



## **PROJECT LIMA – PUMPED STORAGE SCHEME**

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### **WETLAND ASSESSMENT REPORT - SCOPING**

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## 1 INTRODUCTION

Eskom plan to develop a hydropower (pumped storage) scheme in the Steelpoort / Sehlakwane area of the Mpumalanga Province. The proposed scheme would consist of two reservoirs, underground tunnels and associated infrastructure. One of the two reservoirs would be located at the top of the Thaba ya Sekhukhune escarpment near the town of Sehlakwane, and the other reservoir would be located at a lower elevation within the Steelpoort River Valley. Water would be pumped from the lower reservoir (which would be fed by a pipeline from the proposed De Hoop Dam to the north) up to the upper reservoir through a system of underground tunnels. The water would be released from the upper reservoir through the same tunnel system to generate electricity during peaking periods.

Eskom previously commissioned an environmental screening study for the proposed hydropower scheme. The study was completed by BKS and examined three alternative upper and lower reservoir sites for the proposed development. Bohlweki Environmental were appointed by Eskom to undertake the formal environmental studies for the proposed development. SiVEST were included on the professional team to assess the impact of the proposed development on wetlands that may exist within the footprint of the proposed scheme.

The BKS screening report assessed surface water resources as one of the environmental parameters that may be affected by the proposed scheme. The purpose of this report is to validate the findings of the BKS screening report and to assess whether any wetlands may be affected by the proposed development.

Under the National Water Act (no 36 of 1998), wetlands are termed as land that is transitional between terrestrial and aquatic systems, where the water table is usually at, or near the surface, where the land is periodically covered with shallow water, and which land in normal circumstances would support vegetation typically adapted to life in saturated soil. Wetlands are classified as water resources, and as such are protected and should not be subject to any pollution or damage. Thus the proposed development should in no way disturb damage or alter the characteristics of the wetland area (see Background – Acts and Policies section).

Following the appointment of SiVEST to undertake the wetland assessment, a desktop delineation and a site visit to the locations of the proposed alternatives for

the proposed scheme was undertaken in the proposed locations for the development in order to identify any wetland areas that may be affected. This report presents the results of the site scan and desktop delineation.

## **2 AIMS OF THE STUDY**

The aims of the study are as follows:

- To identify any wetland areas that may be affected by the footprints of the three alternatives of the proposed development.
- To validate any findings of the screening study with respect to wetlands.
- To recommend further studies that should be carried out in the EIA phase of the study.

### **2.1 Assumptions and Limitations**

The study has been based largely upon the findings of a desktop delineation as well as a site visit undertaken in October 2006, in which certain of the three alternative locations were examined.

It must be noted that shapefiles for only one of the three alternative sites (site A) was provided by the client. This made the desktop delineation of possible wetland areas at the other sites more difficult as it was difficult to accurately identify the footprint of the proposed reservoirs at the other two locations. The site visit undertaken did not cover all of the three alternative sites. Only site A (both top and bottom reservoirs), and the site of the top reservoir at site B were visited. In addition a lack of ortho photo data for Site C entailed that this could not be assessed. Accordingly there was a low confidence rating for the assessment for the lower dam sites at Site B and for both upper and lower sites at Site C.

As this study forms part of the scoping level stage of the environmental assessment, detailed wetland assessments have not been undertaken (if required these will be undertaken during the EIA phase of the project). Rather the focus of this report is on identifying wetland areas that may be affected by the proposed development in keeping with the aim of scoping to identify major potential issues, and thus to provide input on site selection in the context of wetland protection.

At the time of writing, the location of the borrow pit areas had not been finalised by the project engineers. One of the possible borrow pit areas for site A (the preferred site as identified by the screening report) is fields adjacent to the Steelpoort River.

These may well contain wetland soils, and thus the assessment of borrow pit locations for the existence of wetlands should be undertaken during the EIA phase. In addition the location of ancillary infrastructure such as roads, and housing (if needed) had also not been concluded. The location of these may need to be further investigated in the EIA phase.

The findings of this scoping report are based largely on desktop investigation with very limited site investigation. It must be noted that more detailed site investigation which has utilised the four indicators of wetland occurrence (as listed in the DWAF guidelines for the delineation of wetlands and riparian areas (DWAF, 2003)) has not been undertaken. The findings of this report are subject to more detailed studies (including pedological and vegetation studies) that may need to be undertaken in the EIA phase of the project.

## **2.2 Background – Acts and Policies / Management Guidelines**

### ***2.2.1 National Water Act (Act No 36 of 1998)***

The National Water Act 36 of 1998 (NWA) was promulgated on 20 August 1998. This Act is important in that it provides a framework to protect water resources against over exploitation and to ensure that there is water for social and economic development, human needs and to meet the needs of the aquatic environment. The Act also recognises that water belongs to the whole nation for the benefit of all people.

It is important to note that wetlands are protected under the Act, and are defined as water resources. One of the main aims of the Act is the protection of water resources. 'Protection' in relation to a water resource entails:

- Maintenance of the quality of the quality of the water resource to the extent that the water use may be used in a sustainable way;
- Prevention of degradation of the water resource
- The rehabilitation of the water resource

In the context of the development of the proposed hydropower scheme and any potential impact on wetland areas the definition of pollution and pollution prevention contained within the Act is relevant. 'Pollution', as described by the Act is the direct or indirect alteration of the physical, chemical or biological properties of a water resource, so as to make it (inter alia)-

- less fit for any beneficial purpose for which it may reasonably be expected to be used; or
- harmful or potentially harmful to the welfare or human beings, to any aquatic or non-aquatic organisms, or to the resource quality.

This definition of pollution is quite wide ranging, and it applies to all types of water resource, including water bodies such as wetlands. The inclusion of physical properties of a water resource within the definition of pollution entails that any physical alterations to a water body, for example the excavation of a wetland or changes to the morphology of a water body can be considered to be a pollution, and are thus not permitted. Activities which cause alteration of the biological properties of a watercourse, i.e. the fauna and flora contained within that watercourse are also considered pollution.

In terms of section 19 of the Act owners / managers / people occupying land on which any activity or process undertaken which causes, or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring. These measures may include (inter alia)

- measures to cease, modify, or control any act or process causing the pollution
- comply with any prescribed waste standard or management practice
- contain or prevent the movement of pollutants
- remedy the effects of the pollution; and
- remedy the effects of any disturbance to the bed and banks of a watercourse

### **3 WETLAND ASSESSMENT TECHNIQUES**

The first stage of the wetland assessment was undertaken using desktop methodologies. This included analysis of ortho photographs and 1:50 000 topographical maps. Orthophotos of the site were examined to identify any wetland areas that may exist within the footprint of the proposed scheme alternatives. During the site visit undertaken on the 18 October 2006 certain of the locations for the proposed scheme were examined for evidence of wetland habitat.

### **4 FINDINGS OF THE SCREENING REPORT**

The BKS screening report did not specifically assess the occurrence of wetlands on the three locations selected for the proposed development. The report identified a number of vegetation communities which exist on the sites. One of the sites is described as *Fuirena pubescens* – *Schoenoplectus corymbosus* wetland vegetation,

which is found in suitably saturated locations alongside watercourses in the river valleys and on seeps within mountain slopes and plateaus. This community is assessed to exist at the lower dam site at Site A and Site B (in the riverine areas), and at the upper dam site at Site B (it should be noted that the lower dam site at the Site C – the proposed De Hoop Dam – is not discussed in the BKS report).

As part of an assessment of agricultural potential, the screening report examined soil types found on the various sites. The screening report has concluded that type B soils (i.e. soil forms typical of wetland areas) occur at the lower dam sites of Sites A and B. The report concludes however that the wetland soils do occur in conjunction with red soils, which are not wetland soils and have good agricultural potential.

## **5 SITE ASSESSMENT**

### **5.1 Site description and general site conditions**

The site of the proposed development is located to the north of Middelburg in the Sekhukhuneland district of the Mpumalanga province. The Steelpoort River which rises near Belfast drains northwards from the Mpumalanga Highveld towards the Mpumalanga Lowveld where it joins the Olifants River. The Steelpoort River valley is bounded by the steep escarpment which forms the eastern boundary of the Nebo Plateau, with the terrain rising dramatically to the west from the Steelpoort river (800m amsl) to an elevation of approximately 2000m amsl.

The terrain within the Steelpoort river valley is relatively flat, rising steeply towards the mountains of the escarpment. On top of the escarpment the terrain is undulating, with shallow valleys draining into steep poorts which dissect the mountains. The escarpment marks a stark divide in vegetation with bushveld vegetation occurring in the Steelpoort valley and grassland vegetation typical of the Mpumalanga highveld existing to the west of the escarpment. The vegetation within the Steelpoort valley is predominantly natural, except in areas closer to the river where the natural vegetation has been cleared for irrigated cultivation. The main vegetation type in the valley is bushveld, with the Sekhukhune Mountain Bushveld vegetation type dominating. Grassveld (Rand Highveld Grassland) occurs on the top of the escarpment, with trees / shrubs only occurring where rocky outcrops provide protection from fire.

The escarpment also marks a stark socio-economic divide with the Steelpoort River valley being characterised by stock farming and mining and the areas to the west of

the escarpment being formal homeland areas characterised by communal tenure and a weak economy and a legacy of underdevelopment.

## **5.2 Assessment of the three alternative locations for the proposed development**

Three sites have been selected for the proposed scheme. At each site the upper reservoir would be located on the top of the escarpment, with the lower reservoir being located within the Steelpoort River valley at the foot of the mountains. Site A is the most southerly site with the Sites B and C being located further to the north (see Appendix 2)

## **5.3 Assessment of Alternative Sites**

### ***5.3.1 Site A Upper Dam***

In the BKS environmental screening report there are two options for the upper dam indicated. Personal communication with the design engineers during the site visit indicated that one of the dams (of 'cut and fill' design) which is located closest to the edge of the escarpment is the preferred location for the upper dam. The second site for the upper dam at Site A is located slightly to the west, closer to the town of Sehlakwane.

A shapefile of the eastern 'preferred' dam site was provided to SiVEST. Examination of the orthophotos for this site did not reveal evidence of any wetlands within the footprint of the dam. The site was investigated during the site visit and the desktop findings were confirmed. There is no evidence of wetland habitat on this site, with the soils appearing well-drained and yellow in colouration. In addition in most places over the footprint of the dam, there is evidence of bedrock-outcropping on the surface, thus entailing that soils would be shallow and not conducive to wetland formation.

The footprint of the second upper dam site (further to the west) would affect a wetland. The dam wall would be constructed along a narrow drainage line rising at the eastern end of Sehlakwane, and draining into a steep poort through the escarpment. A relatively narrow wetland (approximately 10-15m in width) occurs within the valley bottom. There is evidence of typical wetland vegetation as well as dark, clayey soils. There was also evidence of surface water flow through the wetland, suggesting that parts of the wetland are permanently wet (considering the site was inspected at the end of the dry season). Should the dam wall be constructed

at this site, a certain portion of wetland habitat would be inundated, and would thus be lost. As a shapefile of the western dam has not been provided, it is not possible to assess the area of wetland habitat that would be lost.

As indicated above, the eastern site is the preferred site for the upper reservoir, and thus the western site would be unlikely to be developed. However it must be noted that Eskom previously acquired a positive record of decision for a dam on the western site, and this would apparently be used as a 'fall-back' should the scheme as currently proposed not be allowed to proceed. In this event the wetland within the footprint of the dam would be likely to be lost.

### **5.3.2 Site A Lower Dam**

In the BKS environmental screening report there are two options indicated for the lower dam at Site A. One would dam the Steelpoort River, and the other would dam a tributary of the Steelpoort River which drains the escarpment. The second dam site is the preferred lower dam site at Site A. Accordingly this site was assessed for occurrence of wetland habitat. Desktop analysis indicated that a drainage line / river would be flooded by the dam. A riparian zone adjacent to the drainage line was evident, but analysis of the orthophotos did not seem to indicate any wetland habitat. This was confirmed by the site visit in which the river in the vicinity of the proposed dam wall was investigated. The river contained a well-defined riparian zone in which large indigenous trees existed, but there was no evidence of wetland habitat. The channel in the vicinity of the dam wall had eroded down to bedrock and thus there were no wetland soils within the channel, or within the riparian zone. It must be noted that a shapefile of the proposed footprint (flooded area) of the dam has not been provided, and that during the site visit only the area in the vicinity of the dam wall was investigated. It is unsure whether wetland soils may exist further upstream, however considering the nature of the terrain and soils in the vicinity of the dam wall, which seem to be similar to that upstream, this seems unlikely.

### **5.3.3 Site B Upper Dam**

One dam site has been selected for the upper dam at Site B. No shapefiles for the upper or lower dams were provided, making it difficult to assess the impact of the footprint of the dam sites at a desktop level. However analysis of the orthophotos for the site indicated that there does not appear to be any wetlands on the site.

The site visit to the upper dam location at Site B confirmed that there was no wetland habitat on the site. Although part of the approximate footprint of the dam is located within a slight depression, the soils and vegetation on the site did not indicate that the site was a wetland.

#### **5.3.4 Site B Lower Dam**

Four locations have been indicated for the lower dam at Site B. Although shapefiles for these locations have not been provided, analysis of their approximate footprint on orthophotos indicated that there was unlikely to be any wetlands present within the footprints of the four dam locations.

The actual location of the 'preferred' location at site B was not visited; however an area close to the site was visited. The site assessment of this area in close proximity to the site did not indicate any wetland habitat.

#### **5.3.5 Site C Upper Dam**

Two locations have been indicated for the upper dam at Site C. No shapefiles of these locations were provided, and the site was not visited during the site visit. In addition there was no orthophoto coverage of the upper dam locations at Site C. Thus assessment of wetland occurrence at Site C could not be undertaken, and the assessment has to revert to the results of the BKS screening report which listed no wetland habitat at Site C upper.

#### **5.3.6 Site C Lower Dam**

The proposed De Hoop Dam would be the lower reservoir at site C. As the area to be inundated by the reservoir has been already assessed in terms of the Environmental Impact Assessment conducted for the proposed dam, analysis of Site C lower has not been undertaken.

### **5.4 Preferred Site Selection**

The BKS screening report lists Site A as the 'preferred' site from an environmental point of view. The scoping-level assessment has indicated that there is likely to only be wetland habitat at the western location for the upper dam at Site B. None of the other sites were assessed to have wetland habitat present although there is a low confidence level in the assessment for the lower dam locations at Site B, and Site C could not be assessed due to a lack of data.

From a wetland point of view only the western location of the upper reservoir at Site A should be avoided. However this is not the preferred location for the upper reservoir at Site A. There is thus no clear preference in terms of the three sites in the context of the avoiding of destruction of wetland habitat provided that the western location for the upper reservoir site at Site A is avoided.

## **6 CONCLUSIONS AND RECOMMENDATIONS FOR EIA**

The desktop and brief site assessment of the three sites for the scheme locations has indicated that wetlands only occur at the western reservoir location at Site A. This entails that provided that this location is avoided, there is no clear locational preference for the scheme in the context of wetland protection. The creation of 'on-line' reservoirs (i.e. reservoirs constructed across an existing drainage line) at certain of the sites i.e. the lower reservoir site at Site A, and Site B may have implications for wetland functioning (if wetlands occur further upstream or downstream of the reservoir) in the context of the catchment in which the dam is located. The creation of a reservoir which would effectively remove water from a catchment to be used in the pump storage scheme may have implications for the functions performed by wetlands in that catchment in a greater catchment context. If the site taken through into EIA investigations contains such an online reservoir, the implications of the proposed development on upstream wetland functioning in that catchment and in a greater catchment context will need to be investigated in further detail during the EIA phase of the project.

The location of the borrow pit areas for the preferred site has not been finalised. The borrow pit areas and any other areas that will form part of the footprint of the dam should be assessed for the occurrence of wetlands during the EIA study. Should Site A be selected as the 'preferred site', the full footprint of the proposed dam should be scanned to confirm that there are no wetlands present.



## Appendix 1: PHOTOGRAPHS



Site A Upper eastern location (Cut and Fill Dam site)



Wetland at western Site A upper location



Wetland at Site A upper western location



Location of Site A lower (preferred) dam wall showing drainage line and riparian zone



Site B upper



## Appendix 2: Map of dam site locations