LESOTHO MINISTRY OF WATER, WATER COMMISSION

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND RESETTLEMENT ACTION PLAN FOR THE LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME ZONES 6 AND 7

FINAL ESIA REPORT

18 JUNE 2019

ORIGINAL

wsp

SEED CONSULT

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EXECUTIVE SUMMARY

INTRODUCTION

The Government of Lesotho (GoL) has received financing from the International Development Association (IDA) in the form of a "credit" toward the cost of the Lesotho Water Sector Improvement Project Phase II (LWSIP II). The body responsible for managing the project will be the Lesotho Lowlands Water Supply Scheme Unit (LLWSSU), which falls under the office of the Commissioner of Water (COW). This project represents a scheduled activity in terms of the Environment Act (2008) and Lesotho Environmental Impact Assessment (EIA) Regulations and requires environmental authorisation and therefore an Environmental and Social Impact Assessment (ESIA) is required.

The contents of this ESIA meets both the local requirements in line with the Environment Act (2008) and the Lesotho EIA Regulations; as well as the requirements of the project donors – World Bank and European Investment Bank (EIB).

Chapter 1 of this ESIA includes a summary of the contents of each chapter of the ESIA report. The scoping stage of the ESIA identified the need to consider potential impacts during the construction and operational phases of the Project. The following aspects were identified: air quality, noise and vibration, soil erosion and release of sediment into water courses, release of contaminants into soils, water bodies and groundwater, flood risk, discharge of effluent, waste management, terrestrial ecology, water resources, socio-economic environments, visual and occupational health and safety on the functionality of the Project.

LOCATION OF PROJECT

The overall Lesotho Lowlands Bulk Water Supply Scheme (LLBWSS) project area lies to the western and southern edge of Lesotho and stretches from Butha Buthe in the north to Quthing in the south. Zone 6 and 7, which falls into Project 4 of the of the LLBWSS, stretches across the Mafeteng and Mohale's Hoek regions of the lowlands.

PROJECT PROPONENT

The LLWSSU, which falls under the office of the Commissioner of Water (COW), is the proponent for this project and will be responsible for the implementation of the Environmental and Social Management Plan (ESMP) and the Resettlement Action Plan (RAP).

ENVIRONMENTAL CONSULTANT

The Lesotho based environmental consultancy, Senqu Engineering, Environment and Development Consultants ("SEED CONSULT") and The Biodiversity Company in collaboration with WSP Environment & Energy, Africa, were appointed to undertake the required ESIA for the proposed LLBWSS Zone 6 and 7 project in order to obtain environmental authorisation and funder approval.

APPROACH TO THE ASSESSMENT

Specialist studies have been undertaken to review and ascertain existing environmental and socio-economic conditions relevant to the project area and its surroundings, identify receptors and resources sensitive to potential impacts. Baseline conditions and specialist findings are considered in the assessment of impact significance outlined in Chapter 7: Environment and Social Aspects and Impacts.

Below provides a matrix summarising the key component soft the methodologies undertaken for each specialist study. Detailed methodologies are outlined in standalone specialist reports (**Appendix A – Appendix D**).

	DESKTOP REVIEW	MAPPING	STAKEHOLDER ENGAGEMENT	DATA COLLECTION	DATA ANALYSIS	MODELLING
Surface Water and Groundwater Assessment	X	X		X	X	
Terrestrial Ecological Assessment	X	X		X		
Water Resource Ecological Assessment	X	X		X		
Ecological Flow Requirements (IFR) Analysis	X			X	X	X
Socio-Economic Impact Assessment			X	X		
Archaeological / Palaeontological Survey		X	X			

The identification of alternatives provides a basis for choice among options available to the decision-making authority. Alternatives considered and evaluated in ESIA are outlined in **Chapter 5: Analysis of Alternatives**.

The focus is to identify and evaluate the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The ESIA uses a methodological framework developed by WSP to meet the combined requirements of international best practice and national legislation. The determination and assessment of impacts will be based on the following criteria:

- Nature of the Impact;
- Significance of the Impact;
- Consequence of the Impact;
- Extent of the impact;
- Duration of the Impact;
- Probability if the impact;
- Degree to which the impact:
  - can be reversed;
  - may cause irreplaceable loss of resources; and
  - can be avoided, managed or mitigated.

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact, and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures, and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this ESIA Report.

DESCRIPTION OF THE PROJECT

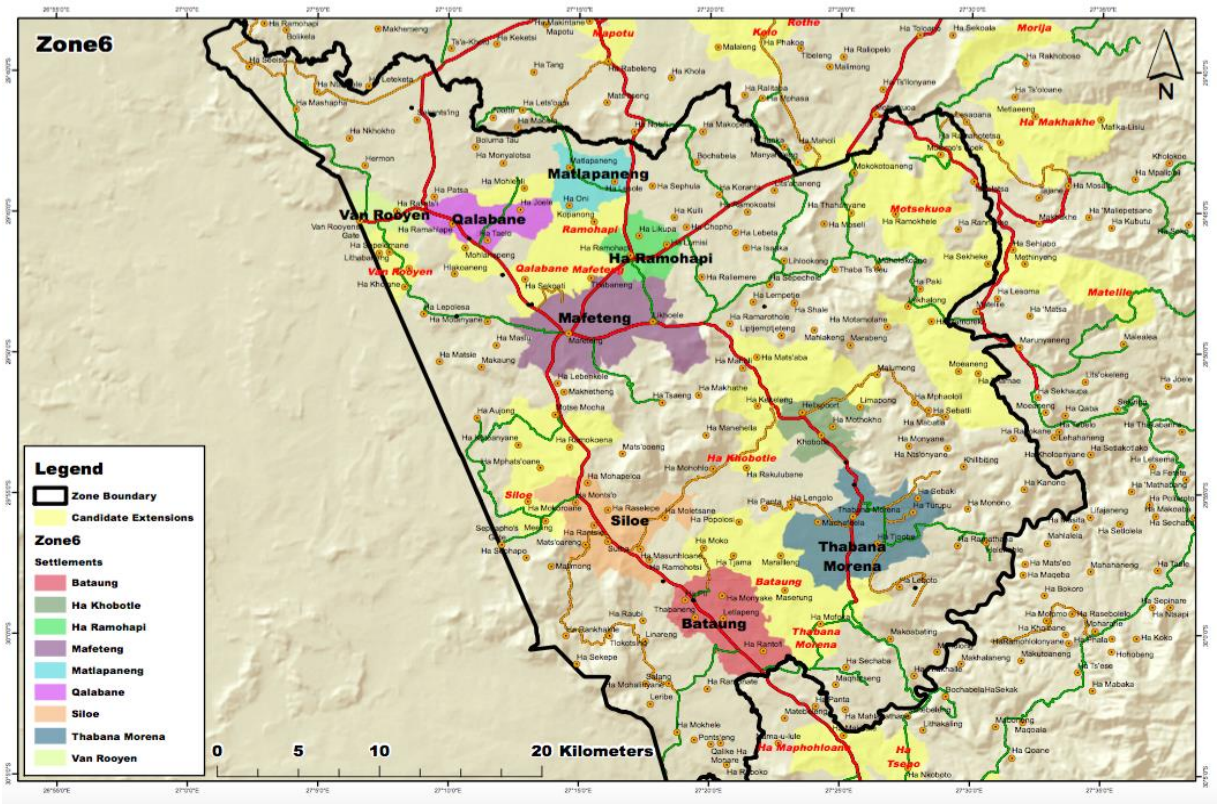
The LLBWSS consists of eight zonal areas. The focus of this study is Zone 6 (Mafeteng) and Zone 7 (Mohale's Hoek). Zone 6 and 7 are situated geographically adjacent to one another; in the southwest of Lesotho. The bulk water supply infrastructure is intended to serve a projected population of 81,850 in Zone 6 (Mafeteng) and a population of 129,493 in Zone 7 (Mohale's Hoek) in 2045. Delivery of this project is planned to take place over two phases. Phase 1 being delivered from 2018 to 2030 and Phase 2 delivered from 2030 to 2045.

The current application for Environmental Licence and scope of this ESIA is for Phase 1 only.

The Zone 6 and 7 bulk water supply scheme comprises the following infrastructure components in Phase 1:

- Direct surface water abstraction from the Makhaleng River with a total capacity of 59,450m^3/d;
- Makhaleng Water Treatment Works (WTW) of 40m^3/d;
- 31 Service Reservoirs / Sumps / Tanks;
- 18 Pumping Stations;
- 151 - 160 km length of pipeline ranging in diameter from 80mm to 800mm;
- Power Supply; and,
- Low-level weir across the Makhaleng River to optimise intake.

The bulk water infrastructure designed for Zone 6 and 7 (as Project 4) is allocated into three lots and planned for delivery as a single contract under the modified International Federation of Consulting Engineers (FIDIC) Red Book conditions of contract.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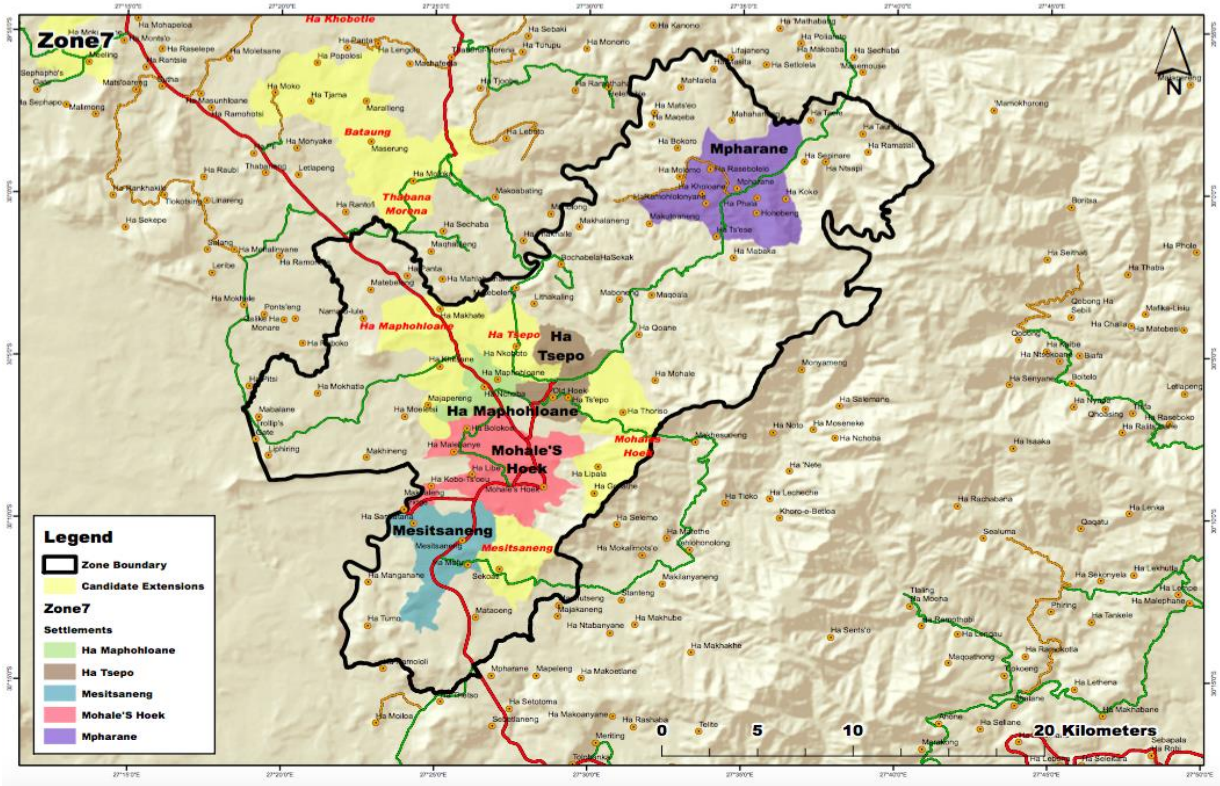
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Ha Maphohloane
Mohale'S Hoek
Mesitsaneng
Bataung
Thabana Morena
Ha Khobotle

PLATE 1: GRAVEL ROAD FROM TSOLOANE VILLAGE TO THABANA-MORENA

PLATE 2: HA MOFOKA SETTLEMENT

PLATE 3: VIEW OF RAMOHAPI VILLAGE FROM THE PROPOSED RESERVOIR

PLATE 4: MAKHALENG RIVER BRIDGE

PLATE 5: MOHALE'S HOEK TOWN

PLATE 6: MAFETENG TOWN

DESCRIPTION OF PHYSICAL AND SOCIAL ENVIRONMENT

CLIMATE AND METEOROLOGY

The climate of Lesotho is described as continental and temperate with four distinct seasons dominated by warm, wet summers, and cool dry winters. The project area has moderate to high temperatures in summer (October to March) and lower temperatures during the dry winter (May to July). The average temperature is 15°C, with the highest maximum temperature recorded at 38.8°C and the lower minimum temperature recorded at -10.8°C. The annual precipitation ranges from around 600 mm in the lowland valleys to around 1,200mm in the northern and eastern escarpment bordering South Africa. Most of the precipitation occurs in spring and summer, from October to April, with peak rainfall being between December and February. Summer storms are often characterised by high-intensity rainfall that generated a significant amount of surface runoff in a short time, resulting in flash floods and erosion. Snow is common in the winter months. The closest weather station to the site is located in Quthing (SSI April 2010), approximately 45km from Zone 7. The average evaporation rate is 1500mm per annum. The average evapo-transpiration rate is 1250mm (SSI, April 2010). Wind speeds are low in the summer months, but tend to get higher in the winter, peaking from late July to the end of August. The Lesotho Meteorological Service state that the monthly mean wind speed for Lesotho Lowlands range from 1.4m/s in October to 8m/s in August. The prevailing wind direction is westerly (SSI, April 2010).

CLIMATE CHANGE

Climate change is likely to have an impact on the availability of the water resources for the country in the long-term. Data from the LMS was used in a World Bank (2016) report, which observed the trends in climate between 1980 and 2012. The data on average minimum and maximum temperatures from all stations in the country indicate a warming of approximately 2°C, over the same period. The range of projected future precipitation includes both an increase and decrease of about 20 percent or 160 mm annually. The intensity and frequency of extreme events such as floods and drought are expected to increase, especially in the western and northern lowlands. The increasing temperatures may lead to a reduction in available soil moisture, and available water resources during periods of inadequate rainfall. Rangeland conditions may deteriorate-and ultimately be destroyed-by changes in climate. The present indigenous forests may change into semi-arid types.

The World Bank (2016) Lesotho Water Security and Climate Change Assessment discusses vulnerabilities associated with bulk water supply systems to climate change, and identifies water, food, energy and the economy as susceptible areas. Water demand in the urban domestic and industrial sectors in Lesotho is not reliably met under a repeat of the historical climate or under the full range of climate futures, and, in the absence of augmentation measures, unmet demand levels will reach 40% by 2050. Agriculture in Lesotho (principally maize, beans, peas, sorghum, and wheat) is almost entirely rain-fed and therefore highly vulnerable to changes in precipitation. Rising temperatures will increase the amount of water required for crops, exacerbating water stress during dry periods. Higher temperatures, lower rainfall, frequent droughts, rainstorms, strong winds, etc are all likely to increase soil loss. Hydropower production under the historical climate and the baseline strategy is constant, producing the maximum amount of 674 GW hours for all but one year. Potential exists for a reduction in energy production due to low flows. The LHWP alone facilitated investments of more than US$3 billion and provided sustained revenues that amount to nearly US$800 million since 1996.Drier climates and lower rainfall resulting in lower flows may affect economies of Lesotho and neighbours, which are heavily reliant on water (e.g. industry and agriculture). Continued development of the LLBWSS is critical for ensuring water-resilience in the domestic and industrial sectors. Exploring interconnections between the LHWP and the LLBWSS could enhance resilience and balance the opportunities afforded through the regional transfer of water with national priorities.

AMBIENT AIR QUALITY AND NOISE

Typical land use in the project area is agricultural or open land, with <5% of the project area built-up and most areas distant from roads and industrial-type activities. Ambient noise levels are low and ambient air quality is not significantly impacted by emissions. Similarly, the rural / peri-urban study area is characterised by low ambient noise levels. Prominent noise noted by field staff was generally from livestock / animal rearing, dominated by the sound of sheep and goats. Other primary noise sources include the use of motor vehicles and taxis.

The most significant sources of pollutants affecting ambient air quality within the rural lowlands include (UNEP, 2008): dust levels associated with agricultural activities and bare soils, emissions generated by outdoor mixed waste (plastics, tyres, organic and inorganic materials) burning and paraffin use for cooking (limited to only ~27% of the surveyed population, as biomass remains the predominant fuel source). Annual burning is an additional key source that should be considered.

TOPOGRAPHY, GEOLOGY AND SOILS

The project area is situated in the western lowlands (one of Lesotho's four physiographic regions) with an altitude that ascends in an approximate north-south direction across Lesotho with the western quarter of the country comprised of plateaux (1500 – 1850 mamsl). The entire eastern and south-eastern country border is formed by the Drakensberg Mountain Range, with the Maluti Mountains running north south. The Zone 6 and 7 development area occurs in the sandstone, siltstone, mudstone and shale of the Elliot and Molteno Formations of the Karoo Supergroup. The Molteno Formation typically occurs at elevations of 1 600 and 1 700 mamsl, and includes medium to coarse-grained buff coloured feldspathic sandstone, with a gravelly basal unit and interbedded thin siltstones and mudstones. The Elliot Formation consists of red clays and mudstones with interbedded fine to medium-grained sandstones. As with the Molteno Formation, the Elliot Formation thins from 200m in the south of Lesotho to 100m in the north.

Many of the soils identified within the project area during site assessments were duplex soils. These include the Valsrivier, Sepane, and Sterkspruit soil forms. The structural instability of the clays associated with duplex soils means that care must be taken when designing structures that will be suited in these conditions. The gullied border Lowlands shows the lowest erosion hazard in Lesotho however on an internationally relative scale, the erosion area for this study area is still high. The Lowlands have suffered years of mismanagement, which accounts for a history of severe soil erosion. Sections of the pipeline route from Makhaleng River and WTW to Mafeteng in Zone 6 lie within an area with large dongas occurring. Similarly, in Zone 7 the pipeline route from the WTW at the Makhaleng River to Mohales Hoek lie within an area with large dongas and gullies. Many of the proposed reservoir sites show signs of sheet erosion ranging from slight to severe.

SURFACE WATER

The southern section of the site falls within the D1L rainfall zone with an average Mean Annual Precipitation (MAP) of 710mm and the northern section of the site falls within the D2G rainfall zone with an average MAP of 624mm. Mean Annual Evaporation (MAE) for the site is higher than the MAP, making this a dry area. Each rainfall zone produces similar runoff volumes and patterns. Flow data, design rainfall depths and daily rainfall have been documented for the project area. Rainfall gauging stations located in close proximity to the site were selected from a database compiled by the Institute for Commercial Forestry (ICFR).The Makaleng River supplies the Mohale's Hoek centre with approximately 1147 m3/day based on data from 2002/2003. More recent data was not made available with current existing conditions.

Eight water samples were collected from surface water bodies and groundwater wells within Zone 6 and 7, which may be influenced by the future development. Due to the lack of water quality guidelines in Lesotho, various international water quality guidelines were assessed in order to determine the most important receptors and/or potential surface water users in the area. In order to achieve this, a Most Sensitive User (MSU) analysis was carried out. Exceedances of aluminium, sodium, manganese, zinc and electrical conductivity were noted in a number of the surface water sampling locations.

The outcomes of the 22nd Southern African Regional Climate Outlook Forum (SARCOF-22), organised by SADC in August 2018 indicated that the bulk of the region is likely to receive normal to below-normal rainfall conditions in the period December 2018-March 2019. This would potentially lead to droughts and widespread food insecurity in the region. Moreover, various international sources recently forecast a 655 chance of the 2016/2017 El Niño prevailing during the period June-August 2019, reducing to 50-55% during the period September-November 2019.

FLORA

The project area is situated in the grassland biome. This biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006). Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for

tree growth. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees. Based on the vegetation type classification no forests or forest vegetation can be found in any section of the Project area. Based on the Plants of Southern Africa (BODATSA-POSA, 2016) (which includes Lesotho) database, 309 plant species are expected to occur in the project area. Of the 309-plant species, zero species are listed as being Species of Conservation Concern (SCC).

Recently, the rangelands of Lesotho have been degraded to levels of non-recovery through overgrazing due in part to overstocking. Overgrazing of the rangelands has led to decrease in diversity of species and invasion of non-palatable species. With the degradation of the rangelands, there is an accompanying invasion of the Karoo species like Chrysocoma. Although Chrysocoma provides ground cover against rain induced soil erosion, it is an indicator of deterioration of the rangelands, loss of useful biological components and a sign of increasing desert-like conditions. Other alien species with some economic and habitat importance are the Xanthium species; Xanthium stromarium and X. spinosum. These are weedy species of both rangelands and cultivated fields causing millions of Maloti in production losses. There is, however, little documentation of these effects of the alien species invasion into economically important ecosystems in the country.

FAUNA

A number of species of avifauna, mammals, reptiles and amphibians are expected to occur on site. These include a variety of Critically Endangered (CR), Endangered (EN), Vulnerable (VU) and Near Threatened (NT) species according to the IUCN Red List of Threatened Species. During the August 2018 survey, certain of these species were confirmed to occur in the project area. Sixty bird species were recorded in the Project area based on either direct observations, vocalisations, or the presence of visual tracks & signs. Four avifaunal SCC were recorded during the survey. They were the Cape Vulture (Gyps coprotheres), Southern Bald Ibis (Geronticus calvus), Sentinel Rock-thrush (Monticola explorator) and Lanner Falcon (Falco biarmicus). Overall, mammal diversity in the project area was moderate, with ten mammal species being recorded during the August 2018 survey based on direct observations, camera trap photographs and/or the presence of visual tracks & signs. One mammal SCC was recorded during the survey, Cape Clawless Otter (Aonyx capensis). Herpetofauna diversity was considered to be moderate (considering the timing of the survey) with six reptile species and four amphibian species bring observed or recorded in the project area during the August 2018 survey. Further surveys conducted during the summer (wet) seasons are expected to yield further results. A number of macroinvertebrates were recorded for the project; including the Bark Scorpion Opisthacanthus asper, cf Protostrophus sp, and cf Latrodectus sp.

WETLANDS AND AQUATIC ECOLOGY AND WATER RESOURCES

A number of wetlands were identified either adjacent to the proposed pipeline or being traversed by the pipeline. The general features of the identified wetland unit within the WTW area were assessed in terms of impacts on the integrity of these systems using the WET-Health methodology. The dominant land use in this area is agriculture, namely crop farming. This has resulted in the removal of natural vegetation resulting in the onset of alien vegetation establishment and the loss of surface roughness. The combination of lost surface roughness and the extent of compacted areas due to roads and tracks has also resulted in an increase in surface flow hydrology across the area. The hydro-dynamics of the area has been altered and this has in turn resulted in the scouring and erosion of some areas. The PES of the wetland system is Largely Modified which suggests the change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognizable (Macfarlane et al., 2009). The ecosystem services provided were only determined for the seepage wetland at the WTW area which were assessed and rated using the WET-EcoServices method (Kotze et al., 2009). The seepage wetland had an overall moderately low rating level of service. The provisioning of cultivated foods and harvestable resources were the only two (2) services determined to provide a moderately high and intermediate benefit level respectively for the assessment.

The proposed WTW is located adjacent to the Makhaleng River, this system is a focal aspect for the aquatic ecological assessment as it is the predominant receiving aquatic environment for potential risks associated with the project. This ecoregion is known to contain approximately 1-19 freshwater fish species of which 1-11 are known to be endemic. The ecoregion is known to have increased flow rates during the spring and summer seasons (September to March) and most of the indigenous fish species breed during this period. A total of five (5) fish species are expected for SQR D15H-4889, none of which are of conservational concern (IUCN, 2018).

A total of five (5) sites were suitable for a low flow assessment. Water quality, habitat integrity and macroinvertebrate community structures were assessed for all the sites, with fish assessments completed for the two (2) sites on the Makhaleng River. The low flow conditions have altered the quantity and quality of habitat, having an impact on the biotic community structure for the system. Furthermore, extensive instream sedimentation has limited habitat diversity for aquatic biota within the reach. The water within the Makhaleng River and associated tributaries was deemed acceptable for aquatic biota and ecosystem function. The biological responses represented by the sampled macroinvertebrate assemblage shows various impacts are present in the project area resulting in a low diversity of macroinvertebrate taxa.

The overall results of the Present Ecological State (PES) assessment derived a largely modified ecological category (Class D). This largely modified status can be primarily attributed to habitat related drivers within the Makhaleng River. Instream conditions were largely influenced by the high level of sedimentation with the project area and surrounding catchment. Altered land use in the form of agriculture and livestock activities in combination with erosion were found to have the highest impact to the riparian ecological condition.

SENSITIVE HABITATS

Ecosystem threat status outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function and composition, on which their ability to provide ecosystem services ultimately depends (Driver et al., 2011). Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), based on the proportion of each ecosystem type that remains in good ecological condition (Driver et al., 2011). The Project area falls within three ecosystems, which are listed as Endangered, Vulnerable and/or Least Threatened.

There are no known protected areas within proximity (< 20km) to the project area. The Caledon Nature Reserve and the Vulture Conservation Area are both located in South Africa, to the west of the Project area. A single RAMSAR area is listed for Lesotho, namely Lets'eng-la-Letsie which is approximately 80km south-east of the WTW area (RAMSAR, 2018). The Lets'eng-la-Letsie (not yet gazetted) protected area, was designated in 2001 as a component of the Conserving Mountain Biodiversity in Southern Lesotho (CMBSL) project. Terrestrial ecosystems associated with the proposed road and project area are rated as either hardly protected, poorly protected, or not protected.

SPECIES OF COMMERCIAL IMPORTANCE

No commercial species were observed in the Project Area. However, investigation on the potential impacts of the weir associated with the water pipeline project on the Makhaleng River and Labeobarbus aeneus populations for food is required. Local community tend to fish extensively in natural pools etc. The inundation caused by the weir provides the ideal environmental for this potential food source.

SPECIES WITH POTENTIAL TO BECOME NUISANCES, VECTORS OR DANGEROUS

Construction activities can result in the attraction of pests or inadvertently create breeding habitat for pest species. Pest species can pose a range of risks to both humans and the environment including the natural biodiversity. Pests that may be encountered on-site during construction include mosquitoes, cockroaches, ants, ticks, mice and rats, feral cats and dogs. All these species can also have an impact on the natural fauna and flora as they not only carry disease, but they also compete with natural species for habitat and resources. Their numbers should be controlled so that they do not have a long-lasting effect on the natural biodiversity.

DEMOGRAPHIC PROFILE

According to the latest National Census, in 2016 Lesotho had a total de jure population of 2,003,962, representing a population growth rate of 1.12% from 2011. Although the growth rate increased from 1976 to 1986, it decreased from 2.6% in 1986 to 0.08% in 2006. Since then there has been a reverse of this downward trend, with steady increases. The average population density nationally was 61.7 people per km2. However, the density is higher in the Lesotho Lowlands than in the Highlands. On a District level, in Botha-Bothe it was 62, in Leribe 103, in Berea 112, in Maseru 100, in Mafeteng 91, in Mohale's Hoek 50, and in Quthing 42.There was also evidence of a decreasing Fertility Rate, and stabilised Infant Mortality Rate (IMR), with rural areas experiencing higher IMR than urban areas.

Although the risk of HIV/AIDS is perceived as high, it is assumed that it will not have the anticipated influence on mortality figures and thus on population projections due to greater awareness, testing and treatment. Christianity is the most widely practiced religion in the project area. The main Christian denominations found are the Apostolic Faith Mission, Roman Catholic, Lesotho Evangelical and Anglican. Furthermore, most Basotho also follow their traditional belief systems, like appeasing their ancestors, 'balimu' in Sesotho.

SERVICES AND INFRASTRUCTURE

Almost all essential services were already available in the zones. Services that are commonly found in both Zones 6 and 7 are include: small shops / kiosks, day care centres/pre-schools, primary schools, churches, hospitals, clinics, local government offices. Local courts, electricity, and communal stand pipes (though some are old and therefore not functioning well). Notably, communication via cellular phones is common throughout the Project Area.

COMMUNITY STRUCTURE

Rural population settlement patterns are characterised by scattered villages, small sized villages, and large extended family units. Urban settlements comprise large, rapidly growing towns/townships with a degree of industrialization. The majority of households' heads in rural areas often build their homesteads and others inherit them from their parents and build some additional structures on their parents' sites, more especially the first born sons who normally according to the customary law inherit their late father's estates. On the other hand, in urban areas the household heads often build or buy their households structures. Furthermore, a reasonable number of residents in urban areas stay in public or privately rented buildings or take care of someone else's property.

The types of housing units commonly found in the two zones are traditional huts and flats for most of the population in rural areas and the modern structures in urban and peri-urban areas or a mixture of traditional and modern structures. In urban areas of Mafeteng and Mohale's Hoek there are also Malaene (rental flats) and informal structures.

ECONOMIC ACTIVITIES

Lesotho faces an unemployment rate of 28% with 32.1% of the female labour force unemployed compared to 21.3% of the male labour force. In rural areas, poverty is further exacerbated by lack of adequate access to safe drinking water as well as lack or not adequate water for agricultural purposes. The main cash sources of income for households in the project area are from production from the fields, sale of vegetables and livestock. Land is of primary importance to sustain livelihoods in Lesotho. More than 40% of the population in Zone 6 and 7 have no reliable means of income as they depend on the production from their fields, sale of vegetables and livestock, piece jobs, domestic work and remittances outside Lesotho. Some (28%) lived on remittances from their family members especially spouses and children who worked in the mines as well as those who are employed as domestic workers in South Africa and inside Lesotho. More than 20% survive on less than M1000.00 per month. Other income sources discussed with participants included pensions, grants and receipt of food aid.

Most people in Zones 6 and 7 are unemployed, particularly women, man have gone to South Africa seeking employment and other means of livelihood while others work as shepherds.Very significant socioeconomic differences exist between rural and urban areas. Average income per person in urban areas exceed those found in rural areas by more than 4 times. As a result, ability to pay for water in rural areas will be significantly lower than in urban areas. Poverty in Lesotho is also characterised by geographic factors that should also be considered with regard to ability to pay for water, particularly in rural areas.

EDUCATION & EDUCATIONAL FACILITIES

Only 7% of adults in the study had completed high school, with very few subsequently attaining a tertiary education or vocational training, and people were low on skills to set them up in the wider economic market. Similarly, the level of education of the population residing in the two zones is very low more especially among the elderly male population, most of them have only attained primary education. Very few people have high school level and those are mostly women. Both male and female youth, ages 10-14, from zones six and seven are still in primary school while some youth, ages 15-18, are married and some are school drop-outs.

There a number of primary and high schools in both zones. In Mafeteng, for instance some of the villages where primary schools and high schools are found include HaKhobotle, Patisi, Likhoele, Van Rooyen, Ha Ralintsi, Thabana Morena, Matholeng and Ha Motlere. In Mafeteng Town, there are 4 primary schools and 3 high schools. There are also some villages where there are no schools like HaSechaba. Students from this village are required to walk very long distances to get to nearby schools. In Mohale's Hoek (zone 7) villages that have schools include HaMalebanye, Kubake, Paul V1, Thabaneng, Mesitsaneng and Moeaneng which has 4 primary schools and a high school. All of these schools are able to service various villages within the project area. In both zones as explained above and teachers are available in the schools, unlike in the mountain areas where one teacher will be responsible for several classes and some are not even qualified teachers.

LAND TENURE

The traditional system of land tenure in Lesotho is such that the king holds the land in trust for the Basotho nation, while individuals hold user rights. There are various modes of acquiring land by household members, these include: allocation by a chief, inherit piece of land from parents or extended family members, bought land from somebody else or chief, acquiring land through a private developer etc. Lesotho's land tenure system recognises three types of title: leasehold, Form C and license. Some households occupy land without the appropriate title in place, i.e., through the traditional/ customary tenure system under which the land was allocated to citizens through chiefs and headmen on behalf of the King.

Under the leasehold system, the leaseholder has the right to use and enjoy the property for the agreed period. Land may be inherited or sub-leased and will never return to the state unless it has become apparent that it has been abandoned. Forms of leasehold comprise residential leases for a period of 90 years, commercial and industrial leases for periods of 30 and 60 years, agricultural leases for periods of 10-90 years and various religious, educational and charitable leases for periods of 90 years. Leasehold agreements are registered at the office of the Land Administration Authority (LAA). Form C was abolished by the Land Act (No. 17) of 1979, however, to date people in the rural areas are still issued with the Form C as proof of land tenure; it refers to land that is allotted by the chief. All forms issued before the 1979 Land Act remained valid. Form Cs and title deeds can be converted into leases. License is a land tenure system used for agricultural land within the urban areas. The tenure's right is called a license, and the land right is neither transferable, subject to inheritance nor negotiable. Licenses are held under customary law.

LAND USE AND AGRICULTURAL ACTIVITIES

Land in the project area is used predominantly for subsistence agriculture. The drought over the last few years has seriously affected agricultural production. Households generally did not plant over the last annual agricultural season (2016/7), and if they did their crops mostly failed. The peri-urban and urban areas such as the Town of Mafeteng support small-scale commercial businesses with industrial areas located in Mesitsaneng and Ha Mapotsane.

Detail of all land owned/used by households surveyed for the 2016 Socio-Economic Survey showed that 81% percent of households had access to agricultural land for cultivation (including vegetable gardens and orchards), 96% of which was owned by household heads. Nearly 60% of the land had not been cultivated the previous year, with no or late rain as the main reason given. For those who planted, the primary crops grown were maize, wheat, sorghum and beans. Vegetables included cabbage, potatoes, peas, spinach, beetroot, pumpkin, onions, tomatoes and carrots. Fruit included peach, apricot and litchi trees, and watermelon. Animal feed was also cultivated. Although livestock plays an important role in farming activities in the study area, only a relatively small percentage of households kept animals. Those that did averaged 8.4 animals, with larger herds owned by a few households. Households mostly kept chickens (owned by 23.6%), goats (11.1%) and sheep (19.6%). Nearly thirty percent of households owned cattle, averaging four animals.

VULNERABILITY AND MARGINALISATION

Most of the population living at the project area are vulnerable people due to unemployment, lack of income earning opportunities, harsh conditions for generating a reliable source of food throughout the year, and poor educational standard level or illiteracy. This is as a result of inadequate social infrastructure and services. The older male population (56 and above) are the most poorly educated. Particularly vulnerable groups include households that do not 'own' land or do not have the ability to farm (e.g., older persons and people with disability; and households that are headed by children) In the project AoI, the broad categories of people who

should be considered to have some level of vulnerability include: women; older persons; youth; herders; orphaned children; and people with disability or chronically ill persons.

Lesotho is also susceptible to human trafficking. As a result of poverty, young girls and women are often promised lucrative jobs on the other side of the border, only to find that they are going to be subjected to forced labour and sex trafficking. Basotho children are commonly subjected to domestic servitude and forced labour in animal herding. Women and children (mostly from rural areas) are coerced into leaving Lesotho in pursuit of income earning opportunities in urban areas (both inside and outside the country). These are often not real opportunities; or are associated with poor working and living conditions.

GENDER AND EQUALITY

Results from the study show very clearly that from early ages respondents knew about gender equality, gender based violence (GBV) and understand gender related issues. They get information from the media, especially radios and newspapers as well as during community gatherings. In cases of gender-based violence, women are the main victims. In Lesotho, it is the cultural practice for women and girls to fetch water used for household purposes. Notably, many women still have to walk long distances to reach the nearest water points as men would be at work, which makes them more susceptible to danger, and gender based violence. Data collected showed that there were no arrangements for people with disability to get job opportunities as well and therefore depriving them of the chance to equally benefit. When looking at projects implemented in their communities, 46% of the respondents said that both men and women get equal chances of being employed. Thirty seven percent (37%) felt that most of those who are employed are men as opposed to women mainly because most of the projects require physical/ human labour. They indicate that women are usually at home to look after children. Lesotho is a patriarchal society. In Lesotho GBV is a common occurrence. Access and quality of GBV responsive services such as health services, psycho-social services, police and legal services are reportedly available for prevention and response to GBV though there is generally low information on GBV related support services and structures.

PUBLIC HEALTH

Only two hospitals exist in the project area, one in Mafeteng (Zone 6) and the other in Mohale's Hoek (Zone 7) as well as a few clinics and mobile clinics. Radio and public gatherings are the leading means through which the community receives health education. In some cases, the public received HIV and AIDS messages in churches and by reading IEC material. HIV testing, counselling, and treatment services are offered at health centres, mobile clinics and New Start/ PSI Tents. Most of these services are local and within a range of 3-7km walking distance. Villages within the study area, which are considerable distance (~ 15km) from these services, include Ha Mohlehli and Ha Molapo in Zone 6 and Mohalinyane in Zone 7. In Lesotho, HIV/AIDS is a burden to the health sector and is one of the factors that have contributed to the slow economic growth and social progress in Lesotho. AIDS has become the leading cause for morbidity and mortality in Lesotho. Twenty five percent of adults aged 15-49 years old in Lesotho are infected with HIV, and is one of the highest prevalence rates in the world. The key drivers that significantly contribute to new infections in the general population include multiple and concurrent sexual partners, low and inconsistent use of condoms, low rates of medical male circumcision, mother to child transmission, and gender based violence. The WHO quoted in the Ministry of Health Lesotho (2015) estimates a tuberculosis (TB) incidence of 916/100,000 (this means 916 out 100,000 people) and prevalence of 613/100,000 in Lesotho. According to the latest WHO data published in 2017, diarrhoeal disease-related deaths in Lesotho reached 1,203 or 4.65% of total deaths in one year. Sanitation services are widely available in Zone 6 and Zone 7. Eighty-four percent (84%) of the respondents had one toilet in their homes, 5 % had two and the rest had none. The respondents felt that with improved water supply, sanitation facilities will improve - especially in public facilities such as schools and health care centres. Substance abuse in Lesotho is quite common with alcohol being the most abused substance in the country. In the study area, many people (more especially women) brew and sell the local beer (Joalla ba Sesotho) to provide extra income for their families. Recent studies have shown that many young people are getting more involved in drug abuse as well, starting from abusing dagga, sniffing glue, up to harder substances like mandrax, cocaine etc

PHYSICAL CULTURAL RESOURCES

The foothills of the Drakensberg and Maloti Mountains are known to house some of the finest cultural and natural heritage remains within the southern African sub-region; which includes the San Rock Art, often in context with stone tools (representing the artists' tool kit), and occasionally skeletal remains of later forms of

human, and fossilized animal and plants. Part of the Orange River is the Makhaleng River catchment in the south of Lesotho, which coincides with the footprint of interest for the Lowlands Bulk Water Supply under assessment. The footprint is also situated within a series of villages' context, which has implications of oral history and active culture. The palaeontological survey identified twelve cultural resources within the project area, including some Stone Age sites burial sites and fossil bone remnant. Cultural heritage assets include musical instruments, namely Lesiba and 'Mamokhorong played by herders, songs, such as initiation ceremonial songs, oral history, language, arts and crafts skills, such as weaving grass sun hats, games and cultural practices.

PROJECT ALTERNATIVES

In developing and conceptualising the Lesotho Lowlands Bulk Water Supply Project a number of alternatives have been considered, these range from design, siting and technology alternatives. There have been a number of feasibility studies and conceptual design studies undertaken throughout the progression of the development of the preferred project. The most significant alternatives considered include the 'without project' alternative, which if progressed would lead to a basic human right (access to potable water) being lost for a population of more than 200,000 Lesotho citizens. By 2045 this population will have a projected water demand of 47,383 m^3 placing significant pressure on the existing water supply facilities. Therefore, the proposed project is required in order to meet the future residential, industrial and agricultural water supply needs of this area. It is recognised that the project will result in Project Affected Persons (PAPs) being displaced and/or resettled and without the project these impacts (positive and negative) would not occur.

Two phasing alternatives were considered by SMEC International (Pty) Ltd when they developed the proposed design and conducted the subsequent 2018 design review. These alternatives included a single-phase delivery over 2018 to 2045 and a two-phase delivery with Phase 1 being delivered from 2018 to 2030 and Phase 2 delivered from 2030 to 2045. The two-phase delivery allowed for the optimisation of costs related to the construction and implementation of the Scheme.

Various options relating to the location of reservoirs for optimisation of supply have been considered since the drafting of the 2008 Design Report. These supply options were assessed for each service reservoir from Zone 1 to Zone 8 as part of the hydraulic modelling development. The original 2008 designs were reviewed and the population that could be serviced by gravity from each of the service reservoirs were assessed. Alternative options were developed for the 2008 designs where < 100 % of the population would be supplied by gravity from the location of the reservoir. Four options for the location of reservoirs were identified in 2008, these were selected on the basis of elevation and extent of gravitational water supply available, once suitable sites were identified options were investigated to increase the supply area and thereby increase the supply of potable water to a larger population. Following this, accessibility and constructability options were investigated. For Zone 7 the reservoir locations selected remained unchanged as a result of the 2018 design review, however for Zone 6, three of the proposed reservoirs remained unchanged in location and two reservoirs shifted to a higher location.

Four alternative sites for the Makhaleng River intake were investigated based on proximity to a suitable water treatment works, the availability of a rock foundation, the river water quality and accessibility for maintenance. The proposed location and footprint of the WTW adjacent to the Makhaleng River has been influenced by the ecological survey, which identified the presence of a seepage wetland system within the originally proposed footprint of the WTW. The ESIA process recommended that the WTW footprint be shifted as far as possible outside the delineated area of the wetland. The location for water transmission and storage infrastructure was selected on the basis of reducing the displacement of households, as such road reserves were followed where possible to minimise residential properties affected. The location of reservoirs in higher lying areas results in fewer direct impacts on communities. Efforts have been made to minimise direct impacts on the numbers of small businesses and residences along the pipeline routes (19 arable fields used for subsistence farming- 10 of which will only be partially affected; and 2 informal business). The environmental impacts related to the alternatives considered were minimal and presented no red flags with the exception of the location of the WTW. The identification of alternatives to avoid the need for resettlement has reduced the potential magnitude of the impact resulting in a single household requiring resettlement across both Zone 6 and 7.

PUBLIC CONSULTATION

Stakeholder Engagement commenced with engaging with the local authorities and community representatives (District Administration Officers, District Council Officers, Principal Chief's and other Area Chiefs). Following this, an inception workshop, attended by local authorities and community representatives, was undertaken where

COW and the Consultant team presented the proposed project components, assessment approach and screening phase findings.

During the ESIA process, 21 Pitsos (Public gatherings) were held reaching representation of 154 villages (~ 1800 community members represented). About 60% reached were women and 40% men.

The public consultation team were also involved in the engagement of community groups and local structures to assist in the socio-economic survey and preparation of the RAP process. Challenges experienced in the field during Pitsos:

- Mafeteng town public meetings failed following planning with the Reserve Chief twice, requiring continued efforts including planning with village chiefs.
- At Sankatana the community were busy at the local "work for food programme" for Department of Ministry of Range and Land Reclamation for soil erosion control. The Supervisor did not release the community for the meeting and hence the attendance was low.

Key community concerns expressed during the Pitsos related to compensation and employment opportunities. There were concerns around the requirement to pay for water following the installation of the infrastructure, given this resource is currently obtained free of charge. Concerns were raised around the potential impact on existing water resources, given the existing supply challenges from the Makhaleng River and how this might affect downstream users.

Responses to comments raised during the Inception Workshop and Pitsos are included in Appendix E: Public Participation Process Report. Below is a consolidated summary of concerns raised and responses provided by COW and the Consultant.

REF	COMMENT / ISSUE RAISED	RESPONSE PROVIDED DURING MEETING	RESPONSE FOR REPORTING PURPOSES
Inception Meeting Comments			
1. *Councillor from Qhalasi*			
a)	Thanked the Consultant and confirmed that letters informing of upcoming Pitsos have been received.		No response required.
2. *Councillor in Mohale's Hoek*			
a)	People living in town do not attend Pitsos. This is problem because they do not know of on-going developments in their own backyard, yet they are quick to criticise.	The public participation specialist noted the recommendations and amended the proposed approach for *Pitsos.*	During the ESIA process, 21 Pitsos (Public gatherings) were held reaching representation of 154 villages (~ 1800 community members represented). About 60% reached were women and 40% men.
b)	She also advised that when holding Pitsos, the town should be divided into two; Thoteng Motse-Mocha, Mohlalisi And Likhutlung, Thabeng , Moeaneng.		
3. Councillor from Khoelenya Community Council			

a)	Asked whether Khoelenya Community Council was deliberately left out as it is was not shown on the proposed Pitso Schedule.	The answer was that Khoelenya Community Council was not in included in the areas that would benefit from the Project.	This was later addressed by extending public consultation / Pitsos to cover 154 villages.
b)	Where exactly is the water coming from and where will it be going?	It is coming from Makhaleng River near the old bridge. The water will be abstracted from the river and pumped to the treatment facility on the nearby field. It will then be distributed to Nkh'uNkh'u reservoir via Maphohloane. From Maphohloane to Qalakheng to Mohale's Hoek town to Mesitsaneng.	No further detail required for reporting purposes.
c)	What Compensation Policy will be used?	COW office responded that compensation will follow the approach that was implemented for the Metolong Dam Water Supply Project and which is similar to that of Lesotho Highlands Development Authority.	No further detail required for reporting purposes.
d)	Who is Financing this Project?	CoW responded that World Bank, EU, EIB and GoL are financing the Project.	No further detail required for reporting purposes.
e)	What job prospects are there for our people?	CoW responded that it is expected that both skilled and unskilled persons will find employment.	See Section 7.4.1: Employment Creation.
4. Lenka Thamae of Survivors of Lesotho Dams (SOLD)			

a)	The water is for the nation. Has the Consultants engaged girls, boys, herd boys in their studies?	Yes, the Consultant has included those groups. Consultation specialist noted that in response to suggestion, herd boys would be engaged as a special group in the socio-economic survey. The questionnaire includes Key Informants (Chiefs, Policemen, Teachers, Nurses, and Councillors etc.) Focus Groups involve vulnerable groups focussing on gender issues and people living with disability). It is important to get information on how they value the water supply project.	No further detail required for reporting purposes.
b)	Please confirm for me that it is from Makhaleng River that Botswana will be getting their water too. How much water will they get?	CoW responded that indeed Botswana has made such a request. Feasibility studies are on-going to establish the location of the proposed dam. The outcome of pre-feasibility study that was done in 2015 is guiding the feasibility study. It will also be known how much water will be supplied to Botswana. It was noted that the key purpose of the LLBWSS is to serve the local lowland populations (not riparian states).	The proposed Makhaleng Dam, which is to provide balancing storage for the bulk supply of water, falls outside the scope of the current application for environmental authorisation.

c)	Are there any lessons from Metolong Dam Water Supply?	COW responded that a great many lessons have been learnt. Firstly, the importance of engaging the people in the planning stages to receive feedback on the development programme. The importance of minimising property loss and where impact cannot be avoided, hence compensate and resettle before implementation.	The current application has made significant efforts to avoid as far as possible resettlement through the identification and assessment of alternative routes. This is illustrated best in Table 25: Proposed Pipeline and Reservoir Site Locations and Initial Assessment of Impacts. Key decision making criteria for the recommendation of alternatives include: - Avoid resettlement of households; - Avoid permanent loss of livelihood activities; - Minimise temporary disruption (construction phase) to subsistence activities; - Minimise temporary disruption (construction phase) to commercial activities (e.g. roadside kiosks); - Minimise temporary disruption to residential frontal land strips in close proximity to the road; and - Reduce the need for compensation.
d)	Will the Consultant also carry out investigations on the pipes going to individuals households?	COW responded and confirmed that the Consultant will only assess pipework going to the reservoirs. The Department of Rural Water Supply (DRWS) and WASCO will take over for distribution network to consumers.	No further detail required for reporting purposes.
e)	Will the water be free of charge?	Cow responded that WASCO will collect revenue from those living in towns. As for those in rural settings, the water will be free. However, there is a new thinking being worked to have people in the rural to also pay for water. That is still in the planning stages.	A proposed tariff system has been proposed and outlined in *Lesotho Water Sector Improvement Project II Updated Detail Design and Construction Supervision: Detailed Financial and Economic Evaluation* (SMEC, October 2017).
f)	Will there be a sanitation Component to the Water Supply Project?	COW responded there will be as potable water will lead to improved hygiene.	This project will indirectly lead to improved general community health, as bulk water supply is required to support the distribution of water in Zone 6 and Zone 7. Benefits include: clean and safe drinking water, improved hygiene and which will significantly reduce the rate of waterborne diseases in the project area.

g)	What other development initiative are coming through the Water Supply Project?	COW replied that people may get electricity as a result of the pumps.	Power supply to the bulk water infrastructure locations for raw water intake, water treatment works, pumping stations and service reservoirs will be provided by LEC.
Closing Remarks DA Mafeteng Mr. Ntsane Mathibeli			
a)	He welcomed the good news of water coming to the Southern Districts, which are much known for being dry areas. He appealed to the people to safeguard the investments coming into their areas and to report any incidences of vandalism. He said the reason that there are no industries in either Mafeteng or Mohale'sHoek, was because there is insufficient water for both domestic and industrial use. Industries bring jobs for our people. He urged the participants to go out and talk about what they have heard from the meeting. He requested them to speak the truth that this was only the first phase of the water supply project. The second phase will follow when water will then be distributed to reach the people in the homes. He also told to tell the people that projects do take some time to be implemented. People must be patient and take courage. The fact that consultations with the communities and their principals had commenced was a good sign that indeed our peoples will receive water as planned. He continued to say it was very important for the Chiefs ad Councillors to ensure that the communities attend the scheduled *Pitsos* for information and knowledge.		
Ref	Comment / Issue Raised	Response Provided During Meeting	Response for Reporting Purposes
COMMENTS RAISED DURING PITSOS			
1. *Stakeholder (e.g. Organisation / Area Name etc.)* Mafeteng area			
a)	Will the project pay compensation of fields for lifetime period since the use is generational?	The compensation policy to be used is not similar to that of the LHWP, but the government related rates will be used, based on the existing Metolong policy and further revisions may apply. Some impact are temporary and require once off payments	A proposed tariff system has been proposed and outlined in Lesotho Water Sector Improvement Project II Updated Detail Design and Construction Supervision: Detailed Financial and Economic Evaluation (SMEC, October 2017).
b)	Why will the supply of water from this project be paid for, when they do not pay for water from their existing sources?	This is treated water and the pipes and other supply infrastructure are costly and will also have to be maintained	This is addressed through the reference to the Lesotho Water and Sanitation Policy (2007) states that "All the Basotho are entitled to have access to a sustainable supply of potable water and to the provision of basic sanitation services at an affordable cost."

c)	Why were the communities not consulted to provide knowledge about existing water sources for this project, and what will happen to these sources?	There was a feasibility study which also included consultation. The existing sources and pipeline network will not be destroyed since the project is meant to augment the existing supply which in many instances are not reliable.	No further detail required for reporting purposes.
d)	Will the contractor come in with labour sourced outside or are the locals going to be considered and how?	It has become a common practice and principle that local people will be preferred to do unskilled jobs and those skilled be given opportunities over outsiders if such required skills are available at local level.	Concern over influx of outsiders for job opportunities and other social impacts are assessed in Section 7.4.2: Introduction and Movement of Workers in and Out of Local Communities. Section 7.4.1: Employment Creation states: "It is anticipated that at the peak of construction a maximum of 400 construction workers will be on site. Construction activities will be undertaken by local contractors, as far as possible". "Construction activities must seek methods that require a large workforce (e.g. manual excavation vs. mechanical excavation) where feasible". This is reiterated in the ESMP. The socio-economic survey results indicate that that most of the community members within Zone 6 and 7 have worked in construction related jobs before, although they were mainly employed as labourers due to lack of skills. Only a few of them (17%) reported to have the following skills: bricklaying, electricians, quality assurer and water engineers, however, less than 10% had acquired training in the said areas. About 7% had worked in water construction projects at some point and primarily as plumbers.
e)	Ha Mofoka community concerned about payment of water of supply especially the usage cost as they feel water should not be paid for.	This will be conveyed to the relevant water departments.	This is acknowledged in Section: 6.4.6: Willingness and Ability to Pay. A proposed tariff system has been proposed and outlined in Lesotho Water Sector Improvement Project II Updated Detail Design and Construction Supervision: Detailed Financial and Economic Evaluation (SMEC, October 2017).
f)	Existing dysfunctional water sources and pipe lines need to be revitalised	The Chiefs and council to consult with the relevant water department for this to be addressed.	As part of the design planning for the LSIP Phase II, existing infrastructure within the supply and distribution network was identified based on information obtained from WASCO and DRWS as relevant to the Project area. The age and materials of the pipes were identified and areas where additional distribution and supply infrastructure is required has been defined.

h)	Poopo water source at Mahlehle area is huge and has capacity to supply many areas this is recommended for exploration.	Taken as a recommendation by water department representatives attending.	No further detail required for reporting purposes.
g)	Recommendation that water for use during funerals preparations should not be paid for, as the use leaves a huge water bill for the bereaved family. Also free water for use at schools	Taken as a recommendation by water department representatives attending.	No further detail required for reporting purposes.
2. *Stakeholder (e.g. Organisation / Area Name etc.) Mohale's Hoek area*			
a)	What is the guarantee that Makhaleng river has the capacity for supply of water both towns when it can hardly supply Mohale's Hoek alone	Feasibility studies have been conducted and water will be stored in reservoirs to sustain supply. Also there is a dam planned like the Malealea Dam.	People from Ha Ts'epo suggested that people from the Water Department should come and explain this as they doubt Makhaleng will hold sufficient water. According to the Makhaleng Storage Dam Study (SMEC, May 2018), the addition of storage at Mid Makhaleng Dam increased the reliability under the climate change conditions from 65% to 97% (for 48 MCM storage). It must be noted that the climate change models that were used, define the near-future climate predictions as the period from 2046-2065. It is therefore expected that the effects of climate change may only impact on the scheme towards the end of its design life. Abstraction impacts on the flow of water in the Makhaleng River and impacts on environmental water requirements (EWR) is discussed and assessed in Section 7.3.1: Change in Makhaleng River Hydraulics.
b)	Likelihood of contamination of river and piped water by treatment process	The treatment plant is meant to treat water and ensure that it is clean not to cause contamination.	This is addressed in ESIA Section 7.1.4: Accidental Release of Contaminants.

b)	Will the contractor come in with labour sourced outside or are the locals going to be considered and how?	It has become a common practice and principle that local people will be preferred to do unskilled jobs and those skilled be given opportunities over outsiders if such required skills are available at local level. It is noted that communities recommend that recruitment should not be politically motivated.	Section 7.4.1: Employment Creation states: "It is anticipated that at the peak of construction a maximum of 400 construction workers will be on site. Construction activities will be undertaken by local contractors, as far as possible". "Construction activities must seek methods that require a large workforce (e.g. manual excavation vs. mechanical excavation) where feasible". This is reiterated in the ESMP. The socio-economic survey results indicate that that most of the community members within Zone 6 and 7 have worked in construction related jobs before, although they were mainly employed as labourers due to lack of skills. Only a few of them (17%) reported to have the following skills: bricklaying, electricians, quality assurer and water engineers, however, less than 10% had acquired training in the said areas. About 7% had worked in water construction projects at some point and primarily as plumbers.
c)	There is urgent need for water supply for communities of Thaba-Ntota Mohale's Hoek	This will be conveyed to the Department.	No further detail required for reporting purposes.
d)	The compensation policy and rates to be used need to be understood translated into Sesotho and distributed to the chiefs and community council offices.	The policy and rates to be disclosed to the local authorities.	According to the RAP Report, the evaluation has been undertaken using the existing Compensation Rates and Compensation Policy procedures and processes. The Compensation Policy Rates were set in 2010, approved by Government (January 2011) and updated using the official Consumer Price Index (CPI). The Indexes from 2010 to 2018 were sourced from the Bureau of Statistics. Structures and land have no established rates and hence their values have to be determined by professional valuers, though construction rates could be initially used to derive budgets.
e)	Use for irrigation and other water projects to be considered.	Recommendation	The project may result in support to small-scale irrigation (not large scale).
f)	Follow-up and monitoring of the project is key and should include local authorities (strongly recommended by Maphohloane community)	Recommendation	The contractor, client and community representation to form coordinating committee and do follow-up during construction phase. This is covered within the Communication Strategy (Appendix B of the ESMP) where a coordinating structure is suggested during construction and operational phases. A project specific Socio-Economic Monitoring System has been provided in Appendix A of the ESIA.

g)	Braakfontein area is in need of water immediately	This will be conveyed to the Department.	No further detail required for reporting purposes. Beyond scope of current assessment.
3. Stakeholder (e.g. Organisation / Area Name etc.) Mohale's Hoek			
a)	When will the construction and implementation process be completed?	It is estimated that the entire LLBWS will be completed by at least 2024-2025.	As stated in Section 1.2.2 of the ESIA, Implementation of Phase 1 is planned as follows: - March 2020 Award Contract - April 2020 Construction Commencement - April 2023 Construction Completion
b)	Will the encroaching roadside vendors be considered for compensation even when they have no documents for the sites	All assets to be affected will be compensated accordingly.	See section 7.4.3: Disturbance and Loss of Social and Economic Activities. A budget has been prepared to cover compensation and related measures including temporary relocation arrangements for commercial shacks however this impact will be limited as alternative routing resulted in avoidance of 200+ commercial activities within Makhaleng Town.
c)	Is it likely for the pipeline to burst? And if so who will be responsible for damage to affected assets and people?	The pipes are buried deep into underground trenches, however detailed maintenance and emergency response will be put in place.	In the report under socio-economic aspects and impacts section; identified as secondary impacts; burst pipes and reservoir leakages may result in damage (flooding) to households and crops in close proximity to failed water transmission infrastructure. The deployment of a Community Liaison Officer (CLO) is key in the feedback mechanism as a link between the Contractor and the community during the construction and operations phases of the project. This enables consultation on construction activities, enables feedback on concerns raised and monitoring unintended impacts. This requirement is outlined in the Communication Strategy (Appendix B of the ESMP).

Public Consultation will continue during the ESIA Phase Public Disclosure Process as well as the project implementation, as part of the requirements set out within the RAP. Comments received have been collated and submitted (in a Comment and Response Report) to DoE for consideration in decision-making.

A Communication Strategy has been prepared and appended to the ESMP to guide continued public consultation into the construction and operational phases.

POTENTIAL IMPACTS

The ESIA has identified potential impacts, these have been assessed, mitigation measures have been identified and the project re-assessed with implementation of the mitigation measures which has resulted in a residual impact associated with the proposed project. The tables presented below provide a summary of the aspects and the associated impact significance rating. Overall, the project will result in 15 moderate negative significance residual impacts, against 44 very low to low negative significance residual impacts with 6 positive residual impacts of moderate to high significance.

AIRBORNE EMISSIONS

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Release of airborne pollutants emissions to atmosphere (vehicular emissions and dust)	Increased dust emissions will result in reduced ambient air quality resulting primarily in a nuisance factor to nearby receptors (e.g. onsite workers, roadside kiosks and residents.	2	2	3	2	4	**1) Dust Controls; 2) Establish Monitoring Network (dust buckets) should excessive complaints be received at key sources (e.g. batching plant)**	2	1	3	2	4
		N3 - Moderate						**N3 - Moderate**				
Release of airborne pollutants emissions to atmosphere (vehicular emissions and dust)	Increased concentration of pollutants (gaseous emissions) will result in reduced ambient air quality. Should emissions exceed short-term guidelines, acute health issues may arise.	3	2	3	2	3	**1) Vehicular Emission Controls**	3	1	3	2	3
		N2 - Low						**N2 - Low**				

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Release of airborne pollutants emissions to atmosphere (vehicular emissions and dust)	Potential odorous gases from WTW sludge includes hydrogen sulphide which is primarily a nuisnace factor as it is detectable by the human nose at levels below which it causes direct health impacts.	2	2	1	4	2	**1) Fenceline hydrogen sulphide monitoring should excessive complaints be received**	2	2	1	4	2
		N2 - Low						**N2 - Low**				

NOISE EMISSIONS AND VIBRATIONS

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Release of noise and vibration into the environment	Vibrations and noise emissions will result in a disturbance and nuisance factor to sensitive receptors (households; formal commercial activities and roadside kiosk; schools; clinics and places of worship) of there is an audible difference.	2	2	1	2	3	**1) Noise reduction and control strategies (temporary noise barriers and deflectors especially during blasting); 2) Establish Monitoring Network should excessive complaints be receved.**	2	1	1	2	3
		N2 - Low						**N2 - Low**				

EROSION AND RELEASE OF SEDIMENT INTO WATER COURSES

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Increased erosion and instability	Reservoirs requiring extensive earthworks and blasting will result in higher likelihood of soil erosion. This is excaberbated by founding condition / soil properties (corrosivity). Receptors closest to the following reservoirs are most likley to experience associated impacts (nuisance factors and safety risks): Industrial Mafeteng Reservoir (Zone 6), Qalabane Reservoir (Zone), Ha Maphohloane Reservoir (Zone 7), Mohales Hoek Command Reservoir (Zone 7)	3	5	5	1	3	**1) Blasting Control Measures 2) Trenching / Soil erosion measures**	3	5	5	1	2
		N3 - Moderate						**N2 - Low**				
Release of sediment into watercourses (direct or via erosion and stormwater entrainment)	Rainfall on eroded / unconsolidated sediment has the potential to result in an indirect impact as runoff with higher sediment load enters surrounding drainage lines and streams leading to sedimentation of watercourses and reduced water quality. Secondary impacts to downstream ecosystems functioning may occur.	3	5	5	2	3	**1) Soil erosion measures (limiting the extent of work areas, management of stormwater runoff, and sediment containment structures); 2) Spoil Disposal Management Plan (SDMP)**	3	5	5	2	2
		N3 - Moderate						**N2 - Low**				

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Increased erosion and instability	Proposed (Preferred) Pipeline Alternative between Z7J2 and Z7R4, Kubake requires a portion of the pipeline to be laid across a donga to avoid potential displacement and resettlement. This has the potential to result in instability of the pipeline in area prone to erosion and potential pipielne failure.	4	3	1	4	3	**1) Placement of selected free draining excess excavated material in the eroded areas above the donga/pipeline crossing point to stabilise and protect.**	4	3	1	4	2
		N3 - Moderate						**N2 - Low**				

ACCIDENTAL RELEASE OF CONTAMINANTS INTO SOILS, WATER BODIES AND GROUNDWATER

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Accidental Release / spills of small quantities of potential contaminants into soils, water bodies, and groundwater	Runoff creates a preferential pathway and exposure of contaminants into the subsurface (groundwater) and downstream watercourses leading to a deterioration in water quality and secondary health impacts on aquatic ecosystems and water users (community).	3	3	5	2	3	**1) Hazardous Materials Management Plan; 2) Spill Prevention and Response Plan; 3) Training; 4) Control measures (secondary containment); 5) Occupational Health and Safety Provisions**	3	3	5	2	2
		N3 - Moderate						**N2 - Low**				

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Accidental Release / spills of large quantities of contaminants into soils, water bodies, and groundwater	Loss of containment and accidental release of chemicals stored and handled at the WTW will result in soil, groundwater and surface water contamination. Potential exists for deterioration of the Makhaleng River water quality to occur and secondary health impacts on downstream aquatic ecosystems and water users, and maintenance of livelihoods.	3	3	3	4	2	**1) Hazardous Materials Management Plan; 2) Spill Prevention and Response Plan; 3) Training; 4) Control measures (secondary containment); 5) Occupational Health and Safety Provisions**	2	3	3	4	2
		N2 - Low						**N2 - Low**				

FLOODING OF MAKHALENG RIVER

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Flooding of the Makhaleng River	Locaton of the WTW within the Makhaleng Floodplain poses a risk of flooding and damage to infrastructure leading to potential contamination by stored chemicals and secondary downstream impacts to aquatic ecosystems and water users, and maitenance of livelihoods.	3	5	5	4	3	**1) Proposed (preferred) alternative to shift WTW as far as practicably possilbl out of the floodplain**	2	5	5	4	1
		N3 - Moderate						**N2 - Low**				

DISCHARGE OF EFFLUENT

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Discharge of Effluent	The incorrect siting of chemical toilets and loss of containment could lead to pollution of the receiving environment (soil, groundwater and surface water), leading to secondary health impacts on downstream aquatic ecosystems and water users (surface and ground), and maintenance of livelihoods.	3	3	3	2	3	**1) Locate chemical toilets beyond 100m of a watercourse or stream; 2) Sewerage generated at the contractor's camp should be handled as hazardous waste material (2007); 3) Maintenance and removal of chemical toilets by a registered sanitation service company**	3	3	3	2	2
		N3 - Moderate						**N2 - Low**				

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Discharge of Effluent	Accidental seepage of WTW process effluent (from loss of containment), and discharge (backwash water) to the Makhaleng River has the potential to lead to decreased water quality of the river system including secondary health affects to aquatic ecosystems and communities (water users) if not treated to acceptable health standards.	3	3	3	4	3	**1) Spill Prevention and Response Plan; 2) Training; 4) Control measures (secondary containment); 5) Assessment for suitability for land application; 6) Compliance with Discharge Permit**	3	3	3	4	2
		N3 - Moderate						**N2 - Low**				

GENERATION OF WASTE

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Generation of general waste	Presence of workforce and absence of adequate waste receptacles results in increased litter leading to unsightly working areas and possible entry into terrestrial habitats and watercourses. This has the potential to result in secondary impacts on local wildlife (in the case of ingestion and entrapment), aquatic ecosystems and downstream community (water users)	2	2	1	1	3	**1) Environmental awareness training on consequences of poor waste management; 2) Provision of suitable waste receptacles across all working areas; 3) Temporary storage in secure skips / containers; 4) Collection and dispoal by licensed waste contractor for disposal at a registered landfill; 5) Proof of dispoasal must be kept in Site Environmental File.**	2	2	1	1	3
		N2 - Low						**N2 - Low**				
Generation of general waste	Spoil material unsuitable for reuse as bedding and backfill material has the potential to disrupt landuse and habitats if inappropriately managed / disposed illegally.	3	2	1	2	3	**1) SDMP; 2) Identification of sites within the projet area requiring levelling and filling of erosion gullies in consultation with Environmental Manager, District Environmental Offivers, and Community Councils**	3	3	1	2	2
		N2 - Low						**N2 - Low**				
Generation of general waste	Waste generation (domestic waste, mixed industrial and metal waste) and a lack of appropriate separation, temporary storage and recycling (i.e. not aligned with the Waste Hierarchy) has the potential to result in unnecessary waste material to landfill (limited national capacity).	3	4	3	4	3	**1) Opportunities should be determined, in consultation with waste service providers, for re-use, recycle, or disposal options**	2	4	3	4	2
		N3 - Moderate						**N2 - Low**				

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Generation of general waste	Waste generation (domestic waste, mixed industrial, WTW residues and Reservoir Scour) and a lack of appropriate separation, temporary storage, recycling and reuse (land application) has the potential to result in unnecessary waste material to landfill (limited national capacity).	3	4	3	4	3	**1) Opportunities should be determined, in consultation with waste service providers, for re-use, recycle, or disposal options; 2) Assessment of residue / scour suitability for land application.**	2	4	3	4	2
		N3 - Moderate						**N2 - Low**				

PIPELINE IMPACTS ON TERRESTRIAL ECOLOGY

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Vegetation clearing and trenching for construction pipelines can lead to temporary displacement of faunal community due to habitat loss, disturbance and/or direct mortalities (including road mortalities and/or poaching). Secondary impacts include destruction and disturbance to local breeding grounds and nesting sites; leading to potential decrease in population densities of threatened and protected species (Cape Clawless Otter and Mountain Reedbuck).	2	2	1	1	3	Controlled access to active construction areas. Environmental awareness training. Use existing access roads and paths whenever possible. Qualified ECO available to relocate fauna. No trapping, killing or poisoning of any wildlife allowed. Trench management measures as outlined in ESMP.	1	2	1	1	3
		N2 - Low						N1 - Very Low				
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Clearance of soil and vegetation for construction of pipelines can lead to temporary loss and fragmentation to portions of certain vegetation types and associated floral species assemblages (including four threatened vegetation types). Secondary potential impacts include encroachment of alien vegetation.	2	2	3	1	3	Areas denuded during construction need to be re-vegetated with indigenous species only. No harvesting of plants allowed. Alien invasive plant management plan to be compiled and implemented post construction.	2	1	3	1	2
		N2 - Low						N1 - Very Low				
Fragmentation effect of linear infrastructure on the movement and migration of faunal species	Linear nature of pipelines can lead to temporary interuption to faunal species' migration routes.	2	2	1	1	3	Environmental awareness training. Qualified ECO available to relocate fauna.	2	1	1	1	2
		N2 - Low						N1 - Very Low				

WTW IMPACTS ON TERRESTRIAL ECOLOGY

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Clearance of soil and vegetation for construction of the WTW can cause temporary disturbance and displacement of local fauna and/or direct mortalities (including road mortalities and/or poaching). The location of the WTW in close proximity to a natural rocky ridge, which provides habitat for specific faunal species assemblages.	3	2	1	2	3	Controlled access. Environmental awareness training. Use existing access roads and paths whenever possible. Qualified ECO available to relocate fauna. No trapping, killing or poisoning of any wildlife. Workers should be prevented from accessing the ridge area adjacent to the WTW.	2	2	1	2	3
		N2 - Low						N2 - Low				
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Clearance of soil and vegetation for construction of the WTW will cause the permanent replacement of vegetation including Zastron Moist Grassland, which is listed as Vulnerable. Alien invasive plant species also pose a long-term threat to the vegetation community adjacent to the WTW.	3	2	5	5	5	Areas denuded during construction need to be re-vegetated with indigenous species only. No harvesting of plants allowed. Alien invasive plant management plan to be compiled and implemented post construction.	3	1	5	5	5
		N4 - High						N4 - High				

RESERVOIR IMPACTS ON TERRESTRIAL ECOLOGY

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Construction of the various reservoirs and associated permanent access roads will include the clearance of soil and vegetation leading to the disturbance and displacement of local fauna and their habitats on the rocky hillslopes (including the threatened Cottrell's Mountain Lizard).	3	2	1	1	3	Controlled access. Environmental awareness training. Use existing access roads and paths whenever possible. Qualified ECO available to relocate fauna. No trapping, killing or poisoning of any wildlife. Workers should be prevented from accessing the ridge area adjacent to the WTW.	2	2	1	1	3
		N2 - Low						N2 - Low				
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Construction of the various reservoirs and associated permanent access roads will include the clearance of soil and vegetation leading to the permanent replacement of small portions of vegetation types, some of which are listed as threatened and others displaying most natural condition of any of the identified habitats (Rocky Grassland). Encroachment of alien invasive plant species also pose a long-term threat to the vegetation communities across the project area.	3	2	5	5	5	Areas denuded during construction need to be re-vegetated with indigenous species only. No harvesting of plants allowed. Alien invasive plant management plan to be compiled and implemented post construction.	3	1	5	5	5
		N4 - High						N4 - High				

WEIR IMPACTS ON WATER RESOURCES AND AQUATICS

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Change in the Makhaleng river hydraulics	Construction of the weir will require dredging of the Makhaleng River for the weir foundations and river diversion around the working area. This will lead to temporary alteration of flow regime and sedimentation / increased turbidity. The effects of diversion will be localised with hydraulics and water quality being restored downstream.	4	2	3	2	5	**1) Erosion and sedimentation prevention measures (gabions and aggregate). 2) Energy dissipaters (aggregate)**	3	2	3	2	3
		N3 - Moderate						N2 - Low				

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation (M+	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Change in the Makhaleng river hydraulics	Post-construction, the weir will result in inundation upstream and decreased flow volumes downstream of the weir. The impounded area upstream of the weir will potentially provide dam-like conditions suited for aquatic biota, promoting non-riverine habitat and greater diversity and abundances of fish and macroinvertebrate communities preferring such conditions.	4	2	3	5	3	**None required**	4	2	3	5	3
		P3 - Moderate						**P3 - Moderate**				
Change in the Makhaleng river hydraulics	1) The current design according to the Intake Design Desk Review (P&P, 2008) illustrates a smooth low crest overspill area, which will result in a single flow class, limiting movement of certain fish and other aquatic fauna. 2) Proposed position of the fish ladder separate from the ecological discharge (environmental water release) will create a potential barrier to fish migration - especially during periods of low flow.	4	2	5	5	5	**1a) Energy velocity dissipaters in the form of surface roughness (varying size aggregates) should be built into the overspill areas to create a variety of hydraulic conditions suitable for different fish species' swimming capabilities. 1b) Pool areas/depressions built into the overspill area with allow resting areas for aquatic fauna migration. 2) Ecological discharge is recommended to be partly or fully discharged through the fish ladder to ensure year round fish migration.**	2	2	3	4	2
		N4 - High						**N2 - Low**				
Change in the Makhaleng river hydraulics	Inundation of the Makhaleng River upstream of the weir will result in a build-up of sediment and inundation/flooding of areas upstream of weir leading to possible increase of the flood width upstream of and decrease in flood width downstream of the weir. Decrease in downstream flow volume and velocity has the potential to lead to secondary impacts on downstream environmental water requirements (EWR) and communities (water users) dependet on sustain river flow for subsistence livelihood activities.	5	3	3	5	3	**1) Sediment release measures should ensure sediment release is equal to sediment flow regime prior to weir construction to limit sediment build above weir. 2) Excess sediment can be harvested in an environmentally friendly manner for the construction sector provided permits have been obtained. 3) Post-development detailed flood risk assessment should be prepared and implementation of an Emergency Flood Response Plan.**	3	3	3	5	3
		N3 - Moderate						**N3-Moderate**				

WTW IMPACTS ON WATER RESOURCES AND AQUATICS

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Change in the Makhaleng river hydraulics	Construction of the weir will require dredging of the Makhaleng River for the weir foundations and river diversion around the working area. This will lead to temporary alteration of flow regime and sedimentation / increased turbidity. The effects of diversion will be localised with hydraulics and water quality being restored downstream.	4	2	3	2	5	**1) Erosion and sedimentation prevention measures (gabions and aggregate). 2) Energy dissipaters (aggregate)**	3	2	3	2	3
		N3 - Moderate						**N2 - Low**				

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Reduced water flow in the Makhaleng River downstream of the abstraction point	Abstraction from the WTW has the potential to result in lower flows (especially during drier months). River volume and velocity which does not meet the EWR may result in insufficient flow to sustain resident fish and macroinvertebrate communities, flush spawning beds of fine sediments, and maintain cues for breeding.	5	5	3	4	4	**Compliance with stipulated seasonal EWR releases as per PROBFLOW (Appendix B) recommendations**	3	5	3	4	2
		N4 - High						**N2 - Low**				
Reduced water flow in the Makhaleng River downstream of the abstraction point	Abstraction from the WTW has the potential to result in lower flows (especially during drier months). This may lead to insufficient flow to support livestock drinking, irrigation purposes, cooking and bathing. Reduced flow volumes can lead to increased likelihood of health impacts due to a lack of dilution.	5	5	3	4	4	**Sufficient water is to be released for both ecosystem function and use by downstream users. The proposed Makhaleng Dam is essential to project is reliant on the supplement flow.**	3	5	3	4	3
		N4 - High						**N3 - Moderate**				

EMPLOYMENT CREATION BENEFITS

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Employment associated with construction and operational phases	Temporary employment (~300-400 jobs) will result in increased income generation in marginalised communities and improved livelihoods. Potential exists for secondary benefits of local upskilling for locals to take advantage of future construction activities within and surrounding the project area.	2	2	3	2	3	**1) Measures to enhance local recruitment from affected settlements within project area. 2) Appointment of a suitably qualified and experienced Community Relations Officer (CRO). 3) Local publication and announcements on job and training opportunities.**	3	2	3	2	4
		P2 - Low						**P3 - Moderate**				

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Employment associated with construction and operational phases	Permanent employment opportunities for skilled and semi-skilled labour to operate and maintain bulk water infrastructure will result in increased income generation in marginalised communities and improved livelihoods. It is estimated that a minimum of 40 jobs will be created for operation of the WTW alone.	2	2	1	4	3	**1) Measures to enhance local recruitment from affected settlements within project area. 2) Appointment of a suitably qualified and experienced Community Relations Officer (CRO). 3) Local publication and announcements on job and training opportunities.**	2	2	1	4	4
		P2 - Low						**P3 - Moderate**				

IMPACTS DUE TO INCREASE IN MOVEMENT OF WORKERS

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E +	R +	D)x	P=		(M+	E +	R +	D)x	P=
Introduction and movement of workers into/out of local communities	A change in demographics may lead to secondary negative impacts including HIV/AIDS and STD infection rates. This contributes to increased health and safety issues within local communities.	3	3	5	5	3	**1) Employ locals as far as reasonably possible. 2) Liaise with relevant service providers in relation to HIV/AIDS awareness raising campaigns. 3) Provision of condoms for workers.**	3	3	5	5	2
		N3 - Moderate						**N3 - Moderate**				
Introduction and movement of workers into/out of local communities	A change in demographics may lead to negative impacts including increased crime rates in particular by job seekers who struggle to confirm employment. Potential also exists for an increase in Trafficking in Persons (TIP) as traffickers target unsuccessful job seekers. Both impacts contribute to increased health and safety issues within local communities.	3	3	5	5	3	**1) Employ locals as far as reasonably possible. 2) TIP awareness raising campaigns.**	3	3	5	5	2
		N3 - Moderate						**N3 - Moderate**				

IMPACTS ON ECONOMIC AND SOCIAL ACTIVITIES

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Disturbance/loss/destruction of social and economic activities (e.g. crop fields, kiosks etc)	Excavation, trenching and installation of pipelines along road reserve will lead to temporary loss of land use and livelihood opportunities (fourteen arable fields and four businesses plots). Inadequate resettlement and livelihood restoration planning and implementation could have a long-term impact on PAP's livelihood and food security.	4	2	3	2	5	**1) Design and implement alternative routes identified. 2) Compensation and Livelihood Restoration where there is unavoidable loss of land. 3) Provision of alternative areas to trade.**	3	2	2	2	2
		N3 - Moderate						**N2 - Low**				

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Disturbance/loss/destruction of social and economic activities (e.g. crop fields, kiosks etc.)	Placement of bulk water infrastructure will lead to permanent loss of land use and livelihood opportunities (eleven arable fields and two informal business). Inadequate resettlement and livelihood restoration planning and implementation could have a long-term impact on PAP's livelihood and food security.	4	2	3	5	5	**1) Design and implement alternative routes identified 2) Compensation and Livelihood Restoration where there is unavoidable loss of land.**	3	2	3	5	2
		N4 - High						**N2 - Low**				
Disturbance/loss of households/residential land use (due to resettlement activities)	Placement of bulk water infrastructure within / across homesteads that directly affect structures rendering the site unsuitable for occupation resulting in displacement and the need for resettlement. Inadequate resettlement and livelihood restoration planning and implementation could have a long-term impact on PAP's livelihoods and support structures. The identification of alternatives to avoid the need for resettlement has reduced he potential magnitude of the impact resulting in only one household to be resettled across both Zone 6 and 7.	4	2	3	5	5	**1) Design and implement alternatives identified 1) Implementation of the RAP endorsed by local authorities.**	3	1	3	5	2
		N4 - High						**N2 - Low**				

IMPACTS ON CULTURAL RESOURCES

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Disturbance/loss of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Accidental exposure of unidentified subsurface fossil remains will result in a lost opportunity to preserve local cultural heritage and historical records.	2	3	5	5	3	**1) Chance Find Procedure**	1	3	5	5	2
		N3 - Moderate						**N2 - Low**				
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Earthworks and deposition of materials along and within and surrounding the development footprint has the potential to destroy the identified cultural resources (heritage artefact, palaeontological sites and graves) resulting in the loss of national heritage value.	2	3	5	5	3	**1) Alternative siting of the pipeline and reservoir where they interfere with identified cultural resources. 2) Measures to ensure that development footprint does not encroach on other identified cultural resource sites (cordoned off with controlled access).**	1	3	5	5	1
		N3 - Moderate						**N1 - Very Low**				
Introduction and movement of workers into/out of local communities	Job seekers not formally appointed and accommodated may potentially lead to squatters utilising the stone-age rock shelters identified in the project area leading to potential deterioration of these sites and loss of national heritage value.	2	3	5	5	3	**1) Recruitment within local area conducted away from the construction site to discourage squatters from utilising the rock shelters. 2) Liaison with Heritage Authority for protection of stone age rock shelters.**	1	3	5	5	1
		N3 - Moderate						**N1 - Very Low**				
Disturbance/loss of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Incorporation of identified cultural resources / heritage artefacts in the national database (resource museum collections and information for further research and education.	2	4	3	5	2	**None required**	2	4	3	5	2
		P2 - Low						**P2 - Low**				
Introduction and movement of workers into/out of local communities	A change in demographics may further affect the cultural norms of the project area, particularly related to the dilution and degradation of oral history practises.	2	2	3	5	3	**Locals should be employed as far as reasonably possible to avoid influx of workers into the local communities, which will affect the cultural norms.**	1	2	3	5	2
		N3 - Moderate						**N2 - Low**				

IMPACTS ON ELECTRICITY SUPPLY

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Demand on local utilities – electricity	Additional power requirements to support construction activities including contractor accommodation) will result in additional pressure on existing electricity supply. This may result in a reduction in capacity and quality of existing infrastructure and services to meet the needs of the local residents as well as the additional project related personnel.	4	2	3	2	3	**1) Locals should be employed as far as reasonably possible to avoid temporary immigrants into the project area and minimise additional energy demands. 2) Use of generators on site as far as reasonably possible.**	2	2	3	2	1
		N3 - Moderate						**N1 - Very Low**				

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Demand on local utilities – electricity	Operational facilities (raw water intake, water treatment works, pumping stations and service reservoirs) and possible influx of people to beneficiary settlements due to improved water supply will result in additional power requirements. This may result in a reduction in capacity and quality of existing infrastructure and services to meet the needs of the local residents.	4	2	3	4	4	**1) LEC to implement additional power requirements as identified by SMEC 2018**	2	2	3	4	1
		N3 - Moderate						**N1 - Very Low**				

IMPACTS ON POTABLE WATER SUPPLY

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Demand on local utilities – potable water	Increased demand on potable water leading to potential disruption of supply to local communities (already experiencing limited water supply in the area).	4	2	3	2	2	**Training on sustainable use of water resources. Contractors to tanker in water should local supply be restrained.**	2	2	3	2	1
		N2 - Low						**N1 - Very Low**				

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Demand on local utilities – potable water	Project will indirectly lead to improved general community health, as bulk water supply is required to support the distribution of water in Zone 6 and Zone 7. Benefits include: clean and safe drinking water, improved hygiene and which will significantly reduce the rate of waterborne diseases in the project area.	3	3	3	5	2	**Implementation of proposed project**	4	3	3	5	3
		P2 - Low						**P3 - Moderate**				

IMPACTS ON INCREASED DEMAND FOR LOCAL BUSINESS

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Increase in demand for local businesses (food and beverage, construction materials, general consumer goods)	Potential growth of local businesses and improved income generation at the household level. Growth in the regional economy (particularly for the supply of construction material and equipment) will occur as a secondary impact.	2	2	3	2	3	**1. Goods should be purchased locally as far as reasonably possible.**	3	2	3	2	4
		P2 - Low						**P3 - Moderate**				

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Increase in demand for local businesses (food and beverage, construction materials, general consumer goods)	Increased long-term demand on goods and services provided by locals businesses and increased potential for new business start-ups, which may result in additional direct employment opportunities for local communities.	2	2	3	4	2	**1. Goods should be purchased locally as far as reasonably possible.**	4	3	3	4	3
		P2 - Low						**P3 - Moderate**				

IMPACTS RELATING TO HAZARDS AND COMMUNITY SAFETY RISKS

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Presence of hazards in construction areas and community areas (excavations, chemical storage, machinery etc.)	Community health and safety is placed at risk by the following: Dust fallout in close proximity to roadside kiosks, Improper chemical storage and handling may expose the communities to hazardous chemicals; People and livestock falling into open trenches	4	2	3	2	4	**1. Restrict access to the construction sites. 2. Dust control measures 3. Trenches should be barricaded. 4. Spill Contingency Plan 5. Appointment of a Community Liaison Officer.**	4	2	3	2	2
		N3 - Moderate						**N2 - Low**				

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Presence of hazards in construction areas and community areas (excavations, chemical storage, machinery etc.)	Electric and magnetic fields (EMF) emitted by electrical equipment (communication towers) can lead to potential adverse health risks to surrounding receptors.	4	2	3	4	2	**1) Do not place communication towers in close proximity to sensitive receptors (creches, schools etc). 2) BPEO Buffer to be established and implemented.**	4	2	3	4	1
		N2 - Low						**N1 - Very Low**				

TRAFFIC AND ACCESS IMPACTS

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Increased vehicular activities along roadways and in public areas	The increase in vehicles, particularly heavy haulage vehicles, increases the potential for accidents and injuries to occur to pedestrians and other motorists and in some cases, fatality.	3	2	1	2	3	**1) Planned delivery of materials (including abnormal loads). 2) Adequate traffic signage and traffic controllers. 3) Temporary diversion of access routes to avoid high-risk areas.**	3	2	1	2	2
		N2 - Low						**N2 - Low**				
Restrained Access	Nuisance or inconvenience to community members and business owners during temporary closure of access routes.	3	2	1	2	3	**1) Appointment of a CLO. 2) Landowner / land user notification. 3) Temporary relocation of kiosks followed by reinstatement. 4) Where possible the route shall be made safe and re-opened to traffic overnight.**	2	2	1	2	2
		N2 - Low						**N1 - Very Low**				
Import of Materials and Machinery	Congestion at the border gate for the import of specific machinery and material has the potential to result in delays for travellers.	3	3	1	2	3	**Not possible**	3	3	1	2	3
		N2 - Low						**N2 - Low**				
Community Hazards	Given the relatively high level of current road use by local members, including school children, vehicles and livestock, leaving trenches open for long periods will cause a risk to the safety of the community members.	3	2	3	2	3	**1) Trench / excavations backfilled within 7 days. 2) Restricted access to active working areas 3) Fencing.**	3	2	3	2	2
		N2 - Low						**N2 - Low**				

VISUAL IMPACTS

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Visual Intrusion	Dust emissions results in reduced visibility for nearby receptors and denuded areas result in changes to colours and textures of local areas.	2	2	1	1	4	**1) Dust emission controls 2) Stockpile Management 3) Limit active working areas 4) Revegetation**	1	2	1	1	3
		N2 - Low						**N1 - Very Low**				

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Visual Intrusion	Proposed infrastructure that have the potential to result in a change to landscape and character include reservoirs, communication towers, electricity transmission lines, conductors and substations - resulting in a negative aesthetic effect especially in the more remote areas.	2	2	3	4	1	**Existing Mitigatory factors include: 1) Ground level reservoirs 2) Most rural homesteads are situated at a low elevation in the valleys, often surrounded by trees, which will reduce visibility 3) Undulating topography will contribute to fewer breaks the skyline**	1	2	3	4	1
		N1 - Very Low						**N1 - Very Low**				

OCCUPATIONAL HEALTH AND SAFETY IMPACTS

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Physical hazard associated with the use of heavy equipment.	Potential for accident or injury or illness due to repetitive exposure to mechanical action or work activity. Single exposure to physical hazards may result in a wide range of injuries (minor cuts or bruises to disabling loss of limb to fatal)	4	1	5	2	4	**1. Planning work site layout to minimize the need for manual transfer of heavy loads. 2. Selecting tools and designing method of working to reduce force required**	4	1	5	2	3
		N3 - Moderate						**N3 - Moderate**				
Construction activities may result in an increase in movement of heavy vehicles for transport of materials and equipment.	Increased the risk of traffic related accidents and injuries to workers and local communities.	4	1	5	2	4	**1. Education and awareness raising emphasising safety aspects among drivers. 2. Use of speed control devices on trucks and remote monitoring of driver actions.**	4	1	5	2	3
		N3 - Moderate						**N3 - Moderate**				
Use of potentially hazardous chemicals in construction	Chemical Exposure to construction workers resulting in health implications	4	1	5	2	4	**1. Records of all hazardous equipment, materials, or other substances and any other health hazards on the Site. 2. If an epidemic endangers a significant proportion of the workforce; or a spillage of hazardous substance or similar event - the Engineer may order that work on the Site be suspended until the Contractor has brought the epidemic or hazardous event under control.**	4	1	5	2	3
		N3 - Moderate						**N3 - Moderate**				
Use of explosives when blasting during construction to remove large areas of hard rock.	Potential loss of property as well as possible injury or fatalities to project workers.	4	2	5	2	4	**1. Contractor to submit to the Engineer a detailed method statement for use of explosives. 2. Sirens shall be sounded continuously for at least 5 minutes before any blast takes place and shall continue for one minute after the blast has taken place. 3. The Contractor shall station personnel on roads and elsewhere with red flags to prevent persons, animals and traffic entering or remaining within the danger zone. 4. Blasting shall not be carried out unless occupants of any nearby building or working area have been notified by the Contractor CLO at least 24 hours in advance.**	4	2	5	2	3
		N3 - Moderate						**N3 - Moderate**				

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Chemical Exposure: The storage and handling of chemicals required for water disinfection.	Potential for illness or injury due to single acute exposure or chronic repetitive exposure to hazardous substance to operational staff.	4	1	5	4	4	**1. Implement a training program regarding safe handling practices and emergency response procedures. 2. Provide appropriate personal protective equipment. 5. Install containment systems to capture and neutralise chemical spills.**	4	1	5	4	3
		N3 - Moderate						**N3 - Moderate**				
Working within a water and sanitation facility is often physically demanding and may involve hazards such as open water, trenches, slippery walkways, working at heights, energised circuits, entry into confined spaces and heavy equipment.	Accidents and injuries to workers	4	1	5	4	4	**1. Install railing around all process tanks and pits. 3. Use of personal flotation devices when working near waterways. 4. Implement a confined spaces entry program that is consistent with applicable national requirements and internationally accepted standards. 5. Valves to process tanks should be locked to prevent accidental flooding during maintenance. 6. Use fall protection equipment when working at heights. 7. Maintain work areas to minimise slipping and tripping hazards.**	4	1	5	4	3
		N3 - Moderate						**N3 - Moderate**				
High noise levels present in the vicinity of operating machinery and flowing water at water and sanitation facilities.	Potential injury to hearing or loss of hearing.	4	1	5	4	4	**1. Provide and require use of suitable PPE 2. Demarcate high noise zones.**	4	1	5	4	3
		N3 - Moderate						**N3 - Moderate**				

CLIMATE CHANGE

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Release of sediment into watercourses (direct or via erosion and stormwater entrainment)	Due to the steep topography at the reservoir sites throughout the Project area, the risk of erosion after site clearance is high. Access routes to the along undulating topography further increases the likelihood of soil erosion occurring. Loss of topsoil and vegetation community due to soil erosion can be exacerbated by climate change.	3	3	3	4	3	1) Soil erosion measures (limiting the extent of work areas, management of stormwater runoff, and sediment containment structures); 2) Spoil Disposal Management Plan (SDMP)	2	2	3	4	2
		N3 - Moderate						N2 - Low				
Release of airborne pollutants emissions to atmosphere	Additional journeys will be completed during the construction phase, associated with the transportation of materials/wastes to and from the construction areas. The exhaust emissions will contribute to the presence of GHGs in the atmosphere	2	3	3	4	5	1) Vehicular Emission Controls	1	3	3	3	3
		N3 - Moderate						N2 - Low				
Generation of general waste	Putrescible waste generated during construction (e.g. cleared vegetation and scrap labourer food) will decompose and generate greenhouse gases	2	3	3	4	5	1) Opportunities should be determined, in consultation with waste service providers, for re-use, recycle, or disposal options	2	3	3	3	2
		N3 - Moderate						N2 - Low				
Wetland loss	Construction of the WTW adjacent to Makhaleng River will result in the partial loss of a wetland area, thereby removing a carbon sink.	2	3	3	4	5	1) Shift location of WTW as far as reasonably possible out of delineated wetland; 2) Investigate offset opportunities	2	2	3	3	2
		N3 - Moderate						N2 - Low				

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Release of airborne pollutants emissions to atmosphere	The generation of methane gas from any organic component in the sludge drying beds at the WTW will contribute to greenhouse gas emissions.	2	3	3	4	5	1) Investigate utilisation of methane gas for heating in WTW process, alternatively for electricity generation or flaring on site	1	3	3	4	3
		N3 - Moderate						N3 - Moderate				
Demand on local utilities – potable water	Climate change is likely to have an impact on the availability of the water resources for the country in the long-term. The LLBWS will increase Lesotho's resilience to climate change by providing water security.	3	3	1	4	3	1) Implementation of proposed project; 2) Training on sustainable use of water resources	3	4	1	4	4
		P3 - Moderate						P3 - Moderate				
Demand on local utilities – electricity	The pumping system will be electrically-operated, resulting in an increase in energy demand and consequently indirectly increasing greenhouse gas emissions.	1	3	3	4	5	1) Investigate utilisation of renewable electrical resources	1	3	1	4	3
		N3 - Moderate						N2 - Low				
Flooding of the Makhaleng River	Flood events are predicted to become more severe as a result of climate change impacts, and poorly positioned infrastructure could be damaged during such events.	3	3	3	2	3	1) Proposed (preferred) alternative to shift WTW as far as practicably possilble out of the floodplain	1	2	3	2	1
		N3 - Moderate						N1 - Very Low				

The **majority of impacts were assessed to be of Low negative significance** with the implementation of recommended mitigation measures. There are **no Very High negative residual impacts** associated with this project. The High residual negative impacts of the project relate to the replacement of vegetation for the permanent placement of the WTW and reservoirs, which support Vulnerable species and represent highest floristic biodiversity in the area, respectively. Mitigation measures will likely only result in the reduction of alien invasive encroachment.

The **Moderate residual negative effects** of the project arise from the temporary generation of dust emissions during construction resulting in primarily nuisance factors to nearby receptors (residents and roadside businesses). The proposed mitigation measures cannot sufficiently reduce probability of this impact.

The **Moderate residual negative effects** on water resource aspects relate to the positioning of a low-level weir within the Makhaleng River upstream of the WTW. This will potentially result in a build-up of sediment and changes in the inundation/flooding of areas upstream and downstream of the weir. This impact assessment however is stated with low confidence as the weir's specifications and effects still need to be modelled prior to implementation (and the ESMP updated of required). Finally, the abstraction of water from the Makhaleng

River WTW intake is likely to result in a decrease in volume and flow in the river leading to water availability impacts for downstream users. This impact is also stated with low confidence, as the e-flow assessment did not include social "end points". Previous studies however state that flow may be too low during drier months and a dam upstream to balance supply is essential for the feasibility of the bulk water supply scheme.

With respect to socio-economic impacts during the construction phase, there are two **Moderate negative residual effect**, which relate to influx of workers in the projects area, a change in demographics and an increase in health and safety (e.g. communicable diseases and trafficking in persons (TIP). The Socio-Economic survey findings indicate that the project area is supported by a number of health care and awareness raising facilities and organisations, which will likely be able to assist in mitigating this impact amongst local communities.

Hazards associated with occupational health and safety negative impacts on workers are all of **Moderate significance**.

The **positive residual impacts** that relate to this project are detailed below:

- Inundation upstream of stream creating greater diversity and abundance of fish and invertebrates preferring such conditions (**Moderate significance**).
- The construction phase will result in temporary employment of ~300-400 people, which has the potential to increase income generation for marginalised communities (**Moderate significance**).
- The construction of bulk water supply will support the roll out of distribution networks to improve access to clean water, indirectly resulting in improved hygiene within communities (**Moderate significance**).
- The construction phase an increase in population to the region, which will have a positive knock-on effect to local businesses and improved income generation at household level (**Moderate significance**).
- The operation of the bulk water supply system will create new permanent employment in the area for skilled and semi-skilled labourers. A minimum of 40-50 jobs will be created to operate the WTW alone. (**Moderate significance**).
- The improved access to potable water within Zone 6 and Zone 7 will attract potential for new business start-ups **(Moderate significance)**.
- The opportunity presented by excavation potentially uncovering chance finds of historic resources that can be identified and captured within the national database of the resource museum collections for the benefit of research and education, will result in a moderate positive residual impact (**Low significance**).

The RAP has confirmed that the identification of alternatives to avoid the need for resettlement has significantly reduced the potential magnitude of the impact of the proposed LLBWSS Zone 6 and Zone 7 project resulting in only one household requiring resettlement across both Zone 6 and 7. However, the project will result in the following disturbance and loss of social and economic activities:

- Temporary loss of livelihoods from construction activities will affect:
  - Fourteen arable fields (eleven of which are located at WTW) used for subsistence; and
  - Four businesses plots (two of which will only be partially affected).
- Permanent loss of livelihoods, displacement and resettlement will affect:
  - Eleven arable fields (Maphohloane WTW) used for subsistence farming; and
  - Two informal business – one of which is a seasonal informal business selling green harvests).

The reduction of livelihood and involuntary resettlement impacts significance presented by alternatives can be confidently maintained by the implementation of the Livelihood Restoration Plan and Resettlement Action Plan (RAP).

PROPOSED MITIGATION MEASURES

A number of measures have been identified as necessary to minimise and control negative impacts resulting from the project, such as the risk of contamination from hazardous waste storage or impacts to indigenous vegetation. Measures such as environmental awareness training on waste management, access control measures defining 'no go areas' to limit the impact on natural vegetation and preventing the risk to community presented by open trenches, erosion and water pollution to surrounding water resources. Water use and pollution would need to be monitored in the future to limit residual effects on other water users and ecosystems in the Project area.

An ESMP has been developed (Vol II). The ESMP represents the Lesotho Lowlands Bulk Water Supply Project, Zone 6 and 7 commitment to address and manage the potential negative and enhance the positive impacts associated with the bulk water supply infrastructure. The key intent of the ESMP is to ensure that the environmental and social objectives of the project are met, and it is based on the various components of the Project throughout design, construction and operational phases. The following supporting documents have been prepared to support the implementation of the ESMP:

- Monitoring and Evaluation Plan
- Communication Strategy
- Heritage Management Plan

The ESMP makes recommendation for institutional strengthening (including capacity building) and assigns responsibilities for the implementation of enhancement and mitigation measures as well as the completion of the monitoring programs.

The ESIA has not identified any fatal flaws that would restrict the development of the proposed bulk water supply infrastructure for Zone 6 and 7.

A Resettlement Action Plan has been developed as part of the Project, which focuses on displacement issues in more detail.

RECOMMENDATIONS

The proposed LLBWSS should be approved for development with the following key recommendations:

- The ecological assessment was undertaken only during winter months (dry season) and therefore two seasons were not assessed. It is recommended, in order for the assessment to be closer aligned with World Bank requirements, that this gap be addressed by a wet season survey to confirm whether critical habitats occur within the project footprint and increase the confidence percentage closer to 100%.
- The proposed weir analysis should be based on daily flow data. In its absence, monthly data was used. Data for 65 years (780 months) was available. The long-term trend analysis showed that there is a minimal reduction (approx. -1% per year) of the average annual flow implying an insignificant change in low flow rates. However, available reports state that the low flow amounts will significantly reduce due to impact of climate change, as such this anticipated reduction should be taken into account during the detailed design for the balancing reservoir (i.e. Makhaleng Dam).
- Further investigation required to calculate the potential area of inundation upstream of the proposed low-level weir.
- A post-development detailed flood risk assessment should be prepared and implementation of an Emergency Flood Response Plan for infrastructure within Makhaleng Floodplain.
- A sand settler should be built next to the water treatment plant, from the point at which the water gravitates to the treatment plant.
- In order to improve the present ecological state of the Makhaleng River it is recommended that erosion prevention and management plans be implemented with particular emphasis on the marginal and riparian zones.
- It is recommended that the precautionary approach must be adopted. To this end, steps must be taken to ensure the management of EMF exposures. EMF measurements pre-and post-installation of the mast are required to ensure that exposure limits for general public exposure to electric and magnetic fields published in the World Bank (2007) EHS Guidelines for Telecommunications sub-reference: International Commission on Non-Ionizing Radiation Protection (ICNIRP).
- Project implementing agencies must commit to tailored mitigation to ensure that local people will actually benefit from the project through being offered manual jobs, some targeted training, preparation and implementation of resettlement action plan, allocation of alternative land plots in the vicinity for them to continue their subsistence farming that has been their means of livelihood for many years.
- Compile and implement an alien vegetation management plan for the entire site. For the pipeline and reservoir construction areas it is recommended that denuded areas be re-seeded directly after construction is completed and that these areas are monitored for re-growth of alien plant species every two months, for a period of a year.

- It is recommended that the ecological discharge and fish way should be located in close proximity to one another. The fish way should be positioned where the main flow releases are, due to the shallow nature of the Makhaleng River to ensure year-round fish migration.
- Energy dissipaters and pool areas/depressions are recommended as a means to improve the aquatic ecology. Energy velocity dissipaters in the form of surface roughness (varying size aggregate / similar) built into the overspill areas will create a variety of hydraulic conditions suiting different fish species swimming capabilities. Further, pool areas/depressions built into the overspill area with allow resting areas for aquatic fauna migration.
- The construction of the WTW will result in the loss of a seepage area providing habitat services. There is the potential for offsets to compensate for the loss. Further investigations should be carried out to identify and assess opportunities for rehabilitation of wetlands within the study area.
- Green or soft engineering must be incorporated into the design of the WTW to manage and for the discharge of storm water.
- Stringent waste management measures should be put in place for the WTW. Staff operating the facility should undergo environmental training and should be aware of environmental consequences of poor waste management.
- Project implementing agencies must undertake the required detailed engineering feasibility and design requirements for the proposed alternatives selected as the preferred options for implementation.
- Recycling and reuse opportunities are to be investigated as recommended in the ESIA to reduce the amount of project waste generation and disposal requirements (national shortage of landfill space).
- Sludge residue from WTW need to be quantified and classified to determine suitability for disposal or beneficial reuse through land application. Quality of residuals for land application should be consistent with relevant public health-based guidance with the WHO (2006) Guidelines for Safe Use of Wastewater and applicable national requirements. If suitable for land application, the next step is to identify application sites. This will involve the establishment of baselines concentrations (nutrients, trace elements and metals, as well as pH in the soil) and the development of a monitoring programme.
- Monitoring and Evaluation System must be implemented to monitor implementation of the RAP and Livelihood restoration recommendations.
- The following permits will be required for certain activities:
  - Noise Permit issued by the DOE - Permit to allow excessive emission of noise (in excess of the noise emission standards) [blasting activities]
  - Waste Licence issued by the - Licence to own or operate a waste disposal site or plant, other than domestic waste, generate, store, handle, transport or dispose of hazardous waste [the relevance of this requirements must be assessed once the reuse / disposal of WTW sludge residue / reservoir scour is determined following waste classification and land use suitability to receive such material].
  - Mining (or quarrying) licence issued by the Ministry of Natural Resources - EIA a prerequisite for obtaining mining rights.
  - Building permit issued by Municipalities and Ministry of Local Government - Have to fulfil all environmental requirements and include the EIA Licence in the application for a permit.

CONCLUDING STATEMENT

The proposed bulk water supply project contributes to the national objectives of promoting equitable access to water supply and sustainable management of water resources. The delivery of the projects has become increasingly crucial in light of current drought conditions affecting individual households and businesses. The requirement for improved supply is reflected in the recent application by the Humanitarian Country Team (HCT) to the Central Emergency Response Fund (CERF) in December 2018 to respond to immediate humanitarian needs in Mohale's Hoek, Maseru, Quthing and Qacha's Nek. The Lesotho Water and Sanitation Policy (2007) states that "All the Basotho are entitled to have access to a sustainable supply of potable water and to the provision of basic sanitation services at an affordable cost." The policy indicates that all Basotho have a right to 30 litres of water. As a result of drought, most of the communities in Zone 6 resort to other sources of water, such as swamps and wells. The most prevalent problem being the reliance on unclean water. In some areas, the same sources of water are shared with animals, thereby putting people's health at risk.

This project will indirectly lead to improved general community health, as bulk water supply is required to support the distribution of water in Zone 6 and Zone 7. Indirect benefits include:

- Access to clean potable water improves the quality of life of communities by meeting a basic human need.
- Significant positive impact on human hygiene and reduction of waterborne diseases leading to health improvements in beneficiary communities at the household level.
- Improved water supply, sanitation facilities will improve - especially in public facilities such as schools and health care centres.

From a socio-economic perspective, over and above the temporary job creation during construction, and 40-50 job opportunities created during operation, the provision of bulk water supply systems will contribute to the viability of water supply to support commercial and industrial activities. Demand in the urban domestic and industrial sectors in Lesotho is not reliably met under a repeat of the historical climate or under the full range of climate futures, and, in the absence of augmentation measures, unmet demand levels will reach 40% by 2050. Unmet demand grows significantly starting in 2025. Reduced runoff predicted in climate change scenarios would result in a drying up of wells and springs, lower water tables, higher borehole costs, and reduced yields.

Tie-inn to existing or proposed distribution infrastructure will be carried out to minimise disruption to supplies critical for ensuring water-resilience in the domestic and industrial sectors, including but not limited to:

- Peri-urban and urban areas such as the Town of Mafeteng support small-scale commercial businesses with industrial areas located in Mesitsaneng and Ha Mapotsane.
- Mohale's Hoek Town is the major concentration of water demand in the Zone. This is expected to continue with the establishment of the planned Mohale's Hoek II (East) Industrial Estate, with a planned development area of 150 hectares.

The viability of the proposed bulk water supply is dependent on sufficient water in the river to provide for the required flows. LWSIP II - Final Water Resource Assessment (SMEC, 2015) and the LWSIP II - Final Water Demand Assessment (SMEC, 2017) indicates that the identified sources and calculated yields would be able to meet the existing demands however there is a need to build storage for resilience on climate change and its impacts and cater for the season variability of the flows. Provision of balancing storage was proposed as a potential solution to increase the assurance of supply back up to acceptable levels. LWSIP II - Final Water Demand Assessment (SMEC, 2017) identifies the need to build storage for resilience on climate change and its impacts and cater for the season variability of the flows. According to the Makhaleng Storage Dam Study (SMEC, May 2018), the addition of storage at Mid Makhaleng Dam increased the reliability under the climate change conditions from 65% to 97% (for 48 MCM storage). This proposed balancing dam is not part of the current application for environmental licence. This is being carried out as a separate project by COW.

A PROBFLO assessment was undertaken to assess the impacts on the EWR / e-flows resulting from direct surface water abstraction from the Makhaleng River with a total capacity of 59,450m^3/d. The system is currently in a D Category river condition. Based on the scenarios considered and the low confidence understanding of the ecosystem and how it interacts with flows, the e-flows relating to Category D can be achieved. Aquatic biota require a range of depth and flow classes for survival, feeding and breeding with many species considered flow-dependent. Seasonal differences in flow must be maintained through the responsible management of the weir and timing of water releases as recommended in the ESMP and Appendix B.

In addition to the maintenance of aquatic ecosystems, reduced flow volumes and water levels within the Makhaleng River could affect local communities who rely on the Makhaleng River for livestock, crop watering, washing, bathing and cooking. The project should ensure that enough water is reserved (released) for both ecosystem function and use by downstream users. Social end-points should be considered in an updated e-flow assessment following the conclusion of the Groundwater Supply Assessment being facilitated by COW.

It is recommended by the EAP that this project be approved for development. The environmental licence should include a number of conditions to be formulated with consideration of the ESIA Recommendations.

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APPENDICES

LIST OF ACRONYMS

Abbreviation	Definition
3PA	3 Pillar Assessment Results Framework
ADU	Animal Demography Unit
AfIF	Africa Investment Facility
AoI	Area of Influence
BODATSA	Based on the Plants of Southern Africa
BPEO	Best Practicable Environmental Option
$C_6H_8O_6$	Ascorbic Acid
CERF	Central Emergency Response Fund
CIA	Cumulative Impact Assessment
CLO	Community Liaison Officer
CMBSL	Conserving Mountain Biodiversity in Southern Lesotho
CO	Carbon Monoxide
COW	Lesotho Commissioner of Water
CR	Critically Endangered
CRR	Comment and Response Register
DC	District Committee
DCS	District Council Secretaries
DEM	Digital Elevation Model
DMA	Disaster Management Authority
DMU	Discrete Management Unit
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
DoE	Department of Environment
DPU	District Planning Unit
DRWS	Department of Rural Water Supply
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
EC	Electrical Conductivity
ECO	Environmental Control Officer
EFA	E-Flow assessment
EHS	Environmental Health and Safety
EHSGs	World Bank Group Environmental, Health and Safety Guidelines
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EMF	Electric and Magnetic Fields
EN	Endangered
EPA	Environmental Protection Agency
EPC	Engineering, Procurement & Construction
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EWR	Ecological Water Requirements
EU	European Union
FEPAs	Freshwater Ecosystem Priority Areas
FGDs	Focus Group Discussions
FIDIC	International Federation of Consulting Engineers
GDP	Gross Domestic Product

GHG	Greenhouse Gases
GIS	Geographic Information System
GPS	Global Positioning System
GN	Guidance Note
GoL	Government of Lesotho
HCT	Humanitarian Country Team
H_2O_2	Hydrogen Peroxide
H_2S	hydrogen Sulphide
ha	Hectare
ICM	Catchment Management
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IDA	International Development Association
IFC	International Finance Corporation
IFR	Instream Flow Requirements
IHIA	Intermediate Habitat Integrity Assessment
IMR	Infant Mortality Rate
IPC	Integrated Food Security Phase Classification
IRI	International Research Institute
IUCN	International Union of Conservation of Nature
HIV	Human Immunodeficiency Virus
LAA	Land Administration Authority
L-BWT	Lesotho-Botswana Water Transfer
LCDB	Lesotho Land Cover Database
LDS	Lesotho Demographic Survey
LEC	Lesotho Electricity Corporation
LENDU	Lesotho Epidemiology Network on Drug Abuse
LEFT	Local Ecological Footprinting Tool
LEWA	Lesotho Electricity and Water Authority
LHWP	Lesotho Highlands Water Project
LLWSFS	Lesotho Lowlands Water Supply Feasibility Study
LLBWSS	Lesotho Lowlands Bulk Water Supply Scheme
LLWSSU	Lesotho Lowlands Water Supply Scheme Unit
LMS	Lesotho Meteorological Services
LWSIP II	Lesotho Water Sector Improvement Project Phase II
m^3	Cubic Metres
MAE	Mean Annual Evaporation
MAMSL	Meters Above Mean Sea Level
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
MCM	Million Cubic Metres
MDWSP	Metolong Dam and Water Supply Programme
MIRAI	Macroinvertebrate Response Assessment Index
mm	Millimetre
MSDS	Material Safety Data Sheet
MSU	Most Sensitive User
MTEC	Ministry of Tourism and Environment and Culture
M&E	Monitoring and Evaluation
$Na_2S_2O_3$	Sodium Thiosulphate
NBA	National Biodiversity Assessment
NEM:AQA	National Environmental Management: Air Quality Act 39 of 2004
NGO	Non-Government Organisation
NO_2	Nitrogen Dioxide
NSDP	National Strategic Development Plan 2012/2013 – 2016/2017

NT	Near Threatened
OPs	Operational Principles
PAPs	Project Affected People
PES	Present Ecological Status
PH	Potential of Hydrogen
PM	Particulate Matter
POP	Persistent Organic Pollutants
P&P	Posch and Partner Engineers
PPE	Personal Protective Equipment
PS	Performance Standard
PSI	Population Services International
RAMSAR	Convention on Wetlands of International Importance
RAP	Resettlement Action Plan
RCIA	Rapid Cumulative Impact Assessment
RF	Radiofrequency
RfP	Request for Proposal
SABAP2	South African Bird Atlas Project Version 2
SANS	South African National Standards
SARCOF	Southern African Regional Climate Outlook Forum
SC	Steering Committee
SCC	Species of Conservation Concern
SDMP	Spoil Disposal Management Plan
SDS	Safety Data Sheet
SEED	Senqu Engineering, Environment and Development Consultants
SIA	Social Impact Assessment
SMEC	Snowy Mountains Engineering Corporation
SO_2	Sulphur Dioxide
SOC	Stones in Current
SOOC	Stones Out Of Current
SPSS	Statistical Package for Social Scientists
SSI	SSI Engineers and Environmental Consultants (Pty) Ltd
STD	Sexually Transmitted Diseases
STI	Sexually Transmitted Infections
TIP	Trafficking in Persons
ToR	Terms of Reference
TSP	Total Suspended Particulates
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, Cultural Organization
USD	United States Dollar
USEPA	United States Environmental Protection Agency
USTs	Underground Storage Tanks
VEC	Valued Environmental And Social Components
VU	Vulnerable
WASH	Water, Sanitation and Hygiene
WMA	Water Management Area
WMO	World Meteorological Organization
WMP	Waste Management Plan
WASCO	Water and Sewerage Company
WHO	World Health Organization
WTP	Water Treatment Plant
WTW	Water Treatment Works
WSP	WSP Environmental (Pty) Ltd

1 INTRODUCTION

1.1 TERMS OF REFERENCE

The Government of Lesotho (GoL) has received financing from the International Development Association (IDA) in the form of a "credit" toward the cost of the Lesotho Water Sector Improvement Project Phase II (LWSIP II) (**Table 1**). The Water Commission has applied a portion of the proceeds for the appointment of consultants to carry out the ESIA and RAP for Zone 6 and Zone 7 of the Lesotho Lowlands Bulk Water Supply Scheme (LLBWSS). The body responsible for managing the project will be the Lesotho Lowlands Water Supply Scheme Unit (LLWSSU), which falls under the office of the Commissioner of Water (COW).

Table 1 Summary of Project Sponsors and Implementing Agents

ORGANISATION	DESCRIPTION
Project Sponsors	
World Bank	Detailed Design, ESIA
European Investment Bank (EIB)/ European Union (EU)	Environmental and Social Management Plan (ESMP), Detailed Design due diligence, Supervision, and Construction
Implementing Agents	
LLWSSU	LLWSSU which is under COW is the main implementing agent of this project. The mandate of LLWSSU is to oversee the implementation of the LWSIP II in accordance with the provisions of the Lesotho Water and Sanitation Policy of 2007.
Water and Sewerage Company (WASCO)	WASCO is a public company established through WASCO Act No. 13 of 2010. Its mandate is to provide water and sewerage services in urban and other designated areas of Lesotho.
Department of Rural Water Supply (DRWS)	DRWS is also a beneficiary of the proposed project infrastructures as it distributes water in urban-rural areas of Lesotho. It is responsible for water supply and sanitation infrastructure development and service delivery in the rural areas.

The tender[1] to perform the Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) was awarded to WSP Environmental (Pty) Ltd. ("WSP") in partnership with Senqu Engineering, Environment and Development Consultants ("SEED CONSULT") and The Biodiversity Company, collectively referred to in the ESIA as "the Consultant".

WSP, SEED CONSULT and The Biodiversity Company understand the overall objectives of the appointment are to:

- Undertake an ESIA and prepare the associated Environmental and Social Management Plan (ESMP) to inform all stakeholders of the potential environmental and social risks associated with the project, and inform the detailed design based on findings of the study.
- Prepare a RAP in order to identify activities that will restrict access or require resettlement and provide a detailed action plan for compensation of affected populations.

This report presents the ESIA deliverable as Volume I, and is accompanied by four standalone reports:

- Appendix A: Ecological Impact Assessment
- Appendix B: Environmental Water Requirements (EWR) Study

[1] See full Terms of Reference included as Appendix L.

- Appendix C: Social Impact Assessment
- Appendix D: Cultural Heritage Survey
- Appendix E: Public Participation Report

The ESMP and RAP are presented as Volume II and III respectively.

The specific objectives of the ESIA are as follows:

- Identify project beneficiaries, with particular attention to vulnerable groups;
- Identify potential biophysical, socio-economic, health and sanitation impacts on the environment and evaluate the significance of these;
- Evaluate project options;
- Describe project activities;
- Conduct public consultations with all interested and affected stakeholders;
- Describe the positive and negative environmental impacts and propose feasible mitigation measures;
- Conduct a gender analysis to identify opportunities to contribute to improving gender gaps in relation to the project;
- Provide recommendations for the project design;
- Prepare a ESIA compliant to the relevant authorities (and international best practice); and,
- Prepare an ESMP that details mitigation measures, the monitoring process, training support and institutional structure required for implementation.

The ESIA forms Deliverable 5 of the LWSIP II//COMP III/C/23-2017. The overarching structure of this ESIA is presented below, and has been designed with reference to requirements set out in the Request for Proposal (RfP) (LWSIP II//COMP III/C/23-2017). Minor adaptations to the structure proposed in Annex 1 of the RfP have been made to accommodate specific lender or project-specific requirements.

The report is structured as follows:

Chapter 1: Introduction - indicates the purpose of the ESIA, presents an overview of the proposed project to be assessed, as well as the project's purpose and needs.

Chapter 2: ESIA Methodology - presents the project background, the ESIA methodology and the experts involved. The impact assessment methodology applied during the ESIA and the cumulative impact assessment explained. This chapter also includes a summary of the stakeholder engagement process undertaken and includes a section on assumptions and limitations to the ESIA.

Chapter 3: Policy, Legislative and Regulatory Framework - provides a description of the relevant parts of the project, and includes the following information: location; general layout; size, capacity, etc.

Chapter 4: Project Description - describes alternatives that were examined in the course of developing the proposed project and identifies other alternatives, which would achieve the same objectives, including the "without project" option.

Chapter 5: Analysis of Alternatives - outlines the ESIA methodology.

Chapter 6: Description of Physical and Social Environment - evaluates and presents baseline data on the relevant environmental characteristics of the study area.

Chapter 7: Environment and Social Aspects and Impacts - describes the environmental aspects associated with the project. It further predicts and assesses the project's likely positive and negative significant impacts, direct and indirect impacts, and immediate and long-term impacts during construction and operation as well as maintenance phases indicating their importance level and their probability of occurrence. The chapter briefly identifies mitigation measures and any residual negative impacts that cannot be mitigated (fuller mitigation information is presented in the accompanying ESMP).

Chapter 8: Cumulative Impact Assessment - Analysis of potential impacts and risks of proposed developments together with current impact assessment based on chosen valued environmental and social components (VEC).

Chapter 9: Conclusion and Recommendations - specifies the environmental and social acceptability of the project, taking into account the impacts and measures identified during the assessment process.

1.2 PROJECT BACKGROUND

1.2.1 LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME OVERVIEW

In recent years, with the exception of the Lesotho Highlands Water Project, the majority of investment in economic and industrial development has been in the Western Lowlands of Lesotho. The recent rapid economic development in the lowlands has placed increasing demand on existing water supply facilities. Water supply is becoming a major constraint to continued economic growth. The provision of potable and adequate water supply to domestic and commercial consumers in the Western Lowlands area of Lesotho is therefore of critical importance (SSI[2], April 2010).

In recognition of this the Government of Lesotho (GoL), with assistance from the European Commission, appointed consultants in 2003 to undertake the Lesotho Lowlands Water Supply Feasibility Study (LLWSFS). The GoL accepted and approved findings and recommendation in May 2005 (SSI, April 2010). These recommendations included the preliminary design of five treated bulk water supply schemes serving eight designated water demand zones. These zones fall into three regions, namely the Northern, Central and Southern Regions.

The primary purpose of the LLBWSS is to:

- Improve water supplies to the Lowland settlements with populations in excess of 2500 for domestic, institutional and industrial purposes; and
- Support the introduction of technically, economically, socially, environmentally and financially viable, bulk-treated water supply systems.

The LLBWSS entails the abstraction of water from river courses; establishment of associated water treatment works; and construction of pump stations, pipelines and reservoirs to facilitate the transfer of potable water to settlements. The construction of the Metolong Dam and Water Supply Programme (MDWSP), officially launched in 2008, was fast-tracked for implementation under a multi-donor funding arrangement. The Programme is in operation, providing safe drinking water mainly to Maseru town, the area north to Teyateyaneng and south to Morija.

The Lowlands Water Joint Venture was engaged in 2008 to produce conceptual designs, tender documents and financial/economic analysis of the LLBWSS. In accordance with Lesotho environmental legislation, a Southern, Central and Northern Environmental and Social Impact Assessment (ESIA) and associated Environmental and Social Management Plan (ESMP) were completed and approved by the Department of Environment (DOE) in 2010.

Since the detailed design of the LLBWSS undertaken in 2008, there have been changes that warranted design review and update prior to implementation (SMEC[3], 2018). These changes include:

Population growth/decline in different parts of the country.

- Demographic and socio-economic changes;
- Rural-urban migration;
- Water resources constraints, particularly following the recent years (2014 to 2017) of successive droughts;
- Variations in industrial growth; and,
- Implementation of some water supply schemes that impact the 2008 designs.

[2] SSI Engineers and Environmental Consultants (Pty) Ltd.
[3] Snowy Mountains Engineering Corporation.

SMEC International was appointed in 2016 to review and update the 2010 ESIA and ESMP reports and prepare Environmental and Social Management Framework (ESMF), Resettlement Policy Framework (RPF) and a Generic Environmental and Social Management Plan (ESMP) in accordance with the World Bank Safeguard Policies.

Delivery of the scheme is planned for two phases, with Phase 1 required to meet water demands from 2018 to 2030 and Phase 2 from 2031 to 2045.

1.2.2 ZONE 6 AND 7 PROJECT OVERVIEW

The LLBWSS consists of eight zonal areas, plus Semonkong (Zone 8A). Six of the zones have been grouped together to ensure viable water sources and water treatment works to form standalone bulk water systems (SMEC, 2018). The focus of this study is Zone 6 (Mafeteng) and 7 (Mohale's Hoek). The Zones are situated geographically adjacent to one another; in the south west of Lesotho.

The bulk water supply infrastructure is intended to serve a projected population of 81,850 in Zone 6 (Mafeteng) (**Figure 1**) and 129,493 in Zone 7 (Mohale's Hoek) (**Figure 2**) in 2045. Delivery of this project is planned to take place over two phases. Phase 1 being delivered from 2018 to 2030 and Phase 2 delivered from 2030 to 2045.

The current application for Environmental Licence and scope of this ESIA is for Phase 1 only.

The Zone 6 and 7 bulk water supply scheme comprises of the following infrastructure components in Phase 1:

- Direct surface water abstraction from the Makhaleng River[4] with a total capacity of 59,450m^3/d;
- Makhaleng Water Treatment Works (WTW) of 40m^3/d;
- 31 Service Reservoirs / Sumps / Tanks;
- 18 Pumping Stations;
- 151 - 160 km length of pipeline ranging in diameter from 80mm to 800mm;
- Power Supply; and,
- Low-level weir across the Makhaleng River to optimise intake.

The bulk water infrastructure designed for Zone 6 and 7 (as Project 4) is allocated into three lots and planned for delivery as a single contract under the modified International Federation of Consulting Engineers (FIDIC) Red Book conditions of contract. The proposed Zone 6 and 7 supply scheme requires that ESIA and Resettlement Action Plan (RAP) be undertaken prior to implementation.

Implementation of Phase 1 is planned as follows:

- March 2020 Award Contract
- April 2020 Construction Commencement
- April 2023 Construction Completion

[4] There is an existing treatment works at the Makhaleng River and command reservoir.

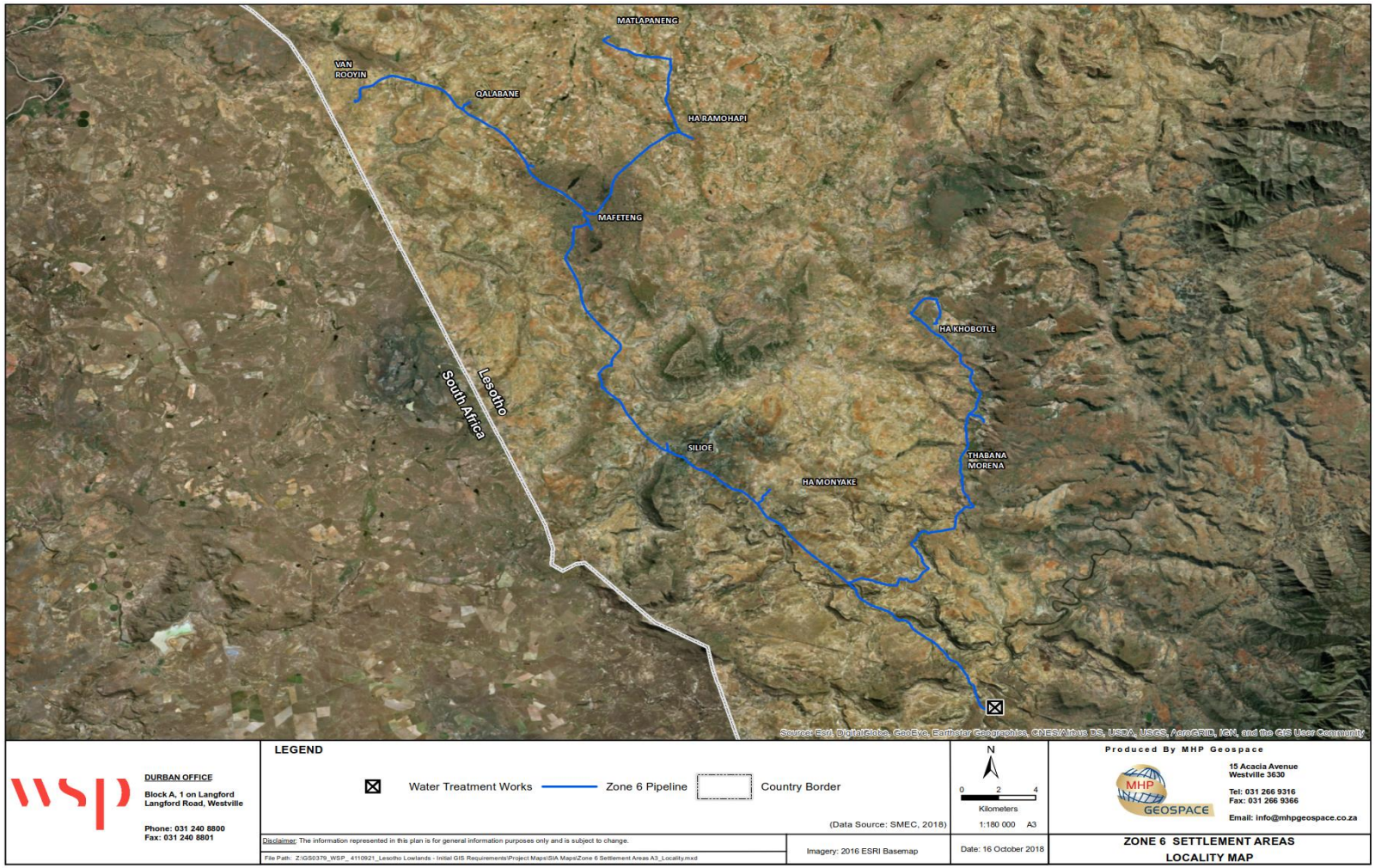


Figure 1 Zone 6 Beneficiary Settlement Areas

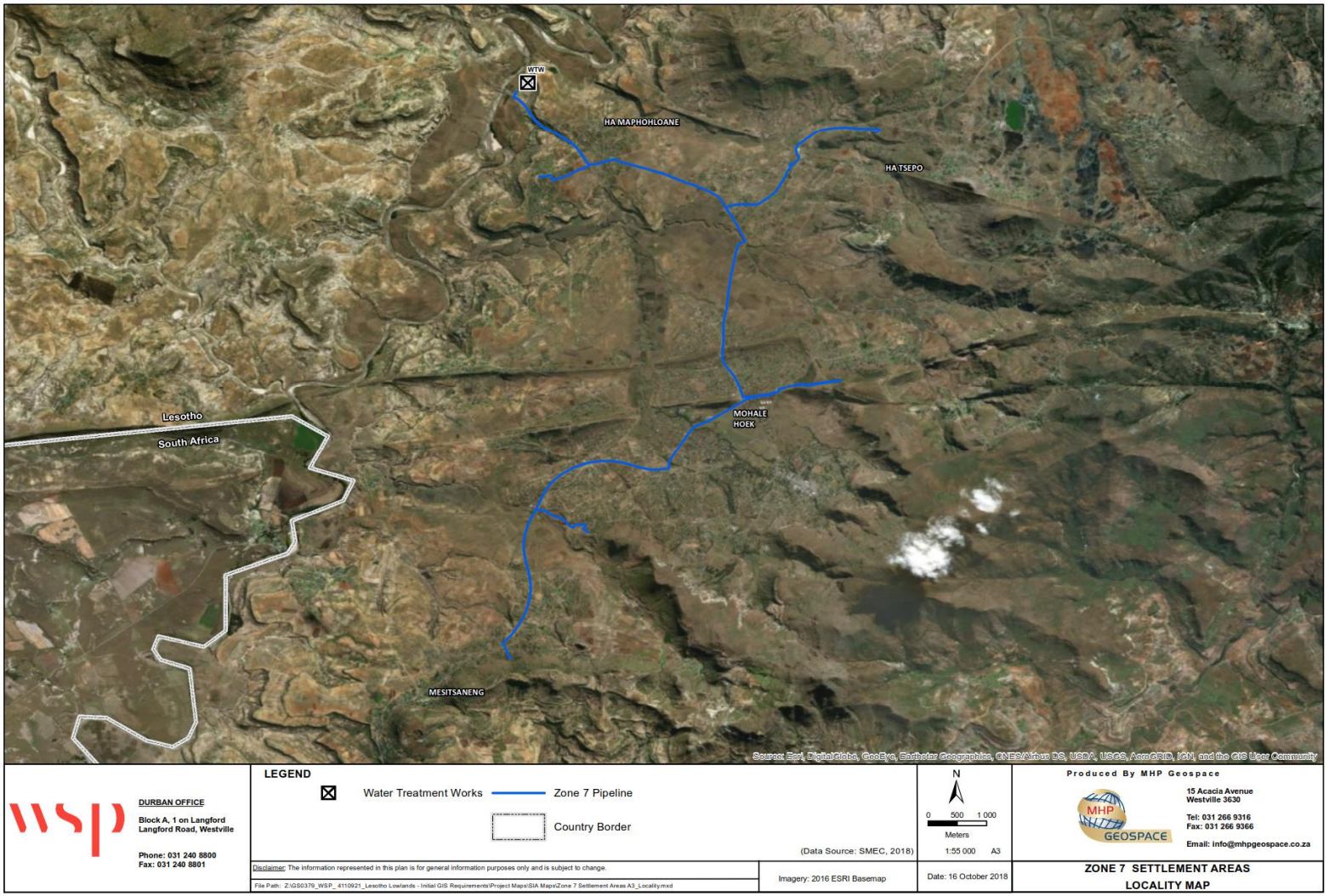


Figure 2 Zone 7 Beneficiary Settlement Areas

2 ESIA METHODOLOGY

2.1 OVERALL PROCESS

The generation of this ESIA was initiated by literature review of available existing project information to provide background information and identify key socio-economic and environmental aspects and impacts for consideration. The following key stages have applied through the generation of the ESIA[5] (**Figure 3**):

- **Scoping –** much of the early feasibility and engineering design of the project had been completed between 2003 and 2017. An Inception Report presenting scoping information has been generated by the Consultant presented scoping information, in addition to baseline information understood at that time.
- **Establishing Baseline Conditions –** to establish a reliable set of baseline condition data WSP and SEED have supplemented existing information with further desk-based review, site verification visits, surveys, mapping, and sampling.
- **Impact Assessment –** having established baseline conditions, this information was analysed and modelled in order to establish potential positive and negative project impacts of the project for the construction and operational phases.

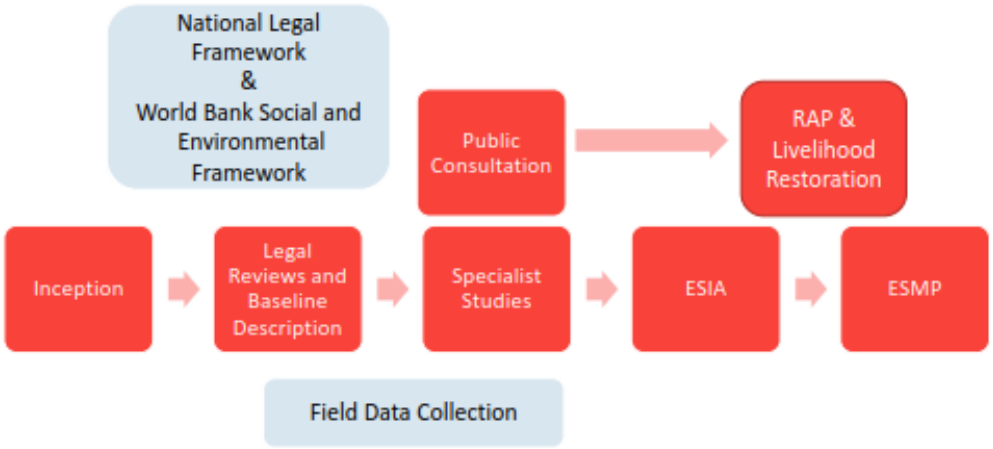


Figure 3 Summary of ESIA Process followed

2.2 ESIA EXPERTS

The consultant team comprises a team of 23 highly qualified and experienced environmental and social specialists (Key and Non-Key Experts. Key Experts are detailed in **Appendix F)**.

[5] Survey and assessment methodologies associated with specialist studies are presented within the relevant appended reports.

2.3 IMPACT ASSESSMENT METHODOLOGY

2.3.1 ORTHOPHOTO MAPPING

Longitudinal Drawings of the proposed water transmission infrastructure were prepared by SMEC (2018) using aerial imagery dated 2008. More recent aerial imagery was sourced (2016-2017) for an updated representation on the ground. Shapefiles were generated of proposed project infrastructure (pipeline alignment and associated infrastructure including reservoirs, pump stations and water treatment works (WTW)) from CAD files received from SMEC. Shapefiles have been overlaid on the more recent aerial imagery (ESRI 2016-2017). The Consultant prepared a Map Book consisting of 26 maps for Zone 6 and 15 maps for Zone 7 at a scale of 1: 5000 to allow for detailed rapid assessment by socio economic, RAP and ecological specialists.

Printing of large scale maps (A1) for detailed rapid assessment by socio economic, RAP and ecological specialists. This updated detailed mapping assisted in the identification of alternatives to avoid or minimise potential negative impact. These new base maps have also been used in the preparation of mapping contained in the ESIA presented in Chapter 4: Project Description and Chapter 6: Description of Physical and Social Environment.

2.3.2 SPECIALIST STUDIES

Specialist studies have been undertaken to review and ascertain existing environmental and socio-economic conditions relevant to the project area and its surroundings, identify receptors and resources sensitive to potential impacts. Baseline conditions and specialist findings are considered in the assessment of impact significance outlined in **Chapter 7: Environment and Social Aspects and Impacts.**

SURFACE WATER AND GROUNDWATER ASSESSMENT

The purpose of the surface and groundwater assessment was to characterise the conditions along the length of the pipeline infrastructure in order to identify potential impacts associated with the establishment of the infrastructure, which may include *inter alia*:

- Interception of aquifers associated with the excavation of foundation and cut lines.
- Contamination of groundwater resources associated with the handling of construction chemicals.
- Increased risk of erosion associated with infrastructure development within river channels (pipeline crossings, abstraction weir etc.).

TERRESTRIAL ECOLOGICAL ASSESSMENT

The terrestrial ecological assessment was undertaken to assess potential biodiversity impacts associated with the proposed pipelines, service reservoirs and pumping stations. Ideally, terrestrial studies (specifically flora and herpetofauna) should be conducted during the summer months.

WATER RESOURCE ECOLOGICAL ASSESSMENT

The purpose of the water resource ecological assessment was to provide an updated ecological assessment of the river for the following aspects: wetlands, aquatic ecology, and river health.

ECOLOGICAL WATER REQUIREMENTS (EWR)

An Ecological Water Requirement (EWR) Analysis has been undertaken for the project in order to establish the risks of altered flows on the river system associated with the proposed design. PROBFLO is considered to be the best environmental flow (E-flow) determination procedure for the Southern African Region as a suitable established E-Flow assessment (EFA) for the study. A rapid PROBLO assessment was proposed for this study

based on the receipt of hydrological information from existing surface and groundwater assessments and supplementary hydraulic data collected during the site verification visit.

SOCIO-ECONOMIC IMPACT ASSESSMENT

The socio-economic impact assessment has been undertaken using both qualitative and quantitative methods, which will complement each other in providing the status quo of Zones 6 and 7 study area.

Qualitative approach ensures that the perceptions, feelings and views of different target groups of the Project Affected People (PAPs) are clearly understood. Quantitative data analysis results in the identifications of themes or categories for interpretation and drawing conclusions and recommendations. The quantitative approach is used to complement the qualitative research design providing a more objective assessment. Through, these methods the Sociologist / Anthropologist has predicted the likely social impacts of the project **Table 17** details the population sampling techniques, data collection methods and analysis.

ARCHAEOLOGICAL / PALAEONTOLOGICAL SURVEY

The cultural heritage survey was undertaken to determine the extent to which Stone Age, Historical, and Palaeontological sites located within and surrounding the development footprint may be affected. Interviews with local community and authorities conducted assist to understand community oral histories and appreciation of the cultural heritage value. The Cultural Heritage Management Plan recommends mitigation actions for in-situ conservation or rescue and transfer to a controlled environment.

Table 2 provides a matrix summarising the key component soft the methodologies undertaken for each specialist study. Detailed methodologies are outlined in standalone specialist reports (**Appendix A – Appendix D**).

Table 2 Summary Matrix of Specialist Methodologies

	DESKTOP REVIEW	MAPPING	STAKEHOLDER ENGAGEMENT	DATA COLLECTION	DATA ANALYSIS	MODELLING
Surface Water and Groundwater Assessment	X	X		X	X	
Terrestrial Ecological Assessment	X	X		X		
Water Resource Ecological Assessment	X	X		X		
Ecological Flow Requirements (IFR) Analysis	X			X	X	X
Socio-Economic Impact Assessment			X	X		
Archaeological / Palaeontological Survey		X	X			

2.3.3 ANALYSIS OF ALTERNATIVES

The identification of alternatives provides a basis for choice among options available to the decision-making authority. Alternatives considered and evaluated in ESIA are outlined in **Chapter 5: Analysis of Alternatives**.

2.3.4 ASSESSMENT OF IMPACTS AND MITIGATION

The focus is to identify and evaluate the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

- **Direct**: Direct impacts occur through direct interaction of an activity with an environmental, social, or economic component.
- **Indirect**: Indirect impacts on the environment are these which are not a direct result of the project, often produced away from or as a result of a complex impact pathway. The indirect impacts are also known as secondary or even third level impacts.
- **Cumulative**: Cumulative impact consists of an impact that is created as a result of the combination of the project evaluated in the EIA together with other projects causing related impacts. These impacts occur when the incremental impact of the project is combined with the cumulative effects of other past, present and reasonably foreseeable future projects.

2.3.5 IMPACT ASSESSMENT CRITERIA

The ESIA uses a methodological framework developed by WSP to meet the combined requirements of international best practice and national legislation. The determination and assessment of impacts will be based on the following criteria:

- Nature of the Impact;
- Significance of the Impact;
- Consequence of the Impact;
- Extent of the impact;
- Duration of the Impact;
- Probability if the impact;
- Degree to which the impact:
  - can be reversed;
  - may cause irreplaceable loss of resources; and
  - can be avoided, managed or mitigated.

Following international best practice, additional criteria have been included to determine the significant effects. These include the consideration of the following:

- Magnitude: to what extent environmental resources are going to be affected;
- Sensitivity of the resource or receptor (rated as high, medium and low) by considering the importance of the receiving environment (international, national, regional, district and local), rarity of the receiving environment, benefits or services provided by the environmental resources and perception of the resource or receptor); and
- Severity of the impact, measured by the importance of the consequences of change (high, medium, low, negligible) by considering inter alia magnitude, duration, intensity, likelihood, frequency and reversibility of the change.

It should be noted that the definitions given are for guidance only, and not all the definitions will apply to all of the environmental receptors and resources being assessed. Impact significance is assessed with and without mitigation measures in place, allowing residual impacts to be identified.

IMPACT ASSESSMENT METHODOLOGY

Impacts are assessed in terms of the following criteria:

a) The **nature**; a description of what causes the effect, what will be affected and how it will be affected.

Table 3 Nature or Type of Impact

NATURE OR TYPE OF IMPACT	DEFINITION
Beneficial / Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Adverse / Negative	An impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor.
Direct	Impacts that arise directly from activities that form an integral part of the Project (e.g. new infrastructure).
Indirect	Impacts that arise indirectly from activities not explicitly forming part of the Project (e.g. noise changes due to changes in road or rail traffic resulting from the operation of Project).
Secondary	Secondary or induced impacts caused by a change in the Project environment (e.g. employment opportunities created by the supply chain requirements).
Cumulative	Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.

b) The **physical extent**:

Table 4: Physical Extent (E) Rating of Impact

SCORE	DESCRIPTION
1	the impact will be limited to the site;
2	the impact will be limited to the local area;
3	the impact will be limited to the region;
4	the impact will be national; or
5	the impact will be international;

c) The **duration**, wherein it is indicated whether the lifetime of the impact will be:

Table 5: Duration (D) Rating of Impact

SCORE	DESCRIPTION
1	of a very short duration (0 to 1 years)
2	of a short duration (2 to 5 years)
3	medium term (5–15 years)
4	long term (> 15 years)
5	Permanent

d) **Reversibility:** An impact is either reversible or irreversible. A scale of the level of reversibility if an impact is / how long before impacts on receptors cease to be evident.

Table 6: Reversibility (R) Rating of Impact

SCORE	DESCRIPTION
1	impact is immediately reversible.
3	impact is reversible within 2 years after the cause or stress is removed; or
5	activity will lead to an impact that is in all practical terms permanent.

e) The **magnitude** of impact on existing processes, quantified on a scale from 0-5, where a score is assigned.

Table 7: Magnitude (Magnitude) Rating of Impact

SCORE	DESCRIPTION
1	minor and will not result in an impact on processes.
2	low and will cause a slight impact on processes.
3	moderate and will result in processes continuing but in a modified way.
4	high (processes are altered to the extent that they temporarily cease).
5	very high and results in complete destruction of patterns and permanent cessation of processes.

f) The **probability** of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale where:

Table 8: Probability (P) Rating of Impact

SCORE	DESCRIPTION
1	very improbable (probably will not happen).
2	improbable (some possibility, but low likelihood).
3	probable (distinct possibility).
4	highly probable (most likely).
5	definite (impact will occur regardless of any prevention measures).

g) The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;

h) The **status**, which is described as either positive, negative or neutral;

i) The degree to which the impact can be **reversed**;

j) The degree to which the impact may cause **irreplaceable loss** of resources; and

k) The degree to which the impact can be **mitigated**.

The significance is determined by combining the above criteria in the following formula:

Significance = (Extent + Duration + Reversibility + Magnitude) x Probability

$$[S = (E + D + R + M) \times P]$$

Where the symbols are as follows:

The significance weightings for each potential impact are as follows:

Table 9 Significance (S) Weightings as Decision Making Guide

Overall Score	Negative	Positive	Decision Making Guide
4-15	Very Low	Very Low	Negligible / no impact
16-30	Low	Low	Where this impact would not have a direct influence on the decision to develop in the area
31-60	Moderate	Moderate	Where the impact could influence the decision to develop in the area unless it is effectively mitigated
61-80	High	High	Where the impact must have an influence on the decision process to develop in the area
81-100	Very High	Very High	Where the impact is likely to result in a no-go decision (negative). Where a no-go decision will result in unjustifiable impacts (positive).

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact, and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures, and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this ESIA Report.

2.3.6 CUMULATIVE IMPACT ASSESSMENT

Cumulative Impacts identified and assessed relate to projects or actions planned within or in close proximity to the study area.

The Cumulative Impact Assessment (CIA) process analyses the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen valued environmental and social components (VEC) over time and proposing sound measures to avoid, reduce or mitigate the impacts as far as possible.

The methodology and findings are detailed in **Chapter 8: Cumulative Impact Assessment**.

2.3.7 IMPACT MITIGATION

MITIGATION APPROACH

The Mitigation Hierarchy (**Figure 4**) has been applied when proposing prevention, compensation and mitigation measures within the accompanying ESMP:

- **Avoid / Prevent:** Avoidance or prevention refers to the consideration of options in project location, siting, scale, layout, technology and phasing to avoid impacts on biodiversity, associated ecosystem services, and people. This is referred to as 'the best option', but it is acknowledged that avoidance or prevention is not always possible.
- **Minimise:** Minimisation refers to the consideration of alternatives in the project location, siting, scale, layout, technology and phasing that would minimise impacts on biodiversity, ecosystem services and people. As defined in IFC PS1; "acceptable options to minimise will vary and include: abate, rectify, repair, and/or restore impacts, as appropriate".
- **Rehabilitate / Restore:** Rehabilitation refers to the consideration of the rehabilitation of areas where impacts are unavoidable and measures are provided to return impacted areas to a near-natural state or an agreed land use.

- **Offset:** Offsetting refers to the consideration of measures over and above rehabilitation to compensate for the residual negative effects on biodiversity ecosystem services and people, after every effort has been made to minimise and then rehabilitate impacts.

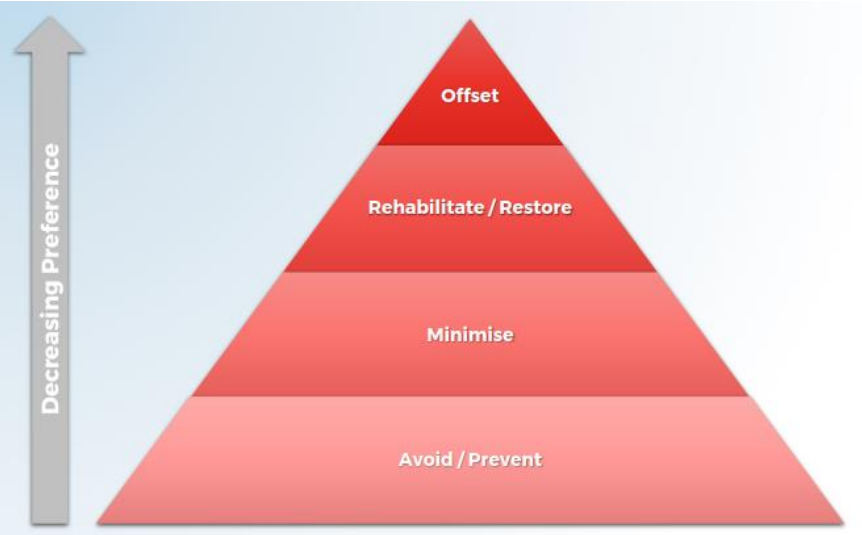


Figure 4 Impact Assessment Mitigation Hierarchy

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The identified mitigation measures are integrated into a suite of customised management programs. The ESMP is developed to guide environmental and social management throughout the project's life cycle. This is the mechanism whereby mitigation and monitoring of environmental impacts (as defined in the ESIA Report) are integrated with project implementation.

For the purposes of this ESIA, project alternatives (pipeline re-routing and relocation of associated infrastructure e.g. the WTW and reservoirs) are being considered (**Chapter 4: Project Description**). Mitigation measures (according to the Mitigation Hierarchy) and monitoring plans are provided per specialist component where impacts are unavoidable, and as designed by appropriately qualified specialists. These take into account the design requirements and objectives of the project.

2.4 PUBLIC CONSULTATION

2.4.1 SENSITISATION CONSULTATION AND STAKEHOLDER IDENTIFICATION

The COW had already consulted widely with the stakeholder groups related to the LLBWSS across the various zones, including national stakeholders and local authorities within Zone 6 and 7. Introductory Letters were provided by COW for use by the public consultation team carrying out further consultations to sensitise the local authorities in particular introducing WSP and SEED CONSULT to the local authorities in July 2018. This included the briefing of the District Administration Offices, District Council Offices, Principal Chief's offices and other Area Chiefs on the proposed project. Consultation mechanisms included: telephone discussions, office meetings and inclusion within monthly meetings (e.g. at Taung Principal Chief's office the chiefs and community councils of Silioe and Mashaleng were consulted during a special monthly meeting).

2.4.2 STAKEHOLDER INCEPTION WORKSHOP

The COW organised a stakeholder inception workshop which included local authority structures in the district, offices of the District Administrators, Principal Chiefs and Area Chiefs, district councils including relevant government departments and non-governmental organisation (NGO) representatives. The workshop took place on 2 August 2018 at Mount Maluti Hotel in Mohale's Hoek. The workshop provided information on the LLBWSS project, its components and different zones as well as the objectives of the project.

The workshop also introduced WSP and SEED CONSULT who shared information on the scope of work, the development of the inception report and planed activities towards the ESIA and RAP process and activities including public participation. The comments and responses from the workshop are included in Public Participation Report **(Appendix E)** and have been included in the non-technical summary**.**

2.4.3 PUBLIC MEETINGS / PITSOS

In consultation with COW, a decision was made to extend the public gathering / *Pitsos*[6] to ensure the equal inclusion of all 74 villages in Zone 6 and 7.

Public meetings were held throughout the project covering villages under major settlement with area chiefs present. The meetings were held from early August to mid-September 2018. The purpose of meetings was to introduce the project to the community and solicit their views on the project. The meetings were also meant to describe project activities and the public participation approach to be employed. The comments and responses from the workshop are included in Public Participation Report **(Appendix E)** and have been included in the non-technical summary.

2.4.4 ESIA PHASE PUBLIC DISCLOSURE

Public consultation is to continue throughout the ESIA process to ensure that:

- Legislative requirements and international operational policy requirements are met;
- Stakeholder concerns are addressed in the assessment;
- Inform local communities about potential impacts; and
- Receive verification from communities on suggested mitigation measures.

Comments received have been collated and submitted (in a Comment and Response Report) to DoE for consideration in decision-making.

2.4.5 COMMUNICATION STRATEGY

The Communication Strategy is a live document which includes an overview of the ESIA Phase public consultation process and its findings (stakeholder database, community concerns etc); and is developed further for implementation during the construction and operations phase in conjunction with the appropriate Government officials.

The purpose of the Communication Strategy is to effectively share project information with beneficiaries and PAPs to enhance their understanding and support for the project. This includes an effective beneficiary feedback mechanism with an agreed response time, in which the project beneficiaries can provide feedback to the project owner, contractors and/or the WASCO and Project Implementing Unit (Lowlands Unit) during the project implementation.

The strategy identifies the most effective channels of communications and communication tools (e.g. press release formats). The Communication Strategy is attached to the Environmental and Social Management Plan (ESMP) (**Vol II**).

[6] Sesotho term for local public gatherings

2.5 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations must be taken into consideration:

- It is assumed that all third-party information obtained (e.g. spatial data) and discussed is correct at the time of writing this report;
- Water quality samples were taken during the low flow periods as this was the only available time to sample. Results obtained may not accurately reflect the instream water quality of the catchments;
- The hydrogeological investigation was carried out at a desktop level only. No in field hydrogeological investigations (including hydro census) were undertaken by WSP;
- COW informed the EAP at Project Inception stage that a Groundwater Supply Assessment was being commissioned for the project area (beyond scope of current application). This is currently underway and not yet completed. The outcome of the report is essential to better understand the potential impact the projet will have on groundwater supply in the region.
- Only a single season was undertaken for this project, namely a dry season or low flow survey. Due to this no temporal or spatial trends have been comprehensively determined nor discussed in this report;
- The dry season or low flow conditions experienced at the time of the survey are likely to inhibit the effective sampling for the respective specialist studies, and in particular terrestrial ecology;
- All relevant spatial data and scientific resources were utilised to compile the expected species lists for the terrestrial fauna and flora. However, Lesotho had historically been under-sampled, and as such, certain species occurrence data had to be supplemented with relevant South African datasets or spatial data
- The ecological study did not interview downstream water users due to time limitations. As a result, the assessment was limited to desktop assessments.
- The accuracy of the GPS used for this assessment are likely to incur an error of between 2-8m, which will in turn have an effect on the accuracy of habitat delineations; and,
- As no other high resolution, multi-spectral imagery was available for the study area, the spatial resolution of imagery used in the classification of habitat types is limited to the 20m pixel size as provided by Sentinel 2 imagery. The use of recent high resolution multi-spectral imagery would greatly assist in overcoming some of the limitations (especially delineating potential habitats).
- The time of socio-economic survey / data collection coincided with the harvesting period which meant that most adults and heads of households were only available very early in the morning (5am-6am) and late at night (6pm-7pm).
- With regards to health care issues, the focus of the study was mainly on HIV/AIDS issues as the nature of the project to be embarked upon requires that the spread of HIV/AIDS should be prevented by all means in the project area. Secondly, Lesotho is rated as one of the countries with the highest rate of HIV/AIDS in the world. This means that the exact number of existing clinics in the project area is not known.
- The 2008 IFR Assessment (LLBWSS- EcoStatus Level III Assessment for Makhaleng, Hlotse and Hololo Rivers) provided by the Client was reviewed at Inception Stage. The following findings are highlighted:
  - Low confidence concerning the hydraulic data used for the project.
  - Confidence in this component of the study is expected to be low due to the “age” of the data – significant changes to the river would have occurred over last 10-14 years.
  - Study indicates that there is insufficient water to maintain the integrity of the Makhaleng River.

3 POLICY, LEGISLATIVE AND REGULATORY FRAMEWORK

3.1 NATIONAL LEGAL AND REGULATORY FRAMEWORK

The Lesotho regulatory framework establishes well-defined requirements and standards for environmental and social management of infrastructure developments. Explanation of legislation, which have a high degree of relevance to the project and/or are referred to in this assessment is provided in **Appendix G-1.**

ENVIRONMENT ACT (NO. 10 OF 2008)

The Environment Act (No. 10 of 2008) makes provision for the following principles of environmental management:

- To assure every person living in Lesotho the fundamental right to a clean and healthy environment;
- To ensure that sustainable development is achieved through sound management of the environment;
- To use and conserve the environment and natural resources of the Basotho Nation for both the present and future generations, taking into account the rate of population growth and the productivity of available resources; and,
- To ensure that waste generation is minimized and safely disposed of.

In addition, the Act prohibits emission of substances, which cause pollution in contravention of emission standards. It also prohibits discharge of hazardous substances, chemicals, materials and oils into the environment.

The proposed development shall adhere to the provisions of this Act to ensure sound environmental management and sustainable development. The ESIA has been prepared to ensure protection of the biophysical and social environment during project implementation and operation. The ESIA content meets both the local requirements in line with the Environment Act (2008) and Lesotho EIA Regulations; as well as the requirements of the project donors – World Bank and European Investment Bank.

SCHEDULE ACTIVITIES REQUIRING ENVIRONMENTAL AUTHORISATION

Part A of First Schedule of the Environment Act (Act 10 of 2008) provides the type of activities for which an ESIA is required. **Table 10** summarises the schedule activities triggered by the proposed project.

Table 10 Schedule Activities

CATEGORY	DESCRIPTION
1. General	a) Any activity outside of character with its surroundings; b) Any structure of a scale not in keeping with its surroundings; c) Major changes in land use.
2. Urban and Rural Development including:	a) Buildings with a total floor space of 500m2 or more; b) Other infrastructure (both rural and urban).
3. Transportation including:	a) Pipelines
4. Dams rivers and water resources including:	a) Reservoirs, levees, storage dams, barrages and weirs; b) Canals, channels and aqueducts, river diversions and water transfer; c) Flood control schemes; d) Pipelines and water reticulation schemes; e) Projects or activities affecting other water sources such as ground water, springs and wells.

6. Mining, mineral extraction including quarrying and open cast extraction of:	a) Aggregates, sand and gravel
17. Projects or activities that can affect the following:	a) Streams and river channels, and their banks; b) Floodplains and wetlands; c) High potential agricultural land; d) Greenbelts or public open spaces in municipal areas; e) Buildings.

Other environmental permits and licences required by the Environment Act; and other regulations are outlined in **Table 11**.

Table 11 Environmental Permits and Licences[7]

ACT, REGULATION OR BYLAW	PERMIT OR LISENCE	REQUIREMENTS	NON COMPLINACE PENALTY	IMPLEMENTING AGENT	PROJECT APPLICABILITY
Section 40 of Environment Act	Effluent Licence	Licence to discharge effluent into the sewage system Validity: One year Fee: As prescribed	M5 000 fine, two years imprisonment, or both. Cancellation of licence.	DoE	Unlikely but may be required during operation for disposal sewage generated by staff at the WTW.
Section 44 of Environment Act	Pollution Licence	Licence to emit any gas, dust or smoke or any other atmospheric pollutant in excess of the prescribed standards Validity: One year Fee: As prescribed	M10 000, three years imprisonment or both. Cancellation of licence.	DoE	Unlikely but may be required during operation should complaints lead to modelling and results show exceedance of standards.
Section 47 of Environment Act	Noise Permit	Permit to allow excessive emission of noise (in excess of the noise emission standards) Validity: Not specified Fee: As prescribed	M5 000 fine, two years imprisonment, or both. Cancellation of licence.	DoE	Unlikely but may be required during construction should complaints be received about blasting activities.

[7] (USAID et al; 2012) SADC Environmental Legislation Handbook 2012

Section 76 of Environment Act	Waste Licence	Licence to own or operate a waste disposal site or plant, other than domestic waste, generate, store, handle, transport or dispose of hazardous waste Validity: One year Fee: As prescribed	M5 000 fine, two years imprisonment, or both. Cancellation of licence.	DoE	Unlikely. The collection and transport of hazardous waste for final disposal will be carried out by a licenced waste contractor.
Mines and Minerals Act	Mine (or Quarrying) Licence	EIA a prerequisite for obtaining mining rights		Ministry of Natural Resources	Borrow pits have not been included in scope of assessment. Should this be required or the sourcing of fill material, an amended to the Environmental Licence can be applied for with submission of an EIS.
Municipal Bylaws	Building Permit	Have to fulfil all environmental requirements and include the EIA Licence in the application for a permit		Municipalities and Ministry of Local Government	This will be required for the proposed WTW and reservoirs.

3.2 LENDER REQUIREMENTS

3.2.1 WORLD BANK GUIDELINES

The World Bank is an international financial institution that provides loans to countries for capital projects. This project is required to comply with the World Bank Group Safeguard Policies and Guidelines.

The following has been considered when undertaking the impact assessment and recommending management and control measures:

- World Bank Group Environmental and Social Safeguard Policies - Policy Objectives and Operational Principles (OPs) (**Appendix G-2**).
- International Finance Corporation (IFC) and World Bank Group Environmental, Health and Safety Guidelines (EHSGs), as follows:
  - EHS General Guidelines (April 2007) (**Table 12**).
  - EHS Guideline for Water and Sanitation (December 2007) (**Table 13**).

Table 12 Summary of EHS General Guidelines Applicability

GENERAL EHS GUIDELINE REFERENCE	APPLICABILITY
1. Environmental	
1.3 Wastewater and Ambient Water Quality	Incorrect management of construction and operational activities in accordance with these guidelines could result in an effect on the water quality in surface water features and aquatic biota. Measures are contained in the ESMP (**Vol II**) for the control of stormwater and prevention of accidental spills of hazardous substances.
1.4 Water Conservation	Guidelines for water monitoring and conservation have been taken into consideration when recommending management and mitigation measures in the ESMP (**Vol II**).
1.5 Hazardous Materials Management	Guidelines for handling and disposal of hazardous material have been considered to include measures in the ESMP (**Vol II**) to prevent the spillage of hazardous chemicals into the environment. Guidelines include measures for the control of persistent organic pollutants (POPs) in pesticide formulations.
1.6 Waste Management	Both general and hazardous waste will be generated during the construction phase, and to a lesser extent, the operation phase of the project. If improperly stored, managed and disposed of, these wastes can pose a risk to human health and the environment. Waste management measures for both general and hazardous waste are contained in the ESMP (**Vol II**).
1.7 Noise	Disturbance to the residents located near the development footprint will have to be taken into account during the construction phase. Unwarranted noise levels due noisy activities (excavations, blasting etc.) need to be maintained by the Contractor within the satisfactory standards for urban and rural areas. World Health Organisation (WHO) (1999) *Guidelines for Community Noise* are referred to as acceptable noise limits (**Table 17 Chapter 3.4.2**). As outlined in the ESMP (Vol II) noise emissions should be controlled by using equipment that emits noise in accordance within acceptable limits for urban and rural areas. Vibrations have the potential to affect fossorial species (such as moles and certain reptile species).
1.8 Contaminated Land	The accidental spillage of chemicals and substances can result in the contamination of soil. Contaminated land should be managed to avoid the risk to ecological receptors. Spill Contingency Measures and Emergency Response measures are contained in the ESMP.
2. Occupational Health and Safety	
2.1 General Facility Design and Operation	The proposed bulk water supply facilities have been designed in line with recognised engineering methods and design practices as outlined in the SMEC (2018) *Lesotho Water Sector Improvement* Project II: *Detailed Design Report (D5) Zone 6 and 7 – Mafeteng and Mohale's Hoek Region*. Further detailed designs recommended within this report should be reviewed and signed off by a suitably qualified person. Qualified and competent persons should be employed to operate the facilities during the operational phase.

2.2 Communication and Training	A Communication Strategy forms part of the ESMP (Vol II) for guidance and implementation during construction and operation. The ESMP also contains environmental training requirements.
2.3 Physical Hazards	Excavating, blasting and operation of construction machinery will present potential physical hazards. Training (toolbox talks / awareness programmes) for both site staff and surrounding communities and other measures (e.g. fencing, signboards, traffic, control of vehicular movement) are contained in the ESMP **(Vol II)** to reduce the risk of these hazards as far as practicably possible.
2.4 Chemical Hazards	Handling and the storage of oils, greases and other chemicals during the construction and operational present potential chemical hazards. Adequate training should be provided to all stakeholders involved in the project to deal with potential chemical hazards. Training and other measures (e.g. storage and handling requirements) are outlined in the ESMP (**Vol II**).
2.5 Biological Hazards	The influx of migrant workers (and potential job seekers) has the potential to cause biological hazards to the local communities through the transmission of communicable diseases. Training (toolbox talks / awareness programmes) for both site staff and surrounding communities and other measures (e.g. health screening assessment of site staff, provision of site medical support and measures to control potential influx of job seekers) are contained in the ESMP (**Vol II**) to avoid these hazards as far as practicably possible.
2.6 Radiological Hazards	Proposed communication towers at reservoir locations are radiation-generating devices. As outlined in the ESMP, the selected (tele) communications provider is to undertake and provide proof of a Radiofrequency (RF) emission studies to ensure that sites do not present a health risk to surrounding communities and maintenance staff during operations (i.e. exposure limits being exceeded). The compliance report must be maintained on site, and contain information on the hazardous areas and contact information for the antenna owner.
3. Community Health and Safety	
3.1 Water Quality and Availability	Standards contained in the WHO (2008) *Guidelines for Drinking Water* provides standards for most pollutants and contains a methodology for the water quality-monitoring plan. These guidelines have been incorporated into the proposed water quality standard operation procedure included in the ESMP (**Vol II)**. The potential effect of surface water abstraction on sustainability of supply, downstream ecosystems and land users is assessed in the EWR Study (**Appendix B**). COW has informed the Consultant that a detailed Groundwater Supply Assessment are being commissioned for the project area (beyond scope of current application).

3.2 Structural Safety of Project Infrastructure	Local communities surrounding active working area (construction phase) are at risk and if project infrastructure is constructed incorrectly (operational phase). The proposed bulk water supply facilities have been designed in line with recognised engineering methods and design practices as outlined in the SMEC (2018) *Lesotho Water Sector Improvement* Project II: *Detailed Design Report (D5) Zone 6 and 7 – Mafeteng and Mohale's Hoek Region*. Further detailed designs recommended within this report should be reviewed and signed off by a suitably qualified person. Qualified and competent persons should be employed to operate the facilities during the operational phase. Safety measures are outlined in the ESMP (**Vol II**) (e.g. fencing, awareness programme and signage). Qualified and competent persons should be employed to operate the facilities during the operational phase.
3.3. Life and Fire Safety	Fire Control measures for implementation by the Contractor are contained in the ESMP (**Vol II**).
3.4 Traffic Safety	Traffic safety measures are imperative to a safe working environment. During the construction phase consideration must be given to the potential traffic safety risks associated with the transportation of labour and delivery of materials. The majority of the pipeline is routed adjacent to and within public roads. Safety measures are outlined in the ESMP (**Vol II**) (e.g. delivery of abnormal loads outside peak times of the relevant communities / pedestrians; and adequate traffic signage).
3.5 Transport of Hazardous Materials	Transportation of temporary ablutions must be undertaken by registered and accredited waste handling companies.
3.6 Disease Prevention	The Client and the contractor are required as outlined in the ESMP **– Vol II**) to avoid/minimise potential community exposure to communicable diseases associated with influx of project labour. Training (toolbox talks / awareness programmes) for both site staff and surrounding communities and other measures (e.g. health screening assessment of site staff, provision of site medical support and measures to control potential influx of job seekers) are contained in the ESMP (**Vol II**) to avoid these hazards as far as practicably possible.
3.7 Emergency Preparedness and Response	Spill Contingency Measures and Emergency Response measures are contained in the ESMP (**Vol II**). The information contained therein should be communicated to site staff and site visitors.
4. Construction and Decommissioning	
4.1 Environment	Key potential construction and decommissioning impacts on the biophysical environment include: dust and particulate emissions, effect of noise and vibrations on fauna; erosion, sedimentation and decreased quality of natural water systems and ultimately the biological systems that use these waters.

4.2 Occupational Health and Safety	Occupational health and safety of the workers is imperative during the construction and decommissioning related activities. Lack of implementation and enforcement of mitigation measures recommended in the guidelines, and contained in the ESMP (**Vol II**) will increase the potential for accidents resulting in potential loss of life or limbs among others.
4.3 Community Health and Safety	The Contractor is to conduct an assessment of potential risks/impacts on community health and safety for the whole project life-cycle, and establish preventative/control measures to avoid/ minimise risk, consistent with human rights principles and good international industry practice. Under Lesotho law, all employers have responsibilities to provide measures to prevent the spread of HIV/AIDS. In respect of broad community health, safety and security, the higher standard (World Bank EHS and national) will prevail. Specific measures to address labour influx, gender based violence, and HIV/AIDS will be included in contracts.

Table 13 Summary of EHS Guideline for Water and Sanitation Applicability

GENERAL EHS GUIDELINE REFERENCE	APPLICABILITY
1. ENVIRONMENT	
1.1.1 Drinking Water	
Water Withdrawal	Water will be withdrawn from for the Makhaleng River. The client must ensure that the reserve for downstream users and aquatic life is considered through the use of appropriate outlet flow infrastructure. Design of the intake infrastructure must consider the safety of aquatic life. These aspects have been considered and recommendations made in the EWR Study (**Appendix B**).
Water Treatment	Water will be treated at the proposed Makhaleng WTW. The client must ensure that solid waste residuals and sludge generated from filtration is disposed in accordance with the appropriate waste disposal standards in registered facilities. Wastewater generated during the treatment of water must be disposed in accordance to the World Bank standards by applying it land rather than releasing to surface water. Chemicals used to treat the water should be stored and handled in accordance to World Bank Standards in the General EHS Guideline. The design of the system should include installation of an ozone-destroying device at the exhaust of the ozone-reactor.
Water Distribution	This project entails the supply of bulk infrastructure ~130-160km in length. The distribution network will be the responsibility of WASCO. Pipes, pumps and control panels must be installed as per the engineering specifications and that that appropriate pressure is maintained Leaks and loss of pressure during the operational phase should be inspected and fixed quickly.

1.1.2 Sanitation	
Faecal Sludge and Septate Collection	During the construction phase, toilet facilities with the ability to treat faecal matter will be provided at the contractor's camp. The Contractor is required to ensure that the system is regularly serviced to prevent plugging and overflows. Servicing of the facilities should be done by a registered and accredited service provider.
Sewerage	Sewerage generated at the contractor's camp must be handled of according to the World Bank Standards for the Management of Hazardous Waste Material. Offsite disposal is required.
Wastewater and Sludge Treatment and Discharge	The discharge of wastewater from the treatment facility during the operational phase must be in line with the standards and guideline of the World Bank. Future investigation into possible beneficial reuse / land application could be undertaken (beyond scope of current application). Quality of WTW residuals for land application should be consistent with relevant public health-based guidance with the WHO (2006) *Guidelines for Safe Use of Wastewater* and applicable national requirements.
1.2 Occupational Health and Safety	
Accidents and Injuries	Construction workers undertaking tasks are required to be qualified and adequately trained. Appropriate safety apparatus, signage and personal protective equipment (PPE) should be provided and utilised onsite as outlined in the ESMP (**Vol II**).
Chemical Exposure and Hazardous Atmospheres	During the operational phase, the operators of the water treatment facility will be exposed to chemicals stored onsite. Storage of the hazardous substances must be line with the World Bank EHS Guideline standards as detailed in the ESMP (**Vol II**), for example: Indoor air quality monitoring should be undertaken regularly; constant surveillance to monitor potential leaks of hazardous gases and liquids; appropriate PPE will be provided to personnel working onsite.
Pathogens and Vectors	During the operational phase, wastewater and sludge attracts pests and exposes workers to pathogens and microorganisms that can remain suspended in the air for long periods, which may expose workers to endotoxins. Measures to mitigate potential occupational health hazards are included in the ESMP (**Vol II**).
Noise	Disturbance to the residents located near the development footprint will have to be taken into account during the construction phase. Unwarranted noise levels due to noisy activities (excavations, blasting etc.) need to be maintained by the Contractor within the satisfactory standards for urban and rural areas. WHO (1999) *Guidelines for Community Noise* are referred to as acceptable noise limits (**Table 17 Chapter 3.4.2**). As outlined in the ESMP (**Vol II**) noise emissions should be controlled by using equipment that emits noise in accordance within acceptable limits for urban and rural areas. Noise from pumps and other machinery relating to the operation of the water treatment facility should be in accordance to the acceptable limits.
1.3 Community Health and Safety	
1.3.1 Drinking Water	

Water Intake (Water Supply Protection)	Flow at the intake point is required to be constantly measured to ensure adequate water inputs and that enough water is bypassed for the downstream communities (water users) in line with EWR Analysis recommendations (**Appendix B**).
Water Treatment	Water outputs should be tested frequently and results should be in accordance to the WHO (2009) *Guidelines for Drinking Water Quality*. Measures to ensure security of the water treatment plant include the acquisition and controlled access of surrounding land parcels.
Water Distribution	Integrity inspection of the pipeline and associated infrastructure is required regularly to ensure sustainable supply and water quality is not compromised.
1.3.2 Sanitation	
Wastewater and Septage Collection	The client should ensure that the public is protected from the health risks associated with the removal and transportation of the contractors' toilet facilities sewerage. Handling and disposal thereof should be undertaken by a registered and accredited waste service provider as outlined in the ESMP (**Vol II**).
Wastewater and Sludge Treatment	Wastewater generated during the treatment of water should be disposed in accordance to the World Bank standards by applying it to land rather than releasing to surface water. Odour nuisance and atmospheric releases from the water treatment facility need to be mitigated as outlined in the ESMP (**Vol II**). A buffer surrounding the WTW (with controlled access) is planned to ensure adequate distance between harmful activities and communities.
Land Application	Wastewater from the facility cannot be used for irrigation unless detailed investigations on suitability have been undertaken.

3.2.2 EUROPEAN INVESTMENT BANK (EIB) GUIDELINES

The European Investment Bank (EIB) is a European Union Body that applies a first class range of policies and standards regarding its operations and relations with stakeholders. These policies and standards are reviewed and updated periodically and are illustrative of how the Bank seeks to fulfil its mission in an open, transparent and responsible way.

Environmental and Social Principles and Standards (2009) outlines the standards that the EIB requires of the projects that it finances, and the responsibilities of the various parties. The EIB's mission is to support projects that make a significant positive impact on people's lives. The EIB applies the highest standards in its project appraisal to ensure that the investments it supports are economically and technically sound and comply with demanding environmental and social criteria. To fulfil these objectives, a mechanism has been developed to determine the eligibility of projects for EIB support, to establish priority, and proposes a monitoring methodology to measure the actual or 'ex-post' value added results at project completion.

THREE PILLARS

In 2012 the Bank reviewed its 3 Pillar Assessment Results Framework (3PA), a multi-criteria project appraisal method which assesses potential operations before Board Approval, and identifies indicators to monitor the projects' expected results. The 3PA is structured around 3 pillars (or metrics), and is complemented by three categories of result monitoring indicators.

Multi-criteria that underpin the 3PA:

- **Pillar 1**: Quality and Contribution to Sustainable Growth and Employment

- **Pillar 2**: Contribution to EU/EIB policy
- **Pillar 3**: EIB Contribution

Three types of monitoring indicators which seek to capture the effects of its lending operations:

- **Core Result Indicators**: These relate to the temporary and permanent employment impact of the operation; energy efficiency savings.
- **Output Indicators**: These are sector indicators that monitor the amount of goods and services produced by the operations financed by the Bank.
- **Outcome Indicators**: These are also sector indicators that try to capture the intermediate effects of EIB operations on people's quality of life, the environment, the Sponsor's activity, sector, and the economy.

Pillar 1 focuses on the technical, financial, economic, environmental and social viability of the project, thereby assessing its potential contribution to sustainable economic growth and employment. It reflects the EIB's commitment to sound investments supporting growth and employment in the EU.

EIB projects, particularly in the African, Caribbean and Pacific Regions, need to align with the EIB's Gender Strategy. EIB have requested that the project clearly indicate how it aligns with and contributes to gender aspects along the following three pillars: Protect, Impact, and Invest. **Appendix G-5** includes a summary of how the above has been applied during the ESIA for the LLBWSS for Zone 6 and 7.

MONITORING AND EVALUATION

Blending facilities are innovative financial instruments that use EU development grants to leverage additional funding from European and regional development financial institutions and the private sector. They help implement key infrastructure and private sector support projects that are critical to sustainable development in partner countries worldwide. Based on comments received on the Draft Inception Report, it is WSP's understanding that blending facility requirements are being applied to the LLBWSS Zone 6 and 7 Project.

The Africa Investment Facility (AfIF), set-up in 2015 as an EU's regional blending facility requires the provision of disaggregate data (typically for gender and youth) provide a baseline and to meet Expected Results / monitoring indicators.

A logical framework and well-defined methods used for monitoring the project's activities and progress will be designed for the project. This includes indicators that measure achievements of the overall goal and its strategic objectives at all levels. The outcome and intermediate indicators will be project specific and cross sector indicators. Monitoring tools will be designed taking into consideration gender-specific needs, impacts and vulnerabilities as mentioned above. **Table 14** outlines indicators that cover the three gender pillars (excludes civil infrastructure indicators).

Table 14 Monitoring and Evaluation Indicators

TYPE OF INDICATOR	DESCRIPTION
Outcome Indicators	**Direct project beneficiaries**: Baseline data from the socio-economic survey. It is defined as the number of households that benefit from safe drinking water. The data will be disaggregated by child headed or female-headed households.
	Number of beneficiaries living below poverty line: This will show the number of people whose living conditions have been improved by the project. The baseline can be estimated from the socio-economic survey or the secondary data from the National Household Budget Survey, Bureau of Statistics. The data will be disaggregated by gender, age, income/poverty level.

	Direct employment during the construction phase: Number of construction workers employed during construction phase. Data will be disaggregated by gender, age and disability. The data will be further analysed by type of work and earnings.
Intermediate Indicators	**Percentage of people affected with assets directly impacted receiving compensation as agreed in RAP**: This indicator will show the percentage of PAPs receiving compensation as planned including the various vulnerable groups.
	PAPs areas under cultivation: Livelihood of the beneficiaries (farming / backyard gardens etc.).

3.3 INTERNATIONAL CONVENTIONS

Appendix G-3 summarises the international conventions to which Lesotho is a signatory, and which are of a high degree of relevance to the proposed Zone 6 and 7 bulk water supply scheme.

3.4 NATIONAL AND INTERNATIONAL GUIDELINES AND STANDARDS

3.4.1 AIR QUALITY

DUST AND PARTCULATE MATTER

The WHO (2000[8]; 2005[9]) air quality interim targets and guidelines are designed to offer guidance in reducing the health impacts of air pollution. The guideline values provided are aspirational and are intended to achieve a maximum degree of protection. The interim targets are set points to allow the staged achievement of the ambient air quality guidelines. While the WHO provides scientific guidance to all countries on the levels of pollution that adversely affect human health, its work does not take into consideration the socio-economic conditions prevalent within any country. These guidelines are intended to inform policy-makers and to provide appropriate targets for a broad range of policy options for air quality management in different parts of the world. The ambient guidelines and interim targets for particulates on 24-hour and annual averaging periods are presented in **Table 15.**

Table 15 WHO Ambient Air Quality Guidelines for Particulate Matter

POLLUTANT	AVERAGING PERIOD	GUIDELINE/TARGETS (µG/M^3)
Particulates (PM_{10})	24-hour	150 (interim target-1) 100 (interim target-2) 75 (interim target-3) 50 (guideline)

[8] World Health Organisation (2000), **Air Quality Guidelines for Europe**, 2nd Edition, Copenhagen.

[9] World Health Organisation (2005). **Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulphur Dioxide, Global Update 2005, Summary of Risk Assessment**, Geneva.

	Annual	70 (interim target-1) 50 (interim target-2) 30 (interim target-3) 20 (guideline)
Particulates ($PM_{2.5}$)	24-hour	75 (interim target-1) 50 (interim target-2) 37.5 (interim target-3) 25 (guideline)
	Annual	35 (interim target-1) 25 (interim target-2) 15 (interim target-3) 10 (guideline)

Total suspended particulates (TSP) includes particles of aerodynamic diameter of 30 microns or less and is generally a nuisance in terms of dust fallout. Dust fallout comprises of particulate matter (PM) with varying aerodynamic diameters and mass characteristics. Visible dust fallout typically has a high particle size and mass characteristic, and thus a localized impact due to the rapid gravity settling of the larger particles. Nuisance effects can be caused by particles of any size, though are generally associated with particles greater than 20 microns. Dust fallout is not usually associated with health impacts, however this depends on the composition of the particles (e.g. the concentration of heavy metals).

The South African National Dust Control Regulations (No. R.827) were promulgated on 01 November 2013 in terms of Section 53(o), read with Section 32 of the National Environmental Management: Air Quality Act 39 of 2004 (NEM:AQA). Whilst these guidelines are currently not enforceable in Lesotho, they do serve as recommendations for good practice. Acceptable dust fall rates under the South African National Dust Control Regulations, expressed in units of $mg/m^2/day$ over a typical 30-day averaging period, are presented in **Table 16.**

Table 16 South African National Dust Fallout Standards

RESTRICTION AREAS	DUST FALLOUT RATE ($MG/M^2/DAY$, 30-DAY AVERAGE)	PERMITTED FREQUENCY OF EXCEEDING DUST FALL RATE
Residential Area	D <600	Two within a year, not sequential months
Non-residential Area	600 < D < 1200	Two within a year, not sequential months

GASEOUS EMISSIONS

The gaseous pollutants of focus are those emitted by vehicles and during small-scale solid waste combustion (e.g. nitrogen dioxide, sulphur dioxide and carbon monoxide). The WHO (2006) *Guidelines for Gases of Focus* are presented in **Table 17.**

Table 17 WHO Ambient Air Quality Guidelines for Gases of Focus

POLLUTANT	AVERAGING PERIOD	GUIDELINE/TARGETS ($\mu G/M^3$)
Nitrogen dioxide (NO_2)	1-hour	200 (guideline)
	Annual	40 (guideline)
Sulphur dioxide (SO_2)	10-minute	500 (guideline)
	24-hour	125 (interim target-1) 50 (interim target-2) 20 (guideline)
Carbon monoxide (CO)	1-hour	30 000 (guideline)
	8-hour	10 000 (guideline)

3.4.2 NOISE EMISSIONS

Disturbance to the residents located near the development footprint will have to be taken into account during the construction phase. Unwarranted noise levels due to noisy activities (excavation of trenches and blasting of bedrock etc.) need to be maintained by the Contractor within the satisfactory standards for urban and rural areas. WHO (1999) *Guidelines for Community Noise* are referred to as acceptable noise limits (**Table 18**). In the case, where consistent complaints are received a monitoring network may be required to assess impacts and recommend mitigation.

Table 18 WHO Guidelines for Community Noise

	ONE HOUR LAEQ (DBA)	
RECEPTOR	**Daytime 07:00 – 22:00**	**Nighttime 22:00 – 7:00**
Residential; institutional; Educational	55	45
Industrial; commercial	70	70

3.4.3 SURFACE WATER QUALITY

The Lesotho Environment Act (2008) have set draft potable water quality standards which are being used as working documents. The drafted water quality standards are presented in **Table 19**. The Act states that in the absence of local standards for other pollutants, developers should refer to WHO, World Bank and/or donor country standards.

Table 19 National Draft Potable Water Quality Standards

WATER QUALITY CONSTITUENT	GUIDELINE FOR DOMESTIC USE
Algae	0 – 5mg/l chlorophyll a
Aluminium	0 – 0.15mg/l
Coliphages	<1 per 100 ml
Dissolved Organic Carbon (DOC)	0 – 5mg/l C
Electrical Conductivity	0 – 70mS/m
Enteric Viruses	<1 TCID 50/10 litres
Faecal Coliforms	0 per 100ml
Fluoride	0 – 1.0 mg/l
Iron	0 – 0.1 mg/l
Manganese	0 – 0.05 mg/l
Mercury	0 – 0.0005 mg/l
Nitrate/Nitrite	0 – 6 mg/l N
Odour TON = 1	TON = 1
pH	6.0-9.0
Protozoan Parasites	<1 Giardia cyst/10 litres
Total Hardness	< 100 mg/l CaCO3
Turbidity	0 –1 NTU

As stated within the IFC/World Bank (2007) *General EHS Guidelines Section 3: Community Health and Safety*; and Lesotho Environment Act (2008), in the absence of local standards for other pollutants, the analytical

programme should be in accordance with the WHO (2011) *Guidelines for Drinking-Water Quality* (**Appendix G-6).** The pH and electrical conductivity measured in-situ must be validated through laboratory testing.

4 PROJECT DESCRIPTION

4.1 PROJECT MOTIVATION

The Lowlands region of Lesotho, which includes the more populous, less mountainous western and southern parts of the country, has suffered from drought (Food and Agriculture Organisation of the United Nations (UN), 2016) and inadequate water supply. Historically, the supply of water to urban areas in the Lowlands region has been possible from river extraction and pumping from underground sources. Increased urban population and commercial activities in the Lowlands have led to an increased demand on these resources and water supply facilities. Although Lesotho possesses abundant water resources, limited access to these resources, and particularly in the Lowlands region, has been an obstacle to growth and development.

The objective of the LLBWSS is to ensure that a high percentage of the lowlands settlements (population in excess of 2,500), which constitutes approximately 75% of the total population of the Kingdom of Lesotho, has access to potable water and sanitation facilities. The supply of secure and clean bulk water in sufficient quantities will assist in achieving long-term national economic and social aspirations.

The objectives of the Lesotho National Strategic Development Plan 2012 to 2016 require the development goals to be delivered in a climate resilient manner. Taking action in relation to environment and climate change is one of its five strategic axes. Concerns with regard to climate change notably relate to its potential impacts on agriculture, water availability, soil erosion, mountain livelihoods, biodiversity, and disaster risks (Global Climate Change Alliance, 2012).

For these reasons, it is important that Lesotho develop a reliable water supply system for a multitude of purposes, such as for domestic usage, agriculture, commercial activities, ecotourism, hydropower generation, and environmental sustainability.

The National Strategic Development Plan 2012/2013 – 2016/2017 (Ministry of Development Planning, 2012) (NSDP) has been developed to guide the Implementation of National Vision 2020. Water is identified as one of the infrastructure platforms that need to be developed to propel growth. The plan states: “The primary focus will be on developing water harvesting capacity and distribution networks to industry, households, other institutions and the Southern African region. Creation of water reserves for national water security will also be taken into consideration. Access to good sanitation is still low and innovative financing solutions are required to augment infrastructure. It is also urgent that pre-treatment and water recycling facilities are developed for industry and other purposes”.

Lesotho Finance Minister Dr Moeketsi Majoro has stated that this project would contribute to the implementation of the Lesotho National Strategic Development Plans 2012/13 to 2018/19, which identified the provision of water access in the lowlands, where about two-thirds of the population lives, as a severe problem.

4.1.1 ECONOMIC COSTS

The *Lesotho Water Sector Improvement Project II Updated Detail Design and Construction Supervision: Detailed Financial and Economic Evaluation* (SMEC, October 2017) estimates costs for planning purposes. Zone 6 and 7 capital costs are estimated at ~USD 99 million for Phase 1. The level of operations and maintenance cost were based on the capacity of facilities and production volume. The potable water production for Zone 6 and 7 of 15,853,000 m^3 is estimated at USD 6,534, 000 in 2035. Tariffs at full cost recovery (capital expenditure as well as operations and maintenance) and tariffs at operations and maintenance-only cost recovery were determined based on a financial internal rate of return of 12.0 %, which was the assumed opportunity cost of capital. The calculated tariffs per project area would provide the revenue levels to attain a financial internal rate of return of 12.0 %, at scenarios of full cost recovery as well as operations and maintenance-only cost recovery. Based on this assumption, tariff at full cost recovery would range from US$ 1.3900 per cubic metre for Zone 6 and Zone 7.

4.1.2 SOCIO-ECONOMIC BENEFITS

The benefits identified in the cost benefit analysis carried out for the *Lesotho Water Sector Improvement Project II Updated Detail Design and Construction Supervision: Detailed Financial and Economic Evaluation* (SMEC, October 2017) are based mainly on avoidance of waterborne diseases, specifically diarrhoea, and consequent results of this, such as:

- Reduction in treatment costs (medicine, professional fees, hospital facilities),
- Increase in productivity (the patient would have less absences in school classes or work and less downtime for those accompanying and caring for the patient);
- Avoidance of premature death.

The economic benefits for the value of healthcare gains, mortality reduction, and health-related productivity, were computed based on data from the study on Global Costs and Benefits of Drinking-Water Supply and Sanitation published by the World Health Organisation (WHO) (Hutton, 2012). The Consultant was able to compute Lesotho-specific estimates to time value saved in fetching water from outside sources before the provision of potable water supply. The projected economic benefits are shown in **Figure 5**.

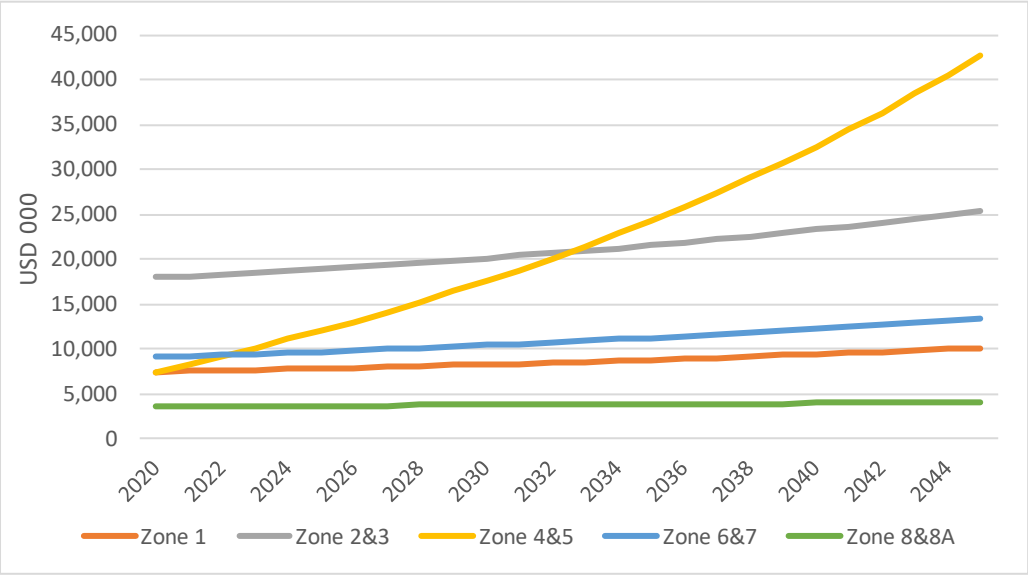


Figure 5 Projected Economic Benefits by Bulk Water Supply Area (SMEC, October 2017)

4.2 LOCATION

4.2.1 NATIONAL SOCIO-ECONOMIC CHARACTERISTIC

Lesotho's economy is dependent on diamond extraction, export of water to South Africa, and migrant remittances. Increasing foreign direct investment in the textile industry and commerce have created more jobs and strengthened the economy, and the GDP per capita, when adjusted by purchasing power parity, has increased. However, poverty, unemployment and high prevalence of HIV/AIDS remain obstacles to economic growth (SMEC, May 2017).

4.2.2 LOCAL SOCIO-ECONOMIC CHARACTERISTICS

Rural population settlement patterns are characterised by scattered small sized villages, and large extended family units. Urban settlements comprise large rapidly growing towns/townships with a degree of industrialisation. The traditional system of land tenure is that the King holds the land in trust for the nation,

while individuals have user rights. In addition to agricultural and livestock production, people relied heavily on their environment for the collection of a wide variety of natural resources, for a range of reasons, for food, medicines, fuel and house construction – collected mainly by women (SMEC, May 2017).

The *Lesotho Water Sector Improvements Project II: Final Socio-Economic Review and Update Report* (SMEC, May 2017) indicates that the most significant population trend is the movement of people from rural to urban areas. The urban pull is triggered by a number of factors, the most important being work opportunities. However, a lack of service provision in rural areas, and particularly around water also contributes to the migratory push.

4.2.3 PROJECT STUDY AREA

The overall LLBWSS project area lies to the western and southern edge of Lesotho and stretches from Butha Buthe in the north to Quthing in the south.

Zone 6 and 7, which falls into Project 4 of the of the LLBWSS stretches across the Mafeteng and Mohale's Hoek regions of the lowlands. **Figure 6** shows the location of Zone 6 and Zone 7 in relation to the other zones included in the overall LLBWSS.

Zone 6 includes, but not limited to, 34 settlements supplied from about 21 supply reservoirs and tanks with a 2045 design population of over 100,000 (**Figure 7**). The proposed reservoirs will be located in the vicinity of Thabana Morena, Ha Turupo, Malumeng, Khobotle, Bataung, Siloe, Mafeteng Town, Qalabane, Van Rooyen, Ramohapi and Matlapaneng. Zone 7 includes, but not limited to, 15 communities supplied from 10 supply reservoirs and tanks with a 2045 design population of about 79,000 (**Figure 8**). The reservoirs will be located in the vicinity of Ha Maphohloane, Ha Tŝepo, Ha Makolane, Mohale's Hoek plus its industrial area, Mesitsaneng and Ha Mapotsane.

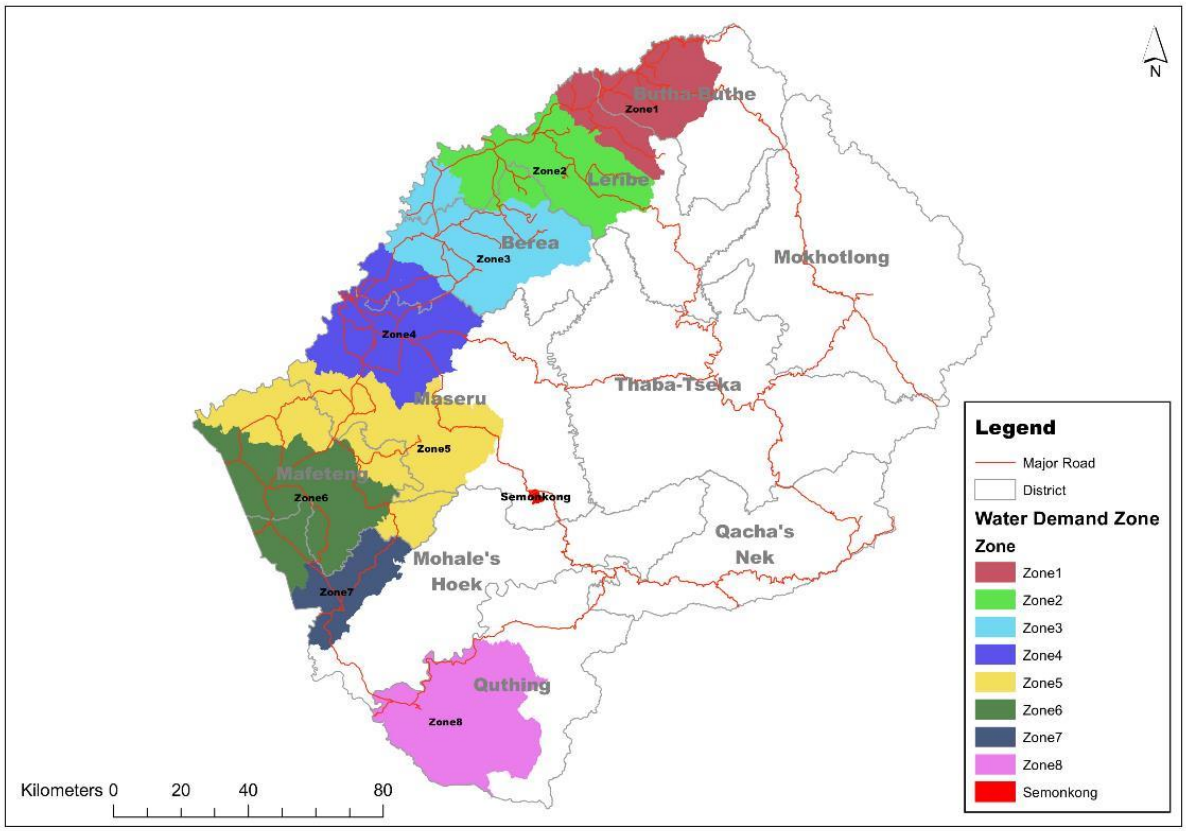


Figure 6 Map showing the Zone 6 and 7 Project Areas (as Project 4) of Lesotho Lowlands Water Supply Scheme (SMEC, 2018)

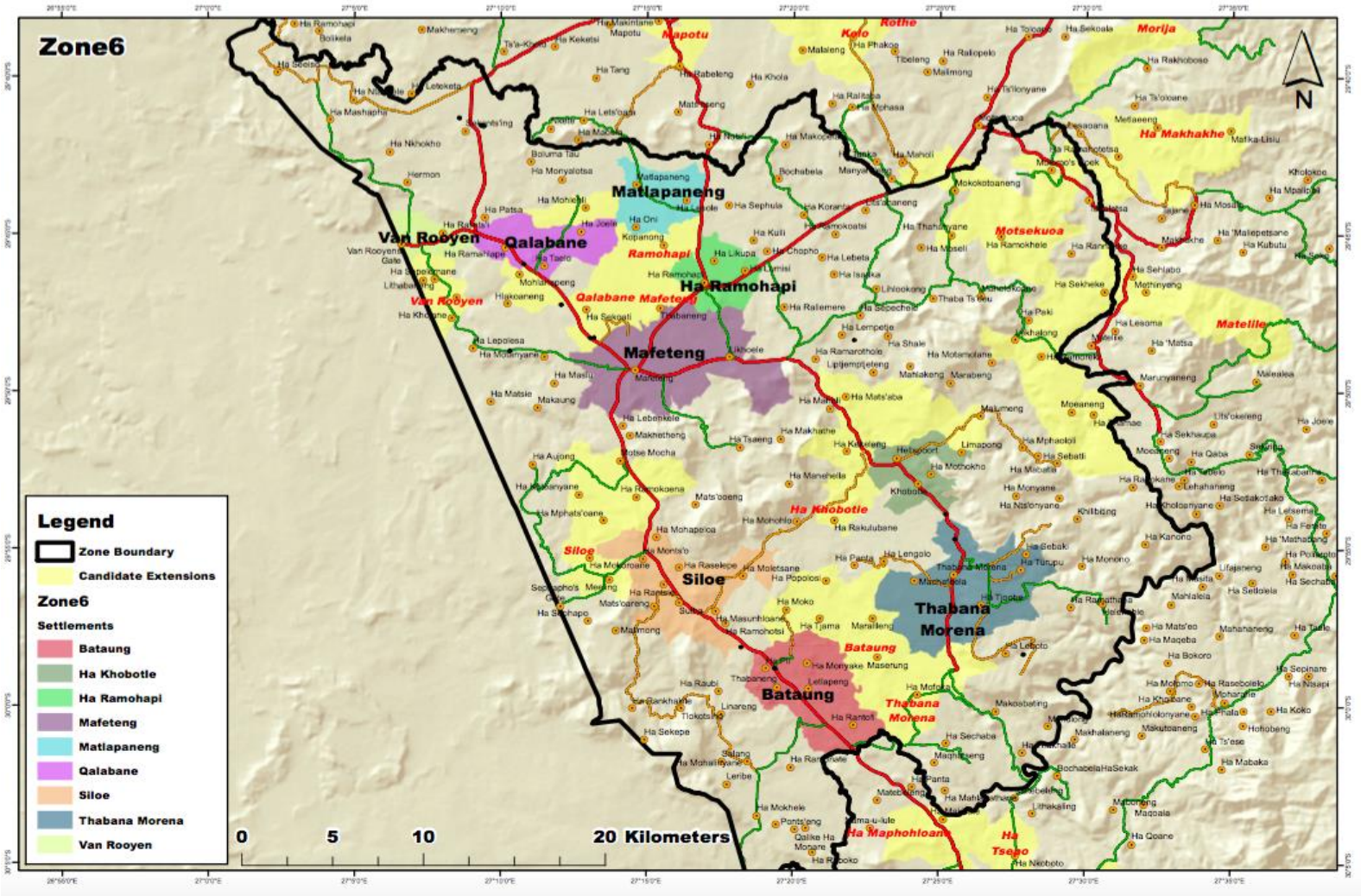


Figure 7 Settlements supplied in Zone 6 (SMEC, 2018)

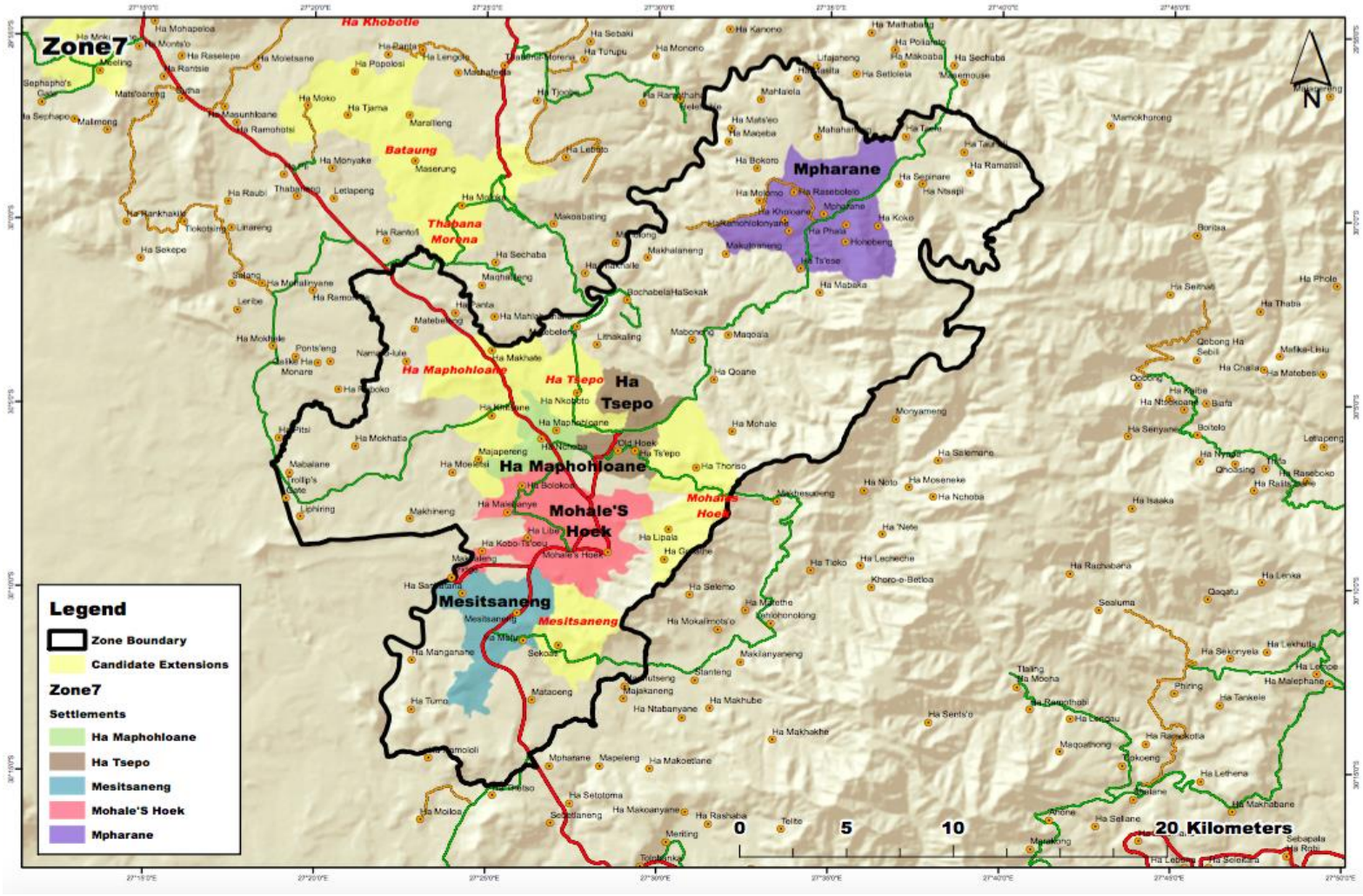


Figure 8 Settlements supplied in Zone 7 (SMEC, 2018)

4.3 PROJECT AREA OF INFLUENCE

4.3.1 SOCIO-ECONOMIC STUDY BOUNDARY

The LLBWSS Southern Region consist of Zone 6 (Mafeteng) and Zone 7 (Mohale's Hoek) main population centres together with surrounding settlements of over 2,500 that fell into 'logical catchments'. Each zone was named after the principal town/s in the area, and did not necessarily correspond to particular Districts or Council areas.

In order to confirm the social study area, the zonal delineations and listing of towns/villages forming settlements were compiled. This was done with use of population greater than 2,500 as a baseline, from various sources including the existing ESIAs for the LLBWSS, conducted in the Northern, Central and Southern parts of the Lowlands (2008 and 2010) and the Feasibility Study (2004) for the LLBWSS. Zone 6 will supply bulk treated water to Mafeteng Town and its adjacent settlement areas around Ramohapi in the North, Van Rooyen's Gate in the West and Thabana-Morena in the South East (**Figure 1**). Zone 7 supplies similar water to Mohale's Hoek Town and its surrounding settlement areas around Mesitsaneng in the South, Ha Tsepo in the North-East, and Maphohloane in the North (**Figure 2**). **Table 20** shows the settlement areas for each zone that form the social study area for this project.

Table 20 Study Area of Project Beneficiaries

ZONE 6 SETTLEMENT AREAS	ZONE 7 SETTLEMENT AREAS
Qalabane	HaMaphohloane
Ha Monyaka	Mpharane
HaKhobotle	Mesitsaneng
HaRamohapi	Mohale's Hoek
Mafeteng	Ha Tsepo
Matlapaneng	
Siloe	
Thabana Morena	
Van Rooyen	

The social area of influence (AoI) will include the settlements and villages where the pipelines will be passing through their properties and where the reservoirs will be installed. A number of communities, nearby schools and individual households in both Zone 6 and 7 will be directly and indirectly affected by the project. For instance, in Zone 6 the communities will include: Makhate, HaTsoloane, Sephapho, Seithleko, a number of areas in Mafeteng town including the hospital area, Matholeng, Ramohapi, Mokhoabong, HaRalintsi, Qalabane, HaRamokhele, ThabanaMorena, Khobutle etc. In Zone 7 the communities include Maphohloane, Nchoba, OldHoek, Ha Tsepo, Qalakheng, Motsemocha, Selibeng, HaMaputsane etc.

4.3.2 ECOLOGICAL STUDY BOUNDARY

In order to manage risks associated with the project, the IFC's Performance Standard 6 (PS6) is crucial for the identification of Critical Habitat, which in turn requires the definition of one or more Discrete Management Units. A spatial 'Discrete Management Unit' (DMU) has been defined for the project. A DMU for a linear development is known to pose challenges.

Whilst a few options are available for defining DMU's for linear projects, this assessment has defined a fixed width "buffer" of 600m from the pipeline footprint area, with direct impacts including the pipeline and 20m corridor, and the footprint area of the WTW (**Figure 9**). The buffer width has taken into consideration the pipeline's and WTW likely area of influence, including indirect and cumulative impacts. The buffer width is described by Desbonnet *et al.* (1994) to be 99% (or greater) effective for the removal and sediment and pollutants, and also excellent general wildlife and avian habitat value, likely to support diverse community and offer protection of significant species. According to Biohabitats Inc. (2007) a 300m buffer is required to allow wildlife movement of rare, threatened or endangered species are present. The DMU has not taken into consideration the likely AoI for the proposed weir, inundation area and water abstraction.

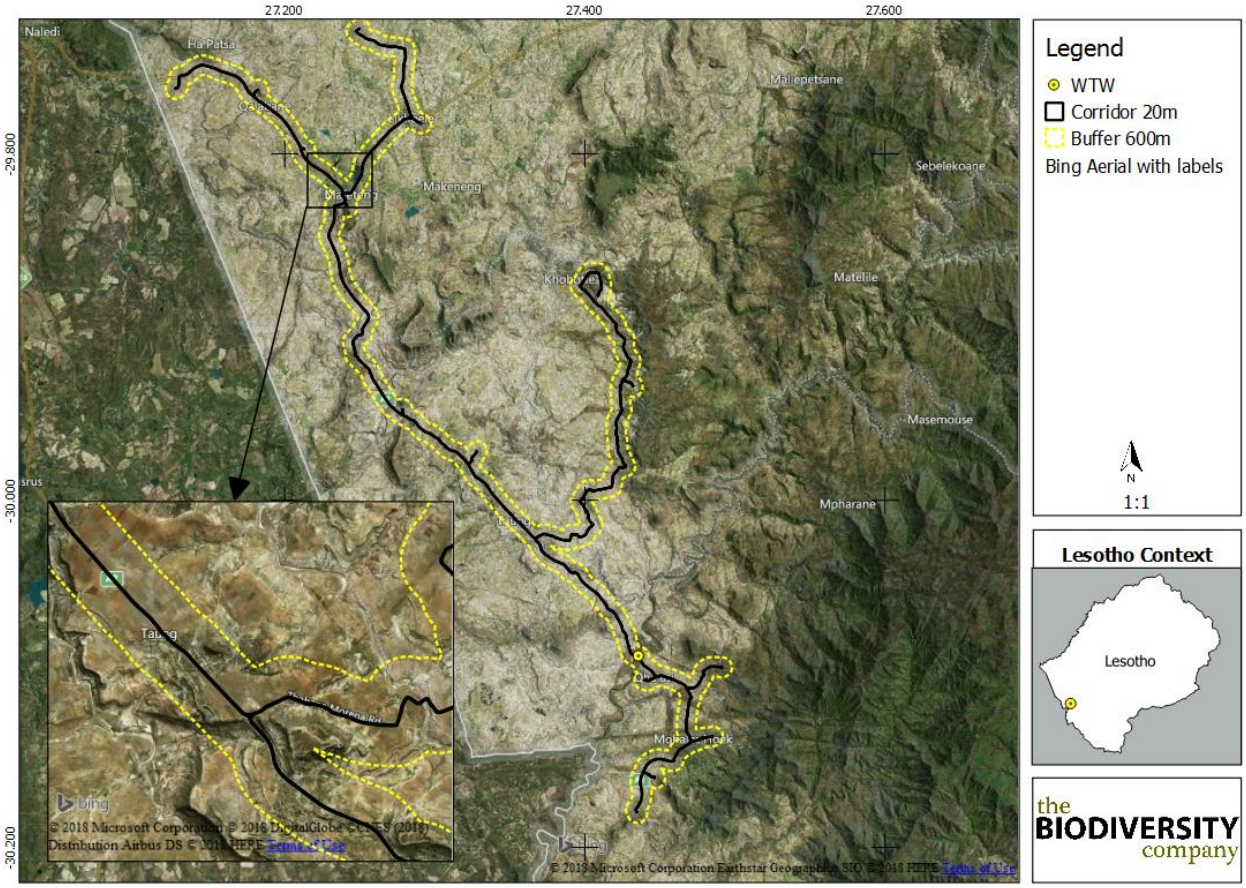


Figure 9: The defined DMU for the project, or likely area of influence

4.3.3 HYDROLOGICAL STUDY BOUNDARY

The hydrological AoI was assessed at a catchment and water management area (WMA) level. Zone 6 and 7 network spread over D15F, D15G, D23F and D23G quaternary catchments which falls within the Lesotho boundary and contributes flow to the Orange Water Management Area (WMA 6). Quaternary catchment D15F and D15G is mainly drained by the Qhoqhoane River and Kolo-La-Pere River respectively which feeds into the Makhaleng River. Quaternary catchment D23F and D23G is mainly drained by the Tsa-Kholo River and Sandsprut River respectively, which feeds into the Caledon River.

4.4 DESIGN AND LAYOUT

4.4.1 DESIGN

BULK WATER SUPPLY SCHEME INFRASTRUCTURE COMPONENTS

Table 21 includes a brief description of the Zone 6 and 7 bulk water supply scheme infrastructure components. The intake, raw water pumping and water treatment plant for Zone 6 are in common with Zone 7 and are designed to accommodate the combined water supply requirements for Zone 6 and 7. The bulk system stops at the proposed reservoirs from where water will enter either a proposed or existing distribution system. Tie-inns to existing distribution systems will be completed under a separate contract. Tie-inn to existing or proposed distribution infrastructure will be carried out to minimise disruption to supplies. Existing distribution networks are severely limited, the area to be supplied from Mafeteng Command reservoir (ZR6) has a network coverage of 40%, Mafeteng Industrial Area (Z6R7) 10% and a coverage of around 30% in the Mohale's Hoek industrial area.

Table 21 Project Design Summary

PROJECT COMPONENT	OVERVIEW
Pipeline	– 130-150 km length of pipelines, with varying diameters from 80mm to 600mm to be constructed in a single phase (Phase 1) to meet 20145 demands. – Comprised of ductile iron and unplasticized polyvinyl chloride (uPVC). – Hydraulic parameter design: 0.6m/s - 2.5m/s. – The main bulk transmission system for Zone 6 comprises of 21 bulk pipeline sections. – The main bulk transmission system for Zone 7 comprises of 9 bulk pipeline sections. – The selection of pipework sizes has been based on achieving acceptable suction and discharge velocities. – which allow for maximising the net positive suction head (NPSH) for the pump-sets as well as optimising. – Sizing of the delivery pipework and ultimate duty head (a function of the static lift and pipe losses).
Makhaleng River Intake	– Direct surface water abstraction from the Makhaleng River with a total capacity of 59,450m3/d. – Hydraulic capacity of 688l/s (about 1.25 times the estimated 2045 demands in both zones). – Integrated intake works and raw water pumping station design including a wet well arrangement with submersible (designed to deliver raw water directly to the inlet of the water treatment works (WTW). – The intake was checked for minimum and maximum velocities for flows required by the WTW.
Makhaleng Water Treatment Works	– Conventional surface water treatment is proposed. – Designed for a capacity of 56 900Ml/d. – The proposed treatment process consists of pre-oxidation of the raw water with chlorine to disinfect and oxidize the possible manganese and iron present in the water, followed by aeration cascade, grit removal system, coagulation / sedimentation / clarification and rapid gravity filtration. – Eight (8) sludge-drying beds each with an area of 241m^2 are proposed; four will be installed to accommodate the 2030 demand (Phase 1), and an additional four will be required to accommodate the ultimate peak demand in 2045. Each bed will have length of 20m and width of 12m.

<table>
<tr><th>PROJECT COMPONENT</th><th>OVERVIEW</th></tr>
<tr><td>Makhaleng Weir</td><td>– Low-level weir across the Makhaleng River with a movable gate / rubber dam next to the proposed intake tower to collect all river flow and create sufficient water depths for the submersible pumps.
– Ecological discharge next to the intake tower.
– Desander next to the water treatment plant.</td></tr>
<tr><td>Reservoirs</td><td>– All the reservoir sites and ancillary works at the sites will be completed in the Phase 1 (some sites make an allowance for future construction of an additional reservoir in Phase 2).
– All reservoirs are roofed.
– 32 (Phase 1 excluding extensions) Service Reservoirs / Sumps.
— 21 Pressed steel reservoirs ranging in capacity from 75-500m3
— 11 Concrete Reservoirs (circular and rectangular) ranging in capacity from 1000–15000m^3
– Reservoir volumes were based on Water and Sewerage Company (WASCO) Guidelines.
– Supply reservoirs sized for 36 hours of storage of the 2045 annual average daily demand.
– Command reservoirs, which receive water pumped from the WTW and deliver to other reservoirs by gravity, are sized for 9 hours peak seasonal daily demand or 6 hours peak incoming pumping rate whichever is largest.
– Proposed height and footprints:
<table>
<tr><th>Type</th><th>Height (m)</th><th>Maximum Footprint including foundations and drainage (m^2)</th></tr>
<tr><td>Rectangular Pressed Steel</td><td>3.6 – 4.8</td><td>32 – 138</td></tr>
<tr><td>Circular Concrete</td><td>4.4 – 5.5</td><td>314 - 573</td></tr>
<tr><td>Rectangular Concreate</td><td>6.0 – 8.5</td><td>1107 - 2059</td></tr>
</table>
</td></tr>
<tr><td>Pumping Stations</td><td>– 18 Pump Stations (Phase 1 excluding extensions) ranging in capacity from 7-849kW
— 5 main transmission pumping stations
— 13 smaller pump stations to individual communities
– All the types are roofed with reinforced concrete slab designed to SANS 0100 199210– The Structural Use of Concrete.
– Pump sumps are size for 2 hours of the peak demand.</td></tr>
<tr><td>Scheme Electrical Installation</td><td>– The electrical installation of this scheme is integrated with the scope falling under the process and instrumentation as applicable to the pump stations, water treatment works and intake works in general. The design-built component is provided at a high level by SMEC (2018), the contractor shall be expected to undertake the complete design-built and take full responsibility thereof.
– Electrical systems for reservoirs and pumping stations will include water communication towers.</td></tr>
</table>

PIPELINE MATERIAL

The selection criteria for the two types of material are based on:

— Constructability

[10] Now superseded by SANS 10100-2:2014.

- Steel pipe joints need to be continuously welded inside and outside of the pipeline and ensuring the pipeline is accessible for welding inside joints. On diameters, smaller than 500mm ø the access inside the pipe becomes difficult. Therefore, all pipes <500mm ø are designed as ductile iron pipes.

- Pressure ratings
  - Ductile iron and steel pipes can withstand the design pressures within the pipelines.
- Site conditions
  - The pipelines are designed to traverse mountainous terrain were rocky excavations will be encountered. The used of ductile iron and steel pipes can take more punishment with regards to installation during construction in these conditions.

4.4.2 LAYOUT

PIPELINE ALIGNMENT

The initial pipeline section was prepared in Civil Designer© software for the 2008 designs. The SSI (2008) design team took this initial pipeline profile and using Engineering judgement "smoothed" the pipeline profile to reduce the number of low and high points caused by strictly following the undulations of ground level. By doing this the number of air valves and drainage (low) points required are greatly reduced.

The horizontal alignment of the pipeline routes was checked and finalized through a process of zooming in to the digital imagery and adjusting alignments where necessary. In some cases, where alignments pass through congested areas or difficult terrain, further fieldwork was carried to make final decisions on such alignments as part of the SSI Engineers and Environmental Consultants (SSI) August 2008 Final Design Philosophy and Processes Report (SSI, 2008). It is noted that most of the proposed pipeline routes have been located within the existing national road reserves.

Liaison were undertaken with the independent team undertaking the Environmental Impact Assessment (EIA), to deal with temporary and permanent impacts on the environment, servitude establishment, public consultation, appropriation and compensation issues. This was also dealt with as part of the SSI (2008) designs.

Following this, the vertical alignments of the pipelines were adjusted and finalised using the digital terrain model.

BULK WATER STORAGE AND TRANSMISSION

The description of the water supply route / pipeline and associated nodes (reservoirs and pumping station) is provided below. **Appendix H-1** includes schematics layouts for Zone 6 (Drawing # Z6/PL/CIV/LAY/002) and Zone 7 (Drawing # Z7/PL/CIV/LAY/002).

The proposed bulk water transmission system stops at the proposed reservoirs from where water will be transferred into either a proposed or existing distribution systems, tie-in's to existing distribution systems will be completed under a separate contract. Tie-in to existing or proposed distribution infrastructure will be carried out to minimise disruption to supplies. It is noted that existing distribution networks are severely limited, the area to be supplied from Mafeteng Command Reservoir (ZR6) has a network coverage of 40%, Mafeteng Industrial Area (Z6R7) 10%; and 30% in the Mohale Hoek Industrial Area.

ZONE 6

The water source for scheme is a river intake on the Makhaleng River, situated on the right bank (Mohale's Hoek side) of the river.

A schematic of the bulk supply system is shown in **Figure 10**. From the Makhaleng WTW the transmission system to Zone 6 will commence with a pumping main pipeline crossing the old steel bridge to the Mafeteng side of the river. From here the pumping main will deliver potable water into Sump 1 (Z6R12) at the junction with the Thabana Morena Road. Two pump stations at the junction will boost the main water supply onwards towards Mafeteng along the Main South 1 Road as well as towards Thabana Morena via a branch line along the Thabana Morena Road.

From the Booster Pump station PS2 water will be supplied via a further booster pump station into a Transfer Reservoir at the summit of the transmission system about 10km south of Mafeteng. Branch lines from the pumping main system will also supply reservoirs at the settlements of Bataung and Siloe via branch lines along the route. Another branch (Thabana Morena branch line) will supply two reservoirs situated at Thabana Morena and Khobotle, via a booster pump station situated along the route.

The gravity-supplied part of the Zone 6 scheme commences at the Transfer Reservoir. From here water will flow by gravity to the Mafeteng Command Reservoir (Z6R6), situated above the town. From here the water will gravitate to Mafeteng Town as well as the Mafeteng Industrial Reservoir (Z6R7) and the remaining downstream settlements.

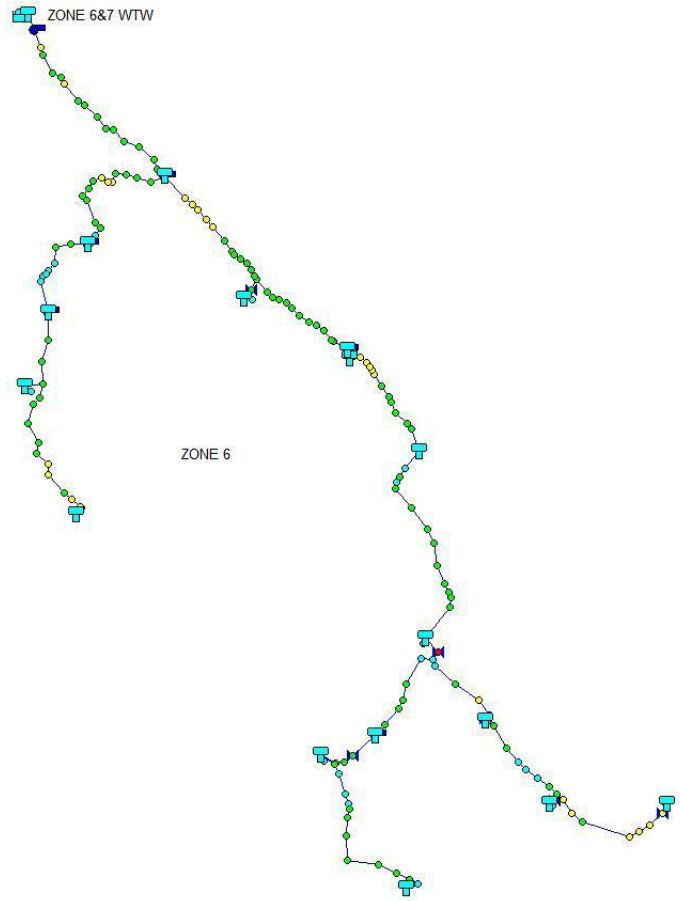


Figure 10 Main transmission supply network layout for Zone 6 (excluding extensions) (SMEC, 2018)

ZONE 7

Mohale's Hoek Town is the major concentration of water demand in the Zone. This is expected to continue with the establishment of the planned Mohale's Hoek II (East) Industrial Estate, with a planned development area of 150 hectares.

In the medium term (up to 2030) and long term (up to 2045), the various existing water supplies in Zone 7 will be augmented by a new scheme supplied by the proposed Makhaleng River intake and WTW. Potable water will be supplied from here to the various reservoirs in the Zone.

A schematic of the bulk supply system is shown in **Figure 11**. The Zone 7 bulk water supply scheme comprises pumping stations, storage and transfer reservoirs and sumps and pumping and gravity mains. From the clear water storage tank at the WTW potable water is delivered to Zone 7 through two independent pump stations and pipeline systems.

The main pump station (Z7PS1) delivers water directly to the Mohale's Hoek Command Reservoir (Z7R3). A line branching from the main pumping line at Junction Z7J1 will supply the Ts'epo Reservoir. From the Mohale's Hoek Command Reservoir the water will gravitate to Mohale's Hoek town as well as to the Mohale's Hoek Industrial Reservoir (Z7R4) and the Mesitsaneng Reservoir (Z7R5).

A second pump station at the WTW (Z7PS2) will deliver water directly to Maphohloane Reservoir (Z7R1). This is the terminal reservoir for the areas of Maphohloane, Ha Nchoba and Ha Matebeleng, situated to the north of Mohale's Hoek Town.

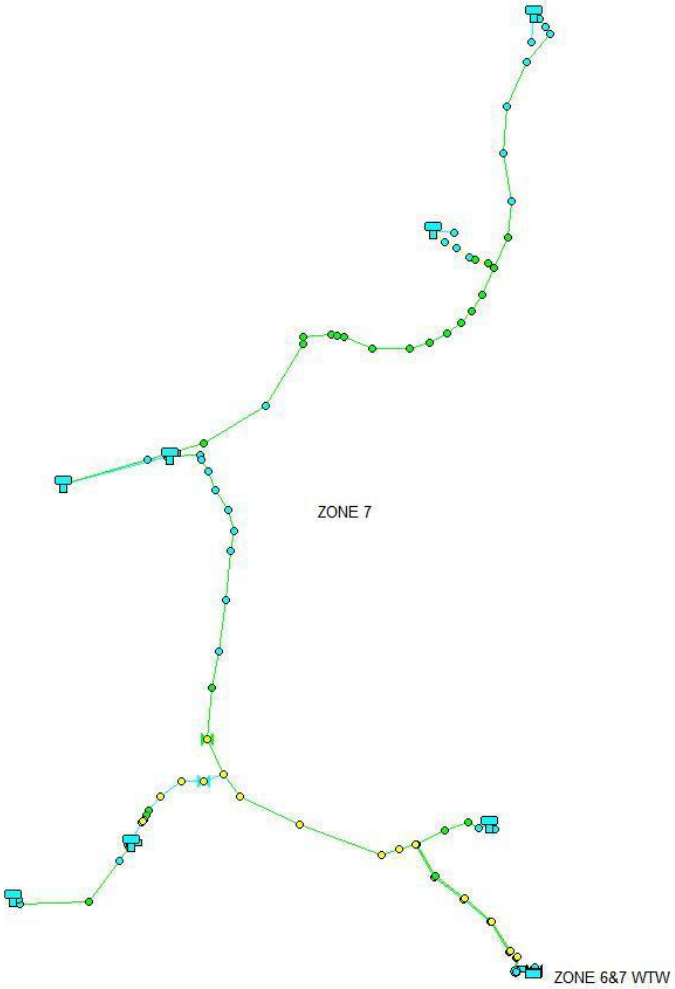


Figure 11 The main transmission network layout for Zone 7 (excluding extensions) (SMEC, 2018)

MAKHALENG RIVER INTAKE AND WATER TREATMENT PLANT

The WTW site layout sets out the process units required to meet the treatment works outputs for 2030, and makes allowance for the additional process units required to meet the works outputs for 2045. The proposed location provided in CAD by SMEC (2018) has been superimposed into ESRI 2016-2017 aerial imagery in **Appendix H-2**.

Two (2) tanks are proposed for the collection and recovery of backwash water to minimize water losses through the plant and the volume of residuals to be disposed of. Initially the recovery system will be provided to accommodate the volume associated with the initial phase of the works with duplication of the facility when the plant is expanded. Eight (8) drying beds each with an area of 241m^2 are proposed, four will be installed to accommodate the 2030 demand, and, an additional four will be required to accommodate the ultimate peak demand in 2045. Each bed will have length of 20m and width of 12m.

The intake structure and the wet well were designed for 1:10 year flood frequency with a flood level of 1,428.9m which shall be confirmed by the Contractor on site. Plant and equipment that are at risk of flood damage are to be located above 1:100 flood level at 1,431.4 m. According to technical drawing provided by SMEC (2018) (**Appendix H-3**) (Drawing #5090025-Z6&7-INT-03000), all components are located between 1435-1438m.

Makhaleng River Intake has three pumping stations on site, one of which (Z7PS2) is a small type. Therefore, Z7PS2 is housed together with Z7PS1, while Z6PS1 would be on its own structure. The pumps and valves connected are a single delivery transmission line leading to the inlet of the water treatment plant. Due to the constructed scour channel in front of the intake, the pumps will be submerged even during low flow conditions. The pumps will operate against a total head of 27m.

MAKHALENG WEIR

EIB appointed Posch and Partner Engineers (P&P) in July 2018 to provide a professional opinion on the proposed intake structure, to consider in particular the secure water abstraction during low-flow periods and to propose improvement measures (if any) and prepare a high level cost estimate for such measures.

The current design (**Figure 12**) foresees an intake building at the outside of a river bend, equipped with an intake screen and submersible raw water pumps. The location is in principle right for placing the intake. However, the Makhaleng River is about 50m wide at this point and pictures show several sand banks across the river section. Bank movements occur during high flow periods resulting in a risk of river discharge channel occurring some distance away from the intake. Secondly, there will be some sub-surface flow in the sandy riverbed which might not be captured. In addition, the water depth during low flow periods might be insufficient for operation of the submersible pumps. It is therefore suggested to build a weir across the Makhaleng River of minimal height.

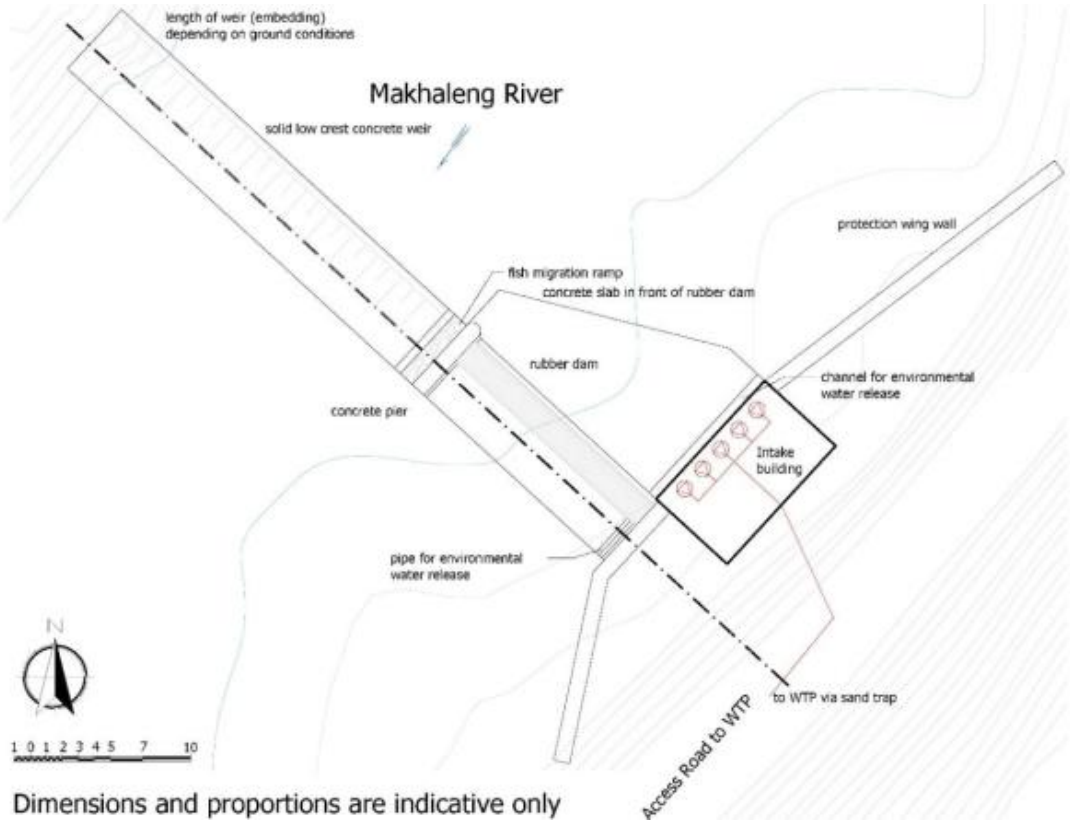


Figure 12 Plan View of the Proposed Weir and Intake (P&P; July 2018)

4.5 SUPPORT INFRASRUCTURE

4.5.1 PROJECT ASSOCIATED INFRASTRUCTURE

Installation of the power supply to the bulk infrastructure will be carried out under a separate contract technically supervised by Lesotho Electricity Corporation (LEC). The proposed project relies on the installation of electrical lines and equipment to LEC specifications up to the edge of the site, or a fixed point within the site, including any transformer requirements, which will remain the property of LEC, and is therefore deemed to be an "associated facility".

Power supply to the bulk water infrastructure locations including water treatment works, pumping stations and service reservoirs will be technically supervised by the LEC. Electricity supply shall be in accordance with LEC's requirements and SANS standards. These include:

- SANS 10142 – National standard for wiring of premises.
- SANS 10142–2 - The code for medium voltage installations above 1 kV AC and not exceeding 22 kV AC and up to and including 3000 kW capacity.

The power supply requirements and standby power generators required in Zones 6 and 7 for each of the infrastructure locations have been assessed and presented in **Table 23** and **Table 24** respectively. This need for construction of advance infrastructure has been discussed between COW and LEC. Electrical supply and costs have been factored into the project.

Table 22 Schedule of power supply source per station for Zone 6 (SMEC, 2018)

AREA	PUMPING STATION ID	PUMP HOUSE STRUCTURE TYPE	PUMP SET ARRANGEMENT (DUTY)	PUMP SET ARRANGEMENT (STANDBY)	ESTIMATED POWER CONSUMPTION PER PUMP	PUMP MOTOR POWER FACTOR	EFF. 100% FL (100%)	STANDARD TRANSFORMER SIZE (KVA)	STANDARD GEN SET SIZE (KVA)
WTW	Z6 PS 01 WTW	Part design and construct	3	1	210	0.9	0.94	630	400
R 12	Z6 PS 02	Large Type 1	3	1	263	0.89	0.9	800	630
R 12	Z6 PS 03	Medium Type 1	1	1	26	0.89	0.94	50	30
R 13	Z6 PS 04	Medium Type 1	1	1	26	0.85	0.73	50	30
R 14	Z6 PS 05	Medium Type 1	1	1	39	0.9	0.76	100	60
R 15	Z6 PS 06	Medium Type 1	1	1	9	0.85	0.86	0	15
R 15	Z6 PS 07	Large Type 1	3	1	210	0.9	0.74	800	630
R 16	Z6 PS 08	Medium Type	1	1	18	0.87	0.67	50	30

R 1	Z6 PS 09	Medium Type	1	1	13	0.87	0.58	50	30
R 2	Z6 PS 10	Large Type 1	1	1	168	0.9	0.94	400	160
R 6A	Z6 PS 11	Small	1	1	9	0.85	0.86	0	15

Table 23 Schedule of power supply source per station for Zone 6 (SMEC, 2018)

AREA	PUMPING STATION ID	PUMP HOUSE STRUCTURE TYPE	PUMP SET ARRANGEMENT (DUTY)	PUMP SET ARRANGEMENT (STANDBY)	ESTIMATED POWER CONSUMPTION PER PUMP	PUMP MOTOR POWER FACTOR	EFF. 100% FL (100%)	STANDARD TRANSFORMER SIZE (KVA)	STANDARD GEN SET SIZE (KVA)
WTW	Intake		3	1	119	0.88	0.921	630	400
WTW	Z6 PS 01	Design and Construct	3	1	347	0.89	0.94	1600	1000
WTW	Z6 PS 02	Design and Construct	1	1	19	0.87	0.887	50	30
R 6	Z6 PS 03	Medium Type 1	1	1	19	0.87	0.887	50	30
R 7	Z6 PS 04	Large Type 2	3	1	275	0.89	0.94	1600	800
R 2	Z6 PS 05	Small	1	1	2.75	0.79	0.8	0	15
R 7	Z6 PS 06	Small	1	1	9.38	0.85	0.86	0	20
R 5	Z6 PS 07	Large Type 1	2	1	176	0.91	0.94	800	400

The required calculated demand for each supply point will be submitted to LEC as soon as the agreements of the total power requirements are finalised. Step down transformers will be installed under this contract to provide low voltage power supply at all the required locations. These will remain the property of the LEC. More engagement will be done prior to construction.

4.5.2 REQUIRED OFF-SITE INVESTMENTS

The COW are investigating the feasibility of the proposed Makhaleng Dam as part of the Lesotho-Botswana Water Transfer (L-BWT) Project. The L-BWT scheme will supply water to Botswana, Lesotho and South Africa from the Makhaleng Dam – part of the Lesotho Lowlands Water Supply Scheme – through a 700 km water conveyance pipeline from Lesotho, through South Africa, to Botswana.

Currently two alternative sites are proposed within Zone 6 for the location of the Makhaleng Dam. The dam will result in the following:

- Water will be released into the Makhaleng River to augment supply to Mohale's Hoek WTP, to serve Mohale's Hoek Town and neighbouring villages; and
- Water will also be availed from L-BWT pipe to serve Mafeteng Town and neighbouring villages.

It is noted that the Makhaleng Dam is not part of the scope for the current assessment (this report), however the dam will assist in augmenting storage capacity to support the proposed LLBWSS.

4.6 PLANNED IMPLEMENTATION

The Bill of Quantities prepared by SMEC (2018) are organised into three Lots for Zones 6 and 7 as follows:

- Lot 1 – Intake, raw water pumping station and transmission main and water treatment works
- Lot 2 – Bulk water transmission mains, service reservoirs and pumping stations
- Lot 3 - Bulk water transmission mains, service reservoirs and pumping stations
- Preliminary and General – includes power supply by LEC which can be determined when commitment to construction date is known.

The three lots are planned to be delivered as one contract under the modified FIDIC Red Book conditions of contract. Lot 1 is planned for procurement as Design and Build to allow the contractors flexibility to adopt innovative technologies for the water treatment processes proposed in this report. Lots 2 and 3 are admeasurement packages under the overall single contract.

Construction for Phase 1 is expected to be carried out over a 36-month period. Phase 2 is planned for execution from 2029 to meet water demands from 2031-2045.

4.7 RESOURCE REQUIREMENTS

4.7.1 ELECTRICITY SUPPLY

CONSTRUCTION

The Contractor shall provide distribution systems from established supply points to the various areas where he requires power for construction purposes or for services or facilities in the various housing, camp and work areas, including the Engineer's site offices. The distribution systems shall comply with the requirements of the LEC. A standby power generator shall be supplied to serve all key installations as well as the Engineer's offices[11].

OPERATION

Power supply to the bulk water infrastructure locations for raw water intake, water treatment works, pumping stations and service reservoirs will be provided by LEC. LEC will determine the best source of power supply to feed each of the infrastructure locations. Main power supply will be fed from existing LEC 11kV system or from the existing low voltage network and reticulated through the building at low 400V. LEC will distribute power to specific locations across the scheme.

4.7.2 WATER SUPPLY

CONSTRUCTION

According to the specifications required by the Contractor[12], the Contractor shall design, supply, install, operate, and maintain an adequate water supply system to supply potable water to the Contractor's labour accommodation and facilities, to the Engineer's offices and to his construction facilities. Potable water shall comply with the requirements of the South African National Standards for drinking water (SANS241:2006). The

[11] Construction of Water Supply Infrastructure for Zone 6 and 7 – Volume III – Work Specifications: Part 1 for Civil Works (2017).
[12] Construction of Water Supply Infrastructure for Zone 6 and 7 – Volume III – Work Specifications: Part 1 for Civil Works (2017).

Contractor shall also provide an ample supply of clean water for aggregate processing, concrete, washing down, and his other uses on the Works.

It is assumed that this requirement will be met either by tanking in potable water or supplied by a potable source. Sourcing of water from ground or surface features, and treatment will be subject to additional assessment and approval.

OPERATION

No requirements for potable water during operation. River water intake is detailed **in Chapter 4.4: Design and Layout; and Chapter 4.8 Operation Phase Activities.**

4.7.3 CONSTRUCTION MATERIAL

Construction materials (including sand) required for this project will be sourced from licensed quarry facilities and approved suppliers. This material should conform to World Bank & IFC (2007) *EHS General Guidelines* (to be managed via contractual documents, as outlined in the accompanying **ESMP – Vol II**).

4.8 PROJECT PHASES

Typically, large-scale infrastructure consists of the following primary phases

- **Pre-Construction Phase**: Project's planning process and authorisations; land acquisition and Engineering, Procurement & Construction (EPC) contracting.
- **Construction Phase**: Construction labour, transportation and the use of heavy equipment, land preparation, construction of temporary facilities (site offices and security), sourcing of materials; demobilisation of the workforce and location cleaning / dismantling of project construction remnants; and rehabilitation.
- **Operational Phase**: Regular maintenance requirements over the lifetime of the project to ensure optimal efficiency and effectiveness (including labour and material / equipment resourcing).
- **Decommissioning Phase**: Due to the nature of this development, the operational phase is assessed as lasting indefinitely and there is no closure or post-closure phases in this scenario.

On completion of the Works, all Temporary Works constructed by the Contractor, unless otherwise specified or directed, shall be removed from the Site. The Contractor shall make safe all areas affected by Temporary Works and reinstate natural drainage. The Contractor shall finish, reinstate, clean up, and relinquish the Site at the end of the Defects Liability Period or such earlier times as directed.

Potential impacts associated with construction and operational phase activities are assessed in the ESIA as detailed below.

The proposed bulk water supply infrastructure is likely to be in operation for the considerable future (well beyond 2045 as a minimum). Therefore, the likely impacts of decommissioning cannot be accurately predicted at this stage. However, impacts during decommissioning are likely to be similar in nature to those identified for the construction phase and will be managed in cognisance of the applicable legislation.

4.8.1 CONSTRUCTION PHASE ACTIVITIES

SITE ESTABLISHMENT

Land is required by the contractor for the following:

- Land for Permanent Works;
- Location of temporary facilities such as offices, workshops, stores, crushing, screening, and concrete site batching plant and other facilities; and
- Location of accommodation facilities for the staff and workforce.

SITE CAMP

Contractor's facilities are required during the construction phase. Site camps are likely to include temporary offices and administration facilities; general materials and chemical storage areas; laydown areas; workshops; accommodation facilities (including ablutions) for construction staff.

It is anticipated that one main site camp will be established in the vicinity of the WTW site (outside of the floodplain of the river). This camp will provide accommodation for staff and labour working at the WTW and facilities, as well as for the pipelines, which are to be constructed north and south of the site. A second site camp is proposed near Mafeteng to support the construction of the pipelines, reservoirs and pump stations proposed.

Before setting up any construction work camp or stockpile site for equipment, the Contractor (or Sub-Contractor) must liaise with the landowner and reach agreement regarding the location and demarcation of any camp to be established, including any compensation to be paid to the landowner. Once agreement with the landowner has been reached on the location of the work camp and site offices, the Contractor must submit a site plan (including general layout drawing to a scale of not less than 1:200) to the Resident Engineer (RE) and Environmental Control Officer (ECO) for approval. This site plan should give details of the layout of the work camp, including site office facilities, toilet and ablution facilities, areas of stockpiling materials, storage of hazardous materials, etc.

Construction work camps should be completely fenced off prior to being established, as to prevent the entry of domestic stock or wild animals and to ensure that the camp is adequately secured against theft and the entry of unauthorised persons.

USE OF EXPLOSIVES

The Contractor's offices, workshops, stores, explosives magazines, fuel depots, and other sensitive facilities shall be surrounded by approved security fencing. The Contractor shall comply with the South African Mine Safety and Health Act (1996) and regulations; the Explosives Amendment Act 1972); as well as additional requirements as may be imposed by the applicable authority in terms of the above regulations involving the use of explosives during construction of the works.

SITE CLEARANCE, MATERIAL REMOVAL & EXCAVATION

Land clearing will be required for construction activities (site preparation, pipelines, reservoirs, pumping stations and water treatment works).

Inspection of the material for any classification other than soft excavation shall be undertaken by the Engineer prior to any excavation. Levels of the occurrence of intermediate and hard rock excavation shall be measured and agreed, recorded and signed by both the Engineer and the Contractor before commencement of intermediate or hard rock excavation. "Hard" material shall be considered to be material requiring the use of explosives to break down for removal. All excavations, whether mass, restricted or trench excavations, which can be efficiently excavated, removed and loaded with hand tools, shall be regarded as soft excavation for the purpose of labour-intensive methods. Mass excavations which cannot efficiently be done by hand methods, and restricted excavations and trench excavations over 2.5 m in depth, as well as individual boulders which cannot efficiently be removed by hand methods, shall be regarded as excavations where conventional methods have to be applied. No excavation for prefabricated culverts may be commenced until the pipes or culverts to be installed are on site. Unless otherwise permitted by the Engineer in writing the total length of open trench shall not exceed five hundred (500) metres.

RESERVOIRS

It is recommended that poor quality soils found during construction will be dug out to a depth of at least 1.5m below the founding level and to an area wider than the footing and be replaced with "G5" material or better quality borrowed material compacted in layers to required engineering specifications.

Land requirements for the placement of reservoirs / storage tanks are calculated considering the following elements: Building footprint, foundation requirements and drainage requirements, (the latter involving a 250mm gravel drain around the tank). The estimated "land take" associated with reservoir / tank installation is as follows:

- Zone 6: 7037m^2
- Zone 7: 6265m^2

The estimated average volume of material to be excavated for the placement of 31 reservoirs totals ~1,430m^3.

PIPE LAYING AND BACKFILLING

Excavation of trenches, bedding and backfilling will be done according to the recommendations and specifications of SANS 1200 DB: Excavation and SANS 1200 LB: Bedding. The recommended bedding to be used is Class B, SANS 1200. Bedding thickness is specified as a minimum of 100mm or quarter of the pipe diameter, whichever is greater (**Figure 13**).

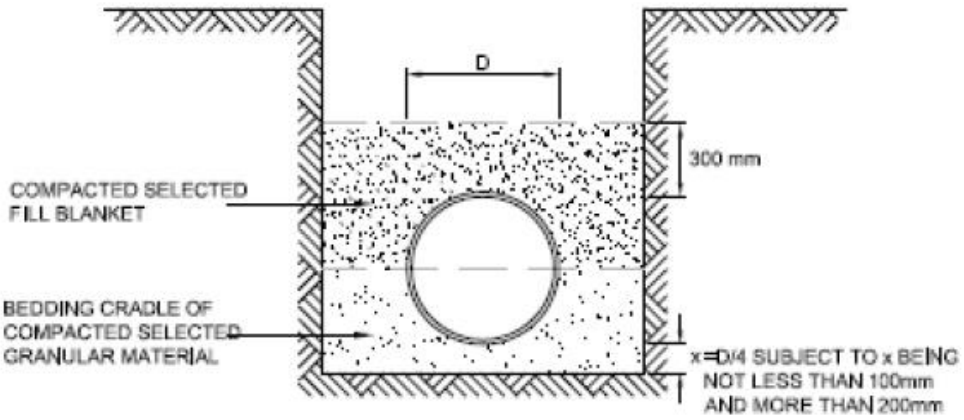


Figure 13 Rigid Pipe on Class B Bed

- Excavation of trenches, bedding and backfilling will be based carried out as follows:
- Maximum excavation depth of 2.5 used for pipes < 500 mm dia.
- Maximum excavation depth of 3.5 m was used for pipes ≥ 500 mm dia.
- Excavation depth kept to a minimum wherever feasible, especially in rocky or hard conditions.
- Minimum cover to pipe soffit of 900mm maintained throughout, except for sections with except for exposed rocks.
- Minimum cover to pipe soffit increased to 1.0m cover to pipe within road reserves.
- Pipeline gradients to minimum of 0.5%, except, where dictated by very flat topography, the minimum grade is relaxed to 0.25%.
- The conservative calculation of "land take" associated with pipeline installation is 5m on either side of the pipeline.
- The estimated average volume of material to be excavated for pipe laying totals ~132,213m3

STOCKPILING AND SPOIL

Excavated material temporarily stockpiled for later re-use. Excavated material will be stockpiled selectively in order to separate material suitable for bedding or other special purpose from unsuitable material.

The Contractor shall ensure that[13]:

- Any rare local plant species as identified by the Engineer that may be affected are replanted as directed by the Engineer;
- Stockpiles and spoil dumps are shaped to blend with the local topography as far as is practicable;
- Excavated spoil dumps are fenced off to prevent unauthorised access,

[13] Construction of Water Supply Infrastructure for Zone 6 and 7 – Volume III – Work Specifications: Part 1 for Civil Works (2017).

- Drainage is provided to control ground water flow such that migration of fines is kept to a minimum;
- Surface water runoff is conducted through or over or around the spoil dumps to prevent erosion damage;
- Toes of the slopes are formed of rock to prevent the sloughing or scour of the slopes; and
- Final exposed surfaces are revegetated.

REHABILITATION AND REINSTATEMENT

Where the route of a pipeline trench crosses existing road ancillaries such as precast concrete kerbs and road signs, the Contractor will be required to dismantle, lift, store, and replace the ancillary as directed by the Engineer. In situ kerbs shall be broken out between neat cuts and after the pipeline has been installed, reinstated to the approval of the Engineer.

Excavated material will be ordered and temporarily stockpiled for later re-use. Material suitable for bedding or other special purpose will be kept separately from unsuitable material.

The EAP recommends that material be sourced from existing licenced quarries. Should this not be feasible, the Contractor Specifications document, fill material must be selected between 15m and 5km from the site and meet specified bedding material.

Rehabilitation of disturbed areas of permanent works, spoil areas, and temporary access will include shaping of excavated areas and revegetation including replacement of topsoil, grassing, fertilising, and planting of trees and shrubs. The planting of grass, trees, and shrubs shall be carried out during periods most likely to produce beneficial results.

Trees and shrubs shall be planted where shown on the Drawings or as directed by the Engineer. Directly after planting, each plant shall be well watered to establish the plant firmly in the soil. After the soil is set, additional soil shall be added where necessary to bring the whole backfill to within 150mm of the ground surface in order to ensure that sufficient water can be retained. All trees shall be tied to a suitable tanalith-treated timber stake planted firmly in the ground. After planting, the ground surface around the plant shall be covered with mulch in order to minimise evaporation. The Contractor shall maintain the trees and shrubs for a period of 12 months or until the issue of the Defects Liability Certificate. Maintenance shall include watering and keeping the plants free from weeds and pests. Every tree or shrub that is not healthy or shows unsatisfactory growth shall be replaced by the Contractor at his own expense before the end of this period.

The Contractor shall ensure that trenches are not flooded by storm water and that pipes laid in the trench are backfilled as soon as possible after laying, except at joints made with couplings or flanges which must be kept visible until the pipeline has been satisfactorily tested. Excavations shall be backfilled within seven days of the pipes or culverts being installed. All manholes, catchpits, kerb inlets, etc., shall be completed and backfilled at the same time as the installation of the prefabricated culverts.

FENCING

Prior to construction commencement all works areas (other than along pipeline routes) are to be enclosed with cattle proof fencing. Where the pipeline route crosses an existing fence, a section of fencing not exceeding 10m in length may be removed temporarily during construction and thereafter reinstated to a condition not worse than the original as soon as the pipeline has been installed and backfilled in the immediate vicinity of the crossing. For the period while the existing fence is dismantled, the Contractor shall erect, at the end of each day's operations, a temporary fence to close the gap in the existing fence.

CONCRETE BATCH PLANTS

A site batching plant has been proposed to supply the required concrete for construction. At the batching plant, concrete is fed from the weight hopper into the mixer trucks and then transported to the site where the concrete is to be poured. Concrete may also be manufactured in a central mix drum and transferred to a transport truck. This plant will be located within the main site camp.

MAKHALENG WEIR

According to the borehole log drilled in the riverbed, a medium hard sand stone layer is found 4 meters below riverbed, so foundation should be reasonably possible. The weir shall reach out only about 30 cm above the

current river bed level, and shall be constructed of concrete (**Figure 14**). Next to the intake structure, a gate of about 10 to 15 meter length shall be constructed on the foundation of the weir. The gate shall have the same crest level as the weir. The height of the gate shall be about 1 to 1.5m only, the exact height will need to correspond with the submersion needs of the pumps.

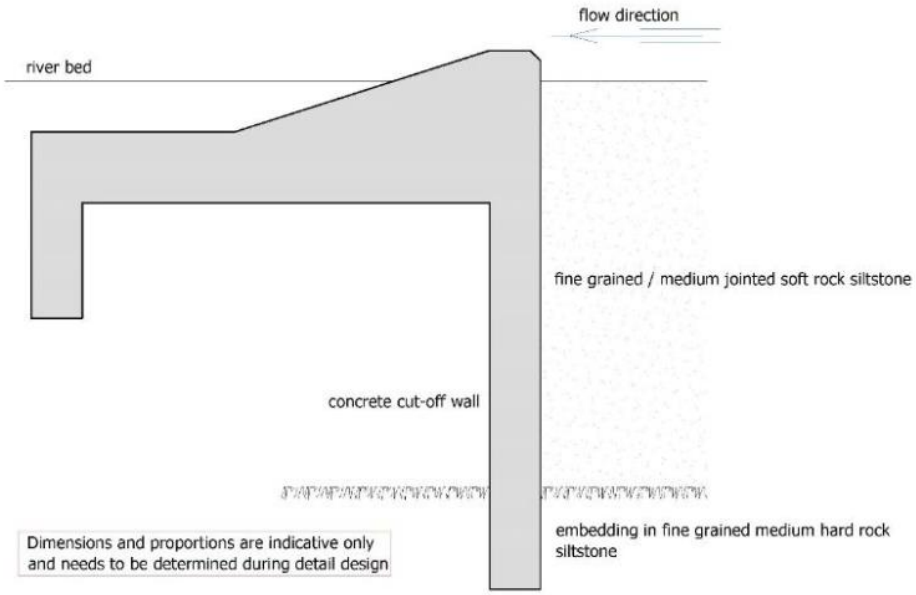


Figure 14 Cross Section through the proposed low crest concrete weir (Posch and Partners, July 2018)

It is anticipated by the project engineer[14] that the weir would be built in two halves with a temporary earth cofferdam around the area where the intake structure and half of the weir would be to protect it from the water and divert flow around this. When the first half is complete, one portion of the cofferdam would be removed to allow flow over the new weir and intake works and extend it to allow construction of the rest of the weir.

This will be planned for construction during the low flow season. The following specs are recommended for the cofferdam:

- Base width: 15m
- Height: 6.5m
- Top width: 2m
- Slope of 1:1

The cofferdam will be removed after construction of the intake and weir structures. Construction of the weir and intake will require dredging around the area of the proposed structures.

RIVER DIVERSION WORKS

Water diversions around active work areas (e.g. weir) must be restricted to within the Makhaleng River channel before the riverbanks are altered for river diversion. Due to expected increased flow volumes and velocities within the diversion path, energy dissipation and riverbed and bank protection measures must be in place to limit scouring and erosion. This must be adaptive as on-site conditions evolve.

- Land will be rehabilitated as follows, following removal of the river diversion works (for the weir):
- Remove soils according to the profile and create separate stockpiles for each soil horizon
- Manage the stockpiles to ensure aeration and fertility, no compaction.

[14] Mr Richards Oglesby, Lesotho Lowlands Water Supply Unit (LLWSU) (*per comm*, email; 24 April 2019).

- Protect soils from erosion
- Backfill soils into the diversion in the original profile, avoid compaction
- Gabions or renos at the entry / exit areas for added stability (as required / prescribed by Engineer or Environmental Control Officer (ECO))

4.8.2 OPERATIONAL PHASE ACTIVITIES

WATER INTAKE AND WEIR

The design will be self-cleansing and foresees high-pressure water jet system discharging clean water underneath the submersible pumps to scour out sediment (i.e. to reduce likelihood of sedimentation). It is recommended that a sand settler be built next to the water treatment plant, from where water gravitates to the treatment plant.

The gate shall be open during medium and high flow periods for flushing the sediment from the area near the intake. The gate could either be a rubber dam (inflatable weir) or a flap gate (**Figure 15**). In case a rubber dam is selected, the control system for inflating and deflating the tube must be able to inflate the weir even if it is covered by some sand or pebbles. The intake design foresees a water jet system placed at the floor of the pump sump which shall create and outflowing current which should avoid sedimentation of sand in the pump sump. The channel and ecological discharge pipe should create the permanent flushing of sand and sediment.

The construction of a fish pass could also be taken into consideration which could be placed between the gate and solid weir, if long periods of low flow with closed weir would prohibit fish passage.

The intake structure, pumping, abstraction, configuration and the weir should be designed to maintain IFR. For the release of the environmental flow, an ecological discharge must placed next to the intake tower.

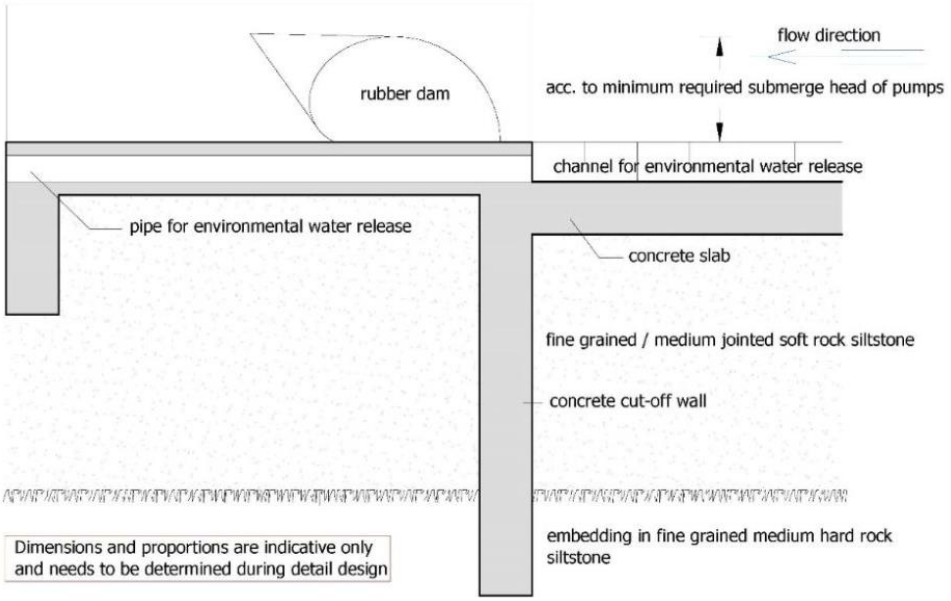


Figure 15 Cross-Section trough the proposed rubber dam (Posch and Partners, July 2018)

In order to deal with possible high silt and sand load, the design foresees high-pressure water jet system discharging clean water underneath the submersible pumps to scour out sediment. This system might show good results. However, it is assumed that in this case the height of the inlets (screens) needs to be big enough to permit a raised inflow and a small outflow near the floor slab. Such mechanical systems are prone to breakdowns. It is recommended that a sand settler be built next to the water treatment plant, from where water gravitates to the treatment plant. The additional pumping head is minimal (few cm). The sand, which settles in the sand trap, can be flushed by gravity back to the river. Sand flushing should be automated.

WATER TREATMENT

Raw water will be abstracted from the Makhaleng River for treatment at the adjacent Makhaleng Water Treatment works. A typical potable water treatment system is illustrated in **Figure 16**.

The proposed treatment process consists of pre-oxidation of the raw water with chlorine to disinfect and oxidize the possible manganese and iron present in the water, followed by aeration cascade, grit removal system, and coagulation/sedimentation/clarification and rapid gravity filtration. Filtration is followed by chlorination. Chlorine will be dosed into the feed line into clear water storage/transfer tank at the water treatment plant before being fed into the bulk water supply system

Based on information shared by WASCO[15] on their standard approach, the treatment processes can be summarised as follows:

- Preliminary Treatment (Intake weir)
  - Pre-Sedimentation: Removal of gravel, sand, silt and other gritty materials that can damage plant equipment.
  - Screening intake / raw water abstraction: Removal of large debris that can damage plant equipment
- Raw water pumping: Pumping/ transferring of raw water to the WTW from Makhaleng River
- Flow Measurement: For production quantification and process control
- Powdered activated carbon (PAC)-Adsorption: Removes Organics and colour
- pH Stabilisation (Addition of White hydrated lime): Increase alkalinity to enable removal of Manganese and iron
- Aeration Cascade: Adds Oxygen to remove Manganese, Iron, odours, dissolved gases, and improves taste
- Coagulation[16] (Particles Aggregation): Addition of Polyelectrolyte Sudfloc 3850 promotes settling of non-settling particles
- Flocculation: Floc formation in the flocculation channel
- Sedimentation: Removal of settleable particles
- Potassium Permanganate: Removes Manganese and Iron
- Dual Rapid Gravity Sand and Anthracite Filtration: Removes finely divided particles, suspended flocs and most microorganisms
- Disinfection (Chlorination): Kills disease-causing micro-organisms
- Clear Water Storage: Variable tank allows contact with for disinfection and provides disinfected water for backwashing of filters
- High Lift Pump Station (HLPS): Pumping water to command Reservoir
- Command reservoir Main Water Storage before distribution

[15] m'e Tokela Selapi; and 'm'e Moliehi Lephoto *[per comm*; email; 27 May 2019]

[16] 3TL can be used as coagulant used in cases of high turbidity (WASCO *per comms*, 2019)

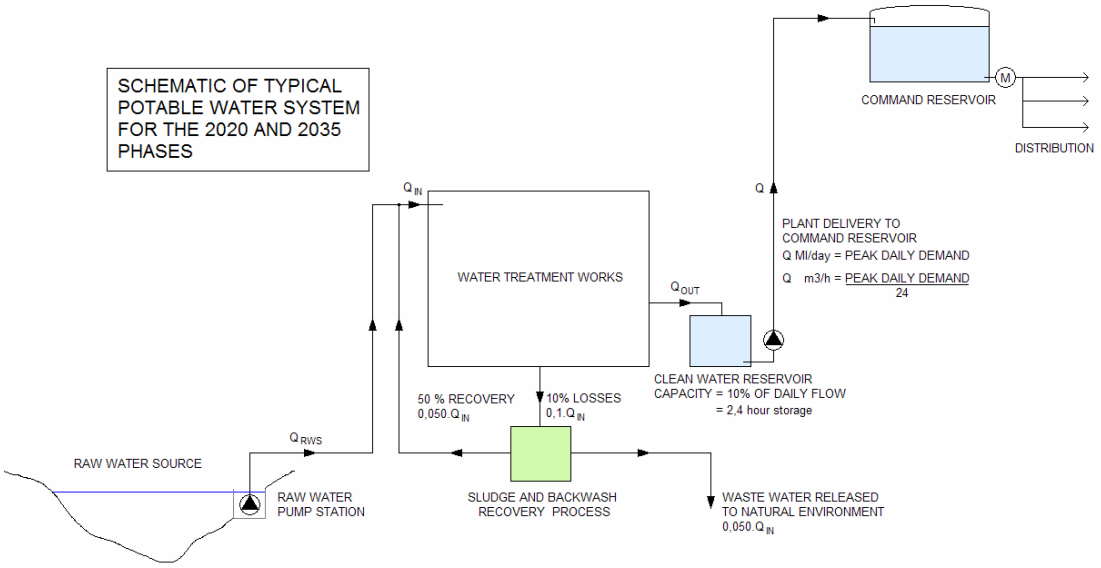


Figure 16 Schematic of Typical Potable Water System for 2020 and 2035 Phase

A more detailed plan proposed for the Makhaleng system includes:

- Grit Removal System
  - A single, 4.4m diameter, 3 m deep grit trap will remove grit particles greater than 0.2mm in diameter from the raw water. Grit removed from the raw water will be removed from the bottom of the grit hopper using an air lift pump. The grit removed will be discharged on to a concrete slab adjacent to the grit trap so that it can be drained and removed from site.
- Oxidation – Cascade Aerators
  - An aeration cascade is proposed to improve taste by introducing oxygen from the atmosphere. In addition, the system will assist in the oxidation of iron and manganese as well as providing flash mixing for the addition of chemicals. Three) rectangular cascade aerator operating in parallel are proposed. Each aerator will have a width of 4m and a length of 9.3m.
- Coagulation/Flocculation/Clarification
  - The coagulation technique proposed makes use of a serpentine channel arrangement to bring particles into contact with each other and provide low intensity mixing. This will be followed by a combined flocculation and clarification system (Clari-flocculator). The flocculated zone is in the centre of the basin and the sedimentation zone peripherally to the flocculation zone. Two identical circular 15.8m diameter flocculator and 31m diameter clari-flocculator operating in parallel are proposed. Clarified water will be collected in a peripheral launder and flow under gravity to the filtration system. A bridge in the clarifier is proposed to scrape sludge settled out in the clarifier to a hopper located in the centre of the tank. Sludge will be withdrawn from the sludge hopper and fed into a holding tank before being discharged to the backwash recovery tanks along with filter backwash water.
- Rapid Gravity Sand Filters
  - The proposed plant will have 12 filters for grain size ranging from 0.75 to 1mm, 8 to accommodate the 2030 demand flow, and the remaining 2 for the ultimate demand 2045 flow.
- Disinfection and Clear Water Storage
  - After filtration, the clear water is disinfected with the objective of destroying and inactivating microorganisms in the clear water storage. Disinfection using gaseous chlorine is proposed. The clear water tank will double up as a chlorine contact tank and will have a separate filtration buffer, which will be used as the water supply for backwashing the filters. For the clear water storage, a circular storage tank with a diameter of 34 m and a water depth of 3m is proposed, giving an overall storage volume of approximately 3231 m^3.
- Chemical Dosing

- The estimated average daily alum dose associated with the flows for the year 2030 is approximately 2,645 kg/day.

- Backwash Recovery Tank
  - Two tanks are proposed for the collection and recovery of backwash water to minimize water losses through the plant and the volume of residuals to be disposed of. Initially the recovery system will be provided to accommodate the volume associated with the initial phase of the works with duplication of the facility when the plant is expanded.

PIPELINE CLEANING

According to the Contractor Specifications,[17] provision has been made in selected valve chambers for chlorination points, to sterilize sections upon commissioning, after repair, or for occasional super-chlorination if required. Where there are empty reservoirs upstream, chlorinated water can be moved to the reservoir, neutralized with sodium thiosulphate ($Na_2S_2O_3$), and discharged through the reservoir scour. Where this is not possible, water tankers should be used as temporary storage/neutralization site. Hydrogen peroxide (H_2O_2) could be used as a more environmentally friendly neutralizing agent if the pH is greater than 7 and if there is sufficient contact time. As a neutralising agent, ascorbic acid ($C_6H_8O_6$) is even more environmentally friendly, but is up to three times the cost.

FLOW METERING

Flow meters are included in the design at the outlet of each pumping stations and reservoir. From these meter recordings, bulk water sales will be monitored and managed. Water balances will be done to determine any losses within the bulk supply system.

ELECTRICAL MAINTENANCE

All materials and equipment shall be designed for long life with minimum maintenance requirements. Routine maintenance and repair shall, as far as possible, not require the services of highly skilled personnel. This will typically include cleaning, painting welding – often involving working at heights.

RESERVOIR PIPE SCOURING AND OVERFLOWS

Scour pipes are installed at the bottom of each reservoir or reservoir compartment to allow the reservoir to be fully drained for servicing and maintenance. According to SMEC (2018)[18], the bulk of water will be drained through the outlet pipe network. Only the bottom 100mm layer of water in the tank is scoured out to waste. Overflow pipes are designed to remove excess inflow from the reservoirs in the event of failure of control system whereby the water level in the reservoir exceeds top water level. It is anticipated that scouring operations, which will be very seldom, once every 5 to 10 years.

[17] Construction of Water Supply Infrastructure for Zone 6 and 7 – Volume III – Work Specifications: Part 1 for Civil Works (2017).
[18] Lesotho Water Sector Improvement Project II: Detailed Design Report (D5) Zone 6 and 7 – Mafeteng and Mohale's Hoek Region.

5 ANALYSIS OF ALTERNATIVES

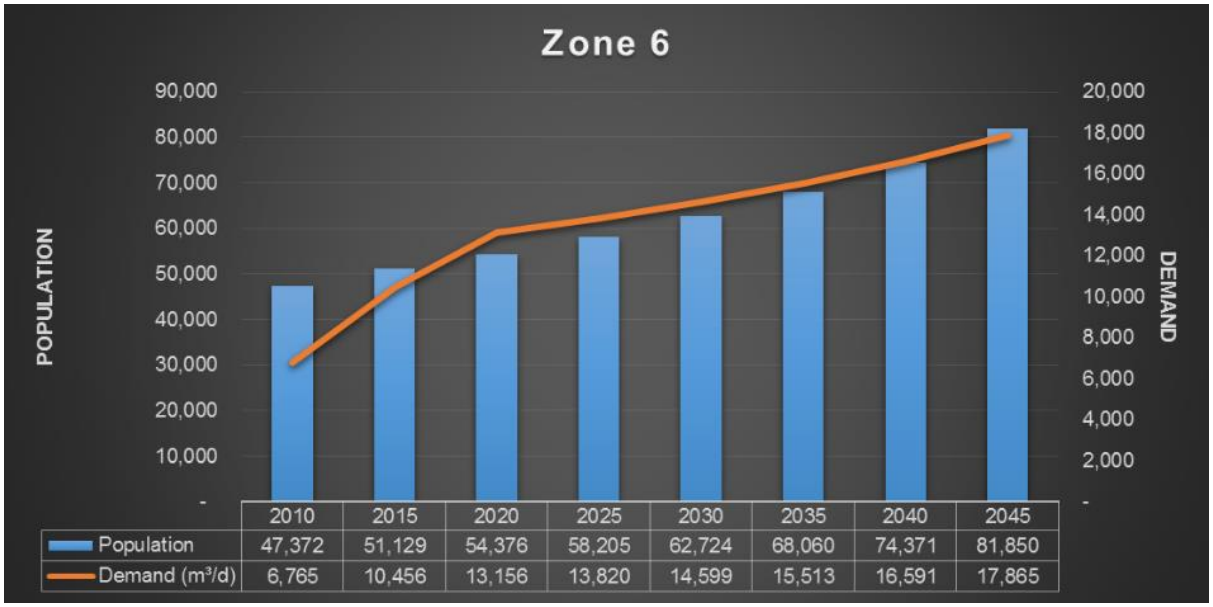
Feasibility of the broader projects, Lesotho Water Sector Improvement Project II has been extensively assessed throughout the project planning stage, which has incorporated consideration of various design, siting and technology alternatives. The historical assessment of these alternatives is contained within the following documents:

1. Government of Lesotho. August 2004. Lesotho Lowlands Water Supply Scheme. *Consultancy Services for a Feasibility Study of the Scheme. Final Report. Volume 1: Main Report* and *Volume 2: Water Demand*. Prepared by Parkman UK Ltd.
2. Government of Lesotho. 2004. Lesotho Lowlands Water Supply Scheme – Feasibility Study. *Water Resources Assessment of Final Development Options*. Prepared by WRP Consulting Engineers.
3. Kingdom of Lesotho. August 2008. *Consultancy Services for Conceptual Design of Lesotho Lowlands Bulk Water Supply Scheme and Implementation of a National Water Sector Information Management System. Environmental Impact Assessment – Northern Region/Central Region/ Southern Region*. Prepared by SSI Engineers and Environmental Consultants (Pty) Ltd.
4. Government of Lesotho. May 2017. Lesotho Lowlands Water Supply Scheme. *Addendum to infrastructure report (task d4). Determination of Supply Options for Zone 1, Zone 2 and 3, Zone 4 and 5, Zone 6 and Zone 7, and Zone 8.* Prepared by SMEC International.
5. Government of Lesotho. January 2018. *Consulting Services for the Update Detail Designs and Construction Supervision of the Lesotho Lowlands Water Supply Scheme: Detail Design Report (D5) Zones 6 & 7 – Mafeteng and Mohale's Hoek Region.* Prepared by SMEC International.
6. Government of Lesotho. May 2018. *Infrastructure Requirements Report Lesotho Water Sector Improvement Project II Updated Detail Design and Construction Supervision*. Prepared by SMEC International.
7. Government of Lesotho. September 2018. *Lesotho Water Sector Improvement Project II Updated Detail Design and Construction Supervision Detailed Financial and Economic Evaluation*. Prepared by SMEC International.

This Chapter provides an overview of the most significant (or most recent) feasible alternatives, and those, which remain as potential design options specific to Zone 6 and 7 of the LLBWSS.

5.1 "WITHOUT PROJECT" ALTERNATIVE

The "without project" alternative is the option of not implementing Zone 6 and 7 of the LLBWSS. In the circumstance that the LLBWSS project was not advanced, there would be no change to the accessibility of clean water to the occupants of Zone 6 and 7 despite the population and consumption demand projects as outlined in SMEC (2018) Infrastructure Requirements Report (D4) (**Figure 17** and **Figure 18**). The bulk water supply infrastructure is intended to serve a projected population of 81,850 (Zone 6) and 129,493 (Zone 7) in 2045. The capacity demand for 2045 is 17,865 m^3 per day for Zone 6 and 29,518 m^3 per day for Zone 7, for a combined 47,383 m^3 per day.



	2010	2015	2020	2025	2030	2035	2040	2045
Population	47,372	51,129	54,376	58,205	62,724	68,060	74,371	81,850
Demand (m³/d)	6,765	10,456	13,156	13,820	14,599	15,513	16,591	17,865

Figure 17 Zone 6 Population and Consumption Demand Projections

	2010	2015	2020	2025	2030	2035	2040	2045
Population	78,892	84,341	89,114	94,746	101,390	109,234	118,508	129,493
Demand (m³/d)	4,175	21,003	26,321	26,771	27,299	27,920	28,652	29,518

Figure 18 Zone 7 Population and Consumption Demand Projections

Critically, there would be no relief to the current demand on existing water supply facilities, which is considered a constraint to continued economic growth. Consequently, the potential local and regional benefits in meeting residential, industrial and agricultural water supply needs outlined in Chapter 1 of this ESIA would not be realised.

However, should Zone 6 and 7 of the LLBWSS project not go ahead, there would be no disruption to PAPs, and the temporary and permanent impacts outlined within this ESIA upon biodiversity and heritage features would not occur.

5.2 TECHNOLOGY ALTERNATIVES

5.2.1 ENGINEERING SOLUTIONS AND IMPLEMENTATION OPTIONS

SMEC International (Pty) Ltd (SMEC) was appointed to assess the design that was undertaken in 2008. The SMEC (2018) *Infrastructure Requirements Report (D4)* outlines findings of this assignment.

The following steps were followed in developing the required solutions based on the 2008 design. The criteria for comparing engineering solutions were based on two mains options:

- **Option 1: Single Phase delivery over a 2018 to 2045 design horizon**.
  - Single phase delivery, all zonal projects will be delivered in separate construction packages
- **Option 2: Two Phase delivery, with Phase 1 for 2018 to 2030 and Phase 2 from 2030 to 2045**.
  - For a two-phase delivery, all zonal projects will be delivered in separate construction packages, with delayed construction and implementation of various elements of each construction package. This option was considered in order to optimise the costs related to the construction and implementation of the Scheme

A cost comparison of periodic infrastructure maintenance was considered. For comparison of engineering solutions, 5.0 % of the capital costs have been assumed as replacement and/or refurbishment costs every five years throughout the 2045 design horizon. The data is presented for both the single phase delivery and two phase delivery options.

The total capital and maintenance costs as well as the NPVs for all the zones are consistently lower for the two-phase delivery option than the single phase delivery option. It was therefore, recommended that as far as it is practicable, all the schemes should be implemented in two phases or more.

5.3 DESIGN ALTERNATIVES

5.3.1 RESERVOIR SUPPLY OPTIONS

Various options relating to the location of reservoirs for optimisation of supply have been considered since the drafting of the 2008 Design Report by SSI Engineers and Environmental Consultants.

The reservoirs were analysed based on elevation at the proposed position to determine the extent of the supply from the specific reservoir within the demarcated supply zones. Once the extent was determined in relation to the supply area, the various options were investigated to supply to a larger area of the supply zone. Once 100 % of the supply area is covered, it is assumed that 100 % of the 2045 population assigned to the supply zone can be serviced based on the specific option.

Supply options were assessed for each service reservoir from Zone 1 to Zone 8 as part of the hydraulic modelling development. The original 2008 designs were reviewed and the population that could be serviced by gravity from each of the service reservoirs were assessed. Alternative options were developed for the 2008 designs where < 100% of the population would be supplied by gravity from the location of the reservoir.

Four options for the location of reservoirs are defined by SMEC (2018):

- **Option 1:** Reservoir remains at the original location (2008 design).
- **Option 2:** Reservoir is moved to a nearby but higher location (relative to the 2008 designs), increasing the supply area (reservoir remains close to bulk supply pipeline).
- **Option 3:** Reservoir is moved to a completely different location, away from the bulk supply pipeline at a higher elevation than the 2008 designs to further increase the supply area.
- **Option 4:** Reservoir remains at the original location (as per the 2008 designs) with an additional pump station supplying water to a smaller tank/reservoir that would increase the supply area.

The service area for each of the service reservoirs was obtained using the elevation at the proposed location to determine the extent of gravitational water supply for that specific reservoir. Once the extent of the service area for each service reservoir was determined, additional options were investigated to increase the supply area and, thereby, supply potable water to a larger number of the population. As part of the options development, a due diligence check was undertaken to ensure the practicality of the recommend option with regard to accessibility and constructability. The selection criteria for each option was based on the cost per capita, expressed in United States Dollar (US$) per capita. For each of the options that follows Option 1, the cost per capita was presented as the difference in capital cost divided by the difference in population served.

ZONE 6 AND 7 RESERVOIR SUPPLY OPTIONS

With reference to **Table 21**, the preferred option for all reservoirs in Zone 7 is for reservoirs to remain at the original location (as per the 2008 designs) with an additional pump station supplying water to a smaller tank/reservoir that would increase the supply area. This was also preferred for five of the eleven reservoirs proposed for Zone 6; with three of proposed reservoirs remaining at the original location (2008 design); and two reservoirs shifted to a higher location.

Table 24 Summary of Preferred Options Selected for Zone 6 and Zone 7 Reservoirs

ZONE	RESERVOIR #	PREFERRED OPTION FOR RESERVOIR LOCATON
Zone 6	Z6R1	Option 4
	Z6R2	Option 4
	Z6R3	Option 1
	Z6R4	Option 4
	Z6R6	Option 2
	Z6R7	Option 2
	Z6R8	Option 4
	Z6R9	Option 4
	Z6R10	Option 1
	Z6R11	Option 1
Zone 7	Z7R1	Option 4
	Z7R2	Option 4
	Z7R4	Option 4
	Z7R5	Option 4

5.4 SITE ALTERNATIVES

5.4.1 MAKHALENG RIVER INTAKE

Four sites were assessed by SMEC (2018) as potential locations for the intake works considering the suitability of the site for abstraction, the proximity to a suitable water treatment works, the availability of a rock foundation, the river water quality and access for maintenance.

The preferred site for the Makhaleng River Intake was selected on the basis that it is:

- Well located on outside of bend of the river
- Underlain with good rock foundation
- Scour channel erosion in the riverbed which is a good indication of its suitability
- Close to a suitable water treatment plant site

The selected Makhaleng River Intake is located at Latitude 30° 05' 9.6720" S, and Longitude 27° 26' 15.7441"E as shown on the Intake Plan in **Appendix H-4** (Drawing # 5090025-Z6&7-INT-03000). The intake is positioned on the outside of a minor left bend to facilitate diversion of bed load sediment.

The site selected requires:

- Scour channel to be constructed in front of the inlet to the intake and shall be a minimum of 1.2m deeper than the general depth of water in the river.
- The intake face shall be inclined at an angle of 50° to the Makhaleng River channel at the intake location.
- Intake screens shall be provided for each pump chamber.

5.4.2 MAKHALENG WATER TREATMENT WORKS

The proposed WTW is located adjacent to the Makhaleng River. The dominant land use in this area is agriculture, namely crop farming. This has resulted in the removal of natural vegetation resulting in the onset of alien vegetation establishment. The hydro-dynamics of the area has been altered resulting in the scouring and erosion of some areas.

A seepage wetland within proximity of the proposed WTW was identified during the ecological assessment. The location of the proposed WTW within the wetland boundary is presented in **Figure 19.**

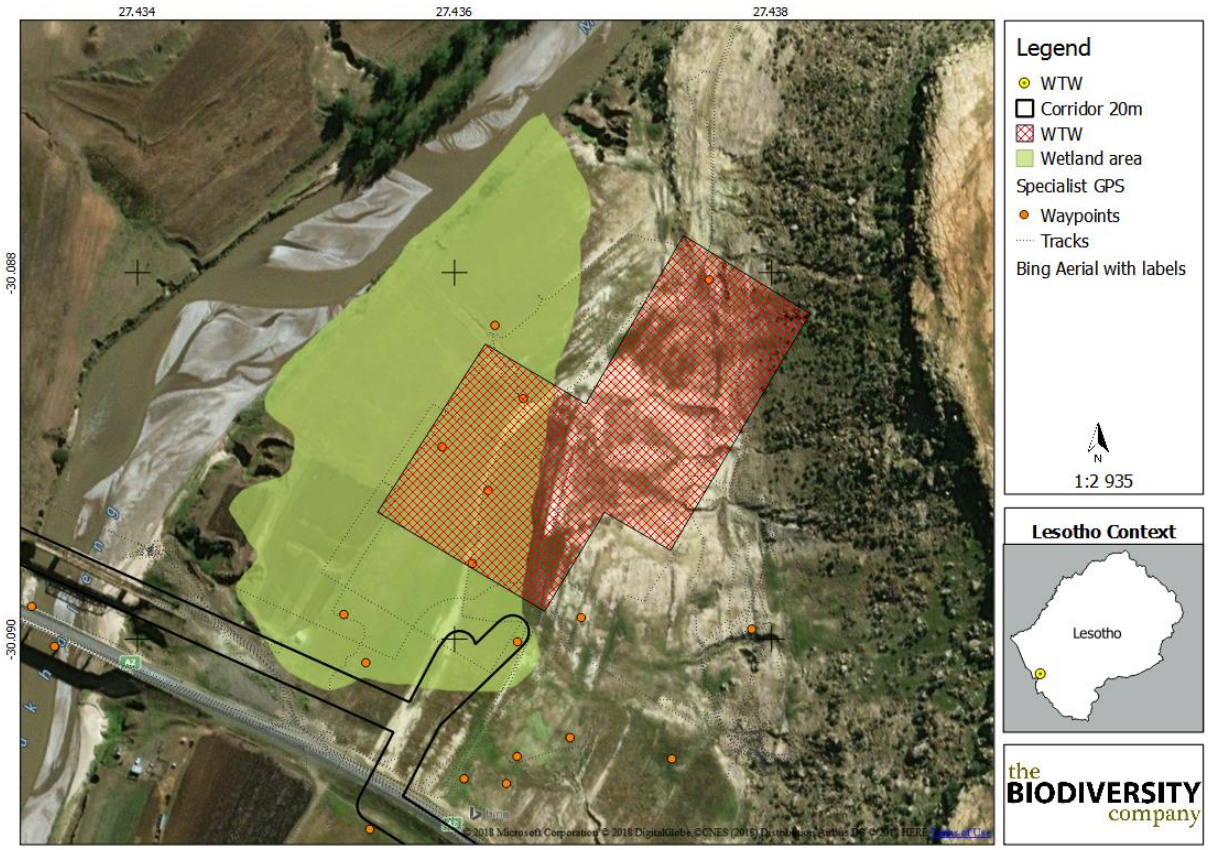


Figure 19 Wetland Delineation at the Propose WTW Area (The Biodiversity Company, 2018)

From a social perspective, the socio-economic survey identified 7-9 privately owned fields used for subsistence agriculture located within the proposed WTW footprint.

The impacts associated with the current WTW location include:

- Direct impact on the seepage wetland system - primarily on habitat provision as the Present Ecological Status (PES) of the wetland system is "Largely Modified".
- Loss of livelihood to household utilising the floodplain for subsistence agriculture.

The Consultant team has recommended the shift of the WTW as far as possible outside the delineated wetland area to minimise the above ecological impacts[19]. LLWSSU has agreed that it is likely feasible to shift the WTW in a northeast direction closer to the toe of the ridge. This will be subject to addition detailed engineering investigations (beyond scope of the current assessment).

From a socio-economic perspective, the shifting of the WTW location will not result in minimising livelihood impacts as the surrounding land use will be acquired by COW to maintain a safety buffer with controlled access around the WTW. Land users will be compensated for loss of livelihood.

5.4.3 WATER TRANSMISSION AND STORAGE INFRASTRUCTURE

Chapter 4.4: design and Layout provides a description of the proposed transmission layout. Schematics are provided in **Appendix H-1**.

The socio-economic rapid assessment carried out by WSP and SEED Consult included the use of maps generated with ESRI 2016-2017 aerial imagery overlain with shapefiles of proposed project infrastructure

[19] COW discussed the shifted location with Department of Water Affairs (DWA). DWA supports the recommendation. Further planning is being based on the proposed shifted location.

(pipeline alignment and associated infrastructure including reservoirs, pump stations) from CAD files received from SMEC.

The maps were screened for the identification of areas where proposed infrastructure was located in more densely populated area, which would result in the displacement of households or in areas supporting subsistence agriculture. Observations include:

- Pipelines follow the road reserve for a large portion of the route, however in some instances the route crosses grazing and arable land or goes through residential areas.
- In some cases the pipeline route in residential areas follow the track/road and does not cut across residential properties. However, in a few cases this may be unavoidable as the storage reservoirs are close to the relevant community / project beneficiaries.
- The reservoirs will be located on higher lying areas on hills, ridges and plateaux in areas that are presently used for grazing purposes. Others will be located on vacant plots within the village areas.
- In Mafeteng Town the pipeline passes through a number of small businesses / shacks located on the road reserve. These structures are under the control of the Town Council. The Involuntary Resettlement (OP 4.12) principles regarding land occupants without any claim to land ownership will apply.

Map observations were ground truthed by the RAP Team, LLWSSU and the COW Director. A meeting was held on 10 September 2018 with LLWSSU and COW to discuss the proposed alternatives. The key decision making criteria for the recommendation of alternatives include:

- Avoid resettlement of households
- Avoid permanent loss of livelihood activities
- Minimise temporary disruption (construction phase) to subsistence activities
- Minimise temporary disruption (construction phase) to commercial activities (e.g. roadside kiosks)
- Minimise temporary disruption to residential frontal land strips in close proximity to the road
- Reduce the need for compensation

Further detailed assessment associated with proposed infrastructure are provided in **Table 25**. The proposed alternatives are supported by COW and were considered infield during RAP Verification and impact assessment.

Table 25 Proposed Pipeline and Reservoir Site Locations and Initial Assessment of Impacts

		ASSESSSMENT OF RELATIVE ADVANTAGES AND DISADVANTAGES		
PROJECT COMPONENT	**EXISTING ROUTE / LOCATION**	***TECHNICAL AND ECONOMIC***	***ENVIRONMENTAL AND SOCIAL***	**ASSESSMENT DECISION AND RATIONALE**
Zone 6				
Matlapaneng Reservoir (Z6R11)	**Original layout** – Z6R11 located at end of line at Matlapaneng- north west of Ha Lesole	**Disadvantage**: Currently proposed elevation is low, reducing gravitational effects.	**Disadvantage**: Compensation required for land lost.	**Original layout** is the preferred alternative. To be assessed in current application as preferred option.
	Alternate layout - Shift the reservoir 60m further to locate at the top of the hill.	**Advantage**: Elevation is more suitable as it allows gravitational fall, and efficiently supplies settlements located on the hillside.	**Advantage:** Houses on hill can collect water directly from the reservoir	See map in **Appendix I-1.**

2. Ha Mofoka Pipeline and Reservoir (Z6R13)	**Original layout** - Pipeline routed on right hand side of Thabana Morena Road from Tsoloáne Junction. Reservoir (Z6R13) and Pump Station are located on land with and existing an electricity pole.	**Advantage**: Disruption to existing services (electricity pole)	**Disadvantage**: Direct impact to Ha Mofoko Cemetery.	**Alternative layout** to be assessed in current application as preferred option. See map in **Appendix I-1.** See map in **Appendix I-1.**
	Alternate layout - Pipeline to be routed along the opposite side of the road (i.e. along the left side of Thabana Morena Road) to avoid cemetery. Reservoir position be adjusted to locate between the electricity poles.	**Advantage**: Avoids disruption to current services.	**Advantage**: Preservation of culture resource through avoidance. **Disadvantage**: Land ownership dispute between the village chief and one resident. Chief Representative and Counsellor to meet community member claiming ownership to provide proof of ownership. The property has been marked and the area measured in the presence of the Chief Representative. RAP team has completed the registration forms with the legitimate owner.	
3. Mafeteng Command Reservoir (Z6R6)	**Original layout** - Pipeline route, both from Makhaleng to the command reservoir and from the reservoir to Ralintsi Reservoir (Z6R9) and Ramohapi Reservoir (Z6R10) are routed through an extensive property with privately built structures (guesthouse, retailer/wholesales, rental items, vehicle repair garages etc.)	**Disadvantage**: Inadequate space exists on the site for construction to be carried out without disturbing foundations of guesthouses built. **Disadvantage**: Cost of relocating the property would be prohibitive considering the fact that the land in question has been acquired illegally. There is a court case in progress on this property.	**Disadvantage**: Landowner at the junction is stopping access to acquire the land as part of the resettlement process, which is creating project delays.	**Alternative layout** is preferred. Remove pipeline and command reservoir from technical scope of current application for environmental authorisation. Prepare an addendum application to authorisation / application for amendment to authorisation. Final decision for location of Z6R6 should be based on an investigation on increasing the elevation of the proposed reservoir by reducing friction head losses between Z6R5 (located south of Borata) and Z6R6 (located within Ha Ramokhele); and possibility of increasing the diameter of the pipeline between the two reservoirs. Hydraulic modelling and redesign will be required. The costs of each solution should be compared before a final decision is made.
	Alternate layout - Remove pipeline and command reservoir from technical scope of current application for environmental authorisation to allow for further investigation.	**Advantageous**: The value of that property will be in the tens of millions of Maluti, and the title to the land is under courts disputes. Removal from scope does not result in rest of system being unfeasible. This option allows for project to process while dispute is resolved.	**Advantage**: No other resettlement / compensation is required.	

4. Mafeteng Traffic Circle to Ramohapi	**Original layout** - Pipeline route from Z6J3 towards Leloaleng.	**Disadvantage**: Major hazardous risks associated with construction of pipeline across a petrol filling station.	**Disadvantage**: Pipeline route intercepts many informal business shacks / kiosks (over 200), and 4 formal business / shops and a filling station. **Disadvantage**: Construction of the pipeline will result in a direct impact to commercial activities during construction; and maintenance difficulties during operation.	**Two alternative options** to be assessed in ESIA: See map in **Appendix A-1.**
	Alternate layout Option 1: Shift original route and into the road (7.5m wide) **Alternate layout Option 2:** Pipeline to be routed from the Lema Tractors towards the Mafeteng Hospital. It will follow the road towards the Mafeteng Raleting Reservoir to the Main South 1 Road (within an existing servitude).	**Option 1 and 2:** **Advantage**: Avoids the potential hazard risk associated with construction of pipeline across a petrol filling station. **Disadvantage:** Additional protection on pipe to ensure dedicated supply to Ramohapi remains	**Option 1 and 2:** **Advantage:** Proposed alternative route can be used as a bypass during construction (bypass may result in loss of trade for 200 kiosks during construction and more than 10 formal businesses). **Advantage:** Reduce potential encroachment by opportunistic community members and possible increase in compensation requirements during implementation. **Advantage**: Minimise temporary disruption to residential frontal land strips in close proximity to the road. **Advantage**: Avoid temporary disruption from 200+ commercial activities during construction. **Advantage**: No compensation required	
5. Pipeline at Ha Ramohapi Junction to Matlapaneng (Z6R11)	**Original layout** - Pipeline junction at Ha Ramohapi to Matlapaneng runs close to the formal business property (from Main South 1 Road to Matlapaneng).	**Disadvantage**: Possible negative impact on the foundations of the building.	**Disadvantage**: Temporary disruption (construction phase) to one commercial property.	**Alternative route** to be assessed in current application as preferred option. Redesign for implementation (i.e. shift the pipeline to the centre of the road to avoid the structure). See map in **AppendixA-1.**
	Alternate layout - Route pipeline in the middle of the road.	**Advantage**: Avoids possible compensation of damaged / affected structure.	**Advantage**: Minimise temporary disruption (construction phase) to commercial activities.	
Zone 7				

1. Good Shepherd Pump Station (Z7PS3), Reservoir (Z7R6) and Pipeline	**Original layout** - A new structure is being built on the road reserve where the pipeline is to be located. The Pump Station and Reservoir located within the empty part of the households' yard.	**Disadvantage**: land user refuses to sell.	**Disadvantage**: Household displacement and involuntary resettlement.	**Full survey to confirm most suitable configuration of reservoir and pump station for maintained hydraulic functioning (possible hydraulic modelling)** RAP team has met with local authority (Old Hoek Village Chief, Counsellor and Principal Chief District Administration) to seek the intervention as per the Compensation Policy and Government legal status. RAP team have recorded size of land and appointed valuer to provide estimated compensation value. Likoeneng Principal Chief to convene a meeting between RAP team, COW and landowner. Initially proposed route and location to be assessed in current application as preferred option.
	Alternate layout - Locate the reservoir on vacant land at the curve opposite the Good Shepherd Primary School with pipeline routed through Bornholm High School property.	**Advantage**: Reduce the need for compensation.	**Advantage**: Avoid involuntary resettlement of households.	
2. Kubake Pipeline from Z7J2 to Z7R4	**Original layout** – Routed between road junction Z7J2 and reservoir Z7R4 in a zig zag manner across a number of residential properties,		**Disadvantage**: Household displacement and resettlement as additional structures have been built on proposed route (involving many households) subsequent to SMEC's survey. **Advantage:** Avoid Mohale's Hoek Urban Cemetery	**Alternative route** to be assessed in current application as preferred option. See map in **Appendix 1-2.**

	Alternate layout - Route pipeline away from villages to be routed through a field (agriculture land).	**Advantage**: Reduce the need for compensation. **Advantage**: Shorter pipeline route (900m compared to 1000m). **Advantage**: Apart from the donga crossing it is simpler to construct and less disruptive. **Disadvantage**: New route goes through agricultural land currently without crops. Should the alternative property be temporarily under cultivation during pipeline construction, compensation for lost crop and the land will be required.	**Advantage**: Avoid resettlement of households and replace with temporary disruption (construction phase) to subsistence activities. **Advantage:** Avoids burial grounds (Mohale's Hoek Cemetery). **Disadvantage:** New route goes through a donga, which may leads to increased stability risks, however this can be managed by correct planning and method during construction.	
3. Qalakheng Junction to the reservoir at Ha Potsane (Z7R7)	**Original layout** - Proposed pipeline is routed very close between the road and several individuals' properties.	-	**Disadvantage**: Household displacement and resettlement.	**Alternative route** to be assessed in current application as preferred option. Two structures (guardhouse and toilet) and the fence lines will need to be relocated within the government owned property. COW to liaise with property owner on use of land. See map in **Appendix 1-2**.
	Alternate layout - Proposed pipeline to be routed to the opposite side of the road along government owned property.	-	**Advantage**: Avoid resettlement of households and compensation.	
4. Pipeline to Ha Potsane Reservoir (Z7R3), Qalakheng	**Original layout** – Routed between reservoir Z7R7 and reservoir Z7R3 through open land.	-	**Disadvantage**: Disturbance to cultural resource composite site (Ancient Village Remains).	**Alternative route** to be assessed in current application as preferred option. Delineated ancient village to be fenced off to protect against the workforce during construction and to preserve the historical village for tourism and cultural purposes. See map in **Appendix 1-2**.
	Alternate layout - Final 200m of pipeline is to be rerouted higher and to the south of the current location.	-	**Advantage**: Preservation of culture resource through avoidance.	

6 DESCRIPTION OF PHYSICAL AND SOCIAL ENVIRONMENT

This chapter provides high-level baseline information on the relevant environmental characteristics of the study area. More comprehensive baseline information is contained within the relevant full specialist reports in **Appendices A-D**.

6.1 PHYSICAL ENVIRONMENT

6.1.1 CLIMATE AND METEOROLOGY

The climate of Lesotho is described as continental and temperate with four distinct seasons dominated by warm wet summers, and cool dry winters. Lesotho enjoys an average of 310 sunshine days per year, with the summer average being 24 sunny days per month. Floods and droughts are a common occurrence, with high intensity rainfall producing flash floods that contribute to erosion and high sediment loads in the rivers (NES, 1999) (SSI, April 2010). According to the Lesotho Meteorological Services (LMS) (2013), the country's climate is influenced by its location in the Karoo Basin, with altitudes ranging from about 1,400m to 3,480m above sea level. Variable climatic conditions, with frost in winter, are characteristic of Lesotho and common in the Lowlands (Maro, 2011).

TEMPERATURE

The project area has moderate to high temperatures in summer (October to March) and lower temperatures during the dry winter (May to July). The average temperature is 15^{o}C, with the highest maximum temperature recorded at 38.8^{o}C and the lower minimum temperature recorded at -10.8^{o}C. The significant variance between average temperatures in winter and, and the frequent occurrence of frost confirms a continental climate (SSI, April 2010).

RAINFALL

Rainfall patterns are determined by regional and local geographic conditions, as such there is a marked variation in rainfall with altitudinal gradients. The annual precipitation ranges from around 600 mm in the lowland valleys to around 1,200mm in the northern and eastern escarpment bordering South Africa.

Most of the precipitation occurs in spring and summer, from October to April, with peak rainfall being between December and February. During winter, precipitation is mainly in the form of snow in the highlands where it falls annually, and quite low in the lowlands where it only falls occasionally. The lowest rainfall occurs in June when monthly totals of less than 15mm have been recorded in some stations.

Summer storms are often characterised by high-intensity rainfall that generated a significant amount of surface runoff in a short time, resulting in flash floods and erosion. Excavations may be prone to flooding. Snow is common in the winter months. The closest weather station to the site is located in Quthing (SSI April 2010), approximately 45km from Zone 7.

This part of the Lesotho Lowlands falls within the summer rainfall region with a Mean Annual Precipitation (MAP) of +/-500mm. Much of the precipitation falls in the form of thunderstorms between November and March. Snow is not uncommon in the winter months. Great differences between the average temperatures in winter and summer, as well as a very frequent occurrence of frost, confirms a continental climate. Further information on rainfall based gauge measurements is included in Section 6.1.6: Surface Water.

EVAPORATION

The wet summer months have high evaporation, while the dry summer months have low evaporation rates. The average evaporation rate is 1500mm per annum. The average evapo-transpiration rate is 1250mm (SSI, April 2010).

WIND

Wind speeds are low in the summer months, but tend to get higher in the winter, peaking from late July to the end of August. The Lesotho Meteorological Service state that the monthly mean wind speed for Lesotho Lowlands range from 1.4m/s in October to 8m/s in August. The prevailing wind direction is westerly (SSI, April 2010).

6.1.2 CLIMATE CHANGE

LESOTHO FUTURE SCENARIOS

Climate change is likely to have an impact on the availability of the water resources for the country in the long-term. Data from the LMS was used in a World Bank (2016) report[20], which observed the trends in climate between 1980 and 2012. The data on average minimum and maximum temperatures from all stations in the country indicate a warming of approximately 2°C, over the same period.

Some GCM-modelled future projections, on average, are wetter while others are drier. For the twenty-year period, more future projections are drier (64 GCM projections) on average than wetter (57 GCM projections). The range of projected future precipitation includes both an increase and decrease of about 20 percent or 160 mm annually. All future scenarios consistently demonstrate an increase in temperature, while changes in patterns of precipitation vary among the different scenarios.

Lesotho is therefore expected to experience a change in temperature and precipitation patterns, toward dryer and hotter conditions. In addition, the intensity and frequency of extreme events such as floods and drought are expected to increase, especially in the western and northern lowlands. The increasing temperatures may lead to a reduction in available soil moisture, and available water resources during periods of inadequate rainfall. The impacts of climate change in Lesotho will vary from sector to sector. Despite its abundant water resources, Lesotho remains vulnerable to the impacts associated with regular and recurrent floods and droughts, the 2016 World Bank report revealed. The floods in 2011 were the largest in the country since the 1930s, while the drought in 2015 –16 period was the most severe on record. All the climate models indicate that average mean surface temperatures will rise, but precipitation projections vary greatly. It is likely that the net result for Lesotho will be an increase in evaporation losses and a decrease in runoff and groundwater recharge. Rangeland conditions may deteriorate and ultimately be destroyed-by changes in climate, leading to a change in the quality of livestock and livestock products. The present indigenous forests may change into semi-arid types, while agricultural production will decline, resulting in food shortages.[21]

LITERATURE REVIEW - VULNERABILITIES

The World Bank (2016) *Lesotho Water Security and Climate Change Assessment* discusses vulnerabilities associated with bulk water supply systems to climate change, and identifies the following susceptible areas:

- Water
- Food
- Energy
- Economic

[20] World Bank Group. 2016. Lesotho Water Security and Climate Change Assessment. World Bank.
[21] http://adaptation-undp.org/explore/southern-africa/lesotho

WATER

Demand in the urban domestic and industrial sectors in Lesotho is not reliably met under a repeat of the historical climate or under the full range of climate futures, and, in the absence of augmentation measures, unmet demand levels will reach 40% by 2050. Unmet demand grows significantly starting in 2025. Reduced runoff predicted in climate change scenarios would result in a drying up of wells and springs, lower water tables, higher borehole costs, and reduced yields.

FOOD

Agriculture in Lesotho (principally maize, beans, peas, sorghum, and wheat) is almost entirely rain-fed and therefore highly vulnerable to changes in precipitation. Stagnant and interannually variable agricultural production could be viewed as highly problematic for a developing country like Lesotho. Rising temperatures will increase the amount of water required for crops, exacerbating water stress during dry periods. Higher temperatures, lower rainfall, frequent droughts, rainstorms, strong winds, etc are all likely to increase soil loss far above current levels, further weakening the capacity of the soils to support the country's agro-ecological and economic well-being.

ENERGY

Hydropower production under the historical climate and the baseline strategy is constant, producing the maximum amount of 674 GW (gigawatt) hours for all but one year. Potential exists for a reduction in energy production due to low flows.

ECONOMIC

Under the current management system, Phase I of the Lesotho Highlands Water Project (LHWP) seeks to deliver 867 million cubic metres (mcm) per year to South Africa. Under repetitions of historical climate conditions up to 2050 the simulations show that this water delivery target (as required by Treaty) would be met in all but one year. Across the full range of future climate projections, however, the delivery target is not always met (transfer deficits occur in 49% of the future scenarios), with the delivery target deficiencies for transfers becoming more pronounced in the last decade of the simulation.

The LHWP alone facilitated investments of more than US$3 billion and provided sustained revenues that amount to nearly US$800 million since 1996.

The governments of Botswana, Lesotho, and South Africa initiated a high-level planning study to evaluate the possible development and transfer of water resources from the highlands of Lesotho to the southern part of Botswana and to communities adjacent to the conveyance system. If the future climate is about the same as the historical climate, or wetter, the results suggest that the transfers to both South Africa and Botswana would be reliably met. Drier climates and lower rainfall resulting in lower flows may affect economies of Lesotho and neighbours, which are heavily reliable on water (e.g. industry and agriculture).

6.1.3 AMBIENT AIR QUALITY AND NOISE

Typical land use in the project area is agricultural or open land, with <5% of the project area built-up and most areas distant from roads and industrial-type activities. Ambient noise levels are low and ambient air quality is not significantly impacted by emissions.

The most significant sources of pollutants affecting ambient air quality within the rural lowlands include (United Nations Environmental Programme (UNEP) 2008): dust levels associated with agricultural activities and bare soils, emissions generated by outdoor mixed waste (plastics, tyres, organic and inorganic materials) burning and paraffin use for cooking (limited to only ~27% of the surveyed population, as biomass remains the predominant fuel source). Annual burning is an additional key source that should be considered.

Similarly, the rural / peri-urban study area is characterised by low ambient noise levels. Prominent noise noted by field staff was generally from livestock / animal rearing, dominated by the sound of sheep and goats. Other primary noise sources include use of motor vehicles and taxis.

6.1.4 LAND USE, TOPOGRAPHY, GEOLOGY AND SOILS

LAND USE

A total of eight (8) land use (or land cover) classes were identified and delineated for the project. Agriculture consist of both crop and livestock farming, which comprises approximately 50% of the project area, the most dominant land use class. Human settlement comprises approximately 40% of the project area, and combined with the agricultural land use, these two land cover classes comprise approximately 90% of the Project area. Water resources, typically comprising watercourses and wetlands were also identified and delineated. For the sake of this project, water resources refer to perennial and non-perennial watercourses, whereas wetlands are defined as "land which is transitional between terrestrial and aquatic. systems, where the water table is usually at, or near the surface, or the land is periodically covered" (National Water Act (Act 36 of 1998) of South Africa). **Table 26** presents a summary and overview of the land uses classes identified and delineated for the Project area. **Figure 20** and **Figure 21** presents an overview of selected stretched of the Project area and the corresponding land use classes delineated for the project.

Table 26 Summary and overview of the land uses classes (The Biodiversity Company, 2018)

LAND USE	AREA (HA)	PERCENTAGE (%)
Dam	0.05	0.02%
Donga (erosion)	1.97	0.75%
Agriculture	132.29	50.36%
Natural areas	7.58	2.89%
Water resource	9.35	3.56%
Rocky ridge	5.91	2.25%
Built-up area	103.86	39.54%
Wetland	1.69	0.64%
Total area	**262.69**	**100.00%**

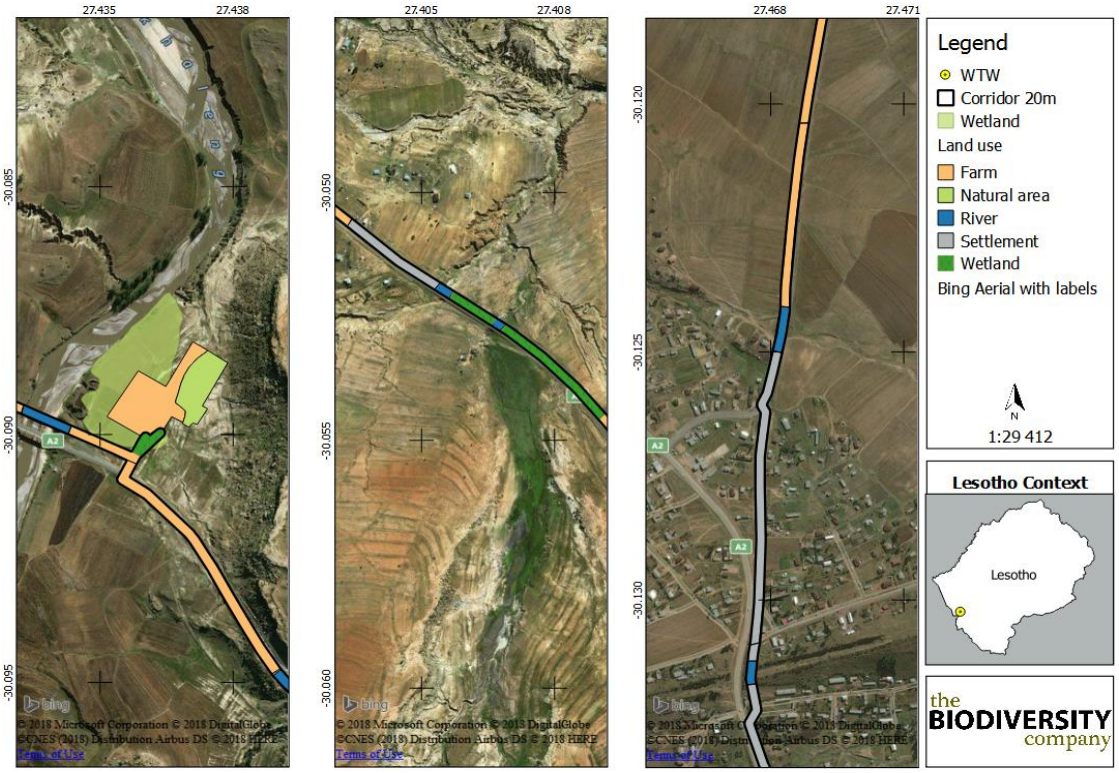


Figure 20 An example of land uses identified and delineated along the pipeline corridor, and WTW area (TBC, 2018)

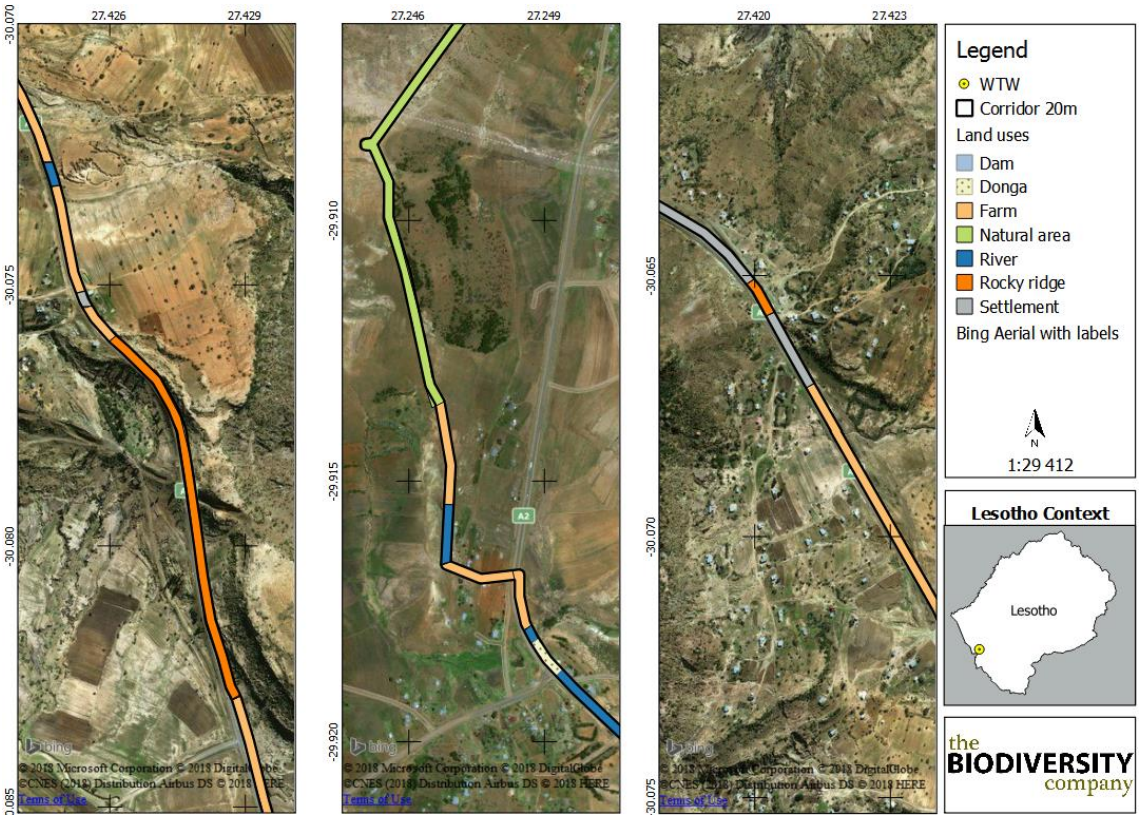


Figure 21 An example of land uses identified and delineated along the pipeline corridor (TBC, 2018)

TOPGRAPHY

Lesotho is divided into four physiographic regions:

- Lowlands (20 – 50 km strip along the western border with South Africa) where elevation ranges from 1400 – 1800 m,
- Foothills with elevations of 1800 – 2000 m,
- Senqu River Valley (extending from Mohale's Hoek and Quthing in the south to Mokhotlong in the north east) with elevations of 1400 – 1800 m,
- Mountainous area (highlands) occurring at an elevation of 2000 – 3400 m

The project area is situated in the western lowlands (**Figure 22**) with an altitude that ascends in an approximate north-south direction across Lesotho with the western quarter of the country comprised of plateaux (1500 – 1850 mamsl). The entire eastern and south-eastern country border is formed by the Drakensberg Mountain Range, with the Maluti Mountains running north south.

The study area is characterised by a gently undulating topography, with mean elevations in the order of 1500 to 1700m amsl for Zone 6 and 530m to 1685 amsl for Zone 7. The foothills of the Drakensberg Mountains form the backdrop to the study area along the eastern boundary. Rivers and streams that drain the area, flow in a south-westerly direction. Wide and deep (up to 4-5m) erosion gullies and dongas are evident throughout the region (Jaffares & Green, 2007).

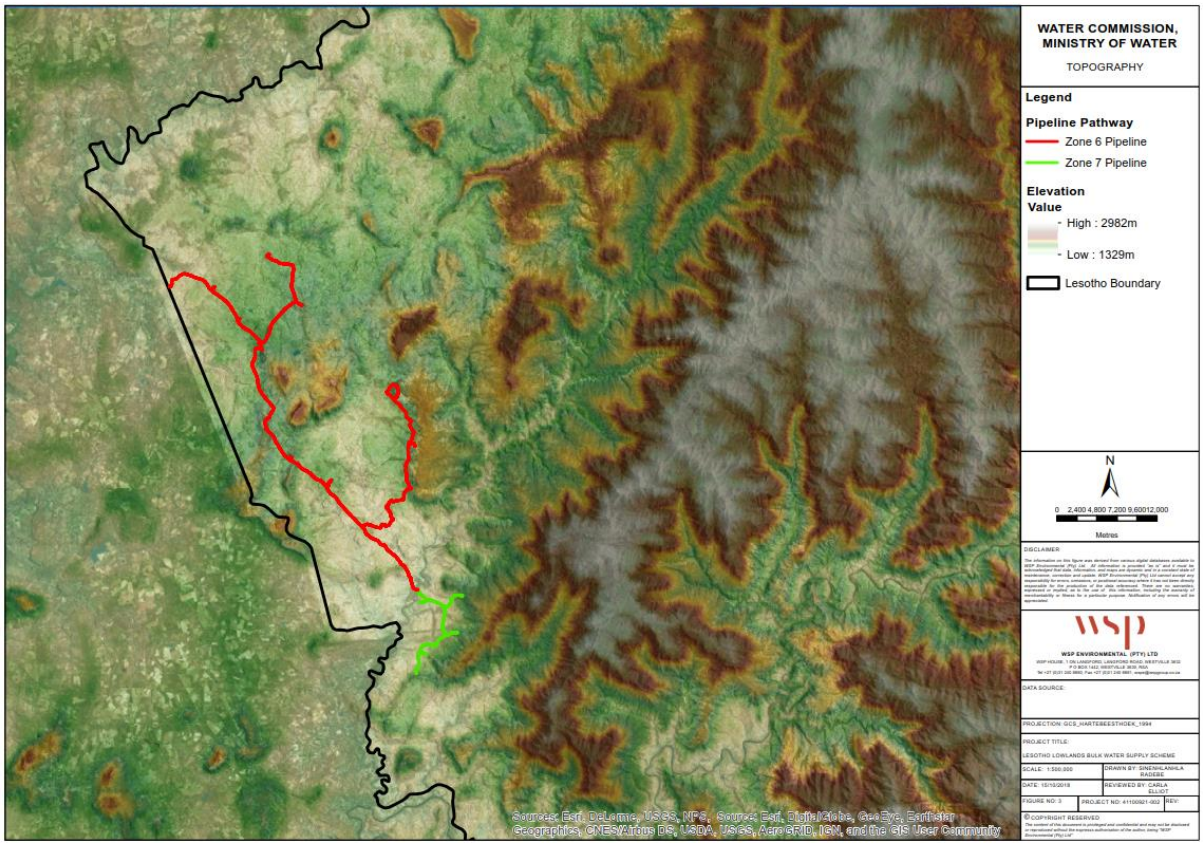


Figure 22 Regional Topography showing Proposed Water Supply Pipeline (WSP, 2018. Source: World Imagery)

REGIONAL GEOLOGY

The geology of Lesotho comprises horizontal to sub-horizontal dipping sedimentary rocks of the Beaufort and Stormberg Groups of the Karoo Supergroup overlain by up to 1600 m of Drakensburg Group basalts. Sedimentary rocks of the Burgersdorp, Molteno, Elliot and Clarens Formations include fluvio-deltaic mudstones, siltstones, and sandstones that underlie and crop out in the western lowlands. The Clarens formation

is overlain by a thick sequence of (up to 1600 m) compact and amygdaloidal basalt flows of the Lesotho Formation. Numerous dykes, ring dykes and sills intrude the sediment and basalt formations (British Geological Survey, 2018).

LOCAL GEOLOGY

The Zone 6 and 7 development area occurs in the sandstone, siltstone, mudstone and shale of the Elliot and Molteno Formations of the Karoo Supergroup. The Molteno Formation typically occurs at elevations of 1 600 and 1 700 mamsl, and includes medium to coarse-grained buff coloured feldspathic sandstone, with a gravelly basal unit and interbedded thin siltstones and mudstones. Outcrops occur in the lowlands between Maseru and Mohale's Hoek and around Hlotse, the South Phuthiatsana and Senqu River valleys. These sediments were deposited as a series of upward fining alluvial channel bedded sandstones, with varying thickness from >250 m in the south to <50 m in the north of the country.

The Elliot Formation consists of red clays and mudstones with interbedded fine to medium-grained sandstones. As with the Molteno Formation, the Elliot Formation thins from 200 m in the south of Lesotho to 100 m in the north. The outcrop of this formation underlies much of the northern lowland area (Davies, 2013).

The Lesotho Lowlands Zone 6 and Zone 7 Geotechnical Report present the below (Jeffares & Green etc al, 2007) – based on reference to Geological Maps[22] and trial pits:

The geology along the proposed Zone 6 pipeline route is variable in terms of the depth to bedrock and the thickness of individual subsurface horizons. The majority of the route intersected an upper horizon of colluvium, described as; slightly moist, light brown/ yellow brown, medium dense, intact, silty SAND frequently with large boulders and cobbles. Frequently beneath the colluvial horizon is a layer of residual soils, which comprise either silty sands or silty clays derived from the completed in-situ weathering of the siltstones and sandstones of the Molteno Formation. In many instances, the bedrock was shallow, and was encountered within the upper 1.0 to 1.5m of the surface. Bedrock, when encountered was described as; light grey and khaki, highly to completely weathered, soft rock becoming medium hard rock with depth, sandstone. In limited sections of the route, soft rock siltstone was also encountered.

The geology along the proposed Zone 7 pipeline route is generally fairly consistent with an upper horizon of colluvium, described as; slightly moist, light brown, medium dense, intact, silty fine grained sand, overlying a lower horizon of brown, medium dense, intact, silty fine grained sand. The colour varied between light reddish brown, light grey brown and light brown. Although the subsoils are predominantly sandy, small sections of silt and occasionally silty clay were encountered. These sections were encountered in the lower lying areas and valley lines. Basalt of the Drakensberg Group was encountered at the Ha Tsepo Reservoir location only. Bedrock, when encountered was described as; light grey, weathered, soft rock becoming medium hard rock with depth, sandstone. In limited sections of the route soft rock siltstone was also encountered. Dolerite dykes were encountered on site but not in any trial pits excavated during the fieldwork.

In summary, none of the in-situ material encountered in the trial pits was deemed suitable for use as pipe bedding material as the material is generally too fine grained to comply with the specification. The material does however comply with the requirements for general backfill[23] in excavated trenches.

As an alternative an investigation into the suitability of potential borrow pit sites was undertaken. One potential borrow pit site was identified within the project area. The site is located within the Makhaleng River bed just downstream from the bridge (**Figure 31**). A test was conducted on this material and the material was found to be suitable for bedding. There is an abundance of sand at this location with suitable accessibility for mining. Small-scale mining of the sand is already taking place. It is recommended that negotiations take place with the current sand winning. This activity will require the application of a Mining Permit from the Government of Lesotho and the paying of loyalties for the abstraction of the sand. The Department of Mines requires environmental clearance as part of the requirements for establishment of both new quarry and sand winning sites and an EMP required for selected sites.

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[22] 1:50,000 Lesotho, Mafeteng Sheet 7C (2927 CC); 1:50,000 Mohale's Hoek Sheet 12B (3027 AB & Part of 3027AA)

[23] Overlying the blanket material, up to ground level, normally consists of material originally removed from the trench for the pipe excavation

Figure 23 Bedding sand found at the Makhaleng River

SOILS

The northern and central lowlands are characterised by large deposits of rich volcanic soils, while the southern or border lowlands are characterised by poor soils and low rainfall[24]. These are derived from the Karoo sedimentary sequences, and are characterised by (SMEC, 2018):

- Low fertility;
- Low water retaining capacity;
- Poor structure; and
- High susceptibility to erosion.

They are, however, the country's main cultivatable areas. **Table 27** below shows the geomorphological units of Lesotho and associated soils.[25]

Table 27 Geomorphological units of Lesotho and associated soils (Schmitz and Rooyani, 1987; SSI, 2010)

GEOLOGY	GEOMORPHOLOGICAL UNIT	ASSOCIATED SOIL SERIES
Lesotho Formation	Steep and middle slopes	Popa and Matlana
	Accumulation glacis	Fusi and Thabana
	Planation surface	Machache, Nkau, Sefikeng, Tumo, Matlaba, Seforong, Ralebese, Matela
	Alluvial deposits	Phechela, Khabo, Sofonia, Maseru dark
Clarens Formation	Structural plateau	Matela, Berea, Ntsi, Qalaheng, Thoteng, Theko
	High structural plateau	Lekhalong, Tsenola, Sani

[24] LMS. 2013. Op cit.
[25] Schmitz and Rooyani, 1987.

Burgersdorp, Molteno and Elliot Formations	Accumulation glasis	Maliehe, Bosiu, Majara, Moshoeshoe, Tsiki, Sephula, Tsakholo, Maseru
	Planation surface	Leribe, Matela, Qalo, Hololo, Roma
	Alluvial deposits; high terrace	Matlaba, Seforong, Ralebese, Kubu, Khabo
	Alluvial deposits; medium terrace	Khabo, Kubu, Bela, Phechela, Maseru, Maseru dark
	Alluvial deposits; low terrace and flood plain	Caledon, Sofonia, Kolonyama, Phechela
	Dolerite dykes and sills	Ralebese

Many of the soils identified within the project area during site assessments were duplex soils. These include the Valsrivier, Sepane, and Sterkspruit soil forms. Duplex soils have in common the development of strong structure in the B-horizon, with marked and abrupt increase in clay from the A-horizon. The B-horizon is often hard and could be a restrictive layer for root growth and water infiltration (Fey, 2010). These soils are also highly erodible. The structural instability of the clays associated with duplex soils means that care must be taken when designing structures that will be suited in these conditions.

The Environmental and Social Impact Assessment for the Southern Regions prepared by SSI in 2010 provides an Erosion Hazard Map that defines high erosion hazard areas and the processes contributing to this hazard. Sub factors that were considered include: slope, soil erodibility, rainfall erosivity and cover with the slope and rainfall being dominant factors that contribute to erosion within Lesotho.

The gullied border Lowlands shows the lowest erosion hazard in Lesotho however on an internationally relative scale, the erosion area for this study area is still high. The Lowlands have suffered years of mismanagement, which accounts for a history of severe soil erosion. The Southern Regions of the Lowlands fall within the *Medium* hazard categories in the western portion of the study area where the Van Rooyen (Zone 6 Reservoir 9 (Z6R9)) and Qalabane (Zone 6 Reservoir 8 (Z6R8)) are located; to *High* for the Mafeteng area; and increasing to *Very High* for the Thabane Morena area. Zone 7 falls within *High* to *Very High* with southernmost portion, Mesitsaneng (Zone 7 Reservoir 5 (Z7R5)) falling into *Very High* erosion hazard category.

SSI (2010) further states that much of the areas falling within the Southern Region fall within “erosion hot spots” where severe erosion is evident. Sections of the pipeline route from Makhaleng River and WTW to Mafeteng in Zone 6 lie within an area with large dongas occurring. Similarly, in Zone 7 the pipeline route from the WTW at the Makhaleng River to Mohales Hoek lie within an area with large dongas and gullies. Many of the proposed reservoir sites show signs of sheet erosion ranging from slight to severe.

Figure 24: Erosion scars / gullies along the gravel road from Tsoloane Village to Thabana-Morena, Zone 6 (SEED, 2018)

Figure 25 Dongas and gullies along the Makhaleng River south of the WTW (SEED, 2018)

6.1.5 GROUNDWATER

GROUNDWATER OCCURRENCE

In Lesotho, groundwater occurs within fractured Karoo Supergroup sedimentary and basalt rock aquifers, alluvial sediments and within fracture and dolerite intrusion zones. The variable occurrence of groundwater is illustrated by borehole yields that vary from dry to up to 8.0 l/s within a few metres of a dolerite intrusion (British Geological Survey, 2018).

Groundwater occurrence in the Zone 6 and 7 development area occurs predominantly in the following two hydrogeological units (Davies, 2013):

- Elliot Formation
  - Geology consisting of red clays and mudstones with interbedded fine to medium-grained sandstones.
  - This Formation is generally not a particularly good aquifer, with typical borehole yields of 0.1 l/s to 0.2 l/s.
  - This aquifer is semi-confined.
- Molteno Formation
  - Geology consisting of medium to coarse-grained feldspathic sandstone, with a gravelly basal unit and interbedded thin siltstones and mudstones.
  - This formation is regarded as the best aquifer in Lesotho. The base of the Molteno Formation generally forms a spring line, and within the formation, stratified variations in permeability produce additional springs, some of which are perennial and high yielding.
  - Boreholes drilled in this formation have safe yields that vary from 0 l/s to 1.6 l/s.
  - The Molteno Formation aquifer has been developed into well fields supplying the towns of Roma and Teyateyaneng.
  - This aquifer is semi-confined.

GROUNDWATER POTENTIAL

Generally, the groundwater potential of the fractured Karoo aquifers of Lesotho is low (**Figure 26**), with increased potential in localised areas due to secondary porosity caused by intrusion of dolorite dykes, and increased primary porosity in the Molteno Formation (Davies, 2013).

JacobsGIBB Ltd undertook a groundwater study in 2005/2006 (JacobsGIBB, 2006) in the Mafeteng area in order to determine the suitability of groundwater as a source of water supply for the region. During this investigation, eleven potential groundwater development areas were identified. Geological mapping and geophysical surveys were carried out in these areas in order to identify potential drilling targets. Based on these investigations, five boreholes were drilled, predominantly targeting the contact zones between dykes and the parent material. The drilling programme found that groundwater flow occurred in shallow, unconfined alluvial aquifers and in deeper, confined fractured rock aquifers, with the most successful water strikes occurring at the contact zones with the dykes at depths of approximately 15m to 55m below surface. Blow yields of these boreholes were in the region of 3 to 4l/s.

Long-term pump tests were carried out in three of the boreholes in order to estimate the long-term abstraction volumes available from the aquifer units, and to determine the aquifer characteristics. Water quality samples collected during the pump-testing programme all indicated water of a good quality, with all analysed parameters falling within the WHO (2009) *Guidelines for Drinking Water*. The results of the pump testing indicated that the aquifers have moderate yields, with a total sustainable abstraction volume of approximately 4.5 million cubic meters of water per annum from the Zone 6 and 7 region. It is thus evident that groundwater is a feasible source of sustainable water which can be used to supplement the water supply in Zone 6 and 7.

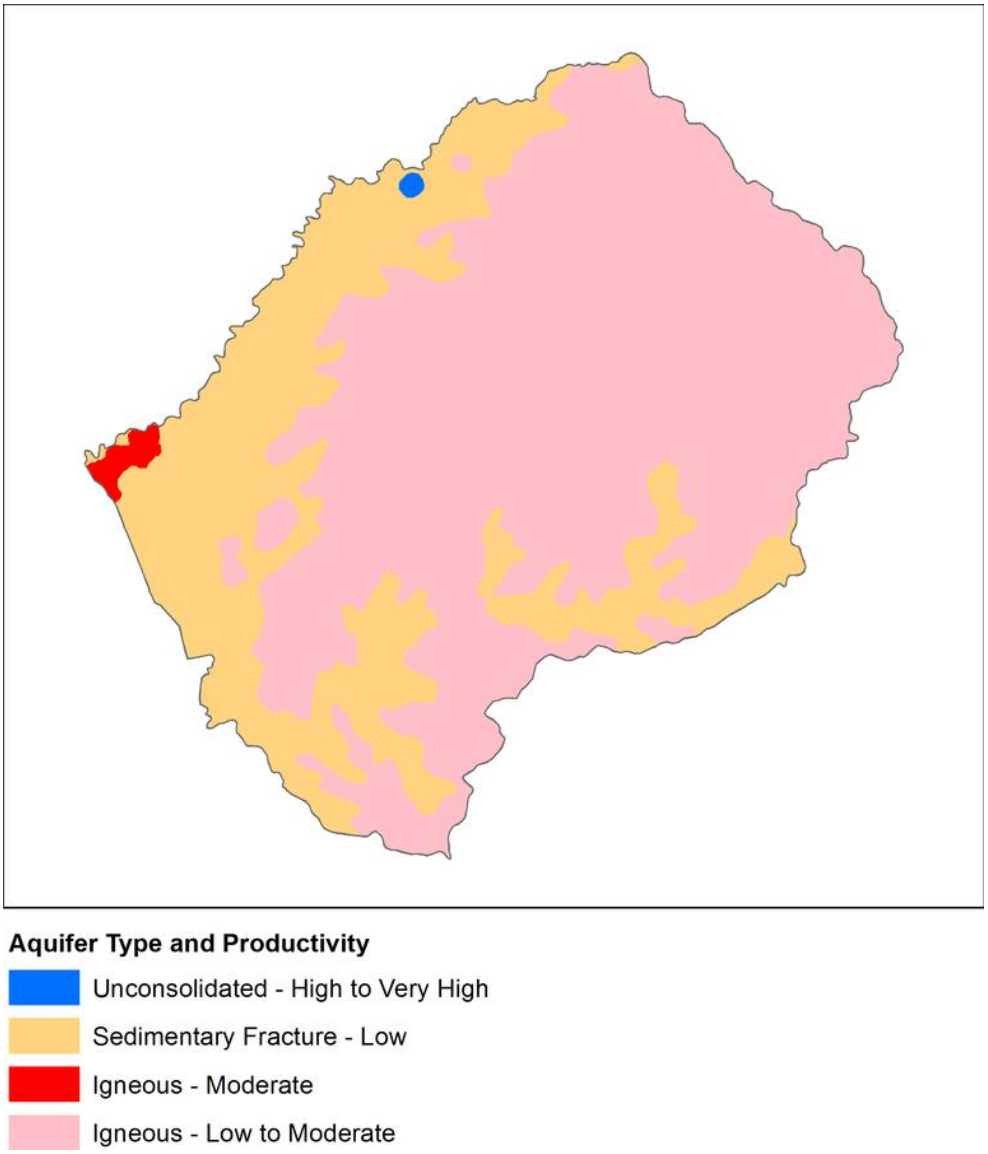


Figure 26: Lesotho groundwater potential per aquifer type (Davies, 2013)

GROUNDWATER USE

Groundwater and springs form a major source of water for rural areas within the Lesotho Lowlands. This is typically because the water needs of the more scattered and remote rural communities are small enough to be met economically from such sources. The Department of Rural water Supply (DRWS) has been reasonably successful in meeting such needs in the past using hand pumps and springs. However, in recent times the policy of water service levels to such areas has changed, with the DRWS moving away from hand pumps as supply sources, and focusing more on using reticulated systems (SSI, 2010).

GROUNDWATER QUALITY

The groundwater quality throughout Lesotho is generally considered to be good, with localised naturally driven increases in concentrations of iron, manganese and fluoride recorded in some areas. Of these trace elements, fluoride has been recorded at levels, which are potentially harmful to human health, based on the WHO (2009) *Guidelines for Drinking Water*. However, these areas are generally not widespread (Davies, 2013).

GROUNDWATER LEVELS

A geotechnical investigation conducted by Jeffares and Green in collaboration with SSI on Zone 6 encountered groundwater seepage in only one of the trial pit excavations, at 1.3 meters below ground level (Jaffares & Green, 2007a). Trial pit excavations at Zone 7 did not encounter and instances of shallow groundwater occurrence (Jaffares & Green, 2007b). It is thus likely that the excavations for the bulk water supply development will intercept the local aquifer units in any significant way.

It is possible however that a perched groundwater condition may be encountered between the colluvial and residual soils, or above the bedrock during the rainy season. However, this is likely to constitute a minor aquifer, with minimal potential impacts as a result of the development.

GROUNDWATER POTENTIAL CONTAMINANTS

As discussed above, the groundwater in the project area can experience locally elevated concentrations of iron, manganese and fluoride. However, the main potential contaminants to groundwater arise from anthropomorphic sources, such as (Davies, 2013):

- Poorly located or constructed pit latrines,
- Waste disposal sites, and
- Unregulated use of agricultural chemicals and disposal of animal wastes.

6.1.6 SURFACE WATER

QUATERNARY CATCHMENTS

Zone 6 and 7 network spread over D15F, D15G, D23F and D23G quaternary catchments, which falls within the Lesotho boundary and contributes flow to the Orange Water Management Area (WMA 6). Quaternary catchment D15F and D15G is mainly drained by the Qhoqhoane River and Kolo-La-Pere River respectively, which feeds into the Makhaleng River. Quaternary catchment D23F and D23G is mainly drained by the Tsa-Kholo River and Sandsprut River respectively, which feeds into the Caledon River **(Figure 27**). The Mean Annual Precipitation (MAP), Mean Annual Evaporation (MAE) and Mean Annual Runoff (MAR) for each quaternary catchment was obtained from the WR2012 database and can be seen in **Table 28** below.

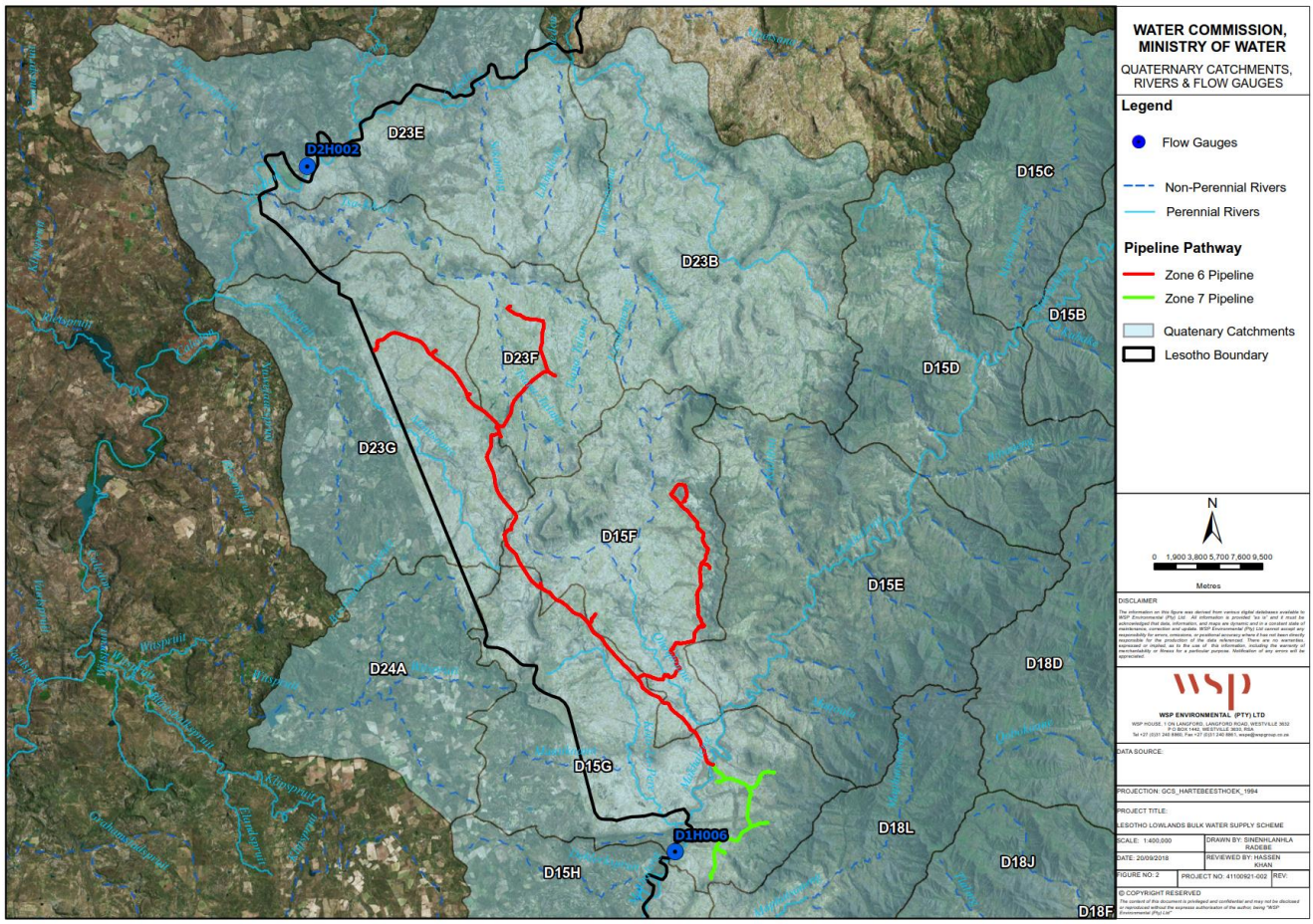


Figure 27 Quaternary Catchments, Rivers and Flow Gauges (WSP, 2019 Revision)

Table 28: Quaternary Catchment Descriptions

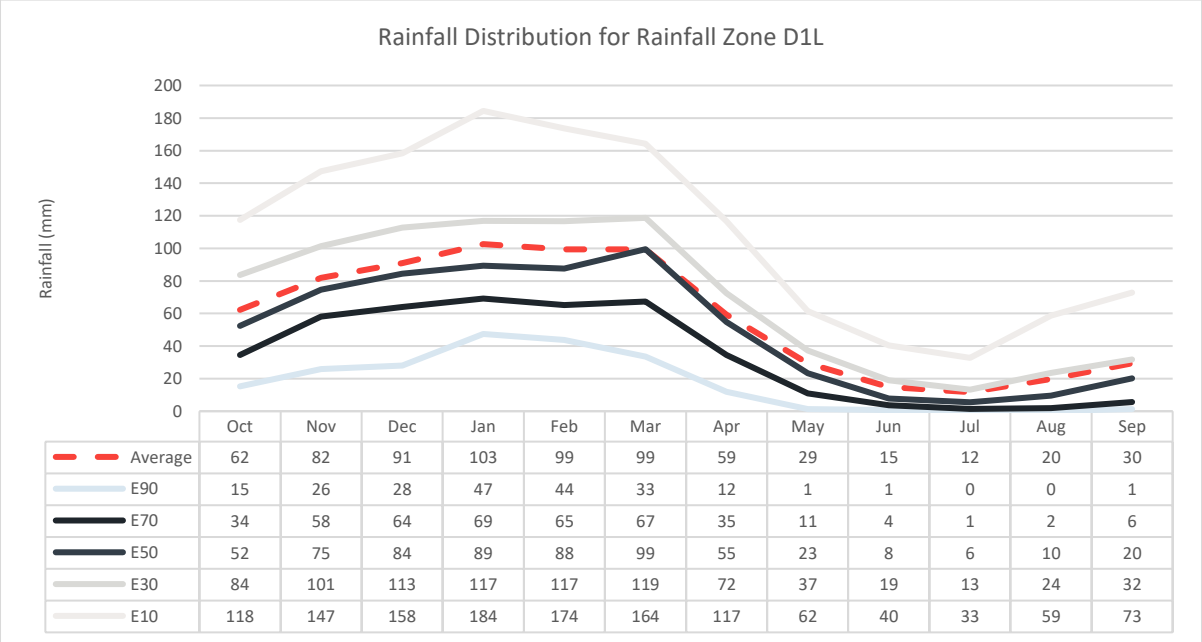
QUATERNARY CATCHMENT	CATCHMENT AREA (KM²)	RAINFALL ZONE	MAP (MM)[26]	EVAPORATION ZONE	MAE (MM)[27]	MAR (MCM)[28]
D15F	352	D1L	750	20B	1526	43.52
D15G	485	D1L	670	20B	1526	44.49
D23F	352	D2G	638	20B	1526	19.13
D23G	512	D2G	622	20B	1526	25.46

PRECIPITATION

The southern section of the site falls within the D1L rainfall zone with an average MAP of 710mm and the northern section of the site falls within the D2G rainfall zone with an average MAP of 624mm. The monthly

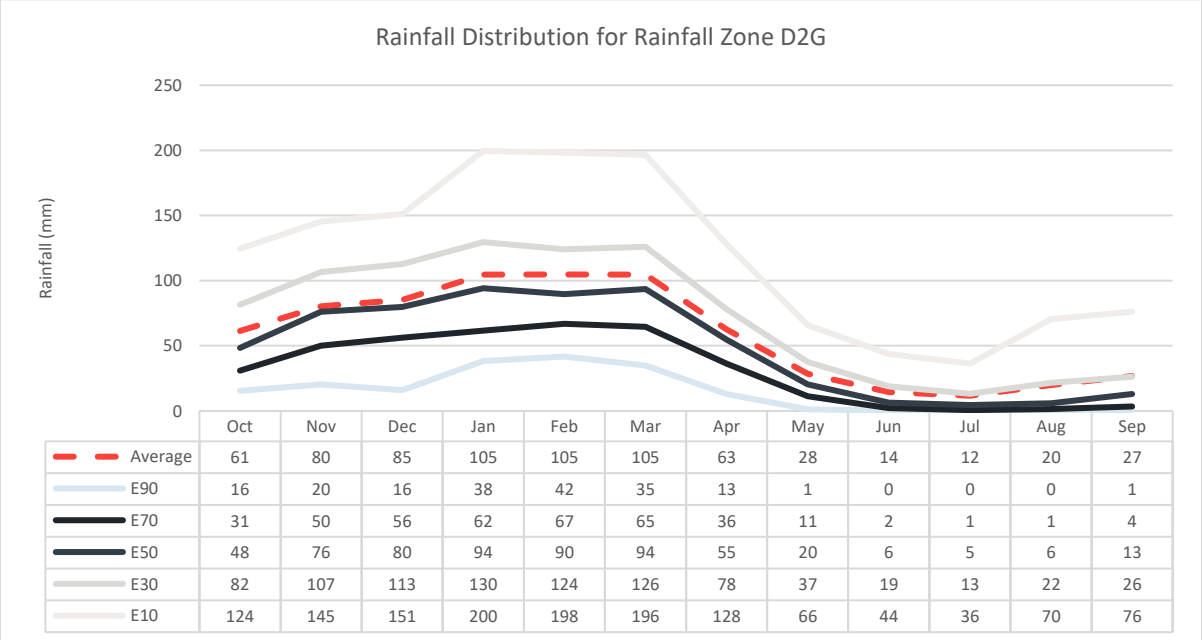
[26] Mean Annual Precipitation
[27] Mean Annual Evaporation
[28] Million Cubic Metres

rainfall distribution is represented in **Figure 28 and Figure 29.** The 'E' values show the probability of non-exceedance, so highlight the likelihood that the specific rainfall event will not be exceeded.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average	62	82	91	103	99	99	59	29	15	12	20	30
E90	15	26	28	47	44	33	12	1	1	0	0	1
E70	34	58	64	69	65	67	35	11	4	1	2	6
E50	52	75	84	89	88	99	55	23	8	6	10	20
E30	84	101	113	117	117	119	72	37	19	13	24	32
E10	118	147	158	184	174	164	117	62	40	33	59	73

Figure 28: Monthly Rainfall Distribution for Rainfall Zone D1L (WR2012)



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average	61	80	85	105	105	105	63	28	14	12	20	27
E90	16	20	16	38	42	35	13	1	0	0	0	1
E70	31	50	56	62	67	65	36	11	2	1	1	4
E50	48	76	80	94	90	94	55	20	6	5	6	13
E30	82	107	113	130	124	126	78	37	19	13	22	26
E10	124	145	151	200	198	196	128	66	44	36	70	76

Figure 29: Monthly Rainfall Distribution for Rainfall Zone D2G (WR2012)

EVAPORATION

Evaporation data for the site was extracted from the WR2012 (WRC, 2015) database. The site falls within evaporation zones 20B. The MAE is clearly considerably higher than the MAP, making this a dry area. The monthly evaporation distribution is presented in **Figure 30**.

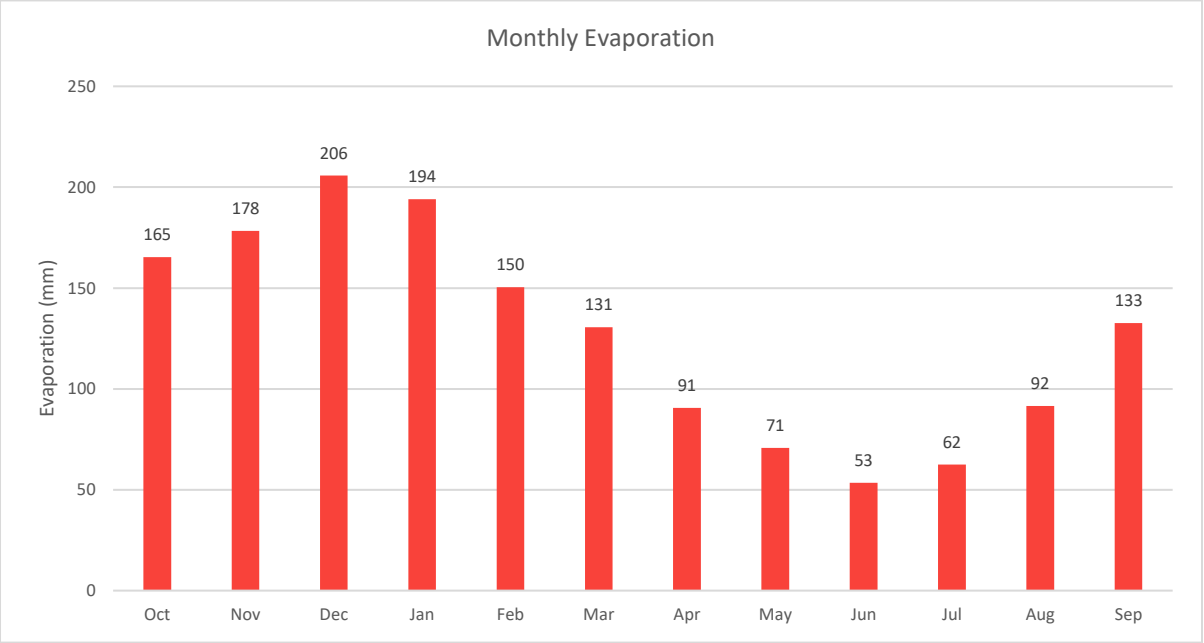
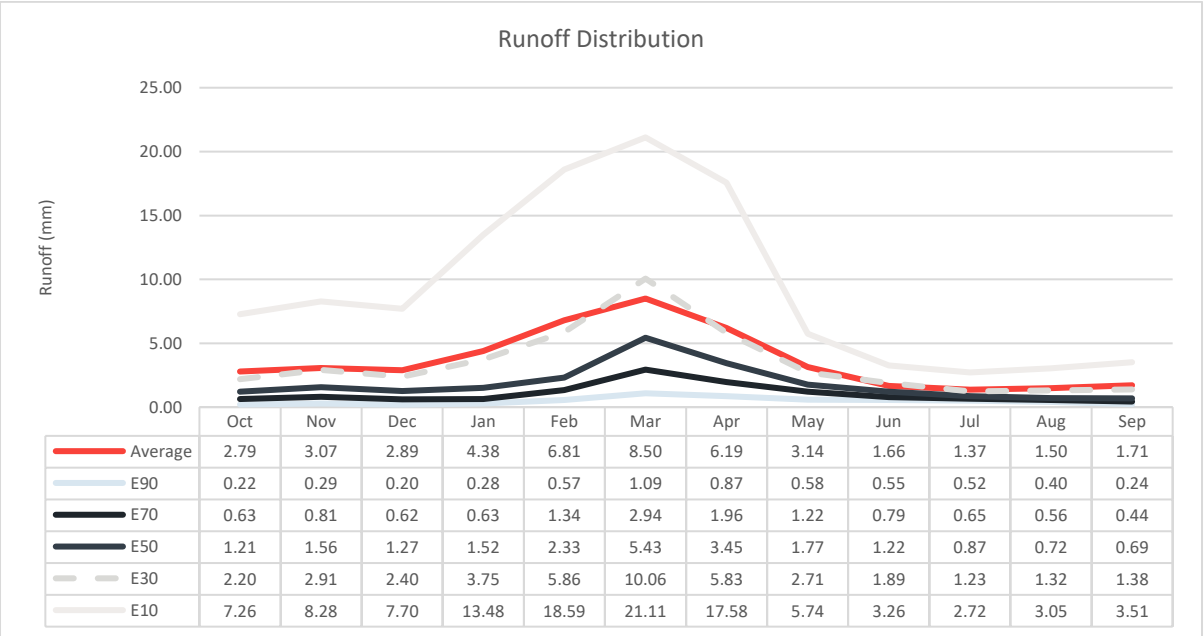


Figure 30: Monthly S-Pan Evaporation for Evaporation Zone 20B (WR2012)

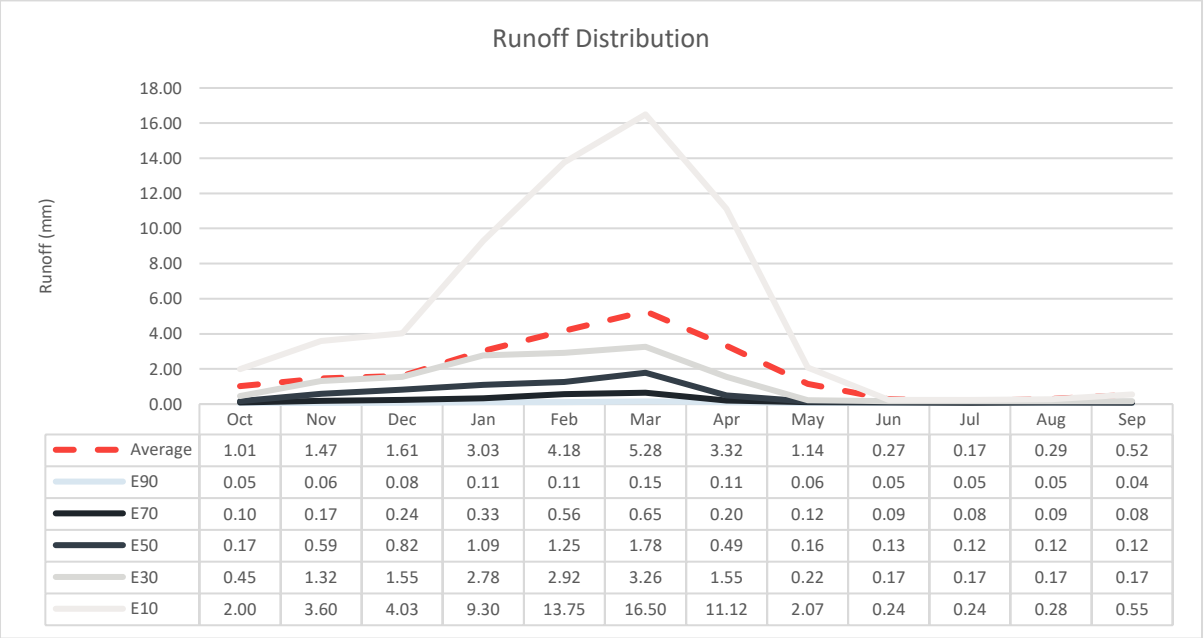
NATURALISED RUNOFF

As mentioned, the southern section of the site falls within the D1L rainfall zone and the northern section of the site falls within the D2G rainfall zone. Each rainfall zones produced similar runoff volumes and patterns. Quaternary catchment D15F and D15G has an MAR of 43.52 and 44.49 MCM respectively and quaternary catchment D23F and D23G has an MAR of 19.13 and 25.46 MCM respectively. These volumes were averaged for each rainfall zone and the monthly rainfall distribution is represented in **Figure 31** and **Figure 32.**



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average	2.79	3.07	2.89	4.38	6.81	8.50	6.19	3.14	1.66	1.37	1.50	1.71
E90	0.22	0.29	0.20	0.28	0.57	1.09	0.87	0.58	0.55	0.52	0.40	0.24
E70	0.63	0.81	0.62	0.63	1.34	2.94	1.96	1.22	0.79	0.65	0.56	0.44
E50	1.21	1.56	1.27	1.52	2.33	5.43	3.45	1.77	1.22	0.87	0.72	0.69
E30	2.20	2.91	2.40	3.75	5.86	10.06	5.83	2.71	1.89	1.23	1.32	1.38
E10	7.26	8.28	7.70	13.48	18.59	21.11	17.58	5.74	3.26	2.72	3.05	3.51

Figure 31: Monthly Runoff Distribution for Rainfall Zone D1L (WR2012)



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average	1.01	1.47	1.61	3.03	4.18	5.28	3.32	1.14	0.27	0.17	0.29	0.52
E90	0.05	0.06	0.08	0.11	0.11	0.15	0.11	0.06	0.05	0.05	0.05	0.04
E70	0.10	0.17	0.24	0.33	0.56	0.65	0.20	0.12	0.09	0.08	0.09	0.08
E50	0.17	0.59	0.82	1.09	1.25	1.78	0.49	0.16	0.13	0.12	0.12	0.12
E30	0.45	1.32	1.55	2.78	2.92	3.26	1.55	0.22	0.17	0.17	0.17	0.17
E10	2.00	3.60	4.03	9.30	13.75	16.50	11.12	2.07	0.24	0.24	0.28	0.55

Figure 32: Monthly Runoff Distribution for Rainfall Zone D2G (WR2012)

SITE SPECIFIC DATA

DAILY RAINFALL

Rainfall gauging stations located in close proximity to the site were selected from a database compiled by the Institute for Commercial Forestry (ICFR). Data pertaining to the rainfall gauging stations is given in **Table 29**. The Mohales Hoek rainfall gauging station (0204819 P) was considered representative of the site based on reliability of the data, distance from site and record length. Data pertaining to the rainfall gauging station is given in **Table 30** and a daily plot of the data is shown in **Figure 33**.

Table 29: Rainfall Gauging Station Summary (Kunz, 2003)

RAINFALL STATION	STATION NO.	LATITUDE	LONGITUDE	DISTANCE FROM SITE (KM)	RECORD (YEARS)	RELIABLE DATA (%)	MAP (MM)
MOHALES HOEK	**0204819 P**	**3009**	**2728**	**8.058**	**121**	**52.7**	**661**
MOHALES HOEK	0207819 W	3009	2729	8.822	121	23.5	664
MAGHALEN	0204670 W	3010	2724	9.779	99	8.8	670
LILLE	0204640 W	3010	2722	11.252	123	53.7	655
SPRING VALLEY	0204518 W	3008	2719	12.536	121	41.6	580

Table 30: Monthly Statistical Analysis of the Mohales Hoek Rain Gauge (0204819 P)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ANNUAL
Average	100	102	94	58	30	13	13	16	28	59	76	91	677
Median	87	89	90	50	24	7	7	7	14	52	70	86	662
Maximum	304	285	265	172	147	57	68	97	162	186	217	216	1231
Minimum	0	0	7	0	0	0	0	0	0	0	0	0	249

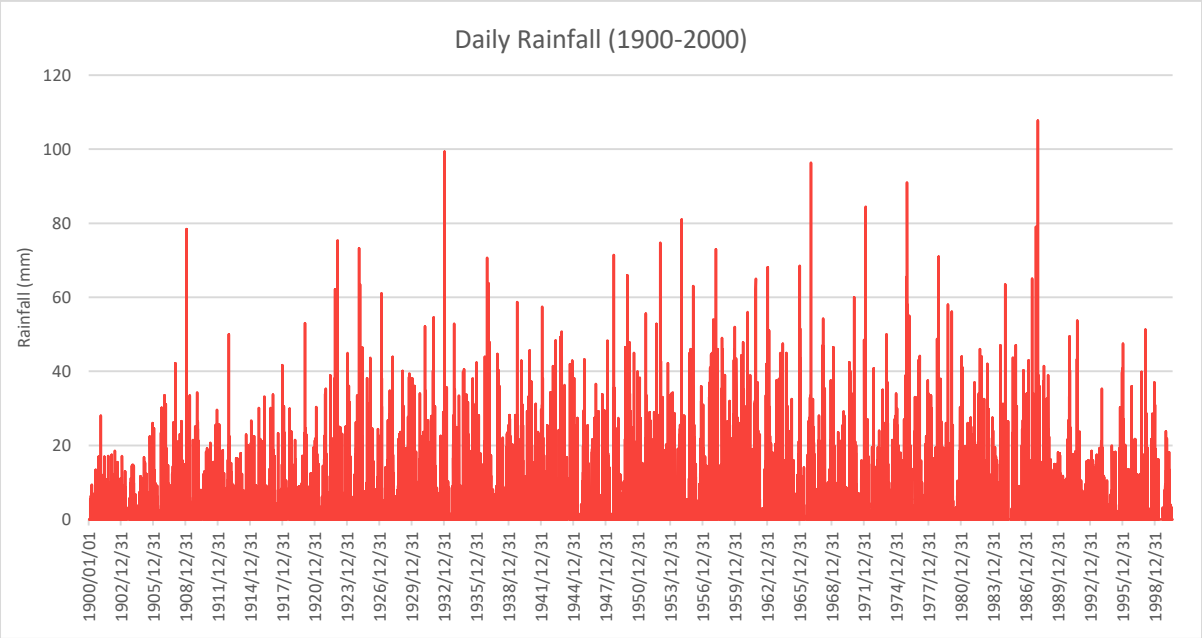


Figure 33: Daily Rainfall Plot of the Mohales Hoek Rain Gauge (0271816 S)

DESIGN RAINFALL DEPTHS

The design rainfall depths for the centroid of the site (lat 30o05', long 27o26') were extracted using the Design Rainfall Estimation software for South Africa (Smithers and Schulze, 2002). The design rainfall depths (mm) for 1:2-year, 1:5-year, 1:10-year, 1:20-year, 1:50-year, 1:100-year and 1:200-year return periods were extracted (**Table 31**). The difference between the 24-hour and the 1-day rainfall is that the 1-day rainfall is measured from 8am on day 1 until 8am on day 2, while the 24-hour rainfall records the 24-hour period that records the highest rainfall

Table 31: Design Rainfall

	RETURN PERIOD (MM)						
DURATION	2	5	10	20	50	100	200
5 minutes	9.7	12.9	15.3	17.7	21.1	23.9	26.9
10 minutes	13.5	18	21.2	24.6	29.4	33.3	37.5
15 minutes	16.4	21.8	25.8	29.9	35.7	40.4	45.5
30 minutes	20.6	27.4	32.4	37.6	44.9	50.8	57.2
45 minutes	23.6	31.4	37.1	43	51.3	58.1	65.4

1 hour	25.9	34.5	40.7	47.2	56.4	63.9	71.9
1.5 hour	29.6	39.5	46.6	54	64.5	73	82.2
2 hour	32.6	43.4	51.2	59.4	70.9	80.3	90.4
4 hour	38.9	51.8	61.1	70.9	84.6	95.8	107.8
6 hour	43.1	57.4	67.8	78.6	93.8	106.2	119.6
8 hour	46.4	61.8	72.9	84.5	100.9	114.3	128.6
10 hour	49.1	65.4	77.2	89.5	106.8	121	136.2
12 hour	51.4	68.5	80.8	93.7	111.9	126.7	142.6
16 hour	55.3	73.7	87	100.8	120.4	136.4	153.5
20 hour	58.5	78	92.1	106.7	127.4	144.3	162.4
24 hour	61.3	81.7	96.5	111.8	133.5	151.2	170.2
1 day	51.9	69.1	81.6	94.6	112.9	127.9	143.9
2 day	65.8	87.7	103.5	120	143.3	162.3	182.6
3 day	75.7	100.8	119	138	164.7	186.5	209.9
4 day	82	109.2	129	149.5	178.5	202.2	227.6
5 day	87.3	116.3	137.3	159.2	190.1	215.3	242.2
6 day	91.9	122.4	144.5	167.5	200	226.5	254.9
7 day	95.9	127.8	150.9	174.9	208.9	236.5	266.2

FLOW GAUGES

Flow data for the Makhaleng River (D1H006) and the Caledon River (D2H002) was obtained from the Department of Water and Sanitation (DWS) to get an understanding of the flow regimes (**Table 32**) (DWS, 2018). D1H006 is located approximately 8km downstream of the WTW and D2H002 is located near the outfall point of Quaternary Catchment D23E and flows through Quaternary catchment D23F and D23G.

The average daily flow (m^3/s) for both gauges were plotted respectively and shown in **Figure 29** and **Figure 30**, respectively. A monthly statistical analysis was performed on the flow and is shown in **Table 34** and **Table 35**.

Table 32: Stream Flow Gauging Station Summary

STATION	NAME	CATCHMENT AREA (KM^2)	LAT	LONG	START DATE	END DATE
D1H006	Kornet Spruit @ Maghaleen	2990	-30.15972	27.40138	1935-11-14	2018-07-26
D2H022	Caledon River @ Wilgerdraai	12852	-29.61666	27.06555	1988-11-09	2018-04-26

Table 33: Statistical analysis of gauge station D1H006 (m^3/s)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Average	30.5	36.3	31.1	27.1	12.0	8.2	5.5	6.5	8.4	14.4	21.6	25.0
Median	18.2	23.3	22.1	16.8	6.8	4.3	3.6	2.8	2.7	6.0	14.5	15.8
Maximum	170.2	142.3	136.8	152.8	66.5	47.5	31.1	58.9	68.4	95.8	140.7	109.5
Minimum	0.1	0.9	0.9	0.6	0.6	0.6	0.3	0.4	0.2	0.1	0.1	0.0

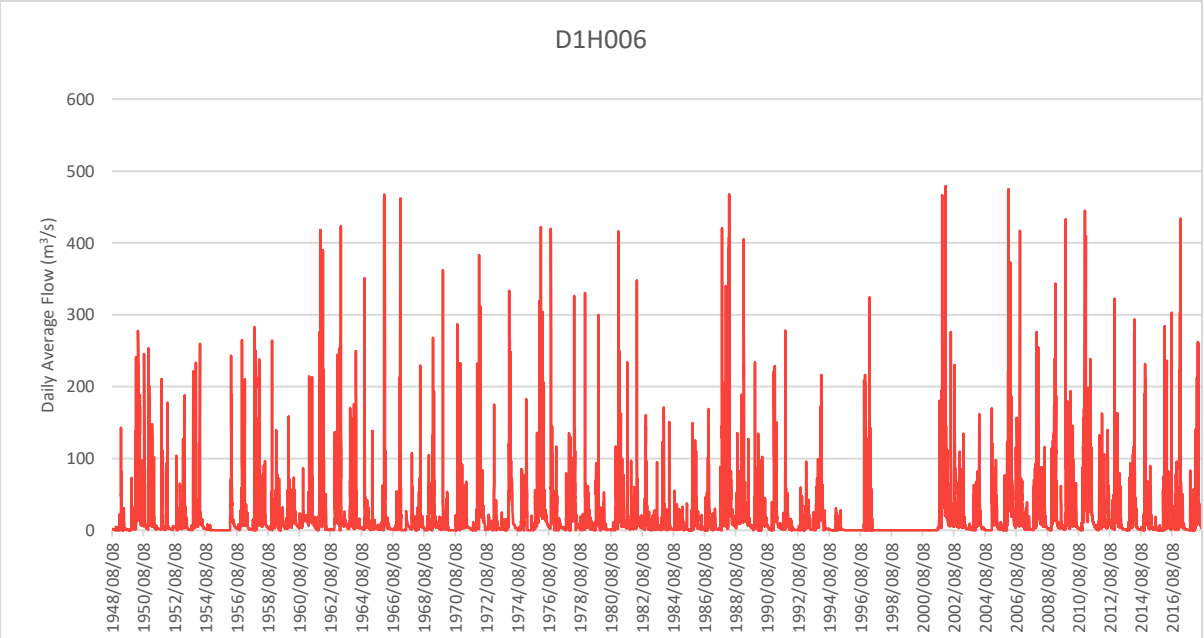


Figure 34: Daily average flow rate for gauge station D1H006 (m^3/s)

Table 34: Statistical analysis of gauge station D2H002 (m^3/s)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Average	57.9	68.9	51.2	31.6	20.8	14.4	9.7	9.9	8.7	18.3	32.7	37.9
Median	42.1	50.7	43.1	28.7	14.2	10.7	7.8	5.5	3.6	11.7	29.0	32.2
Maximum	499.0	305.8	128.7	158.1	104.2	49.1	25.1	39.6	51.4	65.7	138.3	99.0
Minimum	6.0	3.6	4.5	0.0	0.0	0.0	0.0	0.3	0.0	0.2	0.0	1.5

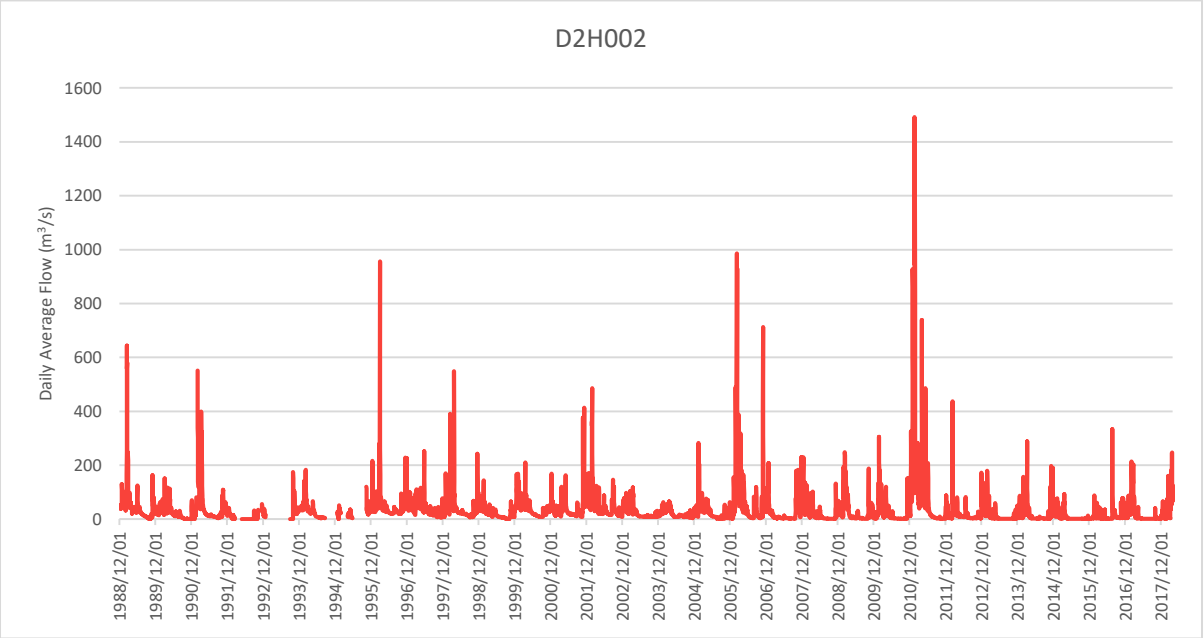


Figure 35: Daily average flow rate for gauge station D2H002

DOWNSTREAM WATER DEMAND

Information for the downstream water demand of the Makhaleng River was obtained from the SMEC Water Resource Assessment Report (2015) which took into account domestic, industrial, institutional and commercial water needs. The Makhaleng catchment was represented as having agro-climatic conditions with the largest irrigation potential demand. The water resource model estimated a potential irrigable land at 17,076ha with an irrigation water demand of 151.5 MCM.

The status quo of water supplies from the Makhaleng River was obtained from the Feasibility Report by Parkman. The Makaleng River supplies the Mohale's Hoek centre with approximately 1147 m3/day based on data from 2002/2003. More recent data was not made available with current existing conditions.

DROUGHT STATUS QUO AND PREDICTIONS

At a regional level, the outcomes of the 22nd Southern African Regional Climate Outlook Forum (SARCOF-22), organised by SADC in August 2018, indicated that the bulk of the region is likely to receive normal to below-normal rainfall conditions in the period December 2018-March 2019. This would potentially lead to droughts and widespread food insecurity in the region. Moreover, various international sources, including the World Meteorological Organization (WMO) and the International Research Institute (IRI) for Climate and Society (Columbia University), recently forecast an 655 chance of the 206/2017 El Niño prevailing during the period June-August 2019, reducing to 50-55% during the period September-November 2019. By mid-December 2018 international models had predicted a 96% of chance of El Niño. The UN and partners have supported the GoL, through the Disaster Management Authority (DMA), in the development of a Drought Contingency Plan and related Response Plan. According to the Lesotho Meteorological Services (LMS), in the period December 2018-March 2019, the south-western part of the country (i.e. Berea, Maseru, Mafeteng, Mohale's Hoek.

In order to respond to immediate humanitarian needs, the Humanitarian Country Team (HCT) submitted an application to the Central Emergency Response Fund (CERF) in December 2018. USD 5,550,533 was allocated to ensure that the most urgent and life-saving humanitarian activities in key sectors: Agriculture; Food Security; Health, Nutrition; Water, Sanitation and Hygiene (WASH); Child Protection; Protection (Gender Based Violence - GBV); and Protection (Migration). Through CERF allocations, HCT targeted 273,635 people in four districts of the country—i.e. Mohale's Hoek, Maseru, Quthing and Qacha's Nek—which were originally projected to be in Integrated Food Security Phase Classification (IPC) Phase 3 (Crisis) or higher.

WATER QUALITY ANALYSIS

Eight water samples were collected from surface water bodies and groundwater wells within Zone 6 and 7, which may be influenced by the future development (**Figure 36, Table 35**).

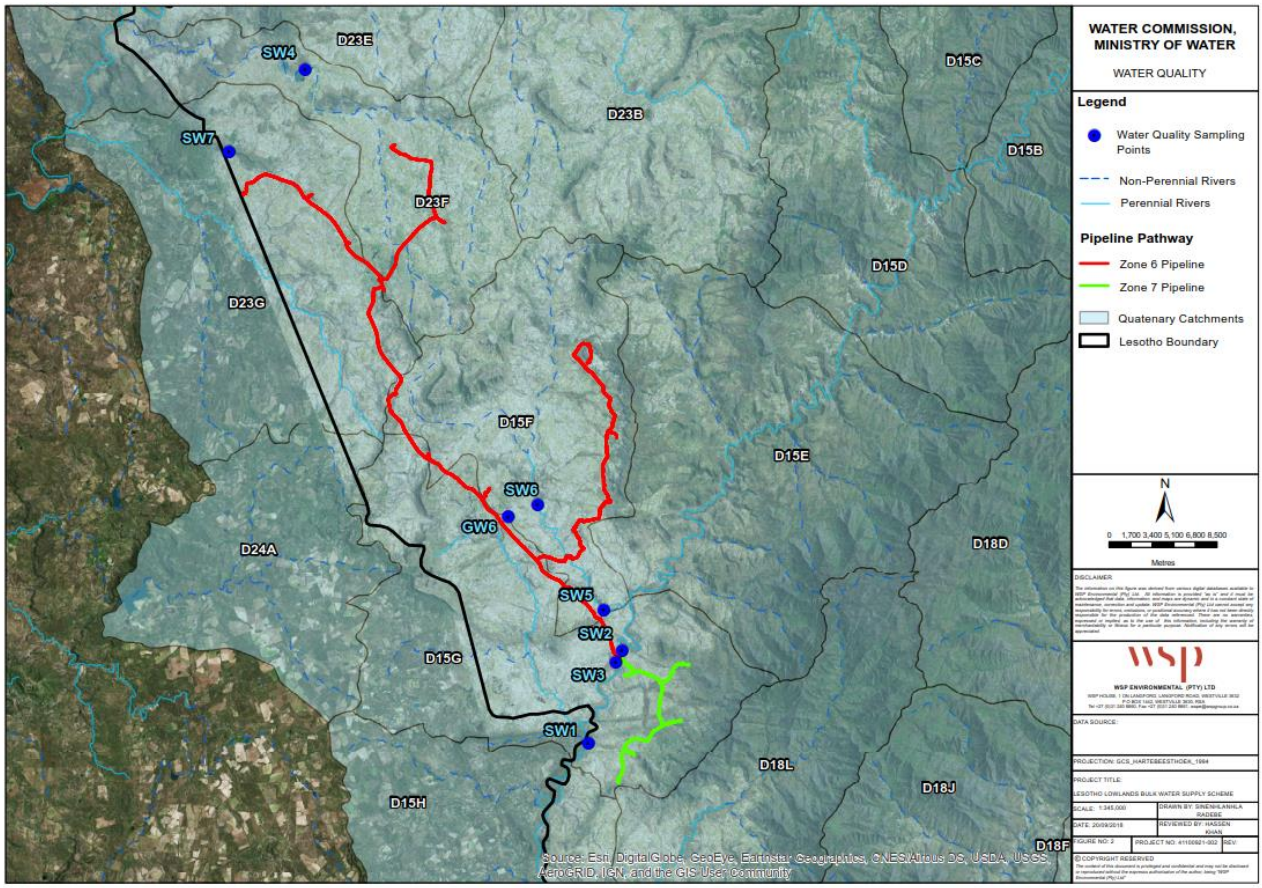


Figure 36 Water Quality Sampling Points (WSP, 2018)

Table 35: Surface Water Sampling Locations

SAMPLING POINTS	LATITUDE	LONGITUDE	DESCRIPTION
SW1	30° 9.121'S	27° 24.595'	Downstream of the Makhaleng River on the border of South Africa and Lesotho
SW2	30° 5.683'S	27° 25.922'E	Downstream of the Water Treatment Works on the Makhaleng River
SW3	30° 5.189'S	27° 26.221'E	Downstream of the Water Treatment Works on the Makhaleng River
SW4	29° 40.422'S	27° 10.616'E	Tsa-Kholo River
SW5	30° 3.463'S	27° 25.319'E	Qhophoane River before entering the Makhaleng River and after the pipeline crossing
SW6	29° 58.971'S	27° 22.052'E	Upstream of the Qhophoane River before the pipeline crossing
GW6	29° 59.492'S	27° 20.611'E	Hand pump at the Monyaki village
SW7	29° 43.940'S	27° 6.906'E	Maseng River, a tributary of the Sandspruit River.

Due to the lack of water quality guidelines in Lesotho[29], various international water quality guidelines were assessed in order to determine the most important receptors and/or potential surface water users in the area. In order to achieve this, a Most Sensitive User (MSU) analysis was carried out, and the following were determined to be of most relevance:

- South African Aquatic Ecosystems Standards
- South African Irrigation Standards
- South African Livestock Watering Standards and
- WHO drinking water quality.

Appendix G-6 provides the MSU Water Quality Guideline Requirements against which the water quality results have been compared. It should be noted that many of the MSU values identified are related to the South African irrigation guidelines.

Table 36 shows the summarised water quality results. The following exceedances are highlighted:

- Aluminium
  - SW1 exceeded the MSU guideline value.
- Sodium
  - SW7 exceeded the MSU guideline value.
- Manganese
  - SW4, SW6 and GW6 exceeded the MSU guideline value.
- Zinc
  - SW4 and GW6 exceeded the MSU guideline value.
- Electrical conductivity
  - SW4, SW5, SW6 and SW7 exceeded the MSU guideline value.

Table 36 Selected Water Quality Results

TEST	UNITS	MSU GUIDELINE VALUE	SW1	SW2	SW3	SW4	SW5	SW6	SW7	GW6
Aluminium	ug/l	5	**205**	<20	<20	<20	<20	<20	<20	<20
Antimony	ug/l	20	<2	<2	4	<2	3	<2	2	<2
Arsenic	ug/l	10	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Barium	ug/l	700	34	23	22	140	92	253	36	55
Boron	ug/l	500	<12	<12	<12	12	<12	<12	157	<12
Cadmium	ug/l	0.15	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	ug/l	12	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Copper	ug/l	0.3	<7	<7	<7	<7	<7	<7	<7	<7
Iron	ug/l	50000	253	<20	<20	32	<20	<20	<20	<20
Sodium	mg/l	40	6.8	6.2	6.1	45	16.7	19.3	**81.4**	16.6
Lead	ug/l	0.2	<5	<5	<5	<5	<5	<5	<5	<5

[29] The Lesotho Environmental Act however, does have set draft portable water quality standards which has been included in the ESMP Proposed Monitoring Programme

Manganese	ug/l	20	20	<2	<2	**98**	<2	**118**	<2	**209**
Mercury	ug/l	0.04	<1	<1	<1	<1	<1	<1	<1	<1
Nickel	ug/l	20	<2	<2	<2	<2	<2	<2	<2	2
Selenium	ug/l	10	<3	<3	<3	<3	<3	<3	<3	<3
Uranium	ug/l	15	<5	<5	<5	<5	<5	<5	<5	<5
Zinc	ug/l	3	<3	<3	<3	**4**	<3	<3	<3	**470**
Fluoride	mg/l	1.5	<0.3	<0.3	<0.3	0.4	0.4	0.4	0.8	<0.3
Chloride	mg/l	1500	4	3.8	3.7	9.3	5.5	4	10.5	7.7
Nitrite as NO^2	mg/l	3000	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate as NO^3	mg/l	50000	2.1	2.3	2.3	<0.2	<0.2	<0.2	1.3	1.2
Sulphate	mg/l	1000	13.6	13.4	13.4	14.9	23.5	16.1	18.1	3.3
Cyanide	mg/l	70	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
EC @25C	uS/cm	400	245	230	232	**481**	**359**	**610**	**527**	179
Chlorine	mg/l	5000	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02
Ammonia as N	mg/l	1.5	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
pH	pH units	6.5-8.5	7.97	7.89	8.09	8.16	8.25	7.76	8.16	6.97
TDS	mg/l	1000	148	133	136	264	200	341	297	92

6.2 ECOLOGICAL ENVIRONMENT

6.2.1 FLORA

VEGETATION

The project area is situated in the grassland biome. This biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the grassland biome include:

- Seasonal precipitation; and
- The minimum temperatures in winter (Mucina & Rutherford, 2006).

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees. The vegetation types associated with the project area include the following (**Figure 37**):

- Basotho Montane Shrubland;
- Eastern Free State Clay Grassland;
- Eastern Free State Sandy Grassland;

- Lesotho Highland Basalt Grassland;
- Senqu montane Shrubland;
- Western Lesotho Basalt Shrubland; and
- Zastron Moist Grassland.

Based on the vegetation type classification no forests or forest vegetation can be found in any section of the Project area.

Based on the Plants of Southern Africa (BODATSA-POSA, 2016) database, 309 plant species are expected to occur in the project area. Of the 309-plant species, zero species are listed as being Species of Conservation Concern (SCC).

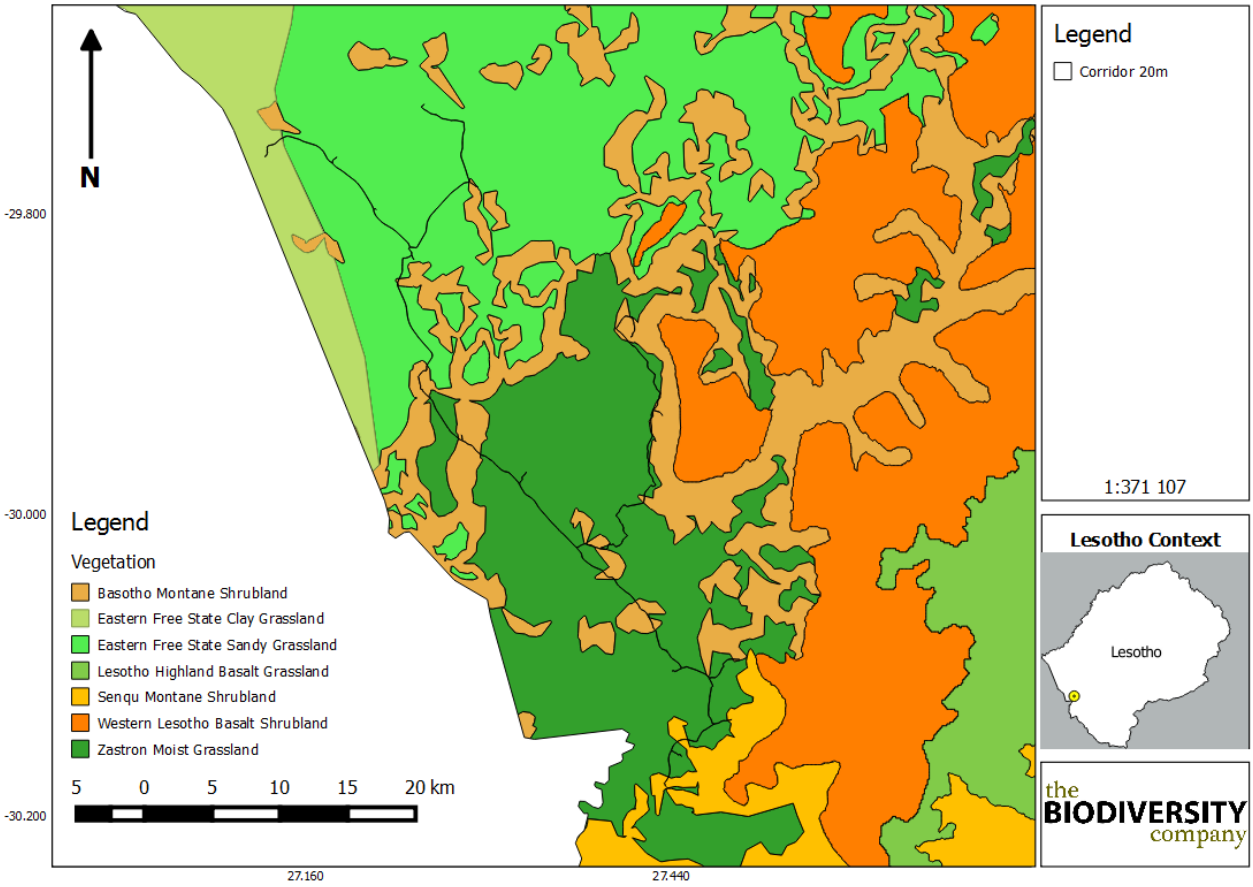


Figure 37 Vegetation types associated with the Project area

ALIEN AND INVASIVE PLANTS

Recently, the rangelands of Lesotho have been degraded to levels of non-recovery through overgrazing due in part to overstocking. Overgrazing of the rangelands has led to decrease in diversity of species and invasion of non-palatable species. With the degradation of the rangelands, there is an accompanying invasion of the Karoo species like *Chrysocoma*. Although the extent of *Chrysocoma* invasion has not been quantified, these shrubs are now being observed in areas where they were not previously known to occur. Although *Chrysocoma* provides ground cover against rain induced soil erosion, it is an indicator of deterioration of the rangelands, loss of useful biological components and a sign of increasing desert-like conditions. In essence, Lesotho is progressively becoming a desert.

Other alien species with some economic and habitat importance are the *Xanthium* species; *Xanthium stromarium* and *X. spinosum*. These are weedy species of both rangelands and cultivated fields causing millions of Maloti in production losses. These weeds have strong burrs on their seeds which cling to wool and mohair rendering it useless. The infected crops, wool and mohair lose in productivity and market value.

There is, however, little documentation of these effects of the alien species invasion into economically important ecosystems in the country; be they cultivated fields or rangelands. This also presents a serious information gap that would handicap efforts to control these alien species.

6.2.2 FAUNA

EXPECTED SPECIES

AVIFAUNA

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 247 bird species are expected to occur in the vicinity of the project area. Of the expected bird species, twenty two (22) species are listed as SCC either on a regional (20) or global scale (12).

The SCC include the following:

- One (1) species that are listed as Critically Endangered (CR) on a regional basis;
- Five (5) species that are listed as Endangered (EN) on a regional basis;
- Seven (7) species that are listed as Vulnerable (VU) on a regional basis; and
- Seven (7) species that are listed as Near Threatened (NT) on a regional basis.

MAMMALS

The International Union for Conservation of Nature (IUCN) Red List Spatial Data (IUCN, 2018) lists 82 mammal species that could be expected to occur within the Project area. Of these species, three are medium to large conservation dependant species, such *Ceratotherium simum* (Southern White Rhinoceros) and *Equus quagga* (Plains Zebra) that, in Lesotho, are generally restricted to protected areas such as game reserves. These species are not expected to occur in the Project area and are removed from the expected SCC list. Of the remaining 79 small to medium sized mammal species, ten (10) are listed as being of conservation concern on a regional (Southern Africa) or global basis. The list of potential species includes:

- One (1) that is listed as Endangered (EN) on a regional basis;
- Four (4) that are listed as Vulnerable (VU) on a regional basis; and
- Five (5) that are listed as Near Threatened (NT) on a regional scale.

REPTILES

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the ReptileMap database provided by the Animal Demography Unit (ADU, 2017) 29 reptile species are expected to occur in the Project area. One (1) reptile specie of conservation concern is expected to be present in the Project area.

Tropidosaura cottrelli (Cottrell's Mountain Lizard) is listed as Near Threatened on a global and regional scale. This species is endemic to the Maloti-Drakensberg highlands of South Africa and Lesotho. They are said to be threatened by climate change (global warming), frequent fires and overgrazing (IUCN, 2017). The likelihood of occurrence was rated as moderate.

AMPHIBIANS

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2018) 16 amphibian species are expected to occur in the project area. No amphibian species of conservation concern is said to be present in the project area according to the above-mentioned sources.

OBSERVED SPECIES

AVIFAUNA

Sixty (60) bird species were recorded in the project area during the August 2018 survey based on either direct observations, vocalisations, or the presence of visual tracks & signs.

Four avifaunal SCC were recorded during the survey. They were the Cape Vulture (*Gyps coprotheres*), Southern Bald Ibis (*Geronticus calvus*), Sentinel Rock-thrush (*Monticola explorator*) and Lanner Falcon (*Falco biarmicus*).

MAMMALS

Overall, mammal diversity in the project area was moderate, with ten (10) mammal species being recorded during the August 2018 survey based on direct observations, camera trap photographs and/or the presence of visual tracks & signs. One mammal SCC was recorded during the survey, Cape Clawless Otter *(Aonyx capensis*).

HERPETOFAUNA (REPTILES & AMPHIBIANS)

Herpetofauna diversity is considered to be moderate (considering the timing of the survey) with six (6) reptile species and four (4) amphibian species bring observed or recorded in the project area during the August 2018 survey. Further surveys conducted during the summer (wet) seasons are expected to yield further results.

ARTHROPODS

A number of macroinvertebrates were recorded for the project; including the Bark Scorpion *Opisthacanthus asper*, *cf Protostrophus* sp , and *cf Latrodectus sp*.

6.2.3 WETLANDS, AQUATIC ECOLOGY AND WATER RESOURCES

WETLANDS

A number of wetlands were identified either adjacent to the proposed pipeline or being traversed by the pipeline. Due to the extent of agricultural activities in the project area and seasonality of the survey, limited vegetation was available to identify and delineate wetland areas. This was compounded by the extent of disturbances and land-use development across the project area. In order to address this limitation, more emphasis was placed on the soil form and soil wetness encountered for the project. A seepage wetland was identified within proximity of the proposed WTW, with a wetland boundary presented in **Figure 19: Site Alternatives**. This seep is expected to be supported by sub-surface ground water flows. A small portion (approximately central) displayed signs of permanent wetness, with the remaining extent of the seep area determined to be a seasonal / temporary system. A number of wetland systems are also traversed by the pipeline corridor, these comprise channelled and unchanneled valley bottom systems.

The general features of the identified wetland unit within the WTW area were assessed in terms of impacts on the integrity of these systems using the WET-Health methodology. Some of the identified sources of impact include activities such as urban development, infrastructure, increased hardened surfaces due to the presence of bridges and roads through wetlands (and associated culverts), alien plant species invasion and agriculture (which promote the processes of erosion). The PES was completed for the proposed location of the WTW, which is likely to have a direct impact on the delineated seepage wetland system. The dominant land use in this area is agriculture, namely crop farming. This has resulted in the removal of natural vegetation resulting in the onset of alien vegetation establishment and the loss of surface roughness. The combination of lost surface roughness and the extent of compacted areas due to roads and tracks has also resulted in an increase in surface flow hydrology across the area. The hydro-dynamics of the area has been altered and this has in turn resulted in the scouring and erosion of some areas. The PES of the wetland system is Largely Modified (**Table 37**) which suggests the

change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognizable (Macfarlane et al., 2009).

Table 37 Wetland PES results for the Project Area

Wetland	Hydrology		Geomorphology		Vegetation	
	Rating	**Score**	**Rating**	**Score**	**Rating**	**Score**
Seepage area	D: Largely Modified	5.2	B: Largely Natural	1.7	E: Seriously Modified	7.8
Overall PES Score	4.9		Overall PES Class		D: Largely Modified	

The ecosystem services provided were only determined for the seepage wetland at the WTW area which were assessed and rated using the WET-EcoServices method (Kotze *et al.,* 2009). The seepage wetland had an overall moderately low rating level of service. The provisioning of cultivated foods and harvestable resources were the only two (2) services determined to provide a moderately high and intermediate benefit level respectively for the assessment. The remaining services were scored as moderately low or lower. These findings suggest the system provides a moderately low level of benefit, with the highest benefit (moderately high) associated with the provision of cultivate foods. The relatively deep (average > 50 cm and saturated) soils enable the planting and growing of crops within the system. The system provides no other services of notable benefit.

AQUATIC ECOSYSTEM AND WATER RESOURCES

The proposed pipeline either traverses or is in proximity to several water courses within the project area, specifically wetland and river systems. The proposed WTW is located adjacent to the Makhaleng River, this system is a focal aspect for the aquatic ecological assessment as it is the predominant receiving aquatic environment for potential risks associated with the project. The Makhaleng River rises in the Maluti Mountains, flows in a south-westerly direction to join the Orange River at the border with the Free State province, South Africa.

Characteristic features of the watercourses are low gradient alluvial fine bed channels. In comparison to more northern African river systems, the aquatic fauna of the considered ecoregion is “lacking in diversity” (Abel et al., 2008). This ecoregion is known to contain approximately 1-19 freshwater fish species of which 1-11 are known to be endemic. The ecoregion is known to have increased flow rates during the spring and summer seasons (September to March) and most of the indigenous fish species breed during this period. A total of five (5) fish species are expected for SQR D15H-4889, which are presented in **Table 38**. No expected species are of conservational concern (IUCN, 2018).

Table 38 Expected fish species for the Makhaleng River in SQR D15H-4889

SPECIES	COMMON NAME	CONSERVATION STATUS (IUCN, 2018)
Clarias gariepinus	Sharptooth Catfish	Least Concern (LC)
Enteromius anoplus	Chubbyhead Barb	Least Concern (LC)
Labeo capensis	Orange River mudfish	Least Concern (LC)
Labeo umbratus	Moggel	Least Concern (LC)
Labeobarbus aeneus	Smallmouth Yellowfish	Least Concern (LC)

FIELD SURVEY

A total of five (5) sites were suitable for a low flow assessment (**Figure 38**). Water quality, habitat integrity and macroinvertebrate community structures were assessed for all the sites, with fish assessments completed for the two (2) sites on the Makhaleng River. The low flow conditions have altered the quantity and quality of habitat, having an impact on the biotic community structure for the system. Furthermore, extensive instream sedimentation has limited habitat diversity for aquatic biota within the reach.

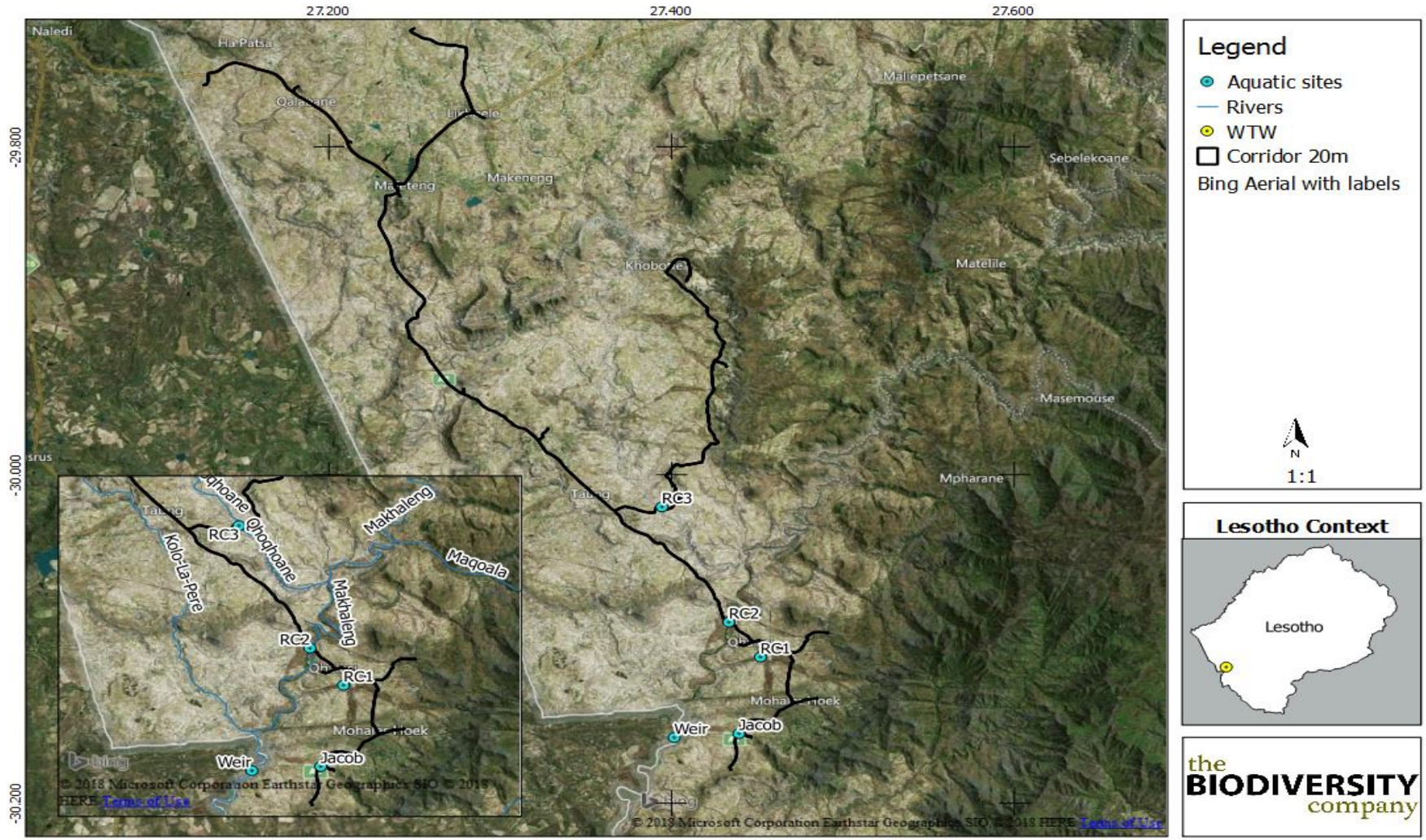


Figure 38 Location of the aquatic sampling sites in relation to the Project area

IN SITU WATER QUALITY

In situ water quality analysis was conducted at all assessed sites. The results of the survey are presented in **Table 39.**

Table 39 In situ water quality results for the low flow survey (August 2018)

SITE	PH	CONDUCTIVITY (µS/CM)	DO (MG/L)	TEMPERATURE (°C)	TURBIDITY (NTU)
TWQR*	6.5-9.0	-	>5.00	5-30	-
RC3	8.66	291	7.91	17.0	0.43
RC2	8.40	181	10.7	10.2	59
RC1	8.97	197	8.60	17.2	301
Jacob	8.49	205	9.86	15.8	109
Weir	8.93	189	9.81	8.50	42.7

* TWQR – Target Water Quality Range;Levels exceeding recommended guideline levels are indicated in red;Sites are arranged in a downstream direction.

In situ water quality analysis of the sampled sites indicates acceptable conditions within the project area for the low flow survey (**Table 36**). The rivers and tributaries associated with the pipeline showed unmodified water quality, with all parameters (pH, Electrical Conductivity (EC), Dissolved Oxygen (DO) and temperature) falling within the TWQR at all five sites. During the survey, the water within the Makhaleng River and associated tributaries was deemed acceptable for aquatic biota and ecosystem function.

HABITAT ASSESSMENT

INTERMEDIATE HABITAT INTEGRITY ASSESSMENT (IHIA)

The results for the instream and riparian habitat integrity assessment for the associated aquatic systems are presented in **Table 40.** The reach includes the 10 km sections of the aquatic systems in which the project area falls under.

Table 40: Results for the Instream Habitat Integrity Assessment

INSTREAM	AVERAGE	SCORE
Water abstraction	5	2.8
Flow modification	6	3.12
Bed modification	21	10.92
Channel modification	16	8.32
Water quality	8	4.48
Inundation	17	6.8
Exotic macrophytes	0	0
Exotic fauna	0	0
Solid waste disposal	6	1.44
Total Instream		62.12
Category		C

Riparian	Average	Score
Indigenous vegetation removal	15	7.8
Exotic vegetation encroachment	12	5.76
Bank erosion	19	10.64
Channel modification	20	9.6
Water abstraction	8	4.16
Inundation	16	7.04
Flow modification	14	6.72
Water quality	10	5.2
Total Riparian		43.08
Category		D

According to the IHIA results instream habitat integrity in the reach is considered to be a Class C, or moderately modified. A loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged. The riparian habitat integrity in the reach is considered to be a Class D, or largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred in the past. Impacts to the bed, channel, flow modification and habitat in the catchment are moderate to critical. The agricultural and livestock activities in the reach have resulted in significant amounts of erosion and sedimentation of the river bank and instream areas, respectively. This was noted in both the Makhaleng and Qhoqhoane River catchments, where sedimentary soils prone to erosion have inundated majority of the instream aquatic areas, limiting aquatic habitat diversity

Instream Habitat Availability

An indication of the available biotopes (sampled) is provided in **Table 41**. A rating system of 0 to 5 was applied, 5 being highly abundant and diverse and 0 being not available. The weightings for typical Lowland river zonation has been used for the Makhaleng and Qhoqhoane rivers (Rountree *et al.*, 2000).

Table 41: Biotope availability at the sites during the June 2018 survey

		QHOQHOANE	MAKHALENG	TRIBUTARY	TRIBUTARY	MAKHALENG
BIOTOPE	**WEIGHTING**	**RC3**	**RC2**	**RC1**	**Jacob**	**Weir**
Stones in current (SIC)	15	0.5	0.5	2	2	0.5
Stones out of current (SOOC)	12	0	1	1.5	1.5	0
Bedrock	2	1	2.5	2	3	1.5
Aquatic vegetation	0.5	0	0	0	0	0
Marginal vegetation in current	2	0	1	0.5	1	0
Marginal vegetation out of current	2	0	0.5	0	2	0
Gravel	0.5	1.5	4	3	3	2
Sand	4	3.5	4	2	2	3
Mud	1.5	0	2	1	1	0.5
Total Score (X / 45)		6.5	15.5	12	15.5	7.5

Weighted Biotope Score (%)	11	22	28	32	11
Biotope Category (Tate and Husted, 2015)	F	F	F	E	F

The biotope availability scores indicate poor instream habitat availability within the project area, likely unable to support a high diversity of aquatic macroinvertebrate taxa.

AQUATIC MACROINVERTEBRATES

Macroinvertebrate assemblages are good indicators of localised conditions because many benthic macroinvertebrates have limited migration patterns or a sessile mode of life. They are particularly well-suited for assessing site-specific impacts (upstream and downstream studies) (Barbour *et al.*, 1999). Benthic macroinvertebrate assemblages are made up of species that constitute a broad range of trophic levels and pollution tolerances, thus providing strong information for interpreting cumulative effects (Barbour *et al.*, 1999). The assessment and monitoring of benthic macroinvertebrate communities forms an integral part of the monitoring of the health of an aquatic ecosystem.

The aquatic macroinvertebrate results for the survey are presented in **Table 42**. The aquatic systems sampled for the surveys fall into the Eastern Escarpment Mountains Lower Ecoregion (Dallas, 2007).

Table 42: Macroinvertebrate assessment results recorded during the June 2018 Survey

SITE	SASS SCORE	NO. OF TAXA	ASPT*	CATEGORY (DALLAS, 2007)
RC3	20	6	3.3	E/F
RC2	93	16	5.8	A
RC1	26	8	3.3	E/F
Jacob	22	9	2.4	E/F
Weir	41	8	5.1	B

*ASPT: Average score per taxon

SASS scores recorded in the Makhaleng River ranged from 41 to 93 at sites Weir and RC2 respectively. ASPT ranged between 5.1 and 5.8 at sites Weir and RC2, respectively. SASS scores recorded in the Qhoqhoane River (RC3), the unnamed Makhaleng River tributary (RC1), and the Jacobspruit (Jacob) were low (≤26) with low ASPT (≤3.3).

Based on the ASPT scores the aquatic macroinvertebrate communities in the Qhoqhoane River and the two Makhaleng River tributaries (Jacobspruit and an unnamed tributary) comprised primarily of tolerant taxa (Intolerance Rating < 5) while the Makhaleng River comprised a fair diversity of moderately tolerant taxa (Intolerance Rating 6 - 10) in low abundances.

Biotic Integrity Based on SASS5 Results

Biotic integrity in the Makhaleng River ranged from natural (Class A) at RC2 to largely natural (Class B) at the weir further downstream (**Table 42**), indicating good habitat availability and good water quality. Despite the macroinvertebrate communities presenting near natural conditions, the poor instream habitat diversity was observed to be a limiting factor during the survey.

The Qhoqhoane River (RC3) and the two Makhaleng River tributaries (RC1 and Jacob) were classed as seriously modified (class E/F). Limited habitat diversity and availability together with domestic use (sand mining, clothes washing and dumping of solid waste) of the rivers by local people were negatively affecting local aquatic biota within the aquatic systems at the time of the survey.

Macroinvertebrate Response Assessment Index

The results of the Macroinvertebrate Response Assessment Index (MIRAI) assessment (Thirion, 2007) are provided in **Table 43**. Results stem from sampling sites RC2 and Weir on the Makhaleng River, and the remainder of the tributary sites (RC3, RC1 and Jacob) during the August 2018 low flow assessment.

Table 43: MIRAI for the aquatic systems from the August 2018 survey

	SCORE CALCULATED	
INVERTEBRATE METRIC GROUP	**Makhaleng**	**Tributaries**
Flow modification	55.6	22.3
Habitat	51.4	40.0
Water Quality	58.5	21.9
Ecological Score	55.0	28.7
Invertebrate Category	Class D	Class E

The results of the MIRAI derived an ecological category of class D or largely modified for the Makhaleng River. Central factors resulting in a lowered ecological category were attributed to habitat level drivers. As observed in the results, habitat factors contributed the most to the deteriorated ecological conditions as the lowest component score obtained, followed by flow modification factors. Invertebrates adapted to vegetation and stones biotopes were largely absent from the SASS5 samples resulting in this lowered score. This result is in agreeance with the biotope availability scores. This result illustrates the importance of the stones and vegetation biotopes for aquatic macroinvertebrate diversity. It can be derived from the results that the level of instream stones and marginal vegetation loss from sedimentation has impacted the macroinvertebrate assemblage in the Makhaleng River.

The results of the MIRAI derived an ecological category of class E or seriously modified for the tributaries of the Makhaleng River. Central factors resulting in a lowered ecological category were attributed to water quality level drivers. Water quality modification contributed the most to the deteriorated ecological conditions in the tributaries as the lowest component score obtained, followed by flow modification factors. Water quality in the tributaries during the low flow survey period was considered adequate according to in situ water quality analyses, however water quality related biological responses (sensitive invertebrates) had changed from the derived reference conditions. A large number of sensitive taxa expected for the Ecoregion under reference conditions were absent from the 2018 low flow assessment. The tributaries are located in populated areas and are used daily for domestic use and dumping, influencing water quality and aquatic macroinvertebrate communities. It was noted that flow sensitive taxa, such as *Perlidae, Heptageniidae, Leptophlebiidae* and *Hydropsychidae* were absent from the tributaries highlighting modified flow conditions in the tributaries. Although habitat level factors were not the main driver for deteriorated ecological conditions in the tributaries, habitat modification was largely present with intense sedimentation in the Qhoqhoane River (RC3) while the vegetation biotope was largely absent from the two Makhaleng River tributaries (RC1 and Jacob) and the Qhoqhoane River.

Overall, the biological responses represented by the sampled macroinvertebrate assemblage shows various impacts are present in the project area resulting in a low diversity of macroinvertebrate taxa.

FISH RESPONSE ASSESSMENT

Two (2) fish species were recorded for the assessment of the Makhaleng River reach. Collected fish species are presented in (**Figure 39**). No fish species were sampled within other systems surveyed for the project area, which may largely be attributed to the low flow conditions during the assessment and limited cover features available to aquatic biota. Both recorded species are migratory, requiring catchment scale accessibility to spawning beds and large pools (where available); and are of Least Concern (LC) according to the IUCN (2017) Conservation Status. In addition, During the baseline assessment, no alien species of conservation concern were sampled in the project area.

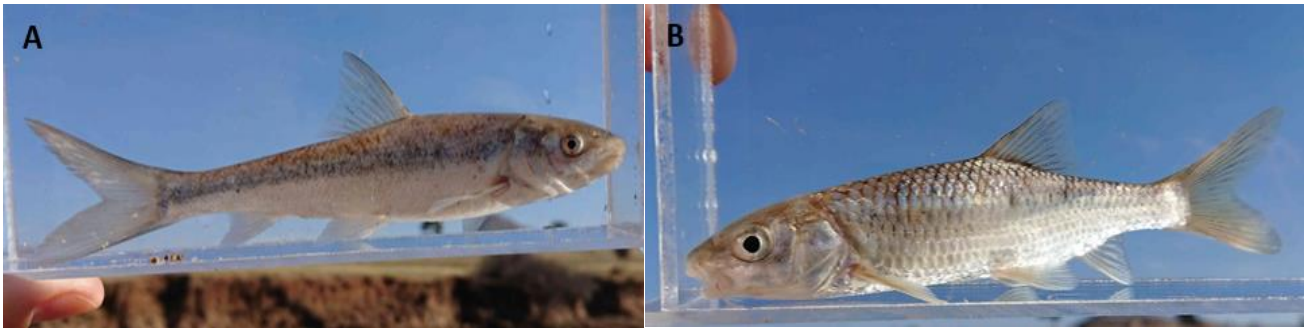


Figure 39 Two (2) fish species sampled for the project; A) *Labeo umbratus* B) *Labeobarbus aeneus*

Fish data collected during the low flow 2018 survey was applied to FRAI (Kleynhans, 2007). FRAI results are presented in **Table 44.**

Table 44: FRAI results for the 2018 period

SITE	MAKHALENG RIVER REACH
FRAI (%)	47.6
EC: FRAI	**D**

The FRAI score for the Makhaleng River reach associated with proposed project was considered as largely modified (class D). This indicates the fish community structure is impaired, with 2 of the 5 expected species sampled. Limitations can be attributed to the nature of the Makhaleng system with a number of weirs (migration barriers), inundated habitat due to sedimentation, low water levels, low diversity of cover and flow classes across the reach, influencing biotic diversity. The combination of these limitations affects the fish community structures present at each site and the river reach as a whole. These limitations are a result of catchment activities. It is the opinion of the specialist that the three expected species not recorded during the survey (*Clarias gariepinus, Enteromius anoplus and Labeo capensis*) are present within the Makhaleng River. The absence of these species is likely due to a combination of the absence of preferred habitat from the sampled sites and natural presence in low abundances.

PRESENT ECOLOGICAL STATE

The results for the reach-based PES assessment is presented in (**Table 45**). The overall results of the PES assessment derived a largely modified ecological category (Class D). This largely modified status can be primarily attributed to habitat related drivers within the Makhaleng River. Instream conditions were largely influenced by the high level of sedimentation within the project area and surrounding catchment. Altered land use in the form of agriculture and livestock activities in combination with erosion were found to have the highest impact to the riparian ecological condition.

Table 45 PES of the Makhaleng River from the August 2018 Survey

ASPECT ASSESSED	CATEGORY
Riparian ecological category	43.1
Aquatic invertebrate ecological category	55.0
Fish ecological category	47.6
Ecostatus	**Class D**

Considering this result, it can be recommended in order to improve PES of the Makhaleng River that erosion prevention and management plans be implemented with particular emphasis on the marginal and riparian zones. In addition to improving marginal and riparian ecological conditions, the aquatic biotic integrity will improve through an improvement in marginal vegetation availability.

6.2.4 SENSITIVE HABITATS

NATIONAL BIODIVERSITY ASSESSMENT

The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. Although primarily focussed on South Africa, this assessment also included information regarding Lesotho and its inclusion is therefore necessary for this report.

The NBA is central to fulfilling SANBI's mandate to monitor and report regularly on the status of the country's biodiversity, in terms of the National Environmental Management: Biodiversity Act (NEMBA, Act 10 of 2004). The NBA endeavours to capture the challenges and opportunities embedded in South Africa's rich natural heritage by looking at biodiversity in the context of social and economic change and recognising the relationship between people and their environment. The NBA deals with all three components of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments.

The two headline indicators assessed in the NBA are ecosystem threat status and ecosystem protection level (Driver *et al.*, 2011).

ECOSYSTEM THREAT STATUS

Ecosystem threat status outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function and composition, on which their ability to provide ecosystem services ultimately depends (Driver *et al.*, 2011).

Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), based on the proportion of each ecosystem type that remains in good ecological condition (Driver *et al.*, 2011).

The proposed project was superimposed on the Terrestrial Ecosystem Threat Status (**Figure 40**). The Project area falls within three ecosystems, which are listed as Endangered, Vulnerable and/or Least Threatened.

PROTECTED AREAS

To define the status of local ecology, it is important to consider the location of protected areas. There are no known protected areas within proximity (< 20km) to the project area. The Caledon Nature Reserve and the Vulture Conservation Area are both located in South Africa, to the west of the Project area.

A single RAMSAR area is listed for Lesotho, namely Lets'eng-la-Letsie which is approximately 80km south-east of the WTW area (RAMSAR, 2018). The Lets'eng-la-Letsie (not yet gazetted) protected area, was designated in 2001 as a component of the Conserving Mountain Biodiversity in Southern Lesotho (CMBSL) project. It consists of a human-made lake with a mean depth of about 1m and its associated catchment area. The main vegetation types are Afromontane and Afroalpine formations that are dominated by grasses and show high biodiversity and endemism levels. A number of vulnerable species occur among the 110 bird species recorded at this site, including the Wattled and Blue Cranes, the Lesser Kestrel and the Bald Ibis. The site is currently used as grazing land and is important for provision of grass for thatching, as a source of water, medicinal plants and wood, and for fishing (RAMSAR, 2018).

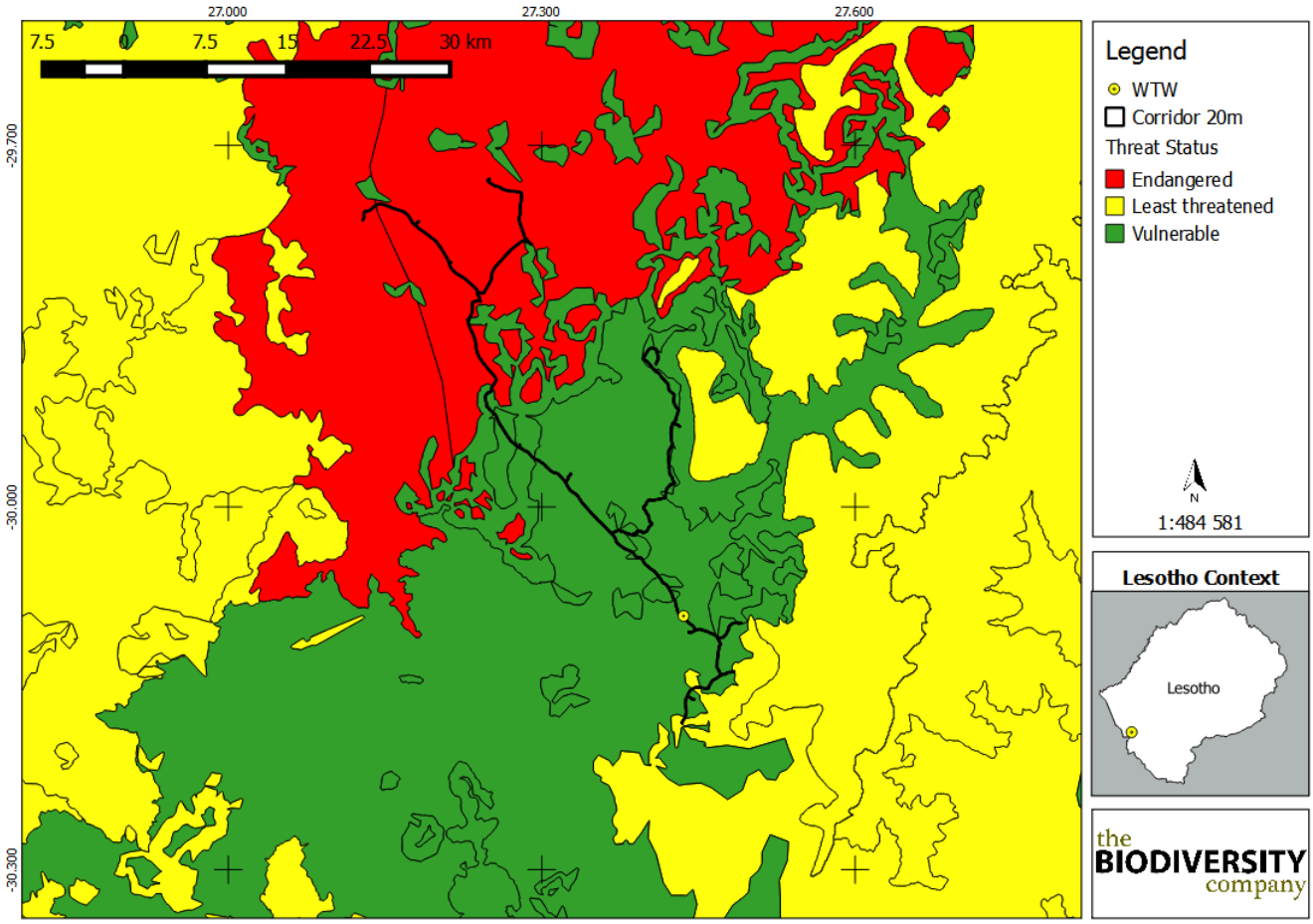


Figure 40 Project Area Showing Ecosystem Threat Status of Associated Terrestrial Ecosystems (NBA, 2012)

ECOSYSTEM PROTECTION LEVEL

Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as not protected, poorly protected, moderately protected or well protected, based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Driver *et al.*, 2011).

The Project area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystems associated with the development **(Figure 41)**. Terrestrial ecosystems associated with the proposed road and project area are rated as either *hardly protected*, *poorly protected*, or *not protected*.

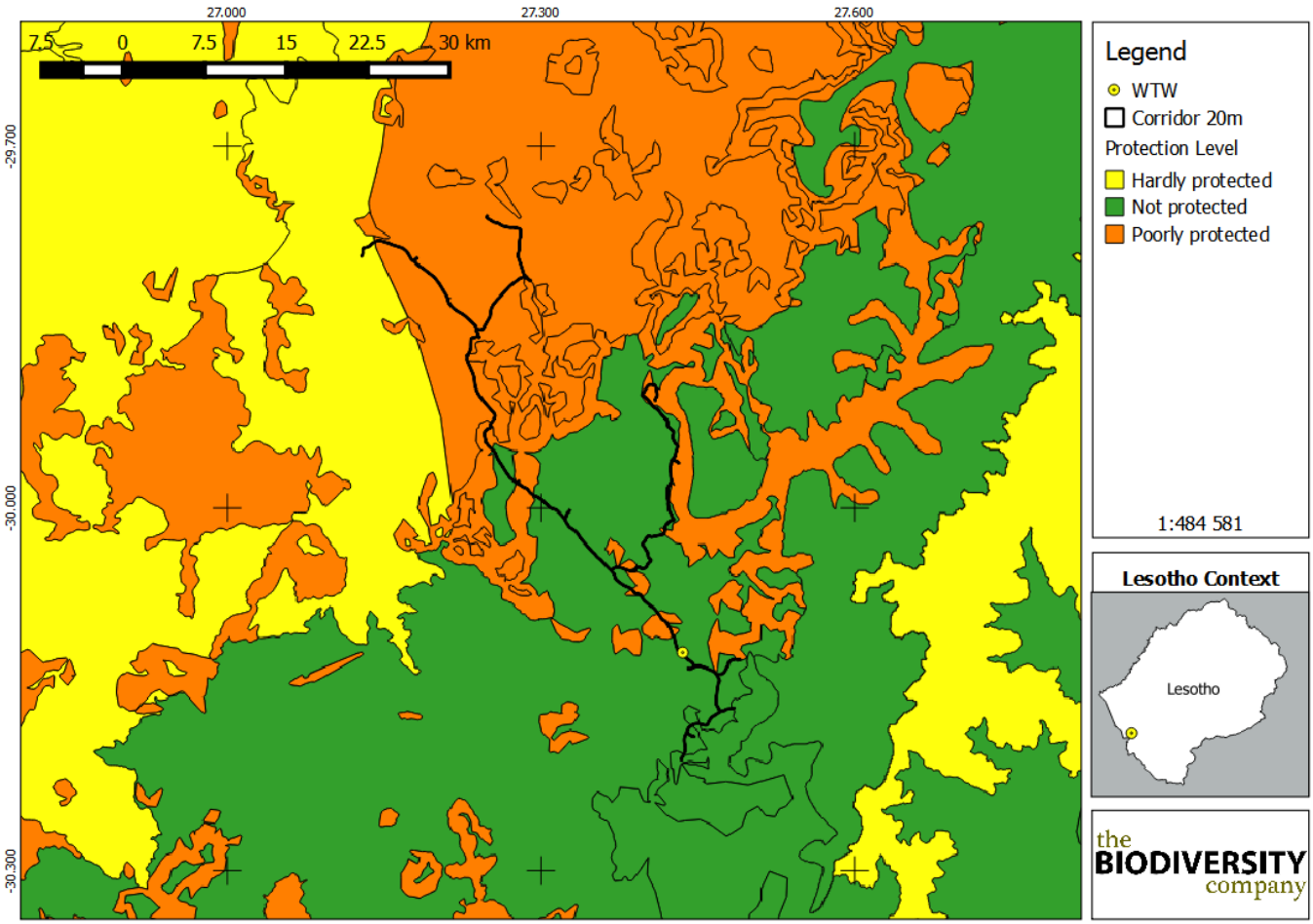


Figure 41 Project Area Showing Level of Protection of Terrestrial Ecosystems (NBA, 2012).

6.2.5 SPECIES OF COMMERCIAL IMPORTANCE

No commercial species were observed in the Project Area. However, investigation on the potential impacts of the weir associated with the water pipeline project on the Makhaleng River and Labeobarbus aeneus populations for food is required. Local community tend to fish extensively in natural pools etc. The inundation caused by the weir provides the ideal environmental for this potential food source.

6.2.6 SPECIES WITH POTENTIAL TO BECOME NUISANCES, VECTORS OR DANGEROUS

Construction activities can result in the attraction of pests or inadvertently create breeding habitat for pest species. Pest species can pose a range of risks to both humans and the environment including the natural biodiversity. Pests that may be encountered on-site during construction include:

- Mosquitoes
- Cockroaches
- Ants
- Ticks
- Mice and Rats
- Feral Cats and Dogs

The habitats in which they are found, construction activities, which attract pests, and associated hazards with the above, are detailed in **Appendix A: Ecological Impact Assessment.** All these species can also have an impact on the natural fauna and flora as they not only carry disease, but they also compete with natural species for habitat and resources. Their numbers should be controlled so that they do not have a long-lasting effect on the natural biodiversity.

6.3 SOCIO-CULTURAL ENVIRONMENT

6.3.1 DEMOGRAPHIC PROFILE

According to the latest national Census, in 2016 Lesotho had a total *de jure* population of 2,003,962, representing a population growth rate of 1.12% from 2011. Trends in the national population growth rate are best illustrated in Figure 3.1 below. Although the growth rate increased from 1976 to 1986, it decreased from 2.6% in 1986 to 0.08% in 2006. Since then there has been a reverse of this downward trend, with steady increases.

Other demographic features recorded by the 2011 Lesotho Demographic Survey (LDS) include the following:

- The average population density nationally was 61.7 people per km^2. However, the density is higher in the Lesotho Lowlands than in the Highlands. On a District level, in Botha-Bothe it was 62, in Leribe 103, in Berea 112, in Maseru 100, in Mafeteng 91, in Mohale's Hoek 50, and in Quthing 42.
- There was evidence of a decreasing Fertility Rate, and stabilised Infant Mortality Rate (IMR):
  - The total Fertility Rate derived from the 2011 LDS fertility data showed an estimate at 3.07 children per woman, which was lower than the 2006 national Census estimate of 3.53.
  - The 2011 LDS found that the rural areas experienced higher IMR, with 96 infant deaths per 1,000 live births, compared to the urban areas estimate of 87 infant deaths per 1,000 live births; the total averaged 94, which was no considerable change from the 2006 National Census.

Although the risk of HIV/AIDS is perceived as high, it is assumed that it will not have the anticipated influence on mortality figures and thus on population projections due to greater awareness, testing and treatment.

Christianity is the most widely practiced religion in the project area, so Basotho are predominantly a Christian society though there are few who follow the Muslim religion. The main Christian denominations found are the Apostolic Faith Mission, Roman Catholic, Lesotho Evangelical and Anglican. Furthermore, most Basotho, perhaps like in any other African country also follow their traditional belief systems, like appeasing their ancestors 'balimu' in Sesotho.

6.3.2 SERVICES AND INFRASTRUCTURE

Almost all essential services were already available in the zones. Services that are commonly found in both Zones 6 and 7 are include: small shops / kiosks, day care centres/pre-schools, primary schools, churches, hospitals, clinics, local government offices. Local courts, electricity, and communal stand pipes (though some are old and therefore not functioning well). Notably, communication via cellular phones is common throughout the Project Area.

6.3.3 COMMUNITY STRUCTURE

Rural population settlement patterns are characterised by scattered villages, small sized villages, and large extended family units. Urban settlements comprise large rapidly growing towns/townships with a degree of industrialization. The majority of households' heads in rural areas often build their homesteads and others inherit them from their parents and build some additional structures on their parents' sites, more especially the first born sons who normally according to the customary law inherit their late father's estates. On the other hand, in urban areas the household heads often build or buy their households structures. Furthermore, a

reasonable number of residents in urban areas stay in public or privately rented buildings or take care of someone else's property.

The types of housing units commonly found in the two zones are traditional huts and flats for most of the population in rural areas and the modern structures in urban and peri-urban areas or a mixture of traditional and modern structures. In urban areas of Mafeteng and Mohale's Hoek there are also Malaene (rental flats) and informal structures.

6.3.4 ECONOMIC ACTIVITIES

EMPLOYMENT AND DISTRIBUTION OF INCOME

Previous studies indicate that unemployment remains high and fiscal situation continues to deteriorate. Lesotho faces an unemployment rate of 28% with 32.1% of the female labour force unemployed compared to 21.3% of the male labour force. In rural areas, poverty is further exacerbated by lack of adequate access to safe drinking water as well as lack or not adequate water for agricultural purposes. The water sector can contribute to economic growth and job creation indirectly through improved access to clean water for various households usage and agricultural purposes, and directly by generating employment opportunities through labour based installation of water pipes and construction of reservoirs (short term) and maintenance activities (medium to long term). The design, construction and laying of pipelines methods and maintenance techniques proposed for this project should therefore consider and adopt standards and methods applicable and efficient for use of labour during construction and maintenance.

The main cash sources of income for households in the project is the production of fields (contribution to household income is not confirmed) and sale of vegetables and livestock The prices at which livestock is sold varies significantly across the project area. In general, the sale of livestock is often undertaken to supplement household income when reserves are low, or in specific times of need (a wedding, funeral, or other celebration, or for school fees). Alternatively, livestock is sold when it is aged and the cash generated is used to purchase replacement stock. Livestock is often sold amongst the villagers, nearby villagers and people in urban areas.

More than 40% of the population in Zone 6 and 7 have no reliable means of income as they depend on the production from their fields, sale of vegetables and livestock, piece jobs, domestic work and remittances outside Lesotho. Some (28%) lived on remittances from their family members especially spouses and children who worked in the mines as well as those who are employed as domestic workers in South Africa and inside Lesotho. More than 20% survive on less than M1000.00 per month; more than 10% survive on less than M2000.00 per month. Less than 10% who survive on approximately M3000.00 per month. Other income sources discussed with participants included pensions, grants and receipt of food aid. Pensions are paid to the elderly, 70 years and older. Other grants include the Child Grant Programme and public assistance, which is run by the Department of Social Development to support Orphans and Vulnerable Children (OVC). Grant money is typically paid to guardians who are in most cases their grandmothers or directly to the households in cases of child-headed households. The income received from the above sources do not finance all their needs.

COMMUNITY LIVELIHOOD

Land is of primary importance to sustain livelihoods in Lesotho. Agriculture is an important livelihood activity for household subsistence. The main farming crops found in both zones are maize and sorghum, wheat, beans and peas (in order of priority). However, the drought over the last few years has lowered agricultural production. Households generally did not get good harvest over the last two agricultural seasons (2016/7-2017/8), most of their crops failed and they reported a poor harvest. In other words, the most common means of livelihood in both Zone 6 and 7 is subsistence farming and casual labour. However, Zone 7 is little different in that, some respondents said that to supplement their means of livelihoods, they resort to livestock. But for both zones when coming to the older persons at the age of seventy and above, they depend on pension fund from the ministry of social development. The shepherds on the other hand showed that they are mostly hired, either to be paid on a monthly basis or at the end of the year.

In March 2016 the Food and Agricultural Organisation of the United Nations (FAO) reported on the state of the drought: that one in four people in Lesotho were at risk of food insecurity; nationally over 377,000 people required immediate food or cash assistance to enable them to access food from the market as well as livelihood support to resuscitate their own food production; the planting season had failed, and food prices in the region

were rising sharply due to poor production in South Africa and the weak Rand-Maloti exchange rate against the United States Dollar (USD); that rangeland and water availability for livestock was poor, and livestock conditions had deteriorated with reported drought-related deaths, mainly in the Senqu Valley and Lowlands; and that support was required "for agriculture and livestock production, nutrition, social protection and resilience-building interventions (FAO, 2016).

Over and above that there are groups of people that are considered to be more vulnerable. Those include households that do not 'own' land or do not have the ability to farm (e.g., older persons and people with disability); and households that are headed by children or older persons who have been left to care for young children due to parental absence or incapacity. In the focus group discussions, such few cases also came up.

LABOUR MARKET

A Socio-Economic Baseline Study undertaken as part of the LHDA Contract 6000 for Phase II of the LHWP, which includes the construction of Polihali Dam on the Senqu River in the Mokhotlong District of the Lesotho Highlands, presented data based on an extensive socio-economic survey administered in the project's study area between May 2013 and February 2014 to 11,006 households. The study found that people were poorly educated: only 7% of adults had completed high school, with very few subsequently attaining a tertiary education or vocational training, and people were low on skills to set them up in the wider economic/labour market.

Detailed economic characteristics of Lesotho's population in 2011:

- The crude economic activity rate was estimated at 37.4, implying that 37.4% of the population was economically active;
- 34.6% of the population of working age were employed, with higher rates for males (45%) than females (24.5%), and for urban areas (45.2%) compared to rural areas (33.2%); and
- The dependency ratio was estimated at 66%. For the 2016 SES, results of the employment status of household members showed:
- Nearly fifty percent of the sampled population was not of the economically active age group, and thus potential dependents;
- Only 28.1% of all household members were employed;
- 24.5% of household members in the economically active age category were 'not employed'; this included the 1.1% that were classified as having a disability;
- Of those employed, most were in formal employment, in the 20-45 age group. More employed men (41.21%) than women (25.8%) were in this age category;
- In general, more women than men were not employed. More women (61.6%) than men were, however, self-employed. The most prevalent form of self-employment was in trading (40.9%). Farming only comprised 22.2%, possibly lower than normal given the extended drought.

Most people in Zones 6 and 7 are unemployed, particularly women. Men have migrated to South Africa seeking employment and other means of livelihood while others work as shepherds.

POVERTY

Very significant socioeconomic differences exist between rural and urban areas. Research studies points out that average income per person in urban areas exceed those found in rural areas more than 4 times. As a result ability to pay for water in rural areas will be significantly lower than in urban areas. The growing gap between the rich and poor has serious implication for the provision of water supply. Several studies have pointed to the fact that HIV/AIDS pandemic is contributing in growing gap between the rich and the poor in Lesotho. According to Sechaba Consultants (2007) Lesotho's high Gini coefficient has serious implications for the provision of water supply. It indicates that those on the poorer end of the scale will have difficulties paying for water and other services as their poverty is extreme. Poverty in Lesotho is also characterised by geographic factors that should also be considered with regard to ability to pay for water, particularly in rural areas.

6.3.5 EDUCATION & EDUCATIONAL FACILITIES

The study found that people were poorly educated: only 7% of adults had completed high school, with very few subsequently attaining a tertiary education or vocational training, and people were low on skills to set them up in the wider economic market.

Similarly, the level of education of the population residing in the two zones is very low more especially among the elderly male population, most of them have only attained primary education, very few have gone up to high school level and those are mostly women. In other words, women seem to be more educated than men as most of them proceeded to the secondary and high school level. This difference in education may have been perpetuated by the reason that, most of the time, males take care of animals and provide for the families as they leave schools to seek employment while their female counter parts still have an opportunity to proceed with their studies.

It seems as if this trend is still going to continue with the younger generation as well, very few of them will make it to secondary or high school level. For instance, looking at the age groups (10-14) and (15-18) respectively both males and females from zones six and seven are still in primary school while some of those in age group (15-18) are married and some are school drop outs.

In terms of educational facilities, there a number of primary and high schools in both zones. In Mafeteng, for instance some of the villages where primary schools and high schools are found include HaKhobotle, Patisi, Likhoele, Van Rooyen, Ha Ralintsi, Thabana Morena, Matholeng and Ha Motlere. In Mafeteng Town, there are 4 primary schools and 3 high schools. There are also some villages where there are no schools like HaSechaba, students from this village are required to walk very long distances to get to nearby schools. In Mohale's Hoek (zone 7) villages that have schools include HaMalebanye, Kubake, Paul V1, Thabaneng, Mesitsaneng and Moeaneng which has 4 primary schools and a high school. All of these schools are able to service various villages within the project area in bot zones. As explained above and teachers are available in the schools, unlike in the mountain areas where one teacher will be responsible for several classes and some are not even qualified teachers.

6.3.6 LAND TENURE

The traditional system of land tenure in Lesotho is such that the king holds the land in trust for the Basotho nation, while individuals hold user rights. There are various modes of acquiring land by household members, these include: allocation by a chief, inherit piece of land from parents or extended family members, bought land from somebody else or chief, acquiring land through a private developer etc. Lesotho's land tenure system recognises three types of title: leasehold, Form C and license. Some households occupy land without the appropriate title in place, i.e., through the traditional/ customary tenure system under which the land was allocated to citizens through chiefs and headmen on behalf of the King. Leasehold acts as a check on private subdivision and allocation of land. Under the leasehold system, the leaseholder has the right to use and enjoy the property for the agreed period. A leaseholder may lease out their land under a sub-lease agreement. In practice the leasehold of land is inherited by the family of the leaseholder; in effect, the land is never returned to the state unless it has become apparent that it has been abandoned. Forms of leasehold comprise of:

- Residential leases for a period of 90 years;
- Commercial and industrial leases for periods of 30 and 60 years;
- Agricultural leases for periods of 10-90 years;
- Others, including religious, educational and charitable leases for periods of 90 years.

Leasehold agreements are registered at the office of the Land Administration Authority (LAA). The Land Act entitles the leaseholder to transfer the title, sub-lease, or use their land as collateral for accessing credit from financial institutions; the title can also be passed on via inheritance to a named family member. Owners of leases for a primary place of residence are exempt from paying ground rent; however, those who have a lease on a second property or for commercial, industrial or agricultural land are required to pay annual ground rent to the LAA.

On the other hand, Form C was abolished by the Land Act (No. 17) of 1979, however, to date people in the rural areas are still issued with the Form C as proof of land tenure; it refers to land that is allotted by the chief. All forms issued before the 1979 Land Act remained valid. Form Cs and title deeds can be converted into leases.

License is a land tenure system used for agricultural land within the urban areas. The tenure's right is called a license, and the land right is neither transferable, subject to inheritance nor negotiable. Licenses are held under customary law.

6.4 LAND USE AND AGRICULTURAL ACTIVITIES

All those with land used their land plots predominantly for subsistence agriculture. There was no evidence of large-scale commercial farming of the land as most people in the two zones were planting their fields mainly for subsistence. The peri-urban and urban areas such as the Town of Mafeteng support small scale commercial businesses with industrial areas located in Mesitsaneng and Ha Mapotsane.

Agriculture is an important livelihood activity for household subsistence. However, the drought over the last few years has seriously affected agricultural production. Households generally did not plant over the last annual agricultural season (2016/7), and if they did their crops mostly failed.

Detail of all land owned/used by households surveyed for the 2016 Socio-Economic Survey showed the following:

- Eighty-one percent of households had access to agricultural land for cultivation (including vegetable gardens and orchards), 96% of which was owned by household heads;
- The average number of land parcels owned/used by households was 1.1, with the average land parcel size being 1.9 ha;
- There was no evidence of large-scale commercial farming of the land; however, thirteen percent of households had 4 ha of land or more;
- 89.5% of the land was being used directly by the household, 9.7% in a sharecropping arrangement, and less than one percent through renting/leasing;
- Just over half of the land was at or adjacent to the homestead; 14.5% indicated that they lived less than thirty minutes walking distance from their land, and a further fifteen percent between half-an-hour to an hour. Land further afield required walking for long periods, or using a horse or donkey, or motor car, for transport;
- 62.2% of those with land relied on rain fed rather than irrigated agriculture;
- Nearly 60 percent of the land had not been cultivated the previous year, with no or late rain as the main reason given (84.9%). Other reasons included: a lack of agricultural equipment (8.1%); no seeds (4.1%); no labour (0.9%); that the land size was too small; or that the land had been abandoned;
- For those who planted, the primary crops grown were maize, wheat, sorghum and beans. Vegetables included cabbage, potatoes, peas, spinach, beetroot, pumpkin, onions, tomatoes and carrots. Fruit included peach, apricot and litchi trees, and watermelon. Animal feed was also cultivated;
- Few households had received an income from sale of agricultural products the previous month (4.2%); and
- Only 3.6% of households employed workers to work their land, and mostly a single worker, on a seasonal basis, paying a daily wage.

Although livestock plays an important role in farming activities in the Study area, only a relatively small percentage of households kept animals. Those that did averaged 8.4 animals, with larger herds owned by a few households. Households mostly kept chickens (owned by 23.6%), goats (11.1%) and sheep (19.6%). Nearly thirty percent of households owned cattle, averaging four animals. [30]

[30] The national Census available at the time did not have information on animal ownership. Studies that I looked at on the internet are old – mostly dating to FAO studies in the 1990s

Livestock ownership details obtained in the Metolong census for 1,489 households[31] showed a total of 3,281 cattle, 1,167 sheep and 1,627 goats recorded. Interestingly, the majority of households owned no livestock. More than 53% of the households owned no cattle, while ownership of other livestock was lower; 92.4% owned no sheep, 88.9% no goats, and 72.7% no sheep. Furthermore, herd sizes were small, with few households owning more than six head of any of the livestock types.

In comparison, a study undertaken by CARE in 2004 in Ha Tumahole in the Lesotho Highlands[32], only 12% of the households surveyed owned sheep, with 4% owning more than ten; 18% owned goats, with stock theft and declining market prospects for wool and mohair affecting this sector; 72% owned chickens, with 8% owning more than ten; 17% kept pigs; and 49% of households owned cattle, averaging 2.3 animals per household.

6.4.1 VULNERABILITY AND MARGINALISATION

Most of the population living at the project area are vulnerable people due to unemployment, lack of income earning opportunities, harsh conditions for generating a reliable source of food throughout the year, and poor educational standard level or illiteracy. This is as a result of inadequate social infrastructure and services. The older male population (56 and above) are the most poorly educated, perhaps due to the need to drop out of school early in order to participate in domestic and subsistence activities.

Within this already vulnerable population, groups of people are considered more vulnerable. These include households that do not 'own' land or do not have the ability to farm (e.g., older persons and people with disability; and households that are headed by children or older persons who have been left to care for young children due to parental absence or incapacity. In the project AoI, the broad categories of people who should be considered to have some level of vulnerability include: women; older persons; youth; herders; orphaned children; and people with disability or chronically ill persons.

Lesotho is also susceptible to human trafficking. As a result of poverty, young girls and women are often promised lucrative jobs on the other side of the border, only to find that they are going to be subjected to forced labour and sex trafficking. The government is trying to curb the problem by requiring documents from both parents for children under 18 years to be able to cross the border. Lesotho's stance on human trafficking has been assessed by the US Department of State's Office to Monitor and Combat Trafficking in Persons, and Lesotho is deemed not to be taking adequate steps to discourage or control human trafficking within, through and beyond its borders[33].

Basotho children are commonly subjected to domestic servitude and forced labour in animal herding. Women and children (mostly from rural areas) are coerced into leaving Lesotho in pursuit of income earning opportunities in urban areas (both inside and outside the country). These are often not real opportunities; or are associated with poor working and living conditions.

6.4.2 GENDER AND EQUALITY

On the overall, results from the study show very clearly that from early ages respondents knew about gender equality, gender based violence and also understand gender related issues. They get information from the media, especially radios and newspapers as well as during community gatherings. However, in line with Gender links (2014:8), findings from the study have shown that in cases where gender based violence happens, women are the main victims.

Literature has shown that in African countries where the majority of the people still live in rural areas and are still enduring the challenges related to inadequate supply of water and poor sanitation, the job of providing water and ensuring proper and hygienic sanitation still lies with women (UN Commission on Sustainable Development). Women tend to be users, providers and managers of water (World Bank, 2002) and in Lesotho, it is the cultural practice for women and girls to fetch water used for household purposes. This is well reflected in

[31] Department of Water Affairs, Lowlands Water Supply Unit. February 2008. *Metolong Dam Environmental and Social Impact Assessment. Final Report. Volume One: Main Report*.

[32] Turner, S.D. July 2005. *Livelihoods and Sharing: Trends in a Lesotho village, 1976-2004*.

[33] https://www.state.gov/j/tip/rls/tiprpt/countries/2017/271226.htm

the SES responses. Although the respondents' argument was that this is the case because women are the ones who use more water than other family members, this is more of an engendered responsibility.

Notably, there are many women who still have to walk long distances to reach the nearest water points as men would be at work which makes them more susceptible to danger and gender based violence. Accessibility to water points will also benefit the other vulnerable people more for instance, people with disability, children from child-headed households as well as older persons.

Data collected showed that there were no arrangements for people with disability to get job opportunities as well and therefore depriving them of the chance to equally benefit.

Results of the socio-economic survey show that 73% of the respondents understand gender equality. When responding to the question on how they obtain information on gender and related matters, 70% indicated that their main source was radios, 41% got more information through discussions they have with other community members while 32% got informed through community gatherings and 13% obtained more information from reading pamphlets.

Seventy-two per cent (72%) of respondents believe that men and women should be given same opportunities and positions in everything. Ninety percent (90%) indicated that the prevalence of gender-based violence is very low in their communities. However, their view is that when it happens women are the most affected followed by children and the older persons.

When looking at projects implemented in their communities, 46% of the respondents said that both men and women get equal chances of being employed. Thirty seven percent (37%) felt that most of those who are employed are men as opposed to women mainly because most of the projects require physical/ human labour. They indicate that women are usually at home to look after children.

Most of the respondents understand issues of gender equality, starting with age groups (10-18), (19-35), (36+) of both sex. When answering the question; should man and women be given the same opportunities and positions, most respondents during Focus Group Discussion (FGDs) stated that: "women will always be women", thus implying that, men will always be superior to women hence they should be given more opportunities and positions. To a lesser extent, some indicated that men and women should have the same opportunities and positions. The difference is spotted on the answers of key informants of both Zones who stipulated that men and women should have equal opportunities and positions. This response is not surprising given the fact that Lesotho is a patriarchal society.

To a lesser extent, some indicated that men and women should have the same opportunities and positions. The difference is spotted on the answers of key informants of both Zones who stipulated that men and women should have equal opportunities and positions.

Moving on to the issues of gender based violence (GBV), literature has shown that in Lesotho GBV is a common occurrence. Access and quality of GBV responsive services such as health services, psycho-social services, police and legal services are reportedly available for prevention and response to GBV though there is generally low information on GBV related support services and structures. An interesting pattern emerged from the results of this socio economic assessment as all age groups played a defensive part, each group indicated that they are the ones mostly affected by gender based violence, for instance, groups of women between the ages (19-35) and (36+) indicated that, women are the ones being abused because they have no power to fight back. Similarly, most of the key informants also indicated from both Zones 6 and 7 that there are issues of gender based violence.

In terms of employment, it is common knowledge that men are more likely to be employed than women and earn one and a half times more than women on average. However, in this particular study (this report) when respondents were asked about gender and employment on previous developmental projects that have been implemented in both Zones, they showed that both men and women are employed equally, since each family gives out one member of the family to be hired. Alternatively, they would attend a public gathering where they will be hired according to their time of arrival and availability.

6.4.3 PUBLIC HEALTH

COMMUNITY HEALTH

Only two hospitals exist in the project area, one in Mafeteng (Zone 6) and the other in Mohale's Hoek (Zone 7). In addition to that, the information received from the respondents' reflects that there are a number of clinics, mobile clinics and New Start/ Population Services International[34] (PSI) tents in both Zone 6 and 7.

HIV / AIDS

Radio and public gatherings are the leading means through which the community receives health education. In some cases, the public received HIV and AIDS messages in churches and by reading IEC material. HIV testing, counselling, and treatment services are offered at health centres, mobile clinics and New Start/ PSI Tents. Most of these services are local and within a range of 3-7km walking distance. Villages within the study area, which are considerable distance (~ 15km) from these services, include Ha Mohlehli and Ha Molapo in Zone 6 and Mohalinyane in Zone 7.

The previous studies conducted by Ministry of Health (2015), U.S. President's Emergency Plan for AIDS Relief (PEPFAR) (2016) & World Health Organisation (WHO) (2014) quoted in UN Lesotho Country Analysis Report (2017) revealed that in Lesotho HIV/AIDS is a burden to the health sector and is one of the factors that have contributed to the slow economic growth and social progress in Lesotho. AIDS has become the leading cause for morbidity and mortality in Lesotho. Twenty five percent of adults aged 15-49 years old in Lesotho are infected with HIV, and is one of the highest prevalence rates in the world. The prevalence of HIV is significantly higher among women (29.7%) than men (18.6%), with women aged 35-39 years old having the highest prevalence of 46%. Of particular concern is HIV prevalence among vulnerable and risk populations. The prevalence is reported at 72% among sex workers, 43% in factory workers, 33% in men who have sex with men, and 31% among prison inmates. It has also been found out that prevalence is higher in urban areas than in rural areas. The key drivers that significantly contribute to new infections in the general population include multiple and concurrent sexual partners, low and inconsistent use of condoms, low rates of medical male circumcision, mother to child transmission, and gender based violence.

Health questions asked from the respondents for the current socioeconomic assessment study (this report) were focused only HIV/AIDS awareness and prevention issues as the spread of HIV/AIDS has been a cause for concern for many years in the country as reflected in the previous studies mentioned above. The respondents pointed to the fact that the majority of the community is aware of HIV and AIDS. The 3% of people who were not aware of HIV were those in the youngest age groups (primarily herd boys in the younger age groups (10-14) years). However, almost all children in FGDs were highly informed about HIV. They also said that the anti HIV/AIDS campaigns were beneficial. Majority of the responses indicated that awareness campaigns were being held in most of the villages. The highest frequencies of campaigns were in settlements closest to town like Mafeteng and Matlapaneng in Zone 6 and in Mohale's Hoek in Zone 7. In other settlements, respondents were concerned that they had not had such campaigns in a long time. However, 86% said that they had support groups in their villages (although most of them were not recently visited by the campaign members due to lack of resources and required equipment).

TUBERCULOSIS

The WHO quoted in the Ministry of Health Lesotho (2015) estimates a tuberculosis (TB) incidence of 916/100,000 (this means 916 out 100,000 people) and prevalence of 613/100,000 in Lesotho. This is an increase in prevalence from 548/100,000 in 1990 mainly due to HIV. The rate of TB/HIV co-infection is high at 76%.

[34] Population Services International (PSI) is a global health organisation that focuses on serious challenges such as a lack of family planning, HIV/AIDS, barriers to maternal health, and the greatest threats to children under five, including malaria, diarrhoea, pneumonia and malnutrition.

DIARRHOEAL DISEASES

The World Vision Report (2017) states that 25: of the population lacks access to safe drinking water. In 2016, 17% of households in Lesotho reported using unprotected water sources. It also alludes to poor sanitation in Lesotho, with 75% of people lacking access to adequate sanitation services. Without sanitation facilities, or access to working toilets or latrines, people's only option is open defecation. Open defecation and the absence of washing facilities get associated with poor hygiene and an increased risk for diarrheal diseases. According to the latest WHO data published in 2017 diarrhoeal diseases deaths in Lesotho reached 1,203 or 4.65% of total deaths in one year.

OTHER DISEASES

WHO research contained in the Lesotho Country Cooparation Strategy (2014-2019), has revealed that life expectancy in general has dropped in Lesotho due to various reasons including HIV/AIDS related deaths, non-communicable diseases which include cardiovascular and chronic respiratory diseases, diabetes and road traffic accidents. The vulnerable and socially disadvantaged groups are more likely to die sooner than people of higher social economic class to their exposure to hunger, and the limited access to health care services.

SANITATION

Sanitation services are widely available in Zone 6 and Zone 7. Eighty-four percent (84%) of the respondents had one toilet in their homes, 5 % had two and the rest had none. The respondents felt that with improved water supply, sanitation facilities will improve - especially in public facilities such as schools and health care centres. The Lesotho Water and Sanitation Policy (2007) states that "All the Basotho are entitled to have access to a sustainable supply of potable water and to the provision of basic sanitation services at an affordable cost." The policy indicates that all Basotho have a right to 30 litres of water.

SUBSTANCE ABUSE

Substance abuse in Lesotho is quite common with alcohol being the most abused substance in the country[35]. Poverty and unemployment is high in the country, more especially in rural areas. As a result, many people (more especially women) brew and sell the local beer (Joalla ba Sesotho) to provide extra income for their families. Similarly, in this study brewing and selling homemade traditional beer has been found to be one of the means of livelihood in the project area.

Results of data collected for the Lesotho Epidemiology Network on Drug Abuse (LENDU) in 2003 found alcohol to be the dominant substance of abuse for patients seen at the treatment facilities. 78% of the patients treated for alcohol abuse were male, and 33% of the patients were 30 years of age or younger.

Recent studies have shown that many young people are getting more involved in drug abuse as well, starting from abusing dagga, sniffing glue, up to harder substances like mandrax, cocaine etc. This could be due to peer pressure, inability to cope with life stresses and many other factors; however, there are recent reports that drug abuse offences amongst the youth are increasing.

6.4.4 WATER CONSUMPTION AND USAGE PATTERNS

The socio-economic report indicates the following water sources for cooking, bathing and drinking: public (40% respondents); hand pumps (30%); private sources (19%) (**Figure 42**). The remaining respondents use well, water springs, swamp and stream or river. The latter group indicated that they used these water sources because they have no other option, while others said these sources were cheaper and more affordable. They also mentioned that water is scarce around January and December.

[35] Mphonyane Mofokeng (2013) Global Alcohol Policy Conference

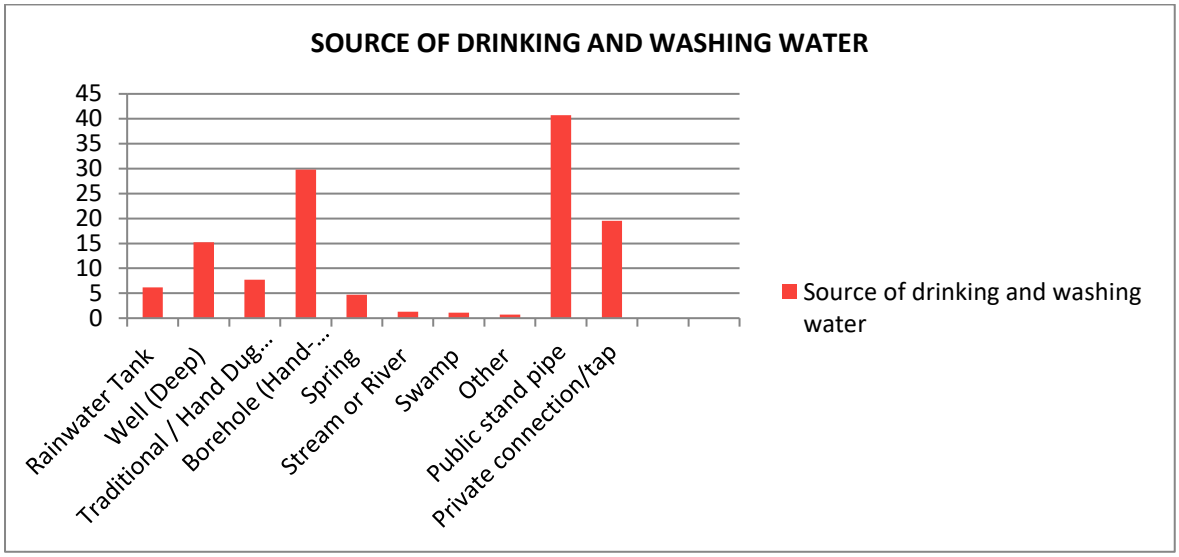


Figure 42: Sources of Potable Water

63% of the respondents were not happy with their current water system since the water was collected from distant places, was unclean/muddy, scarce, contaminated, contained worms, had a bad taste or was inadequate in volume. About 15% said that they have to travel between 1-3 km to the nearest water source, while 1.9% said they collect water from places approximately 4-5 km from their homes. Furthermore, responses from 65.9% of the respondents demonstrated that women draw water more frequently, as they are at home, and also as part of their duty. Only 13.9% reported that men draw water more frequently than women. 10.8% indicated that water-fetching was most frequently completed by girls, and 13.9% by boys.

As a result of drought, most of the communities in Zone 6 resort to other sources of water, such as swamps and wells. The most prevalent problem here proved to be impurity of water. In some areas, the same sources of water are shared with animals, thereby putting people's health at risk. Moreover, in some villages like Ha-Makhate and Lihojeng in Zone 6 community members are expected to contribute a certain amount towards bills incurred in provision of water. Consequently, failure to pay that money by default denies one a right to access communal water.

6.4.5 OTHER USES OF WATER BESIDES DRINKING AND WASHING

The responses indicated that 88.2% of the community members use water principally for gardening or growing and watering gardens, crops and trees. Others (22.6%) also use it for livestock farming and poultry farming (6.3%). A small group of respondents (4.3%), use it for brewing beer.

6.4.6 WILLINGNESS AND ABILITY TO PAY FOR IMPROVED WATER SOURCES

74% of the respondents were either willing or would be able to pay for improved water services citing that they were in desperate need of water, while 26% said they would not be able to due to financial difficulties. Respondents were further asked to suggest options for water supply services for the very poor, the poor and non-poor. Most of them suggested that they should all be subsidised. Those who were already receiving free water from public taps and boreholes said they were not expecting to be charged, and that their supply should be free. It was conveyed that the vast majority in the communities are poor and should be afforded free water.

6.4.7 ECOSYSTEM SERVICES

It was established that medicinal plants are present in the identified project areas. According to 61.4% of the household heads, there were medicinal plants and indigenous vegetables close to the pipeline area. Medicinal plants mentioned were traditional herbs and trees used for curing mild to serious ailments like cough, cramps, pain, dizziness, stomach cramps, and additional uses were known by traditional healers.

They also reported that there are other plants and trees of important use in the village; such as aloe, firewood, wild vegetables, and indigenous trees (ts'inabelo, torofeee, lehlaku, liponaponana, ntjoroana, thitapoho, boleikatlele, lehlaku, pine tree, papoliri (poplar tree), and boleikomo (Bluegum tree)).

6.4.8 PHYSICAL CULTURAL RESOURCES

REGIONAL CULTURAL AND HISTORICAL RESOURCES

The foothills of the Drakensberg and Maloti Mountains are known to house some of the finest cultural and natural heritage remains within the southern African sub-region; which includes the San Rock Art, often in context with stone tools (representing the artists' tool kit), and occasionally skeletal remains of later forms of human, and fossilized animal and plants.

A survey that was undertaken by Prasad in 1997 on the Maseru By-pass route (which has a similar geological profile to the proposed project footprint) identified well preserved plant fossils within the same setting, only marginally further south of the footprint. The footprint is also situated within a series of villages' context, which has implications of oral history and active culture. According to Smits, 1983 there are numerous Rock Art sites dotted along the Likhoele Mountains near Mafeteng Town, along the Likhetlane river catchment constituting Thaba-Tśoeu and Thabana-Morena plateaux. The Motlejoeng caves within Mohale's Hoek peri-urban area and along the Makhaleng river section sedimentary rock outcrops with caves and overhangs within the Mohale's Hoek sub-region[36].

A good collection of fossilised tree trunk samples were also identified by Smith, 1983 around the Nk'hunk'hu mountain. What in his collection were termed 'Major' sites were systematically recorded. Some of these fall within the footprint area along the Thabana-Morena plateau escarpment. There are also some historical, rock art and palaeontological sites identified within the same region by the 5-Towns Water Supply ESIA[1]. "*The Digging Stick*" Publication (April 1984) discusses A.l.B. Humphreys' research into the distribution of bifacial tanged and barbed arrowheads, which he calls '*Sociable Arrows*', as occurring in an area centred on the Orange, Free State and Lesotho areas, and extending marginally into the Northern Cape. Part of the Orange River is the Makhaleng River catchment in the south of Lesotho, which coincides with the footprint of interest for the Lowlands Bulk Water Supply under assessment.

PROJECT AREA CULTURAL AND HISTORICAL RESOURCES

The palaeontological survey identified twelve cultural resources within the project area as summarised in **Table 46**. Further detail is included in the Cultural Heritage Report (**Appendix D**).

The location of the cultural heritage resources are mapped on 2016-2017 aerial imagery for Zone 6 (**Appendix J-J1**) and Zone 7 (**Appendix J-2**).

Table 46 Summary of Cultural Resources Identified within Development Footprint

CULTURAL RESOURCE	SUMMARY DESCRIPTION	LOCATION	MAP REFERENCE
Palaeontological Site 1	Piece of fossil-wood small stone. Historical perspective of Qalabane Mountain itself as a refuge and stronghold in a Basotho war with the Boers (1880).	Scree slope of the Qalabane Mountain - immediately north-west and below the area identified as the pipeline route to the proposed reservoir.	Appendix J-1: Zone 6 ; Qalabane

[36] This information is sourced from personal experience as part of the research team.

Palaeontological Site 2	Fossil bone remnants scattered over an area of approximately 4 to 5m^2	Approximately 200-300m east of the Makoabating (Mt Tabor) Junction with the Tsoloane-Thabana-Morena main road in the Ha 'Ngoae Village	Appendix J-1: Zone 6 ; Thabane Morena
Composite Historical Site	Stone artefact scatter - structural foundations and pieces of wall; and two remains of digging stick weights.	Full width and breadth of habitable space within the huge Qalakheng dike at the top of the hill, south-east of the present Qalakheng village	Appendix J-2: Zone 7; Ha Potsane
Stone Age Site 1	Stone artefact scatter – foundation collapse due to erosion	Scree slope on south eastern end of Qalakheng village. The proposed pipeline traverses this site to the proposed Qalakheng Reservoir	Appendix J-2: Zone 7; Ha Potsane
Stone Age Site 2	Small scatter of stone implements	Surface of the small slope in front of the overhang immediately above the quarry site near Qalakheng village	Appendix J-2: Zone 7; Ha Potsane
Stone Age Site 3	Likely stone-age quarry due to the presence of small lithic strewn in the area	Above the Likhetlane river crossing about ten meters beyond the first junction on the right of the Tsoloáne to Thabana-Morena Road sufficiently outside of the pipeline routing on the road shoulder	Appendix J-1: Zone 6 ; Thabane Morena
Burial Sites / Family cemeteries located in close proximity to project infrastructure (pipeline and reservoir)	Family cemetery	Private property along main pipeline route from Mafeteng to Ha Ralintsi with turnoff to Qalabane Reservoir	Appendix J-1: Zone 6 ; Qalabane
	Ha Monyake village cemetery	Roadside close to pipeline route to Ha Monyake Reservoir	Appendix J-1: Zone 6 ; Thabane Morena
	Ha Maphohloane village cemetery	Ha Maphohloane Reservoir	Appendix J-1: Zone 6 ; Qalabane
	Mohale's Hoek village Cemetery	Mohale's Hoek CBD	Appendix J-2: Zone 7; Ha Potsane
	Ha Mofoka village cemetery	Roadside close to pipeline route from St Marks Mission	Appendix J-1: Zone 6 ; Thabane Morena
	Ha N'goae family cemetery	Roadside close to pipeline route between Mt Tabor Junction to Thabana-Morena	Appendix J-1: Zone 6 ; Thabane Morena

	Ha Mothokho	Graveyards in close proximity to the road near Zone 6 Reservoir 2.	Appendix J-1: Zone 6; Ha Mathoko

ORAL HISTORY AND CULTURAL PRACTICES

During the survey (local interviews) undertaken in August 2018, several people were interviewed in order to understand their appreciation of cultural heritage. People in the village at the foot of the Qalabane Mountain were passionately relating the events of the war between Basotho and the Boers from the Free State. There was also positive response to the other cultural heritage assets as follows:

MUSICAL INSTRUMENTS

Lesiba and 'Mamokhorong are the only instruments currently still played by herders, though they are quickly being replaced by modern electronic instruments. Both are played by herders while herding livestock, although there are very few episodes of this lately. 'Mamokhorong is played by goat herders mostly, and is still highly fashionable amongst young herders.

These instruments are described below:

- ***Lesiba*** is a mouth bow. A stringed-wind instrument with a quill attached to a long string. Its historical origin can be traced to the San who converted their hunting bows to musical instruments.
- ***Mamokhorong*** is a sinew string 'violin' developed in Lesotho. There are modern versions of it, which make use of tin cans in place of a calabash and a piece of wire in place of sinew.

Most herders in the proposed project footprint are seen carrying either pre-recorded music players (tape players, disc-players etc.) or cell phones. Indication is that modern technology has a strong influence on musical composition trends.

THE SONGS

In this part of the country, the community is dominated by initiation practices. The ceremonial songs for initiates have gained access into the current media and in shops, *shibeens* and hand-held gadgets. Initially this seemed to be male dominated, but lately women have joined the practice.

- ***Mokhibo*** is one traditional women's dance that is still highly popular in the proposed project footprint.
- ***Mokorotlo*** performed largely by men, is actively sung at local ceremonies.
- ***Mangae***, sung mainly by teenage boys as part of going through initiation.

ORAL HISTORY

Embedded story telling in the evenings (Litśomo – traditional fictional stories), has mostly declined, although this still takes place in a very few households. There are also riddles (Lilotho - puzzles) that lately feature mostly through media intervention (radio), as practice in the household has declined. Again, as in the case of original music instruments, people have gained access to electricity and therefore television has replaced the use of evening family time. Overall, oral history is depreciating.

LANGUAGE

In this part of the country, there are mainly three languages: Sesotho, Sethepu and dialects mixing Afrikaans with any of these due primarily to community members employment in South African mining activities (therefore predominantly men). It is explained that the *mining language* is typically used to seclude others from understanding discussions. .

Another area of seclusion is the new economic hardship experiences of drug dealers' language and symbolism, which takes various forms, but the most visual is hanging of pairs of shoes on telephone and electricity lines, especially in the peri-urban.

ARTS AND CRAFTS SKILLS

The community has indicated that they have the following cultural skills, which they still practice:

- Livestock rearing;
- Weaving grass sun hats – Tŝetŝe;
- Thatching ropes – Lithapo;
- Weaving of grass mats – Meseme with the specialise Nguni type called Leqase;
- Traditional beer brewing although the strainers are not weaved any more due to scarcity of natural resources. Instead the mealie bags from modern industry have replaced traditional ones;
- Hut making and plastering (*ho lila*); and,
- Grass thatching.

GAMES

Lesokoana (stick used to stir porridge), is still actively played especially in the dry periods. The main purpose of the Lesokoana is a rainmaking ritual. Herders actively practice Ho kalla – stick fighting, which is mostly done by initiates.

CULTURAL PRACTICES

The following cultural practices were recorded to be still active, in almost all community groups within the project area:

- ***Mekete ea Balimo***: a thanksgiving ceremony for one's ancestors;
- ***Lebollo*****:** the initiation or coming of age of both boys and girls, which prepares them for adulthood;
- ***Thapo*****:** following a death in a family, the rest of the family would observe a month-long mourning period while the mother and wife who have lost either a husband or a child must observe an extended mourning period and wear distinct clothing, normally black; and,
- ***Ho beha lejoe*****:** this is unveiling of a tombstone, in a solemn ceremony of relatives joined by locals.

The forms in which these are undertaken tend to reflect infiltration by capital-intensive economy.

7 ENVIRONMENTAL AND SOCIAL ASPECTS AND IMPACTS

This Chapter describes the environmental aspects (physical, ecological, socio-economic and cultural) associated with the construction and operation phase of the project. An environmental aspect is defined as an element or characteristic of the project that interacts or can interact with the environment and which have the potential to cause environmental impacts.

The Chapter identifies and evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria (semi-quantitative approach) during construction, operational and maintenance. The assessment results in the development of required measures to avoid, minimise or compensate adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

7.1 PHYSICAL ASPECTS AND IMPACTS

7.1.1 AIRBORNE EMISSIONS

CONSTRUCTION

DUST AND PARTICULATES

The release of particulate matter (PM) to atmosphere and its migration by wind vectors impacts on ambient air quality. PM varies in size from particles that are only visible under an electron microscope to soot or smoke particles that are visible to the human eye. PM contributes greatly to deteriorations in visibility, as well as posing health risks, as small particles (aerodynamic diameter <10 microns PM_{10}) can penetrate lungs resulting in respiratory problems[37].

The following construction activities result in dust fall out and possible PM emissions: vegetation clearing and exposure of bare soil to wind, excavation, drilling and jackhammering, concrete batching plant, and movement of machinery and vehicles particularly on dirt roads.

Dust emissions will primarily be a nuisance factor to nearby receptors (e.g. onsite workers, and roadside kiosks and residents where the pipeline is routed within a road reserve). However, if suspended particulates exceed short-term guidelines, acute health issues (e.g. eye irritation, breathing problems) may arise.

Based in professional judgement, relevant standards and guidelines for compliance concerning PM_{10} emissions will likely not be exceeded by sort term exposure to dust, however compliance with the South African National Dust Fallout Standards (No. R827) must be ensured as outlined in the ESMP.

GASEOUS EMISSIONS

A secondary source of gaseous (e.g. nitrogen dioxide, sulphur dioxide and carbon monoxide) and particulate emissions may include exhaust from vehicles and other diesel engines of earth moving equipment. In addition, illegal open burning of solid waste on site can contribute to a reduction in ambient air quality.

[37] United States Environmental Protection Agency (USEPA) (undated): **Health and Environmental Effects of Particulate Matter (PM)**, https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm

Although vehicular emissions will results in an increase in ambient concentrations of pollutants in remote areas compared to the baseline situation, vehicular emissions are not likely to result in ambient concentrations beyond WHO health guidelines (**Table 16 in Chapter 3.4.1).**

Waste burning can results in temporary and intermittent exceedences of short-term guidelines in the vicinity of the burning activity leading to potential health implications within the surrounding community).

OPERATION

Wastewater and sludge will be generated as a waste output at the WTW. Potential odorous gases from these include hydrogen sulphide (H_2S). H_2S is detectable by the human nose at levels below which it causes direct health impacts, and thus its nuisance impact is the main focus of interventions. The appropriate management response is to control emissions such that concentrations at local receptors are maintained below the odour threshold. WHO[38] provides an H_2S annoyance guideline of 5ppb on a 30-minute averaging period and an H_2S health guideline of 107.6 ppb on a 24-hour averaging period.

SUMMARY OF AIRBORNE EMISSIONS IMPACT ASSESSMENT

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Release of airborne pollutants emissions to atmosphere (vehicular emissions and dust)	Increased dust emissions will result in reduced ambient air quality resulting primarily in a nuisance factor to nearby receptors (e.g. onsite workers, roadside kiosks and residents.	2	2	3	2	4	1) Dust Controls; 2) Establish Monitoring Network (dust buckets) should excessive complaints be received at key sources (e.g. batching plant)	2	1	3	2	4
		N3 - Moderate						N3 - Moderate				
Release of airborne pollutants emissions to atmosphere (vehicular emissions and dust)	Increased concentration of pollutants (gaseous emissions) will result in reduced ambient air quality. Should emissions exceed short-term guidelines, acute health issues may arise.	3	2	3	2	3	1) Vehicular Emission Controls	3	1	3	2	3
		N2 - Low						N2 - Low				

The release of emissions resulting from construction vehicles and earthmoving activities will result in a negative impact of low significance. The residual impact remains moderate and low. Although the extent may be reduced, there is low confidence that the proposed control measures will reduce probability.

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Release of airborne pollutants emissions to atmosphere (vehicular emissions and dust)	Potential odorous gases from WTW sludge includes hydrogen sulphide which is primarily a nuisnace factor as it is detectable by the human nose at levels below which it causes direct health impacts.	2	2	1	4	2	1) Fenceline hydrogen sulphide monitoring should excessive complaints be received	2	2	1	4	2
		N2 - Low						N2 - Low				

The release of H_2S emissions and potential pungent odour has the potential to result in a nuisance factor. The likelihood of this occurring however is unlikely as the closest receptors to the WTW are in excess of 1km; in addition COW is required to acquire all land surrounding the WTW as a buffer / management zone. The mitigation measures are embedded in the design of the facility; however, undertaking fence line monitoring will provide an early warning system for increases in emissions.

[38] World Health Organisation (2000), **Air Quality Guidelines for Europe**, 2nd Edition, Copenhagen.

7.1.2 NOISE EMISSIONS AND VIBRATIONS

CONSTRUCTION

The following construction related activities are likely to generate vibrations and additional noise into the environment:

- Presence of workforce
- Land clearing
- Drilling and blasting
- Cut and fill operations
- Vehicle activities associated with transport of equipment.
- Use of equipment and machinery
- Concrete mixers and cranes

Vibrations and audible increase in noise can lead to the disturbance and nuisance to sensitive receptors. A receptor is defined by World Bank (April 2007) as "*any point on the premises occupied by persons where extraneous noise and/or vibration are received*". Examples of receptor locations within the project area include residential households; formal commercial and roadside kiosk; schools; clinics and places of worship.

Such disturbances are also likely to negatively affect larger faunal species (including avifauna) who will move away from this disturbance; with vibrations from blasting activities having the most effect on fossorial species (such as moles and certain reptile species).

Nuisance factors will vary in the different areas across the two zones due to differing surrounding land uses and proximity and noise emission sources. Disturbance to the residents located near the development footprint will have to be taken into account during the construction phase. Unwarranted noise levels due to noisy activities need to be maintained by the Contractor within the satisfactory standards for urban and rural areas. WHO (1999) *Guidelines for Community Noise* are referred to as acceptable noise limits (**Table 17 in Chapter 3.4.2**). In the case, where consistent complaints are received a monitoring network may be required to assess impacts and recommend mitigation.

OPERATION

Noise disturbance associated with the operation of the water network is not anticipated. An audible increase in noise may occur due to pumps and other machinery relating to the operation of the water treatment facility. Noise levels should be in accordance to the acceptable limits for rural areas.

SUMMARY OF NOSE EMISSINS AND VIBRATIONS IMPACT ASSESSMENT

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Release of noise and vibration into the environment	Vibrations and noise emissions will result in a disturbance and nuisance factor to sensitive receptors (households; formal commercial activities and roadside kiosk; schools; clinics and places of worship) of there is an audible difference.	2	2	1	2	3	**1) Noise reduction and control strategies (temporary noise barriers and deflectors especially during blasting); 2) Establish Monitoring Network should excessive complaints be receved.**	2	1	1	2	3
		N2 - Low						**N2 - Low**				

The release of noise and vibration into the environment will result in a nuisance to sensitive receptors. This is considered a negative impact of low significance. Although the extent may be reduced with proposed mitigation measures, there is low confidence that the proposed control measures will reduce probability.

7.1.3 SOIL EROSION AND SEDIMENTATION

CONSTRUCTION

CLEARING, TRENCHING AND STOCKPILING

The construction of the project components[39] (WTW, pipeline, reservoirs) will result in clearing of vegetation, levelling and trenching. The removal of vegetation can result in exposure of bare soil to rainfall and a reduction in root density within the soils, which can affect the soil structure leading to an increase in erosion potential. Generation of excess excavation material (aggregates as well as excavated soil) will require spoiling which can lead to an increased risk of soil erosion (particularly on undulating topography).

EXCAVATION AND BLASTING

According to the geotechnical reports for Zone 6 and Zone 7 (Jeffares & Green et al, 2007), resistivity testing resulted in identification of high corrosivity in portions of the study area. Protection of the pipe must be undertaken during construction in these areas. The sandier soils are generally less corrosive and as they permit free circulation of air and are free draining. The majority of the soils in Zone 6 are predominantly sands, and hence the corrosivity is generally within acceptable limits. The soils in Zone 7 are a mixture of sandy and silty soils, and hence the corrosivity is variable.

The Lesotho Lowlands Zone 6 and Zone 7 geotechnical reports divide the proposed pipeline route into a number of sections, and the excavation classifications according to SANS 1200 have been assessed for each section:

- Zone 6: The majority of the excavation 65.5% falls into the 'soft' classification, with 24.9% 'intermediate' and 8.0% of 'hard'. Boulder excavation was encountered in a small 1.6% of the excavation conditions.
- Zone 7: The majority of the excavation, 60%, falls into the soft classification, with 12% intermediate and 25% of hard. Boulder excavation was encountered in a small 3% of the excavation conditions.

Construction of Water Supply Infrastructure for Zone 6 and 7 – Volume III – Work Specifications: Part 1 for Civil Works (2017) provides a description of excavation / construction methods for each identified class (**Table 47**).

Table 47 Classification of Materials

CLASSIFICATION	DESCRIPTION
SOFT, Class 1	Material, which can be excavated by means of a suitable shovel without the use of a pick or other hand, swung tool.
SOFT, Class 2	Material, which can be readily excavated with the aid of a pick or other hand, swung tool.
SOFT, Class 3	Material, which can be excavated with difficulty with the aid of a pick or other hand, swung tool.
Intermediate	Material, which is difficult to excavate by hand even with the aid of a crow bar and requires the assistance of pneumatic tools for economical removal. This material classification shall include material used for covering of rock during blasting operations, including the blasted and shattered rock. Material occurring between dolomite pinnacles shall be classified as intermediate.

[39] 4ha of WTW, 35ha of pipeline coverage

Rock	Material which cannot be economically fragmented and loosened for removal by hand implements and pneumatic tools except by drilling and blasting or the use of rock breaking equipment.

Founding conditions of the proposed reservoir sites have been investigated by Jeffares & Green et al (2007) through the collection of representative samples of subsoils and laboratory testing (grading, hydrometer and Atterberg Limits[40]) as detailed in **Table 48** and **Table 49**.

Table 48 Founding Conditions and Excavation Categories for Zone 6

RESERVOIR	EXCAVATION CATEGORY	FOUNDING CONDITION
Industrial Mafeteng Reservoir Off the main road between Mafeteng and Van Rooyen's Gate	Intermediate - Hard	Rock provides a good founding medium, with high bearing capacities and low settlements expected. Extensive earthworks are not anticipated due to the topographic setting of the reservoir.
Qalabane Reservoir (Figure 43) Accessed via a gravel road off the main road through Qalabane	Intermediate – Hard	The rock will provide adequate bearing pressures to render the sandstone a good founding material with insignificant settlements. Extensive earthworks will be required to create a platform for the reservoir due to the steep incline of the hill.
Van Rooyen Reservoir Off the main road between Mafeteng and Van Rooyen's Gate	Soft Soils Intermediate to Hard Sandstone	It is advisable to found on the sandstone bedrock if encountered, as this should provide adequate bearing pressures, which are not expected in the overlying soft soils.
Ramohapi Reservoir Located on top of a hill in Ramohapi	Intermediate – Hard	The rock provides a good founding medium, with high bearing capacities and insignificant settlement expected.
Matlapaneng Reservoir Vehicular access may prove difficult	Intermediate – Hard	Minor amounts of earthworks required due to the topographic positioning of this reservoir. It is assumed that should the structure be founded on the sandstone it will undergo minimal settlement and the rock should provide adequate bearing capacities to structurally support the reservoir.
Transfer Reservoir Main bulk line which runs along the Mateleng – Mohoale's Hoek Road	Hard (Boulders)	Numerous sandstone boulders are strewn across the hill slope. Due to the inaccessibility of this line by vehicles and plant, combined with the 'hard' excavation class, one option would be to use steel pipes and to anchor the pipes at surface.
Siloe Reservoir 450m to the north of the main bulk line	Hard	No TLB access to site. Hard excavation will be required if the reservoir level needs to be lowered for hydraulic design.

[40] The Atterberg limits are a basic measure of the critical water contents of a fine-grained soil: its shrinkage limit, plastic limit, and liquid limit https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=5&cad=rja&uact=8&ved=2ahUKEwiJ3cTOIc3iAhV8ShUIHQ5cC08QFjAEegQICxAJ&url=https%3A%2F%2Fwww.hwageo.com%2Fsingle-post%2F2017%2F03%2F09%2FWhy-you-should-care-about-Atterberg-Limits&usg=AOvVaw0iI_b77RyG5fWeX6LKZzT4.

Bataung Reservoir Within the boundary of a Mission Station and associated school.	Soft	The sandstone bedrock will provide a suitable founding medium for the reservoir. Excavation class down to the bedrock will be "soft".
Thabana Morena Along the Mateleng – Mohale's Hoek Road.	Soft	No TLB access to site. Soft sandy soils with relatively shallow bedrock The reservoir should be founded on this bedrock.
Khobotle Reservoir No direct vehicular access from the west. Alternate route through the small community to the north east.	Hard	Underlain by hard rock bedrock, as it is positioned at the crest of the hill
Mafeteng Reservoir located on the hillside above the existing Concrete Reservoir	Hard	Upper boulder horizon, which is underlain by sandstone bedrock All boulders should be removed from the foundation trench prior to construction. Foundations should be placed directly onto the bedrock.

Table 49 Founding Conditions and Excavation Categories for Zone 7

RESERVOIR	EXCAVATION CATEGORY	FOUNDING CONDITION
Ha Maphohloane Reservoir (Figure 44) Positioned along a narrow gravel road (which winds between houses) through the community and leads in an westerly direction to the community of Mohales Hoek.	Intermediate – Hard (Rock)	Excellent founding conditions. The construction of the pipeline leading to this reservoir will however require blasting of the medium hard to hard rock.
Ha Tsepo Reservoir No road that leads to this location.	Intermediate - Hard	Adequate bearing pressures and basalt bedrock as good founding material with insignificant settlements.
Mohales Hoek Command Reservoir Located on a hilltop with no vehicular access due to steepness.	Intermediate – Hard (Rock)	Rock should provide adequate bearing pressures. Blasting will be required for the construction of the pipeline.
Industrial Area Reservoir Accessed via informal, narrow community roads and tracks-challenge for construction vehicles.	Soft	Good founding conditions and the siltstone / sandstone will provide adequate bearing pressures.
Ha Mesitsaneng Reservoir Located on a hillside, along the tarred road heading south from the Mohale's Hoek town, towards Quthing. Accessed via informal, narrow community roads and tracks.	Colluvial and residual soils, overlying weathered sedimentary bedrock.	It is assumed that the firm insitu residual soils and the weathered bedrock should provide adequate bearing capacities with insignificant settlements It is also recommended that the colluvial layer be removed as it could prove potentially expansive which could cause damage to structures founded on this material.

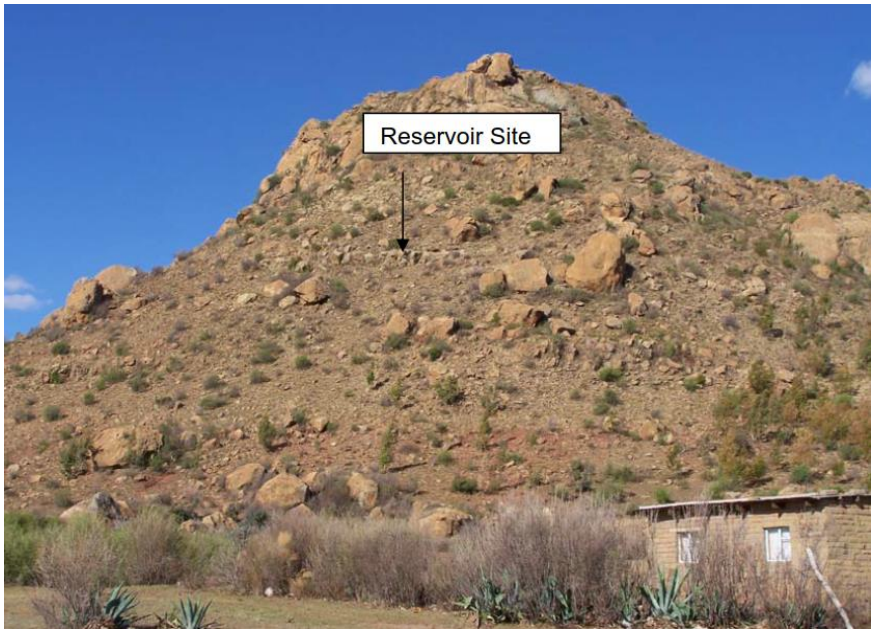


Figure 43 Qalabane Reservoir Site (Zone 6) requiring extensive excavation (Jeffares & Green et al, 2007)

Figure 44 Rock Conditions at Ha Maphohloane Reservoir (Zone 7) requiring blasting (Jeffares & Green et al, 2007)

Reservoirs requiring extensive earthworks and blasting will result in higher likelihood of soil erosion. With reference to **Table 48** and **Table 49**, areas, which may experience higher significance of indirect impacts on nearby receptors (schools, residents) due to increased erosion (i.e. dust), are as follows:

- Extensive Earthworks:
  - Industrial Mafeteng Reservoir (Zone 6)
  - Qalabane Reservoir (Zone)
- Blasting:

- Ha Maphohloane Reservoir (Zone 7)
- Mohales Hoek Command Reservoir (Zone 7)

The above list is simply an initial list of identified locations. It is noted that extensive earthworks and blasting may be required at additional reservoir sites once more updated investigations are undertaken pre-construction.

RUN OFF

Rainfall on unconsolidated sediment has the potential to cause an indirect impact as runoff with higher sediment load enters surrounding drainage lines and streams leading to sedimentation of watercourses and reduced water quality. Secondary impacts to downstream ecosystems may occur. Mitigation measures such as progressive rehabilitation will be essential to reduce the potential of soil erosion and associated indirect and secondary impacts. Construction of the intake structure within the river (including dredging) will also contribute to increased potential of sedimentation.

OPERATION

The Makhaleng River transports a high sand and silt load during high flows. Increased sediment surface water entering the river will exacerbate the high silt loads with the river potentially affecting the operational sustainability of the intake at the WTW. Provisions have been made in the design to manage the sediments entering intake and remove sand and silt is before raw water enters the WTW including:

- The intake is positioned on the outside of a minor left bend to facilitate diversion of bed load sediment
- Scour channel shall be constructed in front of the inlet to the intake and shall be a minimum of 1.2m deeper than the general depth of water in the river
- The intake face shall be inclined at an angle of 50° to the Makhaleng River channel at the intake location.
- Intake screens shall be provided for each pump chamber
- A grit removal system (and grit trap to cater for peak demand) is proposed at the inlet to the works to remove grit that is pumped into the works from the river inlet pump station to prevent mechanical damage and accumulation in basins. It will be designed to remove grit particles greater than 0.2 mm in diameter from the raw water.

This impact is therefore not assessed further.

One proposed alternative route (Kubake Pipeline) includes a “donga” (dry gully, formed by the eroding action of running water) crossing. As noted in the Contractor Specifications[41]; it is not practical to change the erosive nature of such dongas without major Engineering works. Therefore, a decision will be made on site as to how deep to locate the pipeline depending upon the expected severity of future erosion, as indicated by the current state of the donga concerned. On some previous projects, the placement of selected free draining excess excavated material in the eroded areas above the donga/pipeline crossing point has been successful in stabilising the development area and protecting the pipeline.

[41] Construction of Water Supply Infrastructure for Zone 6 and 7 – Volume III – Work Specifications: Part 1 for Civil Works (2017).

SUMMARY OF SOIL EROSION AND SEDIMENTATION IMPACT ASSESSMENT

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Increased erosion and instability	Reservoirs requiring extensive earthworks and blasting will result in higher likelihood of soil erosion. This is excaberbated by founding condition / soil properties (corrosivity). Receptors closest to the following reservoirs are most likley to experience associated impacts (nuisance factors and safety risks): Industrial Mafeteng Reservoir (Zone 6), Qalabane Reservoir (Zone), Ha Maphohloane Reservoir (Zone 7), Mohales Hoek Command Reservoir (Zone 7)	3	5	5	1	3	**1) Blasting Control Measures 2) Trenching / Soil erosion measures**	3	5	5	1	2
		N3 - Moderate						**N2 - Low**				
Release of sediment into watercourses (direct or via erosion and stormwater entrainment)	Rainfall on eroded / unconsolidated sediment has the potential to result in an indirect impact as runoff with higher sediment load enters surrounding drainage lines and streams leading to sedimentation of watercourses and reduced water quality. Secondary impacts to downstream ecosystems functioning may occur.	3	5	5	2	3	**1) Soil erosion measures (limiting the extent of work areas, management of stormwater runoff, and sediment containment structures); 2) Spoil Disposal Management Plan (SDMP)**	3	5	5	2	2
		N3 - Moderate						**N2 - Low**				

Increased erosion resulting in potential dust fallout / safety risks associated with blasting and extensive earthworks for the construction of reservoirs is likely to be experienced as a negative moderate impact. The consultant is confident that the probability can be reduced with the implementation of proposed control measures.

The release of sediment directly into watercourses or via erosion and stormwater entrainment will result in a negative impact of moderate significance before mitigation and this can be reduced to a low impact with soil erosion management measures.

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Increased erosion and instability	Proposed (Preferred) Pipeline Alternative between Z7J2 and Z7R4, Kubake requires a portion of the pipeline to be laid across a donga to avoid potential displacement and resettlement. This has the potential to result in instability of the pipeline in area prone to erosion and potential pipielne failure.	4	3	1	4	3	**1) Placement of selected free draining excess excavated material in the eroded areas above the donga/pipeline crossing point to stabilise and protect.**	4	3	1	4	2
		N3 - Moderate						**N2 - Low**				

Potential instability of project infrastructure placed over a donga can be reduced from a medium to low significance with inclusion of design and interventions as per required contractor specifications.

7.1.4 ACCIDENTAL RELEASE OF CONTAMINANTS

CONSTRUCTION

Potential exists for soil, groundwater and surface water contamination associated with potential releases of small quantities of environmental contaminants and hazardous substances. Sources of pollutants and release mechanisms include:

- Leakages of hydrocarbons (diesel and oil) from construction vehicles and heavy machinery (e.g. excavators and bulldozers).
- Loss of containment and accidental spillage associated with storage and handling of hydrocarbons, chemicals, and concrete respectively.

Runoff creates a preferential pathway and exposure of the above contaminates into the subsurface and downstream watercourses leading to a deterioration in water quality and secondary health impacts on aquatic ecosystems and water users.

OPERATION

Large volumes of chemicals will be stored at the WTW Disinfection and Clear Water Storage (i.e. Aluminium Sulfate; Potassium Permanganate; Sudfloc (coagulant) and 3TL (coagulant); and chlorine). Potential exists for

soil, groundwater and surface water contamination associated with potential accidental releases of due to loss of containment. This has the potential to lead to deterioration of the Makhaleng River water quality and secondary health impacts on downstream aquatic ecosystems and water users. The accidental release of contaminants could lead to soil contamination and loss of vegetation community. This also poses a risk to faunal and floral species.

SUMMARY OF CONTAMINATION IMPACT ASSESSMENT

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Accidental Release / spills of small quantities of potential contaminants into soils, water bodies, and groundwater	Runoff creates a preferential pathway and exposure of contaminants into the subsurface (groundwater) and downstream watercourses leading to a deterioration in water quality and secondary health impacts on aquatic ecosystems and water users (community).	3	3	5	2	3	1) Hazardous Materials Management Plan; 2) Spill Prevention and Response Plan; 3) Training; 4) Control measures (secondary containment); 5) Occupational Health and Safety Provisions	3	3	5	2	2
		N3 - Moderate						N2 - Low				

The negative impact as a result of increased contamination entering the groundwater and downstream watercourses is considered to be of moderate significance before mitigation and of low significance with mitigation.

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Accidental Release / spills of large quantities of contaminants into soils, water bodies, and groundwater	Loss of containment and accidental release of chemicals stored and handled at the WTW will result in soil, groundwater and surface water contamination. Potential exists for deterioration of the Makhaleng River water quality to occur and secondary health impacts on downstream aquatic ecosystems and water users, and maintenance of livelihoods.	3	3	3	4	2	1) Hazardous Materials Management Plan; 2) Spill Prevention and Response Plan; 3) Training; 4) Control measures (secondary containment); 5) Occupational Health and Safety Provisions	2	3	3	4	2
		N2 - Low						N2 - Low				

The loss of containment and accidental release of chemicals stored and handled at the WTW is considered to a negative impact of low significance before mitigation. There is high confidence that the magnitude of the impact can be reduced with implementation of mitigation measures.

7.1.5 FLOODING OF MAKHALENG RIVER

OPERATION

The proposed WTW is located within 100m of the Makhaleng River bank, which is within the flood plain of the river. If a flood event occurs, potential exists for infrastructure; equipment and hazardous substances stored at the WTW to be washed into the river and carried downstream leading to secondary impacts of reduce water quality and ecosystem functioning. Flooding also poses a potential risk to human life.

A site alternative presented in **Chapter 5** proposes to shift the WTW in a northeast direction to avoid as much as possible portion of the WTW located within the floodplain and delineated wetland. This has been accepted by COW for further investigation and is assessed as the preferred option.

The intake structure and the wet well were designed a for 1:10 year flood frequency with a flood level of 1,428.9m which shall be confirmed by the Contractor on site.

The proposed pipeline route includes a number of river crossings. All proposed pipeline crossings within Zone 6 and 7 will be tagged onto existing bridges and road river crossings, which will reduce the potential risk of damage to infrastructure during a flood event.

SUMMARY OF FLOODING IMPACT ASSESSMENT

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Flooding of the Makhaleng River	Locaton of the WTW within the Makhaleng Floodplain poses a risk of flooding and damage to infrastructure leading to potential contamination by stored chemicals and secondary downstream impacts to aquatic ecosystems and water users, and maitenance of livelihoods.	3	5	5	4	3	**1) Proposed (preferred) alternative to shift WTW as far as practicably possilbl out of the floodplain**	2	5	5	4	1
		N3 - Moderate						**N2 - Low**				

The WTW will be located within the Makhaleng floodplain and is therefore is at risk of flooding and damage which could result in contamination risks. The change in layout was proposed by the EAP and Ecological expert to increase confidence in the reduction of impact probability. The negative impact of this is considered to be of moderate significance without mitigation and low significance with mitigation.

7.1.6 DISCHARGE OF EFFLUENT

CONSTRUCTION

Sanitation services are required to accommodate workers on site, contractor's yard and at site camps along the route. Temporary ablution facilities (chemical toilets) are proposed to appropriately contain, and treat waste for offsite disposal. The incorrect siting of chemical toilers (i.e. within 100m of a watercourse or stream) and loss of containment could lead to pollution of the receiving environment (soil, groundwater and surface water), leading to secondary health impact to ecosystems and communities (ground and surface water users).

OPERATION

WATER TREATMENT WORKS

The World Bank (2007) EHS Guidelines: Water and Sanitation outlines the following measures to manage wastewater effluents:

- Land application of wastes with high dissolved solids concentrations is generally preferred over discharge to surface water subject to an evaluation of potential impact on soil, groundwater, and surface water resulting from such application.
- Recycle filter backwash into the process if possible.
- Treat and dispose of reject streams consistent with national and local requirements. Disposal options include return to original source or discharge to a municipal sewerage system, and evaporation.

The planned Makhaleng WTW will involve the collection of clarified water in a peripheral launder and flow under gravity to the filtration system. A bridge in the clarifier is proposed to scrape sludge settled out in the clarifier to a hopper located in the centre of the tank. Sludge (effluent) will be withdrawn from the sludge hopper and fed into a holding tank before being discharged to the backwash recovery tanks along with filter backwash water. According to SMEC (2018), up to 10% of the gross production of the WTW is consumed during the various processes, which include losses due to backwashing of filters and desludging of clarifiers. A requirement of the recovery process will be that at least 50% of this wastewater is recovered and returned to the WTW inlet works.

A discharge permit would be required for discharge of into the Makhaleng River. Effluent would need to be treated and monitored to conform to Draft National Potable Water Standards (once promulgated), and in the interim, the WHO (2011) *Guidelines for Drinking-Water Quality.*

The preferred project option for effluent managements is for sludge / slurry to be treated in drying beds via evaporation. Chapter 7.1.7: Generation of General Waste during operational phase outlines final disposal of WTW residue from drying beds.

SUMMARY OF EFFLUENT DISCHARGE IMPACT ASSESSMENT

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Discharge of Effluent	The incorrect siting of chemical toilets and loss of containment could lead to pollution of the receiving environment (soil, groundwater and surface water), leading to secondary health impacts on downstream aquatic ecosystems and water users (surface and ground), and maintenance of livelihoods.	3	3	3	2	3	**1) Locate chemical toilets beyond 100m of a watercourse or stream; 2) Sewerage generated at the contractor's camp should be handled as hazardous waste material (2007); 3) Maintenance and removal of chemical toilets by a registered sanitation service company**	3	3	3	2	2
		N3 - Moderate						**N2 - Low**				

Potential exists for contamination to occur during the construction phase should chemical toilets be inappropriately managed. With mitigation, this impact is reduced from negative moderate to a negative low impact significance due to reduced probability.

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Discharge of Effluent	Accidental seepage of WTW process effluent (from loss of containment), and discharge (backwash water) to the Makhaleng River has the potential to lead to decreased water quality of the river system including secondary health affects to aquatic ecosystems and communities (water users) if not treated to acceptable health standards.	3	3	3	4	3	**1) Spill Prevention and Response Plan; 2) Training; 4) Control measures (secondary containment); 5) Assessment for suitability for land application; 6) Compliance with Discharge Permit**	3	3	3	4	2
		N3 - Moderate						**N2 - Low**				

Any release of discharge from the WTW that is not under strictly controlled measures has the potential to affect the Makhaleng River; this is considered to be of moderate negative significance before mitigation and of low negative significance with mitigation. Should ongoing planned discharge be required, the facility will need to apply for and comply with a Discharge Permit.

7.1.7 GENERATION OF GENERAL WASTE

CONSTRUCTION

Table 50 provides a summary of the typical general waste type that are likely to be generated on site during construction.

Table 50 Description of Construction Phase General Waste Streams

WASTE CATEGORY	WASTE TYPE	TYPICAL CONSTITUENTS
General Waste	Domestic Waste	Paper and cardboard packaging, empty plastic and metal containers (non-hazardous original contents) etc.
	Organic Waste	Canteen, food and cooking waste
	Mixed Industrial	Wood, plastic, packaging etc.
	Metal Waste	Ferrous and non-ferrous scrap and stainless steel, cast-iron removed pipelines
	Spoil Material	Excavations, trenching and terracing will result in the generation of spoil material
	Building rubble	Wasted flooring material, paint containers, wall tiles, timber, piping etc.
	Biomass	Cleared vegetation

The presence of construction workers has the potential to increase litter on site in the absence of adequate waste receptacles. This results in an unsightly working and possible entry into terrestrial habitats and watercourse leading to secondary impacts on local wildlife (in the case of ingestion and entrapment), aquatic ecosystems and downstream community (water users). Furthermore, waste materials may attract pest species / vectors into working areas leading to potential health implications to construction staff and community members.

Spoil material unsuitable for reuse as backfill and bedding material has the potential to disrupt land use and habitats if inappropriately manage / disposed illegally.

Waste generation (domestic waste, mixed industrial and metal waste) and a lack of appropriate separation, temporary storage and recycling (i.e. not aligned with the Waste Hierarchy) has the potential to result in unnecessary waste material to landfill.

As there are no existing recycling companies or facilities within the project area, general waste must be disposed of at the existing landfills:

- Zone 6: Mafeteng Landfill (towards Qalaheng Settlement).
- Zone 7: Motse-mocha Landfill (close to Junction to Makhaleng Border Gate from Main South One).

Recycling opportunities must be sought in order to reduce the volume of waste to landfill and harness commercial benefits for both the project team and local community. Possibilities of waste recycling and reuse:

- The rock fragments generated during excavations for reservoirs (hard – rock excavation) can be reused as the basis of roads and weir
- The pallet type wood and boards that that package worksite materials and equipment can be reused as signage boards, and fencing worksites.
- Recycling paper, plastics, metal, glass wood crates, cardboard and others rigid containers originating from product acquisition used and generated in site offices (paper, plastics, small batteries and lights among others).
- Returning chemical containers to suppliers
- Collection of canteen waste for use by local pig farmers etc.
- Composting waste plant mater for construction nursery to support rehabilitation and revegetation phase.

OPERATION

Table 51 provides a summary of the typical general waste types that are likely to be generated on site during operation.

Table 51 Description of Operational Phase General Waste Streams

WASTE CATEGORY	WASTE TYPE	TYPICAL CONSTITUENTS
General Waste	Domestic Waste	Paper and cardboard packaging, empty plastic and metal containers (non-hazardous original contents) etc.
	Mixed Industrial	Wood, plastic, packaging etc.
	WTW Residues	Grit removed from river water and drained from grit trap, and slurry / sludge treated on drying beds resulting in dry residue waste.
	Reservoir Scour	Scour pipes installed at the bottom of each reservoir will allow for draining (through the outlet pipe network) during for servicing and maintenance. The bottom 100mm layer of water in the tank is scoured out to waste.

Waste generation (domestic waste and mixed industrial) and a lack of appropriate separation, temporary storage and recycling (i.e. not aligned with the Waste Hierarchy) has the potential to result in unnecessary waste material to landfill.

Residual waste from WTW sludge drying beds residue should be removed offsite for appropriate reuse or disposal as recommended by international best practice.

Options for final disposal or reuse includes:

- Use as daily landfill cover
- Land application (e.g. on agricultural land)

Land application is used by WASCO at the Maseru Water Treatment Works where sludge residual is collected by farmers from the WTW drying beds. (SSI, 2010)

Potential exists for sludge from drying beds to be deemed hazardous due to the chemicals used in the water treatment process; and dependent on the chemical standards for classification used. These wastes will need to be quantified, classified and suitable disposal or beneficial reuse / land application determined. Quality of residuals for land application should be consistent with relevant public health-based guidance with the WHO (2006) *Guidelines for Safe Use of Wastewater* and applicable national requirements.

The following constituents and properties within sludge residual waste needs to be determined due to their potential negative effects:

- Nutrients – the nutrient content (e.g. nitrogen and phosphorus) will determine whether sludge could be used as a fertiliser while high concentrations of certain nutrients could pose a negative environmental impact due to soil, surface and groundwater contamination.
- Trace elements and materials – when present in high concentrations, the metal content[42] of sludge may have negative impacts on several receptors.
- Physical characteristics – the physical properties of sludge may affect the soil properties, air quality and surface water.

If suitable for land application, the next step is to identify application sites. This will involve the establishment of baselines concentrations (nutrients, trace elements and metals, as well as pH in the soil) and the development of a monitoring programme.

If the sludge is unsuitable for agricultural use, other possible re-use options include recovery of coagulants, use in landscape tree nursery; use in brick making, use in Portland cement (high solids); and use in instant lawn farming.

SUMMARY OF GENERAL WASTE GENERATION IMPACT ASSESSMENT

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Generation of general waste	Presence of workforce and absence of adequate waste receptacles results in increased litter leading to unsightly working areas and possible entry into terrestrial habitats and watercourses. This has the potential to result in secondary impacts on local wildlife (in the case of ingestion and entrapment), aquatic ecosystems and downstream community (water users)	2	2	1	1	3	**1) Environmental awareness training on consequences of poor waste management; 2) Provision of suitable waste receptacles across all working areas; 3) Temporary storage in secure skips / containers; 4) Collection and dispoal by licensed waste contractor for disposal at a registered landfill; 5) Proof of dispoasal must be kept in Site Environmental File.**	2	2	1	1	3
		N2 - Low						**N2 - Low**				
Generation of general waste	Spoil material unsuitable for reuse as bedding and backfill material has the potential to disrupt landuse and habitats if inappropriately managed / disposed illegally.	3	2	1	2	3	**1) SDMP; 2) Identification of sites within the projet area requiring levelling and filling of erosion gullies in consultation with Environmental Manager, District Environmental Offivers, and Community Councils**	3	3	1	2	2
		N2 - Low						**N2 - Low**				
Generation of general waste	Waste generation (domestic waste, mixed industrial and metal waste) and a lack of appropriate separation, temporary storage and recycling (i.e. not aligned with the Waste Hierarchy) has the potential to result in unnecessary waste material to landfill (limited national capacity).	3	4	3	4	3	**1) Opportunities should be determined, in consultation with waste service providers, for re-use, recycle, or disposal options**	2	4	3	4	2
		N3 - Moderate						**N2 - Low**				

[42] Residuals could contain relatively high metal concentrations depending on the form and amount of coagulant used (SSI, 2010) resulting in residuals not being suitable for land application. .

The potential impacts relating to the generation of waste and the lack of appropriate separation are of negative low to moderate significance before mitigation, post mitigation all three impacts are reduce to low significance.

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Generation of general waste	Waste generation (domestic waste, mixed industrial, WTW residues and Reservoir Scour) and a lack of appropriate separation, temporary storage, recycling and reuse (land application) has the potential to result in unnecessary waste material to landfill (limited national capacity).	3	4	3	4	3	**1) Opportunities should be determined, in consultation with waste service providers, for re-use, recycle, or disposal options; 2) Assessment of residue / scour suitability for land application.**	2	4	3	4	2
		N3 - Moderate						**N2 - Low**				

The generation of general waste during operation has the potential to result in an impact of moderate significance if opportunities to recycle, reuse and recover are not sought. Reduction of waste initiative have will result in a residual impact of low significance. Investigations and assessments on suitability of proposed mitigation measures are imperative to ensure reuse / land application does not result in impacts to soil and groundwater.

7.1.8 GENERATION OF HAZARDOUS WASTE

CONSTRUCTION

Table 52 provides a summary of the typical hazardous waste types that are likely to be generated on site during construction.

Table 52 Description of Construction Phase Hazardous Waste Streams

WASTE CATEGORY	WASTE TYPE	TYPICAL CONSTITUENTS
Hazardous Waste	Oily Waste	Used lubricant and hydraulic oils and hydrocarbon based solvents
	Oil Contaminated Waste	Solid material (rags etc.) that has come into contact with and contains traces of oil or grease
	Health Care Risk Waste (HCRW)	Waste generated as workers camp clinic
	Sanitary waste	Sewerage sludge / faecal generated at the contractor's camp that may pose risk to infections

Hazardous waste generation and inappropriate management and disposal has the potential to lead to contamination of soil, groundwater and surface water; as well as poisoning of fauna (direct contact, and ingestion).

Lack of waste minimisation measures will lead to regional impacts and increased project costs, as there are no registered hazardous waste collectors located within the project area. The registered hazardous waste collector company will transport hazardous waste to appropriate facilities in South Africa.

OPERATION

Table 53 provides a summary of the typical hazardous waste types that are likely to be generated on site during operation.

Table 53 Description of Operational Phase Hazardous Waste Streams

WASTE CATEGORY	WASTE TYPE	TYPICAL CONSTITUENTS
	Oily Waste	Used lubricant and hydraulic oils and hydrocarbon based solvents

Hazardous Waste	Oil Contaminated Waste	Solid material (rags etc.) that has come into contact with and contains traces of oil or grease
	WTW Reside	Sludge / slurry treated on drying beds resulting in dry residue waste if classified as Hazardous (see Section 7.1.7: Generation of General waste during Operation).
	Hazardous Chemical Containers	Large volumes of chemicals will be stored at the WTW Disinfection and Clear Water Storage

Chemicals used in the treatment process may accumulate in the slurry / sludge. Classification as per WHO (2006) *Guidelines for Safe Use of Wastewater* will need to be undertaken in order to confirm whether deemed hazardous water for appropriate disposal.

Should WTW residual waste be deemed hazardous and not suitable for beneficial reuse / land application, this material must be handled and disposed as hazardous waste.

The empty chemical containers used for water disinfection must be treated as a hazardous waste.

Given the lack of facilities in the Lesotho, a registered hazardous waste collector company will be required to transport hazardous waste to appropriate facilities in South Africa.

SUMMARY OF HAZARDOUS WASTE GENERATION IMPACT ASSESSMENT

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Generation of hazardous waste (oil, greases, and other chemicals and associated contaminated materials)	Hazard waste generation and inappropriate management and disposal has the potential to lead to contamination of soil, groundwater and surface water; as well as poisoning of fauna (direct contact, and ingestion).	3	3	5	2	3	**1) Secondary containment for temporary storage; 2) Licensed contractors handling, treatment and disposal; 3) Environmental awareness training; 4) Limiting access to hazardous waste storage areas; 5) Labelling**	3	3	5	2	2
		N3 - Moderate						**N2 - Low**				
Generation of hazardous waste (oil, greases, and other chemicals and associated contaminated materials)	Lack of waste minimisation measures will lead to regional impacts and increased project construction costs as registered hazardous waste collectors are located outside the project area.	2	5	3	2	3	**1) Stringent waste segregation to prevent comingling of non-hazrdous and hazardous wastes**	2	2	1	2	3
		N3 - Moderate						**N2 - Low**				

The inappropriate handling and disposal of hazardous waste has potential to result in a negative impact of moderate significance. The magnitude and probability of the impact can be reduce to result in an impact of low significance with the implementation of proposed mitigation measures. Similarly, stringent segregation of waste will assist in the reduction of waste disposal costs from moderate to low significance.

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Generation of hazardous waste (oil, greases, and other chemicals and associated contaminated materials)	Chemicals used in the treatment process may accumulate in the slurry / sludge rendering it a hazardous waste. Inappropriate reuse (land application) and / or disposal may lead to contamination of the receiving environment.	3	3	5	2	3	**1) Waste Classification of the WTW residue and 2) Investigation on suitability for land application.**	3	3	5	2	2
		N3 - Moderate						**N2 - Low**				

The generation of waste in the absence of a defined waste management plan will result in a negative moderate impact. However, a waste management plan seeking to recycle, reuse and recover will only be successful where adequate waste facilities and management initiatives exist. Investigations and assessments need to be conducted before a suitable mitigation measure can be implemented. Based on professional judgement, this will result in a residual impact of low significance to reduced probability of the impact occurring.

7.2 TERRESTRIAL ECOLOGICAL ASPECTS AND IMPACTS

7.2.1 DISTURBANCE AND LOSS OF NATURAL FEATURES (SENSITIVE HABITATS)

CONSTRUCTION OF PIPELINES

Pipelines for the development, mostly pose a low impact for local fauna and flora, and/or pass through areas, which are defined as having a low sensitivity due to previous impacts such as livestock grazing or the presence of an existing road.

TEMPORARY DISPLACEMENT OF FAUNAL COMMUNITY

The project area provides possible habitat and shelter to several endemic, threatened and protected mammal, reptile and bird species. Although it is assumed that the majority of fauna species will move to different areas because of disturbance, many protected and endemic fauna species have very specific habitat requirements, and the disturbance of sensitive habitats will result in displacement to less optimal habitats.

Secondary impacts associated include the destruction and disturbance to local breeding grounds and nesting sites; leading to potential decrease in population densities of threatened and protected species (Cape Clawless Otter - *Aonyx capensis*; and Mountain Reedbuck - *Redunca fulvorufula)*.

These impacts will only be present during the construction phase and the area will most likely recover to a near-natural state with limited rehabilitation measures.

LOSS AND FRAGMENTATION OF THE VEGETATION COMMUNITY

The proposed project has the potential to result in temporary fragmentation of vegetation communities, including portions of four threatened vegetation types within the project area, namely:

- Basotho Montaine Shrubland (Vulnerable)
- Eastern Free State Clay Grassland (Endangered)
- Eastern Free State Sandy Grassland (Endangered)
- Zastron Moist Grassland (Vulnerable)

Temporary fragmentation of vegetation communities can lead to:

- Disturbance and potential loss of portion of certain vegetation types and associated floral species assemblages[43]; and
- Encroachments of alien vegetation across the project development footprint, which will compete with indigenous species for water resource.

Much of the areas to be cleared for the pipeline and associated infrastructure is already somewhat disturbed due to the adjacent road infrastructure, over-grazing and anthropogenic impacts.

TEMPORARY FRAGMENTATION EFFECT OF LINEAR INFRASTRUCTURE ON MOVEMENT AND MIGRATION OF FAUNA

Linear infrastructure results in a fragmentation effect and disturbance to the movement and migration of faunal species. The pipeline development route is defined as having a low sensitivity due to previous impacts such as

[43] A total of 33 plant species were recorded in the Project area during the August 2018 survey. The low number of plant species recorded cannot only be attributed to the timing of the field survey, namely the late-dry season, but also the ecological state of the environment which was considered to be highly disturbed. These disturbances were mostly attributed to anthropogenic changes and associated environmental pressures.

livestock grazing or the presence of an existing road. The proposed pipeline route is considered to only have a temporary linear impact during construction and once completed should no longer pose a long-term disturbance to faunal movement in the area.

SUMMARY OF PIPELINE CONSTRUCTION IMPACTS ON TERRESTRIAL ECOLOGY

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Vegetation clearing and trenching for construction pipelines can lead to temporary displacement of faunal community due to habitat loss, disturbance and/or direct mortalities (including road mortalities and/or poaching). Secondary impacts include destruction and disturbance to local breeding grounds and nesting sites; leading to potential decrease in population densities of threatened and protected species (Cape Clawless Otter and Mountain Reedbuck).	2	2	1	1	3	Controlled access to active construction areas. Environmental awareness training. Use existing access roads and paths whenever possible. Qualified ECO available to relocate fauna. No trapping, killing or poisoning of any wildlife allowed. Trench management measures as outlined in ESMP.	1	2	1	1	3
		N2 - Low						N1 - Very Low				
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Clearance of soil and vegetation for construction of pipelines can lead to temporary loss and fragmentation to portions of certain vegetation types and associated floral species assemblages (including four threatened vegetation types). Secondary potential impacts include encroachment of alien vegetation.	2	2	3	1	3	Areas denuded during construction need to be re-vegetated with indigenous species only. No harvesting of plants allowed. Alien invasive plant management plan to be compiled and implemented post construction.	2	1	3	1	2
		N2 - Low						N1 - Very Low				
Fragmentation effect of linear infrastructure on the movement and migration of faunal species	Linear nature of pipelines can lead to temporary interuption to faunal species' migration routes.	2	2	1	1	3	Environmental awareness training. Qualified ECO available to relocate fauna.	2	1	1	1	2
		N2 - Low						N1 - Very Low				

All impacts on flora and fauna associated with the construction of the pipeline are deemed to be of Low significance and Very Low significance following the implementation of mitigation measures. Temporary impacts to fauna are immediately reversible. The extent and probability of interruption to fauna migration routes, and temporary fragmentation of vegetation communities can be easily reduced.

CONSTRUCTION AND OPERATION OF WTW

TEMPORARY DISPLACEMENT OF FAUNAL COMMUNITY

The construction of the WTW and associated infrastructure will include the clearance of soil and vegetation. These activities will cause disturbance and displacement of local fauna (due to habitat loss) and/or direct mortalities (including road mortalities and / or poaching). The location of the WTW in close proximity to a natural rocky ridge (with associated faunal species assemblages) increases the severity of the impact.

LOSS AND FRAGMENTATION OF THE VEGETATION COMMUNITY

The construction of the WTW and associated infrastructure will include the clearance of soil and vegetation. These activities will cause the permanent replacement of this vegetation type, which is listed as Vulnerable (Zastron Moist Grassland). However, the current vegetation community is considered somewhat degraded in this area, with more natural vegetation being found closer to the ridge and ridge slopes. Alien invasive plant species also pose a long-term threat to the vegetation community adjacent to the WTW.

SUMMARY OF WTW IMPACTS ON TERRESTRIAL ECOLOGY

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Clearance of soil and vegetation for construction of the WTW can cause temporary disturbance and displacement of local fauna and/or direct mortalities (including road mortalities and/or poaching). The location of the WTW in close proximity to a natural rocky ridge, which provides habitat for specific faunal species assemblages.	3	2	1	2	3	Controlled access. Environmental awareness training. Use existing access roads and paths whenever possible. Qualified ECO available to relocate fauna. No trapping, killing or poisoning of any wildlife. Workers should be prevented from accessing the ridge area adjacent to the WTW.	2	2	1	2	3
		N2 - Low						N2 - Low				
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Clearance of soil and vegetation for construction of the WTW will cause the permanent replacement of vegetation including Zastron Moist Grassland, which is listed as Vulnerable. Alien invasive plant species also pose a long-term threat to the vegetation community adjacent to the WTW.	3	2	5	5	5	Areas denuded during construction need to be re-vegetated with indigenous species only. No harvesting of plants allowed. Alien invasive plant management plan to be compiled and implemented post construction.	3	1	5	5	5
		N4 - High						N4 - High				

Temporary disturbance to fauna associated with the construction of the WTW is deemed to be of Low both pre and post mitigation despite the fact that the magnitude is reduce post mitigation. Similarly, the significance of replacement of vegetation does not change post mitigation. This is seemed to be of High significance due presence of Vulnerable species within the footprint and the permanent nature of the impact and associated duration and probability. It is noted however that the extent of this impact can be reduced with proposed alien vegetation management measures.

CONSTRUCTION AND OPERATION OF RESERVOIRS

This habitat type contained the highest amount of floral diversity of all the habitats due to the lower levels of anthropogenic disturbance in these areas. Although some of the proposed reservoir sites may be slightly more disturbed than others, due to the overall high sensitivity given to the rocky ridges and rocky grassland habitats based on the results of the field surveys (and the threatened status of the vegetation type), all of the reservoir locations were considered as potentially sensitive.

DISPLACEMENT OF FAUNAL COMMUNITY

The construction of the various reservoirs and associated permanent access roads will include the clearance of soil and vegetation. These activities will cause disturbance and displacement of local fauna (including possible threatened or protected species) due to habitat loss; and/or direct mortalities. The necessary location of reservoirs on elevated areas increases the severity of the impact as rocky hillslopes are considered the most intact of the habitats and are considered the most likely areas to provide refuge and important foraging areas for a diverse array of fauna (including the threatened Cottrell's Mountain Lizard). These areas are regarded as the being the most sensitive areas within the project area.

LOSS OF THE VEGETATION COMMUNITY AND SENSITIVE ROCKY RIDGE HABITAT

The construction of the various reservoirs and associated permanent access roads will include the clearance of soil and vegetation. These activities will cause the permanent replacement of small portions of vegetation types, some of which are listed as threatened. The necessary location of reservoirs on elevated area, which are on or in close proximity to natural rocky ridges, increases the severity of these impacts. These areas (Rocky Grassland) are also considered to be in the most natural condition of any of the identified habitats. Encroachment of alien invasive plant species also pose a long-term threat to the vegetation communities across the project area.

SUMMARY OF RESERVOIR IMPACTS ON TERRESTRIAL ECOLOGY

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Construction of the various reservoirs and associated permanent access roads will include the clearance of soil and vegetation leading to the disturbance and displacement of local fauna and their habitats on the rocky hillslopes (including the threatened Cottrell's Mountain Lizard).	3	2	1	1	3	Controlled access. Environmental awareness training. Use existing access roads and paths whenever possible. Qualified ECO available to relocate fauna. No trapping, killing or poisoning of any wildlife. Workers should be prevented from accessing the ridge area adjacent to the WTW.	2	2	1	1	3
		N2 - Low						N2 - Low				
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Construction of the various reservoirs and associated permanent access roads will include the clearance of soil and vegetation leading to the permanent replacement of small portions of vegetation types, some of which are listed as threatened and others displaying most natural condition of any of the identified habitats (Rocky Grassland). Encroachment of alien invasive plant species also pose a long-term threat to the vegetation communities across the project area.	3	2	5	5	5	Areas denuded during construction need to be re-vegetated with indigenous species only. No harvesting of plants allowed. Alien invasive plant management plan to be compiled and implemented post construction.	3	1	5	5	5
		N4 - High						N4 - High				

Temporary disturbance to fauna associated with the construction of the reservoirs can be immediately revsersed following cessation of construction activities, and is deemed to be of Low both pre and post mitigation despite the fact that the extent can be reduced post mitigation. Similarly, the significance of replacement of vegetation does not change post mitigation. This is seemed to be of High significance due to the existing diversity and sensitivity within the footprint and the permanent nature of the impact and associated duration and probability. It is noted however that the extent of this impact can be reduced with proposed alien vegetation management measures.

7.3 WATER RESOURCE ASPECTS AND IMPACTS

7.3.1 CHANGE IN THE MAKHALENG RIVER HYDRAULICS

It is noted that all proposed pipeline crossings within Zone 6 and 7 will be tagged onto existing bridges and road river crossings therefore no change to the river hydraulics is expected as a result of the linear pipeline development.

CONSTRUCTION OF WEIR

The construction of the low-level weir within the Makhaleng River will require the dredging of the riverbed for the weir foundations. The river will be temporarily diverted around the active working areas. The construction phase will result in increased suspended solids and turbidity. These conditions are unfavourable for aquatic biota as suspended sediments irritate fish gills, which can lead to suffocation if left unchecked. Macroinvertebrate dispersal, feeding and health is affected by increased suspended solids (Kerr. 1995). The diversion of the river will temporary altered flow regimes.

OPERATION OF WEIR

UPSTREAM INUNDATION

The placement of the weir will change the river hydraulics of the Makhaleng River. The weir will have a river intake area, diverting water to the WTW for the water supply scheme. Post-construction, the weir will result in inundation upstream and decreased flow volumes downstream of the weir.

The impounded area upstream of the weir will potentially provide dam-like conditions suited for aquatic biota, promoting non-riverine habitat and greater diversity and abundances of fish and macroinvertebrate communities preferring such conditions.

Equipment and infrastructure along, and traversing the Makhaleng River may be adversely affected. Potential inundation area has not been quantified, as detailed design is currently not available. Further impact assessment has therefore not been undertaken. A post-development detailed flood risk assessment should be prepared and implementation of an Emergency Flood Response Plan.

Decrease in downstream flow volume and velocity has the potential to lead to secondary impacts on downstream environmental water requirements (EWR) and communities (water users) dependent on sustain river flow for subsistence livelihood activities

BARRIER TO FISH MIGRATION

The weir design will limit fish migration. If fish migration is limited or non-existent, local communities may hunt these trapped fish, while limiting spawning and gene pool transfer of migrant fish species. The construction of a weir for the associated water supply scheme has the potential to pose a barrier to fish migration. P&P (2018) provide a professional opinion on the proposed intake structure. The report indicates that the ecological discharge (environmental water release) is separate from the fish ladder / way. This design is flawed as the ecological discharge should flow through the fish ladder / way to accommodate fish migration during periods of low flow, as illustrated in **Figure 45**. The project should cater for fish migration for both strong and weak swimmers as all five of the expected species (Sharptooth Catfish, Chubbyhead Barb, Orange River Mudfish, Moggel and Smallmouth Yellowfish) are likely to occur in the Makhaleng River.

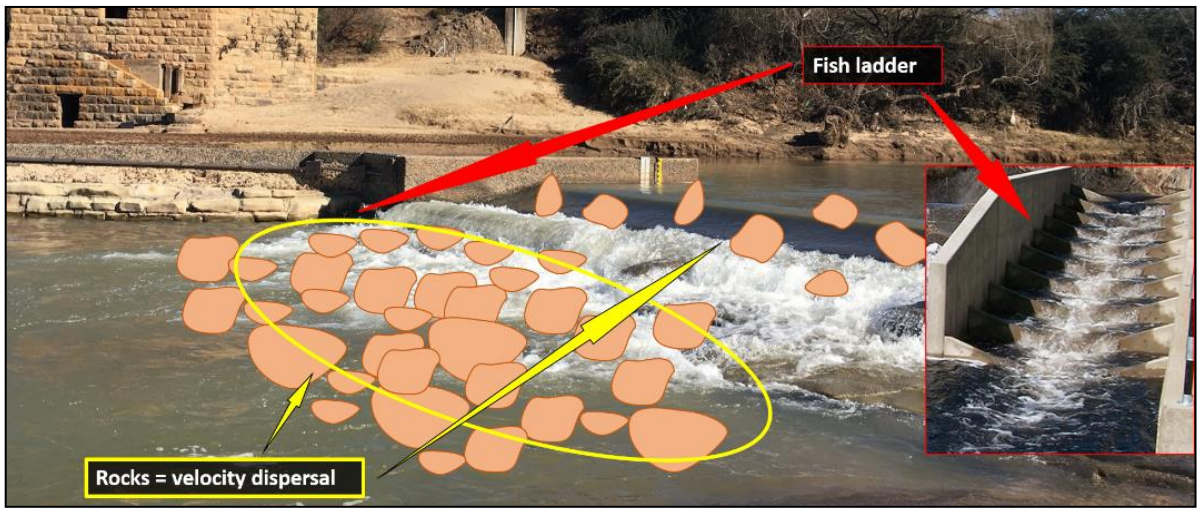


Figure 45: Recommended design to maintain fish movement on the Makhaleng River (The Biodiversity Company, 2018)

SUMMARY OF WEIR IMPACTS ON WATER RESOURCES AND AQUATICS

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Change in the Makhaleng river hydraulics	Construction of the weir will require dredging of the Makhaleng River for the weir foundations and river diversion around the working area. This will lead to temporary alteration of flow regime and sedimentation / increased turbidity. The effects of diversion will be localised with hydraulics and water quality being restored downstream.	4	2	3	2	5	1) Erosion and sedimentation prevention measures (gabions and aggregate). 2) Energy dissipaters (aggregate)	3	2	3	2	3
		N3 - Moderate						N2 - Low				

Increased turbidity and decrease in water quality affecting aquatic ecosystems due to weir construction activities (diversion and dredging) is deemed to be of Moderate significance. Magnitude and probability is reduced with the implementation of mitigation measures resulting in a residual negative impact of Low significance.

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation (M+	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Change in the Makhaleng river hydraulics	Post-construction, the weir will result in inundation upstream and decreased flow volumes downstream of the weir. The impounded area upstream of the weir will potentially provide dam-like conditions suited for aquatic biota, promoting non-riverine habitat and greater diversity and abundances of fish and macroinvertebrate communities preferring such conditions.	4	2	3	5	3	None required	4	2	3	5	3
		P3 - Moderate						P3 - Moderate				
Change in the Makhaleng river hydraulics	1) The current design according to the Intake Design Desk Review (P&P, 2008) illustrates a smooth low crest overspill area, which will result in a single flow class, limiting movement of certain fish and other aquatic fauna. 2) Proposed position of the fish ladder separate from the ecological discharge (environmental water release) will create a potential barrier to fish migration - especially during periods of low flow.	4	2	5	5	5	1a) Energy velocity dissipaters in the form of surface roughness (varying size aggregates) should be built into the overspill areas to create a variety of hydraulic conditions suitable for different fish species' swimming capabilities. 1b) Pool areas/depressions built into the overspill area with allow resting areas for aquatic fauna migration. 2) Ecological discharge is recommended to be partly or fully discharged through the fish ladder to ensure year round fish migration.	2	2	3	4	2
		N4 - High						N2 - Low				
Change in the Makhaleng river hydraulics	Inundation of the Makhaleng River upstream of the weir will result in a build-up of sediment and inundation/flooding of areas upstream of weir leading to possible increase of the flood width upstream of and decrease in flood width downstream of the weir. Decrease in downstream flow volume and velocity has the potential to lead to secondary impacts on downstream environmental water requirements (EWR) and communities (water users) dependet on sustain river flow for subsistence livelihood activities.	5	3	3	5	3	1) Sediment release measures should ensure sediment release is equal to sediment flow regime prior to weir construction to limit sediment build above weir. 2) Excess sediment can be harvested in an environmentally friendly manner for the construction sector provided permits have been obtained. 3) Post-development detailed flood risk assessment should be prepared and implementation of an Emergency Flood Response Plan.	3	3	3	5	3
		N3 - Moderate						N3-Moderate				

CONSTRUCTION OF THE WTW

The construction of the WTW will result in the permanent partial loss of a wetland, which has already been impacted on by agriculture and livestock activities. The wetland system is in a largely modified state on the level of ecosystems services provide by the system was determined to be moderately low. The proposed location of the WTW will result in a partial loss of the seepage area considered to be seasonal / temporary, with the permanent wetland zone (central area) avoided by the proposed footprint. The loss of a portion of the wetland area and subsequent loss of ecological services (habitat provision) is not considered a fatal flaw for this project.

OPERATION OF THE WTW

The abstraction of water (total capacity 59,450m^3/d) at the Makhaleng River WTW intake is likely to result in a decrease flow volume and velocity for the downstream system. This will be more significant during periods of low flow. A decrease in flow is likely to result in a change in water resource availability, hydrological regime and flood peaks / frequencies availability, and quality of instream habitats resulting in secondary impacts to downstream communities (water users) and environmental water requirements (EWR).

(total capacity 59,450m3/d)Lower flows (especially during drier months) which do not meet the EWR may result in insufficient flow to sustain resident fish and macroinvertebrate communities, flush spawning beds of fine sediments, and maintain cues for breeding. Reduced fish migration could occur due to the absence of connectivity with lowered flow levels and no flow through the fish ramp.

PREVIOUS STUDIES

SMEC (2015) prepared the Water Resource Assessment Report for the lowland zones, which made use of a Water Evaluation Analysis Planning (WEAP) model for the integration of all water demand (e.g. agriculture, industrial, irrigation, and hydropower) and water resources for water balance accounting.

LWSIP II - Final Water Resource Assessment (SMEC, 2015) and the LWSIP II - Final Water Demand Assessment (SMEC, 2017) indicates that the identified sources and calculated yields would be able to meet the existing demands however there is a need to build storage for resilience on climate change and its impacts and cater for the season variability of the flows.

This finding is reiterated by Posch and Partners (2018) who undertook a water demand analysis as part of the investigation for the optimisation of the Makhaleng River Intake. The long-term trend analysis shows that there is a minimal reduction (approx. -1% per year) of the average annual flow. This is insignificant. However, available reports state, that the low flow amounts will significantly reduce due to impact of climate change. This needs to be taken into account when designing a balancing reservoir. In addition, the calculated EWR is in the range of 20% to 63% of the total river flow, which appears to be high. The EWR should be determined on a case-by-case basis depending on the actual ecological conditions on site.

Results for design horizon 2035 (Posch and Partners (2018):

- In 9 out of the 780 months (1 month in 7.2 years) the flow is below max future (2035) demand i.e. 0.515 m^3/s. This means there will be a deficit every 7 to 8 years. The shortage lasts only for 1 month. In case the ecological flow in the amounts indicated in the intake design report is abstracted from the river flow, then the situation becomes more serious. In 72 out of the 780 months i.e. 1 month in 11 months, the flow is below max future (2035) demand, which is 0.515 m^3/s. This means a shortfall happens statistically once per year. The duration of the shortfall is often more than one months and reaches even 5 months.
- Considering the large storage volumes required and the fact that the intake site is not suitable for combining the intake with a storage reservoir (dam), is it advised to build the intake based on the river run-off and to develop another project regarding the storage capacity required in future.

According to the Makhaleng Storage Dam Study (SMEC, May 2018), the addition of storage at Mid Makhaleng Dam increased the reliability under the climate change conditions from 65% to 97% (for 48 MCM storage). It must be noted that the climate change models that were used, define the near-future climate predictions as the period from 2046-2065. It is therefore expected that the effects of climate change may only impact on the scheme towards the end of its design life.

2019 PROBFLO ASSESSMENT

A PROBFLO assessment was undertaken with the aim to establish an evidence-based socio-ecological system model, to evaluate the probabilistic consequences of multiple flow and non-flow stressors in the Makhaleng River catchment and establish e-flows for the Makhaleng River (**Appendix B**). The direct surface water abstraction from the Makhaleng River with a total capacity of 59,450m^3/d was considered for this assessment.

Ecological endpoints include characteristics of the structure and function of the ecosystem that are identified to represent the vision of the project area and respond to changes related to proposed developments. As such, ecological endpoints usually include ecological responder components of ecosystems including species and or guilds of species, and or ecosystem processes that may respond to changes in the volume, timing, duration and frequency of flows in the case study. The ecological endpoints selected for this rapid assessment included:

- EE1: Maintain a viable population of instream and riparian vegetation
- EE2: Maintain instream habitats for indicator rheophilic fish species
- EE3: Maintain river connectivity and instream habitats for indicator migratory fish species

Modelling was based on two development plans:

- Scenario 1 flows, abstraction of 0.688 m^3/s (59,443 m^3/d), no e-flows,
- Scenario 2 flows, abstraction of 0.775 m^3/s (66,960 m^3/d), no e-flows.

Scenarios 1 and 2 resulted in similar overall trends. These results demonstrate that the risk to the endpoints selected in the study to represent the ecosystem of the project area at each risk site has increased slightly and that the e-flow Modelled Scenario will result in a continued deterioration of the overall wellbeing of the river but ensures sustainability and the structure and function of the ecosystem.

The average risk outcomes include risk projections to the Fish wellbeing endpoint comparable to the -flow scenario. Conversely, the risk posed to the invertebrate endpoint during SC1 and SC2 is proposed to be considerably less than that associated with the e-flow scenario. Interestingly these risk projections are comparable to the risk to the Invertebrate endpoint observed during the reference scenario. These results suggest that minimum flow requirements for invertebrates will be met during Scenario 1 and 2. Average risk projections to the Vegetation component endpoint of the ecosystem and the River wellbeing were similar to the the e-flow assessment. The possibility of high risk to each endpoint considered for Scenario 1 and 2 increased from 13% high risk of failure for fish communities for reference scenario, 32% for e-flows, 41% for Scenario 1 and 43% for Scenario 2. These outcomes include a 28% increase in the possibility of high risk for Scenario 1 from reference risk and an increase of 9% from the e-flows. Similar increases in risk were observed to the vegetation endpoint. These two endpoints are vulnerable to changes in high flow vs. low flow variability and freshet flows. While the invertebrate communities were proposed to depend more heavily on sustained base flows that were relatively better for Scenarios 1 and 2 compared to the e-flow scenario. As such in combination, the overall risk to the wellbeing of the river has been modelled to be less for Scenarios 1 and 2 compared to the e-flow scenario. We must caution that the increase in risk to the fish endpoint for Scenario 1 and 2 should be considered.

In summary, the system is currently in a D Category river condition. Based on the scenarios considered and the low confidence understanding of the ecosystem and how it interacts with flows, the e-flows relating to Category D can be achieved.

Aquatic biota require a range of depth and flow classes for survival, feeding and breeding with many species considered flow-dependent. Examples of flow-dependent biota would include yellowfish (*Labeobarbus aeneus*) and Stout crawler mayflies (*Trichorythidae*) as sampled within the project area. Seasonal differences in flow must be maintained through the responsible management of the weir and timing of water releases. Seasonal changes in flow volumes and velocities provide seasonal cues for spawning while flushing suitable instream habitat clear of sediment. Table 13 of the Flow Assessment (**Appendix B: EWR Study**) provides a summary of the annual e-flow requirements.

ABSTRACTION IMPACT ON DOWNSTREAM WATER USERS

The construction of the low-level weir and associated WTW will result in reduced flow volumes and water levels within the Makhaleng River. The Makhaleng River serves as a water source for local communities for livestock and crop watering. Large portions of the Makhaleng River banks have been converted to croplands (dryland irrigation) as presented in **Figure 51**. It is likely that local residents use the river for washing and bathing, while river water is likely used for cooking.

Figure 46 Local land use map, located downstream of proposed weir (Google Earth Imagery, 2019)

There is potential for the EWR to be of poor quality for livestock drinking and irrigation purposes. There is further potential for the EWR volumes to be insufficient for downstream irrigation, drinking, cooking and bathing. There is an increased likelihood of health impacts with reduced flow volumes due to a lack of dilution. The project should ensure that enough water is reserved (released) for both ecosystem function and use by downstream users.

TREATED WATER QUALITY

Surface water quality (i.e. WTW intake water) is highly dependent on the source. Similarly, treatment required to render water suitable for human consumption varies depending on the water source but typically includes the removal of suspended solids, removal of dissolved materials, and disinfection. Potential exists for bacteria, algae, suspended solids, and a variety of dissolved constituents (although low) to remain in treated water fed into transmission infrastructure from the WTW.

Water quality sampling results presented in Table 36 have been provided for baseline description of the river (and not to provide the information for treatment requirements at the WTW). The WTW design engineers will monitor the river and design treatment processes accordingly.

The sampling results however provide an indication of the current water quality status. Exceedance of a few parameters (aluminium, sodium, manganese, zinc, and electrical conductivity) predominantly in Zone 6 are noted. Treated water not in compliance with the Lesotho Water Requirements (once promulgated) or WHO (2008) *Guidelines for Drinking Water* (in the interim) has the potential to lead to downstream, health impacts to communities (water users) and sustained livelihoods. It is the hydrology specialist's professional opinion that the removal of metals will be easily achieved.

SUMMARY OF WTW IMPACTS ON AQUATICS AND WATER RESOURCES

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Change in the Makhaleng river hydraulics	The proposed location of the WTW will result in a partial loss of the seepage area considered to be seasonal / temporary providing some recognisable natural habitat features. The permanent wetland zone (central area) has been avoided by the proposed shift in WTW layout / footprint.	3	1	5	5	5	**Potential for offsets to compensate for the loss which may include the rehabilitation of wetlands within the project area.**	2	1	3	5	5
		N4 - High						**N3 - Moderate**				

Due to the permanent nature of the loss of an identified riparian area within the WTW footprint, this impact has been deemed to be of High significance. The loss of habitat can be offset by the rehabilitation of wetlands identified within the project area (number of wetland systems are traversed by the pipeline corridor, comprising channelled and unchanneled valley bottom systems). This will result in a negative residual impact of Moderate significance. The DWA is aware of this project aspect, and have confirmed with COW that this does aspect does not present a red flag to the project.

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Reduced water flow in the Makhaleng River downstream of the abstraction point	Abstraction from the WTW has the potential to result in lower flows (especially during drier months). River volume and velocity which does not meet the EWR may result in insufficient flow to sustain resident fish and macroinvertebrate communities, flush spawning beds of fine sediments, and maintain cues for breeding.	5	5	3	4	4	**Compliance with stipulated seasonal EWR releases as per PROBFLOW (Appendix B) recommendations**	3	5	3	4	2
		N4 - High						**N2 - Low**				
Reduced water flow in the Makhaleng River downstream of the abstraction point	Abstraction from the WTW has the potential to result in lower flows (especially during drier months). This may lead to insufficient flow to support livestock drinking, irrigation purposes, cooking and bathing. Reduced flow volumes can lead to increased likelihood of health impacts due to a lack of dilution.	5	5	3	4	4	**Sufficient water is to be released for both ecosystem function and use by downstream users. The proposed Makhaleng Dam is essential to project is reliant on the supplement flow.**	3	5	3	4	3
		N4 - High						**N3 - Moderate**				

Aspect (Additional)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Intake Water Treatment	Water released from the WTW is required to meet potable water standards. Non-compliance can lead to health impacts on water consumers.	2	3	1	4	2	**Regular water intake monitoring to inform WTW treatment requirements and ensure compliance with potable / drinking water standards.**	2	3	1	4	1
		N2 - Low						**N1 - Very Low**				

The abstraction of water at the WTW intake for the supply of water to the bulk water system will result in lower river flow volume and velocity. This has the potential to affect aquatic ecosystems and functioning. This negative downstream impact is deemed as High significance should the stipulated EWR flows not be released. Modelling has shown that with the release of EWRs, ecosystem integrity can be maintained – resulting in a residual impact of Low significance.

Reduced flow also has the potential to result in negative downstream impacts to water users. The significance attached to this is less confident as social endpoints were not included in the modelling; hence proposed mitigation may likely only result in a residual impact of Moderate significance.

It is noted that the reduction in probability for these impacts to occur for both aspects are heavily dependent on the proposed Makhaleng Dam for the provision of balancing storage and assurance of supply to acceptable levels.

Water released from the WTW not in compliance with the Lesotho Water Requirements (once promulgated) or WHO (2008) Guidelines for Drinking Water (in the interim) has the potential to lead to downstream health impacts to communities (water users) and sustained livelihoods. This is deemed a negative impact of Low significance as the design of the WTW will allow for suitable treatment resulting in this impact being

improbable. Ongoing monitoring will ensure the probability is maintained or reduced to result in a residual impact of Very Low significance.

7.4 SOCIO-ECONOMIC ASPECTS AND IMPACTS

7.4.1 EMPLOYMENT CREATION

CONSTRUCTION

It is anticipated that at the peak of construction a maximum of 400 construction workers will be on site. Construction activities will be undertaken by local contractors, as far as possible. The project will therefore contribute to continued employment of existing contracting staff and local economic development. It is likely that the project will result in the creation of new temporary employment opportunities. This will result in increased income generation in marginalised communities on condition that local labour is sourced. This will result in secondary benefits of local upskilling, which will benefit communities to take advantage of future construction activities in the project area. Construction activities must seek methods that require a large workforce (e.g. manual excavation vs. mechanical excavation) where feasible.

The data from Zones 6 and 7 communities revealed that most of the community members have worked in construction related jobs before, although they were mainly employed as labourers due to lack of skills. Only a few of them (17%) reported to have the following skills: bricklaying, electricians, quality assurer and water engineers, however, less than 10% had acquired training in the said areas. About 7% had worked in water construction projects at some point and primarily as plumbers.

OPERATION

The operation phase also presents opportunities for job creation and local income generation, as there will be a need for people to operate and maintain the bulk water supply infrastructure. Personnel must be sourced from the local communities for unskilled, semi-skilled and skilled labour in the communities. Indirect benefits relate to improved water supply infrastructure to support economic activities such as agriculture; and in some area-industrial activity (existing and planned). This benefit will only be realised in full once the distribution network is installed by WASCO (not included in scope of this assessment). However, it is noted that the distribution network is reliant on the bulk water supply infrastructure. **Table 54** details the likely permanent job creation as provided by WASCO (*per comms, 2019*).

Table 54 Typical Number of Employee of Jobs Permanent during Operation

POSITION	NUMBER	REMARKS
Manager Electro mechanic Maintenance	1	
Manager Laboratory	1	
Manager Water Production	1	
Supervisor Water Production	4	One per shift
Laboratory Technician	4	One per shift
Maintenance Planner	1	
Electrician	2	
Mechanic	2	
Instrumentation Technician	1	
Plant Operator	16	Four per shift
Pump Attendant	8	Two per shift
Total	**41**	

SUMMARY OF EMPLOYMENT CREATION IMPACTS

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Employment associated with construction and operational phases	Temporary employment (~300-400 jobs) will result in increased income generation in marginalised communities and improved livelihoods. Potential exists for secondary benefits of local upskilling for locals to take advantage of future construction activities within and surrounding the project area.	2	2	3	2	3	**1) Measures to enhance local recruitment from affected settlements within project area. 2) Appointment of a suitably qualified and experienced Community Relations Officer (CRO). 3) Local publication and announcements on job and training opportunities.**	3	2	3	2	4
		P2 - Low						**P3 - Moderate**				

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Employment associated with construction and operational phases	Permanent employment opportunities for skilled and semi-skilled labour to operate and maintain bulk water infrastructure will result in increased income generation in marginalised communities and improved livelihoods. It is estimated that a minimum of 40 jobs will be created for operation of the WTW alone.	2	2	1	4	3	**1) Measures to enhance local recruitment from affected settlements within project area. 2) Appointment of a suitably qualified and experienced Community Relations Officer (CRO). 3) Local publication and announcements on job and training opportunities.**	2	2	1	4	4
		P2 - Low						**P3 - Moderate**				

The generation of jobs and upskilling opportunities for local communities is deemed a positive impact of Low significance for both the construction and operational phase. These benefits can be enhanced through the implementation of measures to ensure local employment, resulting in an impact of Moderate significance.

7.4.2 INTRODUCTION AND MOVEMENT OF WORKERS INTO/OUT OF LOCAL COMMUNITIES

CONSTRUCTION

Construction personnel housed within accommodation at the site camp within the project area and an influx of job seekers is likely to bring about change in demographics of the project. A change in demographics may also lead to secondary negative impacts including:

- Increased HIV/AIDS and sexually transmitted diseases (STDs) infection rate as people will be away from their families and may form sexual relationships with locals.
- Increase in communicable diseases such as Tuberculosis.
- Increased crime rates in particular by job seekers who struggle to get employment.
- Increase in Trafficking in Persons (TIP) as traffickers target unsuccessful job seekers.

The socio-economic study however has revealed a high number of HIV/AIDS awareness in the project area with 96% of the respondents being aware of the disease and its causes as well as prevention strategies. They attributed this high rate of awareness to regular community gatherings that are held in the project area by the health officials, local nurse clinicians, IEC materials and radios. Some voluntarily test every 3 months while others test at least twice per year. Nonetheless, in both Zones, males in particular those who are 15-18 years, 19-34 years and herd boys included, seemed a little reluctant to be tested. They test either after a long time or when they fall sick and require medical attention at the clinics.

An increase in population in Zones 6 and 7 due to employment opportunities and in-migration during construction is likely to place additional pressure on existing infrastructure and services (e.g. healthcare). This often results in a reduction in capacity of existing infrastructure and services to meet the needs of the local residents (as well as the additional population added by the Project); leading to diminished quality of services as well as reduced access to the existing infrastructure. There are only two hospitals in the project area, one in Mafeteng in Zone 6 and the other one in Mohale's Hoek in Zone 7 (with a few smaller health care facilities such

as clinics, mobile clinics and New Start/ PSI tents). During construction, however the workforce will be accommodated at camps and it is assumed that sub-contractors will provide a range of on-site amenities inside the camps. This will, to some extent minimise the need for the workforce to use (or rely on) local infrastructure, i.e. minimising the pressure that may be experienced by community infrastructure and services.

SUMMARY OF IMPACTS DUE TO INCREASE IN MOVEMENT OF WORKERS

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E +	R +	D)x	P=		(M+	E +	R +	D)x	P=
Introduction and movement of workers into/out of local communities	A change in demographics may lead to secondary negative impacts including HIV/AIDS and STD infection rates. This contributes to increased health and safety issues within local communities.	3	3	5	5	3	**1) Employ locals as far as reasonably possible. 2) Liaise with relevant service providers in relation to HIV/AIDS awareness raising campaigns. 3) Provision of condoms for workers.**	3	3	5	5	2
		N3 - Moderate						**N3 - Moderate**				
Introduction and movement of workers into/out of local communities	A change in demographics may lead to negative impacts including increased crime rates in particular by job seekers who struggle to confirm employment. Potential also exists for an increase in Trafficking in Persons (TIP) as traffickers target unsuccessful job seekers. Both impacts contribute to increased health and safety issues within local communities.	3	3	5	5	3	**1) Employ locals as far as reasonably possible. 2) TIP awareness raising campaigns.**	3	3	5	5	2
		N3 - Moderate						**N3 - Moderate**				

The temporary change in demographics during the construction phase can lead to two negative impacts related to health and safety of local communities. Although the socio-economic survey findings confirm that support facilities for proposed mitigation, activities (awareness measures etc.) exist within the project area, the significance of the residual impact remains. Although the probability of the impact reduces, the magnitude and permanent nature of the impact pose a challenge to reduce significance within vulnerable communities.

7.4.3 DISTURBANCE AND LOSS OF SOCIAL AND ECONOMIC ACTIVITIES

CONSTRUCTION

TEMPORARY LOSS OF LIVELIHOODS

A temporary loss of land use during construction activities (particularly associated with excavation, trenching and installation of pipelines along road reserve, which accommodates a large number of roadside informal business and kiosks) will lead to decreased livelihoods for land users:

- Fourteen arable fields (eleven of which are located at WTW) used for subsistence; and
- Four businesses plots (two of which will only be partially affected).

Where fields are traversed and where fields are fallow, pipes must be laid and back filled before ploughing begins, the farmer will be able to replant over the pipeline. If the field is planted, compensation for one cropping season for the area damaged should be paid to the owner/user.

For communal land the contractors should reseed the areas disrupted with appropriate grasses and replant in another area some rare natural and medicinal plants important and being used by the residents.

OPERATION

PERMANENT LOSS OF LIVELIHOODS, DISPLACEMENT AND RESETTLEMENT

Physical displacement will have a long-term negative impact on the livelihoods of the local farmers due to inability to continue with their agricultural activities. Although PAPs will be compensated for the lost crops (and residential and business buildings), limited harvests may be lost while looking for an alternative plot which is not guaranteed to be of the same quality and size. RAP results indicate that this will affect:

- Eleven arable fields (Maphohloane WTW) used for subsistence farming; and

— Two informal business – one of which is a seasonal informal business selling green harvests).

Placement of bulk water infrastructure within / across homesteads that directly affect structures rendering the site unsuitable for occupation resulting in displacement and the need for resettlement. Inadequate resettlement and livelihood restoration planning and implementation could have a long-term impact on PAP's livelihoods and support structures. The identification of alternatives to avoid the need for resettlement has reduced he potential magnitude of the impact resulting in only one household to be resettled across both Zone 6 and 7.

Challenges also exist for the introduction of resettled PAPs in host communities due to a difference in community structure and loss of support networks. Inadequate resettlement and livelihood restoration planning and implementation could have a long-term impact on PAP's livelihood and food security.

Disturbances to livelihoods may occur in the case of upset conditions (interruption of power supply, water hammer) of pumps and associated plant, pipelines and equipment. Burst pipes and reservoir leakages may result in damage (flooding) to households and crops in close proximity to failed water transmission infrastructure. Pipeline and associated infrastructure failure due to these pressures will result in secondary impacts to intended domestic and commercial beneficiaries due temporary loss of supply.

SUMMARY OF IMPACTS ECONOMIC AND SOCIAL ACTIVITIES

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Disturbance/loss/destruction of social and economic activities (e.g. crop fields, kiosks etc)	Excavation, trenching and installation of pipelines along road reserve will lead to temporary loss of land use and livelihood opportunities (fourteen arable fields and four businesses plots). Inadequate resettlement and livelihood restoration planning and implementation could have a long-term impact on PAP's livelihood and food security.	4	2	3	2	5	**1) Design and implement alternative routes identified. 2) Compensation and Livelihood Restoration where there is unavoidable loss of land. 3) Provision of alternative areas to trade.**	3	2	2	2	2
		N3 - Moderate						**N2 - Low**				

Temporary loss of land use due to construction activities has the potential to lead to Moderate negative impacts on livelihoods, however COW has accepted the proposed alternative pipeline routes and reservoir locations which results in an impact of Low significance. This reduction in impact significance can be confidently maintained by the implementation of Livelihood Restoration Plan, and provision of temporary alternative trading locations.

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Disturbance/loss/destruction of social and economic activities (e.g. crop fields, kiosks etc.)	Placement of bulk water infrastructure will lead to permanent loss of land use and livelihood opportunities (eleven arable fields and two informal business). Inadequate resettlement and livelihood restoration planning and implementation could have a long-term impact on PAP's livelihood and food security.	4	2	3	5	5	**1) Design and implement alternative routes identified 2) Compensation and Livelihood Restoration where there is unavoidable loss of land.**	3	2	3	5	2
		N4 - High						**N2 - Low**				
Disturbance/loss of households/residential land use (due to resettlement activities)	Placement of bulk water infrastructure within / across homesteads that directly affect structures rendering the site unsuitable for occupation resulting in displacement and the need for resettlement. Inadequate resettlement and livelihood restoration planning and implementation could have a long-term impact on PAP's livelihoods and support structures. The identification of alternatives to avoid the need for resettlement has reduced he potential magnitude of the impact resulting in only one household to be resettled across both Zone 6 and 7.	4	2	3	5	5	**1) Design and implement alternatives identified 1) Implementation of the RAP endorsed by local authorities.**	3	1	3	5	2
		N4 - High						**N2 - Low**				

Permanent loss of land use due to placement of bulk water infrastructure has the potential to result in negative impacts of High significance associated with the loss of livelihoods / food security and involuntary displacement and resettlement. The identification of alternatives (which aimed to avoid displacement of communities) and the implementation of the Livelihoods Restoration Plan and RAP results in residual impacts of Low significance.

7.4.4 DISTURBANCE AND LOSS OF LAND BASED NATURAL AND MAN-MADE FEATURES (CULTURAL RESOURCES)

CONSTRUCTION

IDENTIFIED CULTURAL RESOURCES

Construction activities may lead to disturbance or destruction of cultural resources (archaeological and historical remains and scared sites e.g. graves) should the development footprint encroach on identified sites within the project area (**Appendix J**):

- Two paleontological sites, two stone-age sites and one composite historical site discovered in the project area.
- Graveyards in close proximity to the roads (majority of the pipeline will be placed within the road reserve) in various villages including Ha Monyake, Mohale's Hoek CBD Reservoir, Ha Mofoka and Ha Mothokho.

Alternative routes have been selected as the preferred routes for the assessment of impact significance assessment in order to avoid loss of cultural resources at:

- Ha Mofoka Pipeline to be routed along the opposite side of the road (i.e. along the left side of Thabana Morena Road) to avoid Ha Mofoka Cemetery.
- The final 200m of pipeline to Ha Potsane Reservoir in Qalakheng to be rerouted higher and to the south of the current location to avoid disturbance to cultural resource composite site (Ancient Village Remains).

Management measures will be critical to ensure that development footprint associated with construction work in close proximity to other identified sites does not encroach on other identified cultural resource sites.

INFLUX OF JOB SEEKERS

Influx of job seekers may lead to the development of informal settlers (particularly those not formally appointed and accommodated) utilising the stone-age rock shelters identified in the project area leading to potential deterioration of these sites and loss of heritage value.

Use of heavy machinery (cranes, vehicles, excavators etc.) and construction personnel may lead to encroachment of heritage sites and potential damage resulting in the loss of heritage value if these sacred areas are not marked and cordoned off with controlled access.

CHANCE FIND OF CULTURAL RESOURCES

Earthworks may accidentally expose unidentified subsurface fossil remains. This will result a lost opportunity to preserve local cultural heritage and historical records should appropriate management measures not be in place (e.g. Chance Find Procedure).

This has highly positive effects of information and material remains to incorporate in the national database, to resource the museum collections and as information for further research, education and development.

SUMMARY OF IMPACTS TO CULTURAL RESOURCES

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Disturbance/loss of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Accidental exposure of unidentified subsurface fossil remains will result in a lost opportunity to preserve local cultural heritage and historical records.	2	3	5	5	3	1) Chance Find Procedure	1	3	5	5	2
		N3 - Moderate						N2 - Low				
Disturbance/loss/destruction of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Earthworks and deposition of materials along and within and surrounding the development footprint has the potential to destroy the identified cultural resources (heritage artefact, palaeontological sites and graves) resulting in the loss of national heritage value.	2	3	5	5	3	1) Alternative siting of the pipeline and reservoir where they interfere with identified cultural resources. 2) Measures to ensure that development footprint does not encroach on other identified cultural resource sites (cordoned off with controlled access).	1	3	5	5	1
		N3 - Moderate						N1 - Very Low				
Introduction and movement of workers into/out of local communities	Job seekers not formally appointed and accommodated may potentially lead to squatters utilising the stone-age rock shelters identified in the project area leading to potential deterioration of these sites and loss of national heritage value.	2	3	5	5	3	1) Recruitment within local area conducted away from the construction site to discourage squatters from utilising the rock shelters. 2) Liaison with Heritage Authority for protection of stone age rock shelters.	1	3	5	5	1
		N3 - Moderate						N1 - Very Low				
Disturbance/loss of land based natural and man-made features (e.g. sacred sites, sensitive habitats)	Incorporation of identified cultural resources / heritage artefacts in the national database (resource museum collections and information for further research and education.	2	4	3	5	2	None required	2	4	3	5	2
		P2 - Low						P2 - Low				
Introduction and movement of workers into/out of local communities	A change in demographics may further affect the cultural norms of the project area, particularly related to the dilution and degradation of oral history practises.	2	2	3	5	3	Locals should be employed as far as reasonably possible to avoid influx of workers into the local communities, which will affect the cultural norms.	1	2	3	5	2
		N3 - Moderate						N2 - Low				

The potential disturbance and destruction of cultural resources from all three activities identified above have the potential to result in a negative impact of Medium significance. The Consultant has engaged with COW to ensure that none of the pipeline route and location of reservoirs fall directly within the footprint of identified resources. The acceptance of these alternatives by COW and strict adherence to the Chance Find Procedure will result in impacts of Low and Very Low Significance.

A potential positive impact of Low significance exists should artefacts be discovered, correctly handled and incorporated into the national database. The potential negative impact of Medium significance associated with the influx of workers and change in cultural norms can be reduced to an impact of Low significance as magnitude and probability decreases with the employment of workers from local communities. The socio-economic survey findings confirm that support facilities for these mitigation activities exist within the project area.

7.4.5 DEMAND ON LOCAL UTILITIES – ENERGY

CONSTRUCTION

Additional power requirements for construction purposes and services or facilities in the various housing, camp and work areas is likely to place additional pressure on existing electricity supply. This may result in a reduction in capacity and quality of existing infrastructure and services to meet the needs of the local residents as well as the additional project related personnel.

OPERATION

Increased demand on electricity will be experienced during the operational phase to accommodate:

- Electrical installations necessary for operation of water supply infrastructure (raw water intake, water treatment works, pumping stations and service reservoirs).
- Influx of people to beneficiary settlements due improved water supply.

Existing capacity does not exist. Installation of the power supply to the bulk infrastructure will be carried out under a separate contract technically supervised by LEC. LEC will determine the best source of power supply to feed each of the infrastructure locations. Main power supply will be fed from existing LEC 11kV system or from the existing low voltage network and reticulated through the building at low 400V. Lesotho Electricity Company will distribute power to specific locations across the scheme.

SUMMARY OF IMPACTS ON ELECTRICITY SUPPLY

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Demand on local utilities – electricity	Additional power requirements to support construction activities including contractor accommodation) will result in additional pressure on existing electricity supply. This may result in a reduction in capacity and quality of existing infrastructure and services to meet the needs of the local residents as well as the additional project related personnel.	4	2	3	2	3	**1) Locals should be employed as far as reasonably possible to avoid temporary immigrants into the project area and minimise additional energy demands. 2) Use of generators on site as far as reasonably possible.**	2	2	3	2	1
		N3 - Moderate						**N1 - Very Low**				

Increased electricity demand during construction and increased risk of supply to local communities can be reduced from a negative impact of Moderate significance to a residual impact of Very Low significance should the workforce be sourced from the local communities and generators to be used at contractor camps and working areas.

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Demand on local utilities – electricity	Operational facilities (raw water intake, water treatment works, pumping stations and service reservoirs) and possible influx of people to beneficiary settlements due to improved water supply will result in additional power requirements. This may result in a reduction in capacity and quality of existing infrastructure and services to meet the needs of the local residents.	4	2	3	4	4	**1) LEC to implement additional power requirements as identified by SMEC 2018**	2	2	3	4	1
		N3 - Moderate						**N1 - Very Low**				

Increased electricity demand during operation to support the proposed bulk water supply system (WTW, pump stations etc.) can be reduced from a negative impact of Moderate significance to a residual impact of Very Low significance on condition that LEC install the required power supply. COW and LEC are in discussion to establish a Memorandum of Understanding to provide necessary support infrastructure.

7.4.6 DEMAND ON LOCAL UTILITIES - POTABLE WATER

CONSTRUCTION

According to the specifications required by the Contractor, the Contractor shall design, supply, install, operate, and maintain an adequate water supply system to supply potable water to the Contractor's labour accommodation and facilities, to the Engineer's offices and to his construction facilities. This will result in increased demand on potable water leading to potential disruption of supply to local communities (already experiencing limited water supply in the area).

Local reduction of groundwater availability places pressure on communities (water users) within the project area. COW has appointed specialists to undertake a Groundwater Supply Assessment to provide an improved understanding of the potential impacts to groundwater.

OPERATION

This project will indirectly lead to improved general community health, as bulk water supply is required to support the distribution of water in Zone 6 and Zone 7. Benefits include: clean and safe drinking water, improved hygiene and which will significantly reduce the rate of waterborne diseases in the project area.

Majority of the of residents indicated an overwhelming support for the water supply project due to the associated improved quality of life (improved agricultural production, hygiene and health).

SUMMARY OF IMPACTS ON POTABLE WATER SUPPLY

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Demand on local utilities – potable water	Increased demand on potable water leading to potential disruption of supply to local communities (already experiencing limited water supply in the area).	4	2	3	2	2	Training on sustainable use of water resources. Contractors to tanker in water should local supply be restrained.	2	2	3	2	1
		N2 - Low						N1 - Very Low				

The temporary increased demand on potable water during construction has potential to result in a negative impact of Low significance. It is improbable that a workforce of 300-400 people (mostly sourced from local areas will). The magnitude and probability of this impact can be further reduced to result in an impact of Very Low significance with implementation of sustainable water use training and a contingency plan to tanker in water during time of low supply.

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Demand on local utilities – potable water	Project will indirectly lead to improved general community health, as bulk water supply is required to support the distribution of water in Zone 6 and Zone 7. Benefits include: clean and safe drinking water, improved hygiene and which will significantly reduce the rate of waterborne diseases in the project area.	3	3	3	5	2	Implementation of proposed project	4	3	3	5	3
		P2 - Low						P3 - Moderate				

Distribution of potable water to communities within Zone 6 and 7 has the potential to result in improved quality of life and community health. The current project is for the supply of bulk water infrastructure to support the rollout of distribution networks by WASCO, resulting in a positive impact of Moderate significance.

7.4.7 INCREASE IN DEMAND FOR LOCAL BUSINESSES (FOOD AND BEVERAGE, CONSTRUCTION MATERIALS, GENERAL CONSUMER GOODS)

CONSTRUCTION

The Zones 6 and 7 project areas will require goods and services throughout construction phase of the project. There will therefore be opportunities for local businesses to provide these goods and services e.g. catering/food and beverages for the workers' camp, construction material, office-related supply opportunities and services such as cleaning, general consumer goods etc. As a result, existing local businesses may expand or new businesses may be established locally to meet these demands – providing indirect employment opportunities and short-term growth in the regional economy. The contractor should be encouraged to buy goods locally as far as reasonably possible in order to increase demand for local businesses to ensure this economic growth of the project area.

OPERATION

A potential influx of people to beneficiary settlements may occur due to improved water supply. This will lead to increased long-term demand on goods and services provided by locals businesses and increased potential for new business start-ups, which may result in additional direct employment opportunities for local communities.

SUMMARY OF IMPACTS ON INCREASED DEMAND FOR LOCAL BUSINESS

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Increase in demand for local businesses (food and beverage, construction materials, general consumer goods)	Potential growth of local businesses and improved income generation at the household level. Growth in the regional economy (particularly for the supply of construction material and equipment) will occur as a secondary impact.	2	2	3	2	3	**1. Goods should be purchased locally as far as reasonably possible.**	3	2	3	2	4
		P2 - Low						**P3 - Moderate**				

Opportunities for growth of local business supplying goods and materials during the construction phase is a positive impact of Low significance. This benefit can be enhanced by ensuring contractors do locally source these goods and material as far as reasonably possible, to result in a positive impact of Moderate significance.

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Increase in demand for local businesses (food and beverage, construction materials, general consumer goods)	Increased long-term demand on goods and services provided by locals businesses and increased potential for new business start-ups, which may result in additional direct employment opportunities for local communities.	2	2	3	4	2	**1. Goods should be purchased locally as far as reasonably possible.**	4	3	3	4	3
		P2 - Low						**P3 - Moderate**				

Long terms requirements for goods and material to support the operation of the bulk water system has the potential to result in a positive impact of Low Significance. This benefit can be enhanced by ensuring operational entities do locally source these goods and material as far as reasonably possible, to result in a positive impact of Moderate significance.

7.4.8 HAZARDS AND COMMUNITY SAFETY RISKS

CONSTRUCTION

CONSTRUCTION ACTIVITIES IN CLOSE PROXIMITY TO LAND USERS

A number of hazards threaten the public safety and security during the construction phase, the below are discussed in more detail in following sections:

- Section 7.1.1 (Air Emission): Short-term dust is primarily a nuisance factor to nearby receptors (e.g. onsite workers, roadside kiosks and residents where the pipeline is routed within a road reserve) but may cause acute health issues (e.g. eye irritation, breathing problems) if acceptable standards are exceeded.
- Section 7.1.4 (Accidental Release of Contaminants): Improper chemical storage and handling may expose the communities to hazardous chemicals, which may affect their health.

A key local impact is the threat of People and livestock falling into open trenches leading to injuries and in some cases, fatality. Excavations will result in open trenches of varying depths (up to 3.5m deep, up to 2m width and up to 500m long). These will pose a threat to humans, vehicles and animals if not well managed - given the relatively high level of current road use by local members, including school children, vehicles and livestock, leaving water pipes open trenches for longer periods will significantly cause a risk to the safety of the community members.

OPERATION

ELECTROMAGNETIC FIELDS – HEALTH AND SAFETY CONSIDERATIONS

Electric and magnetic fields (EMF) are invisible lines of force emitted by and surrounding any electrical device, such as power lines and electrical equipment (including communication towers). Electric fields are produced by voltage and increase in strength as the voltage increases. Magnetic fields result from the flow of electric current and increase in strength as the current increases. The radio waves emitted by transmitting antennas such as the proposed communications mast is a form of electromagnetic energy. Radio wave strength is generally much greater from radio and television broadcast stations than from cellular phone communication base transceiver stations (i.e. communication towers).

Although there is public and scientific concern over the potential health effects associated with exposure to EMF (not only high-voltage power lines and substations or radio frequency transmissions systems, but also from everyday household uses of electricity), there is no empirical data demonstrating adverse health effects from exposure to typical EMF levels from power transmissions lines and equipment. [44] However, while the evidence of adverse health risks is weak, it is still sufficient to warrant limited concern.[45]

Electrical systems for reservoirs and pumping stations will include water communication towers. Proposed communication towers at reservoir locations have the potential to present a health risk to surrounding communities and maintenance staff during operations (i.e. exposure limits being exceeded).

It is recommended that the precautionary approach must be adopted. To this end, steps must be taken to ensure the management of EMF exposures. EMF measurements pre-and post-installation of the mast are required to ensure that exposure limits for exposure limits for general public exposure to electric and magnetic fields published in the World Bank (2007) EHS *Guidelines for Telecommunications* sub-reference: International Commission on Non-Ionizing Radiation Protection (ICNIRP).

SUMMARY OF IMPACTS RELATING TO HAZARDS AND COMMUNITY SAFETY RISKS

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Presence of hazards in construction areas and community areas (excavations, chemical storage, machinery etc.)	Community health and safety is placed at risk by the following: Dust fallout in close proximity to roadside kiosks, Improper chemical storage and handling may expose the communities to hazardous chemicals; People and livestock falling into open trenches	4	2	3	2	4	**1. Restrict access to the construction sites. 2. Dust control measures 3. Trenches should be barricaded. 4. Spill Contingency Plan 5. Appointment of a Community Liaison Officer.**	4	2	3	2	2
		N3 - Moderate						**N2 - Low**				

Construction activities in close proximity to communities has the potential to result in an increase of hazards and risks (chemical handling, trenches etc). These impacts can be reduced from a negative impact of Medium to Low significance with strict adherence to mitigation measures contained within the ESMP (spill contingency plans, controlled access and appointment of a CLO).

[44] International Commission on Non-Ionizing Radiation Protection(ICNIRP) (2001); International Agency for Research on Cancer (2002); US National Institute of Health (2002); Advisory Group to the United Kingdom National Radiation Protection Board (2001), and US National Institute of Environmental Health Sciences (1999)
[45] US National Institute of Environmental Health Sciences (2002)

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Presence of hazards in construction areas and community areas (excavations, chemical storage, machinery etc.)	Electric and magnetic fields (EMF) emitted by electrical equipment (communication towers) can lead to potential adverse health risks to surrounding receptors.	4	2	3	4	2	**1) Do not place communication towers in close proximity to sensitive receptors (creches, schools etc). 2) BPEO Buffer to be established and implemented.**	4	2	3	4	1
		N2 - Low						**N1 - Very Low**				

Electric and magnetic fields emitted by communication towers proposed for the bulk water supply system is improbable however can have adverse effects to surrounding communities. Proposed buffers however can reduce this negative impact of Low significance to Very Low significance due to reduced probability.

7.4.9 TRAFFIC AND ACCESS

CONSTRUCTION

INCREASED MOVEMENT OF TRAFFIC

The project will result in an increase of vehicles on the bad roads in the project area to transport workers, goods, materials and machinery to and from the project site during construction. The increase in vehicles, particularly heavy haulage vehicles, increases the potential for accidents and injuries to occur to pedestrians and other motorists and in some cases, fatality. With the exception of roads to the major centres, roads in the areas to villages are unsealed, being in poor condition and particularly inaccessible over the rainy season.

Apart from a taxi service on the main roads, there is little to no public transport offered on the road network in and around the villages, and people mostly walk, ride donkeys and horses, or rely on renting cars. Only 4.89% of households that participated in the Socio-Economic Survey conducted by SMEC over 2017-2018 indicated that they own a motor vehicle. According to the Work Specifications document (2017), for any person recruited locally but whose place of residence is more than thirty minutes walking distance from his place of work or from the nearest point to which the Contractor is prepared to run daily transport, the Contractor shall provide free on-site living accommodation. For Lesotho employees recruited elsewhere in Lesotho, the Contractor shall provide either an end of the month transport allowance or round-trip transportation free of charge to selected major towns in Lesotho during the payday weekend.

Mitigatory measures include the planned delivery of materials (including abnormal loads) and workers outside peak times of the relevant communities. Adequate traffic signage should and traffic controllers employed from community and provided with training. Existing rights of way, pony tracks, or roads running through the project area are to be kept open as far as possible. Access routes may need to be temporarily diverted or closed for short periods when construction activities pose a potential safety risk.

RESTRAINED ACCESS

During the construction of the pipeline, access to community facilities, services and business activities will be constrained. This will be particularly relevant for sections of the pipeline that are located within / adjacent to the road reserve as well as accessing some reservoirs locations. This will pose a nuisance or inconvenience to community members, and alternative temporary access may need to be provided. In some cases, businesses (kiosks etc.) may need to be temporary relocated for the duration of the construction of that section of line, and then reinstated once construction is complete.

Mitigatory factors contained in the Work Specifications document (2017) states that the contractor may, with the approval of the Engineer, arrange with the occupiers of the affected erven and properties to temporarily close off portion of a street, road, footpath or entrance on condition that they are provided due notice. These routes are to be reopened as punctually as possible within the prescribed time. Where possible the route shall be made safe and re-opened to traffic overnight. Any such closure shall be an arrangement between the Contractor and the occupiers and shall not absolve the Contractor from his obligation under the Contract to provide access

at all times. Barricades, traffic signs, and drums shall be provided by the Contractor to suit the specific conditions.

IMPORT OF MATERIALS AND MACHINERY LEADING TO CONGESTION

Congestion at the border gate for the import of specific machinery and material has the potential to result in delays for travellers. Presumably, much of the imported materials will be transported from Johannesburg via the Van Rooyen's border. This will lead to infrequent, short-term congestion at the border post resulting in a nuisance factor to travellers and locals commuting for work.

CONSTRUCTION ACTIVITIES IN CLOSE PROXIMITY TO LAND USERS

A key local impact is the threat of People and livestock falling into open trenches leading to injuries and in some cases, fatality. Excavations will result in open trenches of varying depths (up to 3.5m deep, up to 2m width and up to 500m long). These will pose a threat to humans, vehicles and animals if not well managed. Given the relatively high level of current road use by local members, including school children, vehicles and livestock, leaving trenches open for long periods will cause a risk to the safety of the community members.

SUMMARY OF TRAFFIC AND ACCESS IMPACTS

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Increased vehicular activities along roadways and in public areas	The increase in vehicles, particularly heavy haulage vehicles, increases the potential for accidents and injuries to occur to pedestrians and other motorists and in some cases, fatality.	3	2	1	2	3	**1) Planned delivery of materials (including abnormal loads). 2) Adequate traffic signage and traffic controllers. 3) Temporary diversion of access routes to avoid high-risk areas.**	3	2	1	2	2
		N2 - Low						**N2 - Low**				
Restrained Access	Nuisance or inconvenience to community members and business owners during temporary closure of access routes.	3	2	1	2	3	**1) Appointment of a CLO. 2) Landowner / land user notification. 3) Temporary relocation of kiosks followed by reinstatement. 4) Where possible the route shall be made safe and re-opened to traffic overnight.**	2	2	1	2	2
		N2 - Low						**N1 - Very Low**				
Import of Materials and Machinery	Congestion at the border gate for the import of specific machinery and material has the potential to result in delays for travellers.	3	3	1	2	3	**Not possible**	3	3	1	2	3
		N2 - Low						**N2 - Low**				
Community Hazards	Given the relatively high level of current road use by local members, including school children, vehicles and livestock, leaving trenches open for long periods will cause a risk to the safety of the community members.	3	2	3	2	3	**1) Trench / excavations backfilled within 7 days. 2) Restricted access to active working areas 3) Fencing.**	3	2	3	2	2
		N2 - Low						**N2 - Low**				

Temporary safety risks associated with increased traffic and open trenches result in potential negative impacts of Low significance. Although the probability of these risks can be reduced with implementation of proposed mitigation measures contained in the ESMP, the impact remains Low significance. Congestion at the border resulting from import of specialised machinery and material cannot be mitigated. It remains an impact of Low significance. Nuisance and inconvenience to community members during times of restricted access can be mitigated from an impact of Low to Very low significance with the appointment of a CLO, temporary rerouting and relocation and immediate reinstatement by the contractor.

7.4.10 VISUAL

CONSTRUCTION

The movement of construction vehicles and machinery on untarred roads results in dust, which has the potential to lead temporary reduced visibility within close proximity to the construction areas.

Loss of vegetation during land clearing increases the visibility of contrasting soils, resulting in changes to the colour and texture of the site. Clearing vegetation will also result in increased windblown dust, reducing visibility of both day and night skies.

OPERATION

The development footprint is routed through uninhabited wide-open spaces however a large portion of the project area displays characteristics typical of the lowlands zone where landscape, which is, flatter and has a greater extent of settlements, cultivated areas and other economic activities than the highlands. It is characterised by the undulating topography with rugged koppies and hills, low vegetation and clear skylines (**Figures 47 – 49**).

A change in landscape and character can occur with the introduction of vertical structures. Proposed infrastructure that have the potential to result in a visual intrusion within the natural landscape include tall reservoirs, communication towers, electricity transmission lines, conductors and substations. The introduction of hard steel and concrete structures has the potential to result in a negative aesthetic effect especially in the more remote areas, as it will contrast with the agricultural landscape. It is noted that steel reservoirs planned for Zone 6 and Zone 7 are ground level and not elevated (**Figure 50-51**).

Powerlines however are already present throughout the project area especially in the peri-urban areas and more densely populated towns. Most rural homesteads are situated at a low elevation in the valleys, often surrounded by trees, which will reduce visibility of the proposed vertical structures. The presence of undulating topography will contribute to fewer breaks the skyline thus making vertical structures less visually intrusive (if located correctly).

People's perceptions and experiences of landscapes vary. Memory and association are also important. As such, value is difficult to quantify in absolute terms.

Figure 47 Mesitsaneng Settlement, Zone 7

Figure 48 Ha Lumisi in Zone 6

Figure 49 View of Ramohapi village from the proposed reservoir site

Figure 50 Facility Illustration of Ground Level Steel Tanks Reservoir

(Source: Braithwaite, www.braithwaite.co.uk; 2018)

Figure 51 Facility Illustration of Typical Communication Towers in Africa

(Source: Tower Xchange; www.towerxchange.com; 2018)

SUMMARY OF VISUAL IMPACTS

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Visual Intrusion	Dust emissions results in reduced visibility for nearby receptors and denuded areas result in changes to colours and textures of local areas.	2	2	1	1	4	**1) Dust emission controls 2) Stockpile Management 3) Limit active working areas 4) Revegetation**	1	2	1	1	3
		N2 - Low						**N1 - Very Low**				

Visual changes and nuisance factors can be mitigated to reduce the negative impact from a Low to a Very Low impact due to reduced magnitude and probability.

OPERATION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Visual Intrusion	Proposed infrastructure that have the potential to result in a change to landscape and character include reservoirs, communication towers, electricity transmission lines, conductors and substations - resulting in a negative aesthetic effect especially in the more remote areas.	2	2	3	4	1	**Existing Mitigatory factors include: 1) Ground level reservoirs 2) Most rural homesteads are situated at a low elevation in the valleys, often surrounded by trees, which will reduce visibility 3) Undulating topography will contribute to fewer breaks the skyline**	1	2	3	4	1
		N1 - Very Low						**N1 - Very Low**				

The magnitude of the potential negative visual intrusion impacts resulting from tall structures is mitigated by the receiving environment. In addition, reservoirs / tanks are ground level and not elevated. These factors result in a potential impact and residual impact of Very Low Significance.

7.5 OCCUPATIONAL HEALTH AND SAFETY ASPECTS AND IMPACTS

It is noted that community and occupational health and safety aspects have been dealt with throughout this ESIA due to its interrelatedness. For example, exposure to dust and hazardous materials that may be present in construction materials and demolition waste has been addressed within the socio-economic aspects above. In addition, consequences resulting from the interaction of project work force with the local people potentially resulting in the spread of diseases including HIV and Communicable and Sexually Transmitted Infections (STIs) has been addressed within the socio-economic aspects related to the introduction and movement of workers into/out of communities. Therefore, this section deals specifically with additional occupational health and safety issues that are not already covered elsewhere.

7.5.1 CONSTRUCTION

During construction physical hazards associated with the use of heavy equipment have the potential to cause accident, injury or illness (due to repetitive exposure to mechanical action or work activity). Single exposure to physical hazards may result in a wide range of injuries (minor cuts or bruises to disabling loss of limb to fatal).

Construction activities may result in an increase in movement of heavy vehicles for transport of materials and equipment. This represents an increased the risk of traffic related accidents and injuries to workers and local communities.

Water system leaks can reduce pressure of the water system compromising its integrity and the ability to protect water quality (by allowing contaminated water to leak into the system). This poses a risk to human health as a consequence arising from an increases in water borne diseases.

The use of potentially hazardous chemicals in construction may result in chemical exposure to construction workers resulting in health implications.

Explosives will be used when blasting during construction to remove large areas of hard rock. This activity may result in the possible injury to both workers and community, as well as loss of property if not correctly managed.

7.5.2 OPERATION

WASCO confirmed that the following chemicals will be used at the WTW: Aluminium Sulfate; Potassium Permanganate; Sudfloc (coagulant) and 3TL (coagulant); and chlorine. Exposure risks to workers (e.g. chlorine acute exposure or chronic repetitive exposure can pose an irritant in humans to the eyes, the upper respiratory tract, and the lungs) handling these chemicals can be planned for prior to operation by facility management and OHS Officers. Measures should include implementation of controls as per Material Safety Data Sheets etc. (e.g. PPE for controlling existing worker exposures; and engineering controls designed to remove the hazard at the source before it encounters workers).

Working within a water and sanitation facility is often physically demanding and may involve hazards such as open water, trenches, slippery walkways, working at heights, energised circuits, entry into confined spaces and heavy equipment causing accidents and injuries

High noise levels present in the vicinity of operating machinery and flowing water at water and sanitation facilities can potentially result in injury to hearing or loss of hearing.

SUMMARY OF OCCUPATIONAL HEALTH AND SAFETY IMPACTS

CONSTRUCTION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Physical hazard associated with the use of heavy equipment.	Potential for accident or injury or illness due to repetitive exposure to mechanical action or work activity. Single exposure to physical hazards may result in a wide range of injuries (minor cuts or bruises to disabling loss of limb to fatal)	4	1	5	2	4	1. Planning work site layout to minimize the need for manual transfer of heavy loads. 2. Selecting tools and designing method of working to reduce force required	4	1	5	2	3
		N3 - Moderate						N3 - Moderate				
Construction activities may result in an increase in movement of heavy vehicles for transport of materials and equipment.	Increased the risk of traffic related accidents and injuries to workers and local communities.	4	1	5	2	4	1. Education and awareness raising emphasising safety aspects among drivers. 2. Use of speed control devices on trucks and remote monitoring of driver actions.	4	1	5	2	3
		N3 - Moderate						N3 - Moderate				
Use of potentially hazardous chemicals in construction	Chemical Exposure to construction workers resulting in health implications	4	1	5	2	4	1. Records of all hazardous equipment, materials, or other substances and any other health hazards on the Site. 2. If an epidemic endangers a significant proportion of the workforce; or a spillage of hazardous substance or similar event - the Engineer may order that work on the Site be suspended until the Contractor has brought the epidemic or hazardous event under control.	4	1	5	2	3
		N3 - Moderate						N3 - Moderate				
Use of explosives when blasting during construction to remove large areas of hard rock.	Potential loss of property as well as possible injury or fatalities to project workers.	4	2	5	2	4	1. Contractor to submit to the Engineer a detailed method statement for use of explosives. 2. Sirens shall be sounded continuously for at least 5 minutes before any blast takes place and shall continue for one minute after the blast has taken place. 3. The Contractor shall station personnel on roads and elsewhere with red flags to prevent persons, animals and traffic entering or remaining within the danger zone. 4. Blasting shall not be carried out unless occupants of any nearby building or working area have been notified by the Contractor CLO at least 24 hours in advance.	4	2	5	2	3
		N3 - Moderate						N3 - Moderate				

The implementation of mitigation measures will result in reduced probability of the impacts occurring during the construction phase, however the residual negative impact remains as Moderate significance.

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Chemical Exposure: The storage and handling of chemicals required for water disinfection.	Potential for illness or injury due to single acute exposure or chronic repetitive exposure to hazardous substance to operational staff.	4	1	5	4	4	1. Implement a training program regarding safe handling practices and emergency response procedures. 2. Provide appropriate personal protective equipment. 5. Install containment systems to capture and neutralise chemical spills.	4	1	5	4	3
		N3 - Moderate						N3 - Moderate				
Working within a water and sanitation facility is often physically demanding and may involve hazards such as open water, trenches, slippery walkways, working at heights, energised circuits, entry into confined spaces and heavy equipment.	Accidents and injuries to workers	4	1	5	4	4	1. Install railing around all process tanks and pits. 3. Use of personal flotation devices when working near waterways. 4. Implement a confined spaces entry program that is consistent with applicable national requirements and internationally accepted standards. 5. Valves to process tanks should be locked to prevent accidental flooding during maintenance. 6. Use fall protection equipment when working at heights. 7. Maintain work areas to minimise slipping and tripping hazards.	4	1	5	4	3
		N3 - Moderate						N3 - Moderate				
High noise levels present in the vicinity of operating machinery and flowing water at water and sanitation facilities.	Potential injury to hearing or loss of hearing.	4	1	5	4	4	1. Provide and require use of suitable PPE 2. Demarcate high noise zones.	4	1	5	4	3
		N3 - Moderate						N3 - Moderate				

The implementation of mitigation measures will result in a reduced probability of the impacts occurring during the operational phase, however the residual negative impact remains as Moderate significance.

7.6 CLIMATE CHANGE ASPECTS AND IMPACTS

7.6.1 RELEASE OF SEDIMENT INTO WATERCOURSES (DIRECT OR VIA EROSION AND STORMWATER ENTRAINMENT)

CONSTRUCTION

Due to the steep topography at the reservoir sites throughout the Project area, the risk of erosion after site clearance is high. Access routes to the along undulating topography further increases the likelihood of soil erosion occurring. Loss of topsoil and vegetation community due to soil erosion can be exacerbated by climate change.

7.6.2 RELEASE OF AIRBORNE POLLUTANTS EMISSIONS TO ATMOSPHERE

CONSTRUCTION

Additional journeys will be completed during the construction phase, associated with the transportation of materials/wastes to and from the construction areas. The exhaust emissions will contribute to the presence of GHGs in the atmosphere.

OPERATION

The generation of methane gas from any organic component in the sludge drying beds at the WTW will contribute to greenhouse gas emissions.

7.6.3 GENERATION OF GENERAL WASTE

CONSTRUCTION

Putrescible waste generated during construction (e.g. cleared vegetation and scrap labourer food) will decompose and generate greenhouse gases

7.6.4 WETLAND LOSS

OPERATION

Construction of the WTW adjacent to Makhaleng River will result in the partial loss of a wetland area, thereby removing a carbon sink.

7.6.5 DEMAND ON LOCAL UTILITIES – POTABLE WATER

OPERATION

Climate change is likely to have an impact on the availability of the water resources for the country in the long-term. The LLBWS will increase Lesotho's resilience to climate change by providing water security.

7.6.6 DEMAND ON LOCAL UTILITIES – ELECTRICITY

OPERATION

The pumping system will be electrically-operated, resulting in an increase in energy demand and consequently indirectly increasing greenhouse gas emissions.

7.6.7 FLOODING OF THE MAKHALENG RIVER

OPERATION

Flood events are predicted to become more severe as a result of climate change impacts, and poorly positioned infrastructure could be damaged during such events. Plant and equipment that are at risk of flood damage shall be located above 1:100 flood level (this includes the WTW) or designed for a 1:10 year flood frequency (intake structure and wet well).

SUMMARY OF CLIMATE CHANGE IMPACT ASSESSMENT

CONSTRUCTION

Aspect (Pre-defined)	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Release of sediment into watercourses (direct or via erosion and stormwater entrainment)	Due to the steep topography at the reservoir sites throughout the Project area, the risk of erosion after site clearance is high. Access routes to the along undulating topography further increases the likelihood of soil erosion occurring. Loss of topsoil and vegetation community due to soil erosion can be exacerbated by climate change.	3	3	3	4	3	**1) Soil erosion measures (limiting the extent of work areas, management of stormwater runoff, and sediment containment structures); 2) Spoil Disposal Management Plan (SDMP)**	2	2	3	4	2
		N3 - Moderate						**N2 - Low**				
Release of airborne pollutants emissions to atmosphere	Additional journeys will be completed during the construction phase, associated with the transportation of materials/wastes to and from the construction areas. The exhaust emissions will contribute to the presence of GHGs in the atmosphere	2	3	3	4	5	**1) Vehicular Emission Controls**	1	3	3	3	3
		N3 - Moderate						**N2 - Low**				
Generation of general waste	Putrescible waste generated during construction (e.g. cleared vegetation and scrap labourer food) will decompose and generate greenhouse gases	2	3	3	4	5	**1) Opportunities should be determined, in consultation with waste service providers, for re-use, recycle, or disposal options**	2	3	3	3	2
		N3 - Moderate						**N2 - Low**				
Wetland loss	Construction of the WTW adjacent to Makhaleng River will result in the partial loss of a wetland area, thereby removing a carbon sink.	2	3	3	4	5	**1) Shift location of WTW as far as reasonably possible out of delineated wetland; 2) Investigate offset opportunities**	2	2	3	3	2
		N3 - Moderate						**N2 - Low**				

All negative residual impacts associated with climate change during the construction phase are of Low significance.

OPERATION

Aspect	Impact Summary	Pre-Mitigation					Mitigation	Post-Mitigation				
		(M+	E+	R+	D)x	P=		(M+	E+	R+	D)x	P=
Release of airborne pollutants emissions to atmosphere	The generation of methane gas from any organic component in the sludge drying beds at the WTW will contribute to greenhouse gas emissions.	2	3	3	4	5	**1) Investigate utilisation of methane gas for heating in WTW process, alternatively for electricity generation or flaring on site**	1	3	3	4	3
		N3 - Moderate						**N3 - Moderate**				
Demand on local utilities – potable water	Climate change is likely to have an impact on the availability of the water resources for the country in the long-term. The LLBWS will increase Lesotho's resilience to climate change by providing water security.	3	3	1	4	3	**1) Implementation of proposed project; 2) Training on sustainable use of water resources**	3	4	1	4	4
		P3 - Moderate						**P3 - Moderate**				
Demand on local utilities – electricity	The pumping system will be electrically-operated, resulting in an increase in energy demand and consequently indirectly increasing greenhouse gas emissions.	1	3	3	4	5	**1) Investigate utilisation of renewable electrical resources**	1	3	1	4	3
		N3 - Moderate						**N2 - Low**				
Flooding of the Makhaleng River	Flood events are predicted to become more severe as a result of climate change impacts, and poorly positioned infrastructure could be damaged during such events.	3	3	3	2	3	**1) Proposed (preferred) alternative to shift WTW as far as practicably possilble out of the floodplain**	1	2	3	2	1
		N3 - Moderate						**N1 - Very Low**				

During operation, there is one residual impact of moderate negative significance which relates to the release of airborne pollutants to atmosphere due to construction related vehicular traffic and the generation of methane gas from any organic component in the sludge drying beds at the WTW. There is one residual impact of moderate positive significance, which relates to the fact that implementing this project will strengthen Zone 6 and 7's resilience to climate change by providing sufficient storage capacity to sustain a dry period.

8 CUMULATIVE IMPACT ASSESSMENT

8.1 INTRODUCTION AND METHODOLOGY

The ESIA process serves to assess, mitigate and manage the environmental and social impacts of individual projects, but may be insufficient for identifying and managing incremental impacts on areas or resources used or directly affected by a given development from other existing, planned, or reasonably defined developments. The IFC Good Practice Handbook: Cumulative Impact Assessment and Management defines cumulative impacts as follows:

"Cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, project, or activity (collectively referred to in this document as "developments") when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/or concerns of affected communities."

The cumulative impact assessment (CIA) process analyses the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen valued environmental and social components (VEC) over time and proposing sound measures to avoid, reduce or mitigate the impacts as far as possible.

A rapid cumulative impact assessment process (RCIA) was undertaken in order to evaluate potential cumulative impacts of the LBWSS project in the context of a number of current and proposed regional projects. The RCIA process (in contrast to comprehensive CIA) was adopted due to a general lack of basic baseline data and uncertainty with anticipated regional developments. The methodology for the RCIA was generally aligned with the IFC Good Practice Handbook: Cumulative Impact Assessment and Management *viz:*

- Identification of VEC's;
- Identification of regional projects; and,
- Qualitative analysis of cumulative impacts with consideration to i) the present state of the VEC, ii) overlaps in the areas of influence, and timing of the LBWSS and the regional projects, and iii) the stressors on VECs associated with the LBWSS and the regional projects.

8.2 IDENTIFICATION OF VECS

The ESIA for the LBWSS has identified the following VEC's, which have the potential to be impacted on by the project:

- Air Quality
- Surface Water
- Ambient Noise
- Soil
- Cultural Heritage
- Communities / Social
- Human Health
- Terrestrial Ecology
- Water Resources / Aquatic Ecology

8.3 IDENTIFICATION OF REGIONAL PROJECTS

The regional projects in **Table 55** have been identified as having the potential to compound the impacts associated with the LBWSS, and vice versa, and were therefore considered in the RCIA. The location and potential influence of these projects is included in **Appendix K: Regional Projects Map**.

Table 55: Current and proposed regional projects

Lesotho Bulk Water Supply Scheme (LBWSS)	
Locations	Van Rooyen, Qalabane, Ha Ramohapi, Mafeteng, Siloe, Thabana Morena, Tsolane, Khitsane, Ha Tsepo, Old Mohale's Hoek, Mohale's Hoek
Proximity to LBWSS	N/A
Current Status	ESIA studies ongoing
Anticipated Construction Dates	2020-2023
Lesotho Botswana Bulk Water Transfer (LBWTP) (including the construction of Makhaleng Dam)	
Locations	Makhaleng via South Africa through Van Rooyen to Botswana
Proximity to LBWSS	Approx. 1km
Current Status	Feasibility phase –to be completed in April 2020.
Anticipated Construction Dates	2026 – Unknown
Lesotho Infrastructure Connectivity (TIC) Project - Output and Performance Based Contracts on Selected Secondary Road Networks	
Locations	Old Mohale's Hoek via Mpharane to Qachas Nek
Proximity to LBWSS	Approx. 10 km
Current Status	The project is at concept design stage – bidding for project construction to be in 2019
Anticipated Construction Dates	2022 – Unknown
Refurbishment of 39km electricity transmission line from Mohale's Hoek to Quthing Towns (Mohale's Hoek TL)	
Locations	Mohale's Hoek to Quthing
Proximity to LBWSS	Approx. 2 km
Current Status	Feasibility studies ongoing
Anticipated Construction Dates	2020 – Unknown
Mohale's Hoek Industrial Estate	
Locations	Mohale's Hoek
Proximity to LBWSS	Approx. 1 km
Current Status	Site exists with 2 operations and 8 empty factory shells. Awaiting for investors to occupy it. Expansion planned for 2025 and beyond
Anticipated Construction Dates	Already exists – expansion post 2025
Proposed Ramarothole 70MW Solar Project	

Locations	Ramarothole
Proximity to LBWSS	Approx. 2.5 km
Current Status	Inception Stage – at the Environmental Assessment Bidding phase
Anticipated Construction Dates	2022 – Unknown

8.4 RAPID CUMULATIVE IMPACT ASSESSMENT RESULTS

VEC – Air Quality

The LBWTP, Mohale's Hoek IS, and Ramathole Solar Project are all sufficiently close together to be considered as sharing an AOI in terms of air quality.

Construction phase dust emissions (stressor) from these projects have the potential to cumulatively impact on the air VEC. However due to the absence in overlaps in the construction phase of these projects cumulative impacts are not possible. **No cumulative impacts anticipated**.

Operational phase emissions (stressor) associated with the LBWSS include potential chlorine and odorous emissions. There is potential for operational phase emissions from the Mohale's Hoek IS. As the projects are relatively close together (within 2-3km from the Mohale's Hoek IS boundary), they are considered to share a common AOI. The determination of cumulative impact significant is not possible without an understanding of potential emissions from the Mohale's Hoek IS. **Potential for cumulative impacts is indeterminate**. Air quality studies associated with potential industrial developments in the Mohale's Hoek IS should consider the WTW as a potential background air quality pollution source

VEC – Surface Water

The LBWTP, Mohale's Hoek IS, and Ramathole Solar Project are all likely to sharing an AOI in terms of water quality; specifically the receiving surface water bodies (streams and rivers) receiving runoff from his region.

Construction related contaminated stormwater and effluent discharges to watercourses (stressors) from these projects have the potential to cumulatively impact on the quality of the water in these systems. The commonality of these watercourses has not been defined in the RCIA. It may conservatively be assumed that these stressors are all in the same river system / AOI. Due to the absence in overlaps in the construction phases of these projects, construction phase cumulative impacts on the air quality VEC are not possible. **No cumulative impacts anticipated**.

Operational phase water quality impacts relate to the quality of intake water at the LBWS WTP as well as potential accidental spillage of process effluent and chlorine. Effluent discharges to watercourses (stressor) associated with the Mohale's Hoek IS that could affect the quality if intake water are a possibility. In addition, accidental spillages associated with the Mohale's Hoek IS have the potential to impact on water quality in receiving watercourses. It may conservatively be assumed that these stressors are all in the same river system / AOI. It is assumed that normal discharges from the Mohale's Hoek IS would meet environmental standards. The potential for impacts on the operation of the plant and downstream water quality would be low under normal operating conditions. **No cumulative impacts anticipated**.

VEC – Ambient Noise

The LBWTP, Mohale's Hoek IS, and Ramathole Solar Project are all sufficiently close together to be considered as sharing an AOI in terms of the ambient noise environment.

Construction phase vibrations and noise emissions (stressor) from these projects have the potential to cumulatively impact on the ambient noise VEC. However due to the absence in overlaps in the construction phase of these projects cumulative impacts are not possible. **No cumulative impacts anticipated**.

There are no significant operational phase noise stressors associated with LBWSS. **No cumulative impacts anticipated**.

VEC – Soil

The LBWTP, Mohale's Hoek IS, and Ramathole Solar Project are all sufficiently close together to be considered as sharing an AOI in terms soil resources.

Construction related soil contamination (stressors) from these projects have the potential to cumulatively impact on the soil VEC. However due to the absence in overlaps in the construction phase of these projects cumulative impacts are not possible. **No cumulative impacts anticipated**.

Operational phase soil impacts relate to the soil stability along the preferred pipeline alternative in an area prone to erosion. There is potential for construction phase activities from the Mohale's Hoek IS to also cause residual effects on the soil stability in the area surrounding the donga (e.g. improper stabilisation post construction, or changes in micro-topography resulting in soil erosion). The determination of cumulative impact significant is not possible without an understanding of the Mohale's Hoek IS activities (specific siting, construction methodologies etc.); however, as soil impacts are generally quite feasible to mitigate cumulative soil impacts would probably not be significant in any event. **No cumulative impacts anticipated**.

VEC – Cultural Heritage

Cultural heritage resources are regarded as a national / international asset and as such the LBWSS and all other regional activities and projects would be regarded as being within the AOI of this VEC.

The construction phase of the LBWSS has the potential to contribute to a broader regional potential impact on cultural heritage resources. Impacts associated with the LBWSS are considered low based on the ESIA findings and the recommendation of a chance find procedure. The significance of impacts associated with regional activities and projects cannot be reasonably discussed within the limitations of the LBWSS ESIA. **Analysis of cumulative impacts is not reasonably possible.**

There are no significant operational phase cultural heritage stressors associated with LBWSS. **No cumulative impacts anticipated**.

VEC – Social / Community

The LBWTP, Mohale's Hoek IS, and Ramathole Solar Project are all sufficiently close together to be considered as sharing an AOI in terms of community receptors.

The ESIA for LBWSS has identified positive impacts in terms of short term employment creation, and associated livelihood opportunities. Similar positive opportunities may be generated by other regional projects; and, although not generally concurrent with LBWSS construction they may be regarded as cumulatively benefitting communities within the region. A range of potential negative social impacts associated with the LBWSS have been identified with significance ranging from very low to moderate. Similar negative impacts may be generated by other regional projects; and, although not generally concurrent with LBWSS construction there is potential for cumulative effects. It is not however reasonably possible to qualify these cumulative effects within the limitations of the LBWSS ESIA without detailed knowledge on the socio-economic impacts associated with other regional projects. **Potential for cumulative impacts is indeterminate**. Social monitoring recommended during project implementation in order to identify and manage potential cumulative impacts.

The operational phase social / community impacts associated with the LBWSS are generally different in nature to regional projects, as these projects are within different industry / service sectors. **No cumulative impacts anticipated**.

VEC – Human Health

The LBWTP, Mohale's Hoek IS, and Ramathole Solar Project are all located within relatively close proximity to the LBWSS (~1km). Due to this proximity, these projects have the potential to cumulatively impact on the human health VEC as a result of a variety of stressors including Spillage of hazardous chemicals; and, risks posed by general construction activities (e.g. construction site hazards and traffic hazards to pedestrians and other road users).

Although the construction phase of these projects are not concurrent, a cumulative impact on human health issues is possible. Given the recommended mitigation measures for the LBWSS and the implementation of similar measures on the other projects the cumulative significance should remain unchanged. **No cumulative impacts anticipated**.

Human health cumulative impacts during the operational phase are possible. Given the recommended mitigation measures for the LBWSS and the implementation of similar measures on the other projects the cumulative significance should remain unchanged. **No cumulative impacts anticipated**.

VEC – Terrestrial Ecology

The LBWTP, Mohale's Hoek IS, and Ramathole Solar Project are all sufficiently close together to be considered as sharing an AOI in terms of terrestrial ecology VEC.

During construction, all of these projects are likely to result in a loss of specific habitat and shelter to faunal species, as well as localised destruction of floral species. In the case of LLBWSS the majority of the disturbance is associated with the pipelines. This will be temporal in nature and following construction and rehabilitation, it is anticipated that ecological functioning will return to these areas. **No cumulative impacts anticipated**.

Disturbances at the reservoir sites and WTW are however permanent in nature and regarded as a stressor in terms of regional ecosystem fragmentation including wetlands. Additional regional stressors include general urbanisation within the region (agriculture, land development etc.). Neither the degree of LBWSS contribution nor the significance of the cumulative impact can be reasonably quantified within the limitations of the LBWSS ESIA. **Analysis of cumulative impacts is not reasonably possible.**

VEC – Water Resources / Aquatic Ecology

Water resource and aquatic ecology impacts associated with the LBWSS relate principally to changes in ecological functioning in the inundation area as well as downstream due to reduced water quality and flow. External stressors on water quality and aquatic ecosystems include agricultural and social water users. The EWR methodology considered the effects of the LBWSS and external stressors and is inherently cumulative.

9 CONCLUSION AND RECOMMENDATIONS

9.1 CONCLUSION

The impact assessment carried out and mitigation measures recommended have been done with reference to both national legislation and regulations; as well as key lender requirements and guidelines – specifically:

- World Bank EHS General Guidelines
- World Bank EHS Water and Sanitation Guidelines
- EIB Three Pillar Assessment Framework

A rapid assessment was undertake at project commencement from July to August 2018. Initial findings were included in the Inception Report approved by both COW and project funders.

A summary of the impact assessment undertaken within this ESIA are presented below:

The **majority of impacts were assessed to be of Low negative significance** with the implementation of recommended mitigation measures. There are **no Very High negative residual impacts** associated with this project. The High residual negative impacts of the project relate to the replacement of vegetation for the permanent placement of the WTW and reservoirs, which support Vulnerable species and represent highest floristic biodiversity in the area, respectively. Mitigation measures will likely only result in the reduction of alien invasive encroachment.

The **Moderate residual negative effects** of the project arise from the temporary generation of dust emissions during construction resulting in primarily nuisance factors to nearby receptors (residents and roadside businesses). The proposed mitigation measures cannot sufficiently reduce probability of this impact.

The **Moderate residual negative effects** on water resource aspects relate to the positioning of a low-level weir within the Makhaleng River upstream of the WTW. This will potentially result in a build-up of sediment and changes in the inundation/flooding of areas upstream and downstream of the weir. This impact assessment however is stated with low confidence as the weir's specifications and effects still need to be modelled prior to implementation (and the ESMP updated of required). Finally, the abstraction of water from the Makhaleng River WTW intake is likely to result in a decrease in volume and flow in the river leading to indirect water resource availability impacts for downstream users. This impact is also stated with low confidence, as the e-flow assessment did not include social "end points". Previous studies however state that flow may be too low during drier months and a dam upstream to balance supply is essential for the feasibility of the bulk water supply scheme.

With respect to socio-economic impacts during the construction phase, there are two **Moderate negative residual effect**, which relate to influx of workers in the projects area, a change in demographics and an increase in health and safety (e.g. communicable diseases and trafficking in persons (TIP). The Socio-Economic survey findings indicate that the project area is supported by a number of health care and awareness raising facilities and organisations, which will likely be able to assist in mitigating this impact amongst local communities.

Hazards associated with occupational health and safety negative impacts on workers are all of **Moderate significance**.

The **positive residual impacts** that relate to this project are detailed below:

- Inundation upstream of stream creating greater diversity and abundance of fish and invertebrates preferring such conditions (**Moderate significance**).
- The construction phase will result in temporary employment of ~300-400 people, which has the potential to increase income generation for marginalised communities (**Moderate significance**).
- The construction of bulk water supply will support the roll out of distribution networks to improve access to clean water, indirectly resulting in improved hygiene within communities (**Moderate significance**).

- The construction phase an increase in population to the region, which will have a positive knock-on effect to local businesses and improved income generation at household level (**Moderate significance**).
- The operation of the bulk water supply system will create new permanent employment in the area for skilled and semi-skilled labourers. A minimum of 40-50 jobs will be created to operate the WTW alone. (**Moderate significance**).
- The improved access to potable water within Zone 6 and Zone 7 will attract potential for new business start-ups **(Moderate significance)**.
- The opportunity presented by excavation potentially uncovering chance finds of historic resources that can be identified and captured within the national database of the resource museum collections for the benefit of research and education, will result in a moderate positive residual impact (**Low significance**).

The RAP has confirmed that the identification of alternatives to avoid the need for resettlement has significantly reduced the potential magnitude of the impact of the proposed LLBWSS Zone 6 and Zone 7 project resulting in only one household requiring resettlement across both Zone 6 and 7. However, the project will result in the following disturbance and loss of social and economic activities:

- Temporary loss of livelihoods from construction activities will affect:
  - Fourteen arable fields (eleven of which are located at WTW) used for subsistence; and
  - Four businesses plots (two of which will only be partially affected).
- Permanent loss of livelihoods, displacement and resettlement will affect:
  - Eleven arable fields (Maphohloane WTW) used for subsistence farming; and
  - Two informal business – one of which is a seasonal informal business selling green harvests).

The reduction of livelihood and involuntary resettlement impacts significance presented by alternatives can be confidently maintained by the implementation of the Livelihood Restoration Plan and Resettlement Action Plan (RAP).

Public consultation commenced with engagement with the local authorities and community representatives (District Administration Officers, District Council Officers, Principal Chief's and other Area Chiefs). This was followed by an inception workshop where COW and the Consultant team presented the project components, assessment approach and screening phase findings. This was attended by local authorities and community representatives. *Pitsos* (Public gatherings) were discussed and a way forward defined in terms of dates and frequency of meetings. In total, 21 Pitsos were held reaching representation of 154 villages (~ 1800 community members represented). About 60% reached were women and 40% men. The public consultation team were also involved in the engagement of community groups and local structures to assist in the socio-economic survey and preparation of the RAP process. Responses to both comments raised during the Inception Workshop and *Pitsos* are included in **Appendix E: Public Participation Process Report**.

Public Consultation will continue during the ESIA Phase Public Disclosure Process. The comments received following the authority review period have been incorporated into a Comment and Response Report and submitted to DoE for consideration in decision-making. A Communication Strategy has been prepared and appended to the Environment and Social Management Plan (ESMP) to guide continued public consultation into the construction and operational phases.

A number of measures have been identified as necessary to minimise and control negative impacts resulting from the project, such as the risk of contamination from hazardous waste storage or impacts to indigenous vegetation. Measures such as environmental awareness training on waste management, access control measures defining 'no go areas' to limit the impact on natural vegetation and preventing the risk to community presented by open trenches, erosion and water pollution to surrounding water resources. Water use and pollution would need to be monitored in the future to limit residual effects on other water users and ecosystems in the Project area.

An ESMP has been developed (Vol II). The ESMP represents the Lesotho Lowlands Bulk Water Supply Project, Zone 6 and 7 commitment to address and manage the potential negative and enhance the positive impacts associated with the bulk water supply infrastructure. The key intent of the ESMP is to ensure that the environmental and social objectives of the project are met, and it is based on the various components of the Project throughout design, construction and operational phases. The following supporting documents have been prepared to support the implementation of the ESMP:

- Monitoring and Evaluation Plan

- Communication Strategy
- Heritage Management Plan

The ESMP makes recommendation for institutional strengthening (including capacity building) and assigns responsibilities for the implementation of enhancement and mitigation measures as well as the completion of the monitoring programs.

The ESIA has not identified any fatal flaws that would restrict the development of the proposed bulk water supply infrastructure for Zone 6 and 7.

A Resettlement Action Plan has been developed as part of the Project, which focuses on displacement issues in more detail.

9.2 RECOMMENDATIONS

The proposed LLBWSS should be approved for development with the following key recommendations:

- The ecological assessment was undertaken only during winter months (dry season) and therefore two seasons were not assessed. It is recommended, in order for the assessment to be closer aligned with World Bank requirements, that this gap be addressed by a wet season survey to confirm whether critical habitats occur within the project footprint and increase the confidence percentage closer to 100%.
- The proposed weir analysis should be based on daily flow data. In its absence, monthly data was used. Data for 65 years (780 months) was available. The long-term trend analysis showed that there is a minimal reduction (approx. -1% per year) of the average annual flow implying an insignificant change in low flow rates. However, available reports state that the low flow amounts will significantly reduce due to impact of climate change, as such this anticipated reduction should be taken into account during the detailed design for the balancing reservoir (i.e. Makhaleng Dam).
- Further investigation required to calculate the potential area of inundation upstream of the proposed low-level weir.
- A post-development detailed flood risk assessment should be prepared and implementation of an Emergency Flood Response Plan for infrastructure within Makhaleng Floodplain.
- A sand settler should be built next to the water treatment plant, from the point at which the water gravitates to the treatment plant.
- In order to improve the present ecological state of the Makhaleng River it is recommended that erosion prevention and management plans be implemented with particular emphasis on the marginal and riparian zones.
- It is recommended that the precautionary approach must be adopted. To this end, steps must be taken to ensure the management of EMF exposures. EMF measurements pre-and post-installation of the mast are required to ensure that exposure limits for general public exposure to electric and magnetic fields published in the World Bank (2007) EHS Guidelines for Telecommunications sub-reference: International Commission on Non-Ionizing Radiation Protection (ICNIRP).
- Project implementing agencies must commit to tailored mitigation to ensure that local people will actually benefit from the project through being offered manual jobs, some targeted training, preparation and implementation of resettlement action plan, allocation of alternative land plots in the vicinity for them to continue their subsistence farming that has been their means of livelihood for many years.
- Compile and implement an alien vegetation management plan for the entire site. For the pipeline and reservoir construction areas it is recommended that denuded areas be re-seeded directly after construction is completed and that these areas are monitored for re-growth of alien plant species every two months, for a period of a year.
- It is recommended that the ecological discharge and fish way should be located in close proximity to one another. The fish way should be positioned where the main flow releases are, due to the shallow nature of the Makhaleng River to ensure year-round fish migration.
- Energy dissipaters and pool areas/depressions are recommended as a means to improve the aquatic ecology. Energy velocity dissipaters in the form of surface roughness (varying size aggregate / similar) built into the overspill areas will create a variety of hydraulic conditions suiting different fish species swimming

capabilities. Further, pool areas/depressions built into the overspill area with allow resting areas for aquatic fauna migration.

- The construction of the WTW will result in the loss of a seepage area providing habitat services. There is the potential for offsets to compensate for the loss. Further investigations should be carried out to identify and assess opportunities for rehabilitation of wetlands within the study area.
- Green or soft engineering must be incorporated into the design of the WTW to manage and for the discharge of storm water.
- Stringent waste management measures should be put in place for the WTW. Staff operating the facility should undergo environmental training and should be aware of environmental consequences of poor waste management.
- Project implementing agencies must undertake the required detailed engineering feasibility and design requirements for the proposed alternatives selected as the preferred options for implementation.
- Recycling and reuse opportunities are to be investigated as recommended in the ESIA to reduce the amount of project waste generation and disposal requirements (national shortage of landfill space).
- Sludge residue from WTW need to be quantified and classified to determine suitability for disposal or beneficial reuse through land application. Quality of residuals for land application should be consistent with relevant public health-based guidance with the WHO (2006) Guidelines for Safe Use of Wastewater and applicable national requirements. If suitable for land application, the next step is to identify application sites. This will involve the establishment of baselines concentrations (nutrients, trace elements and metals, as well as pH in the soil) and the development of a monitoring programme.
- Monitoring and Evaluation System must be implemented to monitor implementation of the RAP and Livelihood restoration recommendations.
- The following permits will be required for certain activities:
  - Noise Permit issued by the DOE - Permit to allow excessive emission of noise (in excess of the noise emission standards) [blasting activities]
  - Waste Licence issued by the - Licence to own or operate a waste disposal site or plant, other than domestic waste, generate, store, handle, transport or dispose of hazardous waste [the relevance of this requirements must be assessed once the reuse / disposal of WTW sludge residue / reservoir scour is determined following waste classification and land use suitability to receive such material].
  - Mining (or quarrying) licence issued by the Ministry of Natural Resources - EIA a prerequisite for obtaining mining rights.
  - Building permit issued by Municipalities and Ministry of Local Government - Have to fulfil all environmental requirements and include the EIA Licence in the application for a permit.

9.3 CLOSING STATEMENT

The proposed bulk water supply project contributes to the national objectives of promoting equitable access to water supply and sustainable management of water resources. The delivery of the projects has become increasingly crucial in light of current drought conditions affecting individual household and businesses; and for the support of existing and proposed commercial and industrial activities. The requirement for improved supply is reflected in the recent application by the Humanitarian Country Team (HCT) to the Central Emergency Response Fund (CERF) in December 2018 to respond to immediate humanitarian needs in Mohale's Hoek, Maseru, Quthing and Qacha's Nek. The Lesotho Water and Sanitation Policy (2007) states that "All the Basotho are entitled to have access to a sustainable supply of potable water and to the provision of basic sanitation services at an affordable cost." The policy indicates that all Basotho have a right to 30 litres of water. As a result of drought, most of the communities in Zone 6 resort to other sources of water, such as swamps and wells. The most prevalent problem being the reliance on unclean water. In some areas, the same sources of water are shared with animals, thereby putting people's health at risk.

This project will indirectly lead to improved general community health, as bulk water supply is required to support the distribution of water in Zone 6 and Zone 7. Indirect benefits include:

- Access to clean potable water improves the quality of life of communities by meeting a basic human need.

- Significant positive impact on human hygiene and reduction of waterborne diseases leading to health improvements in beneficiary communities at the household level.
- Improved water supply, sanitation facilities will improve - especially in public facilities such as schools and health care centres.

From a socio-economic perspective, over and above the temporary job creation during construction, and 40-50 job opportunities created during operation, the provision of bulk water supply systems will contribute to the viability of water supply to support commercial and industrial activities. Demand in the urban domestic and industrial sectors in Lesotho is not reliably met under a repeat of the historical climate or under the full range of climate futures, and, in the absence of augmentation measures, unmet demand levels will reach 40% by 2050. Unmet demand grows significantly starting in 2025. Reduced runoff predicted in climate change scenarios would result in a drying up of wells and springs, lower water tables, higher borehole costs, and reduced yields.

Tie-inn to existing or proposed distribution infrastructure will be carried out to minimise disruption to supplies critical for ensuring water-resilience in the domestic and industrial sectors, including but not limited to:

- Peri-urban and urban areas such as the Town of Mafeteng support small-scale commercial businesses with industrial areas located in Mesitsaneng and Ha Mapotsane.
- Mohale's Hoek Town is the major concentration of water demand in the Zone. This is expected to continue with the establishment of the planned Mohale's Hoek II (East) Industrial Estate, with a planned development area of 150 hectares.

The viability of the proposed bulk water supply is dependent on sufficient water in the river to provide for the required flows. LWSIP II - Final Water Resource Assessment (SMEC, 2015) and the LWSIP II - Final Water Demand Assessment (SMEC, 2017) indicates that the identified sources and calculated yields would be able to meet the existing demands however there is a need to build storage for resilience on climate change and its impacts and cater for the season variability of the flows. Provision of balancing storage was proposed as a potential solution to increase the assurance of supply back up to acceptable levels. LWSIP II - Final Water Demand Assessment (SMEC, 2017) identifies the need to build storage for resilience on climate change and its impacts and cater for the season variability of the flows. According to the Makhaleng Storage Dam Study (SMEC, May 2018), the addition of storage at Mid Makhaleng Dam increased the reliability under the climate change conditions from 65% to 97% (for 48 MCM storage). This proposed balancing dam is not part of the current application for environmental licence. This is being carried out as a separate project by COW.

A PROBFLO assessment was undertaken to assess the impacts on the EWR / e-flows resulting from direct surface water abstraction from the Makhaleng River with a total capacity of 59,450m^3/d. The system is currently in a D Category river condition. Based on the scenarios considered and the low confidence understanding of the ecosystem and how it interacts with flows, the e-flows relating to Category D can be achieved. Aquatic biota require a range of depth and flow classes for survival, feeding and breeding with many species considered flow-dependent. Seasonal differences in flow must be maintained through the responsible management of the weir and timing of water releases as recommended in the ESMP and Appendix B.

In addition to the maintenance of aquatic ecosystems, reduced flow volumes and water levels within the Makhaleng River could affect local communities who rely on the Makhaleng River for livestock, crop watering, washing, bathing and cooking. The project should ensure that enough water is reserved (released) for both ecosystem function and use by downstream users. Social end-points should be considered in an updated e-flow assessment following the conclusion of the Groundwater Supply Assessment being facilitated by COW.

It is recommended by the EAP that this project be approved for development. The environmental licence should include a number of conditions to be formulated with consideration of the ESIA Recommendations.

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A ECOLOGICAL IMPACT ASSESSMENT

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B ENVIRONMENTAL WATER REQUIREMENT STUDY

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C SOCIAL IMPACT ASSESSMENT

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D CULTURAL HERITAGE SURVEY

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E PUBLIC PARTICIPATION REPORT

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F TEAM KEY EXPERTS

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REF	NAME	POSITION	QUALIFICATIONS	EXPERIENCE
K-1	Nigel Seed	Team Leader - ESIA Specialist	Bachelor of Social Science, Environmental Management & Geography, University of KwaZulu-Natal (UKZN)	Nigel has 15 years' environmental and social consulting experience. He is a Technical Director as well as the Africa lead for the ESIA service and Power in Africa.
K-2	Pumela Mahao	Sociologist / Anthropologist	M.Sc. Social Work, University of Lesotho. BA. Sociology and Public Administration, University of Lesotho.	Pumela is well respected within her sector having published papers on social work within sub-Saharan Africa and with vulnerable groups. She is fluent is in five languages: English, Xhosa, Southern Sotho, Zulu, Tswana, Northern Sotho (Sepedi).
K-3	Thato Parrow	Public Consultation Specialist	MSc, Social Development, University of Cape Town (UCT). Bachelor of Social Science Social Development and Policy (Hons), UCT. Advanced Diploma Social Work, Dar E'Salaam Tanzania.	Thato is a local consultant fluent in English and Sesotho. She has had significant work experience across all Lesotho districts and South Africa as Resettlement Officer; Public Outreach Specialist; Community Participation Specialist and Community Liaison Officer.
K-4	Richard Ramoeletsi	Compensation & Resettlement Specialist	MSc Rural Resource Management	Richard has strong management skills particular in dispute resolution. His involvement on Phase 1 and Phase 2 as Resettlement Field Operations Manager, and Community Forestry Project Manager of the Lesotho Highlands Water Project ensures his local knowledge of the study area, project challenges, and benefits.
K-5	Matumelo Monoko	Monitoring and Evaluation (M&E)	BA Statistics and Demography, National University of Lesotho Certificate in Statistics, National University of Lesotho	Matumelo has 21 years' experience in data collection, validation, analysing and producing statistical reports while working under the Planning Unit of the Ministry of Agriculture and Food Security, the Ministry of Public Works and Transport and the Ministry of Education and Training. Within this, Matumelo has gathered 13 years of monitoring and evaluation experience. This includes the preparation of the Monitoring Results Framework for Integrated Transport Project in agreement with GOL, implementing agencies and development partners (WB and EU).
K-6	Phakisa Mokhesi	Data Management Specialist	Honours Bachelor of Commerce (Business Information Systems), University of Natal. Post Graduate Certificate in Education (Science and Mathematics), National University of Lesotho. Bachelor of Science (Computer Science and Physics), National University of Lesotho.	Phakisa has first-hand experience in managing interactive data sets for compensation management systems, having developed a database for capturing households and household assets for Lesotho Highlands Development Authority (LHDA), Phase II, on the project of: Resettlement Planning and Implementation: Polihali North East Access Road and Site Establishment Areas.
K-7	Chris Carter	GIS Specialist	B.Sc. Survey (Hons) Land Surveying	Chris is both a registered professional land surveyor and registered professional GIS practitioner who chose to specialise in Geographical Information Systems (GIS) in 1995. Over the past 18 years he has developed

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				strong skills in working with orthophotos and super-imposing geo-referenced CAD data.
K-8	Martin Ntsihlele	Cadastral Surveyor	BSc. (Hons) Land Survey and Photogrammetry, University of Lesotho BSc. Maths and Physics, University of Nairobi.	Martin Ntsihlele has been practicing as a freelance Land Surveyor since 1989. In 2003, Martin registered a Limited Company, Ntsihele Land Surveyors. The main practices include engineering and topographic surveys. He is licensed by the Government of Lesotho to carry out cadastral surveys.
NK-1	Lipalesa Malebese	ESIA Specialist Support (Local)	Master of Environmental Management, University of KwaZulu-Natal. Bachelor of Science, Environmental Science, University of Lesotho.	Lipalesa is a member of the Environmental Assessment Practitioners Association of Lesotho (EAPAL). Recent experience undertaken within Maseru and Berea in 2017 includes: Lesotho Lowlands Rural Water Supply and Sanitation Project (LLRWSSP), Zone 2, Zone 5, Zone 17 and Zone 19; and Social Assessment –LLRWSP.
NK-2	Tatyana McNaughton	Sociologist / Anthropologist QAQC	MA. Social Science and Foreign Languages. MSc Applied Environmental and Social Economics.	Extensive experience delivering SIAs in Africa (to IFC PS, World Bank and African Development Bank (AfDB) requirements). Tatyana is a Technical Director who leads SIAs on large infrastructure projects. She was involved in projects in the following countries: Zambia, , Gabon, Republic of Equatorial Guinea, Guyana, Ghana, Jordan, Ethiopia, Oman, Nigeria, Rwanda, Saudi Arabia, Turkmenistan, Afghanistan, Pakistan, India, Albania, Greece, Italy, Senegal, Morocco, Brazil, Bangladesh, Turkey, Russia, Mongolia, Ukraine, Armenia, Uzbekistan, Azerbaijan, Bulgaria, Georgia, Iran, Kazakhstan, Kyrgyzstan, Moldova, Romania, Tajikistan.
NK-3	Carla Elliott	ESIA Specialist Support (International)	Masters of Social Science, Environmental Management, University of KwaZulu-Natal. Environmental Management University of KwaZulu-Natal Bachelor of Social Science (Honours), Geography and Environmental Management University of KwaZulu-Natal (2000) Bachelor of Social Science. Environmental and Geographical Sciences	Carla has 15 years post graduate experience in the field of economic development, project management and environmental services. Her role as project manager within the Economic Development Unit of the eThekwini Municipality afforded her valuable project planning and management experience. Her areas of expertise include: environmental strategic and framework planning, team management, Environmental and Social Impact Assessments (ESIAs), Environmental and Project Management and Reporting.
NK-4	Taole Tesele	Local Archaeologist / Palaeontologist	Honours BA Archaeology & Social Anthropology, University of Cape Town. University of Archaeology & Social Anthropology	Taole has experience in Cultural Heritage Impact assessments and development of Cultural Heritage Management Plan.
NK-5	Hassan Khan	Environmental Hydrologist	Honours in Bachelor of Science in Hydrology, University of KwaZulu-Natal, Pietermaritzburg	Hassen is a Principal Hydrologist with 8 years of experience in the engineering and environmental consulting sectors. His experience in hydrology provides an ideal platform for innovative hydrological and hydraulic solutions in the urban, mining and agricultural sectors both locally and internationally.

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				His key areas of expertise include Surface Water Impact Studies; Water Risk Assessment, Integrated Water Management Planning; Water Resource Assessment and Management; Flood Risk Assessment; Stormwater Management; Water Use Licensing.
NK-6	Greg Matthews	Environmental Hydrologist	University of KwaZulu-Natal; Bachelor of Science (Honours), Major in Hydrology University of KwaZulu-Natal; Bachelor of Science, Majors in Hydrology, Geography and Geology	Greg Matthews has over 20 years' experience in environmental water resource assessment and management related projects. His specialities include water management and sustainability, environmental risk appraisal, surface- and groundwater assessment (quality and quantity), flood risk, stormwater management, integrated water management planning and contaminated land assessment.
NK-7	Michael Adams	Terrestrial Ecologist	MBA (Master in Business Administration) University of the Witwatersrand. Bachelor of Science, Honours (Wildlife Management) Bachelor of Science (Environmental & Geographic Science) University of Cape Town	Michael has experience in project management, environmental impact assessment, environmental monitoring plans, biodiversity action plans, biodiversity studies, herpetofauna.
NK-8	Andrew Husted	Aquatic Ecologist	Master of Science (Aquatic Health); University of Johannesburg. Bachelor of Science, Honours (Aquatic Health); Rand Afrikaans University. Bachelor of Science (Zoology and Botany); Rand Afrikaans University	Andrew has experience in aquatic surveys, wetland studies, ecological assessments, monitoring surveys, GIS mapping and spatial analyses, Project management, Environmental impact assessment, Environmental monitoring plans, biodiversity action plans, IFC critical habitat assessments.
NK-10	Wayne Jackson	Wetland Specialist	Bachelor of Science (Soil Science and Hydrology); University of KwaZulu-Natal.	Wayne has experience with soils assessments, soil contamination studies, land capability assessments, agricultural potential assessments, wetland studies, wetland rehabilitation plans, monitoring surveys, GIS mapping and spatial analyses, project management, environmental impact assessment, environmental control officer (eco).
Terrestrial Team				
NK-11	Dr Gordon Craig O'Brien	Principal Ecologist	Postdoctoral Fellowship North West University. Doctor of Philosophy (Aquatic Health) University of Johannesburg. Master of Science (Aquatic Health) University of Johannesburg	Mau Mara Serengeti Sustainable Water Initiative. Application of the PROBFLO E-flows method and Building Block Methodology. Assessment of the fish communities of the Mara River, their wellbeing and response to altered flows. Preparation of NBI Guidance Document on Environmental Flows. Development of a customised Nile E-flows framework including technical manual and implementation guidelines. Project also included

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			Bachelor of Science (Zoology and Botany), Rand Afrikaans University Bachelor of Science, Honours (Aquatic Health), Rand Afrikaans University.	the demonstration of the Nile E-flows Framework in the Mara, Dinder, Kagera and Malaba Rivers, Nile Basin Instream Flow Requirement determination study for the Lesotho Highland Water Development study (Phase II, Polihali Dam): Specialist Consultants to Undertake Baseline Studies (Flow, Water Quality and Geomorphology) and Instream Flow Requirement (IFR) Assessment for Phase II. Monograph of the Limpopo River Catchment (Reserve and Ecological Water Requirement Study). Establishment of the reserve and evaluation of the ecological flow requirements of fishes within the Limpopo Catchment.
NK-11	Martinus Stefanus Erasmus	Terrestrial	National Diploma in Nature Conservation, Tshwane University of Technology. B-Tech in Nature Conservation, Tshwane University of Technology.	Ecological assessments, monitoring surveys, GIS mapping and spatial analyses, Environmental impact assessment, Environmental monitoring plans, biodiversity action plans, IFC critical habitat assessments. Aquatic and Wetland assessment assistant.
NK-11	Philip Patton	Avifauna	Honours Bachelor of Science, (EGS/Ornithology), University of Cape Town. Bachelor of Science (Geology and Botany), University of Port Elizabeth.	Philip has experience in Avifaunal Assessments, High Conservation Value Assessment for feasibility studies and environmental impact assessments.
Add.	Benedict Mateka	RAP Support	MSc, Urban Development Planning, University College, United Kingdom. Bachelor of Environmental Studies (Hons): Urban & Regional Planning, University of Waterloo, Canada.	Benedict has experience in carrying out of socio-economic studies (social and health impact assessment, assets adjudication, compensation, livelihoods restoration and development planning. He has been involved in resettlement planning relating to the land loss of projects, preparation and implementation Resettlement Action Plans, Resettlement Policy Framework, overseeing social participation in the construction of urban water supply infrastructure

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G POLICY, LEGISLATIVE AND REGULATORY FRAMEWORK

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G-1 *NATIONAL POLICIES AND LEGISLATION*

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LAW / POLICY / GUIDELINE	PROVISIONS
Constitution of Lesotho (1993)	Section 36 of Lesotho's constitution makes provision for the protection of the natural environment and states that *"Lesotho shall adopt policies designed to protect and enhance the natural and cultural environment of Lesotho for the benefit of both present and future generations and shall endeavour to assure all citizens a sound and safe environment adequate for their health and well-being".* **Applicability** All phases of the project are required to comply with this constitution and all legislation meant for protection of the environment.
Government of Lesotho Vision 2020	The Lesotho Vision 2020 statement is as follows: *"By the year 2020 Lesotho shall be a stable democracy, a united and prosperous nation at peace with itself and its neighbours. It shall have a healthy and well-developed human resource base. Its economy will be strong, its environment well managed and its technology well established".* Part of the Vision is to ensure that all Basotho have access to safe drinking water and basic sanitation in order to attain a healthy and well-developed human resource base. This is also in pursuit of achieving the Millennium Development Goal (MDG) 8 - ensuring environmental sustainability by reducing (up to half) the proportion of the people living without access to safe drinking water and basic sanitation and reversing loss of environmental resources. **Applicability** The proposed project falls within the national drive and planning for improving access to both water and sanitation. This will improve both human health and environmental management of resources. International and national guidelines for environmentally responsible construction and operation have been considered in the assessment and recommendation of mitigation measures.

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Lesotho Water and Sanitation Policy (2007)	This policy is based on the "*Recognition of a need for a holistic and sustainable water resources management and development approach, ensuring a wide participation of water stakeholders and treating the resource as an economic, environmental and social good".* Policy objectives include: – Promotion of adequate and sustainable supply of potable water and sanitation services to all the population of Lesotho – Promote harmonisation of processes and procedures followed by different development partners and other stakeholders in order to optimise available internal and external resources and ensure timely implementation of sector programmes. Transboundary water resources are addressed in Policy Statement 4, which states the intention to: *"Manage trans-boundary water resources on the basis of Lesotho's sovereignty in a way that ensures maximum benefits while taking cognisance of her obligations to downstream users under international law."* The strategies to achieve this objective include, promoting cooperation, adopting Integrated Water Resource Management (IWRM), and promoting bilateral initiatives for the development and implementation of an integrated planning frameworks. This policy states "All the Basotho are entitled to have access to a sustainable supply of potable water and to the provision of basic sanitation services at an affordable cost." The policy indicates that all Basotho have a right to 30 litres of water. **Applicability** The proposed bulk water supply project contributes to the national objectives of promoting equitable access to water supply and sustainable management of water resources. Potential impacts to downstream users have been considered in the ESIA, and the ESMP includes the needs for IWRM when recommending institutional arrangements.
National Environmental Policy (1998)	This policy provides the framework for water policy development in the country. The policy recognizes "periodic prolonged drought and scarcity of water for agriculture" and "pollution of land and water courses" in its preamble, and advocates providing access to portable water for all people. **Applicability** The proposed bulk water supply project contributes to the national objectives of promoting equitable access to water supply and sustainable management of water resources. The delivery of the projects has become increasingly crucial in light of current drought conditions affecting individual household and businesses; and for the support of existing and proposed industrial.
Lesotho HIV/AIDS Policy (2006)	The Policy reflects the GoL's commitment to ensuring adequate protection, care and support to all vulnerable groups in all interventions on HIV/AIDS. The framework provides guidance for stakeholders in the formulation of the National HIV and AIDS Strategic Plan, and the development of sectoral policies and plans. It also provides the framework for coordination, management arrangements, research, and monitoring and evaluation of the policy, including resource mobilisation, utilisation, and accountability. **Applicability** The Policy must form the basis of an HIV/AIDS program to be put in place by contractors involved in Project Works.

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Lesotho Gender Policy (2003)	The Gender and Development Policy is a government tool geared towards addressing the challenges of gender inequities and inequalities, poverty, increased spread of HIV/ AIDS, retrenchment and unemployment by adopting a rights-based approach to development. The policy is based on the realisation of human rights of all, women and men alike, holding principles of equal participation in development, non-discrimination and the empowerment of the marginalised women and men, boys and girls. **Applicability** The SIA identifies potential project related gender issues and assessment of potential disparity impacts to recommend measures to addresses these challenges.
Environment Act (No. 10 of 2008)	The Environment Act (No. 10 of 2008) makes provision for the following principles of environmental management: – To assure every person living in Lesotho the fundamental right to a clean and healthy environment; – To ensure that sustainable development is achieved through sound management of the environment; – To use and conserve the environment and natural resources of the Basotho Nation for both the present and future generations, taking into account the rate of population growth and the productivity of available resources; and, – To ensure that waste generation is minimized and safely disposed of. – Part V includes provisions for environmental management and protection including the need to carry out an ESIA for projects listed in its First Schedule – Part A. In addition, the Act prohibits emission of substances, which cause pollution in contravention of emission standards. It also prohibits discharge of hazardous substances, chemicals, materials and oils into the environment. **Applicability** The proposed development shall adhere to the provisions of this Act to ensure sound environmental management and sustainable development. The ESIA has been prepared to ensure protection of the biophysical and social environment during project implementation and operation. The ESIA content meets both the local requirements in line with the Environment Act (2008) and Lesotho EIA Regulations; as well as the requirements of the project donors – World Bank and European Investment Bank.

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Lesotho Water Act (2008)	This Act makes provision for the management of water resources in Lesotho in an integrated and sustainable manner. The principles underlying the Act include: sustainable usage; intergenerational equity; the equitable distribution of water and sanitation services; a public participatory approach; and, included in integrated water resources management, the integration of environmental and social issues, "among them, HIV/AIDS and gender mainstreaming". It establishes the office of the Commissioner of Water (COW) and defines powers and duties of the Commissioner and the Minister responsible for water resources. – Section 30 deals with compensation and states that "where compulsory acquisition of land is required in terms of this Act, compensation may be paid in accordance with the Land Act 1979. – Section 32 of the Act states that, the Minister shall have power to acquire, establish, control, manage and operate government waterworks. **Applicability** – The area surrounding the proposed Makhaleng WTW will be acquired by the COW. The area is currently being used for subsistence agricultural purpose (in the floodplain). These land users are required to be compensated for loss of livelihood. – This Act is relevant because this project involves the establishment of a bulk water supply scheme
Water Resource Act (1978)	The legislative framework for water resources management in Lesotho. The Act stipulates the requirements for obtaining a permit for any water use other than for domestic purposes, and specifies that domestic water use take priority over other uses. Under the Act, the Minister of Natural Resources declares certain areas protected for the purpose of development. Further legislation relevant to water resources is dispersed in several orders and acts administered by different departments. The objective of this Act is to provide for the use and control, the protection and conservation of water resources and for connection purposes. **Applicability** – It is the Consultants understanding that the below does NOT apply to the proposed project as water abstraction and sourcing direct from water bodies during construction is not permitted as per the ESMP; and neither is direct discharge of waste water to the environment: — A Water Use Permit is required for abstraction of water during construction, as well as any raw water used for construction purposes. — An Effluent Discharge Permit is required to be issued by the Department of Water Affairs (DWA) for direct discharge into water bodies. However, a Water Use Permit is required for abstraction of water during operation (outside current scope of application).

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Land Act (No 8 of 2010)	Land Act (No 8 of 2010) provides for the granting of titles to land, the administration of land, expropriation of land for public purposes, the grant of servitudes, regulation and adjudication and settlement of disputes. The Act also states that "*No compensation shall be payable under section 53(1) where:* *The land which suffers damage has been either replaced or restored;* *Movable property damaged has been either replaced or restored; or* *The works constructed do not interfere substantially with the enjoyment of land; and* *"(2) Nothing in subsection (1) shall be deemed to preclude the payment of compensation for damage to crops on the land affected by the exercise of the servitude".* Part X of the Act also makes provision for 'compensation' of property at market value, should a person be deprived of it. **Applicability** The project complies with the provisions of this Act as a minimum; however, additional compensation requirements aligned with World Bank Operation Policy (OP) 4.12 are included in the Resettlement Action Plan process. The OP 4.12 requires that displaced people's livelihoods and standards of living be restored (as a minimum) to pre-displacement levels, if not improved.
Mines and Minerals Act (No. 4 of 2005)	Provides rules relative to the exploration for and the exploitation of mineral resources and related matters such as the protection of the environment and the use of water resources. Permits issued by the Department of Mines are required for the establishment of quarries and borrow pits. In line with Section 58 all material sourcing areas must be rehabilitated. This Act also addresses issues of staff employment in section 11(1) – preference in employment of staff has to be given to Lesotho citizens with the required qualifications and training is required to encourage and promote development of Lesotho citizens employed. **Applicability** The current application excludes the assessment of construction material being sourced from quarries and borrow pits. The ESMP stipulates that construction material is to be sourced only from existing and lawful facilities (e.g. national quarries).
Road Traffic Act (No. 8 of 1981)	The Act provides for the registration of vehicles, use of vehicles on public roads and regulation of traffic. According to Chapter 3 Section 20, a Certificate of Road Worthiness will be required for all project vehicles. Chapter 8 provides the rules of the road that must be adhered to by construction vehicles and delivery trucks. **Applicability** Construction vehicles and machinery used on site and travelling to and from site are required to comply with the Act provisions.
Road Transport Act (No. 6 of 1981)	Part III of this Act provides for control of road transport through permits. **Applicability** All material delivery trucks will be required to have a B-permit issued under this Act by the Department of Transport.

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Local Government Act (1997)	Local Authorities are amongst others charged with the responsibility of land administration, water supply and public health. **Applicability** Local authorities have been engaged with from ESIA inception phase. This will continue throughout into the ESIA Disclosure phase.
Anti-Trafficking in Persons Act (No. 1 of 2011)	The GoL enacted the Anti-Trafficking in Persons Act No. 1 of 2011 that prohibits and punishes all forms of trafficking and requires protection measures for victims of trafficking and forced labour. **Applicability** In line with this Act all efforts must be made towards prohibition and prevention of the offence of Trafficking in Persons (TIP). Project Contracts must ensure legitimate employment and fair remunerations. Measures are included in the ESMP (Vol II) to increase protection of vulnerable groups during employment.
Public Health Order (1970)	Provides requirements for human dwellings including issues of sanitation as a measure of disease prevention, through making accessible to workers, safe drinking water and toilets at all times. The Order emphasizes that no person shall cause nuisance or allow nuisance to continue on any land or premises owned or occupied by him or of which he is in charge, which is likely to be injurious or dangerous to health as per Section 56. **Applicability** The contractor shall ensure safe environment for workers. It is also the developers' obligation to ensure a safe and health environment surrounding the project working areas.
Labour Code Order, as amended (1992)	Part VII of this Code deals with Health, Safety and Welfare at work *viz. "The employer is required to ensure that persons, both those employed and those not employed but who may be affected by his/her activities, are (as far as is reasonably practicable) not exposed to risks to their safety and health".* The Labour Code Order aims to prevent accidents likely to cause harm to workers. The Order refers to Labour Recruitment, Occupational Health and Safety, Working Conditions and Management of HIV and AIDS at the workplace, amongst other aspects. **Applicability** The Labour Code is to be used as a guide for matters of recruitment, payment of labourers, and overall treatment of hired labour during the construction. Key requirements relevant to the bulk water supply project has been included in the ESMP. The developer and contractor should also comply with the following Labour Code Amendments: – Construction Regulations (2002) – Codes of Good Practice (2003) – HIV and AIDS at Workplace Guidelines (2010)

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Natural Heritage Resources Act (2012)	Extends legislative protection to living and intangible heritage and also informs the management measures required for dealing with heritage artefacts, chance finds, ash heaps, and graves. **Applicability** A number of physical cultural resources (archaeological / paleontological sites and burial grounds) have been identified within the Project AoI. Management requirements have been included in **Vol II** (Cultural Heritage Management Plan and ESMP).
Heritage Bill (2006)	The heritage bill is charged with the responsibility of classifying heritage sites, including archaeological and paleontological sites. The bill also ensures that sites are taken to preserve the most important sites and interpret them to the public. **Applicability** The ESIA identifies a number of alternative routing and location to avoid direct impacts to the identified physical cultural resources. Should additional archaeological and paleontological sites be discovered during the construction phase, the chance find procedure defines within Vol II (Cultural Heritage Management Plan and ESMP) must be followed.
Historical Monuments and Relics, Fauna and Flora Act (1967)	This Act prohibits the destruction, damage or removal of relics, monuments and certain specified fauna and flora. The Proclamation, made under section 8 of the Act, 1967 specifies monuments, relics, protected fauna and protected flora for purposes of the Act. It provides for the establishment of a Commission for the preservation of natural and historical monuments, relics and antiques and protection of fauna and flora as a body corporate and authorises the Minister to designate protected species. Provision is made for penalties. **Applicability** The Mitigation Hierarchy Area has been adopted in the development of measures within the ESMP (Vol II) to avoid and reduce likelihood of damaging cultural resources and protected species.
Lesotho Water Security and Climate Change Assessment (2016)	The Assessment of the World Bank Group looks at balancing opportunities afforded by the continued development of water resources within Lesotho, with the need to increase water security against potential future vulnerabilities of Lesotho's water management system to climate change. It examines these vulnerabilities by exploring a set of adaptation strategies across a wide range of potential future conditions, demonstrating that such strategies can provide benefits to water resources management over a broad range of possible future scenarios for possible positive outcomes. **Applicability** Implementation of the proposed project has the potential to provide benefits to water resources management as proposed implementation of ESMP (Vol II) measures seeks to enhance collaboration across government departments for an integrated approach for water conservation and reducing vulnerability to climate change risks.
Legal Capacity of Married Persons Act (2006)	Together with application of the Land Act (2010) and Decentralisation Policy (2014), individuals are facilitated to be able to take part in development activities. **Applicability** The above instruments are relevant to ESIA as they support the Lesotho Constitution in terms of Gender issues where women are given equal rights with men in all developmental issues/activities.

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Public Health Bill, which seeks to repeal the Public Health Order No.12 of 1970	A Public Health Bill including regulations has been drafted and awaits enactment by Parliament. This Bill provides for the establishment of the national health system in Lesotho and has been discussed widely among different stakeholders including at cabinet level. **Applicability:** According to the Bill, public and occupational services include the active promotion of sanitation and universal access to a protected source of water.
Lesotho's Health and Social Welfare Policy (2004);	This policy has been revised to the National Social development policy 2012. The policy was aimed at responding to the national needs with special focus on the most vulnerable persons. **Applicability:** The policy indicates that other determinants of health include water and sanitation, and health services. These factors are described as socio-economic, cultural and environmental conditions and they affect an individual's social and educational pathway through life.
Health Sector Strategic Plan 2012/13-2016/17	The Purpose of the Health sector strategic plan 2012/13-2016/17 is “to consolidate health systems that will guarantee quality health care to the poor, vulnerable and disadvantaged”. The priority areas include HIV and AIDS care, treatment and prevention as well as sanitation and hygiene. The strategic plan also takes into consideration issues of gender balance in health service planning and implementation. **Applicability:** The above strategic plan is applicable to the project as it is a government tool geared towards addressing among other things the challenges of gender inequities and inequalities, sanitation and hygiene as well as increased spread of HIV/ AIDS.
National HIV and AIDS Strategic Plan (2006 – 2011), and related guidelines such as for HIV treatment	The mission of national HIV and AIDS strategic plan is to “provide comprehensive high quality HIV and AIDS services and community led interventions which reduce new infections, provide treatment, care and support and impact mitigation for all Basotho whilst recognizing and assuring participation of all stakeholders”. The overarching goal of this plan is to “scale up universal access to information , knowledge and services to enable individuals to protect themselves from HIV infection and access treatment, care, support and impact mitigation services and empathize with those affected by HIV and AIDS” **Applicability:** This plan is relevant to the project as it provides guidelines for prevention of the spread of HIV and AIDS. In line with the strategic plan, the project has to make efforts towards prevention of the spread of HIV and AIDS in the project area.

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G-2 INTERNATIONAL AND REGIONAL CONVENTIONS AND PROTOCOLS

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CONVENTION	PROVISIONS
Basel Convention (1989)	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal aims to address the growing threat to human health and the environment posed by the increased generation and complexity, and transboundary movement of hazardous wastes and other wastes. States should take necessary measures to ensure that the management of hazardous wastes and other wastes including their transboundary movement and disposal is consistent with the protection of human health and the environment whatever the place of disposal. **Applicability** The appointed waste removal company must keep proof of hazardous waste disposal whether in Lesotho or South Africa as outlined in the ESMP (**Vol II**).
Stockholm Convention (2004)	Stockholm Convention on Persistent Organic Pollutants (POPs) aims to eliminate or restrict the production and use of POPs which accumulate in the atmosphere. **Applicability** The convention applies to the combustion of plastics and release of dioxins and furans into the atmosphere. The ESMP (**Vol II**) stipulates that the contractor is not permitted to burn of plastic as a waste management measure.
Convention on Wetlands of International Importance Especially as Waterfowl Habitat (RAMSAR)	The RAMSAR Convention is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. **Applicability** The WTW is partially located in a delineated wetland. It is proposed that the proposed siting of the WTW shift in order to avoid / reduce impacts to the wetland.
Southern African Development Community (SADC) Revised Protocol on Shared Watercourses (2000)	Southern Africa relies on agriculture for its subsistence, water is therefore of special concern for SADC. Many watercourses in the region are shared among several Member States, a situation that demands their development in an environmentally sound manner. To this end, SADC initially passed its Protocol on Shared Watercourses in the SADC on 28th August 1995, which was revised on 7th August 2000. The Protocol aims to foster closer cooperation among Member States for protection, management, and use of shared watercourses in the region. Member States agree to cooperate on projects and exchange information on shared watercourses, consulting with each other and collaborating on initiatives that balance development of watercourses with conservation of the environment. The Protocol also contains an institutional framework that sets out a Water Sector Organ, its committees and units, and its duties for joint protection and development of shared watercourses in Southern Africa. **Applicability** COW has, and will continue to engage with riparian states on the status of the projects, which entails work on the Makhaleng River, which flows generally in a south-westerly direction to join the Orange River at the border with Frees State in South Africa.

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Rio Declaration (1992)	The Rio Declaration on Environment and Development, often shortened to Rio Declaration consist of 27 principles intended to guide countries in future sustainable development. The principles include; sustainable development in harmony with nature, restriction of pollutants spread to different countries, development must be done in such a way that environmental needs of future generations are met, and environmental impact assessment shall be undertaken for proposed activities to point out adverse effects. **Applicability** The construction of the project must take place in such a manner to not adversely affect the environment. Strict compliance with the ESMP (**Vol II**) is required to be enforced and monitored.
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	CITES is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. As the trade in wild animals and plants crosses borders between countries, the effort to regulate it requires international cooperation to safeguard certain species from over-exploitation. CITES was conceived in the spirit of such cooperation. Today, it accords varying degrees of protection to more than 35,000 species of animals and plants, whether they are traded as live specimens, fur coats or dried herbs. **Applicability** The convention is applicable to the illegal trade of species; this is specifically relevant to species that might be un-earthed in the project area and possible trade with South Africa / Botswana.
Convention on Climate Change	The ultimate objective of this Convention and any related legal instruments (Kyoto Protocol to the Convention on Climate Change) that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a period sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner. **Applicability** LLBWSS is critical for ensuring water-resilience in the domestic and industrial sectors Both climate change vulnerability and mitigation has been considered in the ESIA. The ESMP (Vol II)
Southern Africa Development Community (SADC) Policy and Strategy for Environment and Sustainable Development	SADC recognises the importance of sustainable use and management of the environment in the fight against poverty and food insecurity. In order to address sustainable development, SADC has established three main environmental policy goals: – Protect and improve the health, environment and livelihoods of the people of southern Africa with priority to the poor majority; – Preserve the natural heritage, biodiversity and life supporting ecosystems in southern Africa; and – Support regional economic development on an equitable and sustainable basis for the benefit of present and future generations. **Applicability** The objectives of the proposed project are well aligned with the Policy as it will result in improved community health and sanitation; and promotes more equitable access to potable water. The assessment undertaken in the ESIA, and the measures contained in the ESMP have been undertaken to ensure that both biophysical and social resources are support and not disturbed.

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African Ministerial Conference on Environment (AMCEN), and other similar programmes	AMCEN's mandate is to provide advocacy for environmental protection in Africa; to ensure that basic human needs are met adequately and in a sustainable manner; to ensure that social and economic development is realized at all levels; and to ensure that agricultural activities and practices meet the food security needs of the region. They also review and monitor environmental programmes at regional, sub-regional and national levels. **Applicability** The AMCEN guidelines provide environmental awareness guidelines for the sustainable use and development in the natural environment as outlined in the Ecological Impact Assessment Report. These guidelines have been considered during the darting of proposed mitigation and monitoring measures. .
Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW) (1987)	**Appilcability** The project shall ensure that women are afforded equal employment opportunities throughout all the phases of the project.
Convention on the Rights of the Child (CRC) (1989)	**Applicability** Procedures for child protection against violence and abuse as a result of constrution works in project areas shall be developed and implemented. The project shall also ensure prevention of child labour by ensuring that only adults are engaged in the project.
Vienna Declaration and Programme of Action: Vienna Conference on Human Rights (1993)	**Applicability** The Declaration seeks to promote economic and social progress of all peoples. Employment creation as a result of the project shall therefore contribute to economic progress of communities in the project areas and of individuals that shall be engaged in the project. Measures shall be put in place to prevent social deterioration in project communities.
International Covenant on Economic, Social and Cultural Rights (1993)	**Applicability** The project shall ensure that measures are in place to afford employees labour rights. Both employees and communities' right to health shall be maintained. The operation phase shall be a positive step towards the right to adequate standard of living.
Millennium and Sustainable Development Goals (2000, 2015)	**Applicability** The project is a positive step towards sustainable development goal on clean water and sanitation. It is important to ensure compliance with the ESMP (VOL 2) developed for the project in order to ensure sustainability of the project.
Convention on the Rights of Persons with Disabilities (2006)	**Applicability** People with disabilities shall be afforded the right to human rights brought about by the project.
Convention for the Safeguarding of the Intangible Cultural Heritage (2008)	**Applicability** It is important to implement the cultural heritage management plan developed as part of the ESMP for the project in order to ensure respect for the intangible cultural heritage of the communities and individuals in the project area.

G-3 WORLD BANK OP APPLICABILITY

APPENDIX

OBJECTIVES	OPERATIONAL PRINCIPLES	APPLICABILITY
Environmental Assessment (OP 4.01)		
To help ensure the environmental and social soundness and sustainability of investment projects.	Use a screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment (EA). Such screening permits that studies are undertaken proportional to potential risks and to direct (and, as relevant, indirect, cumulative, and associated) impacts. Use sectoral or regional environmental assessment when appropriate.	The scope of impact assessment for the proposed project is aligned with requirements of Category A. The environmental assessment for a Category A project examines the project's potential negative and positive environmental impacts, compares them with those of feasible alternatives (including the "without project" situation), and recommends any measures needed to prevent, minimise, mitigate, or compensate for adverse impacts and improve environmental performance.
To support integration of environmental and social aspects of projects into the decision making process.	Assess potential impacts of the proposed project on physical, biological, socio-economic and physical cultural resources (PCR), including transboundary and global concerns, and potential impacts on human health and safety.	Impacts are identified, described and assessed in **Chapter 7: Physical Environmental and Social Aspects**; and **Chapter 8: Physical Environmental and Social Impacts of the ESIA Report**.
	Assess the adequacy of the applicable in-country and international legal and institutional framework, including applicable international environmental agreements, and confirm that they provide that the cooperating government does not finance project activities that would contravene such obligations.	A legal and policy review of both national and international requirements is outlined in **Chapter 3: Policy, Legislative and Regulatory Framework** and associated appendices. It is noted that contradiction across Lesotho and World Bank does not exist; however in some instances, the World Bank requires that the study, recommendations and interventions are expanded (e.g. compensation and livelihood restoration for Potentially Affected People (PAPs) who do not own land, but only use land).
	Provide for assessment of feasible investment, technical, and siting alternatives (including the "no action" alternative); potential impacts, feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and the institutional, training and monitoring requirements associated with them.	The Detailed Design and Infrastructure Reports prepared by SMEC (2018) outline a number of feasibility and technical alternatives in terms of supply options and reservoir designs; including the “no action” alternative. The Consultant team has identified requirements for alternative pipeline routings and reservoir locations to avoid impacts. This is detailed in **Chapter 5: Analysis of Alternatives.**
	Prevent and, where not possible to prevent, at least minimize, or compensate for adverse project impacts and enhance positive impacts through environmental management and planning. This includes the proposed prevention and mitigation measures, monitoring, institutional capacity development and training measures, an implementation schedule, and cost estimates.	The Mitigation Hierarchy is based on a series of essential, sequential steps that must be taken throughout the project’s life cycle in order to limit negative impacts. The Mitigation Hierarchy (Avoidance – Minimisation – Rehabilitation / Restoration – Offset). This has been applied when proposing prevention, compensation and mitigation measures within the **ESMP (Vol II)**.

	Involve stakeholders, including project-affected groups and local non-governmental organisations, as early as possible, in the preparation process and ensure that their views and concerns are made known to decision makers and taken into account. Continue consultations throughout project implementation, as required in order to address EA-related issues raised.	Consultation/stakeholder engagement/social participation is central to the ESIA (and is closely linked to the socio-economic and Resettlement Action Plan (RAP) activities). The Public Participation Report (Appendix X) details the process followed and outcomes of authority sensitisation, and *Pitsos* (public gatherings) undertaken at village level. Further Public Disclosure of the ESIA will be facilitated following submission to DoE.
	Use independent expertise in the preparation of EA where appropriate. Use independent advisory panels during preparation and implementation of projects that are highly risky or contentious, or that involve serious and multi-dimensional environmental and/or social concerns.	COW responsibility.
	Provide measures to link the environmental assessment process and findings with studies of economic, financial, institutional, social and technical analyses of a proposed project.	Institutional strengthening recommendations are outlined in the **ESMP (Vol II)**.
	Provide for application of the principles in this Table to sub-projects under investment and financial intermediary activities.	COW responsibility.
	Disclose draft EA in a timely manner, before appraisal formally commences and in a form and language understandable to key stakeholders.	A stakeholder workshop with community leaders from Zone 6 and 7 was held during the Inception Phase. Comments and concerns raised together with responses are captured in the **Public Participation Report** (**Appendix E**). In addition, extensive consultation has been undertaken with communities during public gatherings / *Pitsos* sharing project details and possible impact (negative and positive). Comments and concerns raised have been consolidated into key themes for reporting purposes and contained within **Public Participation Report (Appendix X.** An Executive Summary of the Draft ESIA will be prepared to encourage further authority and community involvement (distributed ahead of the planned Public Disclosure Workshop).
Natural Habitats (OP 4.04)		
To promote environmentally sustainable development by supporting the protection, conservation, maintenance, and	Use a precautionary approach to natural resources management to ensure opportunities for environmentally sustainable development. Determine if project benefits substantially outweigh potential environmental costs.	The IFC PS6 is the guideline for the project, this will ensure implementation of a precautionary approach.

rehabilitation of natural habitats and their functions.	Avoid significant conversion or degradation of critical natural habitats, including those habitats that are (a) legally protected, (b) officially proposed for protection, (c) identified by authoritative sources for their high conservation value, or (d) recognized as protected by traditional local communities.	Identification of a) natural habitat issues and b) measures to protect these areas is a critical element of this operational policy. Standalone specialist studies have been prepared: – **Ecological Impact Assessment (Appendix A)** – **Social Impact Assessment (Appendix C)** – **Cultural Heritage Impact Assessment (Appendix D)** The ecological, social and archaeological experts will engage in this regard.
	Where projects adversely affect non-critical natural habitats, proceed only if viable alternatives are not available, and if appropriate conservation and mitigation measures, including those required to maintain ecological services they provide, are in place. Include also mitigation measures that minimize habitat loss and establish and maintain an ecologically similar protected area.	The Mitigation Hierarchy will be implemented for the project (**Chapter 2: Methodology**). Project alternatives (pipeline re-routing and relocation of associated infrastructure e.g. the WTW and reservoirs) are detailed in **Chapter 5: Analysis of Alternatives.**
	Whenever feasible, give preference to siting projects on lands already converted.	The Mitigation Hierarchy will be implemented for the project (**Chapter 2: Methodology**). Project alternatives (pipeline re-routing and relocation of associated infrastructure e.g. the WTW and reservoirs) are detailed in **Chapter 5: Analysis of Alternatives.**
	Consult key stakeholders, including local non-governmental organizations and local communities, and involve such people in design, implementation, monitoring, and evaluation of projects, including mitigation planning.	The public consultation process undertaken to date is outlined in the Public **Participation Report (Appendix E**). Recommendations for further stakeholder involvement throughout the construction and operation phase is outlined in the **Communication Strategy** appended to **ESMP (Vol II)**.
	Provide for the use of appropriate expertise for the design and implementation of mitigation and monitoring plans.	Managements, mitigation and monitoring measures have been recommended by team experts and included in the ESMP (Vol II).

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	Disclose draft mitigation plan in a timely manner, before appraisal formally begins, in an accessible place and in a form and language understandable to key stakeholders.	World Bank disclosure guidelines state that the method of disclosure needs to be undertaken in a way that is readily understandable. It needs to communicate the project activities, how communities could be affected, and give community an opportunity to raise their issues and concerns. The initial public consultation process (involving public gatherings / Pitsos) on this project has been extensive in covering these principles. The Lesotho legislation requires an ESIA disclosure process involving the placement of the ESIA Report on website and a two-week comment period mainly targeting NGO's / non-community stakeholders. This will be done in parallel with the DoE authorisation process due to time constraints. The DoE is responsible for inviting comments from the public; and will determine the need for a public hearing for persons most likely to be affected by the proposed project or activity if it deems necessary (Section 22, Environment Act (2008)). The DoE consult with the Line Ministries relevant to the project and decide whether to approve the project and issue an EIA Licence or not.
Pest Management (OP 4.09)		
To minimize and manage the environmental and health risks associated with pesticide use and promote and support safe, effective, and environmentally sound pest management.	Promote use of demand driven, ecologically based biological or environmental pest management practices (Integrated Pest Management [IPM] in agricultural projects and Integrated Vector Management [IVM] in public health projects) and reduce reliance on synthetic chemical pesticides. Include assessment of pest management issues, impacts and risks in the EA process.	The proposed project is not primarily an agricultural nor public health project. The study area however includes subsistence farming areas which could be negatively impacted should the use of dangerous pesticides be recommended for the control of alien invasive species. In addition, the key purpose of the project is to deliver potable water to outlying communities, therefore direct positive and indirect negative health impacts on the communities in the study area will be assessed. Sludge at the proposed WTW has the potential to attract pest species. Measures for the control of this aspect is included in the ESMP (**Vol II**).
	Procure pesticides contingent on an assessment of the nature and degree of associated risks, taking into account the proposed use and intended users. Do not procure formulated products that are in WHO Classes IA and IB, or formulations of products in Class II unless there are restrictions that are likely to deny use or access to lay personnel and others without training or proper equipment Reference: WHO's "Recommended Classification of Pesticides by Hazard and Guidelines to Classification" (IOMC, 2000-2002).	It is noted that where environmental methods alone are not effective, the Bank may finance the use of pesticides for control of disease vectors. Only appropriate pesticides may be used as included in the ESMP (Vol II).
Cultural Property (OP 4.11)		

To assist in preserving physical cultural resources and avoiding their destruction or damage. PCR includes resources of archaeological, paleontological, historical, architectural, and religious (including graveyards and burial sites), aesthetic, or other cultural significance.	Use an environmental assessment (EA) or equivalent process to identify Physical Cultural Resources (PCR) and prevent or minimize or compensate for adverse impacts and enhance positive impacts on PCR through site selection and design.	The proposed project has the potential to disturb cultural property due to large scale excavation and earth moving required. An archaeological, paleontological study will be undertaken to identify potential culturally important areas to be avoided as far as possible. Where this is not possible, engagement with the community will need to be undertaken with assistance of the public consultation specialist and COW. The archaeological and ecological exerts will liaise to determine and assess natural environmental features that have cultural significance (e.g. sacred graves, sacred sites).
	As part of the EA, as appropriate, conduct field based surveys, using qualified specialists.	The methodology proposed to be carried out by a professional Archaeologist involvement both desktop review and field survey was included the proposal and scope approved in the contract.
	Consult concerned government authorities, relevant non-governmental organizations, relevant experts and local people (relevant project affected groups) in documenting the presence and significance of PCR, assessing the nature and extent of potential impacts on these resources, and designing and implementing mitigation plans.	The initial reconnaissance survey has identified a number of graves along the road. The more detailed site assessment will verify whether these occur within the road servitude in which the pipeline route is to be placed in most part. The socio-economic questionnaire includes questions to gather data on archaeological and social significance sites/artefacts. The University will be consulted to verify items if needs be.
	For materials that may be discovered during project implementation, provide for the use of "chance find" procedures in the context of the PCR management plan or PCR component of the environmental management plan.	A Chance Find Procedure with relevant key contact details will be included in the ESMP.
	Disclose draft mitigation plans as part of the EA or equivalent process, in a timely manner, before appraisal formally begins, in an accessible place and in a form and language that are understandable to key stakeholders.	The loss of such cultural resources is irreplaceable and will be avoided as far as possible. It is not envisaged that the project will involve land acquisition where cultural constructions, historical heritages, or temples exist. However if this requirement does emerge, a plan for preservation will be included in the ESMP.
Involuntary Resettlement (OP 4.12)		
To avoid or minimize involuntary resettlement and, where this is not feasible, to assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to	Assess all viable alternative project designs to avoid, where feasible, or minimize involuntary resettlement.	Involuntary Resettlement is applicable to this project as its infrastructural aspects have the potential to disturb and remove assets/property through land requirements for water treatment plants, pipelines, pumping stations and treated water storage reservoirs (tanks). Alternative pipeline routes and reservoir location have been proposed in Chapter 5: Analysis of Alternatives to avoid and minimise resettlement. The key rationale for the proposed alternative pipeline routes are to avoid involuntary resettlement. Only one case of involuntary resettlement may occur because of project infrastructure.

the beginning of project implementation, whichever is higher.	Through census and socio-economic surveys of the affected population, identify, assess, and address the potential economic and social impacts of the project that are caused by involuntary taking of land (e.g., relocation or loss of shelter, loss of assets or access to assets, loss of income sources or means of livelihood, whether or not the affected person must move to another location) or involuntary restriction of access to legally designated parks and protected areas.	This is covered in the **Social Impact Assessment (Appendix C)**; and **Resettlement Action Plan (RAP) (Vol III).**
	Identify and address impacts also that result from activities that are (a) directly and significantly related to the proposed project, (b) necessary to achieve its objectives, and (c) carried out or planned to be carried out contemporaneously with the project.	The RAP currently under preparation is designed to identify and address impacts related to PAPs' welfare. The RAP will also utilise information from other ESIA Studies (e.g. Socio-Economic, Archaeology, Palaeontology and Heritage; and public consultation).
	Consult project-affected persons, host communities and local non-governmental organizations, as appropriate. Provide them opportunities to participate in the planning, implementation, and monitoring of the resettlement program, especially in the process of developing and implementing the procedures for determining eligibility for compensation benefits and development assistance (as documented in a resettlement plan), and for establishing appropriate and accessible grievance mechanisms. Pay particular attention to the needs of vulnerable groups among those displaced, especially those below the poverty line, the landless, the elderly, women and children, Indigenous Peoples, ethnic minorities, or other displaced persons who may not be protected through national land compensation legislation.	What is applicable in this project is the loss of pieces of land and associated assets (sites, fields, trees, gardens). Based on 2010 maps and the reconnaissance inspection limited structures will be impacted, although the asset adjudication phase could reveal some recently affected structures. Notwithstanding this no relocation is envisaged. Consultation/participation is central to the RAP preparation process and is being undertaken at Local Authority structures' level and at villagers' levels. It will continue throughout all phases of RAP preparation and implementation. The grievance redress mechanism is already prescribed in the RPF and will be localised in the RAP. Vulnerable groups will be identified through socio-economic surveys and livelihoods restoration plans would be developed in consultation with the PAPs and Authorities. The monitoring framework is designed to trace the affected persons.

	Inform displaced persons of their rights, consult them on options, and provide them with technically and economically feasible resettlement alternatives and needed assistance, including (a) prompt compensation at full replacement cost for loss of assets attributable to the project; (b) if there is relocation, assistance during relocation, and residential housing, or housing sites, or agricultural sites of equivalent productive potential, as required; (c) transitional support and development assistance, such as land preparation, credit facilities, training or job opportunities as required, in addition to compensation measures; (d) cash compensation for land when the impact of land acquisition on livelihoods is minor; and (e) provision of civic infrastructure and community services as required.	As stated above, relocation is not envisaged in this particular project provided the proposed pipeline alternatives be found feasible. Should PAP requirement be identified, the Involuntary Resettlement stipulation concerning relocation would be observed. Compensation will be disbursed as part of the RAP to all the affected persons, including communal and State assets as applicable and in alignment with the RPF (SMEC, 2018).
	Give preference to land-based resettlement strategies for displaced persons whose livelihoods are land-based.	
	For those without formal legal rights to lands or claims to such land that could be recognized under the laws of the country, provide resettlement assistance in lieu of compensation for land to help improve or at least restore their livelihoods.	A large number of informal traders (with informal structures) exist within the legal road reserves in urban areas and busy road junctions) where pipelines are proposed to be laid. However, their displacement is expected to be temporary (~ 4-6 weeks) during physical construction and rehabilitation, after which they would be able to return subject to Local Authority enablement. They do not have 'land claims' within the gazetted road reserves but have been trading with the Local Authorities' sanction. The Compensation Policy stipulates cash compensation if they are displaced permanently.
	Disclose draft resettlement plans, including documentation of the consultation process, in a timely manner, before appraisal formally begins, in an accessible place and in a form and language that are understandable to key stakeholders.	The RPF (2018) stipulates how information disclosures are to be carried out in line with the Involuntary Resettlement (OP 4.12) of the World Bank. The RAP will align with, and further elaborate on this.
	Apply the principles described in the involuntary resettlement section of this Table, as applicable and relevant, to subprojects requiring land acquisition.	Zones 6 and 7 Bulk Water Supply Project is a 'sub project' following the OP 4.12 Involuntary Resettlement principles, including production of the RPF for sub-projects implementation to which the current RAP will align.

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	Design, document, and disclose before appraisal of projects involving involuntary restriction of access to legally designated parks and protected areas, a participatory process for: (a) preparing and implementing project components; (b) establishing eligibility criteria; (c) agreeing on mitigation measures that help improve or restore livelihoods in a manner that maintains the sustainability of the park or protected area; (d) resolving conflicts; and (e) monitoring implementation.	Public access restrictions in Zone 6 and 7 do not exist in any significant scale, and where they may potentially exist, RAP recommendations would address this (i.e. trenches for laying pipes should remain open for no more than a stipulated time to prevent harm to community and livestock). Lack of significant access restrictions on this project renders the Involuntary Resettlement restriction sections not applicable in this case.
	Implement all relevant resettlement plans before project completion and provide resettlement entitlements before displacement or restriction of access. For projects involving restrictions of access, impose the restrictions in accordance with the timetable in the plan of actions.	What is applicable in this project is the requirement to disburse compensation before the project could physically commence. The Policy, RPF and current RAP are designed to ensure that.
	Assess whether the objectives of the resettlement instrument have been achieved, upon completion of the project, taking account of the baseline conditions and the results of resettlement monitoring.	Data collection will allow for further baseline information. A Monitoring and Evaluation System to monitor implementation of the RAP recommendations at the end of implementation phase is attached to ESMP (Vol I). This will allow for COW to prepare a project implementation completion report, assessing the extent of objectives achievement.
Dam Safety (OP 4.37)		
To assure quality and safety in the design and construction of new dams and the rehabilitation of existing dams, and in carrying out activities that may be affected by an existing dam.	Identify existing dams and dams under construction that can influence the performance of the project and implement necessary safety measures/remedial works.	“Small dams” are defined as typically <15m height, and the OP states that ‘generic dam safety measures designed by qualified engineers are usually adequate’. The reservoirs for the proposed project have been designed by a qualified engineer, and do not exceed 8.5m in height.
	Use experienced and competent professionals to design and supervise the construction, operation, and maintenance of dams and associated works (for the life of the dam).	
	Develop detailed plans, including for construction supervision, instrumentation, operation and maintenance and emergency preparedness.	
	Use independent advice on the verification of design, construction, and operational procedures and appoint independent panels of experts for large or high hazard dams.	
	Use contractors that are qualified and experienced to undertake planned construction activities.	

	Carry out periodic safety inspections of new/rehabilitated dams after completion of construction/rehabilitation, review/monitor implementation of detailed plans and take appropriate action as needed.	
To assist in preserving physical cultural resources and avoiding their destruction or damage. PCR includes resources of archaeological, paleontological, historical, architectural, and religious (including graveyards and burial sites), aesthetic, or other cultural significance.	Use an environmental assessment (EA) or equivalent process to identify Physical Cultural Resources (PCR) and prevent or minimize or compensate for adverse impacts and enhance positive impacts on PCR through site selection and design.	The proposed project has the potential to disturb cultural property due to large scale excavation and earth moving required. An archaeological, paleontological study has been undertaken to identify potential culturally important areas to be avoided, protected and enhanced as far as possible. Twelve sites have been identified where water supply infrastructure is planned to be located and cultural resources are located. This is detailed in **Chapter 7: Physical Environmental and Social Aspects**; and **Appendix D: Cultural Heritage Survey Report.**
	As part of the EA, as appropriate, conduct field based surveys, using qualified specialists.	Methodology is detailed in **Appendix D: Cultural Heritage Survey Report.**
	Consult concerned government authorities, relevant non-governmental organizations, relevant experts and local people (relevant project affected groups) in documenting the presence and significance of PCR, assessing the nature and extent of potential impacts on these resources, and designing and implementing mitigation plans.	Findings of the **Cultural Heritage Assessment Report (Appendix D)** have been incorporated into the environmental assessment. This will be shared with authorities during public disclosure. The ESMP includes measures to manage cultural resources. Should relevant authorities require additional interventions; this will be included in the Final ESMP.
	For materials that may be discovered during project implementation, provide for the use of "chance find" procedures in the context of the PCR management plan or PCR component of the environmental management plan.	A Chance Find Procedure with relevant key contact details is included in the **Cultural Heritage Management Plan** appended to the ESMP, and carried across into the ESMP (**Vol II**).
	Disclose draft mitigation plans as part of the EA or equivalent process, in a timely manner, before appraisal formally begins, in an accessible place and in a form and language that are understandable to key stakeholders.	Findings of the **Cultural Heritage Assessment Report (Appendix D)** have been incorporated into the environmental assessment. This will be shared with authorities during public disclosure. The ESMP includes measures to manage cultural resources. Should relevant authorities require additional interventions; this will be included in the Final ESMP.
Project on International Waterways (OP 7.50)		

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Ensures that the international aspects of a project on an international waterway are dealt with at the earliest possible opportunity.	The Bank requires the beneficiary state to notify both upstream and downstream riparians directly or undertakes notification on their behalf whether or not there are likely to be adverse impacts. Following notification, if the other riparians raise objections to the proposed project, the Bank, in appropriate cases, may appoint one or more independent experts to examine the issues in accordance with Best Practice Guideline (BP) 7.50. Should the Bank decide to proceed with the project despite the objections of the other riparians, the Bank informs them of its decision.	COW has engaged with riparian states. It is the Consultant's understanding that no issues have been raised to date. COW has confirmed that development plans with riparian states for the basin are inclusive of the LLBWSS project (www.orasecom.org).

APPENDIX

G-4 EIB REQUIREMENTS APPLICABILITY

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OBJECTIVE	APPLICABILITY
Protect Pillar	
To protect women's rights and avoid doing harm or reinforcing pre-existing gender inequalities through the systematic consideration of gender-specific needs, impacts, vulnerabilities. This requires that the Promoter consider gender risks, analyse the project's gender dimensions, conduct gender-balanced stakeholder engagement and, where risks are identified, devise tailored remedial measures.	The SES equally addressed man-women and boys-girls specific needs and perceptions of the proposed project. It also included other vulnerable groups such as children, older persons and people with disability. Findings are provided in **Chapter 6.3.9** with salient points included below: – Overall, results from the study show very clearly that from early ages respondents knew about gender equality, gender based violence and also understand gender related issues. They get information from the media, especially radios and newspapers as well as during community gatherings. However, in line with Gender links (2014:8), findings from the study have shown that in cases where gender based violence happens, women are the main victims. – Notably, there are many women who still have to walk long distances to reach the nearest water points as men would be at work which makes them more susceptible to danger and gender based violence. – Data collected showed that there were no arrangements for people with disability to get job opportunities as well and therefore depriving them of the chance to equally benefit. – When looking at projects implemented in their communities, 46% of the respondents said that both men and women get equal chances of being employed. Thirty seven percent (37%) felt that most of those who are employed are men as opposed to women mainly because most of the projects require physical/ human labour. They indicate that women are usually at home to look after children.
Impact Pillar	
To avoid gender discrimination in the ability to access the assets, benefits and opportunities generated by the project, thus increasing the positive impact on gender equality. This would be achieved by applying a gender perspective in the project cycle and by actively supporting the promotion of gender equality in the workplace, in job creation and in decision-making.	Salient points on SES findings: – Seventy-two per cent (72%) of respondents believe that men and women should be given same opportunities and positions in everything. Ninety percent (90%) indicated that the prevalence of gender-based violence is very low in their communities. However, their view is that when it happens women are the most affected followed by children and the older persons. – On projects that have been implemented in both zones, respondents showed that, both men and women are employed equally as most of the time each family gives out one member of the family to be hired, or sometimes they would go to a public gathering where they will be hired according to their time of arrival and availability. Gender sensitive measures are included in the ESMP (Vol II) to avoid gender discrimination.
Invest Pillar	

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To reduce gender gaps in employment and promote women's economic empowerment, by increasing women's participation, on equal terms, in the economy and labour market, e.g. focussing on increasing women's access to services and supporting female entrepreneurship.	Salient points on SES findings: — Literature has shown that in African countries where the majority of the people still live in rural areas and are still enduring the challenges related to inadequate supply of water and poor sanitation, the job of providing water and ensuring proper and hygienic sanitation still lies with women (UN Commision on sustainable development). Women tend to be users, providers and managers of water (World Bank, 2002) and in Lesotho, it is the cultural practice for women and girls to fetch water used for household purposes. This is well reflected in the SES responses. Although the respondents' argument was that this is the case because women are the ones who use more water than other family members, this is more of an engendered responsibility. — When answering the question; should man and women be given the same opportunities and positions, most respondents during Focus Group Discussion (FGDs) stated that: "women will always be women", thus implying that, men will always be superior to women hence they should be given more opportunities and positions. To a lesser extent, some indicated that men and women should have the same opportunities and positions. The difference is spotted on the answers of key informants (KIs) of both Zones who stipulated that men and women should have equal opportunities and positions. Mitigation Measures to reduce gender gaps are include in the ESMP (Vol II), *inter alia*: - Exploring unusual jobs (ho luba taka, opening and closing boom gate by women; women being forewomen) - Purchasing local supplies and services (chicken, vegetables, fruits, meat, accommodation, etc.) - Including gender-specific clauses in bidding documents - Promoting sustainable employment opportunities for female-headed households (e.g. purchase of food supplies and catering services).

APPENDIX

G-5 *WHO (2011) GUIDELINES FOR DRINKING WATER QUALITY*

APPENDIX

VARIABLE	MEASURING UNITS	GUIDELINE VALUE
1. Physical and Organoleptic		
Alkalinity	mg/l CaCO3	
Colour	mg/l Pt	15 TCU
Conductivity	mS/m	
DOC	mg/l C	
DO	% sat.	NS
Hardness	mg/l CaCO3	500
Odour	TON	INOFFENSIVE
PH	pH Units	6.5-8.5
Taste	TTN	INOFFENSIVE
Temperature	°C	NS
Turbidity	NTU	5
2. Micro elements		
Antimony	Sbµg/l	5
Arsenic	Asµg/l	10
Berylium	Beµg/l	NS
Bismuth	Biµg/l	NS
Cadmium	Cdµg/l	3
Chromium	Crµg/l	50
Cobalt	Coµg/l	NS
Cyanide	CNµg/l	70
Gold	Auµg/l	NS
Lead	Pbµg/l	10
Mercury	Hgµg/l	1

APPENDIX

Molybdenum	Moμg/l	70
Nickel	Niμg/l	20
Selenium	Seμg/l	10
Silver	Agμg/l	NS
Tellurium	Teg/l	NS
Thallium	Tlμg/l	NS
Tin	Snμg/l	NS
Titanium	Tiμg/l	NS
Tungsten	Wμg/l	NS
Vanadium	Vμg/l	NS
3. Macro elements		
Aluminium	Al mg/l	0.2
Ammonia	NH3 mg/l	1.5
Barium	Ba mg/l	0.7
Boron	Bo mg/l	0.3
Bromide	Br mg/l	NS
Calcium	Ca mg/l	NS
Chloride	Cl mg/l	250
Copper	Cu mg/l	1
Fluoride	F mg/l	1.5
Iodide	I mg/l	NS
Iron	Fe mg/l	0.3
Lithium	Li mg/l	NS

APPENDIX

G-6 MSU WATER QUALITY GUIDELINE REQUIREMENTS

APPENDIX

TEST	UNITS	IRRIGATION	LIVESTOCK WATERING	AQUATIC ECOSYSTEM	WHO	MSU
Aluminium	ug/l	5000	5000	5	100	5
Antimony	ug/l				20	20
Arsenic	ug/l	100	1000	10	10	10
Barium	ug/l				700	700
Boron	ug/l				500	500
Cadmium	ug/l			0.15	3	0.15
Chromium	ug/l			12	50	12
Copper	ug/l	200	50	0.3	2000	0.3
Iron	ug/l	5000	10000	-	-	50000
Sodium	mg/l	70	2000	-	40	40
Lead	ug/l	200	100	0.2	10	0.2
Manganese	ug/l	20	10000	180	400	20
Mercury	ug/l	-	1	0.04	6	0.04
Nickel	ug/l	20	100	-	70	20
Selenium	ug/l				10	10
Uranium	ug/l				15	15
Zinc	ug/l				3	3
Fluoride	mg/l	2	2	≤0.75	1.5	1.5
Chloride	mg/l	-	1500	-		1500
Nitrite as NO^2	mg/l				3000	3000
Nitrate as NO^3	mg/l				50000	50000
Sulphate	mg/l	-	1000	-		1000
Cyanide	mg/l				70	70
EC @25C	uS/cm	400	1540			400
Chlorine	mg/l				5000	5000
Ammonia as N	mg/l				1.5	1.5
pH	pH units				6.5-8.5	6.5-8.5
TDS	mg/l	-	1000	-		1000

APPENDIX

H PROJECT LAYOUTS

APPENDIX

H-1 *SCHEMATICS LAYOUTS FOR ZONE 6 & 7 (SMEC 2018)*

APPENDIX

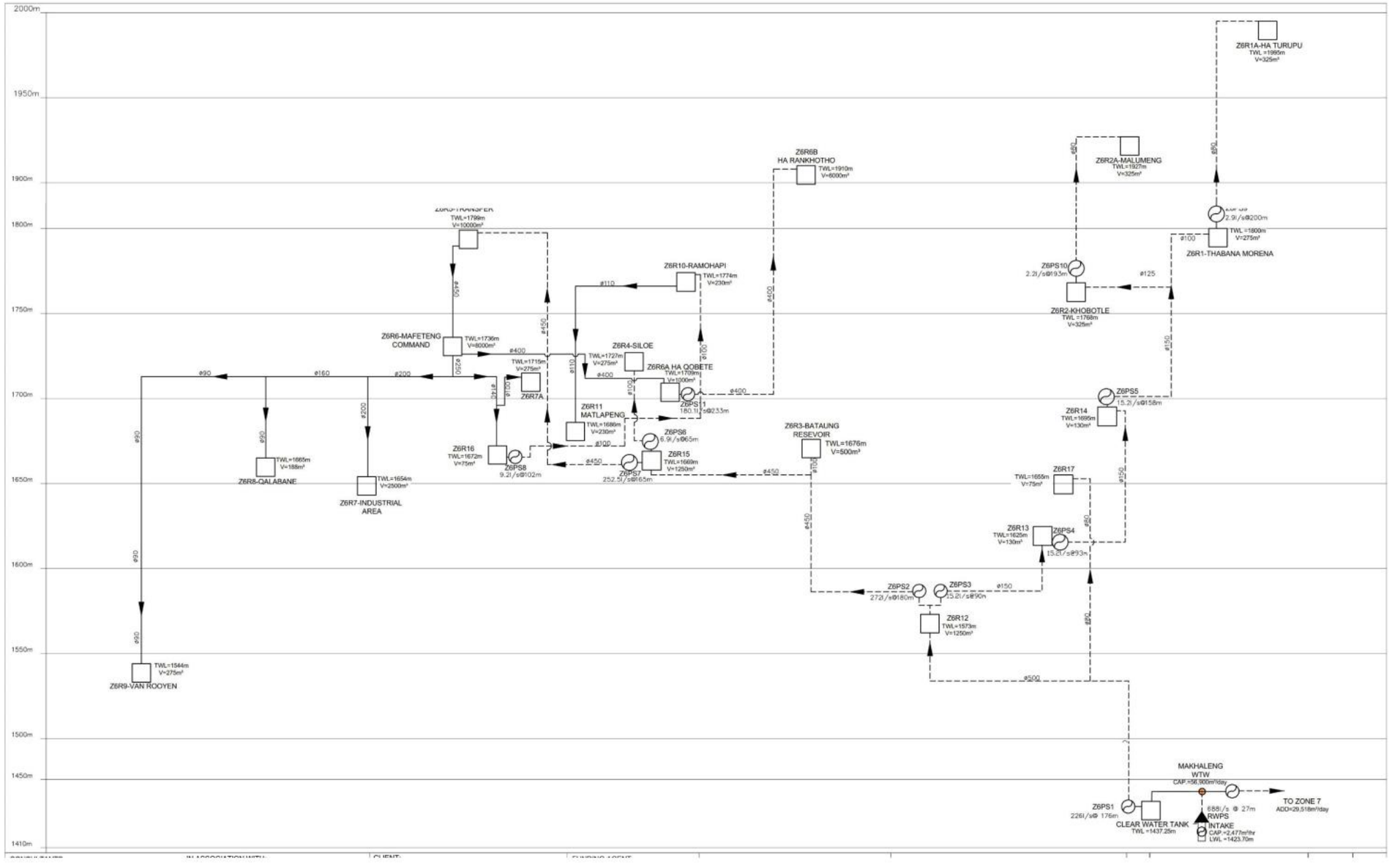


Figure 36: Schematic of Bulk Water Supply System for Zone 6 showing relative elevations

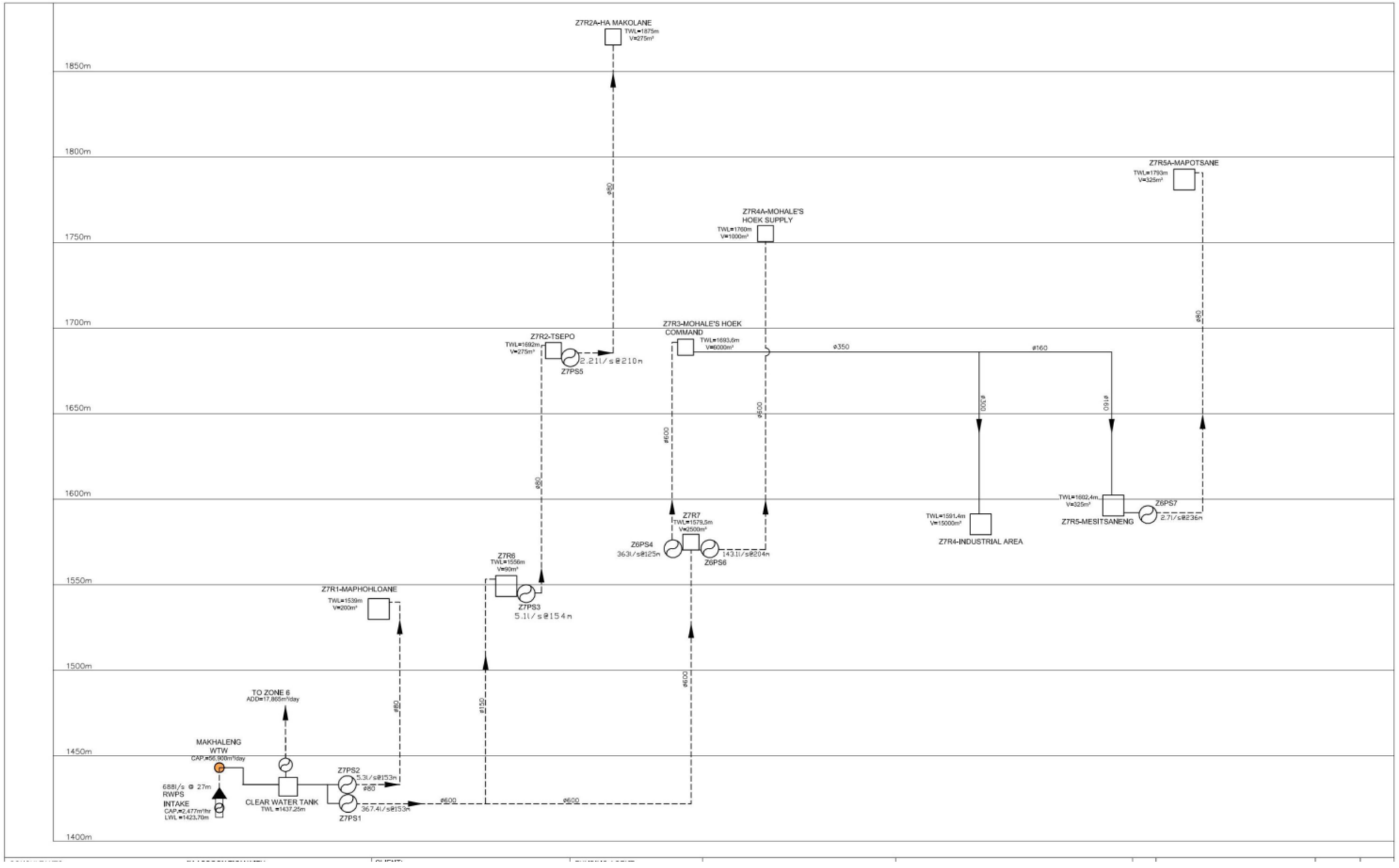


Figure 37: Schematic of Bulk Water Supply System for Zone 7 showing relative elevations

APPENDIX

H-2 *LOCATION OF THE WTW*

APPENDIX

WATER COMMISSION, MINISTRY OF WATER

PROPOSED LOCATION OF WATER TREATMENT WORKS

N

0 10 20 30 40 50

Metres

DISCLAIMER

WSP ENVIRONMENTAL (PTY) LTD

DATA SOURCE:

IMBIC (2019).

PROJECTION: GCS_WGS_1984.

PROJECT TITLE:

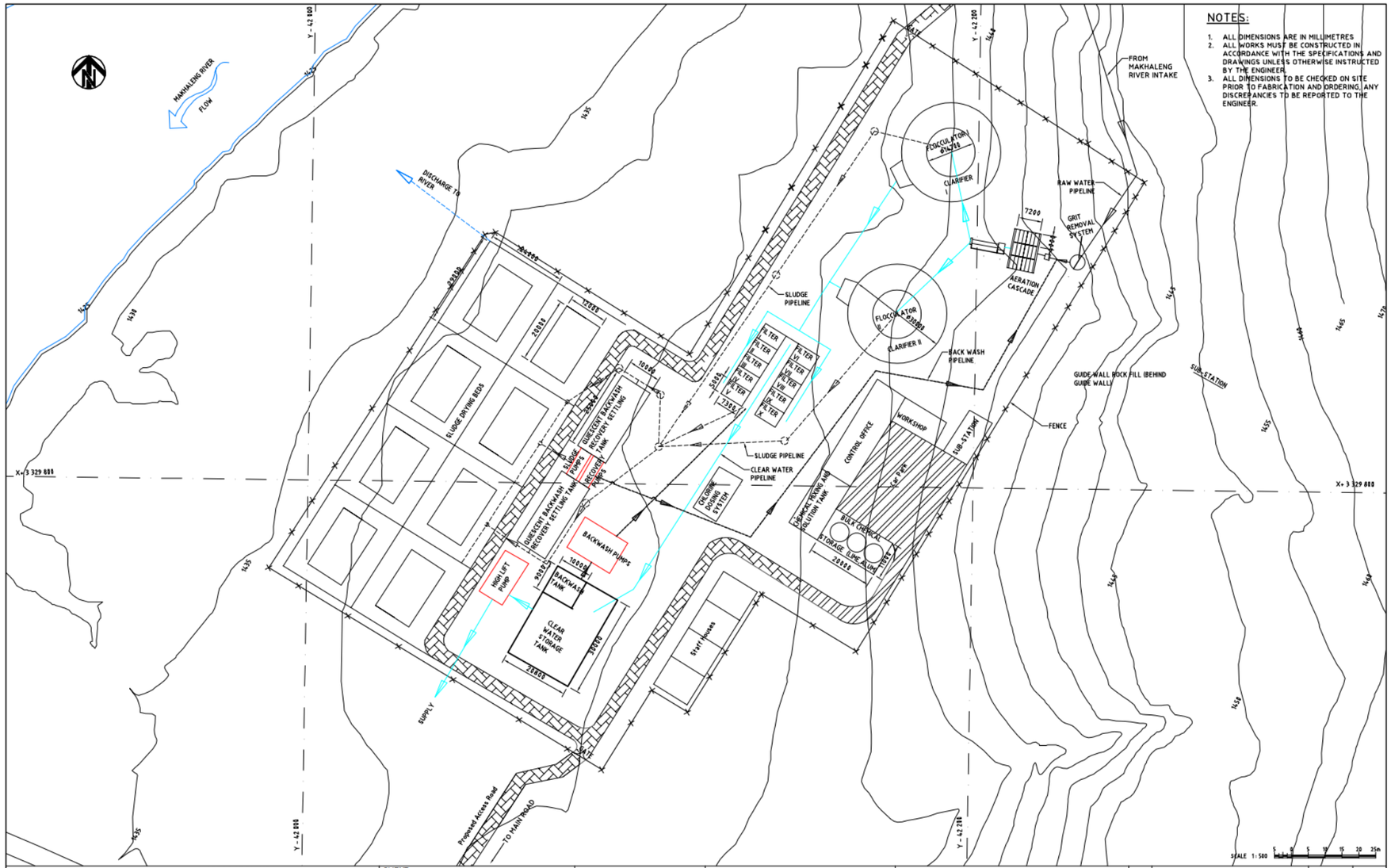
LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME

SCALE: 1:3,600 | DRAWN BY: SINENHLANHLA RADEBE

DATE: 26/10/2019 | REVIEWED BY: CARLA ELLIOT

FIGURE NO: 2 | PROJECT NO: 41100621-002 | REV:

APPENDIX



CONSULTANTS: SMEC Member of the Surbana Jurong Group 25A REEDBUCK ROAD, KABULONGA, PO BOX 31256, LUSAKA, ZAMBIA Tel: +260 211 267 280 Fax: +260 211 267 982 E-mail: Stayford.phiri@smec.com www.smec.com	IN ASSOCIATION WITH: TCC Tsoelopele Consultants & Contractors (Pty)Ltd TSOELOPELE CONSULTANTS & CONTRACTORS P.O.Box 101, Teyateyaneng, Berea, Lesotho Tel: +266 22500240 Fax: +26622500852 E-mail: tcc@r2.co.ls	CLIENT: LESOTHO MINISTRY OF WATER	FUNDING AGENT: WORLD BANK

PURPOSE OF ISSUE: FOR TENDER			
DESIGNED: I.W.BARASA	DATE: OCT'17	PROJECT:	LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME
DRAWN: M.PHENEKUS	DATE: OCT'17	TITLE:	WATER TREATMENT WORKS ZONE 6&7
CHECKED: I.W.BARASA	DATE: OCT'17	DESCRIPTION:	SITE LAYOUT
APPROVED: S.NTIFO	DATE: OCT'17		
DRAWING SCALE: A3: / A1: AS SHOWN	SHEET SIZE: A1		

REV.	REVISION	APPROVED	DATE
A	FOR TENDER	S.N	OCT'17

SHEET 1 OF 1

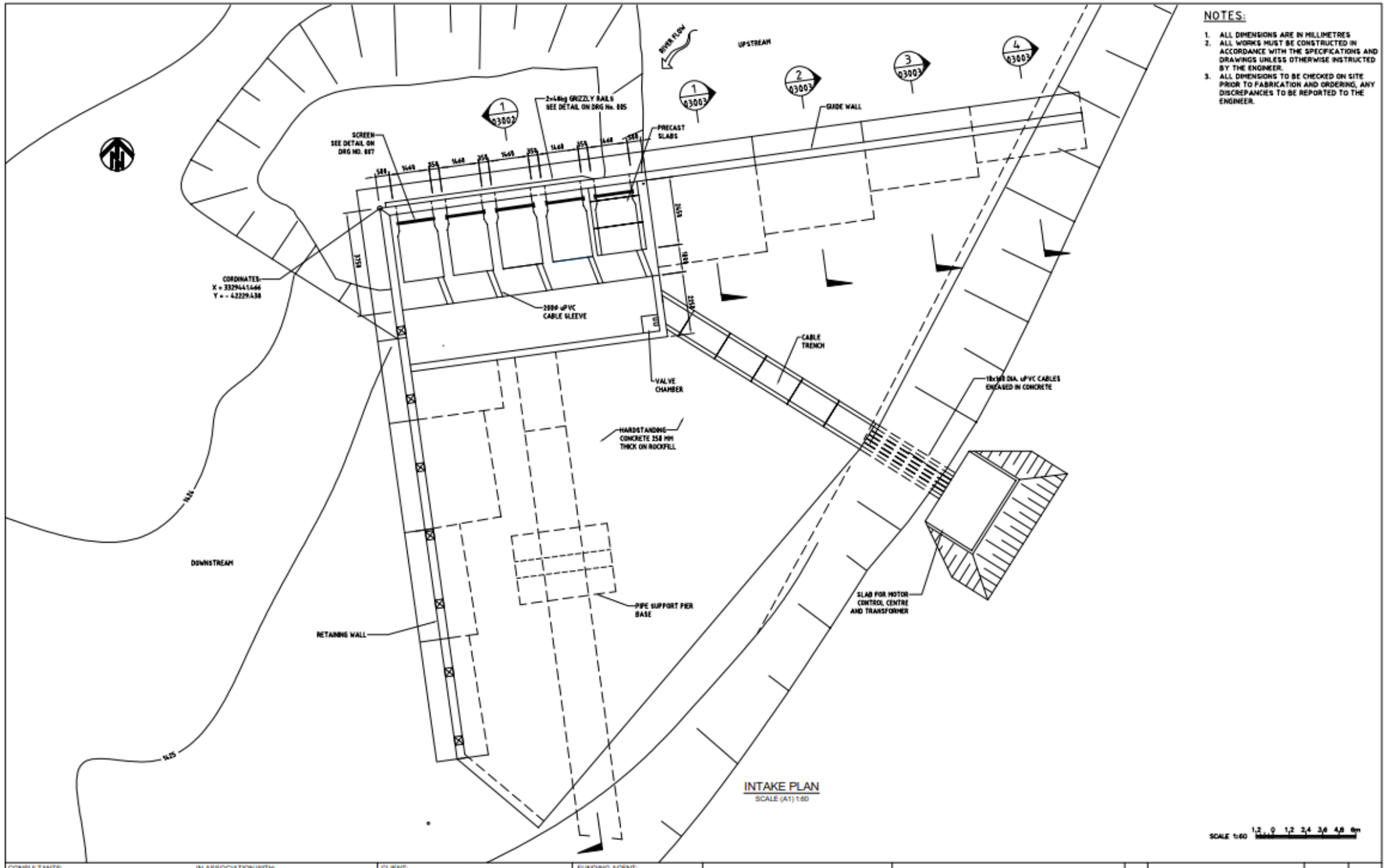
DRW NO. 5090025-Z6&7-WTP-05001

A

APPENDIX

H-3 ALTERNATIVES: INTAKE PLAN (DRAWING #5090025-Z6&7-INT-03000)

APPENDIX


NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES
2. ALL WORKS MUST BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWINGS UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER.
3. ALL DIMENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION AND ORDERING, ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
RIVER FLOW
UPSTREAM
DOWNSTREAM
N.A.S
N.2.5
SCREEN SEE DETAIL ON DRG NO. 007
2x48kg GRIZZLY RAILS SEE DETAIL ON DRG No. 005
PRECAST SLABS
GUIDE WALL
CORDINATES: X = 3329441.466 Y = -62229.438
2000 uPVC CABLE SLEEVE
VALVE CHAMBER
CABLE TRENCH
10x160 DIA. uPVC CABLES ENCASED IN CONCRETE
HARDSTANDING CONCRETE 150 MM THICK ON ROCKFILL
PIPE SUPPORT PIER BASE
RETAINING WALL
SLAB FOR MOTOR CONTROL CENTRE AND TRANSFORMER
INTAKE PLAN
SCALE (A1) 1:60
SCALE 1:60
CONSULTANTS:
SMEC
Member of the Surbana Jurong Group
25A REEDBUCK ROAD KABULONGA PO BOX 31256 LUSAKA ZAMBIA
Tel: +260 211 267 280
Fax: +260 211 267 982
E-mail: Stayford.phiri@smec.com
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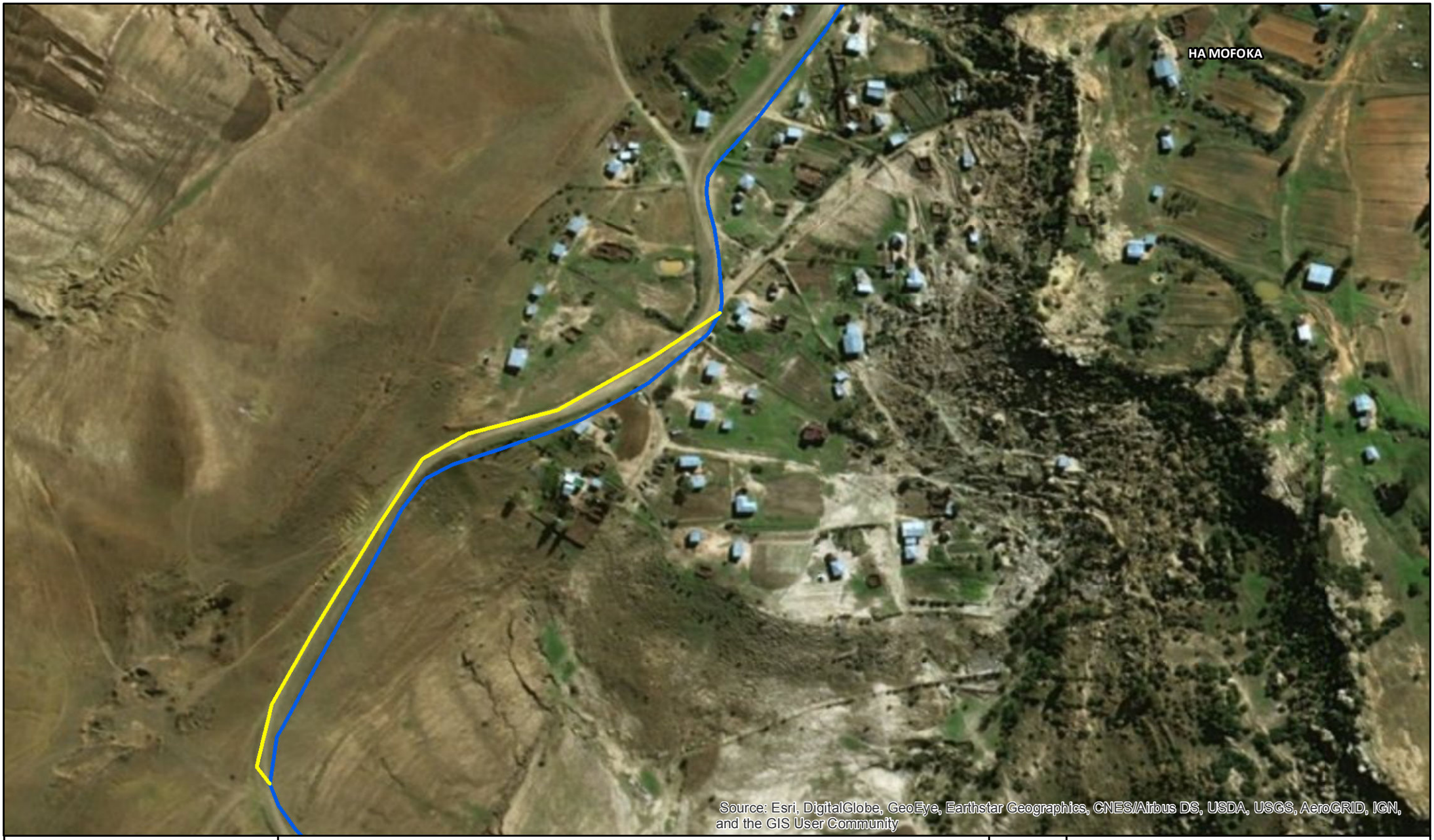
IN ASSOCIATION WITH:
TCC Tsoelopele Consultants & Contractors (Pty)Ltd
TSOELOPELE CONSULTANTS & CONTRACTORS
P.O.Box 101 Teyateyaneng Berea, Lesotho
Tel: +266 22500240
Fax: +26622500852
E-mail: tcc@r2.co.ls
CLIENT:
LESOTHO MINISTRY OF WATER
FUNDING AGENT:
WORLD BANK
PURPOSE OF ISSUE: TENDER
DESIGNED: J.S.MANYANYE DATE: OCT'17
DRAWN: K.MAKHELE DATE: OCT'17
CHECKED: T.GUI DATE: OCT'17
APPROVED: S.NTIFO DATE: OCT'17
DRAWING SCALE: A3: A1: AS SHOWN
SHEET SIZE: A1
PROJECT: LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME
TITLE: MAKHALENG INTAKE
DESCRIPTION: INTAKE PLAN
B CLIENT APPROVAL S.N AUG'17
A ISSUED FOR TENDER M.M OCT'17
REV. REVISION APPROVED DATE
SHEET 1 OF 1
DRW NO. 5090025-Z6&7-INT-03000
B

APPENDIX

I SITE ALTERNATIVES

APPENDIX

I-1 ZONE 6



DURBAN OFFICE

Block A, 1 on Langford
Langford Road, Westville

Phone: 031 240 8800
Fax: 031 240 8801

LEGEND

Proposed Reroute — Zone 6 Pipeline

(Data Source: SMEC & Ntsihlele Land Surveyors, 2018)

N

1:3 000 A4

Produced By MHP Geospace

15 Acacia Avenue
Westville 3630

Tel: 031 266 9316
Fax: 031 266 9366

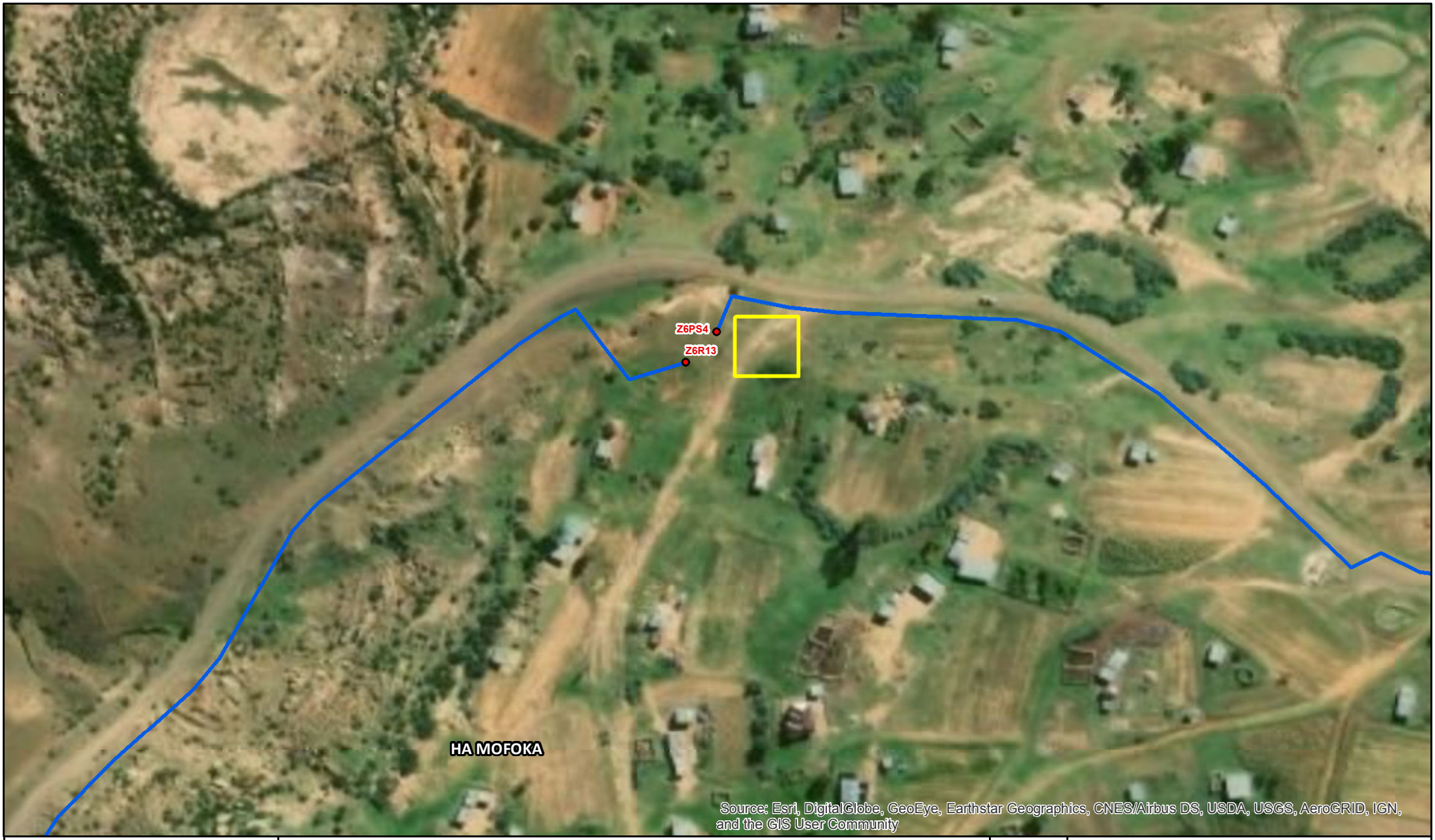
Email: info@mhpgeospace.co.za

File Path: Z:\GS0379_WSP_4110921_Lesotho Lowlands - Initial GIS Requirements\Project Maps\Alternatives\Zone 6 Ha Mofoko Pipeline Proposed Rerouting A4.mxd

Imagery: 2016 ESRI Basemap

Date: 23 October 2018

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME ZONE 6 AND 7
PROPOSED PIPELINE REROUTE AT HA MOFOKA



DURBAN OFFICE

Block A, 1 on Langford
Langford Road, Westville

Phone: 031 240 8800
Fax: 031 240 8801

LEGEND

Reservoirs and Pumpstations — Proposed Reservoir — Zone 6 Pipeline

(Data Source: SMEC & Ntsihlele Land Surveyors, 2018)

N

1:2 000 A4

Produced By MHP Geospace

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Westville 3630

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Fax: 031 266 9366

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File Path: Z:\GS0379_WSP_ 4110921_Lesotho Lowlands - Initial GIS Requirements\Project Maps\Alternatives\Zone 6 Ha Mofoko Reservoir Proposed Rerouting A4.mxd

Imagery: 2016 ESRI Basemap

Date: 30 April 2019

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME ZONE 6 AND 7
PROPOSED NEW Z6R13 LOCATION AT HA MOFOKO

DURBAN OFFICE

Block A, 1 on Langford
Langford Road, Westville

Phone: 031 240 8800
Fax: 031 240 8801

LEGEND

Reservoirs and Pumpstations — Proposed Reroute — Zone 6 Pipeline

(Data Source: SMEC & Ntsihlele Land Surveyors, 2018)

N

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File Path: Z:\GS0379_WSP_4110921_Lesotho Lowlands - Initial GIS Requirements\Project Maps\Alternatives\Zone 6 Ha Ralintsi Pipeline Proposed Rerouting A4.mxd

Imagery: 2016 ESRI Basemap

Date: 23 October 2018

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME ZONE 6 AND 7

PROPOSED PIPELINE REROUTING AT HA RALINTSI TO Z6R9

DURBAN OFFICE

Block A, 1 on Langford
Langford Road, Westville

Phone: 031 240 8800
Fax: 031 240 8801

LEGEND

Proposed Reroute — Zone 6 Pipeline

(Data Source: SMEC & Ntsihlele Land Surveyors, 2018)

N

1:3 000 A4

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File Path: Z:\GS0379_WSP_4110921_Lesotho Lowlands - Initial GIS Requirements\Project Maps\Alternatives\Zone 6 Ha Ramohapi Pipeline Proposed Rerouting A4.mxd

Imagery: 2016 ESRI Basemap

Date: 23 October 2018

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME ZONE 6 AND 7
PROPOSED PIPELINE REROUTING FROM JUNCTION AT HA RAMOHAPI TO MATLAPANENG Z6R9

DURBAN OFFICE

Block A, 1 on Langford
Langford Road, Westville

Phone: 031 240 8800
Fax: 031 240 8801

LEGEND

Junctions — Proposed Reroute — Zone 6 Pipeline

(Data Source: SMEC & Ntsihlele Land Surveyors, 2018)

N

1:12 000 A4

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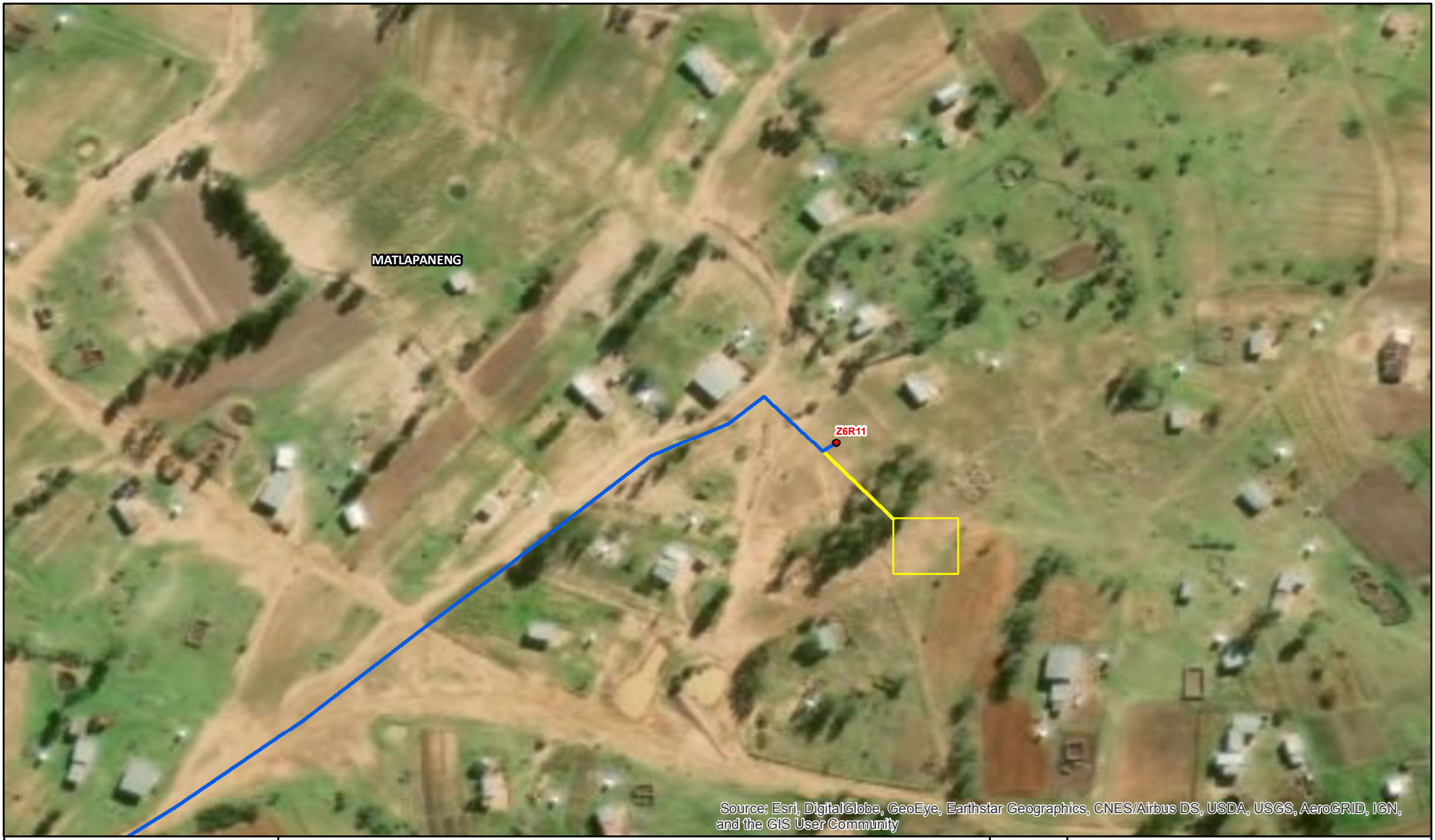
File Path: Z:\GS0379_WSP_ 4110921_Lesotho Lowlands - Initial GIS Requirements\Project Maps\Alternatives\Zone 6 Mafeteng Pipeline Proposed Rerouting A4.mxd

Imagery:
2016 ESRI Basemap

Date:
23 October 2018

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME ZONE 6 AND 7
PROPOSED PIPELINE REROUTING AT MAFETENG TRAFFIC CIRCLE TO RAMOHAPI



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Langford Road, Westville

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LEGEND

Reservoirs and Pumpstations — Zone 6 Pipeline — Proposed Reroute

(Data Source: SMEC & Ntsihlele Land Surveyors, 2018)

N

1:2 000 A4

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Imagery: 2018 ESRI Basemap

Date: 30 April 2019

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME ZONE 6 AND 7
PROPOSED PIPELINE EXTENSION AT MATLAPANENG TO SHIFT RESERVOIR UPSLOPE

DURBAN OFFICE

Block A, 1 on Langford
Langford Road, Westville

Phone: 031 240 8800
Fax: 031 240 8801

LEGEND

- Junctions
- Reservoirs and Pumpstations
- Proposed Reroute
- Zone 6 Pipeline

(Data Source: SMEC & Ntsihlele Land Surveyors, 2018)

N

1:4 000 A4

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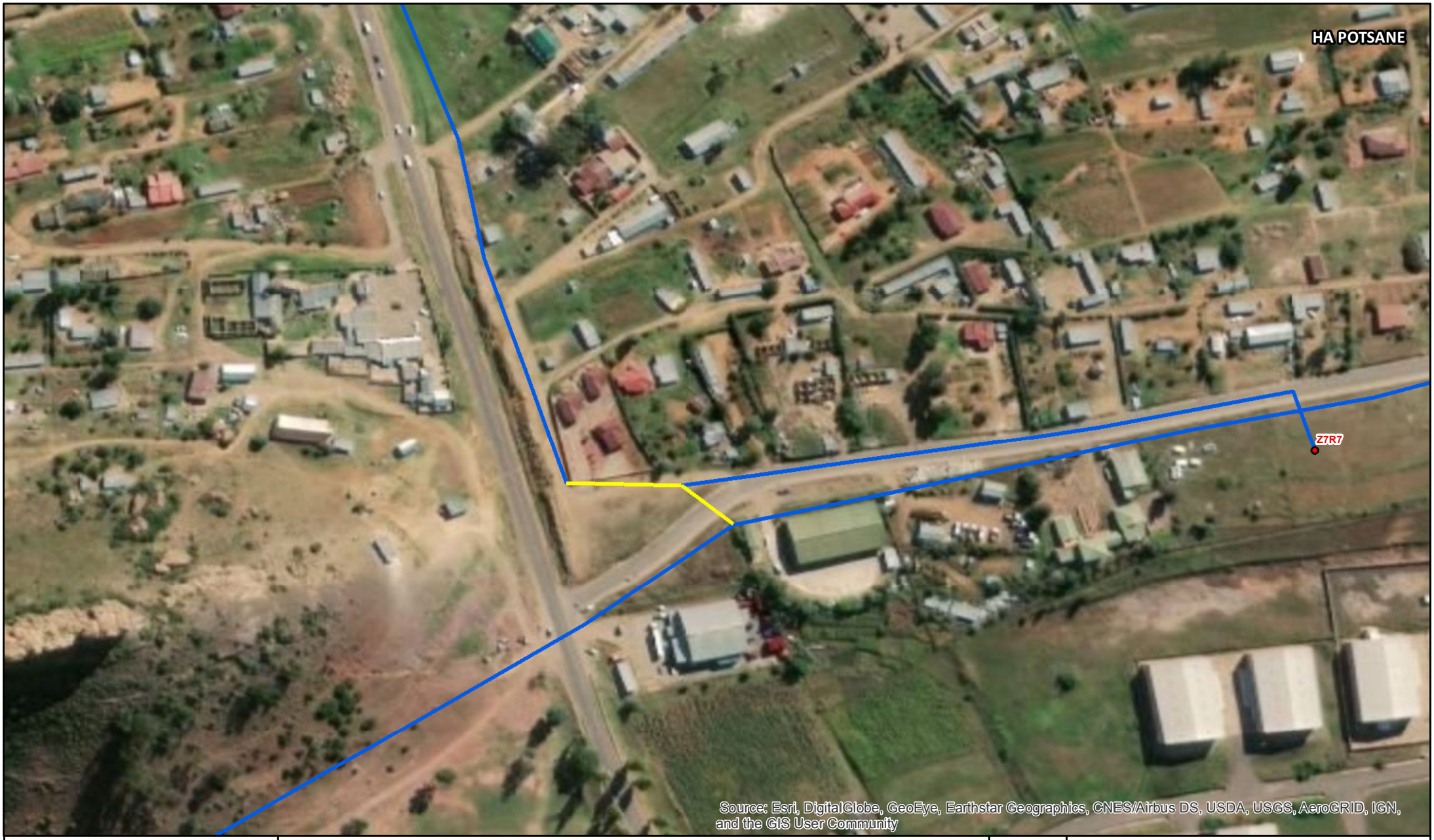
File Path: Z:\GS0379_WSP_4110921_Lesotho Lowlands - Initial GIS Requirements\Project Maps\Alternatives\Zone 6 Qalabane Pipeline Proposed Rerouting A4.mxd

Imagery: 2016 ESRI Basemap

Date: 23 October 2018

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME ZONE 6 AND 7
PROPOSED PIPELINE REROUTING AT QALABANE (Z6J5 TO Z6R8)

I-2 ZONE 7



DURBAN OFFICE

Block A, 1 on Langford
Langford Road, Westville

Phone: 031 240 8800
Fax: 031 240 8801

LEGEND

- Junctions
- Reservoirs and Pumpstations
- Proposed Reroute
- Zone 7 Pipeline

(Data Source: SMEC & Ntsihlele Land Surveyors, 2018)

N

1:2 500 A4

Produced By MHP Geospace

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Westville 3630

Tel: 031 266 9316
Fax: 031 266 9366

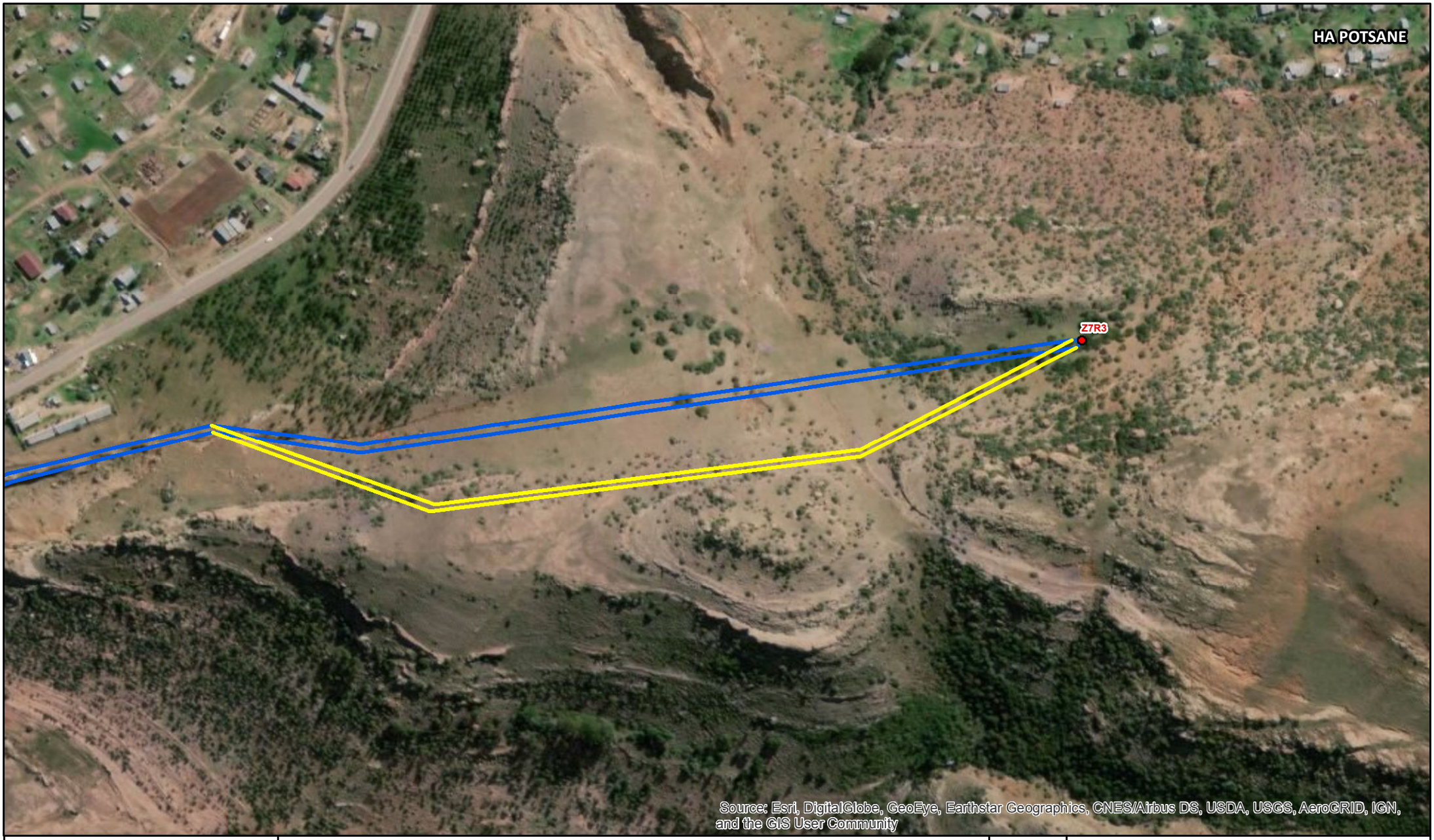
Email: info@mhpgeospace.co.za

File Path: Z:\GS0379_WSP_ 4110921_Lesotho Lowlands - Initial GIS Requirements\Project Maps\Alternatives\Zone 7 Ha Potsane Pipeline Proposed Rerouting A4v2.mxd

Imagery: 2018 ESRI Basemap

Date: 02 May 2019

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME ZONE 6 AND 7
PROPOSED PIPELINE REROUTING FROM QALAKHENG JUNCTION TO Z7R7 AT HA POTSANE



DURBAN OFFICE

Block A, 1 on Langford
Langford Road, Westville

Phone: 031 240 8800
Fax: 031 240 8801

LEGEND

Reservoirs and Pumpstations — Proposed Reroute — Zone 7 Pipeline

(Data Source: SMEC & Ntsihlele Land Surveyors, 2018)

N

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Westville 3630

Tel: 031 266 9316
Fax: 031 266 9366

Email: info@mhpgeospace.co.za

File Path: Z:\GS0379_WSP_ 4110921_Lesotho Lowlands - Initial GIS Requirements\Project Maps\Alternatives\Zone 7 Ha Potsane Pipeline Proposed Rerouting No 2 A4.mxd

Imagery: 2016 ESRI Basemap

Date: 30 April 2019

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME ZONE 6 AND 7
PROPOSED PIPELINE REROUTE AT HA POTSANE

DURBAN OFFICE

Block A, 1 on Langford
Langford Road, Westville

Phone: 031 240 8800
Fax: 031 240 8801

LEGEND

- Junctions
- Reservoirs and Pumpstations
- Zone 7 Pipeline
- Proposed Reroute

(Data Source: SMEC & Ntsihlele Land Surveyors, 2018)

N

1:5 000 A4

Produced By MHP Geospace

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Westville 3630

Tel: 031 266 9316
Fax: 031 266 9366

Email: info@mhpgeospace.co.za

File Path: Z:\GS0379_WSP_ 4110921_Lesotho Lowlands - Initial GIS Requirements\Project Maps\Alternatives\Zone 7 Kubake Pipeline Proposed Rerouting A4v2.mxd

Imagery: 2016 ESRI Basemap

Date: 30 April 2019

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME ZONE 6 AND 7
KUBAKE PIPELINE PROPOSED REROUTING AND RESERVOIR LOCATION

APPENDIX

J CULTURAL RESOURCE LOCATIONS

J-1 ZONE 6

APPENDIX

THABANE MORENA

WATER COMMISSION, MINISTRY OF WATER

IDENTIFIED CULTURAL HERITAGE RESOURCES

Legend

- Village Names
- Zone 6 Nodes

Pipeline Pathway

- Zone 6 Pipeline

Cultural Heritage Resources

- Cemetery
- Palaeontology Site

N

0 325 650 975 1,300 1,625

Metres

DISCLAIMER

The information on this figure was derived from various digital databases available to WSP Environmental (Pty) Ltd. All information is provided "as is" and it must be acknowledged that data, information, and maps are dynamic and in a constant state of maintenance, correction and update. WSP Environmental (Pty) Ltd cannot accept any responsibility for errors, omissions, or positional accuracy where it has not been directly responsible for the production of the data referenced. There are no warranties, expressed or implied, as to the use of this information, including the warranty of merchantability or fitness for a particular purpose. Notification of any errors will be appreciated.

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WSP HOUSE, 1 ON LANGFORD, LANGFORD ROAD, WESTVILLE 3632
P O BOX 1442, WESTVILLE 3630, RSA
Tel +27 (0)31 240 8860, Fax +27 (0)31 240 8861, wspe@wspgroup.co.za

DATA SOURCE:

PROJECTION: GCS_WGS_1984

PROJECT TITLE:

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME

SCALE: 1:64,600	DRAWN BY: SINENHLANHLA RADEBE
DATE: 25/10/2018	REVIEWED BY: CARLA ELLIOT
FIGURE NO: 5c	PROJECT NO: 41100921-002 REV:

APPENDIX

HA MOTHOKO

WATER COMMISSION, MINISTRY OF WATER

IDENTIFIED CULTURAL HERITAGE RESOURCES

Legend

- Village Names
- Zone 6 Nodes

Pipeline Pathway

- Zone 6 Pipeline

Cultural Heritage Resources

- Cemetery

N

0 150 300 450 600 750

Metres

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P O BOX 1442, WESTVILLE 3630, RSA
Tel +27 (0)31 240 8860, Fax +27 (0)31 240 8861, wspe@wspgroup.co.za

DATA SOURCE:

PROJECTION: GCS_WGS_1984

PROJECT TITLE:

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME

SCALE: 1:29,500	DRAWN BY: SINENHLANHLA RADEBE
DATE: 25/10/2018	REVIEWED BY: CARLA ELLIOT
FIGURE NO: 5b	PROJECT NO: 41100921-002 REV:

APPENDIX

QALABANE

WATER COMMISSION, MINISTRY OF WATER

IDENTIFIED CULTURAL HERITAGE RESOURCES

Legend

- Village Names
- Zone 6 Nodes

Pipeline Pathway

- Zone 6 Pipeline

Cultural Heritage Resources

- Palaeontology Site
- Cemetery

N

0 40 80 120 160 200

Metres

DISCLAIMER

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WSP HOUSE, 1 ON LANGFORD, LANGFORD ROAD, WESTVILLE 3632
P O BOX 1442, WESTVILLE 3630, RSA
Tel +27 (0)31 240 8860, Fax +27 (0)31 240 8861, wspe@wspgroup.co.za

DATA SOURCE:

PROJECTION: GCS_WGS_1984

PROJECT TITLE:

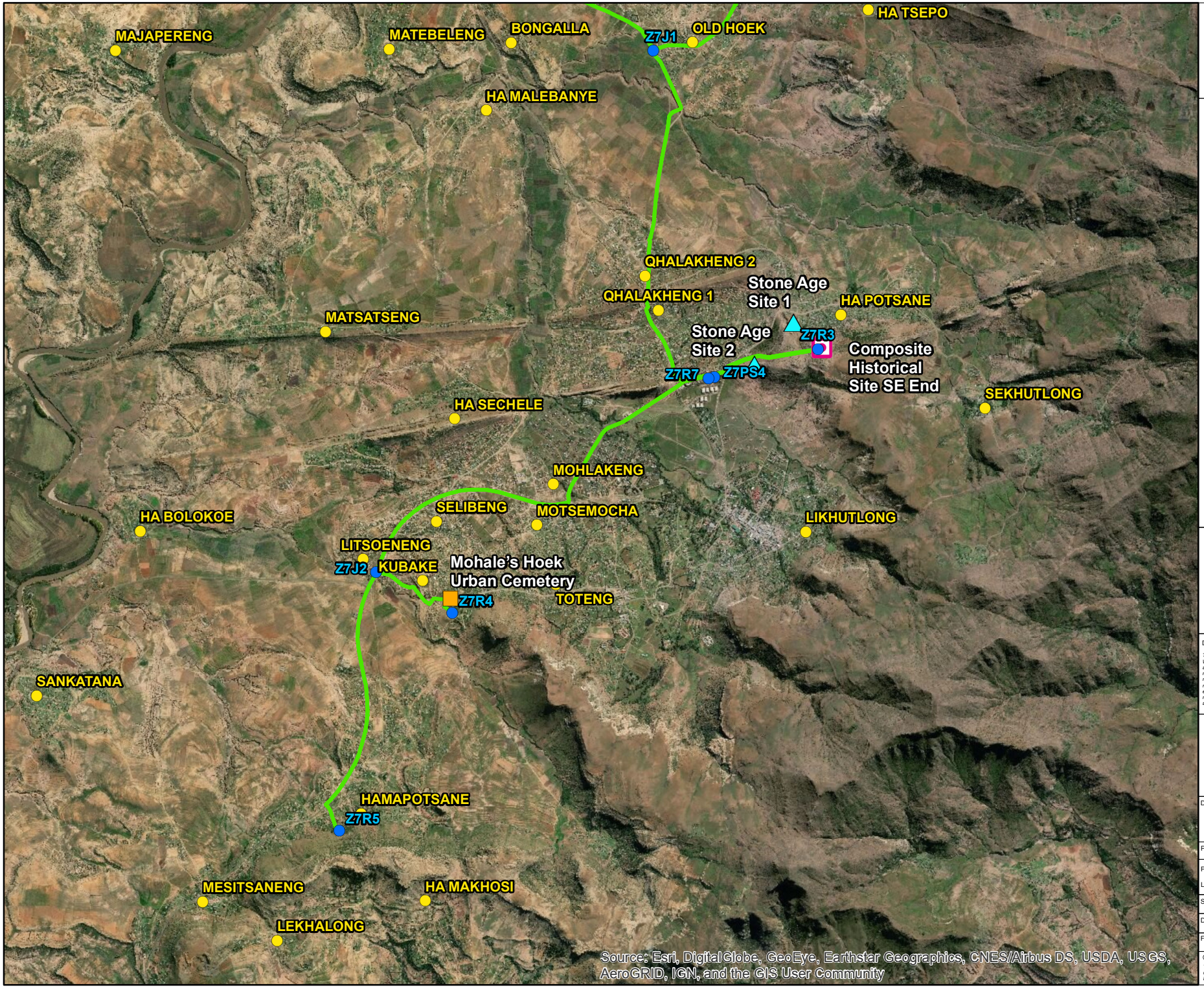
LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME

SCALE: 1:8,000	DRAWN BY: SINENHLANHLA RADEBE
DATE: 25/10/2018	REVIEWED BY: CARLA ELLIOT
FIGURE NO: 5a	PROJECT NO: 41100921-002 REV:

J-2 ZONE 7

APPENDIX

HA POTSANE



WATER COMMISSION, MINISTRY OF WATER

IDENTIFIED CULTURAL HERITAGE RESOURCES

Legend

- Village Names
- Zone 7 Nodes

Pipeline Pathway

- Zone 7 Pipeline

Cultural Heritage Resources

- Cemetery
- Stone Age Site
- Historical Site

N

0 250 500 750 1,000 1,250

Metres

DISCLAIMER

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DATA SOURCE:

PROJECTION: GCS_WGS_1984

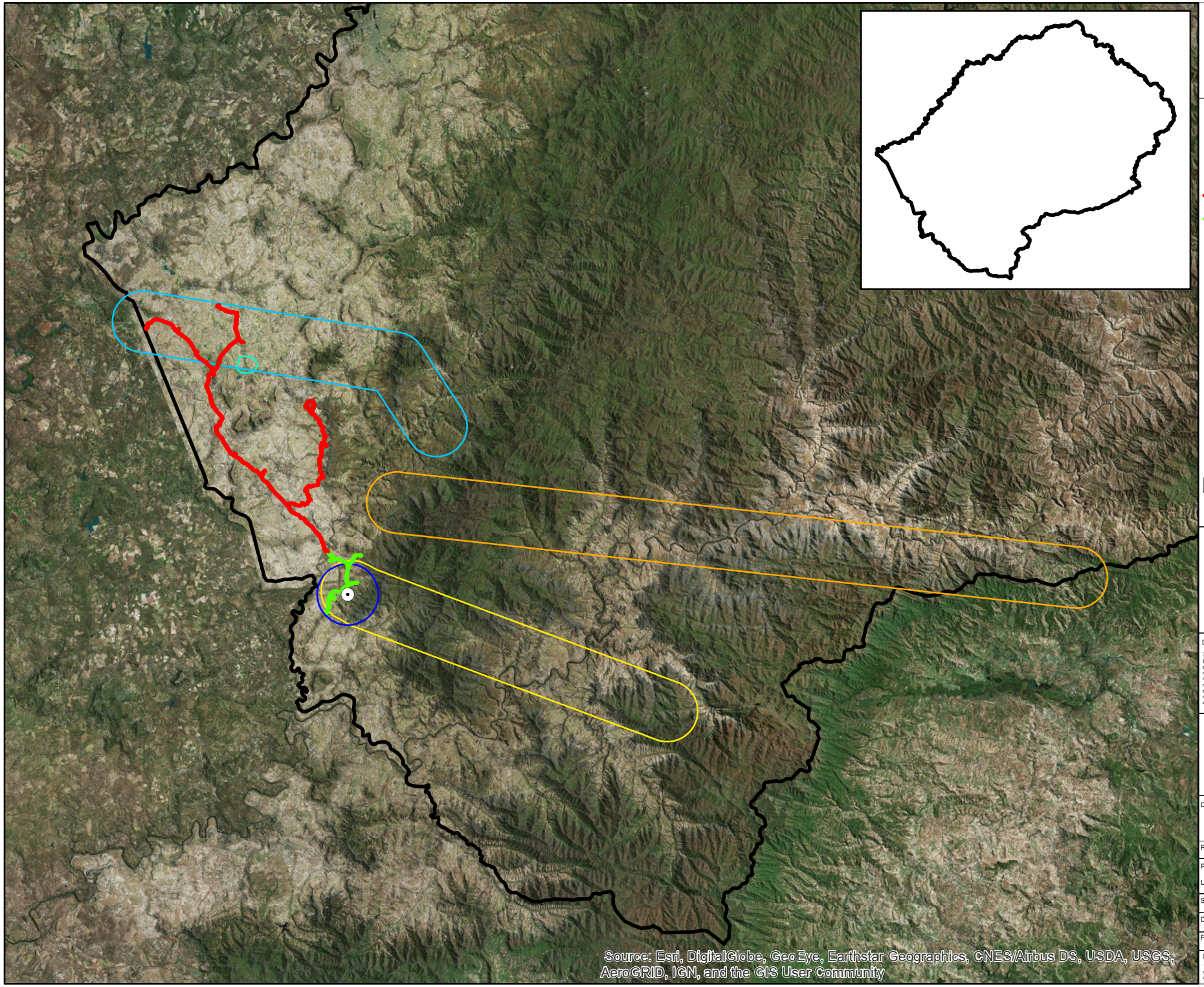
PROJECT TITLE:

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME

SCALE: 1:50,000	DRAWN BY: SINENHLANHLA RADEBE
DATE: 25/10/2018	REVIEWED BY: CARLA ELLIOT
FIGURE NO: 5d	PROJECT NO: 41100921-002 REV:

APPENDIX

K REGIONAL PROJECTS MAP



WATER COMMISSION, MINISTRY OF WATER

REGIONAL PROJECTS

Legend

- Mohales Hoek

Pipeline Pathway

- Zone 6 Pipeline
- Zone 7 Pipeline

CIA Projects

- Ramathole Solar Panel Project
- Electricity Transmission Project
- T CIP Road Network Project
- LS-RSA-Botswana Water Transfer Project
- Mohales Hoek IS

- Lesotho Boundary

N

0 3,900 7,800 11,700 15,600 19,500

Metres

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DATA SOURCE:

PROJECTION: GCS_HARTEBEESTHOEK_1994

PROJECT TITLE:

LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME

SCALE: 1:800,000	DRAWN BY: SINENHLANHLA RADEBE
DATE: 02/11/2018	REVIEWED BY: MPENDULO DLAMINI
FIGURE NO: 6	PROJECT NO: 41100921-002 REV:

APPENDIX

L TERMS OF REFERENCE

REQUEST FOR PROPOSALS

RFP No: LWSIP II/Comp III/C/23-2017

Country: LESOTHO

Project Name: LESOTHO WATER SECTOR IMPROVEMENT PROJECT – Second Phase

Credit/ Grant No: IDA4570-LS/ H4750-LS/IDA H738/IDA 5492-LS

Title of Consulting Services: CONSULTANCY SERVICES TO CARRY OUT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND RESETTLEMENT ACTION PLAN FOR ZONES 6 AND 7 OF THE LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME

TABLE OF CLAUSES

PART I

Section 1. Letter of Invitation

RFP No. LWSIP II/Comp III/C/37-2018
***Credit No:* IDA-5492**
Grant: H4750-LS, H967-LS, H738-LS and 5492-LS

Maseru, Lesotho – 29th March, 2018

WSP, Africa
Tel: +27 312408874
Fax: +27 312408861
Mob: +27 824530764
Email: carla.elliott@wsp.com

Attention: Carla Elliot

Dear Sir/Madam,

1. The Government of Lesotho (hereinafter called "Borrower") has received financing from the International Development Association (IDA) (the "Bank") in the form of a "credit" (hereinafter called "credit") toward the cost of the Lesotho Water Sector Improvement Project Phase II. The ***Water Commission*** intends to apply a portion of the proceeds of this credit to eligible payments under the contract for which this Request for Proposals is issued. Payments by the Bank will be made only at the request of the Client and upon approval by the Bank, and will be subject, in all respects, to the terms and conditions of the financing agreement. The financing agreement prohibits a withdrawal from the grant account for the purpose of any payment to persons or entities, or for any import of goods, if such payment or import, to the knowledge of the Bank, is prohibited by a decision of the United Nations Security council taken under Chapter VII of the Charter of the United Nations. No party other than the Client shall derive any rights from the financing agreement or have any claims to the proceeds of the grant.

2. The Client now invites proposals to provide the following consulting services (hereinafter called "Services"): ***Consultancy Services to Carry out Environmental and Social Impact Assessment and Resettlement Action Plan for Zones 6 And 7 of the Lesotho Lowlands Bulk Water Supply Scheme.*** More details on the Services are provided in the Terms of Reference (Section 7).

3. This Request for Proposals (RFP) has been addressed to:

Name of the lead Firm	Nationality of the Lead firm	Associate Firms	Nationality of Associate firm	Type of Association
WSP	South Africa	SEED Consult	Lesotho	Joint Venture

4. It is not permissible to transfer this invitation to any other firm.

5. A firm will be selected under ***Consultant's Qualifications Selection Method*** procedures and in a Simplified Technical Proposal (STP) format as described in this RFP, in accordance with the policies of the Bank detailed in the Consultants' Guidelines which can be found at the following website: *www.worldbank.org/procure*.

6. The RFP includes the following documents:

   Section 1 - Letter of Invitation
   Section 2 - Instructions to Consultants and Data Sheet
   Section 3 - Technical Proposal STP - Standard Forms
   Section 4 - Financial Proposal - Standard Forms
   Section 5 – Eligible Countries
   Section 6 – Bank's Policy – Corrupt and Fraudulent Practices
   Section 7 - Terms of Reference
   Section 8 - Standard Forms of Contract Lump-Sum

7. Please inform us by the ***3rd April 2018***, in writing, by facsimile *+266 - 22324529*, or by E-mail *mojakisanem@yahoo.com* *and cc:* lwsip.procurement@gmail.com:

   (a) that you have received the Letter of Invitation; and
   (b) whether you intend to submit a proposal alone or intend to enhance your experience by requesting permission to associate with other firm(s) (if permissible under Section 2, Instructions to Consultants (ITC), Data Sheet 14.1.1).

8. Details on the proposal's submission date, time and address are provided in Clauses17.7 and 17.9 of the ITC.

Yours sincerely,

M. Mojakisane (Mr.)
Commissioner of Water

Section 2. Instructions to Consultants and Data Sheet

A. General Provisions

1. Definitions

(a) "Affiliate(s)" means an individual or an entity that directly or indirectly controls, is controlled by, or is under common control with the Consultant.

(b) "Applicable Guidelines" means the policies of the Bank governing the selection and Contract award process as set forth in this RFP.

(c) "Applicable Law" means the laws and any other instruments having the force of law in the Client's country, or in such other country as may be specified in the **Data Sheet**, as they may be issued and in force from time to time.

(d) "Bank" means the International Bank for Reconstruction and Development (IBRD) or the International Development Association (IDA).

(e) "Borrower" means the Government, Government agency or other entity that signs the *financing* agreement with the Bank.

(f) "Client" means the implementing agencythat signs the Contract for the Services with the selected Consultant.

(g) "Consultant" means a legally-established professional consulting firm or an entity that may provide or provides the Services to the Client under the Contract.

(h) "Contract" means a legally binding written agreement signed between the Client and the Consultant and includes all the attached documents listed in its Clause 1 (the General Conditions of Contract (GCC), the Special Conditions of Contract (SCC), and the Appendices).

(i) "Data Sheet" means an integral part of the Instructions to Consultants (ITC) Section 2 that is used to reflect specific country and assignment conditions to supplement, but not to over-write, the provisions of the ITC.

(j) "Day" means a calendar day.

(k) "Experts" means, collectively, Key Experts, Non-Key Experts, or any other personnel of the Consultant, Sub-consultant or Joint Venture member(s).

(l) "Government" means the government of the Client's country.

(m) "Joint Venture (JV)" means an association with or without a legal personality distinct from that of its members, of more than one Consultant where one member has the authority to conduct all business for and on behalf of any and all the members of the JV, and where the members of the JV are jointly and severally liable to the Client for the performance of the Contract.

(n) "Key Expert(s)" means an individual professional whose skills, qualifications, knowledge and experience are critical to the performance of the Services under the Contract and whose CV is taken into account in the technical evaluation of the Consultant's proposal.

(o) "ITC" (this Section 2 of the RFP) means the Instructions to Consultants that provides the shortlisted Consultants with all information needed to prepare their Proposals.

(p) "LOI" (this Section 1 of the RFP) means the Letter of Invitation being sent by the Client to the shortlisted Consultants.

(q) "Non-Key Expert(s)" means an individual professional provided by the Consultant or its Sub-consultant and who is assigned to perform the Services or any part thereof under the Contract and whose CVs are not evaluated individually.

(r) "Proposal" means the Technical Proposal and the Financial Proposal of the Consultant.

(s) "RFP" means the Request for Proposals to be prepared by the Client for the selection of Consultants, based on the SRFP.

(t) "SRFP" means the Standard Request for Proposals, which must be used by the Client as the basis for the preparation of the RFP.

(u) "Services" means the work to be performed by the Consultant pursuant to the Contract.

(v) "Sub-consultant" means an entity to whom the Consultant intends to subcontract any part of the Services while

remaining responsible to the Client during the performance of the Contract.

(w) "TORs" (this Section 7 of the RFP) means the Terms of Reference that explain the objectives, scope of work, activities, and tasks to be performed, respective responsibilities of the Client and the Consultant, and expected results and deliverables of the assignment.

2. Introduction

2.1 The Client named in the **Data Sheet** intends to select a Consultant from those listed in the Letter of Invitation, in accordance with the method of selection specified in the **Data Sheet**.

2.2 The shortlisted Consultants are invited to submit a Technical Proposal and a Financial Proposal, or a Technical Proposal only, as specified in the **Data Sheet**, for consulting services required for the assignment named in the **Data Sheet**. The Proposal will be the basis for negotiating and ultimately signing the Contract with the selected Consultant.

2.3 The Consultants should familiarize themselves with the local conditions and take them into account in preparing their Proposals, including attending a pre-proposal conference if one is specified in the **Data Sheet**. Attending any such pre-proposal conference is optional and is at the Consultants' expense.

2.4 The Client will timely provide, at no cost to the Consultants, the inputs, relevant project data, and reports required for the preparation of the Consultant's Proposal as specified in the **Data Sheet**.

3. Conflict of Interest

3.1 The Consultant is required to provide professional, objective, and impartial advice, at all times holding the Client's interests paramount, strictly avoiding conflicts with other assignments or its own corporate interests, and acting without any consideration for future work.

3.2 The Consultant has an obligation to disclose to the Client any situation of actual or potential conflict that impacts its capacity to serve the best interest of its Client. Failure to disclose such situations may lead to the disqualification of the Consultant or the termination of its Contract and/or sanctions by the Bank.

3.2.1 Without limitation on the generality of the foregoing, and unless stated otherwise in the **Data Sheet**, the Consultant shall not be hired under the circumstances set forth below:

a. Conflicting activities

(i) Conflict between consulting activities and procurement of goods, works or non-consulting services: a firm that has been engaged by the Client to provide goods, works, or non-consulting services for a project, or any of its Affiliates, shall be disqualified from providing consulting services resulting from or directly related to those goods, works, or non-consulting services. Conversely, a firm hired to provide consulting services for the preparation or implementation of a project, or any of its Affiliates, shall be disqualified from subsequently providing goods or works or non-consulting services resulting from or directly related to the consulting services for such preparation or implementation.

b. Conflicting assignments

(ii) Conflict among consulting assignments: a Consultant (including its Experts and Sub-consultants) or any of its Affiliates shall not be hired for any assignment that, by its nature, may be in conflict with another assignment of the Consultant for the same or for another Client.

c. Conflicting relationships

(iii) Relationship with the Client's staff: a Consultant (including its Experts and Sub-consultants) that has a close business or family relationship with a professional staff of the Borrower (or of the Client, or of implementing agency, or of a recipient of a part of the Bank's financing)who are directly or indirectly involved in any part of (i) the preparation of the Terms of Reference for the assignment, (ii) the selection process for the Contract, or (iii) the supervision of the Contract, may not be awarded a Contract, unless the conflict stemming from this relationship has been resolved in a manner acceptable to the Bank throughout the selection process and the execution of the Contract.

4. Unfair Competitive Advantage

4.1 Fairness and transparency in the selection process require that the Consultants or their Affiliates competing for a specific assignment do not derive a competitive advantage from having provided consulting services related to the assignment in question. To that end, the Client shall indicate in the **Data Sheet** and make available to all shortlisted Consultants together with this RFP all information that would in that respect give such Consultant any unfair competitive advantage over competing Consultants.

5. Corrupt and Fraudulent Practices

5.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Section 6.

5.2 In further pursuance of this policy, Consultant shall permit and shall cause its agents, Experts, Sub-consultants, sub-contractors,

services providers, or suppliers to permit the Bank to inspect all accounts, records, and other documents relating to the submission of the Proposal and contract performance (in case of an award), and to have them audited by auditors appointed by the Bank.

6. Eligibility

6.1 The Bank permits consultants (individuals and firms, including Joint Ventures and their individual members) from all countries to offer consulting services for Bank-financed projects.

6.2 Furthermore, it is the Consultant's responsibility to ensure that its Experts, joint venture members, Sub-consultants, agents (declared or not), sub-contractors, service providers, suppliers and/or their employees meet the eligibility requirements as established by the Bank in the Applicable Guidelines.

6.3 As an exception to the foregoing Clauses 6.1 and 6.2 above:

a. Sanctions

6.3.1 A firm or an individual sanctioned by the Bank in accordance with the above Clause 5.1 or in accordance with "Anti-Corruption Guidelines" shall be ineligible to be awarded a Bank-financed contract, or to benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall determine. The list of debarred firms and individuals is available at the electronic address specified in the **Data Sheet**.

b. Prohibitions

6.3.2 Firms and individuals of a country or goods manufactured in a country may be ineligible if so indicated in Section 5 (Eligible Countries) and:

(a) as a matter of law or official regulations, the Borrower's country prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the provision of Services required; or

(b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's Country prohibits any import of goods from that country or any payments to any country, person, or entity in that country.

c. Restrictions for Government-owned Enterprises

6.3.3 Government-owned enterprises or institutions in the Borrower's country shall be eligible only if they can establish that they (i) are legally and financially autonomous, (ii)

operate under commercial law, and (iii) that they are not dependent agencies of the Client

To establish eligibility, the government-owned enterprise or institution should provide all relevant documents (including its charter) sufficient to demonstrate that it is a legal entity separate from the government; it does not currently receive any substantial subsidies or budget support; it is not obligated to pass on its surplus to the government; it can acquire rights and liabilities, borrow funds, and can be liable for repayment of debts and be declared bankrupt; and it is not competing for a contract to be awarded by the government department or agency which, under the applicable laws or regulations, is its reporting or supervisory authority or has the ability to exercise influence or control over it.

d. Restrictions for public employees

6.3.4 Government officials and civil servants of the Borrower's country are not eligible to be included as Experts in the Consultant's Proposal unless such engagement does not conflict with any employment or other laws, regulations, or policies of the Borrower's country, and they

(i) are on leave of absence without pay, or have resigned or retired;

(ii) are not being hired by the same agency they were working for before going on leave of absence without pay, resigning, or retiring

(in case of resignation or retirement, for a period of at least 6 (six) months, or the period established by statutory provisions applying to civil servants or government employees in the Borrower's country, whichever is longer. Experts who are employed by the government-owned universities, educational or research institutions are not eligible unless they have been full time employees of their institutions for a year or more prior to being included in Consultant's Proposal.; and

(iii) their hiring would not create a conflict of interest.

B. Preparation of Proposals

7. General Considerations

7.1 In preparing the Proposal, the Consultant is expected to examine the RFP in detail. Material deficiencies in providing the information requested in the RFP may result in rejection of the Proposal.

8. Cost of Preparation of Proposal

8.1 The Consultant shall bear all costs associated with the preparation and submission of its Proposal, and the Client shall not be responsible or liable for those costs, regardless of the conduct or outcome of the selection process. The Client is not bound to accept any proposal, and reserves the right to annul the selection process at any time prior to Contract award, without thereby incurring any liability to the Consultant.

9. Language

9.1 The Proposal, as well as all correspondence and documents relating to the Proposal exchanged between the Consultant and the Client, shall be written in the language(s) specified in the **Data Sheet**.

10. Documents Comprising the Proposal

10.1 The Proposal shall comprise the documents and forms listed in the **Data Sheet**.

10.2 If specified in the **Data Sheet**, the Consultant shall include a statement of an undertaking of the Consultant to observe, in competing for and executing a contract, the Client country's laws against fraud and corruption (including bribery).

10.3 The Consultant shall furnish information on commissions, gratuities, and fees, if any, paid or to be paid to agents or any other party relating to this Proposal and, if awarded, Contract execution, as requested in the Financial Proposal submission form (Section 4).

C. Submission, Opening and Evaluation

11. Only One Proposal

11.1 The Consultant (including the individual members of any Joint Venture) shall submit only one Proposal, either in its own name or as part of a Joint Venture in another Proposal. If a Consultant, including any Joint Venture member, submits or participates in more than one proposal, all such proposals shall be disqualified and rejected. This does not, however, preclude a Sub-consultant, or the Consultant's staff from participating as

Key Experts and Non-Key Experts in more than one Proposal when circumstances justify and if stated in the **Data Sheet**.

12. Proposal Validity

12.1 **The Data Sheet** indicates the period during which the Consultant's Proposal must remain valid after the Proposal submission deadline.

12.2 During this period, the Consultant shall maintain its original Proposal without any change, including the availability of the Key Experts, the proposed rates and the total price.

12.3 If it is established that any Key Expert nominated in the Consultant's Proposal was not available at the time of Proposal submission or was included in the Proposal without his/her confirmation, such Proposal shall be disqualified and rejected for further evaluation, and may be subject to sanctions in accordance with Clause 5 of this ITC.

a. Extension of Validity Period

12.4 The Client will make its best effort to complete the negotiations within the proposal's validity period. However, should the need arise, the Client may request, in writing, all Consultants who submitted Proposals prior to the submission deadline to extend the Proposals' validity.

12.5 If the Consultant agrees to extend the validity of its Proposal, it shall be done without any change in the original Proposal and with the confirmation of the availability of the Key Experts.

12.6 The Consultant has the right to refuse to extend the validity of its Proposal in which case such Proposal will not be further evaluated.

b. Substitution of Key Experts at Validity Extension

12.7 If any of the Key Experts become unavailable for the extended validity period, the Consultant shall provide a written adequate justification and evidence satisfactory to the Client together with the substitution request. In such case, a replacement Key Expert shall have equal or better qualifications and experience than those of the originally proposed Key Expert. The technical evaluation score, however, will remain to be based on the evaluation of the CV of the original Key Expert.

12.8 If the Consultant fails to provide a replacement Key Expert with equal or better qualifications, or if the provided reasons for the replacement or justification are unacceptable to the Client, such Proposal will be rejected with the prior Bank's no objection.

c. Sub-Contracting

12.9 The Consultant shall not subcontract the whole of the Services.

13. Clarification and Amendment of RFP

13.1 The Consultant may request a clarification of any part of the RFP during the period indicated in the **Data Sheet** before the Proposals' submission deadline. Any request for clarification must be sent in writing, or by standard electronic means, to the Client's address indicated in the **Data Sheet**. The Client will respond in writing, or by standard electronic means, and will send written copies of the response (including an explanation of the query but without identifying its source) to all shortlisted Consultants. Should the Client deem it necessary to amend the RFP as a result of a clarification, it shall do so following the procedure described below:

13.1.1 At any time before the proposal submission deadline, the Client may amend the RFP by issuing an amendment in writing or by standard electronic means. The amendment shall be sent to all shortlisted Consultants and will be binding on them. The shortlisted Consultants shall acknowledge receipt of all amendments in writing.

13.1.2 If the amendment is substantial, the Client may extend the proposal submission deadline to give the shortlisted Consultants reasonable time to take an amendment into account in their Proposals.

13.2 The Consultant may submit a modified Proposal or a modification to any part of it at any time prior to the proposal submission deadline. No modifications to the Technical or Financial Proposal shall be accepted after the deadline.

14. Preparation of Proposals – Specific Considerations

14.1 While preparing the Proposal, the Consultant must give particular attention to the following:

14.1.1 If a shortlisted Consultant considers that it may enhance its expertise for the assignment by associating with other consultants in the form of a Joint Venture or as Sub-consultants, it may do so with either (a) non-shortlisted Consultant(s), or (b) shortlisted Consultants if permitted in the **Data Sheet**. In all such cases a shortlisted Consultant must obtain the written approval of the Client prior to the submission of the Proposal. When associating with non-shortlisted firms in the form of a joint venture or a sub-consultancy, the shortlisted Consultant shall be a lead member. If shortlisted Consultants associate with each other, any of them can be a lead member.

14.1.2 The Client may indicate in the **Data Sheet** the estimated Key Experts' time input (expressed in person-month) or the Client's estimated total cost of the assignment, but not both. This estimate is indicative and the Proposal shall be based on the Consultant's own estimates for the same.

14.1.3 If stated in the **Data Sheet**, the Consultant shall include in its Proposal at least the same time input (in the same unit as indicated in the **Data Sheet**) of Key Experts, failing which the Financial Proposal will be adjusted for the purpose of comparison of proposals and decision for award in accordance with the procedure in the **Data Sheet**.

14.1.4 For assignments under the Fixed-Budget selection method, the estimated Key Experts' time input is not disclosed. Total available budget, with an indication whether it is inclusive or exclusive of taxes, is given in the **Data Sheet**, and the Financial Proposal shall not exceed this budget.

15. Technical Proposal Format and Content

15.1 The Technical Proposal shall not include any financial information. A Technical Proposal containing material financial information shall be declared non-responsive.

15.1.1 Consultant shall not propose alternative Key Experts. Only one CV shall be submitted for each Key

Expert position. Failure to comply with this requirement will make the Proposal non-responsive.

15.2 Depending on the nature of the assignment, the Consultant is required to submit a Full Technical Proposal (FTP), or a Simplified Technical Proposal (STP) as indicated in the **Data Sheet** and using the Standard Forms provided in Section 3 of the RFP.

16. Financial Proposal

16.1 The Financial Proposal shall be prepared using the Standard Forms provided in Section 4 of the RFP. It shall list all costs associated with the assignment, including (a) remuneration for Key Experts and Non-Key Experts, (b) reimbursable expenses indicated in the **Data Sheet**.

a. Price Adjustment

16.2 For assignments with a duration exceeding 18 months, a price adjustment provision for foreign and/or local inflation for remuneration rates applies if so stated in the **Data Sheet**.

b. Taxes

16.3 The Consultant and its Sub-consultants and Experts are responsible for meeting all tax liabilities arising out of the Contract unless stated otherwise in the **Data Sheet**. Information on taxes in the Client's country is provided in the **Data Sheet**.

c. Currency of Proposal

16.4 The Consultant may express the price for its Services in the currency or currencies as stated in the **Data Sheet**. If indicated in the **Data Sheet**, the portion of the price representing local cost shall be stated in the national currency.

d. Currency of Payment

16.5 Payment under the Contract shall be made in the currency or currencies in which the payment is requested in the Proposal.

C. Submission, Opening and Evaluation

17. Submission, Sealing, and Marking of Proposals

17.1 The Consultant shall submit a signed and complete Proposal comprising the documents and forms in accordance with Clause 10 (Documents Comprising Proposal). The submission can be done by mail or by hand. If specified in

the **Data Sheet**, the Consultant has the option of submitting its Proposals electronically.

17.2 An authorized representative of the Consultant shall sign the original submission letters in the required format for both the Technical Proposal and, if applicable, the Financial Proposals and shall initial all pages of both. The authorization shall be in the form of a written power of attorney attached to the Technical Proposal.

17.2.1 A Proposal submitted by a Joint Venture shall be signed by all members so as to be legally binding on all members, or by an authorized representative who has a written power of attorney signed by each member's authorized representative

17.3 Any modifications, revisions, interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the Proposal.

17.4 The signed Proposal shall be marked "ORIGINAL", and its copies marked "COPY" as appropriate. The number of copies is indicated in the **Data Sheet**. All copies shall be made from the signed original. If there are discrepancies between the original and the copies, the original shall prevail.

17.5 The original and all the copies of the Technical Proposal shall be placed inside of a sealed envelope clearly marked "**TECHNICAL PROPOSAL", "CONSULTANCY SERVICES TO CARRY OUT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND RESETTLEMENT ACTION PLAN FOR ZONES 6 AND 7 OF THE LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME, LWSIP II/Comp III/C/37-2018**, name and address of the Consultant, and with a warning "**DO NOT OPEN UNTIL 17TH APRIL, 2018 AT 15:00**."

17.6 Similarly, the original Financial Proposal (if required for the applicable selection method) shall be placed inside of a sealed envelope clearly marked "**FINANCIAL PROPOSAL**" followed by the name of the assignment, reference number, name and address of the Consultant, and with a warning "**DO NOT OPEN WITH THE TECHNICAL PROPOSAL**."

17.7 The sealed envelopes containing the Technical and Financial Proposals shall be placed into one outer envelope and sealed. This outer envelope shall bear the submission address, RFP reference number, the name of the assignment, Consultant's name and the address, and

shall be clearly marked "**DO NOT OPEN BEFORE 17TH APRIL, 2018 AT 15:00**".

17.8 If the envelopes and packages with the Proposal are not sealed and marked as required, the Client will assume no responsibility for the misplacement, loss, or premature opening of the Proposal.

17.9 The Proposal or its modifications must be sent to the address indicated in the **Data Sheet** and received by the Client no later than the deadline indicated in the **Data Sheet**, or any extension to this deadline. Any Proposal or its modification received by the Client after the deadline shall be declared late and rejected, and promptly returned unopened.

18. Confidentiality

18.1 From the time the Proposals are opened to the time the Contract is awarded, the Consultant should not contact the Client on any matter related to its Technical and/or Financial Proposal. Information relating to the evaluation of Proposals and award recommendations shall not be disclosed to the Consultants who submitted the Proposals or to any other party not officially concerned with the process, until the publication of the Contract award information.

18.2 Any attempt by shortlisted Consultants or anyone on behalf of the Consultant to influence improperly the Client in the evaluation of the Proposals or Contract award decisions may result in the rejection of its Proposal, and may be subject to the application of prevailing Bank's sanctions procedures

18.3 Notwithstanding the above provisions, from the time of the Proposals' opening to the time of Contract award publication, if a Consultant wishes to contact the Client or the Bank on any matter related to the selection process, it should do so only in writing.

19. Opening of Technical Proposals

19.1 The Client's evaluation committee shall conduct the opening of the Technical Proposals in the presence of the shortlisted Consultants' authorized representatives who choose to attend (in person, or online if this option is offered in the **Data Sheet**). The opening date, time and the address are stated in the **Data Sheet**. The envelopes with the Financial Proposal shall remain sealed and shall be securely stored with a reputable public auditor or independent authority until they are opened in accordance with Clause 23 of the ITC.

19.2 At the opening of the Technical Proposals the following shall be read out: (i) the name and the country of the Consultant

or, in case of a Joint Venture, the name of the Joint Venture, the name of the lead member and the names and the countries of all members; (ii) the presence or absence of a duly sealed envelope with the Financial Proposal; (iii) any modifications to the Proposal submitted prior to proposal submission deadline; and (iv) any other information deemed appropriate or as indicated in the **Data Sheet**.

20. Proposals Evaluation

20.1 Subject to provision of Clause 15.1 of the ITC, the evaluators of the Technical Proposals shall have no access to the Financial Proposals until the technical evaluation is concluded and the Bank issues its "no objection", if applicable.

20.2 The Consultant is not permitted to alter or modify its Proposal in any way after the proposal submission deadline except as permitted under Clause 12.7 of this ITC. While evaluating the Proposals, the Client will conduct the evaluation solely on the basis of the submitted Technical and Financial Proposals.

21. Evaluation of Technical Proposals

21.1 The Client's evaluation committee shall evaluate the Technical Proposals on the basis of their responsiveness to the Terms of Reference and the RFP, applying the evaluation criteria, sub-criteria, and point system specified in the **Data Sheet**. Each responsive Proposal will be given a technical score. A Proposal shall be rejected at this stage if it does not respond to important aspects of the RFP or if it fails to achieve the minimum technical score indicated in the **Data Sheet**.

22. Financial Proposals for QBS

22.1 Following the ranking of the Technical Proposals, when the selection is based on quality only (QBS), the top-ranked Consultant is invited to negotiate the Contract.

22.2 If Financial Proposals were invited together with the Technical Proposals, only the Financial Proposal of the technically top-ranked Consultant is opened by the Client's evaluation committee. All other Financial Proposals are returned unopened after the Contract negotiations are successfully concluded and the Contract is signed.

23. Public Opening of Financial Proposals (for QCBS, FBS, and LCS methods)

23.1 After the technical evaluation is completed and the Bank has issued its no objection (if applicable), the Client shall notify those Consultants whose Proposals were considered non-responsive to the RFP and TOR or did not meet the minimum qualifying technical score (and shall provide information relating

to the Consultant's overall technical score, as well as scores obtained for each criterion and sub-criterion) that their Financial Proposals will be returned unopened after completing the selection process and Contract signing. The Client shall simultaneously notify in writing those Consultants that have achieved the minimum overall technical score and inform them of the date, time and location for the opening of the Financial Proposals. The opening date should allow the Consultants sufficient time to make arrangements for attending the opening. The Consultant's attendance at the opening of the Financial Proposals (in person, or online if such option is indicated in the **Data Sheet**) is optional and is at the Consultant's choice.

23.2 The Financial Proposals shall be opened by the Client's evaluation committee in the presence of the representatives of those Consultants whose proposals have passed the minimum technical score. At the opening, the names of the Consultants, and the overall technical scores, including the break-down by criterion, shall be read aloud. The Financial Proposals will then be inspected to confirm that they have remained sealed and unopened. These Financial Proposals shall be then opened, and the total prices read aloud and recorded. Copies of the record shall be sent to all Consultants who submitted Proposals and to the Bank.

24. Correction of Errors

24.1 Activities and items described in the Technical Proposal but not priced in the Financial Proposal, shall be assumed to be included in the prices of other activities or items, and no corrections are made to the Financial Proposal.

a. Time-Based Contracts

24.1.1 If a Time-Based contract form is included in the RFP, the Client's evaluation committee will (a) correct any computational or arithmetical errors, and (b) adjust the prices if they fail to reflect all inputs included for the respective activities or items in the Technical Proposal. In case of discrepancy between (i) a partial amount (sub-total) and the total amount, or (ii) between the amount derived by multiplication of unit price with quantity and the total price, or (iii) between words and figures, the former will prevail. In case of discrepancy between the Technical and Financial Proposals in indicating quantities of input, the Technical Proposal prevails and the Client's evaluation committee shall correct the quantification indicated in the Financial Proposal so as to make it consistent with that indicated in the Technical Proposal, apply the relevant unit price included in

the Financial Proposal to the corrected quantity, and correct the total Proposal cost.

b. Lump-Sum Contracts

24.2 If a Lump-Sum contract form is included in the RFP, the Consultant is deemed to have included all prices in the Financial Proposal, so neither arithmetical corrections nor price adjustments shall be made. The total price, net of taxes understood as per Clause ITC 25 below, specified in the Financial Proposal (Form FIN-1) shall be considered as the offered price.

25. Taxes

25.1 The Client's evaluation of the Consultant's Financial Proposal shall exclude taxes and duties in the Client's country in accordance with the instructions in the **Data Sheet**.

26. Conversion to Single Currency

26.1 For the evaluation purposes, prices shall be converted to a single currency using the selling rates of exchange, source and date indicated in the **Data Sheet**.

27. **Combined Quality and Cost Evaluation**

a. Quality- and Cost-Based Selection (QCBS)

27.1 In the case of QCBS, the total score is calculated by weighting the technical and financial scores and adding them as per the formula and instructions in the **Data Sheet**. The Consultant achieving the highest combined technical and financial score will be invited for negotiations.

b. Fixed-Budget Selection (FBS)

27.2 In the case of FBS, those Proposals that exceed the budget indicated in Clause 14.1.4 of the **Data Sheet** shall be rejected.

27.3 The Client will select the Consultant that submitted the highest-ranked Technical Proposal that does not exceed the budget indicated in the RFP, and invite such Consultant to negotiate the Contract.

c. Least-Cost Selection

27.4 In the case of Least-Cost Selection (LCS), the Client will select the Consultant with the lowest evaluated total price among those consultants that achieved the minimum technical score, and invite such Consultant to negotiate the Contract.

D. Negotiations and Award

28. **Negotiations**

28.1 The negotiations will be held at the date and address indicated in the **Data Sheet** with the Consultant's representative(s) who must have written power of attorney to negotiate and sign a Contract on behalf of the Consultant.

28.2 The Client shall prepare minutes of negotiations that are signed by the Client and the Consultant's authorized representative.

a. Availability of Key Experts

28.3 The invited Consultant shall confirm the availability of all Key Experts included in the Proposal as a pre-requisite to the negotiations, or, if applicable, a replacement in accordance with Clause 12 of the ITC. Failure to confirm the Key Experts' availability may result in the rejection of the Consultant's Proposal and the Client proceeding to negotiate the Contract with the next-ranked Consultant.

28.4 Notwithstanding the above, the substitution of Key Experts at the negotiations may be considered if due solely to circumstances outside the reasonable control of and not foreseeable by the Consultant, including but not limited to death or medical incapacity. In such case, the Consultant shall offer a substitute Key Expert within the period of time specified in the letter of invitation to negotiate the Contract, who shall have equivalent or better qualifications and experience than the original candidate.

b. Technical negotiations

28.5 The negotiations include discussions of the Terms of Reference (TORs), the proposed methodology, the Client's inputs, the special conditions of the Contract, and finalizing the "Description of Services" part of the Contract. These discussions shall not substantially alter the original scope of services under the TOR or the terms of the contract, lest the quality of the final product, its price, or the relevance of the initial evaluation be affected.

c. Financial negotiations

28.6 The negotiations include the clarification of the Consultant's tax liability in the Client's country and how it should be reflected in the Contract.

28.7 If the selection method included cost as a factor in the evaluation, the total price stated in the Financial Proposal for a Lump-Sum contract shall not be negotiated.

28.8 In the case of a Time-Based contract, unit rates negotiations shall not take place, except when the offered Key Experts and Non-Key Experts' remuneration rates are much higher than the typically charged rates by consultants in similar contracts. In such case, the Client may ask for clarifications and, if the fees are very high, ask to change the rates after consultation with the Bank.

The format for (i) providing information on remuneration rates in the case of Quality Based Selection; and (ii) clarifying remuneration rates' structure under Clause 28.8 above, is provided in Appendix A to the Financial Form FIN-3: Financial Negotiations – Breakdown of Remuneration Rates.

29. **Conclusion of Negotiations**

29.1 The negotiations are concluded with a review of the finalized draft Contract, which then shall be initialed by the Client and the Consultant's authorized representative.

29.2 If the negotiations fail, the Client shall inform the Consultant in writing of all pending issues and disagreements and provide a final opportunity to the Consultant to respond. If disagreement persists, the Client shall terminate the negotiations informing the Consultant of the reasons for doing so. After having obtained the Bank's no objection, the Client will invite the next-ranked Consultant to negotiate a Contract. Once the Client commences negotiations with the next-ranked Consultant, the Client shall not reopen the earlier negotiations.

30. **Award of Contract**

30.1 After completing the negotiations the Client shall obtain the Bank's no objection to the negotiated draft Contract, if applicable; sign the Contract; publish the award information as per the instructions in the **Data Sheet**; and promptly notify the other shortlisted Consultants.

30.2 The Consultant is expected to commence the assignment on the date and at the location specified in the **Data Sheet**.

Instructions to Consultants

E. Data Sheet

A. General	
ITC Clause Reference	
1 (c)	**Lesotho**
2.1	Name of the Client**:** **Water Commission, Ministry of Water** Method of selection: **Consultants' Qualifications Selection** Applicable Guidelines*:* **Selection and Employment of Consultants [under IBRD Loans and IDA Credits & Grants] by World Bank Borrowers, (revised January, 2011 available on www.worldbank.org/procure**
2.2	Financial Proposal to be submitted together with Technical Proposal: **Yes** The name of the assignment is: **Consultancy Services to Carry out Environmental and Social Impact Assessment and Resettlement Action Plan for Zones 6 And 7 of the Lesotho Lowlands Bulk Water Supply Scheme**
2.3	A pre-proposal conference will be held: **No**
2.4	The Client will provide the following inputs, project data, reports, etc., to facilitate the preparation of the Proposals: **As requested by Consultants**
4.1	*N/A*
6.3.1	**A list of debarred firms and individuals is available at the Bank's external website***:* www.worldbank.org/debarr

B. Preparation of Proposals	
9.1	This RFP has been issued in the **English** language. Proposals shall be submitted in **English** All correspondence exchange shall be in **English** Language
10.1	**The Proposal shall comprise the following**: **1st Inner Envelope with the Technical Proposal:** (1) Power of Attorney to sign the Proposal (2) TECH-1 (3) TECH-4 (4) TECH-5 (5) TECH-6 AND **2nd Inner Envelope with the Financial Proposal (if applicable):** (1) FIN-1 (2) FIN-2 (3) FIN-3 (4) FIN-4 (5) Statement of Undertaking (if required under Data Sheet 10.2 below)
10.2	Statement of Undertaking is required Yes *X* Consultants are required to observe the required below: "In competing for (and, if the award is made to us, in executing) the Contract, we undertake to observe the laws against fraud and corruption, including bribery, in force in the country of the Client"
11.1	Participation of Sub-consultants, Key Experts and Non-Key Experts in more than one Proposal is permissible **No**

12.1	Proposals must remain valid for **90** days (i.e., until: **17th July, 2018.**
13.1	Clarifications may be requested no later than **10 days** prior to the submission deadline (**10th April, 2018**). The contact information for requesting clarifications is: 'Mamaseko Lefothane Facsimile: +266 22 324529 E-mail: lwsip.procurement@gmail.com and copy Mr. L. Nnena at leshoboro.nena@gmail.com
14.1.1	Shortlisted Consultants may associate with **(a) non-shortlisted consultant(s):** *Yes*
14.1.2 (do not use for Fixed Budget method)	Estimated input of Key Experts' time-input: **140 man-days**.
14.1.3 for time-based contracts only	***N/A***
14.1.4 and 27.2 use for Fixed Budget method	***N/A***
15.2	The format of the Technical Proposal to be submitted is: **Simplified Technical Proposal** **Submission of the Technical Proposal in a wrong format may lead to the Proposal being deemed non-responsive to the RFP requirements.**
16.1	*(1) a per diem allowance, including hotel, for experts for every day of absence from the home office for the purposes of the Services;*

	(2) cost of travel by the most appropriate means of transport and the most direct practicable route; *(3) cost of office accommodation, including overheads and back-stop support;* *(4) communications costs;* *(5) cost of purchase or rent or freight of any equipment required to be provided by the Consultants;* *(6) cost of reports production (including printing) and delivering to the Client;*
16.2	A price adjustment provision applies to remuneration rates: **No**
16.3	**5% withholding tax applies to local firms pay, while 10% is** **For foreign firms. Withholding tax shall be paid to Lesotho Revenue Authority by the Client on behalf of the Consultant. Further Information on the Consultant's tax obligations in the Client's country can be found at** *Lesotho Revenue Authority, website* www.lra.org.ls , *phone number +266-22313796.*
16.4	The Financial Proposal shall be stated in the following currencies: **Consultant may express the price for their Services in any fully convertible currency, singly or in combination of up to three foreign currencies.** The Financial Proposal should state local costs in the Client's country currency (local currency): ***Yes***
C. Submission, Opening and Evaluation	
17.1	The Consultants ***shall not*** have the option of submitting their Proposals electronically.
17.4	The Consultant must submit: (a) **Technical Proposal:** one (1) original and three (3) copies and an electronic copy; (b) **Financial Proposal:** one (1) original and three (3) copies and an electronic copy
17.7 and 17.9	The Proposals must be submitted no later than: **Date:** ***17th April, 2018*** **Time:** ***03:00*** *pm* ***local time*** The Proposal submission address is:

	Commissioner of Water, Water Commission, 15 UN Road, Sentinel Park Building, Maseru, Lesotho
19.1	N/A
19.2	**In addition, the following information will be read aloud at the opening of the Technical Proposals** ___N/A_____
21.1	Criteria, sub-criteria, and point system for the evaluation of the Simplified Technical Proposals are: Points **(i) Adequacy and quality of the proposed methodology, and work plan in responding to the Terms of Reference:** Total points for criterion (i): ***40*** **(ii) Key Experts' qualifications and competence for the Assignment:** *{Notes to Consultant: each position number corresponds to the same for Key Experts in Form TECH-6 to be prepared by the Consultant}* *Position K1:*Team Leader – Environmental Impact Assessment Specialist 15 *Position K2:* Sociologist/Anthropologist 6 *Position K3:* Public Consultation Specialist 6 *Position K4:* Compensation and Resettlement Specialist 10 *Position K5:* Monitoring and Evaluation 6 *Position K6:* Data Management Specialist 6 *Position K7:* GIS Specialist 6 *Position K8:* Cadastral Surveyor - 5

The number of points to be assigned to each of the above positions shall be determined considering the following "three sub-criteria and relevant percentage weights:	
a) General qualifications (general education, training, and experience)	*20*
b) Adequacy for the Assignment (relevant education, training, experience in the sector/similar assignments)	*70*
c) Relevant experience in the region (working level fluency in local language(s)/knowledge of local culture or administrative system, government organization, etc.)	*10*
Total	**100**

Total points for criterion (ii): ***60***

	Total points for the two criteria*:* ***100*** **The minimum technical score (St) required to pass is: *75***
21.1 [for STP]	*N/A*
23.1	An online option of the opening of the Financial Proposals is offered**: *No***
25.1	For the purpose of the evaluation, the Client will exclude: (a) all local identifiable indirect taxes such as sales tax, excise tax, VAT, or similar taxes levied on the contract's invoices; and (b) all additional local indirect tax on the remuneration of services rendered by non-resident experts in the Client's country. If a Contract is awarded, at Contract negotiations, all such taxes will be discussed, finalized (using the itemized list as a guidance but not limiting to it) and added to the Contract amount as a separate line, also indicating which taxes shall be paid by the Consultant and which taxes are withheld and paid by the Client on behalf of the Consultant.
26.1	The single currency for the conversion of all prices expressed in various currencies into a single one is**: *United States Dollar (USD)*** The official source of the selling (exchange) rate is: ***Central Bank of Lesotho*** The date of the exchange rate is**: 28 days prior to the deadline for submission of proposals and no later than the date of the original validity of Proposals (*17th July, 2018*).**
	D. Negotiations and Award
28.1	**Expected date and address for contract negotiations:** **Date: *23rd April*, 2018** Address: ***Water Commission, 15 UN Road, Sentinel Park Building, Maseru, Lesotho***
30.1	**The publication of the contract award information following the completion of the contract negotiations and contract signing will be done as following: *clientconnection.worldbank.org, UNDB online local newspapers*** The publication will be done within ***fourteen (14) days after the contract signing.***

30.2	Expected date for the commencement of the Services: **Date:** ***30th April, 2018 in Maseru***

Section 3.

Technical Proposal – Standard Forms

{Notes to Consultant shown in brackets { } throughout Section 3 provide guidance to the Consultant to prepare the Technical Proposal; they should not appear on the Proposals to be submitted.}

CHECKLIST OF REQUIRED FORMS

Required for FTP or STP (√)		FORM	DESCRIPTION	*Page Limit*
FTP	STP			
	√	TECH-1	Technical Proposal Submission Form.	
		"√ " If applicable	If the Proposal is submitted by a joint venture, attach a letter of intent or a copy of an existing agreement.	
"√" If applicable		Power of Attorney	No pre-set format/form. In the case of a Joint Venture, several are required: a power of attorney for the authorized representative of each JV member, and a power of attorney for the representative of the lead member to represent all JV members	
		TECH-2	Consultant's Organization and Experience.	
		TECH-2A	A. Consultant's Organization	
		TECH-2B	B. Consultant's Experience	
		TECH-3	Comments or Suggestions on the Terms of Reference and on Counterpart Staff and Facilities to be provided by the Client.	
		TECH-3A	A. On the Terms of Reference	
		TECH-3B	B. On the Counterpart Staff and Facilities	
	√	TECH-4	Description of the Approach, Methodology, and Work Plan for Performing the Assignment	
	√	TECH-5	Work Schedule and Planning for Deliverables	
	√	TECH-6	Team Composition, Key Experts Inputs, and attached Curriculum Vitae (CV)	

All pages of the original Technical and Financial Proposal shall be initialled by the same authorized representative of the Consultant who signs the Proposal.

FORM TECH-1

TECHNICAL PROPOSAL SUBMISSION FORM

{Location, Date}

To: *[Name and address of Client]*

Dear Sirs:

We, the undersigned, offer to provide the consulting services for *[Insert title of assignment]* in accordance with your Request for Proposals dated *[Insert Date]* and our Proposal. *[Select appropriate wording depending on the selection method stated in the RFP:* "We are hereby submitting our Proposal, which includes this Technical Proposal and a Financial Proposal sealed in a separate envelope" *or, if only a Technical Proposal is invited* "We hereby are submitting our Proposal, which includes this Technical Proposal only in a sealed envelope.*"]*.

{If the Consultant is a joint venture, insert the following*:* We are submitting our Proposal a joint venture with: {Insert a list with full name and the legal address of each member, and indicate the lead member}. We have attached a copy {insert: "of our letter of intent to form a joint venture" or, if a JV is already formed, "of the JV agreement"} signed by every participating member, which details the likely legal structure of and the confirmation of joint and severable liability of the members of the said joint venture.

{OR

If the Consultant's Proposal includes Sub-consultants, insert the following: We are submitting our Proposal with the following firms as Sub-consultants: {Insert a list with full name and address of each Sub-consultant.}

We hereby declare that:

(a) All the information and statements made in this Proposal are true and we accept that any misinterpretation or misrepresentation contained in this Proposal may lead to our disqualification by the Client and/or may be sanctioned by the Bank.

(b) Our Proposal shall be valid and remain binding upon us for the period of time specified in the Data Sheet, Clause 12.1.

(c) We have no conflict of interest in accordance with ITC 3.

(d) We meet the eligibility requirements as stated in ITC 6, and we confirm our understanding of our obligation to abide by the Bank's policy in regard to corrupt and fraudulent practices as per ITC 5.

(e) *[Note to Client: Only if required in ITC10.2 (Data Sheet 10.2), include the following:* In competing for (and, if the award is made to us, in executing) the Contract, we undertake to observe the laws against fraud and corruption, including bribery, in force in the country of the Client.*]*

(f) Except as stated in the Data Sheet, Clause 12.1, we undertake to negotiate a Contract on the basis of the proposed Key Experts. We accept that the substitution of Key Experts for reasons other than those stated in ITC Clause 12 and ITC Clause 28.4 may lead to the termination of Contract negotiations.

(g) Our Proposal is binding upon us and subject to any modifications resulting from the Contract negotiations.

We undertake, if our Proposal is accepted and the Contract is signed, to initiate the Services related to the assignment no later than the date indicated in Clause 30.2 of the Data Sheet.

We understand that the Client is not bound to accept any Proposal that the Client receives.

We remain,

Yours sincerely,

Authorized Signature {In full and initials}: _____
Name and Title of Signatory: _____
Name of Consultant (company's name or JV's name):
In the capacity of: _____

Address: _____
Contact information (phone and e-mail): _____

{For a joint venture, either all members shall sign or only the lead member, in which case the power of attorney to sign on behalf of all members shall be attached}

FORM TECH-4 (FOR SIMPLIFIED TECHNICAL PROPOSAL ONLY)

DESCRIPTION OF APPROACH, METHODOLOGY, AND WORK PLAN FOR PERFORMING THE ASSIGNMENT

Form TECH-4: a description of the approach, methodology, and work plan for performing the assignment, including a detailed description of the proposed methodology and staffing for training, if the Terms of Reference specify training as a specific component of the assignment.

{Suggested structure of your Technical Proposal}

a) ***Technical Approach, Methodology, and Organization of the Consultant's team***. {Please explain your understanding of the objectives of the assignment as outlined in the Terms of Reference (TOR), the technical approach, and the methodology you would adopt for implementing the tasks to deliver the expected output(s); the degree of detail of such output; and describe the structure and composition of your team. Please do not repeat/copy the TORs in here.}

b) ***Work Plan and Staffing***. {Please outline the plan for the implementation of the main activities/tasks of the assignment, their content and duration, phasing and interrelations, milestones (including interim approvals by the Client), and tentative delivery dates of the reports. The proposed work plan should be consistent with the technical approach and methodology, showing understanding of the TOR and ability to translate them into a feasible working plan and work schedule showing the assigned tasks for each expert. A list of the final documents (including reports) to be delivered as final output(s) should be included here. The work plan should be consistent with the Work Schedule Form.}

c) ***Comments (on the TOR and on counterpart staff and facilities)***

{Your suggestions should be concise and to the point, and incorporated in your Proposal. Please also include comments, if any, on counterpart staff and facilities to be provided by the Client. For example, administrative support, office space, local transportation, equipment, data, background reports, etc.}

FORM TECH-5

WORK SCHEDULE AND PLANNING FOR DELIVERABLES

N°	Deliverables [1] (D-..)	Months											
		1	2	3	4	5	6	7	8	9	.....	n	TOTAL
D-1	{e.g., Deliverable #1: Report A												
	1) data collection												
	2) drafting												
	3) inception report												
	4) incorporating comments												
	5)												
	6) delivery of final report to Client}												
D-2	{e.g., Deliverable #2:.....}												
n													

1 List the deliverables with the breakdown for activities required to produce them and other benchmarks such as the Client's approvals. For phased assignments, indicate the activities, delivery of reports, and benchmarks separately for each phase.

2 Duration of activities shall be indicated in a form of a bar chart.

3. Include a legend, if necessary, to help read the chart.

FORM TECH-6

TEAM COMPOSITION, ASSIGNMENT, AND KEY EXPERTS' INPUTS

N°	Name	Expert's input (in person/month) per each Deliverable (listed in TECH-5)											Total time-input (in Months)		
		Position		D-1		D-2		D-3	.....		D-...		Home	Field	Total
KEY EXPERTS															
K-1	{e.g., Mr. Abbbb}	[Team Leader]	[*Home*]	[2 month]		[1.0]		[1.0]							
			[*Field*]	[0.5 m]		[2.5]		[0]							
K-2															
K-3															
n															
											Subtotal				
NON-KEY EXPERTS															
N-1			[*Home*]												
			[*Field*]												
N-2															
n															
											Subtotal				
											Total				

1 For Key Experts, the input should be indicated individually for the same positions as required under the Data Sheet ITC21.1.

2 Months are counted from the start of the assignment/mobilization. One (1) month equals twenty two (22) working (billable) days. One working (billable) day shall be not less than eight (8) working (billable) hours.

3 "Home" means work in the office in the expert's country of residence. "Field" work means work carried out in the Client's country or any other country outside the expert's country of residence.

Full time input
Part time input

FORM TECH-6
(CONTINUED)

CURRICULUM VITAE (CV)

Position Title and No.	{e.g., K-1, TEAM LEADER}
Name of Expert:	{Insert full name}
Date of Birth:	{day/month/year}
Country of Citizenship/Residence	

Education: {List college/university or other specialized education, giving names of educational institutions, dates attended, degree(s)/diploma(s) obtained}

_____

_____

Employment record relevant to the assignment: {Starting with present position, list in reverse order. Please provide dates, name of employing organization, titles of positions held, types of activities performed and location of the assignment, and contact information of previous clients and employing organization(s) who can be contacted for references. Past employment that is not relevant to the assignment does not need to be included.}

Period	Employing organization and your title/position. Contact infor for references	Country	Summary of activities performed relevant to the Assignment
[e.g., May 2005-present]	[e.g., Ministry of ……, advisor/consultant to… For references: Tel……/e-mail……; Mr. Hbbbbb, deputy minister]		

Membership in Professional Associations and Publications:

_____

Language Skills (indicate only languages in which you can work): _____

_____

Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:	**Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks**
{List all deliverables/tasks as in TECH- 5 in which the Expert will be involved)	

Expert's contact information: (e-mail ……., phone……)

Certification:
I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and I am available to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my disqualification or dismissal by the Client, and/or sanctions by the Bank.

{day/month/year}

Name of Expert | Signature | Date

{day/month/year}

Name of authorized Representative of the Consultant (the same who signs the Proposal) | Signature | Date

Section 4. Financial Proposal - Standard Forms

{*Notes to Consultant* shown in brackets { } provide guidance to the Consultant to prepare the Financial Proposals; they should not appear on the Financial Proposals to be submitted.}

Financial Proposal Standard Forms shall be used for the preparation of the Financial Proposal according to the instructions provided in Section 2.

FIN-1 Financial Proposal Submission Form

FIN-2 Summary of Costs

FIN-3 Breakdown of Remuneration,

FIN-4 Reimbursable expenses

FORM FIN-1
FINANCIAL PROPOSAL SUBMISSION FORM

{Location, Date}

To: [Name and address of Client]

Dear Sirs:

We, the undersigned, offer to provide the consulting services for [Insert title of assignment] in accordance with your Request for Proposal dated [Insert Date] and our Technical Proposal.

Our attached Financial Proposal is for the amount of {Indicate the corresponding to the amount(s) currency(ies)} {Insert amount(s) in words and figures}, *[Insert "excluding"] all indirect local taxes in accordance with Clause 25.2 in the Data Sheet.* The estimated amount of local indirect taxes is {Insert currency} {Insert amount in words and figures} which shall be confirmed or adjusted, if needed, during negotiations. {Please note that all amounts shall be the same as in Form FIN-2}.

Our Financial Proposal shall be binding upon us subject to the modifications resulting from Contract negotiations, up to expiration of the validity period of the Proposal, i.e. before the date indicated in Clause 12.1 of the Data Sheet.

Commissions and gratuities paid or to be paid by us to an agent or any third party relating to preparation or submission of this Proposal and Contract execution, paid if we are awarded the Contract, are listed below:

Name and Address of Agents	Amount and Currency	Purpose of Commission or Gratuity

{If no payments are made or promised, add the following statement: "No commissions or gratuities have been or are to be paid by us to agents or any third party relating to this Proposal and Contract execution."}

We understand you are not bound to accept any Proposal you receive.

We remain,

Yours sincerely,

Authorized Signature {In full and initials}: _____
Name and Title of Signatory: _____

In the capacity of: _____

Address: _____

E-mail: _____

{For a joint venture, either all members shall sign or only the lead member/consultant, in which case the power of attorney to sign on behalf of all members shall be attached}

FORM FIN-2 SUMMARY OF COSTS

Item	Cost			
	{Consultant must state the proposed Costs in accordance with Clause **16.4 of the Data Sheet**; delete columns which are not used}			
	{Insert Foreign Currency # 1}	*{Insert Foreign Currency # 2, if used}*	*{Insert Foreign Currency # 3, if used}*	*{Insert Local Currency, if used and/or required (16.4 Data Sheet}*
Cost of the Financial Proposal				
Including:				
(1) **Remuneration**				
(2) **Reimbursables**				
Total Cost of the Financial Proposal: {Should match the amount in Form FIN-1}				
Indirect Local Tax Estimates – to be discussed and finalized at the negotiations if the Contract is awarded				
(i) {insert type of tax e.g., VAT or sales tax}				
(ii) {e.g., income tax on non-resident experts}				
(iii) {insert type of tax}				
Total Estimate for Indirect Local Tax:				

Footnote: Payments will be made in the currency(ies) expressed above (Reference to ITC 16.4).

FORM FIN-3 BREAKDOWN OF REMUNERATION

When used for Lump-Sum contract assignment, information to be provided in this Form shall only be used to demonstrate the basis for the calculation of the Contract's ceiling amount; to calculate applicable taxes at contract negotiations; and, if needed, to establish payments to the Consultant for possible additional services requested by the Client. This Form shall not be used as a basis for payments under Lump-Sum contracts

A. Remuneration _____

No.	Name	Position (as in TECH-6)	Person-month Remuneration Rate	Time Input in Person/Month (from TECH-6)	{*Currency # 1- as in FIN-2*}	{*Currency # 2- as in FIN-2*}	{*Currency# 3- as in FIN-2*}	{*Local Currency- as in FIN-2*}
	Key Experts							
K-1			[*Home*]					
			[*Field*]					
K-2								
	Non-Key Experts							
N-1			[*Home*]					
N-2			[*Field*]					
				Total Costs				

Appendix A. Financial Negotiations - Breakdown of Remuneration Rates

1. Review of Remuneration Rates

1.1. The remuneration rates are made up of salary or a base fee, social costs, overheads, profit, and any premium or allowance that may be paid for assignments away from headquarters or a home office. An attached Sample Form can be used to provide a breakdown of rates.

1.2. If the RFP requests submission of a technical proposal only, the Sample Form is used by the selected Consultant to prepare for the negotiations of the Contract. If the RFP requests submission of the financial proposal, the Sample Form shall be completed and attached to the Financial Form-3. Agreed (at the negotiations) breakdown sheets shall form part of the negotiated Contract and included in its Appendix D or C.

1.3. At the negotiations the firm shall be prepared to disclose its audited financial statements for the last three years, to substantiate its rates, and accept that its proposed rates and other financial matters are subject to scrutiny. The Client is charged with the custody of government funds and is expected to exercise prudence in the expenditure of these funds.

1.4. Rate details are discussed below:

(i) Salary is the gross regular cash salary or fee paid to the individual in the firm's home office. It shall not contain any premium for work away from headquarters or bonus (except where these are included by law or government regulations).

(ii) Bonuses are normally paid out of profits. To avoid double counting, any bonuses shall not normally be included in the "Salary" and should be shown separately. Where the Consultant's accounting system is such that the percentages of social costs and overheads are based on total revenue, including bonuses, those percentages shall be adjusted downward accordingly. Where national policy requires that 13 months' pay be given for 12 months' work, the profit element need not be adjusted downward. Any discussions on bonuses shall be supported by audited documentation, which shall be treated as confidential.

(iii) Social Charges are the costs of non-monetary benefits and may include, inter alia, social security (including pension, medical, and life insurance costs) and the cost of a paid sick and/or annual leave. In this regard, a paid leave during public holidays or an annual leave taken during an assignment if no Expert's replacement has been provided is not considered social charges.

(iv) Cost of Leave. The principles of calculating the cost of total days leave per annum as a percentage of basic salary is normally calculated as follows:

$$\text{Leave cost as percentage of salary} = \frac{\text{total days leave x } 100}{[365 - w - ph - v - s]}$$

Where w = weekends, ph = public holidays, v = vacation, and s = sick leave.

Please note that leave can be considered as a social cost only if the Client is not charged for the leave taken.

(v) Overheads are the Consultant's business costs that are not directly related to the execution of the assignment and shall not be reimbursed as separate items under the Contract. Typical items are home office costs (non-billable time, time of senior Consultant's staff monitoring the project, rent of headquarters' office, support staff, research, staff training, marketing, etc.), the cost of Consultant's personnel not currently employed on revenue-earning projects, taxes on business activities, and business promotion costs. During negotiations, audited financial statements, certified as correct by an independent auditor and supporting the last three years' overheads, shall be available for discussion, together with detailed lists of items making up the overheads and the percentage by which each relates to basic salary. The Client does not accept an add-on margin for social charges, overhead expenses, etc. for Experts who are not permanent employees of the Consultant. In such case, the Consultant shall be entitled only to administrative costs and a fee on the monthly payments charged for sub-contracted Experts.

(vi) Profit is normally based on the sum of the Salary, Social costs, and Overheads. If any bonuses paid on a regular basis are listed, a corresponding reduction shall be made in the profit amount. Profit shall not be allowed on travel or any other reimbursable expenses.

(vii) Away from Home Office Allowance or Premium or Subsistence Allowances. Some Consultants pay allowances to Experts working away from headquarters or outside of the home office. Such allowances are calculated as a percentage of salary (or a fee) and shall not draw overheads or profit. Sometimes, by law, such allowances may draw social costs. In this case, the amount of this social cost shall still be shown under social costs, with the net allowance shown separately.

UNDP standard rates for the particular country may be used as reference to determine subsistence allowances.

Sample Form

Consultant: Country:
Assignment: Date:

Consultant's Representations Regarding Costs and Charges

We hereby confirm that:

(a) the basic fees indicated in the attached table are taken from the firm's payroll records and reflect the current rates of the Experts listed which have not been raised other than within the normal annual pay increase policy as applied to all the Consultant's Experts;

(b) attached are true copies of the latest pay slips of the Experts listed;

(c) the away- from- home office allowances indicated below are those that the Consultant has agreed to pay for this assignment to the Experts listed;

(d) the factors listed in the attached table for social charges and overhead are based on the firm's average cost experiences for the latest three years as represented by the firm's financial statements; and

(e) said factors for overhead and social charges do not include any bonuses or other means of profit-sharing.

_____
[Name of Consultant]

_____ _____
Signature of Authorized Representative Date

Name: _____

Title: _____

FORM FIN-4 BREAKDOWN OF REIMBURSABLE EXPENSES

When used for Lump-Sum contract assignment, information to be provided in this Form shall only be used to demonstrate the basis for calculation of the Contract ceiling amount, to calculate applicable taxes at contract negotiations and, if needed, to establish payments to the Consultant for possible additional services requested by the Client. This form shall not be used as a basis for payments under Lump-Sum contracts

B. Reimbursable Expenses

N°	Type of Reimbursable Expenses	Unit	Unit Cost	Quantity	{Currency # 1- as in FIN-2}	{Currency # 2- as in FIN-2}	{Currency# 3- as in FIN-2}	{Local Currency- as in FIN-2}
	{e.g., Per diem allowances**}	{Day}						
	{e.g., International flights}	{Ticket}						
	{e.g., In/out airport transportation}	{Trip}						
	{e.g., Communication costs between Insert place and Insert place}							
	{ e.g., reproduction of reports}							
	{e.g., Office rent}							
	.....							
	{Training of the Client's personnel – if required in TOR}							
				Total Costs				

Legend*:*
"Per diem allowance" is paid for each night the expert is required by the Contract to be away from his/her usual place of residence. Client can set up a ceiling.

Section 5. Eligible Countries

In reference to ITC6.3.2, for the information of shortlisted Consultants, at the present time firms, goods and services from the following countries are excluded from this selection:

Under the ITC 6.3.2 (a): ***None***

Under the ITC 6.3.2 (b): ***None***

Section 6. Bank Policy – Corrupt and Fraudulent Practices

(this Section 6 shall not be modified)

Guidelines for Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011:

"**Fraud and Corruption**

1.23 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), consultants, and their agents (whether declared or not), sub-contractors, sub-consultants, service providers, or suppliers, and any personnel thereof, observe the highest standard of ethics during the selection and execution of Bank-financed contracts [footnote: In this context, any action taken by a consultant or any of its personnel, or its agents, or its sub-consultants, sub-contractors, services providers, suppliers, and/or their employees, to influence the selection process or contract execution for undue advantage is improper.]. In pursuance of this policy, the Bank:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party[1];

(ii) "fraudulent practice" is any act or omission, including misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation[2];

(iii) "collusive practices" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party[3];

[1] For the purpose of this sub-paragraph, "another party" refers to a public official acting in relation to the selection process or contract execution. In this context "public official" includes World Bank staff and employees of other organizations taking or reviewing selection decisions.

[2] For the purpose of this sub-paragraph, "party" refers to a public official; the terms "benefit" and "obligation" relate to the selection process or contract execution; and the "act or omission" is intended to influence the selection process or contract execution.

[3] For the purpose of this sub-paragraph, "parties" refers to participants in the procurement or selection process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish prices at artificial, non-competitive levels, or are privy to each other's bid prices or other conditions.

(iv) "coercive practices" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party[4];

(v) "obstructive practice" is

(aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or

(bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights;

(b) will reject a proposal for award if it determines that the consultant recommended for award or any of its personnel, or its agents, or its sub-consultants, sub-contractors, services providers, suppliers, and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

(c) will declare misprocurement and cancel the portion of the Loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the Loan were engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the selection process or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner they knew of the practices;

(d) will sanction a firm or an individual at any time, in accordance with prevailing Bank's sanctions procedures[5], including by publicly declaring such firm or an ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract, and (ii) to be a nominated[6] sub-consultant, supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract.

[4] For the purpose of this sub-paragraph, "party" refers to a participant in the selection process or contract execution.

[5] A firm or an individual may be declared ineligible to be awarded a Bank-financed contract upon (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including inter alia: cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application of the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceedings. See footnote 12 and paragraph 8 of Appendix 1 of these Guidelines.

[6] A nominated sub-consultant, supplier, or service provider is one which has been either (i) included by the consultant in its proposal because it brings specific and critical experience and know-how that are accounted for in the technical evaluation of the consultant's proposal for the particular services; or (ii) appointed by the Borrower.

Section 7. Terms of Reference

1. Introduction

1.1 Lesotho Lowlands Water Supply Scheme

A feasibility study of the Lesotho Lowlands Water Supply Scheme (LLWSS) was started in 2003 and a Final Report was published by Parkman Ltd (UK) in 2005. Its findings and recommendations were approved and accepted by the GoL in May 2005.

The Lesotho Lowlands Water Supply Scheme (LLWSS) was started with the primary purpose of improving water supply to the Lowlands settlement with populations in excess of 2500 for domestic, institutional and industrial purposes. The aim of the project is to support the introduction of technically, economically, socially, environmentally and financially viable, bulk-treated water supply system.

The LLWSS is expected to include:

- Development of new water resources
- Treatment of water as necessary
- Transfer of water to demand areas
- Bulk storage of treated water at suitable locations serving those centres

In the Lowlands, these 2005 recommendations included the preliminary designs of (5) treated bulk water supply schemes serving (8) water demand zones falling into three regions, i.e. the Northern, Central and Southern Regions. The 8 water demand zones are:

- Zone 1 Botha – Bothe
- Zone 2 Hlotse / Maputsoe
- Zone 3 Peka / Mapoteng
- Zone 4 Maseru / Mazenod / Roma
- Zone 5 Morija / Matsieng
- Zone 6 Mafeteng
- Zone 7 Mohale's Hoek
- Zone 8 Quthing

In 2008 under EDF funding, Lowlands Water Joint Venture was engaged to produce conceptual designs, tender documents and financial/economic analysis of the LLWSS. In accordance with the Lesotho environmental legislation, a detailed Southern, Central & Northern Environmental & Social Impact Assessment (ESIA) and associated Environment & Social Management Plan (ESMP) Reports were also prepared and completed in 2010. These reports were then approved by the Department of Environment in 2010.

In 2016, SMEC International was contracted to review and update the 2010 ESIA and ESMP reports and prepare Environmental & Social Management Framework, Resettlement Policy Framework and a Generic Environmental Management Plan all in accordance with the World Bank's Safeguard Policies. The review and update is nearing completion.

The Consultant will have to zoom into Zone 6 & 7 while preparing the ESIA, the ESMP and the Resettlement Action Plan (RAP) in consideration of the designs and assessments studies completed in 2004, 2008, 2010 and ongoing.

The studies and designs include but not limited to:

- The Feasibility Study of the Lesotho Lowlands Bulk Water Supply Scheme 2004
- The detailed Design of the Lesotho Lowlands Bulk Water Supply Scheme 2008
- LLWSS Southern Region EIA and April 2010
- The Designs and Construction of the five towns water projects, involving the towns of Botha-Bothe, Hlotse, Mafeteng, Mohale's Hoek and Qacha's Nek
- LLWSS Environmental and Social Impact Assessment Water Resources – On going
- LLWSS Environmental and Social Impact Assessment Infrastructure – On going
- LLWSS Socio-Economic Review and Update Report – On going
- LLWSS Environmental and Social Management Framework – On going
- LLWSS Resettlement Policy Framework – On going
- LLWSS Generic Environmental Management Plan – On going

A) 1.2 Broad Description of the Zone 6 and 7 Project

Zone 6 – Mafeteng In this Zone, a direct river abstraction point on the Makhaleng River near the Mafeteng to Mohale's Hoek road bridge crossing is proposed, with the treatment works located nearby. Zone 6 has a projected population of 81,000 for 2020 and 94,000 in 2035. The zone is dominated by Mafeteng town (incorporating nearby Likhoele), which is a commercial and institutional centre that also contains limited industrial development. It is also the site for the planned Mafeteng Industrial Estate.

Zone 7 – Mohale's Hoek - Mohale's Hoek town is the major concentration of water demand in this Zone. This is expected to continue with the establishment of the planned Mohale's Hoek II (East) Industrial Estate, with a planned development area of roughly 150 hectares. In the medium term (up to 2020) and long term (up to 2035), the various existing water supplies in Zone 7 will be augmented by a new scheme supplied by the proposed Makhaleng River intake and water treatment works (WTW). Potable water will be supplied from here to the various reservoirs in the Zone.

- **1.2.1 Detailed Scheme Description for Zone 6 and 7**

The Zone 6 and 7 bulk water supply scheme comprises of the following infrastructure components:

- Direct surface water abstraction from the Makhaleng River with a total capacity of 59,450m^3/d;
- Makhaleng Water Treatment Works (WTW) of 56, 900m^3/d;
- 49 Service Reservoirs, with 32
- 18 Pumping Stations
- 156km length of pipeline ranging in diameter from 100mm to 600mm.
- Power Supply

- **1.2.3 The settlements to be served in Zone 6**

The settlements to be served in Zone 6 are listed below and shown in table 1.

Zone 6 Settlements			
1.	Mafeteng	5.	Matlapaneng
2.	Ramohapi	6.	Bataung
3.	Thabana – Morena	7.	Qalabane
4.	Van Rooyen	8.	Siloe

Table 1: Zone 6 Settlements

Mafeteng. Mafeteng is a town situated 85km south of Maseru in the southern Lowlands. It is the administrative and commercial centre for the Mafeteng District. The town is an important service centre for the surrounding area, but there are relatively few other large settlements. The extent of future growth will be largely dependent on how rapidly the small industrial area can

be extended. This, in turn, will depend on water supply, which is somewhat constrained by the distance of the town from major sources other than groundwater.
The Mafeteng urban boundary used for the purpose of this study is the existing urban boundary gazetted by Government Notice No. 29 of 1996, to which has been added the Ward Chief's village of Likhoele, an area that has grown at a rapid rate and has effectively merged with the gazetted Mafeteng area. The built-up area includes Ha Seetsi and Ha Joase in the east and Ha Sebusi in the south-east.

Thabana-Morena. Thabana-Morena, taken together with Khobotle, is a long linear built-up area along a newly tarred road on the western side of the Thabana-Morena plateau. The water supply area extends along the tarred road and to immediately adjoining settlements.

Matlapaneng. This relatively little-known area (it is distant from any main roads) falls under Matsieng administratively although in Mafeteng District. Matlapaneng is linked by an almost continuously built-up area to Ha Oni in the south and Ha Lesole in the east.

Qalabane. Villages near the Qalabane mountain are Ha Ramahlape, Ha Molapo, Ha Taelo and also (with short gaps) Ha Joele and Ha Mohlehli. These make up more than 2 500 people. The southern villages have tarred road access.

Ramohapi. Three large closely adjoining villages close to the Maseru to Mafeteng Road near Mafeteng are Ha Ramohapi, Ha Lumisi and Ha Likupa, each with a current population of about 900 people.

Van Rooyen. This is a group of villages closely adjoining the Van Rooyen's Gate Border Post to South Africa. The area includes a local court and 'Mantoetse High School. The largest village is Ha Ralintši with over 1 000 people.

Bataung. This settlement is astride the main Mafeteng to Mohale s Hoek tarred road. Several villages are closely linked with Bataung, of which the largest is Letlapeng with about 800 people. Other important villages in the cluster are Thabaneng, Ha Pii, fifteen (this village was situated next to the old 15 milestone) and Ha Monyake.

Siloe. Siloe lies astride the main Mafeteng to Mohale's Hoek tarred road and closely adjoining villages, including Ha Ramohotsi, Ha Masunhloane, Ha Moletsane, Ha Raselepe, Sutha and Ha Rantsie ensure a population of over 2 500.

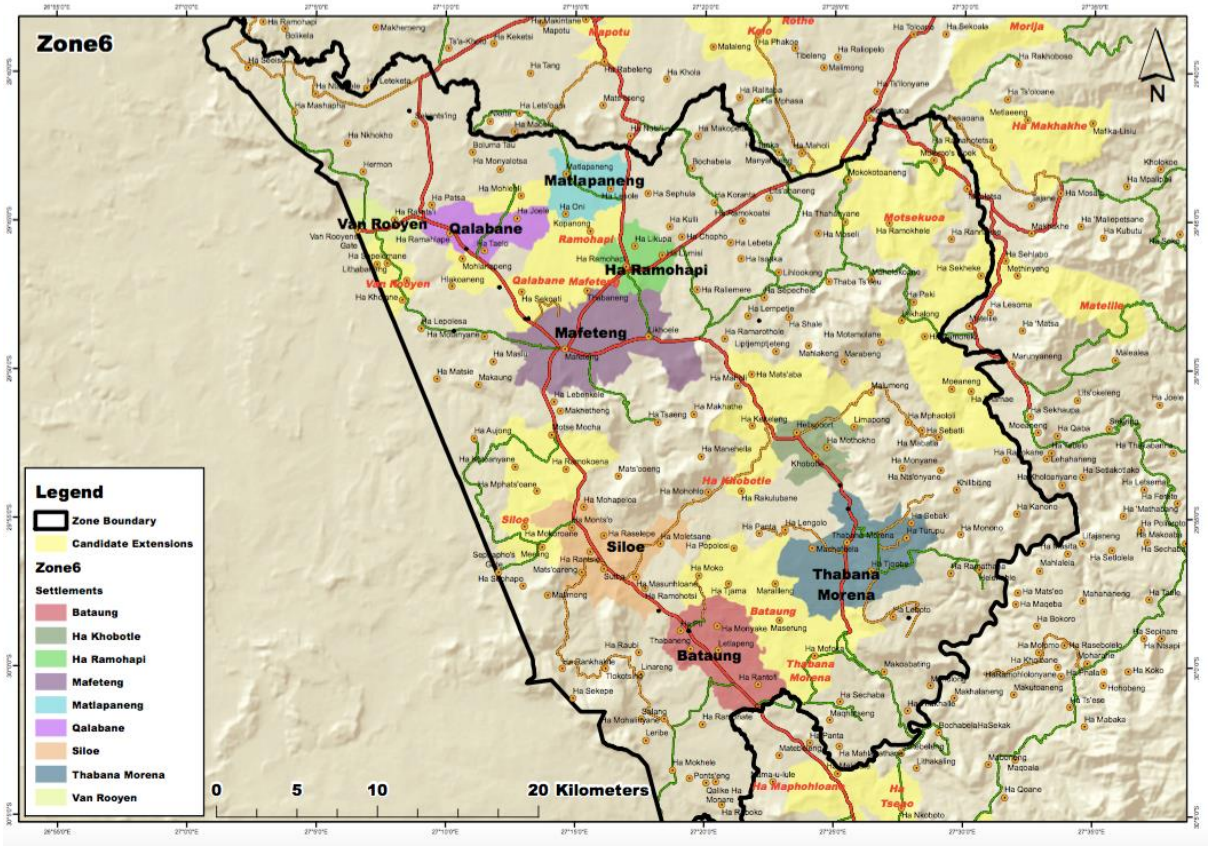

Fig 1: Zone 6 Settlements

- **1.2.4 The settlements to be served in Zone 7**

The settlements to be served in Zone 7 are listed below and shown in table 2.

Zone 6 Settlements			
1.	Mohale's Hoek	**3.**	Maphohloane
2.	Mesitsaneng	**4.**	Tšepo

Table 2: Zone 7 Settlements

Mohale's Hoek. The area for LLBWSS purposes was defined as the Mohale's Hoek urban area, as gazetted, plus the adjacent areas of Ha Malebanye, Ha Bolikoe Matsatseng and Majakaneng. These areas have been included since they form part of the continuously built-up area around Mohale's Hoek.

Mesitsaneng. Mesitsaneng is a large collection of villages closely adjoining Mohale's Hoek on the tarred road to Quthing. Mesitsaneng built-up area includes settlements on both sides of the

tarred road, lying between Ha 'Mapotsane and Ha Senekal. These include the villages of Ha Mosuhli, Mesitsaneng, Ha Jane, Thaba-Chitja, and Ha Malebanye. It also includes the outlying villages of Ha Thaba-Bosiu and Ha Sankatana.

Maphohloane. Ha Maphohloane and Ha Nchoba are large villages situated around the tarred road immediately south of the Makhaleng Bridge on the Main South 1 road. Ha Maphohloane is situated to the east of the tarred road and Ha Nchoba is to the west of the road. The villages together total over 2 500 population with the addition of Matebeleng, which adjoins Ha Nchoba to the south.

Tšepo. This area might also be called Old Hoek or Thaba-Tšoeu. It adjoins the Mohale's Hoek urban area to the NNE and includes a High School, Postal Agency, Village Health Centre, Court House and the Residence of the Chief of Thaba-Tšoeu (an Independent Chief who has some of the status of a Ward Chief).

The Mpharane settlement is excluded from the scheme as per the Feasibility Study Review (LWJV, 2008).

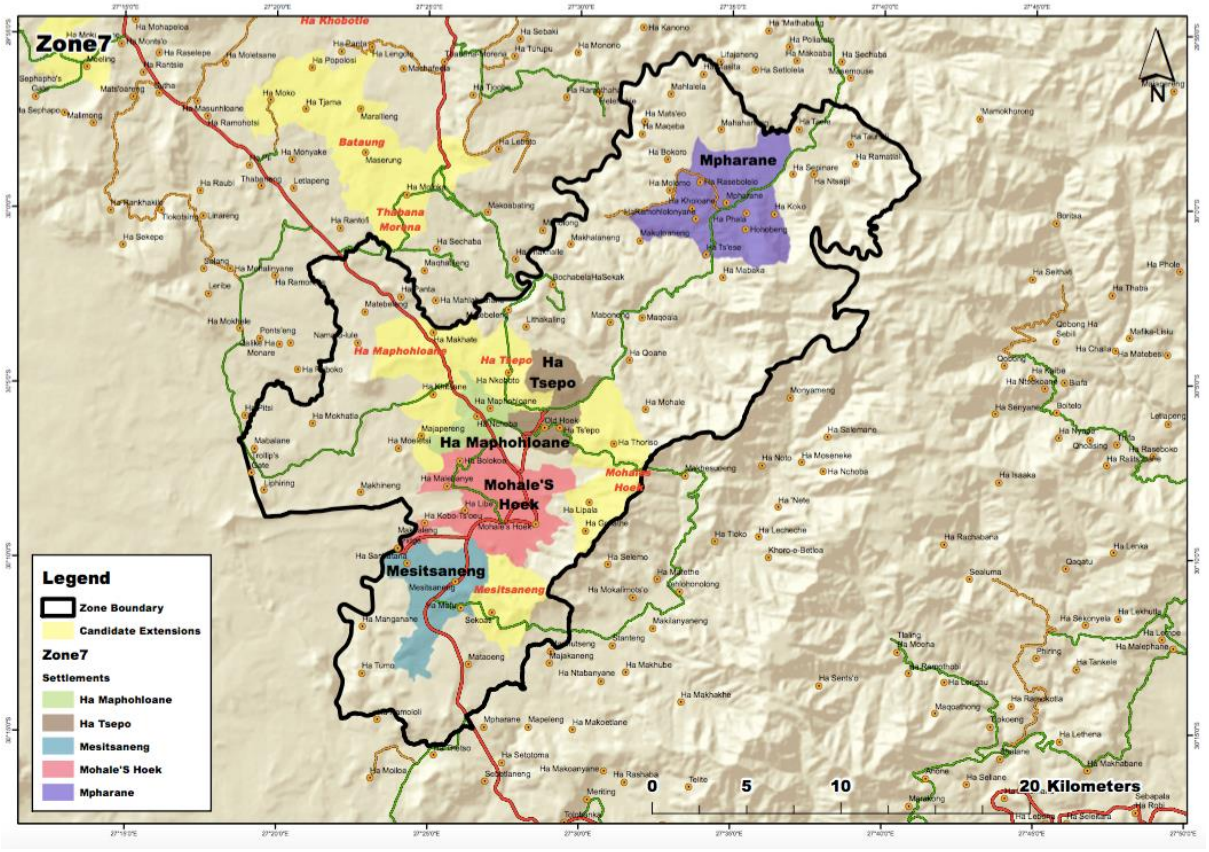

Fig 2: Zone 7 Settlements

2. Objectives

B) 2.1 Main Objective

The objective of this consultancy is to carry out an Environmental and Social Impact Assessment (ESIA) and prepare an Environmental and Social Impact Assessment (ESIA) study report and the associated Environmental and Social Management Plan (ESMP) for the Lesotho Lowlands Bulk Water Supply Scheme (LLBWSS) for Zones 6 and 7. The ESIA will be prepared to guide design team on the detail design of the project based on understanding of its environmental and social consequences to facilitate protection, restoration and enhancement of the environment. The ESMP will provide detailed guidance on the implementation of the mitigation measures, which have been recommended.

The ESIA should inform the Government of Lesotho, the Lesotho Water Commission, national water utilities, interested and affected parties and other stakeholders about the potential environmental and social risks and impact associated with the project activities. This will include potential impacts upstream and/or downstream of the facilities such as water abstraction units.

The consultancy should also prepare the Resettlement Action Plan (RAP) within the framework of the Resettlement Policy Framework (RPF). The RAP should identify activities that will restrict access or require physical resettlement. The RAP should provide a detailed action plan for compensation of affected populations.

C) 2.2 Specific Objectives

D) 2.2.1 Environmental and Social Impact Assessment

The ESIA for the proposed Lesotho Lowlands Bulk Water Supply Scheme (LLBWSS) - Zone 6 & 7 will be carried out with the following objectives:

- Identify project beneficiaries and describe their current social and economic conditions and their views on current water and sanitation services. Pay special attention to vulnerable groups among the beneficiaries (e.g. the elderly, the poor, female-headed and child-headed households, and other socially excluded groups);

- Identify probable biophysical, socio-economic and health and sanitation impacts that the project will have on aspects of the physical and social environment, and to evaluate and determine the significance of these impacts;

- Evaluate project options and advise on the most appropriate option taking into account, a combination of environment and social dimensions;

- Outline project activities that will be undertaken during implementation of the project;

- Review national, regional, international policy, legal and administrative framework relevant to the development of the project;

- Conduct project public consultations with all affected and interested stakeholders and describe disclosure requirements;

- Identify the positive and negative environmental and social impacts of the project and propose feasible mitigation measures to address negative impacts;

- Carry out a gender analysis to explore the project's opportunities to contribute to closing gender gaps relative to the project;

- Provide a set of recommendations for the project design to avoid and /or minimise the negative impacts and maximise the positive impacts of the project;

- Prepare an Environmental and Social Impact Assessment (ESIA) compliant to the relevant authorities, and detailing findings and recommendations;

- Prepare an Environmental and Social Management Plan (ESMP) that describes in detail mitigation measures, a detailed monitoring process and scheduled and a description of any training support that may be needed as well as the institutional structure to guide the implementation of the ESMP;

- **2.2.2 Resettlement Action Plan**

The Resettlement Action Plan for the proposed Lesotho Lowlands Bulk Water Supply Scheme (LLBWSS) - Zone 6 and 7 will be carried out with the following specific objectives:

- Prepare the RAP that is consistent in policy and context to the laws, regulations, and procedures adopted by the Government of Lesotho and the World Bank's operational

policy on involuntary resettlement (OP4.12) covering displacement, resettlement, and livelihood restoration;

- Conduct consultations with identified project affected persons (PAPs), based on a census of the affected sites;
- Establish local decision-making bodies who will be part of RAP implementation of valuation and compensation approaches;
- Develop in a participatory manner the proposed grievance mechanism to be covered in the RAP; and
- Complete a baseline socio-economic survey of PAPs and host communities.

3. Environmental and Social Impact Assessment Requirements

The Environment Act (2008), Part V has provisions for environmental management and protection including the need to carry out Environmental Impact Assessment (EIA) for projects listed in its First Schedule – Part A. Therefore, the ESIA content and level will be in line with the Lesotho EIA Regulations and Environment Act (2008) as well as the World Bank Procedures and other international protocol requirements to which Lesotho is a signatory.

E) The ESIA will also address the following World Bank Group Safeguard Policies and Guidelines:

- Environmental Assessment OP 4.01
- Natural Habitats OP 4.04
- Cultural Property OP 11.03
- Involuntary Resettlement OP 4.12
- Pest Management Safeguard Policy OP 4.09
- Project on International Waterways OP 7.50

F) World Bank Group Environmental, Health and Safety Guidelines (EHSGs);
G) World Bank Group Industry Sector Guidelines for Water and Sanitation.

4. PROJECT AREA

The study area will include the following area:

- Areas and adjacent areas that would be required for water treatment plant, sludge drying beds, water storage reservoirs, pumping stations, pipelines and other ancillary works;
- The land resources and the people who may be affected by construction;
- Makhaleng Catchment area in Mohale's Hoek, Mafeteng and users that would be affected by water abstraction

N.B: Finalisation of the study area will be finalised at the inception stage with the Commissioner of Water.

5. Scope of Works

The Consultant shall work in close collaboration with Lesotho Lowlands Water Supply Scheme Unit (LLWSSU) Environment Specialist and Social Development Specialist.

The Consultant will prepare an Environmental and Social Impact Assessment and Resettlement Action Plan for the Lesotho Lowlands Bulk Water Supply Scheme (LLBWSS) - Zone 6 and 7. The preparation of ESIA and RAP shall be done in close collaboration with all categories of impacted households, affected community members, local chiefs, Community Councils and other interested and affected parties in accordance with the scope of Services that will include but not limited to the following:

Task 1: Inception Report including a detailed work plan

The consultant will examine all aspects of the Project and in an inception report will review the tasks to be carried out and agree with the client, any modifications and additions that may be required. The consultant will prepare a detailed work plan indicating schedules and inputs required to complete each of the tasks. During this inception period the consultant will refer to the scoping and bounding exercise already done during the Project Feasibility Study as well as lessons learned from the Metolong Dam and Water Supply Project (MDWSP). These lessons should include the considerable information and "best" practices established with respect to social assessment, resettlement, and compensation to those affected and Environmental Flow Assessment. The Consultant will also provide a full description of the methodology to be used in complete the assignment in the inception report. This information will provide a basis for the report and the detailed work plan. The Inception report shall be work-shopped by all stakeholders and, following any revisions consequent on stakeholder input, will be submitted to the World Bank for a "No Objection" process.

Task 2: Literature Review

The Consultant shall examine all relevant documents relating to the LLBWSS as well as Metolong Dam and Water Supply Programme (MDWSP) and any other relevant documents containing information that might be useful for the assignment.

Task 3: Description of the Proposed Project

The aim and motivation for the project should be stated. The description of the project should include physical works, ancillary facilities and associated activities. This should include process diagram of the entire project with its identified aspects. A detailed description of the relevant parts of the Project including maps (at appropriate scales) should be provided where necessary. The following information should be included: location; general layout; size; capacity, etc.; facilities and services; operation and maintenance activities; and areas of probable Project influence (the Project study area).

A physical and engineering description of the project should be provided including at least the following:

- Location
- Water supply source
- General layout (e.g. transmission and/or collection systems, pumping stations, treatment works, and intakes)
- Unit process description and diagram for the water treatment facilities
- Size in terms of population and population equivalents, present and projects
- Number of types of connected industries
- Anticipated influent characteristics
- Pre-construction, construction and post-construction activities
- Schedule, staffing and support facilities and services
- Required off-site investments (such as future dam construction)

Task 4: Methodology

As a chapter of the ESIA and RAP report the consultant will describe in detail the methods to be used for conducting the ESIA and RAP. Methods applied for scoping and bounding, impact analysis and the public consultation process will be clearly described. In the latter, the consultant will include a public participation plan to include the stakeholder identification process, stakeholders identified, stages within the ESIA and RAP processes where stakeholders have participated, and the different levels of participation used. Identification of impacts will include the identification of the important environmental and social components, and the selection of criteria used for identifying the significance of impacts. Significance levels may be determined through the application of a scoring system if the consultant feels that such an approach is warranted. Such an approach should weigh the impacts according to their significance, reversibility and duration of impact. The consultant will employ social impact

analysis, environmental economic analysis and other techniques where applicable, to justify significant impacts to be mitigated.

Task 5: Develop Orthophoto Maps for Upstream and Downstream Components

1) Obtain the latest engineering designs showing the layout of all upstream and downstream components, including: (i) Intake site; (ii) Reservoir sites; (iii) access roads, power lines and other advanced infrastructure; (iv) construction camps; (v) quarries and related access; (vi) water treatment works; (vii) pipelines, and superimpose layouts on the latest Orthophoto maps of the area for identification of the affected assets for adjudication purposes.

2) Prepare a GIS database based on the information mentioned in (1).

Task 6: Public Consultation Process

The purpose of the public consultation process is to solicit public concerns on the project, explore ways of avoiding or minimizing identified concerns, and reach consensus that all residual concerns have been minimized as far as is practicable. The Consultant will be expected to identify all the various public groups (e.g. those who will be living adjacent to any of the new structures [e.g. new water treatment plant]) that should be involved in the ESIA and RAP. As well, NGOs and government departments and agencies that may have a stake in the Project and its effects should also be consulted. Since involuntary resettlement, if required, is invariably a major impact, an early requirement is to determine the extent of involuntary resettlement. This being the case, the consultative program would place a major focus on groups and individuals that will be directly affected; Describe a schedule for public consultation with these different groups, including number and timing of public input, and the methods to be employed (e.g. media announcements, town hall meetings, questionnaires, one-on-one meetings, public ESIA and RAP steering committees). Public consultation should occur throughout the ESIA and RAP process and conclude with draft report consultations.

It is recommended that at least two main consultations with key stakeholders be held as follows:

I. At the project start to solicit feedback of the scope of the work for the ESIA and RAP
II. Consultation of the Draft ESIA and RAP

Task 7: Communications Strategy: As a result of the public consultations and as a way to include all stakeholders, consultants should design and be prepared to carry out, in conjunction with the appropriate Government officials, a communication strategy. A purpose of the communication strategy is to effectively share project information with beneficiaries and project affected people to enhance their understanding and support for the project. This includes an effective beneficiary feedback mechanism with an agreed response time, in which the project

beneficiaries can provide feedback to the project owner, contractors and/or the Water and Sewerage Company (WASCO) and Project Implementing Unit (Lowlands Unit) during the project implementation.
The strategy will include the development of a communications programme and identify the most effective channels of communications. Specific tools that are to be developed include: Frequently Asked Questions (FAQs); press release formats, talking points on major issues, etc. Communication tools should be developed in both English and Sesotho.

Task 8: Policy, Legal and Administrative Framework

Describe the pertinent polices, regulations, and standards governing environmental quality, health and safety, protection of sensitive areas, protection of endangered species, land use control, land acquisition, rights to land, compensation, resettlement, etc., at international, national, regional and local levels. Key will be the Lesotho Environment Act 2008, Local Government Act 1997, the Forestry Act 1998 and the water quality standards currently in use in Lesotho. Lesotho is signatory to a number of international Conventions/Protocols which include the following being the most relevant to this project: UN-Convention on Bio-Diversity, Ramsar and SADC Protocol on shared water courses also the World Bank Group Safeguard Policies and Guidelines:

Describe the current administrative arrangements for environmental regulation, enforcement and management in Lesotho, and more specifically, within WASCO and Department of Rural Water Supply. Thereafter, the Consultant shall identify the project activities that should comply with the identified regulations as well as, indicate weaknesses and strengths of the legal and administrative system and provide a strategy and process that will ensure that the environmental management plan will be effectively implemented.

Task 9: Description of the baseline characteristics:

Assemble, evaluate and present baseline data on the relevant environmental and social characteristics of the study areas (Zone 6 & 7). In addition to this data being used for determining and assessing impacts it will also be used as a baseline against which future changes caused by the project can be measured and monitored. The data should include any information on any changes anticipated before the Project commences. The description should contain relevant descriptions of the following:

- ***Physical environment***: geology, topography, soils, climate and meteorology; groundwater and surface hydrology (including the Makhaleng River) of all areas affected by the Project; quality and quantity of probable inflows to the reservoir. There should be investigations on erosion downstream, potential bank erosion, and environmental flow requirements; the physical baseline should include water balance

study that is projected demand vs availability. Also, the water quality should be compared with the national and international standards.

- ***Biological environment:*** flora; fauna; rare or endangered species; sensitive habitats including parks or preserves, significant natural sites, etc.; species of commercial importance; and species with potential to become nuisances, vectors or dangerous. The above information will also be considered as it relates to the World Bank Natural Habitat Safeguard Policy; the biological baseline information should also include information on migratory fish species and aquatic habitats and ecosystems that are sensitive to changes in environmental flow.

- ***Socio-cultural environment:*** (include both present and projected where appropriate): population affected (percentage (%) of population to be serviced vs. those without services); distributional analysis of benefits and impact (including gender and vulnerable people); land use where appropriate (e.g. housing around reservoir); planned development activities including assessment of labour influx; community structure (of communities to be affected); employment; distribution of income; goods and services; recreation; public health; cultural properties; tribal peoples (if relevant); and customs, aspirations and attitudes. Of particular importance will be those households that will be required to re-locate elsewhere as well as assets to be lost and for which compensation will be required. Social and cultural analysis of these households and the communities to which they belong will be required, as well as of the host community to which they will be moving. The World Bank's safeguard policies on resettlement will be addressed if this policy is triggered by any relocation requirement;

Task 10: Adjudication of Assets

Final adjudication must ensure that all affected assets are properly identified, verified, numbered, measured, mapped, valued, documented and witnesses on appropriate forms. The process must be done in the presence of the owners and/or users, Adjudication Teams, local chiefs and relevant Community Councils and LLWSSU. The signed forms will be the basis of compensation entitlements and payments. The owners and/or users of the impacted properties (Private, public, institutional, state or communal) have to be identified.

1) Using orthophotos, physically identify, verify, number, measure, map, value, document and witness all affected properties and assets

2) Identify owners and users of all affected properties working with the Adjudication team

3) Ensure that all assets and properties are uniquely identified and linked to their owners and/or users;

4) Document photographic images indicating conditions of all properties especially buildings to be affected prior to any construction activities;

5) Determine and indicate the percentage of loss of arable land for individually owned and/or used arable land;

6) Investigate land availability and facilitate land acquisition on behalf of those individuals who opt for 'Land for Land' compensation for loss of arable land;

7) Identify all share-cropping arrangements and facilitate affecting compensation payments to the rightful owner(s) and/or users;

8) Using a qualified Property Valuer, determine the compensation to be paid for each affected property and produce a Property Valuation Report which form a separate section of the Resettlement and Compensation Action Plan;

9) Meet with relevant companies to negotiate mitigation and/or compensation measures for public utilities impacted by the works (pylons, poles, drains culverts, cables, water pipes etc.);

Task 11: Create an Assets register

The Consultant shall develop and test a compensation and resettlement information management system (CIMS). The system must be able to contain all information recorded during the Adjudication of Assets (task 9), including digital records such as maps and photos, as well as related household information collected in the course of household surveys. The CIMS must readily identify impacted persons by unique identity numbers and keep a record of each loss associated with the project affected persons. The CIMS must also be able to identify and all losses of communal, public and institutional assets. The CIMS must be able to automatically calculate compensation packages based on the latest approved rates and to process multiple payments per loss and project future payments. The CIMS should also generate automatic quarterly cash payment schedules, keep histories of all payments against recorded losses, and track all grievances relating to any particular loss. The CIMS must be able to interface with LLWSSU financial management systems with regards to payment information and processing. It should be able to handle any changes in beneficiaries (e.g. due to death and inheritance) and should record old and new beneficiary information. It should be secure and shall maintain an audit trail of all changes made to the master data. It must maintain historic data, such as cheque numbers issued, to facilitate audits.

1) Review available CIMS technology in market and also Metolong Authority CIMS technology and recommend the most appropriate system for purchase by the LLWSSU;

2) Set up CIMS ensuring that data tables and other CIMS attributes are fully in compliance with specifications spelt out in the procedure;

3) Train four operators to be appointed by LLWSSU;

4) Enter data gathered using Adjudication Forms and assessment of communal asset losses, indicate child-headed, female-headed and those households headed by the elderly in the Asset Register;

5) Test and refine the CIMS;

6) Operationalise CIMS, as per requirements listed above.

Task 12: Design and Plan Resettlements

It is anticipated that there will be limited resettlement thus this task will include, but not limited to:

1) Obtaining the latest designs of the LLBWSS zone 6 and 7;

2) Super-imposing designs on the latest Orthophoto maps for identification of the affected assets;

3) Verifying the situation on the ground, and confirm with cadastral surveyors where structures appear to be close;

4) Ensuring that structures and all other related assets are captured and included in the adjudication exercise processes;

5) Producing with their costs alternative replacement housing designs for the affected to select;

6) Drawing up settlement plan for all the categories of the affected in line with the Resettlement Policy Framework as well as the engineering/construction programme;

Task 13: Design and Plan for the Implementation of Socio-economic Monitoring System

Household-level socio-economic data will need to be collected during the physical census and inventories of assets. However, low-income households such as the rural communities affected by the LLBWSS have diversified livelihood strategies that combine agriculture with wage labour and small-scale businesses. Therefore, it is important to survey all income sources in order to calculate income loss from project impacts as a proportion of total income. The socio-economic studies are therefore required to collect additional quantitative supported by qualitative data. This information of household income streams and how these can be restored (through the Livelihood Restoration and Enhancement Programmes. It will also provide a baseline for evaluating the success of livelihood restoration and community development initiative.

In carrying out the studies, the Consultant shall ensure that a statistically valid representative sample of all strata of the affected communities – including women and other vulnerable groups is included in the survey. The Consultant shall also involve representatives of various stakeholder groups; in particular, community members and the LLWSSU in survey design and data gathering as this will improve the quality and comprehensiveness of the survey results. Moreover, the Consultant shall link the socio-economic studies with the census and inventory of assets (Assets Register) to provide complete information on household income streams. The survey shall essentially:

- Provide basic economic and social information needed to design appropriate livelihood restoration and development interventions; and

- Provide qualitative demographic, economic, educational, occupational and health indicators for future monitoring and evaluation of the RAP implementation.

In conducting the survey, the Consultant shall:

1. Develop monitoring indicators;

2. Conduct a baseline/pre-construction socio-economic survey linked to the census data and inventory of assets contained in the CIMS to: provide household income streams focusing on those households that will be affected by asset loss; capture essential socio-economic data required to monitor livelihood status, participation, receipt of compensation, perceptions of the LLBWSS and any related information required by other LLBWSS programmes.

3. Collect qualitative and qualitative information in two extreme areas:

    a. Household level income streams and livelihood strategies; and
    b. The structure, organisation, economic inter-dependencies within the larger community affected by the LLBWSS.

4. Analyse the above data to identify those households most at risk from project impacts and resettlement;

5. Quantify net returns from income streams;

6. Establish replacement values for land and assets impacted and/or lost;

7. Provide results of the census, assets register/inventories and socio-economic surveys;

8. Identify all categories of impacts and people affected by the project activities and resettlement;

9. Summarise consultations on the results of the various surveys with affected communities

Task 14: Plan and Design Livelihood Restoration and Enhancement Programmes

The livelihood restoration and enhancement programmes will provide a form of indirect compensation to communities impacted by loss of individual and communal resources. All impacted persons shall be eligible although those highly impacted households, as defined in the Resettlement Policy Framework (RPF) will be given priority. The role of the Consultant will be to facilitate the participatory planning and design of the programmes and to provide technical support and supervision in the course of implementation. Selected service providers/NGOs will carry out the actual design and implementation of the programmes.

1. Prepare terms of reference and Contracts for service providers to design and implement the livelihood restoration programmes;

2. In consultation and approval of the LLWSSU, select a qualified service provider(s) for design and implementation of the livelihood restoration programmes

Task 15: Grievance Redress Mechanism

The Consultant shall:

1. Develop a step by step process for registering and addressing grievances and provide specific details regarding a process for registering complaints, response time, and communication modes;

2. Incorporate the process of registering and addressing complaints in the CIMS;

3. Develop the mechanism for appeal.

Task 16 Gender Analysis

Purpose of the gender analysis is to provide concrete advice on how these gender gaps can be addressed by specific project actions, and how the gender-related outcomes of these activities can be measured. Actions and recommendations should be developed in close coordination with the project team, to ensure that they are relevant to the project objectives and are adapted to the cultural context of the country and to the capacity of the client.

The consultant will be responsible for the following tasks:

Analysis of gender gaps

- Identify the key gender-related gaps between women and men, boys and girls in the country/region that relate to the objectives of the project, using information from several sources, such as World Bank documents (e.g. country or regional gender action plans, Systematic Country Diagnostic, Country Partnership Framework, gender analyses (if previously conducted), participatory studies and socio-economic assessments, etc.) and gender-disaggregated information collected through consultation, surveys and interviews. Gender gaps can be related to access to information or services, participation in decision-making at household or community levels, economic opportunities, voice and agency.
- Review the gender-related activities of other key donors, development organizations, and NGOs working in the WSS sector
- Assess availability of sex- or-disaggregated[7] data and data gaps relevant to the project
- Analyze policy, legal and cultural aspects hindering participation in the project or uptake of project outputs (e.g. new knowledge, improved practices, technologies, etc.)

Planning of activities/project design

- Synthesize what is known about the roles of men and women, especially in activities relating to water and sanitation, including access to services, decision making power, and employment opportunities
- Identify constraints and opportunities faced by men and women in carrying out their activities, as they relate to water and sanitation access
- Assess how well the current water and sanitation services meet the needs of men and women, and identify possible constraints (technical, logistical, and attitudinal) to improvements in the delivery of these services (e.g. more equitable access) and female participation in decision making bodies (e.g. water user committees)

[7] Sex-disaggregated data includes information not only on sex of respondent, but also on factors such as age, ethnicity, etc.

- Develop a gender result chain/outcome pathway that includes specific activities and indicators that will allow monitoring of progress towards those gender outcomes

Implementation planning

- Assess the capacity and training needs of the planned project organization/implementers on gender integration in the project
- Plan approaches for how the planned activities will be implemented in practice (e.g. considering innovative communication approaches, thoughtful engagement processes, capacity strengthening efforts).
- Provide practical guidance for the Project Implementation Manual
- Outline themes that might be addressed in future analytic work relevant to key gender aspects of the project.
- Include in the project's result framework indicators which measure changes in outcomes between men and women and how to monitor them

Task 17 Occupational Health and Safety

The Consultant will analyse and describe all occupational health and safety concerns brought about by activities during all the phases of the project (Construction, Operation etc.). These are to be outlined in the ESIA in line with the World Bank Group Environmental, Health and Safety Guidelines (EHSGs), Industry Sector Guidelines for Water and Sanitation as well as the Labour Code (1992) of Lesotho. The Consultant will make recommendations on corrective and remedial measures to be implemented under the ESMP.

The Consultant will:

- Identify safety procedures based on existing practices and standards in Labour Code (1992) as well as international OSHA regulations and make recommendation.

- Conduct a risk assessment for the project to assess the probability and consequence of incidents.

- Describe the preventive measures and actions to be taken in the event of a safety problem and the associated health risks.

The Consultant will further comprehensively cover among others protection against:

- Exposure to dust and hazardous materials that may be present in construction materials and demolition waste;

- Physical hazard associated with the use of heavy equipment, or use of explosives;

- Existing baseline information on communicable and Sexually Transmitted Infections (STIs). Describe the expected communicable disease increase as a result of the project implementation, with emphasis on HIV/ AIDS and policies to be adopted to control its spread within the project area;

- Consequences arising from any increases in water borne diseases;

- Interaction of project work force with the local people, including HIV impacts on construction and operational phases;

- Health services in the area;

- Community nutritional status in the area;

Task 18: Archaeological/Paleontological Reconnaissance Surveys a) Archaeological Survey:

As a chapter of the ESIA, the consultant will be required to conduct an Archaeological Reconnaissance study of the area. The Mafeteng and Mohale's Hoek areas are known for its richness of archaeological sites of the Mesolithic period including Bushmen paintings. There will be a need to determine if some of the rock paintings can be relocated or professionally traced for archiving. The Consultant will also be expected to establish a protocol for chance find of archaeological or cultural heritage/ property during construction. It is important that some paleontological survey be done to ascertain the significance of any fossil bearing profiles, and what may need to be done to conserve them.

Task 19: Determination of Potential Impacts of the Proposed Projects

In addition to the impacts to be identified, which will include an In-stream Flow Requirements (IFR) analysis, the consultant will also identify the environmental benefits of the Project as well as any environmental enhancement that may occur. The study will also review negative downstream impacts such as impacts on people's livelihoods. Compensation and public consultation with respect to downstream impacts will be included. Impacts can be classed as both direct and indirect and the consultant will identify these (with input from the consultative process). Stages of planning/surveying, construction, and operations and maintenance will be addressed. For each potential impact the consultant should determine the impact's level of significance, describe the potential impact, the consequences of the impact (who it will affect and how), the probability of reversing the impact, and the probability that the impact can be

avoided and the effects of proposed mitigation measures. The consultant shall recommend strategies of avoidance primarily and will propose optimized alternatives otherwise.

The consultant will address cumulative impacts and as best as possible describe the contribution that the impact will have to the overall cumulative effect. To determine these, the consultant will require general knowledge of other activities contributing to the cumulative impacts and activities and projects planned for the future that could also contribute to the cumulative effect. The consultant will describe the overall residual impacts that can be expected following mitigation as described in the Social and Environmental Management Plan (ESMP).

A prediction of changes in the environment resulting from project construction and operation should be considered, and an assessment of the effect on the surrounding physical, biological, and human systems, should be presented. The assessment should pay attention to:

- The extent to which the river affected by the abstraction will be positively or negatively affected and the magnitude of the changes in the water quantity and quality.
- Projected quantitative changes in beneficial river uses, such as fisheries (species composition, productivity, etc.) and water availability for portable supply.

Task 20: Analysis of Alternatives to the Proposed Project

Describe the alternatives that were examined in the course of developing the proposed project and identify other alternatives that would achieve the same objectives. Include the alternative of 'no project'. The concept of alternatives extends to sitting, design, technology selection, construction techniques and phasing, and operating and maintenance procedures. Compare alternatives in terms of potential environmental impacts; costs; suitability under local conditions; and institutional, training and monitoring requirements. When describing the impacts, indicate which are irreversible or unavoidable and which can be mitigated. To the extent possible, quantify the costs and benefits of each alternative, incorporating the estimated costs of any associated mitigating measures.

Task 21: Environmental and Social Management Plan (ESMP)

The plan will comprise five main sections: mitigation measures, institutional strengthening and training, budget and monitoring. The Hierarchy of Impact Management should also be specified.

The ESMP will from part of the bidding and Contract documents.

(a) Mitigation of social and environmental impacts: Recommend feasible and cost-effective measures to prevent or reduce significant negative impacts to acceptable levels. Estimate the impacts and costs of those measures. Estimate the costs of any residual impacts. Consider compensation to affected parties for impacts that cannot be mitigated. The plan should include proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures, monitoring etc. Include measures for emergency response to health and safety.

- The ESIA for the LLBWSS (April 2010) indicated that there will be very little involuntary resettlement of people, however there will be land acquisition and loss of productive assets and income sources. The Project will require a resettlement program as mitigation for those forced to move or who have their land and productive assets taken away as a result of land required for the reservoir expansion or for other land needs to meet the objectives of the Project. The definition of affected people is not limited only to those who have to move but would cover people who access to their assets (e.g. field or grazing lands) is temporary or permanently affected by any works (access roads, treatment plants, burrow pits, contractor camps, public infrastructure, etc.), as a result a resettlement and compensation plan will be required according to the World Bank safeguard policies (Involuntary Resettlement OP 4.12).

The ESIA will to need to take into account impacts that could contribute substantially to the cumulative effect are those that can arise from the construction and operational phases of the Project. Most of these, if not all, can be avoided through the following of a set of best practices that the consultant will prepare (e.g. construction workers not littering, soil stockpiled in such a way as to prevent erosion and waterway sedimentation, only working day time shifts to avoid unnecessary noise to adjacent households). There will be a need to prepare a programme of action for the minimization of HIV and AIDS transmission.

The ESMP should have specific instructions to contractors on environmental and social management requirements. These may include the requirement for a contractor to prepare their own Environmental Management System (e.g. Method Statements) in response to the ESMP.

(b) Institutional strengthening and training: Identification of institutional needs to implement social and environmental assessment recommendations. Review the authority and capability of the Office of the Commissioner of Water, Lesotho Lowlands Water Supply Scheme Unit, WASCO, Department of Rural Water Supply and other relevant institutions, in particular the Department of Environment (DOE) and recommend steps to strengthen or expand

these institutions to ensure that effective environmental and social impacts management and monitoring will occur. The analysis of institutional needs should also include plans for capacity to implement social management plans, including resettlement impacts. The recommendations may extend to modification / new laws and regulations, new agencies or agency functions, inter-sectoral arrangements, management procedures and training, staffing, operation and maintenance training, budgeting, and financial support.

It is expected that the consultant will present the Institutional strengthening and training in a tabular format similar to the following:

Institutional Strengthening for Implementation of the ESMP

Institutional Strengthening Activity	**Positions**	**Scheduling**	**Responsibilities**	**Cost Estimates**

Institutional Training for Implementation of the ESMP

Training Activity	**Participants**	**Types of Training**	**Content (Modules etc.)**	**Scheduling**	**Cost Estimates**

(c) Budget: All the various costs related to the implementation and management of the ESMP are to be detailed, including institutional development, capacity building and training. This is essential for future planning purposes of the project.

(d) Monitoring: Describe detailed arrangements required for monitoring implementation of mitigating measures and the impacts of the project during construction and operation. This will include a description of monitoring methodology, specific operations and features to be

monitored, monitoring reporting relationships, and arrangements to ensure that monitoring is effective and leads to modifications where required to ensure minimal impact on the environment. Include in the plan an estimate of costs and a description of other inputs such as training and institutional strengthening (with emphasis on the role of the civil society organizations) to ensure effective monitoring. Emphasis for monitoring will probably be placed on Pre-construction Phase, Construction Phase as well as Operation & Maintenance Phase activities and the monitoring of any resettlement that may be required.

Monitoring Implementation

Project Activity	**Potential Environmental or Social Impacts**	**Proposed Mitigation Measures**	**Institutional Responsibilities** *(Implementation mechanism and Supervision)*	**Time frame** *(for implementation)*	**Cost Estimates**	**Comments** *(e.g. secondary impacts)*
Pre-Construction Phase						
Construction Phase						
Operation and Maintenance Phase						

Task 22: Environmental and Social Assessment (ESIA) Report

The ESIA report should be concise and limited to significant environmental and social issues. The main text should focus on methodology, analysis, findings, conclusions and recommended actions, supported by summaries of the data collected and citations for any references used in interpreting those data. Detailed or uninterrupted data are not appropriate in the main text and should be presented in appendices or a separate volume. Unpublished documents used in the assessment should also be assembled in an appendix.

The consultant shall present the Final Draft ESIA to be presented in a day long stakeholder's workshop for approval.

Task 23: Stand Alone Executive Summary of ESIA

A standalone Executive Summary of the ESIA, in English and Sesotho will be required and will cover the salient sections of the main document. This version of the ESIA will probably be of the order of 25 pages and will be used primarily by senior management to familiarize themselves with the environmental situation vis-à-vis the Project. It will be the main document,

along with the Project Appraisal document; upon which funding agencies/donors would make a decision for project support.

Task 24: LLBWSS Compensation and Resettlement Procedures Report

The consultant shall review and update the LLBWSS update the RPF and develop resettlement and compensation the Procedures and guidelines of the LLBWSS.

The consultant shall present the Draft Final Policy, Procedures and Guidelines to be presented in a day long stakeholder's workshop for approval.

Task 25: Resettlement and Action Plan (RAP) Report

Resettlement Action Plan (RAP) is the core output of the Consultant. The report shall be comprehensive enough to include every issue defined in the Terms of Reference or required by the scope of the service.

The Consultant will develop a comprehensive RAP based on door-to-door survey (resettlement survey) for all project operations.

The objective of the RAP is to ensure that the population to be affected by the project is formally consulted and adequately compensated. Involuntary resettlement should be avoided or minimised where feasible. Displaced or affected persons should be compensated for the losses at full replacement costs prior to the actual move. Secondly, they should be assisted in the move and supported during the transition period in the resettlement site. Thirdly, assistance should be provided in their efforts to improve on their former living standards or at the very least maintain them.

Task 26: Stand Alone Executive Summary of RAP

A standalone Executive Summary of the ESIA, in English and Sesotho will be required and will cover the salient sections of the main document. This version of the ESIA will probably be of the order of 25 pages and will be used primarily by senior management to familiarize themselves with the environmental situation vis-à-vis the Project. It will be the main document, along with the Project Appraisal document; upon which funding agencies/donors would make a decision for project support.

6. Outputs Expected and Timelines

a) Inception Report

The consultant will prepare and present to the client a brief but comprehensive inception report that will contain a detailed work plan (approval will depend on a consensus reached with project stakeholders).

Draft Inception 2 Weeks after commencement of the Consultancy and Final Inception 4 Weeks after commencement of the Consultancy

b) ESIA Report

The ESIA report that will be prepared and presented in draft, draft final and final versions to the client and other key stakeholders to be determined. Number of copies of each will be determined during negotiations with the client. It would be expected that the Reports will be in both hard copy and readable electronic (soft) formats.

Draft ESIA 7 Weeks, Draft final ESIA 10 weeks and Final 13 weeks after commencement of the consultancy

c) ESMP Report

The Consultant will prepare a stand-alone document ESMP that will be prepared and presented in draft, draft final and final versions to the client and other key stakeholders to be determined. Number of copies of each will be determined during negotiations with the client. It would be expected that the Reports will be in both hard copy and electronic (soft) formats.

Draft ESMP 7 Weeks, Draft final ESMP 10 weeks and Final 13 weeks after commencement of the consultancy

d) Executive Summary ESIA

The consultant will also provide a stand-alone executive summary of the ESIA at the draft final and final stage. Number of copies will be decided upon between the consultant and the client. It would be expected that the Reports will be in both hard copy and electronic (soft) formats.

Draft Executive Summary 7 Weeks, Draft Final 10 weeks and final Executive Summary 13 weeks after commencement of the consultancy

e) Resettlement Action Plan (RAP) Report

The resettlement action plan is required as per the World Bank's safeguard policies on resettlement and will in such case be provided as a separate stand-alone document. The

consultant will also provide a RAP at the draft, draft final and final stage. It would be expected that the RAP will be in both hard copy and electronic (soft) formats.

Draft RAP 7 Weeks, Draft final RAP 10 weeks and Final RAP 13 Weeks after commencement of the consultancy

f) Executive Summary RAP

The consultant will also provide a stand-alone executive summary of the RAP at the draft, draft final and final stage. Number of copies will be decided upon between the consultant and the client. It would be expected that the Reports will be in both hard copy and electronic (soft) formats. To be written in both Sesotho and English.

Draft Executive Summary 7 Weeks, Draft final Executive Summary 10 weeks and final 13 weeks after commencement of the consultancy

g) Public Participation Process Report

The consultant will also prepare reports and other materials as required to meet the public consultation needs of the ESIA and RAP

Draft Public Participation Process Report 8 Weeks after commencement of the Consultancy and Public Participation Process Report 13 weeks after commencement of the consultancy

h) Programme

The Consultant will also provide brief, but comprehensive programme on a monthly basis to the LLWSSU through an appointed representative. These will indicate the progress of the ESIA and RAP in terms of tasks accomplished; difficulties encountered, adherence to schedule and budgets, and suggested recommendations for modifications that would be discussed with management.

H) 6.1 Format of Deliverables

Deliverables shall be presented in both hard and soft copy. All documents shall be in English. All reports shall be bound. Maps and schematics included in reports must be a minimum of A3 size, however if the detail is unclear at this size A2 or A1 copies may be required.

Soft copies of reports and other information required shall be in Word, Excel, MS-Project, Arc-GIS 10 with linked shape files. All required data and information for the existing and proposed infrastructure should be presented in the form of shape files for the GIS system. The consultant shall propose other software to be used in the preparation of the plan for approval. Detailed calculations and database used to prepare the plans which do not appear in the final reports shall be presented as soft copy in the same software used to make the calculations or populate the database.

7. Team of Experts

Key Experts:

(i) Team Leader – Environmental Impact Assessment Specialist with at least 15 years of progressively senior experience in managing EIA studies for Bulk Water Supply Infrastructure development project, preferably in SADC Region. In addition, the Team Leader shall be a person with excellent oral and written communication skills and shall demonstrate a high level of organizational skills.

(ii) Sociologist/Anthropologist with 10-15 years progressively senior experience in preparing and implementing resettlement and compensation plans for large projects, preferably in SADC Region

(iii) Public Consultation Specialist with at least 15 years of progressively senior experience in designing and implementing public/stakeholder consultation processes, especially for large water resource development projects, preferably in SADC Region. Specific experience in Lesotho and local language is necessary.

(iv) Compensation and Resettlement Specialist will be responsible for overall management, planning and oversight of all RAP activities and associated deliverables. He should be able to demonstrate a breadth of relevant RAP preparation and monitoring of its implementation experience. The Compensation and resettlement Specialist should have at least 15 years of professional experience in preparation and implementation of Resettlement Action Plans. A minimum of a Master's Degree in a relevant discipline is required. Previous Lesotho or SADC experience will be an added advantage.

(v) Monitoring and Evaluation (M & E) Specialist should have at least a Bachelor's degree in a field related to social research and at least 10 years' experience in M & E., out of which 4 years shall be in conducting assessments and surveys, proposal development,

programme design, selecting indicators, implementing monitoring plans, and data analysis. The Specialist shall be familiar with:

- The logical framework approach and other M & E methods and approaches;
- Planning and implementation of M & E systems;
- Facilitating learning-oriented analysis sessions of M & E data with multiple stakeholders;
- Information analysis and M & E report writing;

The Specialist shall also have a solid understanding of rural development, with focus on participatory process, joint management and gender issues.

(vi) Data Management Specialist shall be a professional with at least a Bachelor's degree in Information Technology (IT) qualification, or data analyst with at least 10 years professional experience out of which 8 years shall be in managing interactive data sets. He should have experience of working with compensation management information systems and similar. Experience in training local staff will be an added advantage.

(vii) GIS Specialist shall have at least a Bachelor's degree in GIS or related field and at least 10 years professional experience out of which eight years shall be in working with orthophotos and superimposing geo-referenced CAD and cadastral format layout on these. He shall have experience in linking GIS data to the compensation information data.

(viii) Cadastral Surveyor shall at least have a Bachelor's degree in surveying or related field and at least 10 years professional experience out of which 8 years shall be of working as a property surveyor. He shall have experience in use of modern surveying equipment and techniques.

Probable additional team members used on short term basis:

i. General ecologist
ii. Environmental Hydrologist/Engineer
iii. Soil Scientist
iv. Archaeologist with an understanding of Lesotho Archaeology
v. In stream Flow Requirements specialist
vi. Occupational Health and Safety specialist
vii. GIS Specialist

viii. Aquatic ecologist
ix. Ornithologist
x. Palaeontologist
xi. Public participation specialist
xii. Others as identified and required

The consultant will use the client's personnel in a constructive manner as part of the ESIA and RAP processes in order to meet 'hands on' training needs.

8. Consultant Responsibilities

i. The Consultant shall be solely responsible for analysis and interpretation of data, reports, review, etc., for the purpose of this assignment and for the findings, conclusions and recommendations in all requested reports;

ii. The Consultant will be responsible for own residential and office accommodation, computers and office expenses. The work plan should also make allowance for the time and travel required for interaction with all the stakeholders;

iii. The Consultant will make all travel, meeting and other necessary arrangements for the assignment;

iv. Conduct of the Consultant:

- The Consultant will be expected to carry out this assignment in an open and transparent manner, with the highest degree of professionalism and integrity;
- The Consultant will not, under any circumstances, take any action or be seen to be taking any actions, which may hinder or prevent the progress of the project;

9. Duration of the Assignment and Timing for the ESIA AND RAP

The assignment will be completed within 3 months after contract signing.

10. Management arrangements for this assignment

I) 10.1 Responsible body

The body responsible for managing the project on a day to day basis will be the Lesotho Lowlands Water Supply Scheme Unit (LLWSSU) which falls under the office of the Commissioner of Water.

10.2 Management structure

The Consultant will report to the Director of the LLWSSU who will handle all correspondence. Correspondence from the consultant to other Government Ministries or departments should be directed through the Director of the LLWSSU. All correspondence concerning the project should be addressed to the Director of LLWSSU and copied to the Water Commission. The LLWSSU will be responsible for keeping all parties informed of progress on the project. Day to day activities of the Consultants will be supervised and monitored by the environment team of the Lesotho Lowlands Water Supply Scheme Unit.

The contracting authority, the Commissioner of Water will be responsible for ensuring that the project is undertaken within the TOR and Conditions of Contract. The Commissioner of Water will check the consultants' payments requests and invoices together with originals of accompanying documentation.

The consultant's qualitative performance will be measured against the milestones to be identified in the Implementation Program prepared by the LLWSSU Representative in consultation with the Contracting Authority and the Consultant. The Consultant's qualitative performance will be assessed based on the comments received from the stakeholders.

10.3 Stakeholders

The following stakeholders have been identified as being directly involved, and as being required to liaise with, get information from and as participants at presentations and workshops as part of the decision-making process. To help ensure a successful outcome to the project utilise their knowledge help and advice.

Stakeholders include but not necessarily limited to:

- Commissioner of Water
- Lesotho Lowlands Water Supply Scheme Unit
- Department of Rural Water Supply (Head Office & District Level)
- Ministry of Agricultural and Food Security (Head Office & District Level)
- Department of Water Affairs (Head Office & District Level)
- District Administrators (Mafeteng, Mohale's Hoek)
- Water and Sewerage Company
- Lesotho Electricity and Water Authority
- Ministry of Tourism, Environment and Culture
- Lesotho Highlands Development Authority
- Lesotho Highlands Water Commission
- Department of Environment (Head Office & District Level)
- Community Councils (Relevant Councils in Zone 6 & 7)

- Chiefs (District, Village etc.)
- Members of Parliament (Relevant Constituencies in Zone 6 & 7)
- NGOs (E.g. Transformation Resource Centre)

11. Payment Schedules

The following will be the schedule to be followed for payment of the consultant:

- 20% of the contract sum will be paid upon approval of the inception report;

- 40 % of the contract sum will be paid upon submission and approval of Final ESIA, ESMP and Public Participation Process Reports by the Client;

- 20% of the contract sum will be paid upon submission and approval of the RAP by the Client;

- 20% of the contract sum will be paid upon submission and approval of the ESIA Report by the Department of Environment and issuance of EIA license.

Annex 1

Typical Contents of an Environmental and Social Impact Assessment (ESIA) Report

The typical contents of an ESIA Report are presented hereafter. It shall be noted that the presentation of the Report may be adapted pending on the nature and specific requirements of the project.

Executive Summary

This section shall present in a non-technical language a concise summary of the ESIA Report with a particular attention on the processes and procedures used; baseline conditions; the alternatives considered; mitigation/enhancement measures; monitoring program; consultations with stakeholders; capabilities of environmental and social units and actions to strengthen those capacities; and cost implications. This Executive Summary shall be written in English for public consultations.

Chapter 1 Introduction

The Introduction shall indicate the purpose of the ESIA, present an overview of the proposed project to be assessed, as well as the project's purpose and needs. This section identifies the project sponsor and the consultant assigned to carry out the ESIA. It shall also briefly mention the contents of the ESIA Report and the methods adopted to complete the assessment.

Chapter 2 Policy, Legislative, Regulatory and Administrative Considerations

This chapter will describe the pertinent policies, legal, administrative, regulations and standards governing environmental quality, health and safety, protection of sensitive areas, protection of endangered species, sitting, land use control, etc., at international, national, regional and local levels.

This chapter will also include an assessment of the 10 World Bank Environmental and Social Standards (ESS), identifying which of these should be triggered. The results should be presented in a tabular format, showing each of the ten standards, status of triggering, and rationale for triggering or not. Details on the triggering of the standards are available in World Bank's Environmental and Social Framework.

Chapter 3 Analysis of Alternatives to the Proposed Project

This section will describe alternatives that were examined in the course of developing the proposed project and identify other alternatives which would achieve the same objectives,

including the “without project option”. The concept of alternatives extends to siting, design, technology selection, construction techniques and phasing, and operating and maintenance procedures. It will compare alternatives in terms of potential environmental impacts and suitability under local conditions.

For each of the alternatives, the environmental and social impacts shall be quantified as possible, including their economic values where feasible. The selected alternative shall be the most environmentally and socially sustainable, taking into account the technical and economic feasibility.

Chapter 4 Description of the Proposed Project and Justification

This chapter will provide a brief description of the relevant parts of the project, using maps (at appropriate scale) where necessary, and including the following information: location; general layout; size, capacity, etc.

The project justification should be based on combined economic, environmental and social assessments. To this end, this chapter shall describe the current situation in the sector, explain the problems or the needs to be satisfied by the project and present the constraints associated with the project implementation.

Chapter 5 Methodology

The Consultant will describe the methods used for conducting the ESIA. The Consultant will include environmental and social assessment team

Chapter 6 Description of the Physical and Social Environment

This chapter will evaluate and present baseline data on the relevant environmental characteristics of the study area. It will include information on any changes anticipated before the project commences.

- Physical environment: geology; topography; soils; climate and meteorology; ambient air quality; surface and groundwater hydrology; existing sources of air emissions; existing water pollution discharges; and receiving water quality.

- Biological environment: flora; fauna; rare or endangered species; sensitive habitats, including parks or preserves, significant natural sites, etc.; species of commercial importance; and species with potential to become nuisances, vectors or dangerous.

- Socio-cultural environment (include both present and projected where appropriate): population; land use; planned development activities; community structure;

employment; distribution of income, goods and services; recreation; public health; cultural prosperities; tribal peoples; and customs, aspirations and attitudes.

Chapter 7 Significant Social and Physical Environmental Impacts

This chapter will distinguish between significant positive and negative impacts, direct and indirect impacts, and immediate and long-term impacts during construction and operation as well as maintenance phases indicating their importance level and their probability of occurrence. It will identify impacts which are unavoidable or irreversible as well as the distributional effect of impacts. Wherever possible, it will describe impacts quantitatively. Cumulative effects shall also be addressed taking into account other projects or actions planned in the study area. This shall include the social – economic impact assessment.

Chapter 8 Stakeholder / Public participation

This chapter shall summarize the actions undertaken to consult the groups affected by the project, as well as other concerned key stakeholders including Civil Society Organizations. This will describe the process that will result in coordinating the environmental and social impact assessment with other government agencies, obtaining the views of local NGOs and affected groups. The detailed record of the consultation meetings shall be presented in annex to the ESIA Report. The first consultation will be a scoping session that will help address particular subjects of interest to the concerned public. Every effort should be taken to include broad representation from all economic and social sectors, especially the potentially marginalized groups such as women, lower socioeconomic standard, etc.

Chapter 9 Gender Analysis

This chapter will summarize the findings and suggestions of appropriate actions and recommendations for the project. It should include:

- Description of current conditions and gender gaps relevant to the project;
- Proposed activities aimed at addressing the project-relevant gender gaps and a results chain/outcome pathway describing how the planned activities will address the identified gender gaps;
- Innovative communication, engagement and capacity strengthening strategies/approaches that will help ensure the planned activities lead to gender-targeted outcomes;
- Indicators which measure changes in outcomes of proposed actions in closing the gaps;
- Identification of knowledge gaps that might be addressed in future analytic/research work.

Chapter 10 Safety Measures during Construction, Operation and Maintenance

The analysis will include a review the existing codes of practice and procedure used by Department of Labour, and check for their consistency with the World Bank guidelines and internationally recognized codes of practices for similar projects. The consultant will therefore carry out a Risk Assessment (RA) study to:

- Identify safety procedures based on existing practices and standards in the Labour Code (1992) and make additional recommendation;
- Conduct a risk assessment for the project to assess the probability and consequence of incidents;
- Describe the preventive measures and actions to be taken in the event of a safety problem and the associated health risks.

Chapter 11 Environmental and Social Management Plan

This chapter will provide details on the management initiatives and on the measures to be implemented during both the construction and operational phases of the project. This chapter should also consider environmental enhancement

Chapter 12 Conclusion

This chapter shall specify the environmental and social acceptability of the project, taking into account the impacts and measures identified during the assessment process. It shall also identify any other conditions or external requirements for ensuring the success of the project.

Appendices

To include but not limited to:

- Record of consultation meetings with primary and secondary stakeholders
- List of the professionals and organizations having contributed to the preparation of the ESIA Report;
- List of consulted documents, including project-related reports;
- Project Area Maps;

References

Annex 2
Generic Contents of an Environmental and Social Management Plan (ESMP)

The ESMP format shall be flexible to ensure the integration of project specific mitigating, enhancing and monitoring requirements. For instance, the ESMP shall integrate or at least refer to any initiatives, such as resettlement plans, that contribute to enhance the project environmental or social performance but may be prepared separately or as part of the ESIA Report. In addition, the ESMP format shall permit adjustments and revisions to reflect new developments and findings along project implementation and operations.

The ESMP's scope and level of details shall be proportional to the number and complexity of the measures required to ensure the project's environmental and social sustainability. The following components constitute the minimal contents of an ESMP.

General Information

- Estimated Starting date of implementation;
- Project completion date;
- Date of operation;
- Period covered by the plan.

Objectives of the ESMP

This section shall specify that the ESMP aims to bring the project into compliance with applicable national environmental and social legal requirements and international organizations' environmental and social policies. Other objective of the ESMP is to outline the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts. It shall also address capacity building requirements to strengthen environmental and social capacities if necessary.

Context

The ESMP shall briefly describe project activities and major environmental and social components that will likely be affected positively or negatively by the project. The information provided shall be concise as the ESIA Report covers in detail this topic. In fact, for this section, cross-references to the ESIA Report are recommended. Moreover, the context section shall outline existing interrelations between ecological and social processes. These interrelations among components shall be mentioned to be taken into account in the impact assessment and the development of mitigation/enhancement measures.

Beneficial and Adverse Impacts

This section shall focus on beneficial impacts that can be enhanced to improve the project environmental and social performance as well as on adverse impacts that require mitigation measures to be minimized or compensated. The impact description in the ESMP shall be brief and refer to the ESIA Report for further details.

Enhancement and Mitigation Program

This section shall propose feasible and cost-effective measures to address the impacts previously defined, in order to accrue project benefits (enhancement measures) or to reduce potentially adverse environmental and social impacts to acceptable levels (mitigation measures). Each measure shall be described in detail, providing all technical information required for its implementation (design, equipment description and operating procedures, as appropriate).

Monitoring Program

A monitoring program aims to ensure that mitigation and enhancement measures are implemented, that they generate intended results and that they are modified, ceased or replaced when inappropriate. Moreover, it allows assessing compliance with national environmental and social policies and standards as well as with the international policies and guidelines. A monitoring program shall include two parts: surveillance and monitoring activities.

Surveillance activities

The surveillance aims to ensure that the proposed mitigation and enhancement measures are effectively implemented during the construction phase.

Monitoring activities

These activities consist in measuring and evaluating the project impacts on some environmental and social components of concern and to implement remedial measures, if necessary.

The program shall define as clearly as possible the indicators to be used to monitor the mitigation and enhancement measures that need to be assessed during project implementation and/or operation. The monitoring program shall also provide technical details on monitoring activities such as methods to be used, sampling locations, frequency of measurements, detection limits, and definition of thresholds that will signal the need for corrective actions.

Consultations

The implementation and monitoring of some mitigation or enhancement measures may require that consultative mechanisms be used. In such cases, the ESMP shall first identify for which

measures consultations will be undertaken as well as the goals and expected outcomes of these consultations. Then the ESMP shall specify the target groups, appropriate consultative processes, consultation frequency, reporting methods and result disclosure procedures.

Complementary Initiatives

The ESMP shall integrate or at least refer to all initiatives that are proposed to improve the project environmental or social performance. As the ESIA Report may include such initiatives, these shall be briefly presented in this section. Moreover, these complementary initiatives shall be taken into account in determining the responsibilities, institutional arrangements, cost estimates and implementation schedule.

Responsibilities and Institutional Arrangements

The implementation of enhancement and mitigation measures as well as the completion of the monitoring program requires to clearly establish responsibilities among the various organizations involved in project implementation and operation. Consequently, the ESMP shall identify the responsibilities of the financier, the implementing agencies and other stakeholders in applying the ESMP, particularly the monitoring program. In addition, the ESMP shall propose support to the organizations that may have insufficient capacities to fulfil their obligations. This support could be provided through various means including technical assistance, training and/or procurement.

Estimated Cost

This section estimates the capital and recurrent cost associated with the various proposed measures (enhancement and mitigation), the monitoring program, consultations, complementary initiatives and institutional arrangements.

Implementation Schedule and Reporting

The ESMP shall include an implementation schedule taking into account all activities related to the proposed measures (enhancement and mitigation), the monitoring program, consultations, complementary initiatives and institutional arrangements. Moreover, the implementation schedule shall be developed by phases and in co-ordination with the overall project implementation plan.

To ensure early detection of critical environmental and social conditions and to provide information on the mitigation progress and results, reporting deadlines shall be specified in the implementation schedule and reporting procedures shall be presented in this section.

Annex 3
Outline of a Typical Full Resettlement Action Plan (RAP)

In general, a RAP would include but not limited to the following sections:

Introduction

This section shall:

- Briefly describe the LLBWSS with all its key components and associated developments, components that require land acquisition and resettlement or will cause impacts on asset, and shall provide the overall estimates of impacts; and

- Describe efforts that were made to minimize land acquisition and resettlement as well as mechanisms that were employed to minimise project impacts during implementation.

Description of the project, project area and area of influence

General description of the project and the area of influence, including:

- Population and settlements;
- Economic conditions and livelihood activities;
- Public and social services.

Review of Policies, Legal and Institutional Frameworks

Policies and laws related to resettlement. Institutional arrangements for resettlement.

RAP Methodology

General description of the approaches engaged to complete the RAP.

Potential Impacts

Including identification of:

- Description of the project components or activities that would give rise to resettlement;
- Zone of impact of such activities;
- The alternatives considered to avoid or minimize resettlement;
- The mechanisms established to minimise resettlement to the extent possible, during project implementation.

Socio-economic studies

(a) A population census covering current occupants of the affected area and excluding subsequent inflows of people for eligibility for compensation and resettlement assistance, including the description of the production systems, household organisation, baseline information on livelihoods and standards of living of the displaced population including income and expenditure profiles, community relations;

(b) An inventory of assets of displaced households; the magnitude of the expected loss – total or partial for individual or group assets, and the extent of physical and economic displacement;

(c) Information on disadvantaged groups or persons for whom special provisions may have to be made;

(d) Provisions to update information on the displaced people's livelihoods and standards of living at regular intervals so that the latest information is available at the time of their displacement;

(e) Description of land tenure and transfer systems, including inventory of common property, natural resources from which people derive their livelihoods and sustenance, non-title-based land ownership or allocation system recognized locally and any related issues raised by different tenure systems in the project area;

(f) The patterns of social interaction in the affected communities, including social networks and social support systems, and how they will be affected by the project;

(g) Public infrastructure and social services that will be affected; and

(h) Social and cultural characteristics of displaced communities including a description of formal and informal institutions that may be relevant to the consultation strategy and to designing and implementing the resettlement activities.

Community participation

A description of the consultation and participation of the displaced and hosts communities in the design and implementation of the resettlement activities including a summary of the views expressed and how these views were taken into account in preparing the resettlement plan.

A review of the resettlement alternatives presented and choices made by displaced persons, including choices related to forms of compensation and resettlement assistance, to relocating as

individual families or as part of pre-existing communities, and to retaining access to cultural property (e.g., places of worship, cemeteries, etc.).

Description of procedures for redress of grievances and conflict resolution by people affected to project authorities throughout the planning and implementation.

Integration with host communities (if needed)
Consultations with host communities and local governments and arrangements for prompt tendering of any payments due to the hosts for land or other assets should be provided to resettlers. Arrangements for addressing any conflict that may arise between the resettlers and host communities should also be made.

Appropriate measures should be taken to augment public services (e.g. education, water, heath, and production) in host communities to make them comparable to services provided to resettlers.

Legal framework including mechanisms for conflicts resolution and appeals

(a) The applicable legal and administrative procedures, including a description of the remedies available to displaced persons in the judicial process, and the normal time frame for such procedures; and available alternative dispute resolution mechanisms that may be relevant to the project;

(b) Laws and regulations relating to the agencies responsible for implementing resettlement activities; and

(c) Any legal steps necessary to ensure the effective implementation of resettlement activities, including a process for recognizing claims to legal rights to land – including claims that derive from customary and traditional law and usage.

Livelihood Restoration and Enhancement Programmes

This section shall outline strategies to address the livelihood restoration and enhancement programme. The section shall:

- Describe additional economic interventions to restore income streams for each category of impacts;

- Spell out the restoration strategies for each category of impact and describe their institutional, financial and technical aspects;

- Describe the process of consultation with affected communities and their participation in finalising strategies for income restoration and other enhancement programmes;

- Describe how these strategies vary with the area of impact;

- Describe whether income restoration would require change in livelihoods, development of agricultural based activities and other interventions that need a considerate amount of training, time for preparation, and implementation;

- Describe how the risks of impoverishment shall be addressed;

- Describe monitoring indicators;

- Describe the process for monitoring and evaluation of the effectiveness of income restoration measures;

- Identify and describe any social or community development programmes currently operating in or around the LLBWSS project area. Assess whether existing programmes meet the development priorities of their target communities. Assess whether there are opportunities for the LLBWSS to support new programmes or expand existing programmes to meet the development priorities of communities in the project area.

Organizational Responsibility

The institutional arrangements within the executing agency (LLWSSU) and provision of adequate resources to this institution should be discussed and all inter-agency coordination should be described. The capacity and commitment of the institution to carry out the resettlement plan should also be evaluated. If necessary, strengthening of this institution should be considered and the steps that will be taken, together with a timetable and budget, should be described at the project preparation phase. There should be considerable scope for involving the local people and NGOs in planning, implementing and monitoring resettlement.

Eligibility

Definition of displaced persons and criteria for determining their eligibility for compensation and other resettlement assistance, including relevant cut-off dates

Valuation of and compensation for losses

(a) The methodology to be used in valuing losses to determine their replacement cost; a description of the proposed types and levels of compensation under local laws and such supplementary measures to achieve replacement cost for lost assets; and

(b) A description of the packages of compensation and other resettlement measures that will assist each category of eligible displaced persons to achieve the objectives of this policy;

(c) A detailed schedule for compensation of loss of land, annual crops, perennial crops or other assets for each individual household affected, including details on income and livelihood restoration activities for communities and/or households affected by the project:
    a. Cash compensation schedule;
    b. Income restoration and improvement initiatives;
    c. Land based compensation;
    d. Social and community development plans;
    e. Other.

Identification of alternative sites and selection of resettlement site(s), site preparation, and relocation (if needed)

(a) Institutional and technical arrangements for identifying and preparing relocation sites, for which a combination of productive potential, locational advantages, and other factors is at least comparable to the ancillary resources;

(b) Procedures for physical relocation under the project, including timetables for site preparation and transfer;

(c) Any measures to prevent influx of ineligible persons at the selected sites; and

(d) Legal arrangements for regularizing tenure and transferring titles to resettlers.

Implementation schedules

An implementation schedule covering all resettlement activities from preparation through implementation, including target dates for achievement of expected benefits to resettlers and hosts and terminating the various forms of assistance.

Costs and budget

Tables indicating breakdown of cost estimates for all resettlement activities, including allowances for inflation and other contingencies; timetable for expenditures; sources of funds; and arrangements for timely flow of funds.

Monitoring and evaluation

Arrangements for monitoring of resettlement activities by the implementing agency (monthly/quarterly/annually); supplemented by independent monitors as appropriate, to ensure complete and objective information; performance monitoring indicators to measure inputs, outputs, and outcomes for resettlement activities; evaluation of the impacts of resettlement for a reasonable period of time after the resettlement activities have been complete.

Annexes

Annexes shall include but not limited to:

- Copies of census and survey instruments, interview formats, and any other research tools;
- Information on all community consultation including announcements and schedules of public meetings, meeting minutes, and lists of attendees;
- Examples of formats for Adjudication forms;
- Examples of formats to be used in monitoring and reporting on RAP implementation

PART II

Section 8. Conditions of Contract and Contract Forms

CONTRACT FOR CONSULTANT'S SERVICES

Lump-Sum

Project Name: Lesotho Water Sector Improvement Project – Second Phase

IDA H738/IDA/5492-LS/H967-LS

Contract No.:

CONSULTANCY SERVICES TO CARRY OUT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND RESETTLEMENT ACTION PLAN FOR ZONES 6 AND 7 OF THE LESOTHO LOWLANDS BULK WATER SUPPLY SCHEME

between

_____

[Name of the Client]

and

_____

[Name of the Consultant]

Dated: _____

Contents

I. Form of Contract

LUMP-SUM

This CONTRACT (hereinafter called the "Contract") is made the *[number]* day of the month of *[month]*, *[year]*, between, on the one hand, *office of the Commissioner of Water* (hereinafter called the "Client") and, on the other hand, *[name of Consultant]* (hereinafter called the "Consultant").

[If the Consultant consist of more than one entity, the above should be partially amended to read as follows: "…(hereinafter called the "Client") and, on the other hand, a Joint Venture (name of the JV) consisting of the following entities, each member of which will be jointly and severally liable to the Client for all the Consultant's obligations under this Contract, namely, *[name of member]* and *[name of member]* (hereinafter called the "Consultant").]

WHEREAS

the Client has requested the Consultant to provide certain consulting services as defined in this Contract (hereinafter called the "Services");

(b) the Consultant, having represented to the Client that it has the required professional skills, and personnel and technical resources, has agreed to provide the Services on the terms and conditions set forth in this Contract;

(c) the Client has received credit from the International Development Association (hereinafter called the "Association") towards the cost of the Services and intends to apply a portion of the proceeds of this credit to eligible payments under this Contract, it being understood (i) that payments by the Association will be made only at the request of the Client and upon approval by the Association, (ii) that such payments will be subject, in all respects, to the terms and conditions of the agreement providing for the credit, and (iii) that no party other than the Client shall derive any rights from the agreement providing for the credit or have any claim to the credit proceeds;

NOW THEREFORE the parties hereto hereby agree as follows:

1. The following documents attached hereto shall be deemed to form an integral part of this Contract:

   (a) The General Conditions of Contract (including Attachment 1 "Bank Policy – Corrupt and Fraudulent Practices);
   (b) The Special Conditions of Contract;
   (c) Appendices:

   Appendix A: Terms of Reference
   Appendix B: Key Experts

Appendix C: Breakdown of Contract Price
Appendix D: Form of Advance Payments Guarantee

In the event of any inconsistency between the documents, the following order of precedence shall prevail: the Special Conditions of Contract; the General Conditions of Contract, including Attachment 1; Appendix A; Appendix B; Appendix C; Appendix D. Any reference to this Contract shall include, where the context permits, a reference to its Appendices.

2. The mutual rights and obligations of the Client and the Consultant shall be as set forth in the Contract, in particular:

(a) the Consultant shall carry out the Services in accordance with the provisions of the Contract; and
(b) the Client shall make payments to the Consultant in accordance with the provisions of the Contract.

IN WITNESS WHEREOF, the Parties hereto have caused this Contract to be signed in their respective names as of the day and year first above written.

For and on behalf of *[Name of Client]*

_____

[Authorized Representative of the Client – name, title and signature]

For and on behalf of *[Name of Consultant or Name of a Joint Venture]*

_____

[Authorized Representative of the Consultant – name and signature]

[For a joint venture, either all members shall sign or only the lead member, in which case the power of attorney to sign on behalf of all members shall be attached.

For and on behalf of each of the members of the Consultant *[insert the Name of the Joint Venture]*

[Name of the lead member]

_____

[Authorized Representative on behalf of a Joint Venture]

[add signature blocks for each member if all are signing]

II. General Conditions of Contract

A. General Provisions

1. Definitions

1.1. Unless the context otherwise requires, the following terms whenever used in this Contract have the following meanings:

(a) "Applicable Guidelines" means Guidelines for Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011.

(b) "Applicable Law" means the laws and any other instruments having the force of law in the Client's country, or in such other country as may be specified in the **Special Conditions of Contract (SCC)**, as they may be issued and in force from time to time.

(c) "Bank" means the International Bank for Reconstruction and Development (IBRD) or the International Development Association (IDA).

(d) "Borrower" means the Government, Government agency or other entity that signs the financing agreement with the Bank.

(e) "Client" means the implementing agency that signs the Contract for the Services with the Selected Consultant.

(f) "Consultant" means a legally-established professional consulting firm or entity selected by the Client to provide the Services under the signed Contract.

(g) "Contract" means the legally binding written agreement signed between the Client and the Consultant and which includes all the attached documents listed in its paragraph 1 of the Form of Contract (the General Conditions (GCC), the Special Conditions (SCC), and the Appendices).

(h) "Day" means a working day unless indicated otherwise.

(i) "Effective Date" means the date on which this Contract comes into force and effect pursuant to Clause GCC 11.

(j) "Experts" means, collectively, Key Experts, Non-Key Experts, or any other personnel of the Consultant, Sub-consultant or JV member(s) assigned by the Consultant to perform the Services or any part thereof under the Contract.

(k) "Foreign Currency" means any currency other than the currency of the Client's country.

(l) "GCC" means these General Conditions of Contract.

(m) "Government" means the government of the Client's country.

(n) "Joint Venture (JV)" means an association with or without a legal personality distinct from that of its members, of more than one entity where one member has the authority to conduct all businesses for and on behalf of any and all the members of the JV, and where the members of the JV are jointly and severally liable to the Client for the performance of the Contract.

(o) "Key Expert(s)" means an individual professional whose skills, qualifications, knowledge and experience are critical to the performance of the Services under the Contract and whose Curricula Vitae (CV) was taken into account in the technical evaluation of the Consultant's proposal.

(p) "Local Currency" means the currency of the Client's country.

(q) "Non-Key Expert(s)" means an individual professional provided by the Consultant or its Sub-consultant to perform the Services or any part thereof under the Contract.

(r) "Party" means the Client or the Consultant, as the case may be, and "Parties" means both of them.

(s) "SCC" means the Special Conditions of Contract by which the GCC may be amended or supplemented but not over-written.

(t) "Services" means the work to be performed by the Consultant pursuant to this Contract, as described in Appendix A hereto.

(u) "Sub-consultants" means an entity to whom/which the Consultant subcontracts any part of the Services while remaining solely liable for the execution of the Contract.

(v) "Third Party" means any person or entity other than the Government, the Client, the Consultant or a Sub-consultant.

2. Relationship between the Parties

2.1. Nothing contained herein shall be construed as establishing a relationship of master and servant or of principal and agent as between the Client and the Consultant. The Consultant, subject to this Contract, has complete charge of the Experts and Sub-consultants, if any, performing the Services and shall be fully responsible for the Services performed by them or on their behalf hereunder.

3. Law Governing Contract

3.1. This Contract, its meaning and interpretation, and the relation between the Parties shall be governed by the Applicable Law.

4. Language

4.1. This Contract has been executed in the language specified in the **SCC**, which shall be the binding and controlling language for all matters relating to the meaning or interpretation of this Contract.

5. Headings

5.1. The headings shall not limit, alter or affect the meaning of this Contract.

6. Communications

6.1. Any communication required or permitted to be given or made pursuant to this Contract shall be in writing in the language specified in Clause GCC 4. Any such notice, request or consent shall be deemed to have been given or made when delivered in person to an authorized representative of the Party to whom the communication is addressed, or when sent to such Party at the address specified in the **SCC**.

6.2. A Party may change its address for notice hereunder by giving the other Party any communication of such change to the address specified in the **SCC**.

7. Location

7.1. The Services shall be performed at such locations as are specified in **Appendix A** hereto and, where the location of a particular task is not so specified, at such locations, whether in the Government's country or elsewhere, as the Client may approve.

8. Authority of Member in Charge

8.1. In case the Consultant is a Joint Venture, the members hereby authorize the member specified in the **SCC** to act on their behalf in exercising all the Consultant's rights and obligations towards the Client under this Contract, including without limitation the receiving of instructions and payments from the Client.

9. Authorized Representatives

9.1. Any action required or permitted to be taken, and any document required or permitted to be executed under this Contract by the Client or the Consultant may be taken or executed by the officials specified in the **SCC.**

10. Corrupt and Fraudulent Practices

10.1. The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in **Attachment 1** to the GCC.

a. Commissions and Fees

10.2. The Client requires the Consultant to disclose any commissions, gratuities or fees that may have been paid or are to be paid to agents or any other party with respect to the selection process or execution of the Contract. The information disclosed must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.

Failure to disclose such commissions, gratuities or fees may result in termination of the Contract and/or sanctions by the Bank.

B. COMMENCEMENT, COMPLETION, MODIFICATION AND TERMINATION OF CONTRACT

11. Effectiveness of Contract

11.1. This Contract shall come into force and effect on the date (the "Effective Date") of the Client's notice to the Consultant instructing the Consultant to begin carrying out the Services. This notice shall confirm that the effectiveness conditions, if any, listed in the **SCC** have been met.

12. Termination of Contract for Failure to Become Effective

12.1. If this Contract has not become effective within such time period after the date of Contract signature as specified in the **SCC**, either Party may, by not less than twenty two (22) days written notice to the other Party, declare this Contract to be null and void, and in the event of such a declaration by either Party, neither Party shall have any claim against the other Party with respect hereto.

13. Commencement of Services

13.1. The Consultant shall confirm availability of Key Experts and begin carrying out the Services not later than the number of days after the Effective Date specified in the **SCC**.

14. Expiration of Contract

14.1. Unless terminated earlier pursuant to Clause GCC 19 hereof, this Contract shall expire at the end of such time period after the Effective Date as specified in the **SCC**.

15. Entire Agreement

15.1. This Contract contains all covenants, stipulations and provisions agreed by the Parties. No agent or representative of either Party has authority to make, and the Parties shall not be bound by or be liable for, any statement, representation, promise or agreement not set forth herein.

16. Modifications or Variations

16.1. Any modification or variation of the terms and conditions of this Contract, including any modification or variation of the scope of the Services, may only be made by written agreement between the Parties. However, each Party shall give due consideration to any proposals for modification or variation made by the other Party.

16.2. In cases of substantial modifications or variations, the prior written consent of the Bank is required.

17. Force Majeure

a. Definition

17.1. For the purposes of this Contract, "Force Majeure" means an event which is beyond the reasonable control of a Party, is not foreseeable, is unavoidable, and makes a Party's performance of its obligations hereunder impossible or so impractical as reasonably to

be considered impossible under the circumstances, and subject to those requirements, includes, but is not limited to, war, riots, civil disorder, earthquake, fire, explosion, storm, flood or other adverse weather conditions, strikes, lockouts or other industrial action confiscation or any other action by Government agencies.

17.2. Force Majeure shall not include (i) any event which is caused by the negligence or intentional action of a Party or such Party's Experts, Sub-consultants or agents or employees, nor (ii) any event which a diligent Party could reasonably have been expected to both take into account at the time of the conclusion of this Contract, and avoid or overcome in the carrying out of its obligations hereunder.

17.3. Force Majeure shall not include insufficiency of funds or failure to make any payment required hereunder.

b. No Breach of Contract

17.4. The failure of a Party to fulfill any of its obligations hereunder shall not be considered to be a breach of, or default under, this Contract insofar as such inability arises from an event of Force Majeure, provided that the Party affected by such an event has taken all reasonable precautions, due care and reasonable alternative measures, all with the objective of carrying out the terms and conditions of this Contract.

c. Measures to be Taken

17.5. A Party affected by an event of Force Majeure shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall take all reasonable measures to minimize the consequences of any event of Force Majeure.

17.6. A Party affected by an event of Force Majeure shall notify the other Party of such event as soon as possible, and in any case not later than fourteen (14) calendar days following the occurrence of such event, providing evidence of the nature and cause of such event, and shall similarly give written notice of the restoration of normal conditions as soon as possible.

17.7. Any period within which a Party shall, pursuant to this Contract, complete any action or task, shall be extended for a period equal to the time during which such Party was unable to perform such action as a result of Force Majeure.

17.8. During the period of their inability to perform the Services as a result of an event of Force Majeure, the Consultant, upon instructions by the Client, shall either:

(a) demobilize, in which case the Consultant shall be reimbursed for additional costs they reasonably and necessarily incurred, and, if required by the Client, in reactivating the Services; or

(b) continue with the Services to the extent reasonably possible, in which case the Consultant shall continue to be paid under the terms of this Contract and be reimbursed for additional costs reasonably and necessarily incurred.

17.9. In the case of disagreement between the Parties as to the existence or extent of Force Majeure, the matter shall be settled according to Clauses GCC 44& 45.

18. Suspension

18.1. The Client may, by written notice of suspension to the Consultant, suspend all payments to the Consultant hereunder if the Consultant fails to perform any of its obligations under this Contract, including the carrying out of the Services, provided that such notice of suspension (i) shall specify the nature of the failure, and (ii) shall request the Consultant to remedy such failure within a period not exceeding thirty (30) calendar days after receipt by the Consultant of such notice of suspension.

19. Termination

19.1. This Contract may be terminated by either Party as per provisions set up below:

a. By the Client

19.1.1. The Client may terminate this Contract in case of the occurrence of any of the events specified in paragraphs (a) through (f) of this Clause. In such an occurrence the Client shall give at least thirty (30) calendar days' written notice of termination to the Consultant in case of the events referred to in (a) through (d); at least sixty (60) calendar days' written notice in case of the event referred to in (e); and at least five (5) calendar days' written notice in case of the event referred to in (f):

(a) If the Consultant fails to remedy a failure in the performance of its obligations hereunder, as specified in a notice of suspension pursuant to Clause GCC 18;

(b) If the Consultant becomes (or, if the Consultant consists of more than one entity, if any of its members becomes) insolvent or bankrupt or enter into any agreements with their creditors for relief of debt or take advantage of any law for the benefit of debtors or go into liquidation or receivership whether compulsory or voluntary;

(c) If the Consultant fails to comply with any final decision reached as a result of arbitration proceedings pursuant to Clause GCC 45.1;

(d) If, as the result of Force Majeure, the Consultant is unable to perform a material portion of the Services for a period of not less than sixty (60) calendar days;

(e) If the Client, in its sole discretion and for any reason whatsoever, decides to terminate this Contract;

(f) If the Consultant fails to confirm availability of Key Experts as required in Clause GCC 13.

19.1.2. Furthermore, if the Client determines that the Consultant has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices, in competing for or in executing the Contract, then the Client may, after giving fourteen (14) calendar days written notice to the Consultant, terminate the Consultant's employment under the Contract.

b. By the Consultant

19.1.3. The Consultant may terminate this Contract, by not less than thirty (30) calendar days' written notice to the Client, in case of the occurrence of any of the events specified in paragraphs (a) through (d) of this Clause.

(a) If the Client fails to pay any money due to the Consultant pursuant to this Contract and not subject to dispute pursuant to Clause GCC 45.1 within forty-five (45) calendar days after receiving written notice from the Consultant that such payment is overdue.

(b) If, as the result of Force Majeure, the Consultant is unable to perform a material portion of the Services for a period of not less than sixty (60) calendar days.

(c) If the Client fails to comply with any final decision reached as a result of arbitration pursuant to Clause GCC 45.1.

(d) If the Client is in material breach of its obligations pursuant to this Contract and has not remedied the same within forty-five (45) days (or such longer period as the Consultant may have subsequently approved in writing) following the receipt by the Client of the Consultant's notice specifying such breach.

c. Cessation of Rights and Obligations

19.1.4. Upon termination of this Contract pursuant to Clauses GCC 12 or GCC 19 hereof, or upon expiration of this Contract pursuant to Clause GCC 14, all rights and obligations of the

Parties hereunder shall cease, except (i) such rights and obligations as may have accrued on the date of termination or expiration, (ii) the obligation of confidentiality set forth in Clause GCC 22, (iii) the Consultant's obligation to permit inspection, copying and auditing of their accounts and records set forth in Clause GCC 25, and (iv) any right which a Party may have under the Applicable Law.

d. Cessation of Services

19.1.5. Upon termination of this Contract by notice of either Party to the other pursuant to Clauses GCC 19a or GCC 19b, the Consultant shall, immediately upon dispatch or receipt of such notice, take all necessary steps to bring the Services to a close in a prompt and orderly manner and shall make every reasonable effort to keep expenditures for this purpose to a minimum. With respect to documents prepared by the Consultant and equipment and materials furnished by the Client, the Consultant shall proceed as provided, respectively, by Clauses GCC 27 or GCC 28.

e. Payment upon Termination

19.1.6. Upon termination of this Contract, the Client shall make the following payments to the Consultant:

(a) payment for Services satisfactorily performed prior to the effective date of termination; and

(b) in the case of termination pursuant to paragraphs (d) and (e) of Clause GCC19.1.1, reimbursement of any reasonable cost incidental to the prompt and orderly termination of this Contract, including the cost of the return travel of the Experts.

C. OBLIGATIONS OF THE CONSULTANT

20. General

a. Standard of Performance

20.1 The Consultant shall perform the Services and carry out the Services with all due diligence, efficiency and economy, in accordance with generally accepted professional standards and practices, and shall observe sound management practices, and employ appropriate technology and safe and effective equipment, machinery, materials and methods. The Consultant shall always act, in respect of any matter relating to this Contract or to the Services, as a faithful adviser to the Client, and shall at all times support and safeguard the Client's legitimate interests in any dealings with the third parties.

20.2. The Consultant shall employ and provide such qualified and experienced Experts and Sub-consultants as are required to carry out the Services.

20.3. The Consultant may subcontract part of the Services to an extent and with such Key Experts and Sub-consultants as may be approved in advance by the Client. Notwithstanding such approval, the Consultant shall retain full responsibility for the Services.

b. Law Applicable to Services

20.4. The Consultant shall perform the Services in accordance with the Contract and the Applicable Law and shall take all practicable steps to ensure that any of its Experts and Sub-consultants, comply with the Applicable Law.

20.5. Throughout the execution of the Contract, the Consultant shall comply with the import of goods and services prohibitions in the Client's country when

(a) as a matter of law or official regulations, the Borrower's country prohibits commercial relations with that country; or

(b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's Country prohibits any import of goods from that country or any payments to any country, person, or entity in that country.

20.6. The Client shall notify the Consultant in writing of relevant local customs, and the Consultant shall, after such notification, respect such customs.

21. Conflict of Interests

21.1. The Consultant shall hold the Client's interests paramount, without any consideration for future work, and strictly avoid conflict with other assignments or their own corporate interests.

a. Consultant Not to Benefit from Commissions, Discounts, etc.

21.1.1 The payment of the Consultant pursuant to GCC F (Clauses GCC 38 through 42) shall constitute the Consultant's only payment in connection with this Contract and, subject to Clause GCC 21.1.3, the Consultant shall not accept for its own benefit any trade commission, discount or similar payment in connection with activities pursuant to this Contract or in the discharge of its obligations hereunder, and the Consultant shall use its best efforts to ensure that any Sub-consultants, as well as the Experts and agents of either of them, similarly shall not receive any such additional payment.

21.1.2 Furthermore, if the Consultant, as part of the Services, has the responsibility of advising the Client on the procurement

of goods, works or services, the Consultant shall comply with the Bank's Applicable Guidelines, and shall at all times exercise such responsibility in the best interest of the Client. Any discounts or commissions obtained by the Consultant in the exercise of such procurement responsibility shall be for the account of the Client.

b. Consultant and Affiliates Not to Engage in Certain Activities

21.1.3 The Consultant agrees that, during the term of this Contract and after its termination, the Consultant and any entity affiliated with the Consultant, as well as any Sub-consultants and any entity affiliated with such Sub-consultants, shall be disqualified from providing goods, works or non-consulting services resulting from or directly related to the Consultant's Services for the preparation or implementation of the project, unless otherwise indicated in the **SCC**.

c. Prohibition of Conflicting Activities

21.1.4 The Consultant shall not engage, and shall cause its Experts as well as its Sub-consultants not to engage, either directly or indirectly, in any business or professional activities that would conflict with the activities assigned to them under this Contract.

d. Strict Duty to Disclose Conflicting Activities

21.1.5 The Consultant has an obligation and shall ensure that its Experts and Sub-consultants shall have an obligation to disclose any situation of actual or potential conflict that impacts their capacity to serve the best interest of their Client, or that may reasonably be perceived as having this effect. Failure to disclose said situations may lead to the disqualification of the Consultant or the termination of its Contract.

22. Confidentiality

22.1 Except with the prior written consent of the Client, the Consultant and the Experts shall not at any time communicate to any person or entity any confidential information acquired in the course of the Services, nor shall the Consultant and the Experts make public the recommendations formulated in the course of, or as a result of, the Services.

23. Liability of the Consultant

23.1 Subject to additional provisions, if any, set forth in the **SCC**, the Consultant's liability under this Contract shall be provided by the Applicable Law.

24. Insurance to be Taken out by the Consultant

24.1 The Consultant (i) shall take out and maintain, and shall cause any Sub-consultants to take out and maintain, at its (or the Sub-consultants', as the case may be) own cost but on terms and conditions approved by the Client, insurance against the risks, and for the coverage specified in the **SCC,** and (ii) at the Client's request, shall provide evidence to the Client showing that such insurance has been taken out and maintained and that the current premiums therefore have

been paid. The Consultant shall ensure that such insurance is in place prior to commencing the Services as stated in Clause GCC 13.

25. Accounting, Inspection and Auditing

25.1 The Consultant shall keep, and shall make all reasonable efforts to cause its Sub-consultants to keep, accurate and systematic accounts and records in respect of the Services and in such form and detail as will clearly identify relevant time changes and costs.

25.2 The Consultant shall permit and shall cause its Sub-consultants to permit, the Bank and/or persons appointed by the Bank to inspect the Site and/or all accounts and records relating to the performance of the Contract and the submission of the Proposal to provide the Services, and to have such accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Consultant's attention is drawn to Clause GCC 10 which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under this Clause GCC25.2 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility under the Bank's prevailing sanctions procedures.)

26. Reporting Obligations

26.1 The Consultant shall submit to the Client the reports and documents specified in **Appendix A**, in the form, in the numbers and within the time periods set forth in the said Appendix.

27. Proprietary Rights of the Client in Reports and Records

27.1 Unless otherwise indicated in the **SCC**, all reports and relevant data and information such as maps, diagrams, plans, databases, other documents and software, supporting records or material compiled or prepared by the Consultant for the Client in the course of the Services shall be confidential and become and remain the absolute property of the Client. The Consultant shall, not later than upon termination or expiration of this Contract, deliver all such documents to the Client, together with a detailed inventory thereof. The Consultant may retain a copy of such documents, data and/or software but shall not use the same for purposes unrelated to this Contract without prior written approval of the Client.

27.2 If license agreements are necessary or appropriate between the Consultant and third parties for purposes of development of the plans, drawings, specifications, designs, databases, other documents and software, the Consultant shall obtain the Client's prior written approval to such agreements, and the Client shall be entitled at its discretion to require recovering the expenses related to the development of the program(s) concerned. Other restrictions about the future use of these documents and software, if any, shall be specified in the **SCC**.

28. Equipment, Vehicles and Materials

28.1 Equipment, vehicles and materials made available to the Consultant by the Client, or purchased by the Consultant wholly or partly with funds provided by the Client, shall be the property of the Client and shall be marked accordingly. Upon termination or expiration of this Contract, the Consultant shall make available to the Client an inventory of such equipment, vehicles and materials and shall dispose of such equipment, vehicles and materials in accordance with the Client's instructions. While in possession of such equipment, vehicles and materials, the Consultant, unless otherwise instructed by the Client in writing, shall insure them at the expense of the Client in an amount equal to their full replacement value.

28.2 Any equipment or materials brought by the Consultant or its Experts into the Client's country for the use either for the project or personal use shall remain the property of the Consultant or the Experts concerned, as applicable.

D. CONSULTANT'S EXPERTS AND SUB-CONSULTANTS

29. Description of Key Experts

29.1 The title, agreed job description, minimum qualification and estimated period of engagement to carry out the Services of each of the Consultant's Key Experts are described in **Appendix B.**

30. Replacement of Key Experts

30.1 Except as the Client may otherwise agree in writing, no changes shall be made in the Key Experts.

30.2 Notwithstanding the above, the substitution of Key Experts during Contract execution may be considered only based on the Consultant's written request and due to circumstances outside the reasonable control of the Consultant, including but not limited to death or medical incapacity. In such case, the Consultant shall forthwith provide as a replacement, a person of equivalent or better qualifications and experience, and at the same rate of remuneration.

31. Removal of Experts or Sub-consultants

31.1 If the Client finds that any of the Experts or Sub-consultant has committed serious misconduct or has been charged with having committed a criminal action, or shall the Client determine that Consultant's Expert of Sub-consultant have engaged in corrupt, fraudulent, collusive, coercive or obstructive practice while performing the Services, the Consultant shall, at the Client's written request, provide a replacement.

31.2 In the event that any of Key Experts, Non-Key Experts or Sub-consultants is found by the Client to be incompetent or incapable in discharging assigned duties, the Client, specifying the grounds therefore, may request the Consultant to provide a replacement.

31.3 Any replacement of the removed Experts or Sub-consultants shall possess better qualifications and experience and shall be acceptable to the Client.

31.4 The Consultant shall bear all costs arising out of or incidental to any removal and/or replacement of such Experts.

E. OBLIGATIONS OF THE CLIENT

32. Assistance and Exemptions

32.1 Unless otherwise specified in the **SCC**, the Client shall use its best efforts to:

(a) Assist the Consultant with obtaining work permits and such other documents as shall be necessary to enable the Consultant to perform the Services.

(b) Assist the Consultant with promptly obtaining, for the Experts and, if appropriate, their eligible dependents, all necessary entry and exit visas, residence permits, exchange permits and any other documents required for their stay in the Client's country while carrying out the Services under the Contract.

(c) Facilitate prompt clearance through customs of any property required for the Services and of the personal effects of the Experts and their eligible dependents.

(c) Issue to officials, agents and representatives of the Government all such instructions and information as may be necessary or appropriate for the prompt and effective implementation of the Services.

(d) Assist the Consultant and the Experts and any Sub-consultants employed by the Consultant for the Services with obtaining exemption from any requirement to register or obtain any permit to practice their profession or to establish themselves either individually or as a corporate entity in the Client's country according to the applicable law in the Client's country.

(e) Assist the Consultant, any Sub-consultants and the Experts of either of them with obtaining the privilege, pursuant to the applicable law in the Client's country, of bringing into the Client's country reasonable amounts of foreign currency for the purposes of the Services or for the personal use of the Experts and of withdrawing any such amounts as may be earned therein by the Experts in the execution of the Services.

(f) Provide to the Consultant any such other assistance as may be specified in the **SCC**.

33. Access to Project Site

33.1 The Client warrants that the Consultant shall have, free of charge, unimpeded access to the project site in respect of which access is required for the performance of the Services. The Client will be responsible for any damage to the project site or any property thereon resulting from such access and will indemnify the Consultant and each of the experts in respect of liability for any such damage, unless such damage is caused by the willful default or negligence of the Consultant or any Sub-consultants or the Experts of either of them.

34. Change in the Applicable Law Related to Taxes and Duties

34.1 If, after the date of this Contract, there is any change in the applicable law in the Client's country with respect to taxes and duties which increases or decreases the cost incurred by the Consultant in performing the Services, then the remuneration and reimbursable expenses otherwise payable to the Consultant under this Contract shall be increased or decreased accordingly by agreement between the Parties hereto, and corresponding adjustments shall be made to the Contract price amount specified in Clause GCC 38.1

35. Services, Facilities and Property of the Client

35.1 The Client shall make available to the Consultant and the Experts, for the purposes of the Services and free of any charge, the services, facilities and property described in the Terms of Reference (**Appendix A)** at the times and in the manner specified in said **Appendix A.**

36. Counterpart Personnel

36.1 The Client shall make available to the Consultant free of charge such professional and support counterpart personnel, to be nominated by the Client with the Consultant's advice, if specified in **Appendix A**.

36.2 Professional and support counterpart personnel, excluding Client's liaison personnel, shall work under the exclusive direction of the Consultant. If any member of the counterpart personnel fails to perform adequately any work assigned to such member by the Consultant that is consistent with the position occupied by such member, the Consultant may request the replacement of such member, and the Client shall not unreasonably refuse to act upon such request.

37. Payment Obligation

37.1 In consideration of the Services performed by the Consultant under this Contract, the Client shall make such payments to the Consultant for the deliverables specified in **Appendix A** and in such manner as is provided by GCC F below.

F. PAYMENTS TO THE CONSULTANT

38. Contract Price

38.1 The Contract price is fixed and is set forth in the **SCC.** The Contract price breakdown is provided in **Appendix C**.

38.2 Any change to the Contract price specified in Clause 38.1 can be made only if the Parties have agreed to the revised scope of Services pursuant to Clause GCC 16 and have amended in writing the Terms of Reference in **Appendix A**.

39. Taxes and Duties

39.1 The Consultant, Sub-consultants and Experts are responsible for meeting any and all tax liabilities arising out of the Contract unless it is stated otherwise in the **SCC**.

39.2 As an exception to the above and as stated in the **SCC**, all local identifiable indirect taxes (itemized and finalized at Contract negotiations) are reimbursed to the Consultant or are paid by the Client on behalf of the Consultant.

40. Currency of Payment

40.1 Any payment under this Contract shall be made in the currency(ies) of the Contract.

41. Mode of Billing and Payment

41.1 The total payments under this Contract shall not exceed the Contract price set forth in Clause GCC 38.1.

41.2 The payments under this Contract shall be made in lump-sum installments against deliverables specified in **Appendix A**. The payments will be made according to the payment schedule stated in the **SCC**.

41.2.1 *Advance payment:* Unless otherwise indicated in the **SCC**, an advance payment shall be made against an advance payment bank guarantee acceptable to the Client in an amount (or amounts) and in a currency (or currencies) specified in the **SCC**. Such guarantee (i) is to remain effective until the advance payment has been fully set off, and (ii) is to be in the form set forth in **Appendix D**, or in such other form as the Client shall have approved in writing. The advance payments will be set off by the Client in equal portions against the lump-sum installments specified in the **SCC** until said advance payments have been fully set off.

41.2.2 *The Lump-Sum Installment Payments.* The Client shall pay the Consultant within sixty (60) days after the receipt by the Client of the deliverable(s) and the cover invoice for the related lump-sum installment payment. The payment can be withheld if the Client does not approve the submitted deliverable(s) as satisfactory in which case the Client shall provide comments to

the Consultant within the same sixty (60) days period. The Consultant shall thereupon promptly make any necessary corrections, and thereafter the foregoing process shall be repeated.

41.2.3 *The Final Payment* .The final payment under this Clause shall be made only after the final report l have been submitted by the Consultant and approved as satisfactory by the Client. The Services shall then be deemed completed and finally accepted by the Client. The last lump-sum installment shall be deemed approved for payment by the Client within ninety (90) calendar days after receipt of the final report by the Client unless the Client, within such ninety (90) calendar day period, gives written notice to the Consultant specifying in detail deficiencies in the Services, the final report. The Consultant shall thereupon promptly make any necessary corrections, and thereafter the foregoing process shall be repeated. 41.2.4 All payments under this Contract shall be made to the accounts of the Consultant specified in the **SCC**.

41.2.4 With the exception of the final payment under 41.2.3 above, payments do not constitute acceptance of the whole Services nor relieve the Consultant of any obligations hereunder.

42. Interest on Delayed Payments

42.1 If the Client had delayed payments beyond fifteen (15) days after the due date stated in Clause GCC 41.2.2 , interest shall be paid to the Consultant on any amount due by, not paid on, such due date for each day of delay at the annual rate stated in the **SCC.**

G. FAIRNESS AND GOOD FAITH

43. Good Faith

43.1 The Parties undertake to act in good faith with respect to each other's rights under this Contract and to adopt all reasonable measures to ensure the realization of the objectives of this Contract.

H. SETTLEMENT OF DISPUTES

44. Amicable Settlement

44.1 The Parties shall seek to resolve any dispute amicably by mutual consultation.

44.2 If either Party objects to any action or inaction of the other Party, the objecting Party may file a written Notice of Dispute to the other Party providing in detail the basis of the dispute. The Party receiving the Notice of Dispute will consider it and respond in writing within fourteen (14) days after receipt. If that Party fails to respond within fourteen (14) days, or the dispute cannot be amicably settled

within fourteen (14) days following the response of that Party, Clause GCC 49.1 shall apply.

45. Dispute Resolution

45.1 Any dispute between the Parties arising under or related to this Contract that cannot be settled amicably may be referred to by either Party to the adjudication/arbitration in accordance with the provisions specified in the **SCC**.

II. General Conditions

Attachment 1: Bank's Policy – Corrupt and Fraudulent Practices

(the text in this Attachment 1 shall not be modified)

Guidelines for Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011:

"**Fraud and Corruption**

1.23 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), consultants, and their agents (whether declared or not), sub-contractors, sub-consultants, service providers, or suppliers, and any personnel thereof, observe the highest standard of ethics during the selection and execution of Bank-financed contracts [footnote: In this context, any action taken by a consultant or any of its personnel, or its agents, or its sub-consultants, sub-contractors, services providers, suppliers, and/or their employees, to influence the selection process or contract execution for undue advantage is improper.]. In pursuance of this policy, the Bank:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party[8];

(ii) "fraudulent practice" is any act or omission, including misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation[9];

(iii) "collusive practices" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party[10];

[8] For the purpose of this sub-paragraph, "another party" refers to a public official acting in relation to the selection process or contract execution. In this context "public official" includes World Bank staff and employees of other organizations taking or reviewing selection decisions.

[9] For the purpose of this sub-paragraph, "party" refers to a public official; the terms "benefit" and "obligation" relate to the selection process or contract execution; and the "act or omission" is intended to influence the selection process or contract execution.

[10] For the purpose of this sub-paragraph, "parties" refers to participants in the procurement or selection process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish prices at artificial, non-competitive levels, or are privy to each other's bid prices or other conditions.

(iv) "coercive practices" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party[11];

(v) "obstructive practice" is

(aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or

(bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights;

(b) will reject a proposal for award if it determines that the consultant recommended for award or any of its personnel, or its agents, or its sub-consultants, sub-contractors, services providers, suppliers, and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

(c) will declare misprocurement and cancel the portion of the Loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the Loan were engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the selection process or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner they knew of the practices;

(d) will sanction a firm or an individual at any time, in accordance with prevailing Bank's sanctions procedures[12], including by publicly declaring such firm or an ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract, and (ii) to be a nominated[13] sub-consultant, supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract.

[11] For the purpose of this sub-paragraph, "party" refers to a participant in the selection process or contract execution.

[12] A firm or an individual may be declared ineligible to be awarded a Bank-financed contract upon (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including inter alia: cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application of the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceedings. See footnote 12 and paragraph 8 of Appendix 1 of these Guidelines.

[13] A nominated sub-consultant, supplier, or service provider is one which has been either (i) included by the consultant in its proposal because it brings specific and critical experience and know-how that are accounted for in the technical evaluation of the consultant's proposal for the particular services; or (ii) appointed by the Borrower.

III. Special Conditions of Contract

Number of GC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
1.1(b) and 3.1	**The Contract shall be construed in accordance with the law of** Lesotho
4.1	**The language is***: English*.
6.1 and 6.2	**The addresses are:** Client : *Water Commission* Attention : *Mr. Mokake Mojakisane* Facsimile : *+266 22324529* E-mail (where permitted):*mojakisanem@yahoo.com* Consultant : _____ _____ Attention : _____ Facsimile : _____ E-mail (where permitted) :_____
8.1	*[If the Consultant consists only of one entity, state "N/A";* *OR* *If the Consultant is a Joint Venture consisting of more than one entity, the name of the JV member whose address is specified in Clause SCC6.1 should be inserted here.]* **The Lead Member on behalf of the JV is** _____ _____ *[insert name of the member]*
9.1	**The Authorized Representatives are:** **For the Client:** *Mr. Mokake Mojakisane* **For the Consultant:** *[name, title]*_____
11.1	**The effectiveness conditions are the following**: *The signature of the contract by both parties and availability of key staff*.
12.1	**Termination of Contract for Failure to Become Effective:** **The time period shall be** *30 days*.
13.1	**Commencement of Services:**

	The number of days shall be *14 days after contract signing* Confirmation of Key Experts' availability to start the Assignment shall be submitted to the Client in writing as a written statement signed by each Key Expert.
14.1	**Expiration of Contract:……, 2018** **The time period shall be …… months**
21 b.	**The Client reserves the right to determine on a case-by-case basis whether the Consultant should be disqualified from providing goods, works or non-consulting services due to a conflict of a nature described in Clause GCC 21.1.3** Yes *X*

23.1	The following limitation of the Consultant's Liability towards the Client can be subject to the Contract's negotiations: **"Limitation of the Consultant's Liability towards the Client:** **(a) Except in the case of gross negligence or willful misconduct on the part of the Consultant or on the part of any person or a firm acting on behalf of the Consultant in carrying out the Services, the Consultant, with respect to damage caused by the Consultant to the Client's property, shall not be liable to the Client:** **(i) for any indirect or consequential loss or damage; and** **(ii) for any direct loss or damage that exceeds [insert a multiplier, e.g.: one, two, three] times the total value of the Contract;** **(b) This limitation of liability shall not** **(i) affect the Consultant's liability, if any, for damage to Third Parties caused by the Consultant or any person or firm acting on behalf of the Consultant in carrying out the Services;** **(ii) be construed as providing the Consultant with any limitation or exclusion from liability which is prohibited by the Laws of Lesotho**. *[Notes to the Client and the Consultant: Any suggestions made by the Consultant in the Proposal to introduce exclusions/limitations of the Consultant's liability under the Contract should be carefully scrutinized by the Client and discussed with the Bank prior to accepting any changes to what was included in the issued RFP. In this regard, the Parties should be aware of the Bank's policy on this matter which is as follows:* *To be acceptable to the Bank, any limitation of the Consultant's liability should at the very least be reasonably related to (a) the damage the Consultant might potentially cause to the Client, and (b) the Consultant's ability to pay compensation using its own assets and reasonably obtainable insurance coverage. The Consultant's liability shall not be limited to less than a multiplier of the total payments to the Consultant under the Contract for remuneration and reimbursable expenses. A statement to the effect that the Consultant is liable only for the re-performance of faulty Services is not acceptable to the Bank. Also, the Consultant's liability should never be limited for loss or damage caused by the Consultant's gross negligence or willful misconduct.* *The Bank does not accept a provision to the effect that the Client shall indemnify and hold harmless the Consultant against Third Party claims, except, of course, if a claim is based on loss or damage caused by a default*

	or wrongful act of the Client to the extent permissible by the law applicable in the Client's country.]
24.1	The insurance coverage against the risks shall be as follows: (a) Professional liability insurance, with a minimum coverage of *an amount equal to the contract price*; (c) Third Party liability insurance, with a minimum coverage of contract amount; (d) employer's liability and workers' compensation insurance in respect of the experts and Sub-consultants in accordance with the relevant provisions of the applicable law in the Client's country, as well as, with respect to such Experts, any such life, health, accident, travel or other insurance as may be appropriate; and (e) insurance against loss of or damage to (i) equipment purchased in whole or in part with funds provided under this Contract, (ii) the Consultant's property used in the performance of the Services, and (iii) any documents prepared by the Consultant in the performance of the Services.
27.1	*N/A*
27.2	The Consultant shall not use these documents and software for purposes unrelated to this Contract without the prior written approval of the Client
38.1	**The Contract price is: _____** *[insert amount and currency for each currency as applicable] [indicate:* **inclusive** *or* **exclusive***]* **of local indirect taxes.** **Any indirect local taxes chargeable in respect of this Contract for the Services provided by the Consultant shall be paid by the Client for the Consultant.** **The amount of such taxes is _____ [insert the amount as finalized at the Contract's negotiations on the basis of the estimates provided by the Consultant in Form FIN-2 of the Consultant's Financial Proposal.**
39.1 and 39.2	**The Client shall obtain an exemption for the local Consultant who is registered to collect VAT. Foreign firms are not entitled to collect VAT. Local firms pay 5% withholding tax, while foreign firms pay 10%. Withholding tax shall be paid to Lesotho Revenue Authority by the Client on behalf of the Consultant.**

	The Client shall reimburse the Consultant, the Sub-consultants and the Experts any indirect taxes, duties, fees, levies and other impositions imposed, under the applicable law in the Client's country, on the Consultant, the Sub-consultants and the Experts in respect of: (a) any payments whatsoever made to the Consultant, Sub-consultants and the Experts (other than nationals or permanent residents of the Client's country), in connection with the carrying out of the Services; (b) any equipment, materials and supplies brought into the Client's country by the Consultant or Sub-consultants for the purpose of carrying out the Services and which, after having been brought into such territories, will be subsequently withdrawn by them; (c) any equipment imported for the purpose of carrying out the Services and paid for out of funds provided by the Client and which is treated as property of the Client; (d) any property brought into the Client's country by the Consultant, any Sub-consultants or the Experts (other than nationals or permanent residents of the Client's country), or the eligible dependents of such experts for their personal use and which will subsequently be withdrawn by them upon their respective departure from the Client's country, provided that: (i) the Consultant, Sub-consultants and experts shall follow the usual customs procedures of the Client's country in importing property into the Client's country; and (ii) if the Consultant, Sub-consultants or Experts do not withdraw but dispose of any property in the Client's country upon which customs duties and taxes have been exempted, the Consultant, Sub-consultants or Experts, as the case may be, (a) shall bear such customs duties and taxes in conformity with the regulations of the Client's country, or (b) shall reimburse them to the Client if they were paid by the Client at the time the property in question was brought into the Client's country.
41.2	**The payment schedule:** • 20% of the contract sum will be paid upon approval of the inception report;

	• 40 % of the contract sum will be paid upon submission and approval of Final ESIA, ESMP and Public Participation Process Reports by the Client; • 20% of the contract sum will be paid upon submission and approval of the RAP by the Client; • 20% of the contract sum will be paid upon submission and approval of the ESIA Report by the Department of Environment and issuance of EIA license. **If advance payment will be required a bank guarantee of an equal amount shall be submitted by the consultant to the client and shall be released after 50% payment of the consultant fees by the client.**
41.2.1	The following provisions shall apply to the advance payment and the advance bank payment guarantee: (1) An advance payment of *10% of the contract amount* in foreign currency and in local currency shall be made within *30* days after the receipt of an advance bank payment guarantee by the Client. (2) The advance bank payment guarantee shall be in the amount and in the currency of the currency(ies) of the advance payment. (3) The bank guarantee will be released when the advance payment has been fully set off.
41.2.4	**The accounts are:** for foreign currency: *[insert account]*. for local currency: *[insert account]*.
42.1	**The interest rate is**: The interest rate that shall be applied is the London Inter Bank Offered Rate (LIBOR) + 1%.
45.1	*[In contracts with foreign consultants, the Bank requires that the international commercial arbitration in a neutral venue is used.]* **Disputes shall be settled by arbitration in accordance with the following provisions:** 1. Selection of Arbitrators. Each dispute submitted by a Party to arbitration shall be heard by a sole arbitrator or an arbitration panel composed of three (3) arbitrators, in accordance with the following provisions:

	(a) Where the Parties agree that the dispute concerns a technical matter, they may agree to appoint a sole arbitrator or, failing agreement on the identity of such sole arbitrator within thirty (30) days after receipt by the other Party of the proposal of a name for such an appointment by the Party who initiated the proceedings, either Party may apply to the Federation Internationale des Ingenieurs-Conseil *(FIDIC)* of Lausanne, Switzerland for a list of not fewer than five (5) nominees and, on receipt of such list, the Parties shall alternately strike names therefrom, and the last remaining nominee on the list shall be the sole arbitrator for the matter in dispute. If the last remaining nominee has not been determined in this manner within sixty (60) days of the date of the list, the Federation Internationale des Ingenieurs-Conseil *(FIDIC)* of Lausanne Switzerland shall appoint, upon the request of either Party and from such list or otherwise, a sole arbitrator for the matter in dispute. (b) Where the Parties do not agree that the dispute concerns a technical matter, the Client and the Consultant shall each appoint one (1) arbitrator, and these two arbitrators shall jointly appoint a third arbitrator, who shall chair the arbitration panel. If the arbitrators named by the Parties do not succeed in appointing a third arbitrator within thirty (30) days after the latter of the two (2) arbitrators named by the Parties has been appointed, the third arbitrator shall, at the request of either Party, be appointed by the International Chamber of Commerce, Paris; etc. (c) If, in a dispute subject to paragraph (b) above, one Party fails to appoint its arbitrator within thirty (30) days after the other Party has appointed its arbitrator, the Party which has named an arbitrator may apply to the International Chamber of Commerce, Paris to appoint a sole arbitrator for the matter in dispute, and the arbitrator appointed pursuant to such application shall be the sole arbitrator for that dispute.
	Rules of Procedure. Except as otherwise stated herein, arbitration proceedings shall be conducted in accordance with the rules of procedure for arbitration of the United Nations Commission on International Trade Law (UNCITRAL) as in force on the date of this Contract. 3. Substitute Arbitrators. If for any reason an arbitrator is unable to perform his/her function, a substitute shall be appointed in the same manner as the original arbitrator. 4. Nationality and Qualifications of Arbitrators. The sole arbitrator or the third arbitrator appointed pursuant to paragraphs 1(a) through 1(c) above shall be an internationally recognized legal or technical expert with extensive experience in relation to the matter in dispute and shall not be a national of the Consultant's home country *[If the Consultant consists*

	of more than one entity, add: or of the home country of any of their members or Parties*]* or of the Government's country. For the purposes of this Clause, "home country" means any of: (a) the country of incorporation of the Consultant *[If the Consultant consists of more than one entity, add:* or of any of their members or Parties*]*; or (b) the country in which the Consultant's [or any of their members' or Parties'] principal place of business is located; or (c) the country of nationality of a majority of the Consultant's [or of any members' or Parties'] shareholders; or (d) the country of nationality of the Sub-consultants concerned, where the dispute involves a subcontract.
	5. Miscellaneous. In any arbitration proceeding hereunder: (a) proceedings shall, unless otherwise agreed by the Parties, be held in *[select a country which is neither the Client's country nor the Consultant's country]*; (b) the English language shall be the official language for all purposes; and (c) the decision of the sole arbitrator or of a majority of the arbitrators (or of the third arbitrator if there is no such majority) shall be final and binding and shall be enforceable in any court of competent jurisdiction, and the Parties hereby waive any objections to or claims of immunity in respect of such enforcement.

IV. Appendices

APPENDIX A – TERMS OF REFERENCE

[This Appendix shall include the final Terms of Reference (TORs) worked out by the Client and the Consultant during the negotiations; dates for completion of various tasks; location of performance for different tasks; detailed reporting requirements and list of deliverables against which the payments to the Consultant will be made; Client's input, including counterpart personnel assigned by the Client to work on the Consultant's team; specific tasks or actions that require prior approval by the Client.

Insert the text based on the Section 7 (Terms of Reference) of the ITC in the RFP and modified based on the Forms TECH-1 through TECH-5 of the Consultant's Proposal. Highlight the changes to Section 7 of the RFP]

……

APPENDIX B - KEY EXPERTS

[Insert a table based on Form TECH-6 of the Consultant's Technical Proposal and finalized at the Contract's negotiations. Attach the CVs (updated and signed by the respective Key Experts) demonstrating the qualifications of Key Experts.]

……

APPENDIX C – BREAKDOWN OF CONTRACT PRICE

[Insert the table with the unit rates to arrive at the breakdown of the lump-sum price. The table shall be based on [Form FIN-3 and FIN-4] of the Consultant's Proposal and reflect any changes agreed at the Contract negotiations, if any. The footnote shall list such changes made to [Form FIN-3 and FIN-4] at the negotiations or state that none has been made.]

When the Consultant has been selected under Quality-Based Selection method, also add the following:

> *"*The agreed remuneration rates shall be stated in the attached Model Form I. This form shall be prepared on the basis of Appendix A to Form FIN-3 of the RFP "Consultants' Representations regarding Costs and Charges" submitted by the Consultant to the Client prior to the Contract's negotiations.
>
> Should these representations be found by the Client (either through inspections or audits pursuant to Clause GCC 25.2 or through other means) to be materially incomplete or inaccurate, the Client shall be entitled to introduce appropriate modifications in the

remuneration rates affected by such materially incomplete or inaccurate representations. Any such modification shall have retroactive effect and, in case remuneration has already been paid by the Client before any such modification, (i) the Client shall be entitled to offset any excess payment against the next monthly payment to the Consultants, or (ii) if there are no further payments to be made by the Client to the Consultants, the Consultants shall reimburse to the Client any excess payment within thirty (30) days of receipt of a written claim of the Client. Any such claim by the Client for reimbursement must be made within twelve (12) calendar months after receipt by the Client of a final report and a final statement approved by the Client in accordance with Clause GCC 45.1(d) of this Contract*.”]*

APPENDIX D - FORM OF ADVANCE PAYMENTS GUARANTEE

[See Clause GCC 41.2.1 and SCC 41.2.1]

Bank Guarantee for Advance Payment

_____ *[Bank's Name, and Address of Issuing Branch or Office]*

Beneficiary: _____ *[Name and Address of Client]*

Date: _____

ADVANCE PAYMENT GUARANTEE No.: _____

We have been informed that _____ *[name of Consultant or a name of the Joint Venture, same as appears on the signed Contract]* (hereinafter called "the Consultant") has entered into Contract No. _____ *[reference number of the contract]* dated _____ with you, for the provision of _____ *[brief description of Services]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum of _____ *[amount in figures]* () *[amount in words]* is to be made against an advance payment guarantee.

At the request of the Consultant, we _____ *[name of bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of _____ *[amount in figures]* () *[amount in words]*[1] upon receipt by us of your first demand in writing accompanied by a written statement stating that the Consultant are in breach of their obligation under the Contract because the Consultant have used the advance payment for purposes other than toward providing the Services under the Contract.

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Consultant on their account number _____ at _____ *[name and address of bank]*.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Consultant as indicated in copies of certified monthly statements which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of the monthly payment certificate indicating that the Consultant has made full repayment of the

[1] The Guarantor shall insert an amount representing the amount of the advance payment and denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the Client.

amount of the advance payment, or on the __ day of _____, 2___,[2] whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458.

_____

[signature(s)]

Note: All italicized text is for indicative purposes only to assist in preparing this form and shall be deleted from the final product.

[2] Insert the expected expiration date. In the event of an extension of the time for completion of the Contract, the Client would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Client might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months][one year], in response to the Client's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."