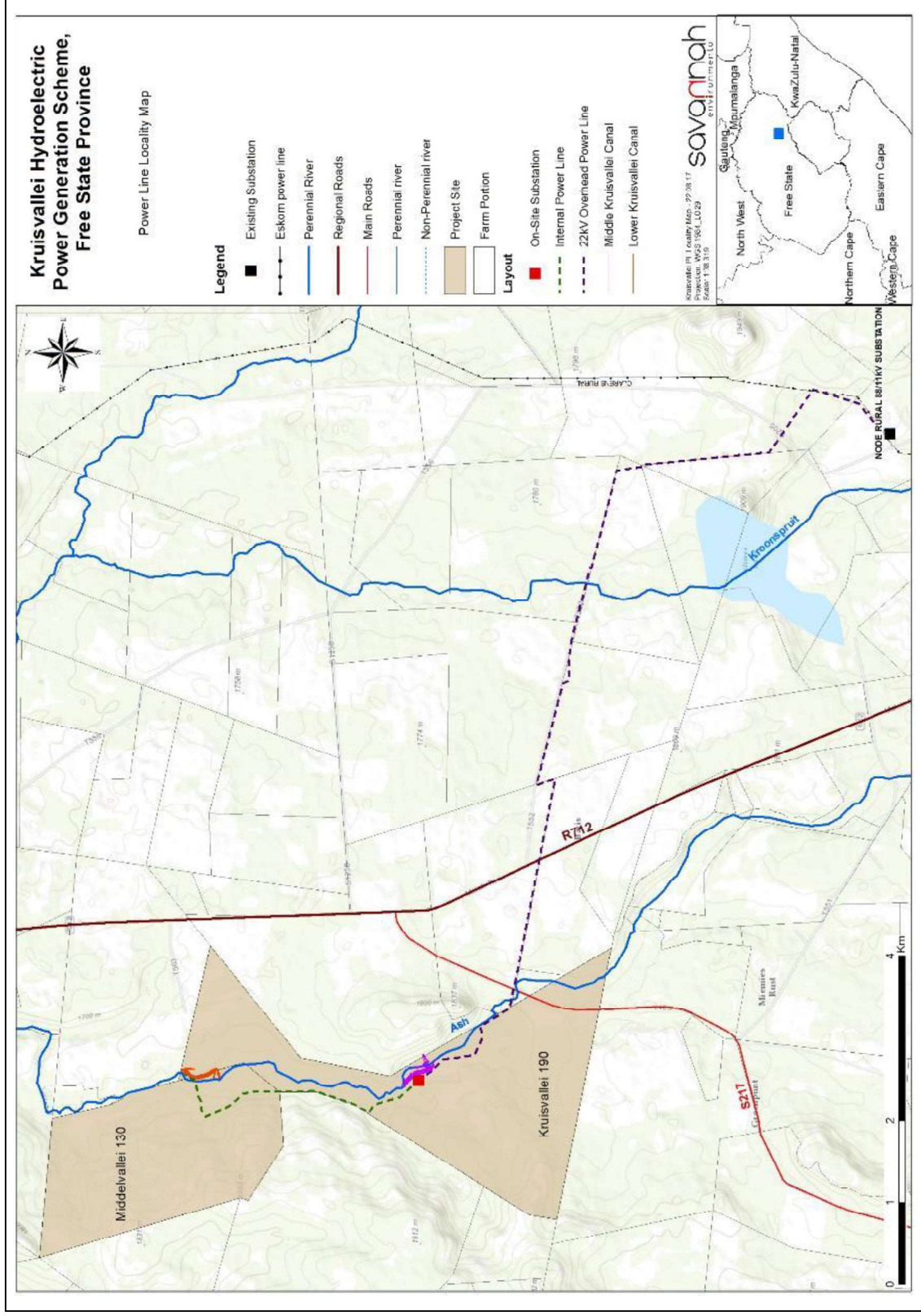


Figure 1.2: Locality map indicating the proposed power line route to connect the Kruisvallei Hydroelectric Power Generation Scheme to the Node Substation.