12. IMPACT ASSESSMENT FOR THE NO PROJECT ALTERNATIVE

By and large, the no project alternative will result in the status quo being maintained.

The following points can however be noted:

- Although no loss or decrease in sensitive species and habitats is expected, the current impacts such as overgrazed veld and alien proliferation along the riparian features will continue. Thus the ecological state of these areas will not improve if the no project alternative is implemented.
- No loss of faunal habitat and RDL and protected species is expected. This should be seen in contrast to the definite impact on population size of endangered, vulnerable and protected indigenous faunal species resulting from the construction of the Lalini Dam.
- In terms of aquatic ecology, the no project alternative will best ensure maintenance of ecological integrity within the system with the current rocky habitat in fast flowing clear water being maintained.
- It is expected that wetland habitats will still undergo alterations as a result of the continued impacts of anthropogenic activities such as vegetation clearing, sediment winning, crop cultivation within wetland habitats, etc. Additionally, due to the extensive erosion within the study area and the catchment, sediment inputs to wetland and riparian habitats are anticipated, thus potentially altering flow patterns within wetlands and riparian zones, as well as smothering vegetation and aquatic macro-invertebrates.
- No negative impacts will accrue to heritage resources. In particular, residents will not be subject to the high emotional cost associated with ancestral grave relocation. Conversely, the scientific knowledge inherent in resources such as archaeological sites will remain unrecovered until and unless funding for research is obtained from another source.
- There is an obligation on the State to advance the interests of the poor and, in accordance with the Bill of Rights, take adequate measures in ensuring that all citizens have access to basic housing, health care, food, water, social security, education and a healthy environment. In addition to this South Africa has a policy of recognising the human right to water at both the Constitutional and policy levels. A no project alternative would contradict these obligations as the Department of Water and Sanitation and the Eastern Cape Province would lose an opportunity to supplement the water resources in the area and consequently to deliver both domestic water and water for irrigation. Together with this lost opportunity would be the loss of a number of job opportunities, not only associated with the construction of the dams and infrastructure, but also associated with the productive potential of the irrigation scheme. With the area being one of the least developed and poorest in the country these losses will have severe social consequences. With the Mzimvubu River being the largest undeveloped water resource in the country any loss of benefits associated with the use of this river will be of national significance.

13. ENVIRONMENTAL IMPACT STATEMENT

While the project was assessed holistically, it is acknowledged that the impacts associated with the various infrastructure components have different degrees of significance. Impacts are summarised below for the dams and associated infrastructure, electricity generation and distribution infrastructure, and road infrastructure.

13.1 DAMS AND ASSOCIATED INFRASTRUCTURE

The construction of the dams, and to a lesser extent the associated infrastructure (including construction offices, potable and raw water distribution infrastructure, borrow pits and quarries etc.) will have significant negative impacts on the terrestrial and aquatic ecology, as well as on the wetlands. To a large extent these impacts will be permanent.

The riparian and wetland areas, as well as a portion of the mountain/rocky outcrop areas and Euphorbia Forest near the Lalini Dam wall that provide habitat for sensitive indigenous vegetation as well as fauna, including possible red data list and protected species, will be lost and the habitat within the river will be permanently altered. This impact is considered to be of high significance.

In addition, wetlands in the project area provide important ecological services in the way of sediment trapping, nutrient cycling and toxicant assimilation, flood attenuation and biodiversity maintenance. Considering the extensive, and often severe, erosion within the study area and greater catchment, sediment trapping is especially important. In view of this, the permanent loss of wetland habitat due to inundation is regarded as being of high significance. The anticipated cumulative loss of riparian and wetland habitat arising from the construction of the dams is estimated to be 1035 hectares. Overall however, the loss of riparian and wetland habitat is deemed to constitute a relatively insignificant fraction of the wetland resources within the Mzimvubu sub Water Management Area.

At Lalini Dam, large scale loss of habitat for animals will result in a loss of animal species numbers and diversity, as species leave the area, adapt to the new environment in lower numbers, or are lost in totality within the study area. In particular, the loss of wetlands, lower grassland areas, mountain bushveld and rocky outcrops will directly impact on the population of red data list and protected species.

At Ntabelanga Dam, the main concern relates to the loss of key breeding crane populations. Wetlands and grasslands within the Ntabelanga Dam basin are used by cranes (Crowned Cranes, Blue Cranes and Wattled Cranes) for breeding and foraging. Cranes are red data list species, threatened with extinction throughout South Africa; Crowned Cranes in particular are listed as endangered by IUCN with rapidly declining populations. Loss of wetlands and grasslands has been identified as one of the main contributing factors. This impact is considered to be of high significance.

Most of the above-mentioned impacts are permanent and thus extend into the operation phase.

The EAP recommends, as indicated by DEA, that any Environmental Authorisation is subject to the Water Use Licence (WUL) being obtained and complied with. The WUL takes the Reserve, which includes the Ecological Water Requirements (EWR), into account. The EWR are determined to protect the in-stream aquatic and riparian ecology of the river by setting the limits of deviation from the natural flow beyond which the impact would be unacceptable.

For this assessment, the specialists and EAP have assumed that the EWR, as defined in the Reserve determinations will be adhered to during the construction and operational phases. Adhering to the EWR will ensure that sufficient water goes over the Tsitsa Falls to prevent the endemic cremnophytes identified at the Falls from being negatively affected, and that the river downstream of the hydropower plant outlet works can also be maintained in an acceptable ecological state.

The most critical socio-economic impacts associated with the construction of the dams relate to relocation and resettlement, the influx of construction workers, and risks and nuisances associated with construction activities. These impacts can be highly disruptive to communities and need to be carefully managed and mitigated.

In terms of affected households and assets, 62 structures and 19.9 km^2 of cultivated land are located within the Ntabelanga Dam basin and will have to be relocated or compensated. At the Lalini Dam site, 12 structures and 7.6 km^2 of cultivated land are located within the dam basin (alternative 1).

Regarding the proposed potable and raw water pipeline routes, 124 structures are located within the pipeline servitudes (feasibility level pipeline routes). This is a large number but it is possible to realign the pipelines during the detailed design stage to avoid most of these structures and minimise, or altogether eliminate, the need for relocation and associated negative social impacts.

The proposed pipelines are largely located within transformed habitat and construction will have a low to very low impact on terrestrial and aquatic ecology and wetlands, provided the mitigation measures contained in the EMPR are adhered to. These include, inter alia, minor realignments to avoid protected trees, and realignments to avoid wetlands where possible.

The Tsitsa River contributes a small percentage of the flow in the Mzimvubu River that reaches the estuary. The Ntabelanga/Lalini system will always be operated in a manner that fulfills the EWR downstream of the hydropower plant outfall, both in terms of minimum and maximum flows. The project is also not expected to impact on the water quality. The sizes of the Ntabelanga and Lalini Dams are such that they will support the EWR and the

Best Attainable State for the estuary, as set out in the estuarine Reserve determination. The impact on the estuary is therefore predicted to be negligible.

The Macro-Economic Impact Analysis found that during the peak of the construction period, the Ntabelanga Dam will result in 2 299 direct employment opportunities created in the Province, with another 843 indirect and 1 036 induced jobs. Of the direct jobs an estimated 1 057 will be semi-skilled and 771 low-skilled and should be recruited from the local community. There is a positive impact on the GDP to the value of R282.7 million. Low income households will also receive a total of R82.42 million out of a total of R528.11 million.

Although only for a short period, the construction activity of the Ntabelanga Dam will contribute considerably to the economy of the region and the province.

The proposed construction of the Lalini Dam and accompanying hydropower plant will also contribute considerably to the economy. At the peak of construction of the dam 815 direct jobs will be created with another 491 indirect and 604 induced jobs in the provincial economy. Of the direct jobs an estimated 375 will be semi-skilled and 273 low-skilled, most of which should be recruited from the local community. There is a positive impact on the Gross Domestic Product to the value of R164.6 million. Low income households are expected to receive a total of R52.38 million out of a total of R335.64 million of the total impact on households.

During operation, both dams will indirectly provide important social and economic benefits at a local, provincial and national level, as the water they supply will enable:

- The provision of potable water to many households in the project area and beyond, which will have a direct positive impact on the quality of life of the recipients;
- The emergence of an agricultural sector which will be able to actively contribute to the economy of the area and of the province; and
- The provision of electricity to alleviate pressures on the national grid and cross-subsidise the cost of the other components of the project.

The irrigation component of the project will contribute an estimated R129.3 million per year to the GDP and a total household income at R146.6 million with R38.6 million for low-income households. The total fulltime employment opportunities is estimated at 1 976 of which 1 301 is direct on the farms.

The agricultural component of the project may, however, place an additional work burden on women who may have to undertake such tasks as weeding.

13.2 ELECTRICITY GENERATION AND DISTRIBUTION

During construction, the main impact of the electricity generation and distribution infrastructure relates to the construction of the tunnel/conduit and hydropower plant. For the

construction of the power line linking the Lalini hydropower plant to the grid, three alternatives were considered and are discussed in more detail below.

During operation, the primary concern relates to the alteration of the natural flow rate and water levels in the Tsitsa River due to releases of water through the tunnel/conduit for hydropower generation. This constitutes a risk for the riparian habitat and the ability of the riparian zone to support biodiversity, with secondary impacts on flow sensitive species, species of conservation concern and aquatic biodiversity in general. The EWR should be adhered to at all times in order to manage this risk. After mitigation, the impact is rated as very low to medium low.

The impact on health of electromagnetic fields associated with power lines has not been determined. From a social point of view, the risk, or perceived risk, is considered to be the main impact of the power line during operation. The precautionary principle will be applied and human settlements and activities within the power line servitude will be restricted.

As far as the electricity generation and distribution component of the project is concerned, the main benefit will be the substantial income generated from the sale of renewable energy, and feeding this power into the national grid.

13.3 ROADS

In general, road upgrades, and to a lesser extent new access roads and road realignments will have a low to very low impact on terrestrial and aquatic ecology and wetlands, provided effective mitigation is implemented.

However, the construction of new roads in the vicinity of the Lalini Dam wall (i.e. haul roads), as well as the access road to the Lalini hydropower plant are located within highly sensitive areas with regard to fauna and flora, and will have a very high negative impact. Alternative access routes to the hydropower plant that could avoid the impact on this sensitive area need to be considered. It is also recommended that a walk-down to undertake search and rescue be done by a qualified specialist before construction of the haul road and access road commences.

During operation, roads will result in a risk of collisions with animals, which is likely not to be fully mitigated.

From a social perspective, 26 structures are within the footprint of proposed roads and road servitudes and may require relocation. The preferred mitigation is to realign the roads to avoid structures as much as possible in order to minimise or altogether eliminate the need for relocation and associated negative social impacts.

Road alignments, the new and upgraded roads will facilitate easier access to the areas served which may indirectly stimulate economic development. On the other hand, this could hasten effects of globalisation and changes to local norms and culture.

13.4 COMPARATIVE ASSESSMENT OF ALTERNATIVES

13.4.1 Preferred power generation mode

The EWR have been determined to protect the in-stream aquatic and riparian ecology of the river by setting the limits of deviation from the natural flow beyond which the impact would be unacceptable. Whichever option of hydropower generation results in the greatest financial income while still fully meeting the EWR is therefore recommended. This still needs to be confirmed.

13.4.2 Preferred tunnel/power line alternative

The aquatic assessment found that in order to reduce the area of impact in terms of silting, sedimentation, decrease in water quality and excessive vegetation growth, the shortest possible section between the dam wall and discharge point should be preferred (i.e. Alternative 1: short hydropower tunnel and associated power line). However, fatal flaws have been identified for Alternative 1 in terms of faunal, floral, and visual impacts. In particular, the power line crosses large sections of indigenous and possible protected trees, and the impact on the faunal habitat on the mountain and within the gorge was not considered viable.

After the environmental assessment had been conducted Alternatives 1 and 2 (associated with the short and medium length tunnels respectively) were eliminated by the technical team due to the presence of deep steep gorges which provide no access to where the tunnel daylights and the hydropower plant would be located. In addition Alternatives 1 and 2 would have significantly less head to generate power, leaving only Alternative 3.

Alternative 3 (associated with the longest pipeline/tunnel and power line) as it is currently proposed has a very high visual impact and also crosses more sensitive floral habitats. It was recommended that this power line be realigned in order to avoid sensitive areas in terms of ecology and visual aspects. The power line route recommended by the EAP is shown in **Figure 78.**

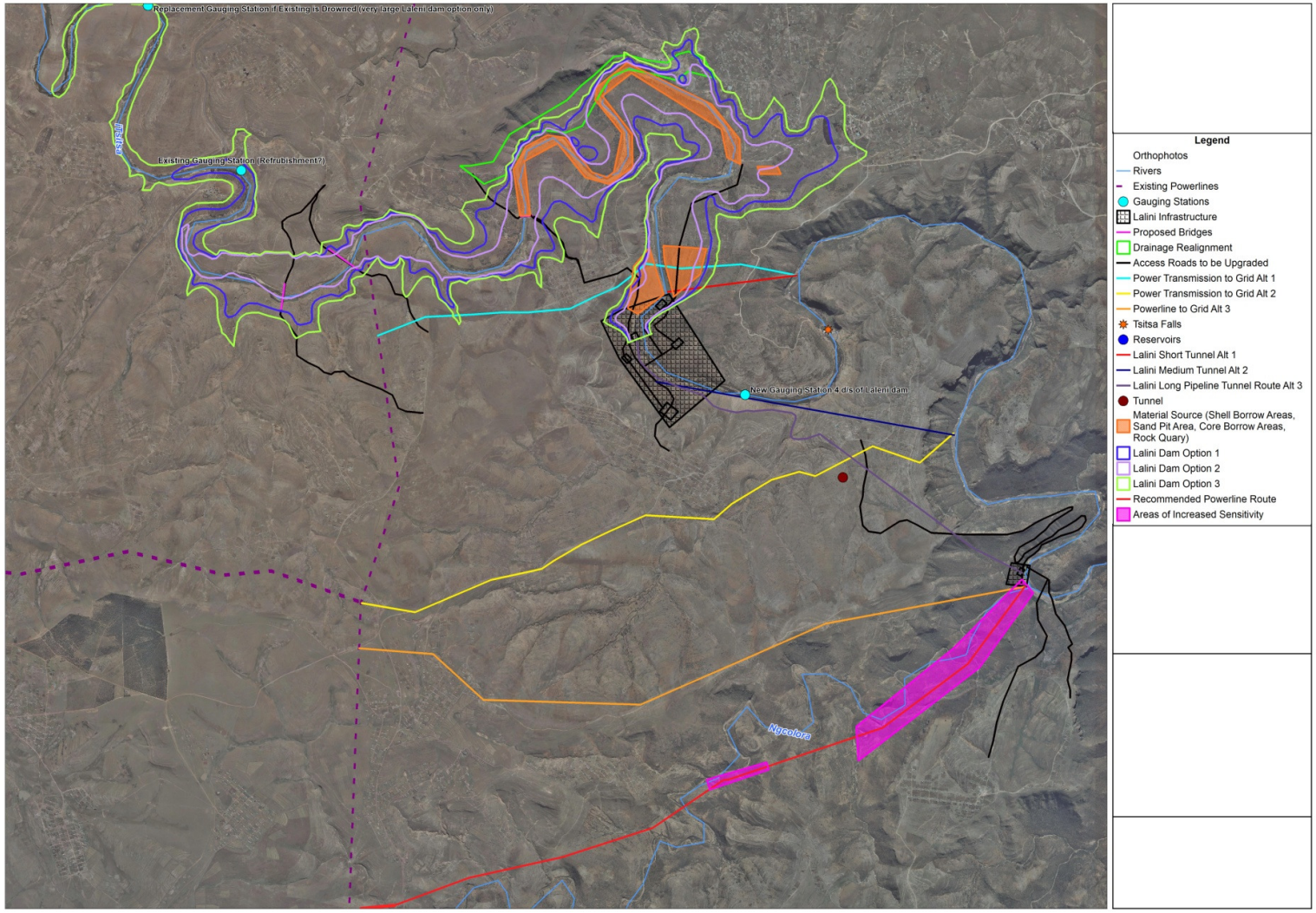

Figure 78: Recommended power line route alignment

13.4.3 Preferred dam size for Lalini Dam

With regard to the Lalini Dam, three dam sizes were considered.

The smallest dam size (Alternative 2) is preferred from a number of perspectives. Firstly, it involves the least loss of cultivated land and structures (i.e. 1 dwelling and 4.9km^2 of cultivated land, compared to 12 structures and 7.6km^2 of cultivated land for technically preferred Alternative 1) and is therefore the socially preferred option. Secondly, it will result in the lowest direct loss of wetland habitat, and is thus considered to be the most viable option in terms of wetland conservation. Thirdly, it will result in the inundation of the least amount of floral and especially sensitive floral vegetation and habitat and is therefore the preferred alternative in terms of floral impacts. Finally, while all 3 alternative dam sizes will lead to a definite impact on population size of endangered, vulnerable and protected indigenous faunal species. Alternative 2 is regarded as impacting the least on faunal RDL species.

Notwithstanding this, no major red flags or fatal flaws were found with technically preferred Alternative 1 (i.e. medium dam size). The technically preferred option is therefore acceptable with the careful application of mitigation measures aimed at reducing the social impact on displaced and host communities, as well as the impacts on ecology and wetlands.

As detailed designs have not yet been finalised for the Lalini Dam, the EAP's recommendation is that the final dam size be within the range of proposed Alternatives 1 and 2 (i.e. a Full Supply Level of between 752.42 mamsl and 763.61 mamsl).

13.5 KEY MITIGATION MEASURES, RELOCATION POLICY FRAMEWORK AND OFFSETS

Based on the findings of the EIA, an EMPR has been compiled. The draft EMPR outlines how negative environmental impacts will be managed and minimized, and how positive impacts will be maximised, before, during and after construction.

13.5.1 Key mitigation measures

While a comprehensive set of mitigation measures has been provided in the EMPR, the following mitigation measures have been identified as essential to minimise significant environmental impacts, and implementation of these measures is a condition to the project proceeding.

Key mitigation measures to be implemented during the pre-construction phase

- A walk-down of the areas impacted by the access road to the hydropower plant and haul roads must be undertaken before clearing. Search and rescue of protected vegetation must be undertaken by a suitably qualified specialist. Floral

species need to be relocated to similar habitat types, outside of infrastructure footprint areas.

- The haul road linking the sand borrow areas furthest from the dam wall to the Lalini Dam construction site must be realigned to avoid going through the town of Lalini, if possible.
- Protected tree species Podocarpus fulcatus and P. latifolius were located along the sections scheduled for road upgrades. The following must be ensured:
  - Possible re-alignment of the roads where protected tree species were found, in order to avoid cutting and destroying the trees;
  - Where protected trees will be disturbed, ensure effective relocation of individuals (if possible) to suitable similar habitat; and
  - Permit applications must be obtained from relevant authorities.
- Rescue and relocation of medicinal important floral species, RDL and protected floral species is essential to minimise impacts from inundation.
- RDL faunal species or species of conservational concern found within the operational footprint area must be relocated to similar habitat within the vicinity of the study area with the assistance of a suitably qualified specialist.
- No hunting or trapping of faunal species is to occur.
- The construction footprint needs to remain as small as possible, especially in the sensitive habitats.
- Aquatic bio-monitoring must take place and if any trends are observed where impacts on the aquatic ecology is becoming unacceptable, measures to reduce the impacts must be immediately implemented.
- Baseline studies must be undertaken for noise, air quality, and water quality.
- An investigation must be undertaken by a qualified specialist to determine whether any waterfall dependant plants in the gorge and on the cliff could be significantly impacted and whether they require relocation. All findings of the investigation must be implemented.
- Areas of increased sensitivity, as shown in the sensitivity maps developed should ideally be avoided in terms of the placement of infrastructure (other than the dams) in order to minimise the footprints within wetland features. Where it is not possible, mitigation measures to limit the impacts (such as ensuring the design of crossings allows for the retention of wetland soil conditions as presented in the EMPR) must be implemented.
- Support structures for pipelines must be placed outside of riparian features, channelled valley bottom wetlands and drainage lines. Should it be essential to place such support structures within these features, the designs of such structures must ensure that the creation of turbulent flow in the system is minimised, in order to prevent downstream erosion. No support pillars should be constructed within the active channels. In order to achieve this all crossings of wetlands should take place at right angles wherever possible.
- Where new roads traverse wetland / riparian habitats, with special mention of drainage lines, channelled valley bottom wetlands and riparian habitat,

disturbance to any wetland crossings must be minimised and suitably rehabilitated. The crossing designs of bridges must ensure that the creation of turbulent flow in the system is minimised, in order to prevent downstream erosion. All crossings of wetlands should take place at right angles wherever possible.

- The design of culverts / bridges should allow for wetland soil conditions to be maintained both upstream and downstream of the crossing to such a degree that wetland vegetation community structures upstream and downstream of the crossing are maintained. In this regard, special mention is made of:
  - The design of such culverts and/or bridges should ensure that the permanent wetland zone should have inundated soil conditions throughout the year extending to the soil surface;
  - The design of such culverts and/or bridges should ensure that the seasonal wetland zone should have water-logged soils within 500 mm of the soil surface during the summer rainfall period; and
- Temporary wetland zone areas should have waterlogged soil conditions occurring to within 300 mm of the land surface during the summer rainfall period.
- Ensure that no incision and canalisation of the wetland system takes place as a result of the construction of the culverts.
- It must be ensured that flow connectivity along the wetland features is maintained;
- The Ecological Water Requirements (EWR) as set out in the Reserve Determination Volume 1: River (Report P WMA 12/T30/00/5212/7) for the Ntabelanga Dam, and the EWR determined for the Lalini Dam, must be adhered to.
- The installation of multiple level outlets, with outlets at no more than 6.5 m intervals from 7 m below the full supply level of the dams and proper operation is required to mitigate the effect of water quality changes downstream of the proposed dams.
- The archaeological site identified in the proposed Ntabelanga Dam basin should be mapped in detail, with judicious sampling, authorised by a permit from ECPHRA. Thereafter the site may be destroyed once a destruction permit has been issued by ECPHRA.
- The archaeological site identified in the proposed Lalini Dam basin should be mapped and excavated/sampled, authorised by a permit from ECPHRA. Thereafter the site may be destroyed once a destruction permit has been issued by ECPHRA.
- A detailed survey of potential Early Iron Age sites should be undertaken once crops have been harvested and vegetation clearance has occurred.
- New roads and pipelines should be realigned as much as possible to avoid structures.
- The proposed access road for construction vehicles through Lotana village must be realigned to avoid the village.

- Fieldwork to identify heritage resources affected by roads and electrical infrastructure must be undertaken, and mitigation measures recommended, once final infrastructural locations and routes have been finalised, surveyed and pegged.
- All graves outside the full supply levels within 300 m of associated infrastructure should be demarcated by the Engineer's environmental representative, in consultation with the next-of-kin, for the duration of construction. These graves should not be disturbed.
- The power line linking the Lalini hydropower plant to the grid must be realigned to avoid the ridge, as shown in **Figure 78**.
- All access roads impacted by inundation must be compensated by providing new roads and bridges.
- The RPF must be implemented in a consultative manner.
- A dedicated Project Management Unit should be set up to manage the project.
- Ensure continued liaison with authorities responsible for potable water distribution.
- The social impacts and institutional arrangements for the proposed commercial irrigated farming scheme (land tenure/ ownership, farming model, farmer identification and support, funding, etc.) needs to be resolved between affected communities and role players before the scheme is implemented.
- A Decisions Register must be established and maintained, and must be available to any member of the public who wishes to access it. The register should include all commitments made to stakeholders during the public participation process, which are recorded in the Issues and Responses Report.
- An employment and skills development policy, maximising employment opportunities and skills development for local communities and promoting gender inclusivity and equity must be developed.
- A procurement policy, promoting business opportunities for local communities and gender inclusivity and equity, must be developed.
- An investigation on the necessity and design specifications for an eel-way should be undertaken and the findings implemented.
- As some roads and bridges will be inundated by the dams, new bridges and road realignments will be required. This will influence travel routes, distances and travel times. Where the proposed realignments will result in significant increases in travel times and distances (e.g. travelling from the villages north of Ntabelanga Dam to Maclear), alternative routes must be provided in order to maintain or improve the current level of service in the areas concerned.

Key mitigation measures to be implemented during the construction phase

- An alien vegetation control programme must be implemented on construction sites, as encroachment of alien vegetation is already apparent in the study area and is expected to increase as a result of the disturbances resulting during the construction process. Rehabilitation of disturbed areas, utilising indigenous

wetland vegetation species, will assist in retaining essential wetland ecological services, particularly flood attenuation, sediment trapping and erosion control, and assimilation of nutrients and toxicants, thus reducing the impacts of construction related activities.

- Prohibit the collection of plant material, outside of the proposed dam basins, for firewood or for medicinal purposes during the construction phase by construction staff.
- Restrict vehicles as far as possible to travel on designated roadways to limit the ecological footprint.
- No hunting or trapping of faunal species is to occur.
- The construction footprint needs to remain as small as possible, especially in the sensitive habitats.
- Sections of power lines that require bird diverters must be identified and implemented.
- Aquatic bio-monitoring must take place, starting six months prior to construction activities, and if any trends are observed where impacts on the aquatic ecology is becoming unacceptable, measures to reduce the impacts must be immediately implemented.
- Identified areas where erosion could occur must be appropriately protected by installing the necessary temporary and/or permanent drainage works as soon as possible and by taking other appropriate measures to prevent water from being concentrated in rivers/streams and from scouring slopes, banks or other areas.
- Storm water control measures must provide for erosion and sedimentation control, and for reinforcement of banks and drainage features, where required. Possible measures include the use of gabions or reno mattresses and geotextiles, re-vegetation of profiled slopes, erosion berms, drift fences with hessian and silt traps.
- It must be ensured that flow connectivity along the wetland features is maintained.
- Monitor rivers and wetlands for incision and sedimentation.
- Implement a water quality and quantity monitoring programme.
- The EWR as set out in the Reserve Determination Volume 1: River (Report P WMA 12/T30/00/5212/7) for the Ntabelanga Dam, and the EWR determined for the Lalini Dam, must be adhered to at all times.
- Develop a Water Management Method Statement (WMMS), including measures for water conservation, for approval by the Engineer prior to the commencement of the works.
- Construction personnel accommodation on site must be as limited as possible. Construction workers should, as much as possible, be recruited from neighbouring communities and transport provided to the construction site(s).
- Local residents should be recruited to fill semi and unskilled jobs.
- Women should be given equal employment opportunities and encouraged to apply for positions.

- A skills development plan should be put in place at an early stage and workers should be provided the opportunity to develop their skills which they can use to secure jobs elsewhere post-construction.
- A procurement policy promoting the use of local business, where applicable, should be put in place to be applied throughout the construction phase.
- Ensure that the appropriate procurement policies are put in place and closely followed.
- Ensure that all consultation is gender inclusive.
- Ensure that the Decisions Register is maintained, and is available to any member of the public who wishes to access it.

Key mitigation measures to be implemented during the operation phase

- Implement a communication strategy for the implementation phase.
- No hunting or trapping of faunal species by operational staff is to occur.
- Aquatic bio-monitoring must take place and if any trends are observed where impacts on the aquatic ecology is becoming unacceptable, measures to reduce the impacts must be immediately implemented.
- An alien vegetation control programme must be maintained, as encroachment of alien vegetation is already apparent in the study area and special attention needs to be given to areas disturbed during the construction process. Rehabilitation of disturbed areas, utilising indigenous wetland vegetation species, will assist in retaining essential wetland ecological services, particularly flood attenuation, sediment trapping and erosion control, and assimilation of nutrients and toxicants.
- The EWR as set out in the Reserve Determination Volume 1: River (Report P WMA 12/T30/00/5212/7) for the Ntabelanga Dam, and the EWR determined for the Lalini Dam, must be adhered to at all times.
- During operation and maintenance of infrastructure, vehicles must remain on designated roads and not be permitted to drive through sensitive wetland / riparian habitat, particularly on the edges of the dams where loss of wetland habitat and therefore ability of the wetlands to provide ecological services, is already compromised.
- Maintenance personnel must ensure that any tools and/or waste products resulting from maintenance activities are removed from the site following completion of maintenance.
- Regular maintenance of all roads, with specific mention of wetland / riparian crossings, must take place in order to minimise the risk of further degradation to wetland / riparian habitat.
- Ensure that the Decisions Register is maintained, and is available to any member of the public who wishes to access it.
- Maintain the potable water infrastructure, control pollution and curb illegal taps. If no such measures are implemented the community may be worse off as a result of water borne diseases or no water at all.

- The use of the access road to the hydropower plant by vehicles must be controlled by way of a manned boom gate or other suitable control system.

13.5.2 Relocation Policy Framework

Recommendations in the RPF include:

- Thorough identification of abandoned homesteads and recording of field ownership is required.
- The locations of ancestral graves at abandoned homesteads affected by the project must be ascertained.
- Certain structures will require replacement so that the relevant family's socio-economic activities can continue.
- All graves within the full supply levels of the dams should be relocated, with the permission of the next-of-kin and a permit from ECPHRA.
- No associated infrastructure may be located within 100 m of graves outside the full supply levels, and if unavoidable, these graves should also be relocated.
- A destruction permit is required from ECPHRA; if possible a single permit should be obtained for all affected structures.
- Avoid involuntary resettlement wherever possible.
- Undertake consultations with displaced people about acceptable alternatives and strategies and include them in the planning, implementing and monitoring processes.
- Choose the relocation site to ensure that the minimum disruption to displaced families and host communities occurs.
- Sensitise host communities to the pending arrival of the displaced communities;
- Establish a forum or resettlement committee through which resettlement and integration can be controlled by those affected.
- A formal accessible grievance procedure should be implemented and communicated to both the displaced and host communities.
- Ensure that the receiving environment is prepared and has adequate infrastructure, facilities and social services to support both the displaced and host communities, prior to moving the displaced communities.

13.5.3 Offsets

The Mzimvubu Water Project will inundate wetland and riparian habitats that are breeding and foraging areas for protected and endangered cranes. The access road to the hydropower plant site also traverses a highly sensitive area. These impacts have been assessed by the ecologist to be of high significance. It is not possible to avoid, minimize or rehabilitate the impact completely. The only mitigation measure that could potentially reduce the residual negative impact significantly is an offset. One of the difficulties associated with a biodiversity offset is that during this EIA, it has not been possible to establish whether suitable offset areas exist in the

catchment, especially if a like for like principle is applied. The process to be followed would be to compile a detailed Baseline Report of the areas to be lost, to reach agreement of the offset ratios/principles, identify offset options, then implement and manage them indefinitely. Although the likelihood of successful and sustainable implementation of a biodiversity offset is questionable, the EAP is confident that some form of conservation initiative aimed at cranes could be implemented somewhere in the province. This option has also not been investigated any further during this EIA, but offers a wider selection of implementation options.

In order to estimate a budget for implementing a traditional biodiversity offset, the area of wetlands and riparian vegetation to be inundated was calculated (approximately 412 ha at the Ntabelanga Dam and 623 ha at the Lalini Dam site), multiplied by an offset ratio associated with the vegetation type (8:1 for Ntabelanga and 17:1 for Lalini) and multiplied by a factor of 3 to allow for the practical packaging of land parcels, in order to estimate an amount of land that would have to be acquired and set aside for protection. Any current use of this land will have to be compensated for. This is expected to be mostly grazing as dwellings are seldom located in wetlands or river beds and banks. If a budget of R2000-00 per ha is used to cover these costs, then approximately R90 million is required to make the land available. An additional R10 million will be required to implement the offset.

The EAP therefore recommends that the planning and initiation of some form of crane conservation project, such as contributing funds to existing projects that protect cranes or their foraging and breeding areas elsewhere in the province, be stipulated as a condition of the authorisation of this project, and that a budget amount of R100 million be incorporated into the planning process.

Without taking the R100 million for an offset into account, the NPV of the project with population scenario 1 is R 1 827.11 million. Allocating an additional R100 million changes NPV to R 1 748.47 million. This is about a 4% change which doesn't change the economic viability of the project. The same applies to the Benefit-Cost Ratio and Internal Rate of Return.

13.6 RECOMMENDATIONS FOR THE IRRIGATION COMPONENT OF THE PROJECT

Although authorisation for the irrigation component of the Mzimvubu Water Project was not applied for as part of this EIA process, the success of the irrigation component is considered essential for the success of the overall project. This will depend on a number of conditions being met, which are presented in the Economic Impact Assessment.

In view of the above, these recommendations are intended to guide relevant parties in planning and designing the proposed irrigation scheme:

- Careful consideration must be given to the suitability of the crop selection for the irrigation development.
- A well-constructed agricultural development training and support system focused on assisting the new farmers will need to be implemented.
- Support structures should be available right from the start to assist with management. This support must cover the whole spectrum of the undertaking, from planting to marketing and the overall management. The best possible management will have to be available right from the start, which means the selection of the farming unit managers as well as the accepted management structure will eventually determine the success of the irrigation scheme.
- The assistance of the Department of Rural Development and Agrarian Reform, Tsolo Agricultural College, and Jongiliswe Agricultural College for Traditional Leaders must be enlisted to train, mentor and support developing farmers.
- This training must include business training, and training in project planning, monitoring and evaluation.

Consideration should also be given to the promotion of gender inclusivity and equity.

14. CONCLUSION AND RECOMMENDATIONS

The main aim of the Mzimvubu Water Project is the socio-economic upliftment of the largely undeveloped and impoverished communities within the project area. This is to be achieved through:

- Supply schemes for domestic and industrial water;
- Supply schemes for irrigated agriculture;
- Hydropower generation; and
- The creation of temporary and permanent jobs.

The provision of potable water to a number of rural and small urban areas is a very important aspect of the total project and is also a constitutional requirement. It should be noted here that while the bulk water distribution infrastructure will enable this constitutional requirement to be fulfilled, the District Municipalities, and not the applicant, will be responsible for the tertiary infrastructure and ultimately distributing potable water to communities. Coordination with these municipalities is therefore required to ensure they can fulfil this mandate.

The analysis of the socio-economic situation in the proposed area indicates very high levels of unemployment and household poverty, which is seen as an indication that a very small number of households will be able to pay for water. The recommendation is that this is seen as part of a developmental project and that government accepts that this will entail a grant with subsidised funding for the basic water needs over a very long period.

Financial viability is not a requirement for a project of this nature, as the objective of the project is not to make a profit on the investment, but rather to contribute to the development of the project area. However the economic impact assessment found that the project can be economically viable, in that the direct and indirect socio-economic benefits will exceed the financial cost of the project.

The benefits of the project in terms of economic and social development are expected to be high, provided the necessary conditions for the success of the project are met and the recommended mitigation and enhancement measures are adhered to.

However, some significant negative impacts, mostly related to flora, fauna, aquatic ecology and wetlands, have been identified. Some of these impacts are permanent and cannot be mitigated to an acceptable level.

In instances where high residual impacts are expected, an offset is the last resort for mitigating these impacts. In addition to their purpose in terms of mitigation, offsets in this particular context may also constitute an opportunity to enhance the potential benefits of the project.

In view of the above, the positive impacts expected to result from the project, in terms of social and economic development are considered to outweigh the negative impacts.

It is therefore recommended that the proposed project proceed, on condition that the mitigation measures proposed are adhered to and that appropriate offsets are implemented.

As the success of the project in terms of socio-economic development rests largely on parties other than the applicant, and depends on factors outside the control of the applicant, it is critical that the necessary institutional arrangements and cooperation between all parties involved be in place, in order to ensure the primary objective of the project is achieved.

15. REFERENCES

Berliner, D. and Desmet, P. (2007) *Eastern Cape Biodiversity Conservation Plan: Technical Report*. Department of Water Affairs and Forestry Project No 2005-012, Pretoria. 1 August 2007

BKS (Pty) Ltd (2009) DWAF Water Resource Study in Support of the AsgiSA EC

Department of Water Affairs and Forestry, South Africa (2008) *Mzimvubu River Spring Survey*.

Department of Water Affairs and Forestry, South Africa (2005) *Mzimvubu River Basin: Water Utilization Opportunities.* Report No: P WMA 12/000/00/0505.

Department of Water Affairs, South Africa (2013a) *Feasibility Study for the Mzimvubu Water Project: Irrigation Development*. DWA Report No: P WMA 12/T30/00/5212/9. Prepared by Jeffares & Green (Pty) Ltd.

Department of Water Affairs, South Africa (2013b) *Feasibility Study for the Mzimvubu Water Project: Geotechnical Investigations*. DWA Report No: P WMA 12/T30/00/5212/10. Prepared by Jeffares & Green (Pty) Ltd.

Department of Water Affairs, South Africa (2013c) *Feasibility Study for the Mzimvubu Water Project: Preliminary Study*. DWA Report No: P WMA 12/T30/00/5212/3. Prepared by Jeffares & Green (Pty) Ltd.

Department of Water Affairs, South Africa (2013d) *Feasibility Study for the Mzimvubu Water Project: Bulk Water Distribution Infrastructure*. DWA Report No: P WMA 12/T30/00/5212/13. Prepared by Jeffares & Green (Pty) Ltd.

Department of Water Affairs, South Africa (2013e) *Feasibility Study for the Mzimvubu Water* Project, *Water Resources*

Department of Water and Sanitation, South Africa (2014a) *Environmental Impact Assessment for the Mzimvubu Water Project: Floral Impact Assessment Report*. DWS Report No: P WMA 12/T30/00/5314/10. Prepared by Scientific Aquatic Services cc.

Department of Water and Sanitation, South Africa (2014b) *Environmental Impact Assessment for the Mzimvubu Water Project: Faunal Impact Assessment.* DWS Report No: P WMA 12/T30/00/5314/11. Prepared by Scientific Aquatic Services cc.

Department of Water and Sanitation, South Africa (2014c) *Environmental Impact Assessment for the Mzimvubu Water Project: Aquatic Ecology Assessment.* DWS Report No: P WMA 12/T30/00/5314/15. Prepared by Scientific Aquatic Services.

Department of Water and Sanitation, South Africa (2014d) *Environmental Impact Assessment for the Mzimvubu Water Project: Wetland Assessment*. DWS Report No: P WMA 12/T30/00/5314/15. Prepared by Scientific Aquatic Services cc.

Department of Water and Sanitation, South Africa (2014e) *Environmental Impact Assessment for the Mzimvubu Water Project: Phase 1 Heritage Impact Assessment Report*. DWS Report No: P WMA 12/T30/00/5314/12. Prepared by eThembeni Cultural Heritage.

Department of Water and Sanitation, South Africa (2014f) *Environmental Impact Assessment for the Mzimvubu Water Project: Visual Impact Assessment*. DWS Report No: P WMA 12/T30/00/5314/9. Prepared by Bapela Cave Klapwijk.

Department of Water and Sanitation, South Africa (2014g) *Environmental Impact Assessment for the Mzimvubu Water Project: Social Impact Assessment*. DWS Report No: P WMA 12/T30/00/5314/7. Prepared by Dr Neville Bews & Associates**.**

Department of Water and Sanitation, South Africa (2014h) *Environmental Impact Assessment for the Mzimvubu Water Project: Economic Impact Assessment Report*. DWS Report No: P WMA 12/T30/00/5314/8. Prepared by Mosaka Economic Consultants.

Department of Water and Sanitation, South Africa (2014i) *Environmental Impact Assessment for the Mzimvubu Water Project: Water Quality Assessment Report.* DWS Report No: P WMA 12/T30/00/5314/13. Prepared by Scientific Aquatic Services cc.

Eastern Cape Department of Economic Development and Environmental Affairs (2011) *Eastern Cape Climate Change Response Strategy*

Johnston, P., Coop, L., and Lennard, C. (2011) *Climate Change Projections and Impacts for the Eastern Cape region of South Africa*. Climate Systems Analysis Group. Cape Town. Report commissioned by Eastern Cape Department of Economic Development and Environmental Affairs.

Makiwane, M. B. & Chimere-Dan, D. (Ed.) (2010). *The People Matter: Poverty, Population Dynamics and Policy,* Bisho: Research and Population Unit of the Eastern Cape Department of Social Development.

Midgley, G., Chapman, R., Mukheibir, P., Tadross, M., Hewitson, B., Wand, S., Schulze, R., Lumsden, T., Horan, M., Warburton, M., Kgope, B., Mantlana, B., Knowles, A., Abayomi, A., Ziervogel, G., Cullis, R. and Theron, A. (2007) *Impacts, Vulnerability and Adaptation in Key South African Sectors: An Input into the Long-Term Mitigation Scenarios Process*. University of Cape Town. 20pp.

Muller, M. (2014) *Mzimvubu water project – strategic review*. Report prepared for the Eastern Cape Social and Economic Consultative Council.

National Planning Commission (2011) *National Development Plan – Vision for 2030*

National Protected Areas Expansion Strategy, 2010

National Water Resource Strategy, 2004

Prins, F. E. and Granger, J. E. (1993) "Early farming communities in northern Transkei: the evidence from Ntsitsana and adjacent areas", in *Southern African Humanities* 5: 153-174.

Stassen, W. (2011) *health-e.org.za.* [Online] Available at: http://www.health-e.org.za/2014/02/26/old-transkei-international-cancer-hot-spot/?utm_source=rss&utm_medium=rss&utm_campaign=old-transkei-international-cancer-hot-spot [Accessed 10 March 2014].

Statistics South Africa (2012) *Census 2011,* Pretoria: s.n.

Statistics South Africa (2012) *General Household Survey, Selected development indicators, July 2012,* Pretoria: Statistics South Africa.

www.climate-data.org

www.ewisa.co.za