



African Water Facility
Facilité africaine de l'eau

Mobilising Resources for Water in Africa
Mobiliser des ressources pour l'eau en Afrique



The Kingdom of Swaziland

MBABANE MANZINI CORRIDOR (NONDVO) MULTIPURPOSE DAM FEASIBILITY STUDY

APPRAISAL REPORT

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African Water Facility | Facilité africaine de l'eau

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ACRONYMS AND ABBREVIATIONS

ADF	African Development Fund
AfDB	African Development Bank
CRIDF	Climate Resilience Infrastructure Development Facility
CSP	Country Strategy Paper
EA	Executing Agency
ESAP	Environmental and Social Assessment Procedures
ESIA	Environmental and Social Impact Assessment
ESMP	Environment and Social Management Plan
GOS	Government of the Kingdom of Swaziland
HDI	Human Development Index
ICB	International Call for Bids
IPP	Independent Power Producer
IWRM	Integrated Water Resources Management
JMRBWS	Joint Maputo River Basin Water Resources Study
LUSIP	Lower Usuthu Smallholders Irrigation Project
MDG	Millennium Development Goal
MIC	Middle Income Country
MNRE	Ministry of Natural Resources and Energy
MOEPD	Ministry of Economic Planning and Development
MOF	Ministry of Finance
NCB	National Call for Bids
NGO	Non-governmental Organisation
O&M	Operation and Maintenance
PPP	Public Private Partnership
PRSP	Poverty Reduction Strategy Plan
PRSAP	Poverty Reduction Strategy and Action Program
RBCSP	Result Based Country Strategy Paper
SADC	Southern Africa Development Community
SEC	Swaziland Electricity Company
SEA	Swaziland Environmental Authority
SWSC	Swaziland Water Services Corporation
UA	Unit of Account

PROJECT INFORMATION

1. Country	The Kingdom of Swaziland
2. Name	NONDVO multipurpose dam feasibility study.
3. Place	The Kingdom of Swaziland
4. Recipient	Ministry of Finance
5. Executing agency	Ministry of Natural Resources and Energy - MNRE Department of Water Affairs - DWA
6. Description	Component 1: Feasibility Study Component 2: Environmental and Social Impact Assessment Study Component 3: Climate Change resilience aspect, PPP and financing strategy, Transboundary rivers issues Component 4: Study Management
7. Total cost	€ 2,800,000
8. AWF Cost	€ 1,280,000
9. Cost (other)	€ 1,000,000 MICTAF Grant € 220,000 CRIDF Grant € 300,000 Government of Swaziland
10. Date of approval	
11. Duration (From Grant Approval + duration of studies)	27 months (including a 24 months period for the studies)
12. Other important dates	Grant Signature: Date of approval +3 months
13. Acquisitions	For funding provided by the AWF and the MICTAF, acquisitions shall be carried out in accordance with the Bank's Rules and Procedures for Goods and Works Acquisitions and the Bank's Procedures for Use of Consultants CRIDF will apply its own rules for the procurement of consultant services under its funding
14. Currency Equivalentents (May 2015)	1 UA = 1.40642 USD 1 UA = 1.25405 EUR 1 UA = 16.6331 SZL
15. Fiscal year	1 st April to 31 st March

Executive Summary

Project History and Background

The Government of Swaziland, Ministry of Natural Resources and Energy, Department of Water Affairs intends to assess the feasibility for the construction of a multipurpose dam, whose main objective is to store water in order to provide potable water to the two growing cities of Mbabane and Manzini. In the meantime, the stored water could also be used for irrigation and for improving the output of runoff the river hydropower plants further downstream.

The Nondvo site, located on a tributary of the Lusushwana River was identified for this purpose based on an initial multi criteria selection process developed during the execution of the Joint Maputo River Basin Water Resources Study (JMRBWS¹; 2008) jointly undertaken by the Kingdom of Swaziland, the Republic of South Africa and the Republic of Mozambique.

Sectorial Priorities

The project corresponds well to the National Development Plan 2014/15 – 2016/17. The National Development Strategy (NDS) also confirms the government priority to improve storage capacity for renewable water resources through the development of two dams, the Nondvo dam being one of them. The project is also quoted in the Government Programme of Action 2013-2018. The project is also in line with the SADC strategies and the principles stated in by the Tripartite Interim Agreement between the 3 riparian countries of the Maputo River Basin.

Amongst the set of actions for supporting Government's efforts to achieve broad-based sustainable growth the Bank's Country Strategy Paper (CSP) pinpoints two specific approaches: (i) connecting people and regions to markets by upgrading infrastructure, (ii) providing clean water. Under the chapter of the CSP, titled *Deliverables and Targets for the Pillar I*, the Nondvo Dam project is quoted as a potential candidate for Bank Group financing.

The project is well aligned with AWF 2012-2016 strategy which focuses on the preparation of bankable projects to mobilise funding. The leverage effect of the project is estimated at about 65.

Problem Definition

In 2015, the global rate of access to potable water supply in Swaziland was 74% and the sanitation coverage rate was 57%². However the water supply situation for the two main cities of Mbabane and Manzini and the neighbouring area requires immediate attention as water supply facilities currently operate at full capacity. Storage and treatment facilities will not meet the needs in the coming years, due to a number of major projects currently under development.

Project Objectives, Beneficiaries and Benefits

The ultimate goal of the project is to prepare a blueprint for the socio-economic development of the Mbabane-Manzini corridor through water resources development and management for increasing water availability for potable water supply, hydropower generation and irrigation. The main expected outcome is that the prepared investment reaches financial closure. The project's specific outputs are:

- i) The Project feasibility study, detailed design, ESIA as well as the Climate Change Resilience Assessment and the PPP feasibility and financing strategy are approved by MNRE;
- ii) Other riparian states do not oppose the project;

¹ 2008 Skoy Plancenter Ltd in association with Diversity and Transformation Solution (D&TS), Ninham Shand, and Water for Africa

² Progress on sanitation and drinking water, 2015 update and MDG assessment, UNICEF and WHO, 2015

The direct beneficiaries of the study are the Ministry of Natural Resources and Energy (Executing Agency), the Ministry of Agriculture, the Swaziland Water Services Corporation and the Swaziland Electricity Company. The implementation of the investment will substantially contribute to increase the water availability for multiple uses for the populations in Mbabane – Manzini corridor, amounting to 300000 people. It will also benefit to the productive socio-economic actors in the various sectors of industry, agriculture, and tourism.

Costs, Financing and duration

The total estimated cost of the project is estimated at € 2,800,000 excluding taxes and duties (but including approx. 5% contingency reserve). AWF's share is € 1,280,000 (45.7%), MIC-TAF share is € 1,000,000 (35.7%) (*equivalent to UA 797,416³*), CRIDF's share is € 220,000 (7.9%) and the monetary contribution from the Government of Swaziland (in addition to in-kind contribution comprising office space and consumables, stationary etc.) € 300,000 (10.7 %).

The overall duration of the project is 27 months.

Conclusions and Recommendations

With the ultimate aim to reduce poverty and increase economic growth, the project will improve availability of water resources for the local populations livelihood as well as their productive activities. Therefore, the project is of utmost importance for the country and fits into its national water resources development objectives. It is coherent with the Africa Water Vision and with SADC planning documents. It is also aligned with the priorities of the AWF Strategic Plan 2012-2016 and the Bank's Long-Term Strategy 2013-2022. The project is technically opportune and justified, given the foreseen domestic water supply shortage for the two cities of Mbabane and Manzini in the near future. It presents a potential leverage effect of 1 to 65.

Based on the analysis of the project's pertinence, effectiveness and sustainability, it is recommended that a grant not exceeding € 1,280,000 from AWF resources be extended to the recipient.

³ at May 2015 rate of exchange

Country and project name: Swaziland: Mbabane Manzini Corridor Multipurpose Dam Study

The purpose of the study is to prepare a blueprint for the socio-economic development of the study area through water resources development and management for increasing water availability for multiple use.

RESULTS CHAIN		PERFORMANCE INDICATORS			Means of Verification	Risks/Mitigation Measures
		Indicator	Baseline	Target		
IMPACT	Improved livelihood, social well being and socio economic development through increased availability of water resources within the Lusushwana River Basin.	Proportion of population below poverty line	40.6% (2012)	Horizon 2030: 20%	National statistics	
OUTCOME	Project reaches financing closure	%age of financing pledged	0%	100% by 2018	MENR donor conference minutes	
COMPONENTS						
OUTPUT	Component 1: Feasibility Study and Detailed Designs					
	Technical and financial options and Detailed designs defined	Project Feasibility Study and Detailed Design ready	JMRBW RMS	Horizon 2018 a) Feasibility Report Detailed design documents Horizon 2018 (At completion of the studies) Approval process engaged with national Authorities	Study reports, detailed design reports	Risk: Delays in the decision and funding the project after the completion of the study. Mitigation: This risk is mitigated through the consultative approach developed (Consultative Committee) and the financing options and studies included as part of the study will start the dialogue and sensitization for implementing and funding the proposed project.
		Staff capacity building	Study Report 2015	Horizon 2018 12 Staff trained	Quarterly Progress Notes	
Component 2: ESIA Study						
	Environmental and social impact assessment studies (incl. ESMP and RAP)	ESIA, ESMP and RAP Reports prepared and validated	NA	Horizon 2018 ESIA and ESMP reports approved	Quarterly Progress Notes	Risk: Riparian states not supporting the outcome of the study Mitigation: TA to support the Government's consultation with other riparian countries
	Compliance of the ESIA and RAP studies with respective national environmental regulations	Approval certificates by National Authorities	NA	Horizon 2018 Certificates obtained	National registry of ESIA certificates	
Component 3: TA Advisory on Climate and Financing Options						
	Climate Change Resilience Assessment	Reports prepared and validated	NA	Horizon 2018 Reports approved by MNRE	Quarterly Progress Notes	

	Project Financing options, including PPP and financing strategy	Study Reports prepared and validated report	NA			
	Support to transboundary consultations	Position of other riparian countries	NA	Horizon 2018 No opposition from other riparian countries	Opinions from other Riparian countries	
	Component 4: Study Management					
KEY ACTIVITIES				Inputs (Euro) AWF: 1,280,000 MIC TAF: 1,000,000 CRIDF: 220,000 Government: 300,000 Total: 2,800,000		
		Euro	UA			
	Component	Total	Total			
	1) Feasibility Study and Detailed Design	1,820,000	1,451,298			
	2) Environmental and Social Studies	460,000	366,812			
	3) Advisory Services on Climate and Financing Options	220,000	175,432			
	4) Study Management	300,000	239,225			
Total	2,800,000	2,232,766				

1. Project background

Swaziland is a landlocked, small open economy in Southern Africa. It has an area of 17,360 km² and a population of 1.39 million (mid 2012). The country is largely mountainous with 75.8% of the population living in rural areas with livelihoods predominantly dependent on subsistence agriculture. It borders Mozambique and South Africa. With a Gross Domestic Product (GDP) per capita of about US\$ 3,500 in 2014, Swaziland is classified as a lower middle income country.

Swaziland has relatively well-developed infrastructure in comparison to other Sub-Saharan African countries. In 2015, the global rate of access to potable water supply in Swaziland was 74% and the sanitation coverage rate was 57%⁴. Addressing issues of water resources mobilisation for basic water supply, industrial and agriculture use is clearly a poverty reduction priority for the country. The two main cities of Mbabane and Manzini and the surrounding area are hosting the major part of the population and most of the industrial and productive activities of the country. This concentration is the driver of the country economic growth and needs to be provided with sustainable public services of high standard. Water supply for the fast growing population and for sustaining the development of economic activities is therefore a challenge which needs to be addressed at very short term. Indicators have already reached alarming levels with shortage of water supply which are forecasted to appear very soon. The mobilisation and better harnessing of surface water resources has become a concern of priority for the government. The challenge is compounded by the additional need of water for implementing the government policy to increase the contribution of agriculture production to the GDP and to exploit hydropower potential of the national rivers network in order to limit the electricity supply dependency from ESKOM in South Africa.

In order to address these challenges, the Government intends to create a multipurpose storage and has identified a site on the Nondvo River as the most promising solution.

1.1 Origin of the project

The choice of the site of Nondvo results from an initial multi criteria selection process developed during the execution of the Joint Maputo River Basin Water Resources Study (JMRBWS⁵; 2008) jointly undertaken by the Kingdom of Swaziland, the Republic of South Africa and the Republic of Mozambique. The study presented water resources development options which could be developed by the different member states.

In Swaziland, all “normal flow” in the rivers, most of them being of transboundary type, has been allocated under the arrangements of the international treaties. “Normal flow” is the water volume that has been calculated as being available 80% of the time during the driest month of the year which is the month of September. The only water that can be made available for allocation is surplus flow (during floods and rainy season) through harnessing in large storage reservoirs. This means that at the moment no water allocation to any new development can be made as water demand far exceeds water availability. This is a major challenge because further social and economic development in the country will be impeded by this lack of one of the most critical natural resources if significant investment are not implemented.

To develop the water sector a SADC Regional Strategic Action Plan III was formulated for the period 2011 - 2015. It was based on the observation that the water storage capacity (m³ per capita) of the SADC

⁴ Op.Cit.

⁵ 2008 Skoy Plancenter Ltd in association with Diversity and Transformation Solution (D&TS), Ninham Shand, and Water for Africa

countries is very low compared to other countries of the world: 450 for Swaziland, 700 for South Africa compared to 6'000 for North America. This indicator is related to the “water security” which is *the reliable availability of an acceptable quantity and quality of water for production, livelihoods and health, coupled with an acceptable level of risk to society of unpredictable water-related impacts*. The transboundary nature of the rivers implies constraints and restrictions on the abstraction allocations. During 2011 the SADC water division assisted each member state to identify a priority water infrastructure development project.

In Swaziland, the studies indicated that the country, amongst 7 possible projects of interest could consider building the Nondvo dam to yield about 92 Mm³ of water for increasing the potable water supply to the two cities of Mbabane and Manzini with a current population estimated at 100000 and 200000 inhabitants in their respective districts. The additional resources mobilised through the Nondvo dam could also satisfy other demands for agriculture and hydropower generation along the Mbabane – Manzini corridor and meet the demand of the fast growing Matsapha and Ezulwini areas where the major part of industries and other economic activities of the country are concentrated or under development (Science and Technology Park, International Convention Centre, several new townships).

1.2 Sectorial priorities

1.2.1 Country sectorial priorities

The project corresponds well to the development plans defined by the Government in the National Development Plan 2014/15 – 2016/17 issued by the Ministry of Economic Planning and Development, Economic Planning Office in March 2014, a provision for budgeting the cost of the feasibility study has already been incorporated for a total amount of E 46'682'000, under the line reference W370/99. This corresponds to the amount in the funding request introduced to the Bank/AFW.

The National Development Strategy (NDS) has identified three ongoing priorities: (i) maintaining macro-economic stability and accelerate economic diversification; (ii) boosting strategic infrastructure; and (iii) unlocking human capacity. Increasing access to safe water and mobilizing additional resources for productive activities through constructing dams and storage capacities is in line with these objectives. Chapters 9 and 11 of the NDS refer to the water and sanitation sectors confirming the priority to improve storage capacity for renewable water resources through the development of two dams, the Nondvo dam being one of them. The project is also quoted in the Government Programme of Action 2013-2018. Given the transboundary type of most of the rivers on the Swaziland territory, the NDS also emphasizes the need for the development of a competent negotiation strategy as well as capable negotiation skills for reviewing the existing international treaties.

The project is also in line with the SADC strategies and the principles stated in by the Tripartite Interim Agreement between the 3 riparian countries of the Maputo River Basin. The Nondvo dam is already quoted as one of the Reference Projects in Swaziland in Article 4 (2) (c) of the Tripartite Agreement.

1.2.2 Bank sectorial priorities

For Swaziland, the Bank's sectorial priorities are defined in the Country Strategy Paper (CSP) for the period 2013 – 2018. The new CSP responds to two decades of slow economic growth and emerging evidence of a reversal of Swaziland's economic gains of the last two decades. It will support the country's economic development by promoting two pillars: (i) *Supporting Infrastructure Development for Sustainable and Inclusive Growth* and (ii) *Strengthening Governance and Institutional Capacity*. The Strategy is anchored to the Bank's Strategy 2013 - 2022.

Amongst the set of actions for supporting Government's efforts to achieve broad-based sustainable growth the Bank's CSP pinpoints two specific approaches: (i) connecting people and regions to markets by

upgrading infrastructure, (ii) providing clean water. Under the chapter of the CSP, titled *Deliverables and Targets for the Pillar I*, the Nondvo Dam project is quoted as a potential candidate for Bank Group financing.

The project is also well aligned with AWF 2012-2016 strategy which focuses on the preparation of bankable projects. More specifically, funding the feasibility studies of the Nondvo project should catalyse further resource mobilisation and commitments from other donors for funding the downstream investments. The leverage effect of the project is estimated at 65.

1.3 Problem definition

The water supply situation for the two main cities of Mbabane and Manzini and the neighbouring area requires immediate attention as existing facilities are operated at full capacity. The Hawane dam/reservoir supplying the city of Mbabane cannot fulfil the current demand. The fast growing city of Manzini and its suburbs are supplied from water directly abstracted from the Lusushwana River through a treatment plant functioning at its full capacity most of the time. This leads to a highly vulnerable situation closely depending on the operation of the pumping/treatment plant and the risk of shortage during low river flows is real.

There are a number of major projects currently under development which cannot be supplied from the available water resources. These projects include the International Convention Centre under construction, the Science and Technology Park at Nokwane and new housing settlements for accommodating the rapid growing population of the area.

Accurate information and data relating to water resources, water usages and realistic projections for the next 2 decades are not available. Proper Water balances have not been assessed in Mbabane and Manzini/Matsapha for planning and projection purposes.

1.3.1 Surface water resources

Swaziland is well endowed with surface water resources, but has limited groundwater resources. Average annual rainfall varies from around 500 mm in the eastern lowlands of the Lowveld to 1500 mm in the Highveld, with more than three-quarters of the rain falling during the summer months (October to March). The mean annual precipitation (MAP) is 850 mm, equivalent to 14800 Mm³ and 18 % of the water is transformed into runoff.

Swaziland has 5 river basins. All except Komati, Usutu and Lomati originate from Swaziland. Development of the water resources from the three rivers (Komati, Usutu and Lomati) is subject to SADC protocols on shared water courses. Inflow/outflows show that 2'700 Mm³ of runoff water are generated in Swaziland per year.

In the project area, the main water resources are drawn from the Lusushwana River and its tributaries where the existing Hawane and Lumphohlo dams are located. Underground sources have a limited potential due to unfavourable hydrogeological features⁶, and mainly cater for the need of rural water supply.

⁶ This statement was confirmed by the Joint Maputo River Basin Water Resources Study (JMRBWS⁶; 2008)

1.3.2 Water usages

Domestic and industrial water supply.

The Swaziland Water Services Corporation (SWSC) is the sole provider of potable water to urban centres. In 2013-2014 it was serving 40,540 connections for a total annual consumption of 13,228,000 m³. The non-revenue water accounts for about 26%, which is a relatively good performance level.

In the project area, the SWSC treatment plant in Matsapha is currently operated at full capacity and processes about 40,000 m³ per day stored in reservoirs for gravity supply to the distribution network. This implies that corresponding treatment capacity will be also required when additional water resources is available.

Past estimates and projections in 2005 indicated that Mbabane would run out of water already in 2011. This forecast was confirmed as the SWSC has reached 98% of its abstraction allocation from the Lusushwana River. Due to concentration of activities in the region with the development of new industrial and activity parks in the vicinity of Manzini and Matsapha and the corresponding increase of population in the peri-urban areas, water supply demand growth is significant.

Hydropower generation.

Hydropower generation is a priority for the Government and the Swaziland Electricity Company. The current policy is to develop any opportunity to exploit water resources where topographical and hydrological features are favourable. The objective is to reduce the costly dependency (currently 85%) to ESKOM supply from South Africa.

The hydropower potential of the country is as follows:

- Gross theoretical potential = 440 MW (3800 GWh/a)
- **Existing capacity = 42 MW (100-200 GWh/a)**
- Economically exploitable potential = 61 MW (310 GWh/a)
- Technically exploitable potential = 110 MW (560 GWh/a)

In the context of the Nondvo Dam project, hydro generation gain can result from the installation of a small plant in the vicinity of the dam and from the optimization of water release along the cascade of plants along the Lusushwana River comprising the 2 run off river plants downstream of the plant fed from the Lumphohlo reservoir. The creation of a reservoir on the Nondvo River, tributary of the Lusushwana River would contribute to regulate the water discharge in the river improving the output of the downstream runoff the river plants.

Irrigation.

The contribution of the agriculture sector to the GDP of the country has decreased below 10%. This contribution has been fluctuating over the past 10 years owing to unreliable rainfall leading to poor harvests. The cultivated area is estimated at 190,000 ha, of which 178,000 ha of arable land and 12,000 ha under permanent crops. Maize is the most important crop, however there has been an increase in the number of farmers growing sugar cane, especially those with irrigation facilities. Swaziland has never been self-sufficient in maize production which is the main staple crop. The irrigation potential for the country, based on the physical land capability and water availability, is estimated at 93,220 ha. In 2000, 50,000 ha of the land was under irrigation, with over 40,000 ha being used for irrigated sugar cane. 85 % of the irrigated land is found in the Lowveld and 15 % in the Middleveld. The Lower Usuthu Small holders Irrigation Project (LUSIP) Phase II for 11,500ha, prepared through an AWF grant and other on-going projects will increase the irrigated surfaces contributing to improvement in food security and economic growth. According to the JMRBWS the Nondvo dam project may provide additional water resources

for irrigating an additional 800ha downstream of the Lusushwana River thus responding to the strategy of the Government to increase the contribution of the agriculture sector to the GDP in the near future.

Climate change

The Climate Emergency Institute reports that, by 2050, Southern Africa's temperatures and rainfall are expected to have risen by 2-4°C and fallen by 10-20 percent, respectively, compared to the 1961-90 baselines. This will exacerbate already volatile climatic variations and will call for duly considering Climate Change effects on the design and dimensioning of the project.

1.3.3 Peri-urban development in the future reservoir

The area where the project may be located has a significant density of population, dwellings, cultivated areas and public infrastructure like schools, roads, railway line etc. It is therefore important that as soon as possible and through application of legal instruments, the further implementation of physical infrastructure is suspended. Then, after the technical studies, the ESIA studies through the consultative process will determine the limits of the impacted areas as well as the modalities for compensation and possible resettlement programs.

In the meantime, recommendations for the appropriate management and protection of the dam project catchment area will be established as part of the studies outputs.

1.4 Institutional situation

In Swaziland, the Ministry of Natural Resources and Energy (MNRE) is the leading institution for the water resources sector. Its aim is to create a conducive environment that promotes the efficient and effective utilization, beneficiation and management of natural resources in the country in order to enhance sustainable socio-economic development. In the MNRE, the Department of Water Affairs (DWA) was created under the Water Act 2003 as the Secretariat to the National Water Authority, an entity composed of representatives from four key government ministries, and five representatives from the river basin authorities.

The Swaziland Water Services Corporation (SWSC) is the sole provider of potable water to urban centres. It is a corporate body duly established under the Water Services Corporation Act, No. 12 of 1992. The objectives of the Corporation are to abstract, store, transport, purify, supply and collect water, convey, treat and dispose sewage in the urban areas as specified in the schedule of the Water Services Act.

The agriculture sector is under the responsibility of the Ministry of Agriculture. For irrigation, the Swaziland Water and Agricultural Development Enterprise (SWADE), an ad-hoc parastatal entity was established in 1999 to facilitate the planning and implementation of the Komati Downstream Development Project (KDDP) and Lower Usuthu Smallholder Irrigation Project (LUSIP) and any other large water and agricultural development project that Government may assign.

Several shared water agreements have been signed between Swaziland and its neighbouring countries. The waters of the Lomati, Komati, Lusutfu (including the Lusushwana River) and Ngwavuma river basins are shared and managed through the Interim IncoMaputo Agreement which was coming to an end in 2010 but was extended to an indefinite date awaiting finalisation of ongoing studies to feed into the Comprehensive Agreement.

In the electricity sector, the Swaziland Electricity Company (SEC), a limited liability company is responsible for generation, including the operation of hydropower plants, transportation and distribution. SEC was established in 1963 as a parastatal and later started operating in a liberalized market through the Electricity Company Act (2007), The Energy Regulatory Authority Act (2007), as well as The Public

Enterprises (Control and Monitoring) Act of 1989. Its operations are highly dependent on the supply of electricity from ESKOM, South Africa accounting for about 85% of the annual consumption. Liberalisation is however contemplated by the Government materialized by the outline of a PPP policy for inviting Independent Power Producers (IPP) to develop and operate the possible micro and mini schemes identified throughout the territory.

1.5 Lessons from past experience and on-going programs

Though the Bank has been active in Swaziland since the 70's, its experience in the water resource management (for various usages) sector in the country was limited to a past Water Supply and Sanitation Study for Lavumisa-Nsalitje corridor concluded in 2012. This experience has been recently reinforced with the Lower Usuthu Smallholder Irrigation Project (LUSIP) and the Ezulwini Sustainable Water Supply and Sanitation Service Delivery Project (approved in June 2014). The Bank's interventions approved during the last five years have all been technical assistance studies supported by MIC and AWF Grants (Studies for the LUSIP II). However, past experience with Bank's portfolio revealed slow rate of project implementation due to institutional weakness (caused by too frequent staff movement, and inability to retain those qualified), and poor compliance with Bank's procedures (e.g. procurement and disbursement).

The proposed project has drawn lessons from the ongoing technical assistance interventions and past investment projects in other sectors financed in Swaziland by the Bank. The main lessons learnt are considered in the formulation and design of the project. They include:

- (i) Strengthening capacity of the Executing Agency by requiring the recruitment of a Project Coordinator and the recruitment/nomination of a Procurement Specialist;
- (ii) Strengthening the monitoring of the ESIA compliance and ESMP preparation with the support of an Environment Expert from the Panel of Experts;
- (iii) Adequate preparation and quality of designs of the project infrastructure supported by the interventions of a Panel of Expert; and
- (iv) Adequately addressing the transboundary dimension and climate change vulnerability of the project by inputs from specific advisory services (Financed by CRIDF).

1.6 Beneficiaries and stakeholders

The direct beneficiaries of the study are the Ministry of Natural Resources and Energy, the Ministry of Agriculture, the Swaziland Water Services Corporation and the Swaziland Electricity Company. The implementation of this project will substantially contribute to increase the water availability for multiple uses for the populations in Mbabane – Manzini corridor, amounting to 300,000 people. It will also benefit to the productive socio-economic actors in the various sectors of industry, agriculture, and tourism.

1.7 Justification for AWF involvement

The project is aligned with AWF 2012-2016 strategy pillar I, preparation of bankable projects. More specifically, the execution of the feasibility study of the a multipurpose dam project up to the stage of detailed design stage should catalyse further resource mobilisation and commitments from other donors for funding the downstream investments. The leverage effect of the project is estimated at 65.

Other aspects of the project related to the objectives of AWF's strategy are:

- AWF's involvement in funding the feasibility study of the project guarantees the project's "quality at entry" and leaves ample room to better assess the transversal aspects, namely i) gender, ii) social equity, iii) environment iv) climate change and v) transboundary/regional integration.
- On the environmental aspect, by financing the feasibility and environmental and social impact assessments studies, the AWF will keep a constant watch over the proper design and implementation of

water resources and environmental protection measures and the reduction of impact in the areas affected by the project.

2. Project description

2.1 Impacts, Outcomes and Outputs

The impacts, expected outcomes and outputs of the study, as summarized in the logical framework are as follows:

- A) **Impacts:** The major development goals of the study are to contribute towards improved livelihood, social well-being and socio economic development through increased availability of water resources for multiple use.
- B) **Outcomes:** the project outcome is: the investment project reaches financing closure. The investment is fully financed and the Government proceed to implementation.
- C) **Output:** the expected project outputs are as follows:
 - The Project feasibility study, detailed design, ESIA as well as the Climate Change Resilience Assessment and the PPP feasibility and financing strategy are approved by MNRE;
 - Other riparian states do not oppose the project;

2.2 Project components and activities

The project essentially involves consultancy services, as identified below:

- Component 1: Technical and Economic Feasibility Studies and Detailed Design Studies;
- Component 2: Environmental and Social Impact Assessment Study (ESIA) (including Environmental and Social Management Plan –ESMP- and Relocation Action Plan -RAP);
- Component 3: Consultant and advisory services on Climate Change Resilience aspects, PPP and financing strategy, Transboundary rivers issues (Funded by CRIDF);
- Component 4: Study management, coordination, communication and consultation. This component makes up the greater part of the recipient's contribution to the financing.

A summarized description of the activities is presented below and more detailed in the terms of reference for the consultancies (Annex 3: ToR for the Feasibility Studies and Annex 4: ToR for the ESIA Studies).

2.2.1 Component 1: Feasibility study

The scope of the Feasibility Study will comprise 3 phases.

Phase 1: Preliminary Scoping Study

Phase 1 will mainly be aimed at checking that Nondvo Dam is the right option for the project. The previous studies proposed a dam with the maximum capacity corresponding to the maximum annual water yield of the catchment area (92 Mm³ and 115m height). This capacity by far exceeds the estimated demand and seems not to be the best and least cost solution. Consequently, an optimisation is required. This will be done through identifying alternatives and comparing the various options through a comprehensive multicriteria analysis which will include environmental and economic assessments. Possible broadly identified alternatives are as follows:

- (i) increasing the existing dams capacities by raising their crest level when technically and environmentally feasible;
- (ii) Down sizing the Nondvo dam or any possible multipurpose dam project in order to limit households relocation and rerouting of the railway line which is flooded if the reservoir is designed with the maximum possible capacity. In this case, the usable volume may meet only the drinking water supply needs, but the dam feasibility would be improved and the time horizon for commissioning the dam would also be shorter;
- (iii) Identifying other possible dam sites;
- (iv) Combining infrastructure development with an ambitious demand management programme in order to reduce the water needs.

Phase 1 will include the following tasks:

- Task 1.1 Information and data acquisition
- Task 1.2 Project context reconnaissance
- Task 1.3 Water resources availability and water demands assessment
- Task 1.4 Scoping of alternatives to the project
- Task 1.5 Socio Environmental aspects
- Task 1.6 Selection of the solution

Phase 2: Feasibility study

Phase 2 will aim at assessing the feasibility of the project in a comprehensive manner: from the technical, economic, financial, institutional, and environmental perspective. It will include the optimisation of the dam management in order to maximise the benefit for the different uses, in particular hydropower production through the maximisation of the existing hydropower plant cascade. It will include the following tasks:

- Task 2.1 Hydrological analysis and studies
- Task 2.2 Flood risk assessment and mapping
- Task 2.3 Sediment and morpho-dynamic Analysis
- Task 2.4 Economic and environmental optimization of the Dam and storage design
- Task 2.5 Topographical surveys
- Task 2.6 Geological and Geotechnical Investigations
- Task 2.7 Preliminary Engineering Design for the dam and appurtenant structures
- Task 2.8 Preparation of Outline O & M, Instrumentation and Emergency Preparedness Plans
- Task 2.9 Infrastructure design for the Hydropower component
- Task 2.10 Conveyance system and water treatment plant
- Task 2.11 Watershed management and protection
- Task 2.12 Incorporation of ESIA study outputs
- Task 2.13 Considerations on Climate Change
- Task 2.14 Confirmation of Project Layout and Preliminary Design Report
- Task 2.15 Construction Plans and Implementation Schedule
- Task 2.16 Institutional analysis
- Task 2.17 Preparation of Cost Estimates and Benefits
- Task 2.18 Economic and Financial Analysis
- Task 2.19 Feasibility Study Report

Phase 3: Detailed design

The implementation of phase 3 shall be conditioned to the endorsement of the feasibility study by the government. During phase 3, the Consultant shall develop the detailed design of the investment. This phase shall encompass the following tasks:

- Task 3.1 Topography

- Task 3.2 Geology and Geotechnics
- Task 3.3 Dam /Diversion Structures Design
- Task 3.4 Power Generation and Evacuation system design
- Task 3.5 Preparation of Draft O& M, Instrumentation and Emergency preparedness plan

2.2.2 Component 2: ESIA studies

The scope of the ESIA studies will comprise the following tasks:

- Task 1: Establishment of a Socio-Environmental Baseline
 - Task 1.1: Description of the Proposed Project
 - Task 1.2: Description of the Environmental condition of the Project Area
- Task 2: Socio-Environmental Scoping
- Task 3: Policy, Legislative, Regulatory and Administrative Considerations
- Task 4: Analysis of alternatives to the proposed project
- Task 5: Determination of the potential impacts of the proposed project
- Task 6: Formulation of Mitigation Measures
- Task 7: Preparation of Dam Safety Plans
- Task 8: Development of Environmental and Social Management Plan (ESMP)
- Task 9: Development of a Resettlement Action Plan (RAP)
- Task 10: Preparation of the ESIA Report

2.2.3 Component 3: Capacity building, Technical Assistance and Advisory Services

Subject to final approval from their funders DFID, CRIDF will fund capacity building, technical assistance and advisory services aimed at reinforcing the knowledge and potential for actions of the Executing Agency and in general authorities of the water sector in Swaziland.

The services will be composed of interventions from experienced specialists and experts selected by CRIDF. They will deliver their contributions through on the spot activities by joining the DWA project team members in their daily work on the project and through specific workshops gathering various ministry officers and civil servants of sector authorities.

The three specific scope of interventions funded by CRIDF are:

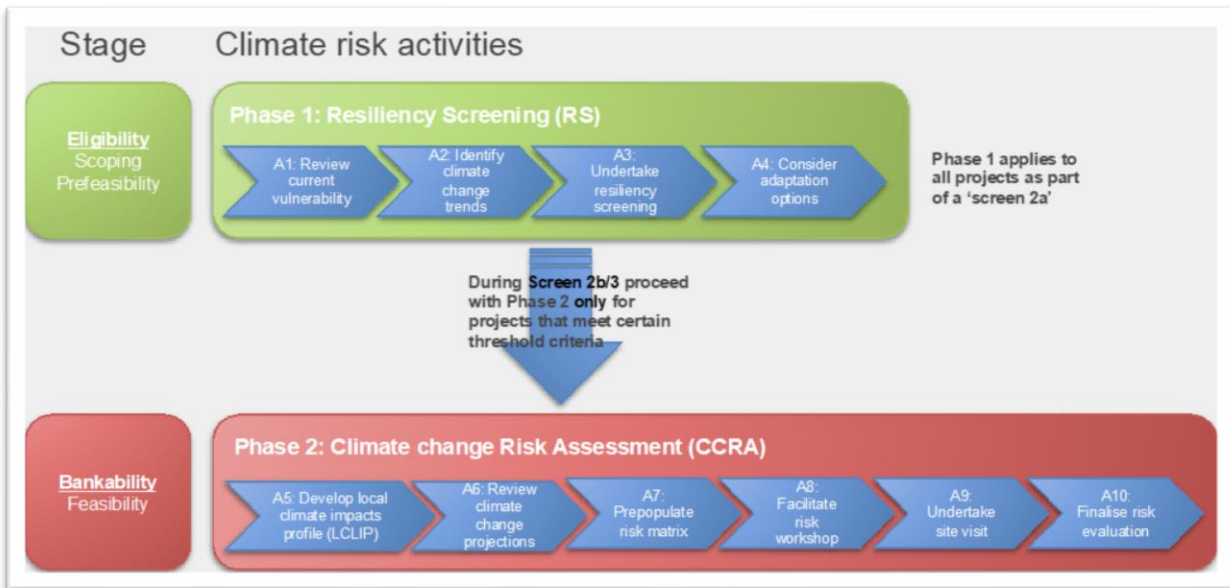
Climate Change Risk Assessment (CCRA):

The CCRA protocol is aimed at mainstreaming climate change in the project and in particular in the design of the infrastructure. It is based on three tools:

- 1) The climate vulnerability tool, which provides a high level analysis of the regions vulnerability to climate change through a set of key indicators.
- 2) The Climate Change Risk Assessment Tool will support the undertaking of the Phase 1 and 2 of the feasibility study. It includes a comprehensive risk matrix.
- 3) A set of projections and accompanying impact statements covering the whole of Southern Africa. They are based on a new technique called self-organising maps, which help reduce uncertainty associated with the range of different models available.

The protocol has two phases, which are shown in the figure below.

- Phase 1: Resiliency screening is comprised of activities 1- 4. These activities form a basic preparatory due diligence and are to be undertaken at concept stage (Phase 1 of the feasibility study).
- Phase 2: Climate Change Risk Assessment is comprised of activities 5-10 and should be undertaken at feasibility/detailed design stage. Phase 2 is detailed and intensive and requires specialised inputs from climate scientists, modellers and climate risk experts, travelling, engagement with stakeholders and on-site presence by a specialist.



PPP and financing strategy:

This consultancy will help the Government assessing the interest of setting-up a PPP scheme to finance the project. It will also propose a comprehensive financing strategy and a preliminary support to mobilise financing through:

- Assessment of existing PPP legal framework;
- Assess the options for PPP funding for the hydropower generation and for the water infrastructure from treatment plant to delivery to the main distribution network;
- Provide support to the Ministry of Finance in contracting and administering PPP funding;
- Explore relevance of project financing principles;
- Raise awareness on existing funds linked to environmental aspects including climate change adaptation funds;
- Prepare guidelines for raising donors' interest and approach potential funders in preparation for the organisation of a donors' round table.

Transboundary Rivers Issues:

The proposed development of a multipurpose dam on a tributary of the Lusushwana River may trigger the need for notification to riparian states under both the Revised SADC Protocol on Shared Watercourses, as well as the Interim InKoMaputo Agreement (IIMA).

The Project for a multipurpose dam in the vicinity of the Mbabane Manzini Corridor therefore provides a useful 'testing ground' for using the notification process as a means to build lasting cooperation and peace dividends. This task will therefore aim to develop a set of training materials as well as advice for the Government of Swaziland, and potentially the Tripartite Permanent Technical Committee (TPTC) for the IIMA, on whether and how the notification process could proceed, as well as options for the affected Countries to avoid, minimise and mitigate any potential impacts.

Specifically through a review of international agreements CRIDF will advise on the need for notification in respect of the study of a multipurpose dam in the Mbabane Manzini Corridor and support the notification process. This will be done in such a manner as to build the capacity of the DWA in Swaziland in terms of the notification process and the implementation of transboundary basin agreements.

2.2.4 Component 4 – Study management.

The management of the study/project will be assured by an ad-hoc Project Team set up within the DWA, under the guidance of a Project Coordinator fully dedicated to the project to be recruited. The tasks of the Project Team will comprise:

- Coordination of the studies;
- Organisation and regular dialog with the Project Steering and Consultative Committees;
- Organisation of the stakeholders consultation process;
- Engagement with Donors and organisation of donor’s roundtables;
- Obtain the required authorisations from the relevant authorities for the construction of the infrastructure (environment, water, land, etc.).
- Implementation of the legal process for controlling urbanisation in the reservoir area.

Given the rapid developments observed in the catchment area where a multipurpose dam could be implemented, it is of utmost importance for the project viability to control the urbanisation in the reservoir and infrastructure area: the Executing Agency shall put in place the required regulatory mechanism for this purpose within 4 months after the project approval.

This component funded by the recipient will cover the overall management of the project/studies including:

- Activities and salaries of the Executing Agency/DWA staff involved in the project;
- Project Coordinator (to be recruited);
- Steering and Consultative Committees meetings;
- Dam Safety and ESIA Compliance Panel of Experts (recipient could apply for financing from other donors)
- Provision of office space and running costs;
- Acquisition and running costs of a vehicle.

2.3 Cost and financing plan

The total estimated cost of the project is estimated at € 2,800,000 excluding taxes and duties (including a 5% contingency reserve on donors’ contributions only). A cost breakdown is presented in the table below and detailed in Annex 2. AWF’s share is € 1,280,000 (45.7%), MIC-TAF share is € 1,000,000⁷ (35.7%), share of CRIDF is € 220,000 (7.9%) and the monetary contribution from the Government of Swaziland (in addition to in-kind contribution) € 300,000 (10.7%). The cost of the two studies will be shared between both facilities as follows: 56,14% for AWF and 43,86% for MIC TAF.

Table 2.1: Project Cost Estimate (per Component and funding sources)

Component (Costs in Euros)	Funding Source				Total
	AWF	MICTAF	CRIDF	Government	
Feasibility study	972,912	760,088			1,733,000
ESIA Studies	245,895	192,105			438,000
Climate change resilience assessment, transboundary issues, PPP and financing strategy			210,000		210,000
Project management, Project Coordinator, POE				300,000	300,000
Contingencies (about 5% - except gov.)	61,193	47,807	10,000		119,000
Total per funding source	1,280,000	1,000,000	220,000	300,000	2,800,000
Allocation per funding source	45.7%	35.7%	7.9%	10.7%	100%

⁷ Equivalent to UA 797,416 at May 2015 rate of exchange

Table 2.2: Project cost estimate per category and funding sources

Euro (including contingencies)

Cost category	Total cost	AWF	MIC - TAF	CRIDF	Government
Services (Total)	2,740,000				
Feasibility and Detailed Design Studies	1,820,000	1,021,754	798,246		
ESIA Studies	460,000	258,246	201,754		
Other Studies and Advisory Services	220,000			220,000	
Project Coordinator and PoE	240,000				240,000
Operation (Total)	60,000				
Car and operation consumables costs	60,000				60,000
Total (Including contingencies)	2,800,000	1,280,000	1,000,000	220,000	300,000
Percentage	100%	45.7%	35.7%	7.9%	10.7%

3. Implementation

3.1 Recipient and Executing Agency

The Government of Swaziland will be the beneficiary of the grants, and the Executing Agency will be the Ministry of Natural Resources and Energy (MNRE) with the Department of Water Affairs (DWA) managing the project.

3.2 Implementation arrangements

The DWA will manage the project. DWA technical capacity should be reinforced since the Department has only conducted a few similar studies, and skilled officers are busy. DWA, under its financial contribution to the financing of the project will recruit a full time Project Coordinator, and will nominate/recruit a procurement officer both acceptable to the Bank. While the Project Coordinator is being recruited, DWA will nominate an interim Project Coordinator acceptable to the Bank. The Project Coordinator, who is the key person in the project organisation/implementation will assure the dialog and consultative activities with the Country authorities, the Project Steering Committee, the Consultative Committee and with the Consultants performing the studies.

The Project Steering Committee will review and endorse the reports, select the best option, and provide guidance to the Executing Agency. It will comprise senior representatives from the concerned Ministries (Natural Resources and Energy, Agriculture, Environment, Economic Planning & Development and Finance) and Utilities.

The dam will impact positively and negatively a number of stakeholders, and the selection of the best option as well as the feasibility study should be supported by a transparent consultation process. For this purpose, the MNRE shall establish a Consultative Committee composed of the main stakeholders, inclusive of Civil Society representatives. The Consultative Committee will inform the decisions of the Steering Committee.

An Independent Panel of Experts, financed by the Government, will be recruited to review the studies regarding Dam Safety and ESIA Compliance. The terms of reference of its mission as well as the experts' curriculum vitae shall be submitted to the Bank for no objection.

3.3 Procurement arrangements

Detailed procurement arrangements are included in Technical Annex 7.

3.3.1 Assessment of the procurement capacity of the Executing Agency

The responsibility for the management of procurement processes shall rest with the Project Management Team within the DWA. The Ministry of Mineral Resources and Energy will provide oversight.

An assessment of the capacity of the Executing Agency to implement procurement actions for the project has been carried out by the Bank. The objectives of the assessment was to (a) evaluate the capability of the implementing agency and the adequacy of procurement and related systems in place; (b) assess the institutional and procedural risks that may negatively affect the ability of the agency to carry out the procurement process; (c) identify risks, develop and incorporate mitigation measures to address the identified deficiencies to minimize the identified risks.

The assessment concluded that the DWA does not have sufficient capacity to handle procurement activities envisaged under the proposed Project. To that end, taking in consideration the nature and complexity of the procurement activities envisaged under the project and in order to enhance procurement capacity, the MNRE shall nominate or recruit a qualified and experienced Procurement Expert, acceptable to the Bank, to be part of the project implementation team and to carry out procurement activities under the Project.

3.3.2 Procurement arrangements

As the project is co-funded by AWF, MICTAF and CRIDF, a discussion with CRIDF on the use of AfDB Rules and Procedures took place during the appraisal. However, CRIDF is a pool of consultants and will provide the experts themselves or will undertake the acquisition of the experts required. Therefore, the conclusion reached was that parallel-financing arrangement was appropriate. It has been agreed that the project would comprise four components, of which one (Climate Resilience Assessment transboundary issues, PPP and Financing Strategy) would be financed by CRIDF. The co-financing arrangement with CRIDF will therefore be on parallel financing basis.

Acquisition of consulting services financed by the Bank will be in accordance with the Bank Rules and Procedures for the Use of Consultants”, dated May 2008, revised July 2012, using the relevant Bank Standard Bidding Documents, and the provisions stipulated in the Financing Agreement. Procurement of goods and services financed by the Government shall be done using Government Procedures. The recipient has expressed desire to apply for advanced contracting procedures to facilitate the selection of consulting services related to feasibility studies, to avoid start up delays in the project. The table below displays the mode of procurement.

Table 3.1: Summary of Procurement Arrangements (In EUROS, including approx. 5% contingencies)

No.	Project Categories	Shortlist	Non-Bank Funded	Total
1	Goods			
1.1	Vehicle incl. operating costs		60,000*	60,000
2	Consultancy Services			
2.1	Feasibility Studies	1,820,000		1,820,000
2.2	EIAS Studies	460,000		460,000
2.3	CRIDF Studies(Climat Resilience Assessment transboundary, PPP and Financing Strategy)		220,000**	220,000
2.4	Project Coordinator		120,000*	120,000
2.5	Panel of Experts (PoE)		120,000*	120,000
TOTAL		2,280,000	520,000	2,800,000

* To be procured using Government of Swaziland Public Procurement National Procedures

** To be procured by CRIDF, using CRIDF Procurement Procedures

Acquisition of consultancy services related to Feasibility and EIAS studies, shall be done through shortlisting of firms, using Quality and Cost Based Selection (QCBS).

When the amount of the contract is less than UA 200,000, the Borrower may limit the Publication of a Specific Procurement Notice (SPN) requesting for expressions of interest to national or regional newspapers. However, if foreign firms express interest they shall be considered.

Any procurement of good or services whose amount exceed Euros 10000 shall be undertaken with the prior review of the Bank. For packages subject to prior review, the following documents are subject to review and approval before promulgation:

- Specific Procurement Notices;
- Tender Documents;
- Requests for Proposals;
- Tender Evaluation Reports;
- Reports on Evaluation of Consultants' Proposals, including recommendations for Contract Award.
- Draft Contracts will also be subject to the Bank's approval if they have been amended from the original drafts included in the tender documents.
- The Bank's no-objection for consultancy technical proposals' evaluation report will be required before the financial evaluation is carried out.

Annex 8 presents the procurement plan. This document shall be updated and submitted to the Bank every year.

3.4 Disbursement terms and conditions

The direct payment and the reimbursement methods shall be used for payment of the main consultancy contracts.

3.5 Accounting and audits

The detailed report relating to the Financial Management Assessment of the Executing Agency is presented in Annex 9.

3.5.1 Evaluation of financial capacity and management

The Bank conducted Financial Management (FM) assessment (through desk review) for the MNRE's Accounts Section FM arrangements for the implementation of the proposed Study (which included a review of the budgeting, accounting, internal controls, flow of funds, financial reporting and auditing arrangements). The assessment indicates that these arrangements meet the Bank's minimum requirements to ensure that the funds made available for project financing are used economically and efficiently and for the purpose intended. The overall FM risk rating is Moderate.

The Project FM will be handled within the existing structures of the MNRE and the overall responsibility for accounting and FM (including budgeting, accounting system, internal controls, transactions processing and reporting system, and audit arrangements) rests with the Principal Accountant who is the head of the Ministry's Accounts Section under supervision and guidance of the Principal Secretary.

The project accounting system will be based on the existing government financial management information system, the cash based Treasury Accounting System (TAS) and it will be complemented by excel spreadsheets to facilitate production of required financial reports to monitor and effectively manage the Study. The Executing Agency will produce quarterly progress reports, including all sources of financing and Study expenditures (within 45 days after the end of each quarter). As required by the AWF Operational Procedures and to harmonize the reporting and auditing arrangements for all sources of financing of this proposed study, the Recipient shall prepare Special Purpose Project Financial Statements (that will include all co-financiers funds and Study expenditures, in form and substance acceptable to the Bank), (i) at the mid-term (about 14 months after the beginning of the Feasibility Study) (ii) and at the closing of the Study.

3.5.2 Audits

The Special Purpose Financial Statements shall be audited by external auditors appointed by the AWF in accordance with an audit Terms of Reference approved by the Bank. The audit reports together with the management letter containing management comments will be submitted to the Bank no later than six months after the end of the mid-term and Study closure. The costs of such audits shall be borne by the AWF and shall not be part of the Grant.

3.6 Implementation and performance schedule

The chart Annex 1 illustrates the schedule of the project implementation. The overall duration of the project is 27 months. The schedule attached in Annex 1 illustrates the chain of completion of components financed by the AWF/MIC and CRIDF as well as key dates and events.

The period of 13 months for conducting the ESIA studies is included within the 24 months period of feasibility studies. The overlap aims at facilitating communication and coordination between the 2 consultants for duly taking socio-environmental constraints into consideration in the design and detailed design of the project.

Other studies (Climate Change, Transboundary rivers, PPP and financing strategy for an estimated duration of 6 months) by other consultants/experts under the funding of CRIDF can be planned and performed at appropriate times matching the progress of the feasibility and ESIA studies for a better incorporation of their findings and results in the design of the project.

The table below presents the performance schedule, with the main milestones of the project.

MAIN ACTIVITIES/KEY EVENT	INDICATIVE END TIME OF ACHIEVEMENT
Request for Advance Acquisition Actions (AAA) and launch of the procurement process	M0-5
Project/funding Approval	M0-3
Signature of the grant agreement	M0
Fulfilling of the condition before disbursement	M0+1
Award of Consultant contract for Feasibility Studies	M0+3
Entry into force of the control of urbanisation in the Nondvo reservoir	M0+4
Award of Consultant contract for ESIA Studies	M0+10
Completion of ESIA Studies	M0+26
Completion of Feasibility Studies	M0+27
Final Audit and AWF project completion report	M0+27

3.7 Monitoring, reporting and communication arrangements

The project follow-up/assessment plan will be put into place by the Executing Agency project team (Project Coordinator within the DWA), subject to the Bank's approval, based on the Logical Framework Matrix that identifies how the project will be rolled out, the objectives to be met and anticipated outcomes. The Steering Committee and the Consultative Committee are the priority receivers of the follow-up reports, which will be shared with AWF and ministries and agencies stakeholders to the project.

The Executing Agency will issue quarterly progress reports, a copy of which will be transferred to the AWF. The reports will be accompanied with administrative and technical follow-up documents, financial statements for each account in compliance with the AWF's format requirements and procedures (Bank's usual format) respectively.

Continued assessment of performance will be made using indicators defined in the Project Logical Framework. An end-of-project report presenting all activities completed and outcomes achieved and the closing financial situation will be drawn up by the recipient and sent to AWF.

For monitoring and follow-up purposes, the AfDB/AWF will jointly appoint a Project Manager who will supervise the project and carry out follow-up procedures. The Bank, as the host institution for AWF, may, at any moment and in consultation with the Executing Agency, carry out field supervision missions.

Moreover, the Executing Agency will comply with the AWF's guidelines specified in Annex 5 (AWF's communication and visibility guidelines) regarding how AWF's role in the project to be emphasized.

3.8 Risks and mitigation measures

The main risks identified that may hinder the performance of the project and their corresponding mitigation measures are as follows:

Risk: Delays in the decision and funding the project after the completion of the study.

Mitigation measure: This risk is mitigated through the consultative approach developed (Consultative Committee) and the financing options and studies included as part of the study will start the dialogue and sensitization for implementing and funding the proposed project.

Risk: Riparian states opposed to the projects.

Mitigation measure: a Technical Assistance (CRIDF funded) will support the Government's consultation with other riparian countries. This TA will help the Government preparing the required consultation document and addressing the riparian countries comments.

4. Project benefits

4.1 Effectiveness and efficiency

The project effectiveness and efficiency will be guaranteed by: (i) the step-wise approach which will help the Government select the best option before embarking on the fully-fledged feasibility studies, (ii) the consultation process and, (iii) the financing strategy that will support financiers' mobilisation.

4.2 Sustainability and cross-cutting issues

Environmental and Climate Change aspects: The Project design will place specific emphasis on environmental and social safeguarding by means of the Environmental and Social Impact Assessment. Its aim, when the infrastructure is implemented on site, is to achieve improvement of populations living standards and economic growth through an inclusive approach. The implementation of watershed management plans and actions with the extended participation of local stakeholders, users and beneficiaries through the appropriate creation of committees, and supervision bodies will reinforce the environmental sustainability of the project. Climate Change is duly taken into account in the design and dimensioning of the infrastructures. It is specifically supported by the Technical Assistance and Advisory services funded by the CRIDF. Effective watershed management all along the lifespan of the project is a tool for securing sustainability of the infrastructure and reduce environmental degradation. It is also an effective Climate Change Adaptation measure as it contributes to reduce that negative effects of Climate Change, particular extreme events. At the early stage of the project, the requirement to the Government to freeze further urbanisation development in the project area will minimize the socioeconomic impacts.

Green growth, gender, and inclusivity: A multipurpose dam in the Mbabane Manzini corridor will, contribute to green growth through achieving sustainable development outcomes. It represents an investment in resources savings by optimizing the use of water resources, by increasing exploitation of renewable hydroelectricity and potential irrigated land. It incorporates actions for the protection of the concerned catchment area as a natural capital. Financial resources, which will be mobilised for its construction, will satisfy development needs and at the same time will reduce the vulnerability of the socioeconomic systems of the concerned area to climate change and resource constraints. Increased access to potable water as well as irrigation development by smallholders will offer opportunities for productive and rewarding activities for women. The targeted impacts oriented towards the increased water availability (drinking water and irrigation) for middle class populations is a significant factor of inclusivity. Additionally, the studies will determine the most suitable techniques, construction methods and more efficient use of energy, materials and manpower at the time of the project construction.

The terms of reference for the technical consultant's services mention that the project should be designed with a green growth and inclusivity approach. The use of environmentally friendly technologies and construction methods with low carbon emissions and intensive use of manpower is a requirement stipulated in the terms of reference to ensure the project's sustainability.

Economic and financial aspects: The economic viability of the Project and its contribution to economic development including revenue generation and creation of local employment opportunities are fundamental factors that have received special attention. The project will generate revenues from water supply, possible electricity generation and several multipurpose benefits connected to possible downstream irrigation. A thorough financial and economic assessment as well as a PPP feasibility are included in the preparatory studies.

5. CONCLUSIONS AND RECOMMENDATIONS

With the ultimate aim to reduce poverty and increase economic growth, the project, when the infrastructure is commissioned, will improve availability of water resources for the Mbabane –Manzini urban corridor from where most of the country growth is originated. It will benefit to about 300,000 inhabitants. Therefore, the project is of utmost importance for the country and fits into its national water resources development objectives and strategy. It is coherent with the Africa Water Vision. It is also aligned with the priorities of the AWF Strategic Plan 2012-2016 and the Bank's Long-Term Strategy 2013-2022. The project is technically opportune and justified, given the foreseen domestic water supply shortage for the two cities of Mbabane and Manzini in the near future. It presents a potential leverage effect of 1 to 65.

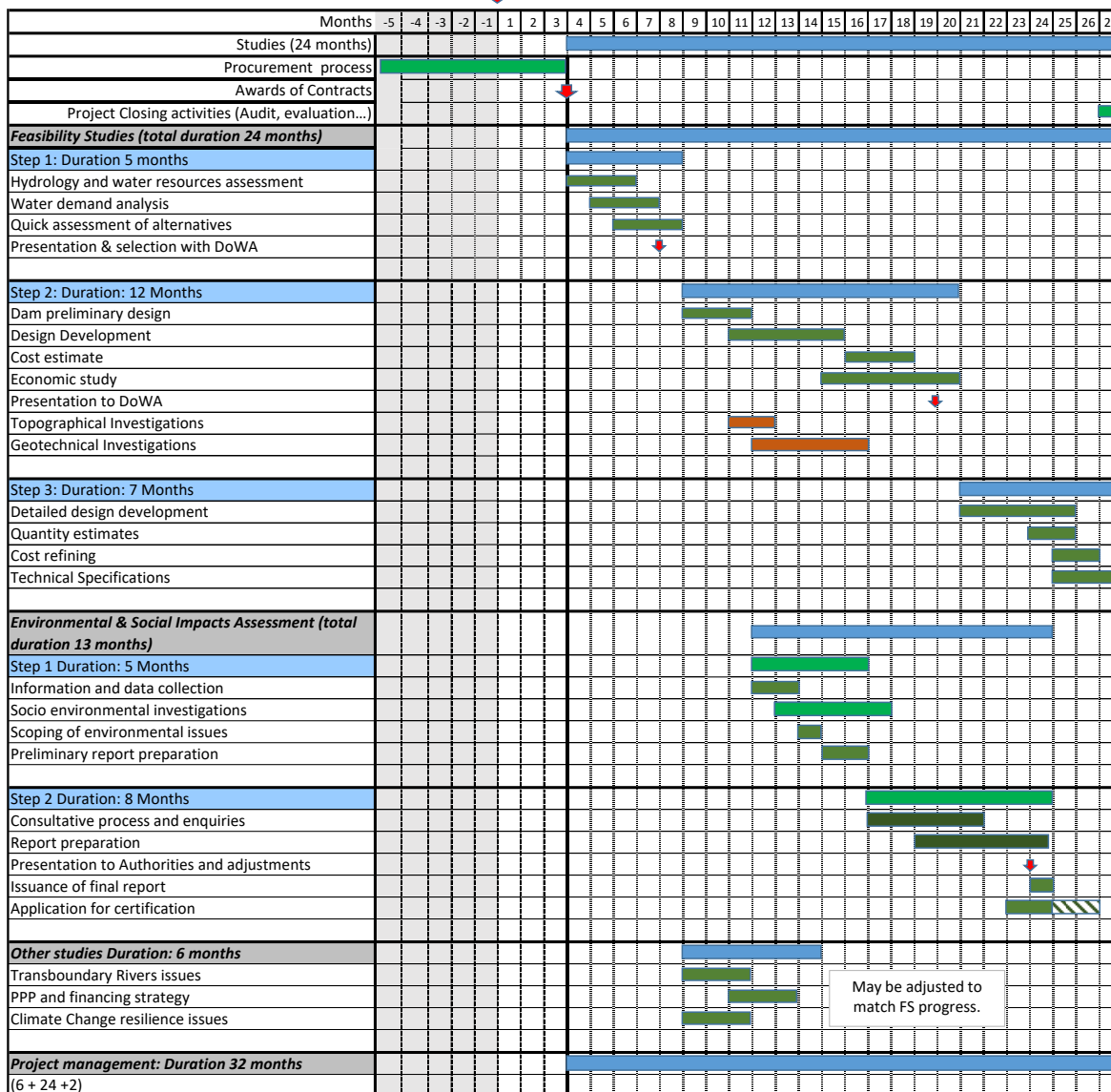
Furthermore, the project presents a holistic approach; the studies and services consider all the subjects necessary to ensure quality at entry and optimum structuration (institutional and legal, technical, environmental, financial, organisational, operational and management aspects).

Based on the analysis of the project's pertinence, effectiveness and sustainability, it is recommended that a grant not exceeding € **1,280,000** from AWF resources be extended to the recipient.

Annex 1: Project schedule

Nondvo Dam Feasibility Study: Indicative Calendar

Signing of Grant Agreement = M0



May be adjusted to match FS progress.

Annex 2: Detailed costs of the project

A.2.1 Feasibility Study

1	Feasibility study	Personnel Involved	Unit rate	Man.month	Total	Mission	Perdiem	Total	Trips	Total
1a	Phase 1: Duration 6 months	Project Manager	21,000	4.00	84,000	2.00	60	10,500	4	6,800
	Preliminary Scoping Studies	Dam Engineer	14,000	0.50	7,000		-	-		-
	Hydrology and water resources assessment	Civil Engineer	19,000	0.50	9,500		-	-		-
	Water demand analysis	Hydromechanical Engineer	17,000	0.75	12,750	0.25	8	1,313	1	1,700
	Quick assessment of alternatives	Hydropower Engineer	17,000	0.50	8,500	0.25	8	1,313	1	1,700
	Presentation & selection with DWA	Hydrologist	19,000	1.25	23,750	1.00	30	5,250	-	-
		Geologist	11,000	1.00	11,000	0.25	8	700		-
		Project Economist	21,000	-	-		-	-		-
		Environmentalist	11,000	1.50	16,500	1.50	45	4,500		-
		Hydraulician - Hydraulic Engineer	11,000	1.50	16,500	1.00	30	3,000	-	-
		Water supply sector Engineer	11,000	2.00	22,000	1.00	30	3,000		-
		Agro development specialist	11,000	0.50	5,500	0.25	8	750	-	-
		Institutional Specialist	11,000	0.50	5,500					
		Technicians	6,500	2.50	16,250	NA	NA	NA		
		Draftman	4,000	2.00	8,000	NA	NA	NA		
		Totals		19.00	246,750		225	30,325	6	10,200
				Grand total	287,275					
		Provision for transport 2% of total			5,746					
				Grand Total Phase 1	293,021					

1b	Phase 2. Duration : 12 Months Project Design Studies	Personnel Involved	Unit rate	Man.month	Total	Mission	Perdiem	Total	Trips	Total
	Dam preliminary design	Project Manager	21,000	8.00	168,000	2.50	75	13,125	5	8,500
	Design Development	Dam Engineer	14,000	2.50	35,000	1.00	30	3,000	2	3,400
	Cost estimate	Civil Engineer	19,000	2.50	47,500	0.50	15	2,625	1	1,700
	Economic study	Hydromechanical Engineer	17,000	1.50	25,500		-	-		-
	Presentation to DoWA	Hydropower Engineer	17,000	2.00	34,000	0.75	23	3,938	1	1,700
		Geotechnical Engineer	17,000	4.50	76,500	2.00	60	10,500	3	5,100
		Hydrologist	19,000	1.50	28,500	1.00	30	5,250	2	3,400
		Geologist	11,000	1.50	16,500	1.00	30	3,000		-
		Project Economist	21,000	3.00	63,000	1.00	30	5,500	2	3,400
		Environmentalist	11,000	1.00	11,000	0.50	15	1,500	-	-
		Hydraulician - Hydraulic Engineer	11,000	0.75	8,250		-	-		-
		Water supply sector Engineer	11,000	1.25	13,750	0.50	15	1,500	1	1,700
		Agro development specialist	11,000	1.00	11,000	0.25	8	750	-	-
		Institutional Specialist	11,000	1.00	11,000	0.50	15	1,500		
		Technicians	6,500	6.00	39,000	NA		-	NA	
		Draftman	4,000	5.50	22,000	NA		-	NA	
		Totals		43.50	610,500	11.50	345	52,188	17	28,900
	Topographical Investigations	Lump Sum			50,000					
	Geotechnical Investigations	Lump sum			350,000					
		Totals			400,000					
				Grand Total	1,091,588					
		Provision for transport 2% of total			21,832					
				Grand Total Phase 2	1,113,419					

1c	Phase 3: Duration: 7 Months Detailed Design Studies	Personnel Involved	Unit rate	Man.month	Total	Mission	Perdiem	Total	Trips	Total
	Detailed design development	Project Manager	21,000	5.00	105,000	2.50	75	13,125	3	5,100
	Quantity estimates	Dam Engineer	14,000	2.50	35,000	1.75	53	5,250	2	3,400
	Cost refining	Civil Engineer	19,000	1.00	19,000	0.50	15	2,625	1	1,700
	Technical Specifications	Hydromechanical Engineer	17,000	1.50	25,500	-	-	-	-	-
		Hydropower Engineer	17,000	1.50	25,500	0.50	15	2,625	1	1,700
		Geotechnical Engineer	17,000	0.75	12,750	-	-	-	-	-
		Hydrologist	19,000	-	-	-	-	-	-	-
		Geologist	11,000	-	-	-	-	-	-	-
		Project Economist	21,000	-	-	-	-	-	-	-
		Environmentalist	11,000	-	-	-	-	-	-	-
		Hydraulician - Hydraulic Engineer	11,000	-	-	-	-	-	-	-
		Water supply sector Engineer	11,000	0.75	8,250	0.50	15	1,350	-	-
		Agro development specialist	11,000	0.25	2,750	0.25	8	750	-	-
		Institutional Specialist	11,000	0.50	5,500	0.50	15	1,350	-	-
		Technicians	6,500	4.00	26,000	NA	-	-	-	-
		Draftman	4,000	3.00	12,000	NA	-	-	-	-
		Totals		20.75	277,250	6.50	195	27,075	7	11,900
		Grand Total			316,225					
		Provision for transport 2% of total			6,325					
		Grand Total Phase 3			322,550					

A.2.2 ESIA Study

2	Environmental & Social Impacts Assessment	Personnel Involved	Unit rate	Man.month	Total	Mission	Perdiem	Total	Trips	Total
2a	Phase 1 Duration: 5 Months	Chief environmentalist Study director	21,000	0.50	10,500	0.25	8	750	1	1,700
	Information and data collection	Environmentalist	11,000	3.00	33,000	2.50	75	7,500	1	1,700
	Socio environmental investigations	Basin conservation specialist	11,000	1.00	11,000	0.50	15	1,500	1	1,700
	Scoping of environmental issues	Expert participative approach and consultations	11,000	1.50	16,500	1.50	45	7,875	-	-
	Preliminary report preparation	Ecologist	11,000	0.75	8,250	0.25	8	750	-	-
		River Morpho-dynamic specialist	19,000	0.50	9,500	0.25	8	750	1	1,700
		Totals		7.25	88,750	5.25	158	19,125	4	6,800
		Total Phase 1			114,675					
2b	Phase 2: Duration 8 months. Consultative process and enquiries	Chief environmentalist Study director	21,000	2.50	52,500	1.00	30	5,250	2	3,400
	Report preparation	Environmentalist	11,000	5.50	60,500	4.50	135	13,500	-	-
	Presentation to Authorities and adjustments	Basin conservation specialist	11,000	2.00	22,000	0.50	15	1,500	-	-
	Issuance of final report	Expert participative approach and consultations	11,000	5.00	55,000	5.00	150	15,000	-	-
	Application for certification	Ecologist	11,000	2.50	27,500	5.00	150	15,000	-	-
		River Morpho-dynamic specialist	19,000	1.00	19,000	0.50	15	2,625	1	1,700
	Workshops			6,000	18,000					
		Totals		16.00	254,500	17	495	52,875	3	5,100
		Total Phase 2			312,475					
		Totals 2a+2b		23.25	427,150		653	72,000	7	11,900
		Provision for transport 2% of total			8,543					
		Grand Total ESIA Studies			435,693					

A.2.3 Other Studies

3	Other studies: Duration 6 months	Personnel Involved	Unit rate	Man.month	Total	Mission	Perdiem	Total	Trips	Total
3a	Transboundary issues capacity building	Expert Transboundary rivers	9,000	2.00	18,000	1.50	45	7,875	2	3,400
3b	PPP and financing strategy	PPP expert	21,000	2.00	42,000	0.50	15	2,625	1	1,700
		Expert Climate Change financing facilities	17,000	1.50	25,500	0.50	15	2,625	1	1,700
		Expert International Donors project financing	17,000	1.50	25,500	0.50	15	2,625	1	1,700
3c	Climate Change resilience issues	Expert Climate Change	19,000	1.00	19,000	0.75	23	3,938	2	3,400
		Expert water natural resources management	17,000	1.00	17,000	0.75	23	3,938	1	1,700
		Totals		9.00	147,000		135	23,625	8	13,600
				Totals	184,225					
		Workshops organization and management		4	6,000					
				Totals other studies	208,225					
		Provision for transport 2% of total			4,165					
				Grand Total other studies	212,390					

A.2.4 Study Management

4	Contribution from Government (Study management)	Units	Quantity	Unit Cost	Total	Type
	Salaries of participating personnel (Part time)	months	32	3,000	96,000	In Kind
	Availability of office space and office supplies	months	24	1,200	28,800	In Kind
	1 car and operation consumables costs	Lumpsum	1	60,000	60,000	Monetary
	Recruitment of study/project coordinator	months	32	3,750	120,000	Monetary
	Dam safety and Socio-Environmental Compliance PoE	3 times 1 week missions by four experts (incl perdiem and trips)	12	10,000	120,000	Monetary
		Total monetary contribution to Project Management			300,000	

Summary of Project Costs

Feasibility Studies	Personnel	Perdiem	Trips	Transport	Investigations	Total
Phase 1	245,000	30,375	11,900	5,746		293,021
Phase 2	617,500	45,188	28,900	21,832	400,000	1,113,419
Phase 3	277,500	25,125	13,600	6,325		322,550
Total	<i>1,140,000</i>	<i>100,688</i>	<i>54,400</i>	<i>33,902</i>	<i>400,000</i>	
					Total	1,728,989
					Contingencies, rounding off	91,011
					Grand Total	1,820,000
ESIA Studies	Personnel	Perdiem	Trips	Transport		Total
Phase 1	88,750	19,125	6,800			114,675
Phase 2	254,500	52,875	5,100	8,543		321,018
Total	<i>343,250</i>	<i>72,000</i>	<i>11,900</i>	<i>8,543</i>	-	
					Total	435,693
					Contingencies, rounding off	24,307
					Grand Total	460,000
Other Studies	Personnel	Perdiem	Trips	Transport	Workhops	Total
	147,000	23,625	13,600	4,165	24,000	212,390
Total	<i>147,000</i>	<i>23,625</i>	<i>13,600</i>	<i>4,165</i>	<i>24,000</i>	
					Total	212,390
					Contingencies, rounding off	7,611
					Grand Total	220,000
Study Management	Personnel			Transport		Total
Project Coordinator	120,000					120,000
PoE	120,000					120,000
Car and operation consumables				60,000		60,000
Total	<i>240,000</i>	-	-	<i>60,000</i>		
					Grand Total	300,000
Total Project Cost						2,800,000

Annex 3: Terms of reference for the Feasibility Studies

**Ministry of Natural Resources and Energy
Department of Water Affairs
The Kingdom of Swaziland**

African Development Bank / African Water Facility

NONDVO MULTIPURPOSE DAM FEASIBILITY STUDY

TERMS OF REFERENCE FOR THE CONSULTANT SERVICES

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Annex 1: Nondvo Dam Feasibility Study Indicative calendar

Annex 2: Map showing the project location

Annex 3: Estimate of Nondvo dam site investigations for feasibility and detailed design studies

List of Acronyms and abbreviations

AfDB	African Development Bank
BOQ	Bill of Quantity
CC	Consultative Committee
CRIDF	Climate Resilience Infrastructure Development Facility
DWA	Department of Water Affairs
EA	Executing Agency
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FS	Feasibility Study
GDP	Gross Domestic Product
ICOLD	International Committee on Large Dams
JMRBWS	Joint Maputo River Basin Water Resources Study
MDB's	Multilateral Development Banks
MNRE	Ministry of Natural Resources and Energy
O&M	Operation and Maintenance
POE	Panel of Experts
PPP	Public Private Partnership
RAP	Resettlement Action Plan
SADC	Southern Africa Development Community
SANCOLD	South Africa National Committee on Large Dams
SC	Steering Committee
SEC	Swaziland Electricity Company
SWSC	Swaziland Water Services Corporation

1. BACKGROUND

Swaziland is a landlocked, small open economy in Southern Africa. It has an area of 17,364 km² and a population of 1.2 million inhabitants. The country is largely mountainous with 75.8% of the population living in rural areas with livelihoods predominantly dependent on subsistence agriculture. It borders Mozambique and South Africa: the nearest ports are Maputo, which is 149 km away, and Durban, about 541 km away. With a Gross Domestic Product (GDP) per capita of about US\$ 3,500 in 2014, Swaziland is classified as a lower middle income country.

Swaziland has relatively well-developed infrastructure in comparison to other Sub-Saharan African countries, but there are a number of critical areas that require further improvement, especially for poor rural communities which can contribute to making growth more inclusive. In terms of water and sanitation, approximately 280,000 people lack access to potable water supply, while 430,000 – nearly 40 percent of the population – lack access to basic sanitation (Data 2013). Addressing issues of basic water supply and sanitation, especially in rural areas and small towns, is clearly a poverty reduction priority for the country. Ensuring adequate water supply to the fast growing area of the two main cities of Mbabane and Manzini will also contribute to develop productive activities and to economic growth. Though Swaziland's National Development Strategy was targeting universal access to safe water supply, sanitation, and solid waste management by 2015, the country lags far behind this ambitious goal.

The Government of Swaziland, Ministry of Natural Resources and Energy, Department of Water Affairs intends to assess the feasibility for the construction of the Nondvo dam on a tributary of the Lusushwana River. The objective of the dam is to store water in order to provide potable water to the two cities of Mbabane and Manzini which are currently suffering intermittent water shortage. On the meantime, the stored water could also be used for irrigation and for improving the output of runoff the river hydropower plants further downstream.

The choice of the Nondvo dam results from a multi criteria selection process developed during the execution of the Joint Maputo River Basin Water Resources Study (JMRBWRs)⁸ jointly undertaken by the Kingdom of Swaziland, the Republic of South Africa and the Republic of Mozambique. The study, financed by the European Union in 2008 to the Southern African Development Community (SADC) presented water resources development options which could be developed by the different member states within their territories in the Maputo Basin.

In Swaziland, all “normal flow” in the rivers, most of them being of transboundary type, has been allocated under the arrangements of the international treaties. “Normal flow” is water that has been calculated as being available 80% of the time during the driest month of the year which is the month of September. The only water than can be made available for allocation is surplus flow (during floods and rainy season) through harnessing in large storage reservoirs. This means that at the moment no water allocation to any new developments can be made as the water demand far exceeds the ‘normal flow’. This is a major challenge because further social and economic development in the country will be impeded by this lack of one of the most critical resources.

⁸ 2008 Skoy Plancenter Ltd in association with Diversity and Transformation Solution (D&TS), Ninham Shand, and Water for Africa

In Swaziland, previous studies indicated that the country could consider building the Nondvo dam to yield about 92 Mm³ of water for increasing the potable water supply to the two cities of Mbabane and Manzini with a current population estimated at 100'000 and 200'000 inhabitants respectively⁹. The additional resources mobilized through the Nondvo dam could also satisfy other demands for agriculture and hydropower generation along the Mbabane – Manzini corridor including rapid growing Matsapha and Ezulwini areas where the major part of industries and other economic activities of the country are concentrated or under development (Science and Technology Park, International Convention Centre, several new townships).

2. SCOPE OF THE PROJECT

The nature of the hydrological network of Swaziland, comprising rivers shared between several states upstream and downstream, coupled with highly seasonal rain patterns with relatively long periods of drought makes the management of the country surface waters very difficult and vulnerable to climatic changes. The economic and demographic growths of the country, the changes in the water usage patterns induce a significant increase of the demand and needs. The size of existing infrastructure and the capacity of equipment will soon become unable to satisfy the demand.

As a response to these constraints, the main scope of the project is to better exploit surface water by storing the surplus available during flooding periods above allocated abstraction limits established by the Tripartite Agreement signed with South Africa and Mozambique. The stored water will then be released along the year for the various downstream usages comprising water supply (domestic and industrial), hydropower generation as a non-consumptive usage and irrigation. During previous studies, the Nondvo dam site was also selected given its proximity to the cities of Mbabane and Manzini where the future water demand is the highest.

The project scope will therefore comprise the following:

- Design of an adequate infrastructure or modification of existing ones for storing surplus of water during flooding period with a technically, economically and environmentally optimized capacity;
- Assessment of alternatives to the construction of a new dam for retaining the best solution;
- Feasibility study of the retained solution up to the stage of detailed design of the storage structure and the conveyance system down to the water intake for water treatment. The water treatment installations downstream of the project will be studied at the level of basic design;
- Environmental and Socio Impacts Assessment (ESIA) studies of the designed project including Environmental and Social Management Plan (ESMP) and Resettlement Actions Plan (RAP) (Object of different specific Terms of Reference for recruitment of another Consultant);

Additional advisory services aiming at reinforcing capacity and skills of the Swaziland water sector institutions on the aspects of i) Climate Change Resilience, ii) PPP and financing strategy and iii) Transboundary Rivers issues are part of the project but will be performed through different assignments under the financing and rules of the CRIDF.

The Consultant in charge of the Feasibility Studies will be required to establish the appropriate collaboration and dialog with the Consultants in charge of the other studies and advisory services in order to (i) adequately incorporate their inputs in the overall project design and, (ii) provide the other consultants with the input they need from the feasibility study to carry out their analysis.

The present Terms of Reference are only relating to the feasibility study.

⁹ Last (UNDP) census results available for 2007 only at the Central Statistical Office (CSO) of Swaziland. Extended “metro areas” of Mbabane and Manzini were totaling 283,000 and 320'000 inhabitants respectively in 2007.

3. OBJECTIVES OF THE STUDY

The main objective of the Feasibility Study is to identify, define and design the infrastructure which will adequately satisfy the needs expressed by the Government Authorities:

- Increase the water availability for supplying domestic and industrial water for the cities of Mbabane and Manzini and the surrounding areas until 2050;
- Increase the generation of hydro-electricity through (i) existing runoff the river power plants downstream on the Lusushwana Rivera, and (ii) a possible new plant;
- Allow the utilization of stored water and regulated flows for irrigated agriculture downstream of the project along the Mbabane – Manzini corridor and further downstream.
- Meet the environmental needs downstream of the reservoir.

The dimensions and capacity of the infrastructures will be designed to satisfy the projected needs and demand till the year 2050. The design of the project will be optimized in order to achieve the best compromise between the various competing demands (water supply, hydropower generation, irrigation and environmental flows) and taking into account socio-environmental constraints and limitations imposed by the transboundary nature of the Rivers of Swaziland ruled by international agreements established with neighboring countries.

The deliverables will be reports, drawings and technical reports relating to the various surveys, investigations and tests performed by the Consultant as well as its computation notes for the dimensioning of the project infrastructure and works. A complete detailed design dossier will be prepared by the Consultant including technical specifications, bills of quantities, cost estimate, provisional construction schedule to a level sufficient for incorporation in the further Tender/Call for Bid Dossier for the construction of the project.

The Contracting Authority for the Consultant's contract will be the Ministry of Natural Resources and Energy (MNRE) which is also the Executing Agency (EA) thereafter designated "the Client". A dedicated project team, headed by a Project Coordinator within the Department of Water Affairs (DWA) will manage and supervise the progress of the studies. A Steering Committee and a Consultative Committee formed by representatives from various line ministries, agencies, State Owned Enterprises which are stakeholders of the project will be constituted. The function of the Committees is to take decision at the highest level and to arbitrate and take final decisions and choices when options are presented and to finally endorse the project design.

4. SCOPE OF THE STUDY

4.1 General scope

The challenge of the study is to identify and design a project satisfying competing water demands up to the horizon 2050 by optimizing its dimensions and costs and minimizing socio-environmental impacts. The project design must also incorporate adequate provisions for taking into account climate changes already observed and foreseen on the surface water patterns in the region.

In order to achieve this, the study will be rolled out in a sequence of 3 phases which are:

- Phase 1: Preliminary Scoping studies including:
 - Water balance forecast, including effects of climate changes;
 - Identification and multi-criteria analysis (cost, environmental impacts, benefits) of possible alternatives;
 - Assessment of the irrigation potential in the area of influence of the project;

- Economic optimization of the water allocation and optimization of the corresponding storage/reservoir volume;
- Phase 2: Feasibility and Design Studies of the retained solution including:
 - Reconnaissance and onsite investigations (topography, geology, hydrology, geotechnics, physical and socio-environmental impacts);
 - Development of the project preliminary design incorporating Climate Change effects, environmental, operational and institutional constraints;
 - Preliminary cost estimates and economic computations establishing usual indicators (Economic Rate of Return, Cost/Benefit ratio, Sensitivity analysis);
- Phase 3: Detailed design including:
 - Final design comprising technical documentations, computation assumptions, methods and notes, final drawings, guiding technical specifications, Bills of Quantities (BoQ), Cost estimate and general Project Information Memorandum (PIM).

Each phase will comprise the issuance of interim descriptive and progress reports, consultation meetings with the Project Team and other consultants and when required, presentations to the Committees. Endorsement of a phase results and outputs by the EA will be a condition for the Consultant to engage in the next phase activities.

4.2 Detailed scope of tasks

4.2.1 Phase 1: Preliminary Scoping Study

Task 1.1 Information and data acquisition

The consultant should collect relevant studies reports, data and information, review the Lusushwana River data as well as reports from previous regional studies (like the Joint Maputo River Basin Water Resources Study - JMRBWRS, the text of the Tripartite Agreement), sector and country/regional strategies, as well as national and regional policies related to water resources and agricultural development within the river basin. The Consultant should screen and synthesize the data related to policies, institutions, existing infrastructure, hydrology and meteorology, topography and maps, geology, soils and materials, multipurpose aspects, agriculture, hydropower, possible environmental impacts (both positive and negative), and socio-economic conditions for use in further analysis. The Consultant should at this stage perform a quick review of the basin hydro-meteorological station network and if needed recommend the upgrading of the hydro-meteorological data collection network for both the pre and post construction phases of the project scheme to enhance the better understanding and monitoring of the water flux in the catchment. Unless provided by the client, the Consultant will acquire at his expenses all maps, satellite photos, numerical and digital data bases required for the studies.

Task 1.2 Project context reconnaissance

Without precluding what will be the best solution for achieving the objective of the water supply project, the Consultant will carry out field reconnaissance missions to the project areas, the upstream watersheds as well as downstream areas likely to be affected to collect data, perform topographical visual appraisals and geotechnical/geological appraisal to identify the general geographical and physical context and issues to be resolved.

Task 1.3 Water resources availability and water demands assessment

The task objective is to assess the water resources availability and the estimated future uses and demands. The analyses of water resources will be based on existing situation / historic information if available, superimposed with the effect of climate changes in terms of changing hydrological regime – average flow levels, extreme event (floods and draughts) magnitude and frequency. Based on the analysis, the consultant

will match the water availability for each time segment with the water supply need and other demands at different levels of probability using appropriate hydrological techniques and match the water availability at monthly time segment with the demands. The Consultant shall:

- (i) Identify existing water storage structures within the project area and their modes of uses and operation;
- (ii) Establish the water balance forecast until the horizon 2050 and determine the current and potential future water uses and demands for the identified water consumptive uses targeted by the project, together with their seasonality, levels of service, priority of use and cumulative effects;
- (iii) Estimate optimal demands and their location areas for the various water uses to be satisfied with the available water resources taking into account constraints for not adversely affecting downstream users in compliance with the terms of the International Tripartite Agreement.

Concerning the potential for irrigation along the Lusushwana River downstream of the project site¹⁰, the Consultant will further develop the assessment conducted under the previous phase. Under this Task, the Consultant will assess the water demand for irrigation. This will be performed through investigations along the Mbabane – Manzini - Matsapha corridor down to the confluence with the Usuthu River. The Consultant will perform:

- (i) Assessment of the National Agricultural Development strategies and policies and the resulting opportunities and rationale for developing additional surfaces;
- (ii) Identification and mapping of areas prone for irrigation including possible conversion of grazing areas; This assessment will be based on: soil aptitude to irrigation, topographic constraints, current use of the soils and potential encroachment of urbanization;
- (iii) Assessment of the aptitude of the main rain fed farming systems to develop into intensive irrigated farming systems;
- (iv) Assessment of the existing agricultural value chains and of the demand for new crops;
- (v) Type of irrigation developments (Smallholders, commercial farming) and irrigation scheme (surface irrigation, sprinkler, etc.); assessment of their corresponding investment and operation costs and profitability;
- (vi) Proposition of cropping systems to be developed, and estimation of the water requirements at various time steps until year 2050 with a probabilistic approach.

Task 1.4 Scoping of alternatives to the project

Once the water balance and computation of demands projection for non-consumptive usages and the optimum corresponding storage capacity is established, the Consultant will evaluate possible alternatives to the project. This will comprise a screening process based on a multi-criteria approach combining technical, socio-economical, environmental and cost aspects. The Consultant will perform a quick assessment of cost/benefit of each identified alternative. Possible broadly identified alternatives are as follows:

- (i) increasing the existing dams' capacities by raising their crest level when technically and environmentally feasible;
- (ii) Down sizing the Nondvo dam project in order to limit households relocation and rerouting of the railway line which is flooded if the reservoir is designed with the maximum possible capacity. In this case, the usable volume may meet only the drinking water supply needs, but the dam feasibility would be improved and the time horizon for commissioning the dam would also be shorter;
- (iii) Identifying other possible dam sites;
- (iv) Combining infrastructure development with an ambitious demand management programme in order to reduce the water needs.

¹⁰ A first rapid field visit seems to show that due to topographic constraints and fast urbanization, the potential for developing irrigation is limited

At this stage, for each alternative the Consultant will conduct more accurate assessments with:

- (v) Calculating the optimum storage capacity required for satisfying the future projected demands taking into account the hydro-meteorological patterns of the river and catchment area;
- (vi) Assessing and quantifying any upstream water uses (abstractions/diversions) and their impacts to the proposed project;
- (vii) Undertaking water quality assessment of the surface water through consultation of previous study reports as well as data provided by the Swaziland Water Services Corporation;

Task 1.5 Socio Environmental aspects

A comprehensive Environmental and Social Assessment – ESIA Study, with related ESMP and RAP is assigned to another consultant independently from these Feasibility Studies. Nevertheless, the Consultant is required to appraise the environmental and social aspects of the project including land acquisition and resettlement sensitivities in the project area and, through the consideration of alternate project designs, develop project proposals (During all phases of the Feasibility Study) that avoid or minimize potential adverse environmental impacts. The options retained for the design development phase as well as the retained location of infrastructures will be made in consultation with the consultant in charge of the ESIA study.

Specifically, the consultant should:

- (i) Assess environmental and social impacts that could make the project non-feasible or financeable, or result in costs likely to exceed the intended benefits when mitigation is taken into account;
- (ii) Estimate the extent of resettlement and land and asset acquisition that would be associated with the project, and develop a preliminary concept of a development program for the area;
- (iii) Examine design alternatives such as changes in dam location, alignment, height, reservoir size, access road alignment, material sources (borrow areas), etc. and make comparison of such alternatives, in technical, economic, social and environmental terms, so that the best recommendations are passed on to the team members working on the engineering aspects for incorporation in the project designs.

The appraisal will be guided by the national environmental laws including land acquisition and resettlement related legislation, the Environmental Management and Rehabilitation Plan of the Lusushwana River corridor (2009), as well as AfDB safeguards.

The depth of the appraisal will be sufficient to adequately inform the development of alternate project designs, the selection and justification of the preferred alternative. Project alternatives that substantially convert or degrade important natural habitats should not be considered unless they include equivalent habitat restoration and maintenance within the project area or elsewhere. Design features to avoid adverse impacts, minimize land acquisition and involuntary resettlement, or enhance environmental/natural resource services are to be clearly noted in the description of preferred project alternatives, with suitable maps. Acceptability of the final project design will depend not only on its technical and financial feasibility, but also on its environmental and social suitability, including transboundary considerations.

Task 1.6 Selection of the solution

At the completion of this Phase 1, the Consultant will hold a meeting with the Steering Committee and Consultative Committee in order to present the solution to be retained for developing the most appropriate project for satisfying the forecast demands at the year 2050 horizon. The choice will be strongly motivated and substantiated with supporting data, computations and multi-criteria indicators illustrating the methods utilized during the screening and analysis process.

The retained solution will be selected through a comprehensive economic evaluation comprising:

- (i) Cost-benefits analysis for most attractive solutions;

- (ii) Taking into account of the added value of additional electric power generated along the cascade of HPP resulting from the better regulation of the water storage/floods/discharge by the project;
- (iii) Computation of the economic benefits generated from impacted various sectors (including additional irrigated land);
- (iv) The due consideration that the additional water supply required to address the forecast shortages is needed within the next 4 years (2020) and therefore a motivated arbitrage between the various competing water usages;
- (v) Due considerations for minimizing socio-environmental impacts which mitigation costs would be prohibitive.

The Client will endorse the choice of the solution as a notification for the continuation of the study to the Phase 2: Feasibility Study.

4.2.2 Phase 2: Feasibility study

Though depending on the results of the Phase 1, it is however likely that the construction of a new dam on the Nondvo river will be required if it is confirmed that increasing the storage capacity of the existing structures cannot satisfy the demand on the long term. (Year 2050)

The scope of the studies described hereafter is relating to the design of a dam of optimum dimensions to be techno-economically feasible. The studies under this phase are a continuation deepening of the investigations performed under the previous phase with focus on domains specific of dam and water management projects.

Task 2.1 Hydrological analysis

The aim of this task is to determine the hydrological patterns of the catchment area from where the retained solution will harness water resources and the resulting characteristics of the river discharge in order to dimension the critical components of the scheme and in particular the hydraulic capacities of the various infrastructures as well as the arrangements for the protection of the site and works during the construction. The analysis will also establish the volume of available water and thus the capacity and size of the other components of the project like the possible hydropower plant and the water conveyance system to downstream treatment plants. The recommended approach is through flood frequency analysis methods that the Consultant will describe and justify in the corresponding reports. The analysis will also factor the Climate Change considerations.

The task of the Consultant shall be to:

- (i) Undertake hydrological analyses to estimate reservoir yield, inflow design flood to facilitate the design and sizing of different hydraulic structures such as the reservoir, spillway and outlet/conveyance works;
- (ii) Determine the flow duration curves to determine the appropriate design of an hydropower plant components such as turbines, canals, penstock, etc. and the added contribution to the power generation of existing and projected runoff the river downstream plants ;
- (iii) Adopt appropriate hydrological techniques (such as modelling, etc.) to derive the required design flows and other hydrological information/statistics from the nearest available gauging stations, rainfall records, etc. where sufficient hydro-meteorological data are not available;
- (iv) Assess the spatial and seasonal fluctuations of climatic variables on the hydrological characteristics retained for the project;
- (v)
- (vi) Assess the effects of the proposed storage on existing uses.

Task 2.2 Flood risk assessment and mapping

Given the high density of populated areas downstream of the project catchment area and along the Lusushwana River, specifically the Manzini city and the Matsapha development zone, assessing the risk of flooding for extreme event of dam failure is a critical requirement. The Consultant, based on the topographic

data derived from the surveys (see Task 2.5) will perform the flood risk assessment and the corresponding mapping of the flood extension throughout the floodplain. He will plan, describe and cost the corresponding mitigation and remediation strategies including the appropriate warning systems.

The main tasks of the Consultant will comprise

- (i) Collect all information available in records and with local communities on the history of flooding, severity and damage caused by floods in the project areas and downstream along the Lusushwana River;
- (ii) Analyze hydro-meteorological records to assess the risk of flooding in the project areas with project situation;
- (iii) Simulate and map the flooding for 2 scenarios (with prior approval by the client), the extreme one being the conjunction of the dam failure during an episode of strong rainfall or exceptional flood. Flooding maps (1/10,000 to 1/25,000) should show classes of danger through combining water height and velocity;
- (iv) Identify major structural and nonstructural measures to prevent adverse impacts to communities, infrastructure and crops in the downstream area and
- (v) Prepare and describe measures, layouts and cost estimates which can be taken to avert floods under the planned project.

The results of the assessment will be illustrated by maps and diagrams for different scenarios of different levels of risk/danger.

Task 2.3 Sediment and morpho-dynamic Analysis

In view of the existing concerns of land degradation, erosion and sedimentation within the project area exacerbated by development of human activities (agriculture, housing, infrastructures) and Climate Change effects, the Consultant will assess the sediment regime and total sediment transport of the river system in the project area.

In addition, and in order to establish the most appropriate design of the project and take account of its impact on the downstream part of the river, the Consultant will apply a morpho-dynamic approach for predicting the possible evolution of the river bed as a result of the water storage and retention of sediments. The Consultant shall specify in its technical proposal the methodology which will be used to quantify the evolution of the river longitudinal profile and of the sedimentation in the reservoir.

This will include:

- (i) Determination of the sediment yield (estimates of sediment load should include projections of changes in upstream sediment release, based on upstream development plans, additional sediment data should be collected during the course of the studies, from the existing hydrological stations);
- (ii) Forecasting of dead storage volume and the future rate of reduction of the live storage and reservoir trap efficiency, which will require limited sediment sampling to the extent possible.

Other than design against the storage depletion (reducing yield and flood attenuation capability), this analysis should also aid the subsequent design against increased loads on the dam, abrasion of outlet structures (e.g. spillways) and mechanical equipment and blockage of outlets which could cause interruption of benefits (e.g. irrigation releases) and reducing the ability of the dam to pass floods safely (e.g. by blocking emergency outlet gates). The analysis will also lead for substantiating the operation manual of the dam in relation with planned releases and flush release for evacuating accumulated sediment. Sediment load estimates should include projections of changes in upstream sediment release, based on upstream development plans. The Consultant will take into consideration the action plans which are foreseen in the near future for the protection of the watershed under the guidelines, if they exist, prepared by the Ministry of Natural Resources and Energy and the Ministry of Agriculture of Swaziland and any other agency involved in the management of the territory. In the absence of such guidelines and actions plans focusing on river basin protection, the Consultant will issue guiding recommendations for watershed management

minimizing the impact on the life span of the scheme and recommendations on the constructive measures to be retained for the project design and its operation and maintenance.

Task 2.4 Economic and environmental optimization of the Dam and storage design

Based on the water demand, and resource availability computed during the previous phase and Tasks, the Consultant will design a dam/storage reservoir.

Based on the topographical surveys, the consultant will optimize the infrastructure dimensions (in particular the dam height and reservoir extension) in order to mitigate the infrastructure impacts especially regarding households relocation.

The consultant will in addition develop reservoir operating rules based on the optimization of multi-purpose benefits of the storage. A reservoir simulation model shall be developed to assess different combinations of multipurpose uses and project scenarios so as to derive an optimum water allocation solution, and to calculate the economic benefits for each project scenario. This analysis will include the optimization of the HPP cascade production taking into account the new HPP projects. Specifically, the Consultant should determine:

- (i) The optimum reservoir size and operational rules, taking into account the mitigation of environmental impacts mentioned above;
- (ii) Efficient and economic uses of the reservoirs; and
- (iii) The life of the reservoir based on the assessment of multi-purpose benefits of the storage and appraisal of sediment carriage and deposit.

The operating rules should maximize the returns on investment in storage. The Consultant should consider the prioritized multipurpose uses of the reservoir and environmental flows.

Task 2.5 Topographical surveys

This task aims to establish:

- (i) The configuration of the dam site and reservoir area;
- (ii) Accessibility to dam site;
- (iii) Accessibility to construction material sources and borrow areas, as a means towards confirmation of dam type and appurtenant structures selection; and
- (iv) Influence on type, layout, and downstream inundation in the selection of the spillway;
- (v) Mapping of the project downstream areas for the purpose of flood routing in case of dam failure;
- (vi) The identification of sensitive areas impacted by the reservoir, infrastructure, access roads and temporary structure that the ESIA study will have to consider like existing cultivated areas, dwellings and public infrastructure;
- (vii) A special attention will be put on the route of the abandoned railway line¹¹ along the future reservoir area. If it is impacted, the Consultant must propose solution for its relocation, duly considering the slope gradient limitation to be coordinated with Swaziland Railways.

The Consultant will carry out a combination of various methods of topographical surveys (on site surveys, numerical data bases, satellite imagery, LIDAR, etc.) to capture specific site features such as the proposed dam axis, spillway area, energy dissipation area, reservoir extent, surface area-volume-depth curves, river channel profiles, locations of proposed infrastructure for hydropower, water supply, livestock, fish farming if any, watershed intervention areas, etc.

The survey will also capture site features such as existing infrastructure within the proposed project area (roads, buildings, bridges, power lines, etc.), trees and vegetation, rock outcrops, etc. Prospective borrow areas for dam and construction materials and aggregates shall be mapped at a scale 1:2,000.

¹¹ Although abandoned, the Government is considering rehabilitating this railway line.

The consultant shall survey cross-sections of the river and its flood plain within the project area and downstream in the urban areas of Manzini at intervals at locations deemed relevant for incorporation in the mathematical hydraulic model of the river (to be specified in the technical proposals) for purpose of routing floods in the event of extreme spillway releases or dam failure. Topographic survey on the reservoir area extent shall be done to an appropriate scale with contour intervals of 1m up to an elevation of maximum water level + 5m.

The final output will be detailed and clear site maps (of a scale equal or better than 1:2,000 with 0.5m contour intervals (at locations of the selected dam site) and scales of 1:500 to 1:200 as applicable with contour intervals of 0.25 m (at locations of ancillary structures) and detailed Digital Terrain Model of the project areas. Both vertical and horizontal dam cross sections shall be prepared at a scale of 1:200 indicating the pertinent features of the head works.

For further reference on the sites of the dam, intake structures and conveyance mean, all the required benchmarks and stations shall be established using stable features and be properly connected with the national grid stations and benchmarks. The number of benchmarks will be proposed in the technical proposals. The method and results of topographic field surveys and mapping shall be duly reported.

Task 2.6 Geological and Geotechnical Investigations

Geological investigations will be conducted during the feasibility stage to such a level for the technical features, dimensions and location of main infrastructures to be sufficiently accurate for avoiding changes and additional investigations during the further Phase of the detailed design studies.

In its proposal, the Consultant is required to fill the form (Annex 3 to these ToR) which provides the description of the proposed activities and quantities that are considered necessary. Costs for mobilization/demobilization, transport and operation of equipment, staffing and associated logistics and conditions of execution must be separately identified. Quantities and types of investigations are indicative. The Consultant may recommend and quote other quantities investigations accompanied with adequately motivated and informed justifications.

The overall objective of the investigations campaigns and analysis will be to determine:

- (i) The general geologic and tectonic setting of the site area by analysis of the lithology, stratigraphy, structural geology, and tectonic history in situ and through exiting relevant documentation;
- (ii) The geologic conditions related to selection of the dam site (rock type, overburden, fractures, bedding which have a strong influence on the need for foundation treatment and costs);
- (iii) The characteristics of the foundation soils and rocks;
- (iv) Other geologic conditions (such as faults) that may influence design, construction, and long term operation;
- (v) Seismicity and earthquake intensity of the project area; and
- (vi) The sources of construction material in the vicinity of the project area.

The Consultant shall identify and geo-reference for illustration on maps, crucial soil and rock features, establish the engineering properties of rocks and soils, sub-surface deposits, and tectonic-structural patterns. The extent, depth, and type of exploration will depend on the complexity of the geology and size and type of dam as conceptualized by the Consultant.

Field Investigations will include but not limited to:

- (i) Exploratory boreholes and trial pits (main tool for investigation) for soil sampling and testing for engineering properties relevant for project design (permeability tests in boreholes, to be undertaken following accepted methods and standards). The consultant could consider topping up selected boreholes with open type piezometers for monitoring (during construction and further operation of the reservoir) pore water pressure and permeability;
- (ii) Foundation investigation of dam axis including the spillway (incl. carrying out geophysical tests as needed, at selected intervals to obtain data on stratification and groundwater) energy dissipation area,

intake area, river diversion works during construction, headrace tunnel, surge chamber, penstocks, power house site substation, (if a power plant is feasible at site), sources of construction materials, and infrastructure to the site;

- (iii) Assessment of uncertainties arising from interpretation of geophysical results and their possible impacts on costs and site viability;
- (iv) Preparation of geological profiles for the dam foundation, abutments, reservoir rim area and potential project command areas, showing all the geological structures in place and inducing the potential permeability and stability;
- (v) Preparation of geological map of the reservoir floor and rim, drawn to sufficient detail commensurate with the feasibility level to allow identification and assessment of potential leakage paths and water losses;
- (vi) Geo-reference possible sources of construction materials, and carry out tests to assess their engineering properties;
- (vii) Analysis of the tectonic/ seismic intensity of the area and recommend safety design measures (against sliding of dam slopes, settlements, sliding of abutments, liquefaction of foundations, cracking of dam body, loss of filter zones).

The final output of this task will be a detailed Geotechnical Baseline Report - GBR which translates the results of the geotechnical investigations and previous experience into clear descriptions of anticipated subsurface conditions upon which contractors may rely at the time of bidding for the construction of the scheme. It will contain the project geology/geotechnical aspects, with engineering properties used by the Consultant in the hydraulic and structural design of the dam. The report shall identify all the information required to reach a satisfactory level of accuracy of the geotechnical assumptions at the base of the design during detailed design phase without requiring additional investigations except those normally executed by the awarded contractors for complementary control purposes. The GBR will be updated as additional information is made available from the investigation campaigns and dedicated studies carried out during detailed design stage of the studies. The final version of the GBR will be provided by the Client as part of the tender documents.

All investigations that the Consultant describes and quotes in his proposal will be specified according to international standards and criteria for hydroelectric dams such as those of ICOLD and SANCOLD publications relating to subsurface investigation criteria, guidelines and manuals, with improvements as recommended by the Consultant.

Task 2.7 Preliminary Engineering Design for the dam and appurtenant structures

Based on findings of investigations relating to the dam site, the Consultant shall:

- (i) Carry out structural and hydraulic designs of the various dam components including foundations and abutments, dam structure, spillways, energy dissipating works, retaining walls, seepage control and internal drainage systems, river diversion works, intake, bottom outlet and gates, outlet works, terminal works; electro-mechanical system and components if any;
- (ii) Prepare the layouts and drawings of the different project components using acceptable CAD software at appropriate scales allowing quantity measurements;
- (iii) Propose dam safety monitoring and management systems and corresponding instrumentation for its surveillance during operation considering both structural and hydraulic safety; and
- (iv) Prepare a bill/schedule of quantities in line with Civil Engineering Standard Methods of Measurement (CESMM 4), for use in cost estimates and the economic and financial analysis of the feasibility study.

The Consultant will issue the corresponding design report, showing the various assumption and parameters retained for the design and the dimensioning. The report will described the methods or computation tools utilized as well as their references. The bills of quantities (BOQ) will be also provided in Excel format.

Task 2.8 Preparation of Outline O & M, Instrumentation and Emergency Preparedness Plans

In compliance with the Multilateral Development Institutions and International Instances guidelines, safeguards and operation procedures relating to Dam Safety and for review by the Panel of Experts, the consultant will prepare:

- (i) An outline of the dam Operation and Maintenance Plan;
- (ii) An outline of an instrumentation plan considering both structural and hydraulic safety (plan for the installation of instruments to monitor and record dam behavior and the related hydro meteorological, structural, and seismic factors, rationale for the instrumentation should be thoroughly documented) and
- (iii) An outline of the Emergency Preparedness plan (specifying roles of responsible parties when dam failure is considered imminent, or when expected operational flow release threatens downstream life, property, or economic operations that depend on river flow levels).

Task 2.9 Infrastructure design for the Hydropower component

Depending on the regime of the water discharge from the dam for the consumptive identified usages downstream and the environmental discharge, the consultant will assess the opportunity for the installation of a power plant and prepare corresponding feasibility level design. Given the small capacity of the plant (estimated at less than 1 MW but to be established by the Consultant) the distribution of electricity generated as well as the operation, management and maintenance of the plant will be likely taken over by the Swaziland Electricity Company (SEC) already operating the runoff the river plants downstream on the Lusushwana River. Detailed tasks will include the following:

Electricity sector and local network analysis

The Consultant will:

- (i) Identify and map the current existing electricity transport and distribution networks in the area, including transnational connection systems with ESKOM system and projects in progress or planned in Swaziland;
- (ii) Enquire on the strategies and development plans of the Swaziland Electricity Company;
- (iii) Establish with SEC the conditions for the take over and the operational constraints and requirements;
- (iv) Analyze the potential local power demand through a power market survey to serve for the economic computation (incl. history and condition of market, trends and growth rates of various consumer groups, tariff and tariff policy, other supply options and their prices, etc.);
- (v) Undertake a load forecast in the targeted areas that the plant can supply (incl. source of forecast, anticipated variation of load, distribution by geographical areas, scenarios and reserve requirements);
- (vi) Prepare a load-resource analysis for peak and average energy loads and resources (incl. identification of dates when power may be needed and impact of alternative assumptions on need for and timing of project); and
- (vii) Determine with SEC the need for and the timing of the hydropower generation from the power plant (incl. definition of the power system and comparison of projected loads with projected resources to determine the type, amount, and scheduling of power).

Reservoir simulation for hydropower generation

The Consultant will conduct studies, computations and simulations for determining the size and capacity of the small power plant and its operation parameters as well as the additional power generation from the downstream existing runoff the river power plants. The tasks will cover:

- (i) Determining the flow available for generation (as a result of competing demands, leakage and losses) and establish the duration curve (flow-duration curves, head-duration curves)
- (ii) Definition of the plant type and characteristics (tail water curve, storage-elevation curve, downstream flow requirements, range of expected heads and discharge series, effect of sediment on live storage and the loss of energy generation over time);

- (iii) Optimize energy output consistent with the reservoir simulation assessment established under previous task;
- (iv) Prepare discharge series that represent the flow available for power production, incl. definition of project operating criteria (operating constraints, downstream channel capacity constraints, etc.).

Energy potential analysis

The main tasks by the Consultant will be to:

- (i) Determine the energy potential of the proposed site by the new power plant as well as by the downstream existing ones (cascade effect) given the discharge series and other developed data. Documentation should include but not limited to: the type of analysis (duration curve vs. sequential routing method), model used as well as input assumptions (incl. alternative power installations studied, turbine characteristics, hydraulic capacity, efficiency, head loss, channel routing assumptions, generation requirements);
- (ii) Define power operation criteria including basis for selection of equipment (maximize firm energy vs. maximize average energy vs. maximize dependable capacity, etc., base load vs. peaking, total energy potential for the site, average annual energy, annual and peak demand months generation-duration curves.)

Evacuation Line alignment and Survey

The Consultant will undertake alignment and map the route of the evacuation line from the plant switchyard site to the nearest substation which will be designated by SEC taking over the operation of the plant and the distribution of electricity to targeted customers. Based on this survey, plan-profile drawings will be produced and used to spot structures. Information on the plan and profile should include alignment, stationing, calculated courses, roads, streams, and swamps etc.

Preliminary design of power plant and evacuation line

The Consultant's task will be to:

- (i) Identify a range of plant size and operating options for the retained reservoir informed by the power system requirements and marketability considerations, and select a range of options (operating modes, alternative methods for firming up peaking capacity, etc.);
- (ii) Analyze physical constraints and environmental and non-power operating constraints impacting the power generation activities (e.g. storage releases for water supply, irrigation, flood control regulation, minimum "environmental" discharges for water quality and fish, etc.);
- (iii) Determine the dependable capacity and compute energy benefits for the retained reservoir capacity and on the basis of net benefit analysis, select the best plant size;
- (iv) Establish dimensions and prepare the main and auxiliary plant equipment and performance specifications for complete out fitting of the power plant;
- (v) Prepare feasibility level designs, preliminary performance specifications of the power plant features including: civil works related to the power plant, the hydro-mechanical, and electro-mechanical works;
- (vi) Undertake preliminary design of the system for evacuation of electricity produced by the power plant into the market, including connection to the substation of the national grid. This will include: confirmation of design data (including but not limited to the transmission voltage, levelised current value, amortized life (40-50 years), location of evacuation line corridor, field effects of the transmission lines and environmental constraints) followed by conductor selection, consideration of wind loading, maximum tension determination, transmission towers, insulators, ruling span determination, spotting towers and magnetic effects;
- (vii) Prepare technical layouts and drawings of the proposed power plant (including intakes, headrace and tailrace canals, penstocks, powerhouse, etc.) and evacuation line infrastructure using Computer Aided Design software;

- (viii) Prepare a bill of quantities and cost estimates for the hydro-mechanical, electro mechanical and evacuation line, for input into economic and financial analysis.

Task 2.10 Conveyance system and water treatment plant

The stored water in the reservoir must be released for supplying the raw water to a treatment plant operated by SWSC for delivering potable water to the distribution network. The design and implementation of this new plant falls under the responsibility of SWSC, The Consultant will determine the optimum mean between several possibilities which are broadly: 1) an intake directly from the reservoir feeding a gravity conveyance work (pipeline or canal) to the new water treatment plant 2) an intake at the toe of the dam feeding a gravity conveyance mean or 3) controlled release from the dam in the river bed with a water intake – pumping station at the location of the new treatment plant.

The Consultant's task will be to:

- (i) Evaluate each alternative on the technical, operational and environmental aspects with due consideration for minimizing energy inputs (pumping);
- (ii) Justify and retain the optimal solution;
- (iii) Define the operation modes of the conveyance system
- (iv) Develop the corresponding design at the feasibility level;
- (v) Make recommendations on the type and capacity of the downstream treatment plant and layout arrangements assuring its safe and continuous operation as guiding principles for SWSC to design and implement the plant.

Task 2.11 Watershed management and protection

The task objective is to take stock of the baseline status of the watersheds in the project areas and identify major interventions required to improve, protect and maintain the watershed in a healthy and sustainable manner, in order to address sedimentation risks related to future depletion of storage (reducing yield and flood attenuation capability); abrasion of outlet structures and mechanical equipment and increment of loads on the dam) in order to sustain the proposed infrastructure.

The Consultant should:

- (i) Review watershed degradation hotspots in the catchments upstream;
- (ii) Identify current interventions and Government agencies policies and plans being applied to combat catchment degradation;
- (iii) Undertake a quick assessment of the current status of the watersheds;
- (iv) Consult the people living in the catchment area to understand their level of dependence on the resources of the watersheds;
- (v) Recommend for implementation by the responsible Authorities and agencies suitable soil, water and sustainable land conservation measures required to enhance the integrity and productive capacity of the watersheds;
- (vi) Assess improvement works in the upstream watershed to reduce erosion and sediment ingress into the reservoir, which would consequently improve water yields. This information will be used to estimate the associated impacts on the watershed and for financial and economic analyses; and
- (vii) Issue recommendations for the surveillance and the protection of the water quality in the watershed.

Task 2.12 Incorporation of ESIA study outputs

Under a separate contract, an independent ESIA study including an Environmental Management Plan EMP and Resettlement Action Plan RAP will be prepared for the projects as will be described in the final feasibility report. Thus, as part of that report, the Consultant should provide and exchange with the Consultant in charge of the ESIA, documentation of the environmental and social information and analyses used to design the project, of the measures included to avoid or minimize adverse impacts, and of project

plans to manage adverse impacts. In particular. The Consultant shall collaborate closely (through liaison and regular meetings) with and provide support to the Consultant hired to conduct the ESIA, for the assessment of potential impacts and design of mitigation measures. Collaboration between the consultants will also focus on costing key items from the EMP for inclusion in the project costing and economic study. Other areas of collaboration/exchange of information will be determined from time to time, in order to enhance the quality of the study outputs.

The Consultant shall adapt the design in order to meet the recommendations of the ESIA study team.

Task 2.13 Considerations on Climate Change

The AfDB is currently rolling out a Climate Safeguard System (CSS) as a set of decision-making tools and guides that enable the screening of projects in vulnerable sectors for climate change risks and to identify appropriate adaptation measures to reduce vulnerability. As a result of the nature of the project, a preliminary assessment has classified the Nondvo dam project as a development which may be very vulnerable to climate risk (Category 1). This requires a detailed evaluation of climate change risks and adaptation measures, and the development of comprehensive risk management and adaptation measures which are to be integrated into the project design and implementation plans.

A Climate Change Expert will be assigned under a different service contract managed and funded by the CRIDF. The Consultant for the Feasibility Study will incorporate as inputs to its design study the results and recommendations of the Expert activities. The envisaged scope of activities (quoted pro-memoria) of the Climate Change Expert funded by CRIDF will include a detailed evaluation of climate change risks associated with the proposed Nondvo dam project as follows:

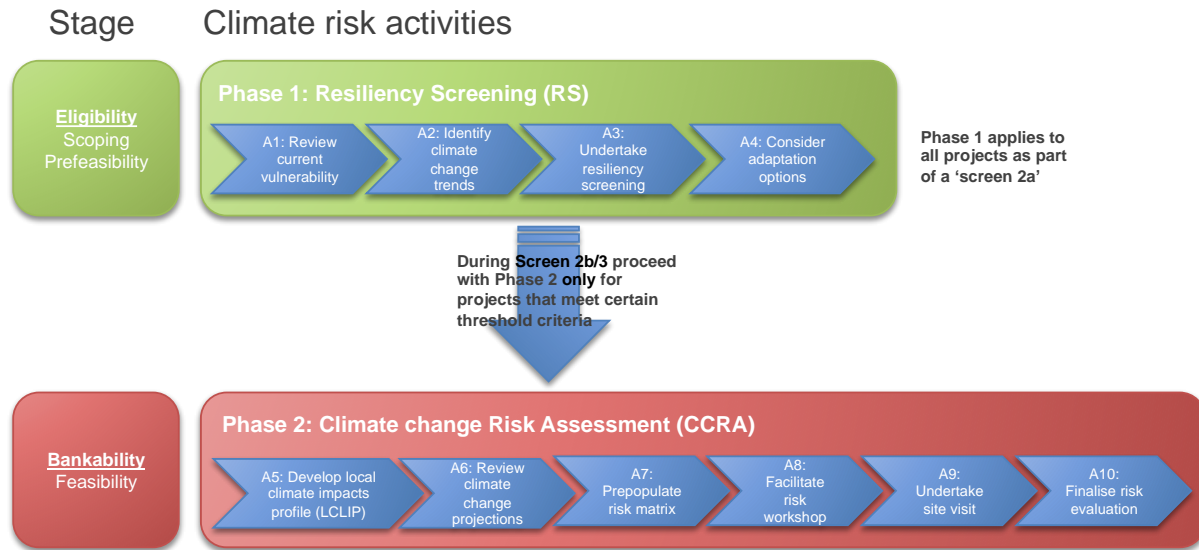
CRIDF will apply their *Climate Change Risk Assessment (CCRA)* protocol, which provides guidance on the activities to be undertaken and deliverables to be produced in order to assess, document and manage climate risk for projects such as the proposed Nondvo Dam.

The protocol is accompanied by three tools:

- 4) The CRIDF climate vulnerability tool, which provides an high level analysis of the regions vulnerability to climate change through a set of key indicators.
- 5) The Climate Change Risk Assessment Tool to support the undertaking of the Phase 1 and 2: Climate Change Risk Assessment. It includes a comprehensive risk matrix for which this protocol provides guidance on how to complete.
- 6) A set of projections and accompanying impact statements covering the whole of Southern Africa. They are based on a new technique called self-organising maps, which help reduce uncertainty associated with the range of different models available.

The protocol has two phases, which are shown in the figure below

- **Phase 1: Resiliency screening** is comprised of activities 1- 4. These activities form a basic preparatory due diligence and are to be undertaken at concept stage (scoping/prefeasibility) for all projects and most likely undertaken by members of the project team.
- **Phase 2: Climate Change Risk Assessment** is comprised of activities 5-10 and should be undertaken at feasibility/detailed design stage. Phase 2 is detailed and intensive and requires specialised inputs from climate scientists, modellers and climate risk experts, travelling, engagement with stakeholders and on-site presence by a specialist. As such it is only required for projects that meet certain threshold criteria e.g. in terms of size, risk, financing and other strategic considerations; CRIDF recommends the application of Phase 2 to the Nondvo Dam project.



The CRIDF experts will apply the CCRA methodology to Nondvo Dam and in doing so provide Technical Assistance to DWA for mainstreaming climate change in the project preparation.

The Consultant will utilize the results of the assessment performed by CRIDF Expert of the general risks of climate change on reservoirs and dams to identify the implications it has on the design of the project and its future strategic management and operations which may require further adaptations.

For background of its design choices, he will use the potential climate change variables or effects with the corresponding level of climate change predicted in the project area that have been identified by the CRIDF expert who may use General Circulation Models (GCM's) and Regional Climate Models (RCM's) or any appropriate methodology inspired from current practices¹².

When conducting the vulnerability assessment of the project, the Consultant will liaise with the experts working on the subject of Climate Change Resilience within the scope of services described above funded by CRIDF.

The retained design for the infrastructures will incorporate an adaptive capacity of the project describing how easily it can be altered to accommodate change to address risks or damages exacerbated by cycles of wet or dry prevailing conditions resulting from climate change. The ultimate aim for the Consultant will be to demonstrate that the design of the system of water storage and water supply has a greater resilience to the impacts of climate change

Task 2.14 Confirmation of Project Layout and Preliminary Design Report

The Consultant will, based on the preceding tasks confirm the project layout, which will include:

- (i) Updating and revision of design parameters;
- (ii) Evaluation of layout alternatives; clearly indicating the assumptions used;
- (iii) Preparation of the final desk project layouts (including main project components, identified potential irrigation area, dam axis location and alignment, dam type, configuration, cross-sections, intakes and waterways, river transfer and diversion works, regulation works, etc.).

¹² Example of the UK: "Impacts of Climate Change on Dams and Reservoirs", Final Guidance Report: May 2013 Atkins Consultants for the Department of Environment, Food and Rural Affairs. .

Following confirmation of the project layout, the Consultant should prepare a preliminary engineering design report and optimize the layout of the main components.

At that stage, the Consultant will co-organize and participate to a workshop for presenting the project to the Client and the Steering and Consultative Committees and various stakeholders. The aim of the workshop is to validate the design parameters and the various selected/retained technical, institutional and organizational orientations relating to the project. The Consultant will prepare the necessary illustrative and descriptive material for the workshop (Project Information Memorandum, Power Point Presentations, etc.) and will validate the workshop agenda with the Client team. He will also establish the minutes of the workshop and the workshop report as the basis for adjusting the design and orientations of the project resulting from comments and suggestions issued by the participants.

Task 2.15 Construction Plans and Implementation Schedule

The Consultant shall establish construction schedules for the implementation of the project components (dam, irrigation system, power station, outlet works and conveyance system for the water supply – to the treatment plant). Apart from the construction items of the earthworks and concrete works for the main structures these schedules shall include activities such as mobilization, construction of access roads as well as routes to borrow areas, mapping and information on quantity and quality of borrow areas, establishment of the construction camp, provision of housing and transport facilities for supervising staff, construction packaging, work methods and preliminary labor force requirements. In the schedules the Critical Path Method shall be applied. Based on this analysis, the disbursement schedule of the project main components will be estimated as an input for the financial and economic analysis.

Task 2.16 Institutional analysis

The objective of this Task is to design institutional arrangements for the proposed project to be sustainably implemented, operated and managed. The consultant will assess institutional constraints and opportunities for efficient management and operation and maintenance of the project infrastructures. The institutional analysis will define the linkages with the current institutional set-up of the national water resources management sector in view to recommend implementation arrangements.

The assessment will result in recommending, within the existing institutional framework the most appropriate arrangements for the ownership of the infrastructures, their operations and maintenance, the set-up of fees and tariffs for the delivered water (for water supply or/and irrigation) and the produced electricity. The activities will cover:

- (i) Assessment of the institutional (including environmental and social) capacity of local agencies in charge of the water resource sector, the water supply utility (SWSC), the electricity utility (SEC) and those supporting agriculture and irrigation services;
- (ii) Assessment at the field level of the importance of and access to local groups and institutions for different socio-economic groups for both women and men;
- (iii) Assessment of private sector involvement in the water supply and electricity generation sectors and the agriculture/irrigation sector;
- (iv) Possibilities of implementation and operation arrangements for the potential project(s) including opportunities for Public-Private-Partnerships (PPP).

Task 2.17 Preparation of Cost Estimates and Benefits

The consultant shall identify and value the costs and benefits that will arise with the proposed project for purposes of comparison with the situation as it would be without the project and determining the incremental net benefit arising from the project investment. This will involve preparation of financial cost estimates, for the various project options and components with expenditure schedules for capital costs, replacement costs, operation and maintenance, management costs, etc. for all activities and services.

A summary of the financial and economic cost estimates should be provided in a tabular form and appropriately classified and discussed. All cost estimates must show the foreign and local currency requirements; taxes, subsidies should be identified and their implications analyzed; physical and price contingency allowances should be quantified appropriately for each component/activity of the project. The consultant should prepare estimates of project benefits, which should include: direct/indirect benefits, revenues generated by the supplied water, the additional electricity and the water delivered for irrigated lands, tangible benefits (arising either from an increased value of production or from reduced costs), intangible benefits (such as new job opportunities, improved environmental conditions, through increased availability of water etc.).

The consultant will also estimate secondary benefits created or costs incurred outside the project (using shadow pricing techniques/non market valuation), so that they can be attributed to the project investment in the economic analysis. Residual values must be calculated. Analysis should include sensitivity tests for different critical parameters and should also involve climate change scenarios having potential negative impacts on the revenues/benefits generated by the project. Economic costs and benefits shall be estimated in economic prices.

Task 2.18 Economic and Financial Analysis

The Consultant shall perform the economic and financial analysis of the project for determining the usual indicators and parameters allowing further decision on the funding and implementation of the project. The financial analysis shall be conducted for each of the institution which will be in charge of operating/constructing a component of the project (Dam, Hydropower plant, conveyance mean etc...). The Consultant will:

- (i) Compile and tabulate estimated incremental direct financial benefit streams from the various water usages (Bulk water supply to the SWSC, additional electricity generated, revenues from tariffication of water for irrigation);
- (ii) Undertake project economic and financial analysis using standard techniques (for the water supply, electricity production and irrigated agriculture). This should include determination of the financial and economic viability of the project, by carrying out analyses to determine the net present value (NPV), cost benefit analysis (CBA; B/C ratio), Net benefit – investment ratio and financial and economic internal rates of return (FIRR, EIRR), including different discount rates; The economic analysis will take into account the indirect benefits and costs.
- (iii) The Consultant should also perform sensitivity analysis on important parameters (including calculation of switching values) to check their impact on the financial and economic viability. The consultant should clearly list what assumptions are made and which key developments are needed to reach FIRR and EIRR.
- (iv) The key information for the project shall be presented in tabular format. The Consultant should also provide documented analysis in Excel spreadsheets and based on this analysis make final recommendations on the way forward.

The Consultant shall closely liaise with CRIDF which will assess the PPP feasibility of the project and shall provide to the CRIDF team its financial model as well as all inputs needed to develop the PPP feasibility financial structuring and model.

Under this task, the Consultant will also assess the potential of the project for contributing to green growth economy. He will determine and substantiate how the project can help the country economy and societies become more resilient as its multipurpose nature contributes to meet demands for domestic water, food production, industrial productive activities and energy.

Task 2.19 Feasibility Study Report

The Consultant will prepare a feasibility study report for the project, which shall document the feasibility study investigations carried out, findings and information. The reports shall contain firm statements on the technical, economic/financial and environmental and social sustainability, and recommendations on project suitability, if necessary through a multi-criteria analysis. The reports shall include concise executive summaries to make the report more accessible to the public. The results of the investigations shall be compiled and appended in a separate volume. This volume will aim at evidencing that the amount of investigation carried out brings a sufficient understanding of the site conditions to finalize the project layout and cost estimate with an acceptable level of accuracy at feasibility level. The reports will form a decision point on whether to advance the studies (Phase 3: Detailed Design Studies), in case the viable option has been identified and confirmed by the Client.

4.2.3 Phase 3: Detailed design

For the selected and agreed design alternatives/layouts, the Consultant shall prepare the detailed final design. The detailed design should include assumptions, analyses, conclusions and recommendations as well as calculations and justification of the methods used for various computations, detailed organizational charts and schedules for implementation, drawings and bill of quantities. The Geotechnical Baseline Report (described under the feasibility study) will be an annex to the Detailed Design documentation. The overall objective of the Detailed Design Phase is in addition to the development of the selected project design performed under the previous phase is to produce a comprehensive documentation which can be directly incorporated in a further Tender Dossier for the construction of the project infrastructures. This implies that the Detailed Design will be elaborated to such a level that:

- (i) Technical features of the project are finalized/fixed;
- (ii) Drawings and plans as well as quantities of works are accurate enough to minimize uncertainties for Contractors to bid for the project construction.

Task 3.1 Topography

If it is required to achieve a sufficient level of accuracy for the final positioning of main infrastructures and to establish accurate bills of quantities to be included in the detailed design documentation, the Consultant, within the scope of the Phase 3 can perform limited additional topographical surveys in view to:

- (i) Prepare a topographic map of the dams at a scale not more than 1:500 and at a contour interval of not more than 0.5m, showing all the features upstream and downstream, right and left of the proposed site, including observation pits and material source areas;
- (ii) Prepare dam site cross-sections at vertical and horizontal scales of 1:200 indicating pertinent features to the head works;
- (iii) Establish additional benchmarks if needed and connect them to national grid stations and;
- (iv) Prepare longitudinal profiles of the conveyance main to the water treatment plant to be projected by SWSC at a scale of vertical 1:100 and horizontal 1:500.

The structures shall include but not be limited to access roads, foundation excavation and treatment works, embankment zoning, dam instrumentation, concrete outlines and placement details, reinforcement details, construction and expansion joint details, block outs for mechanical installations and second stage concrete.

Task 3.2 Geology and Geotechnics

Building on the Geotechnical baseline Report (GBR), the Consultant shall update data series and if necessary, additional/complementary geological/geotechnical investigations (mainly with boreholes) shall be carried out to facilitate a responsible decision for “fine tuning” purposes during the detailed design. Further investigations will be carried out into the sources of construction materials and concrete aggregates. The suitability of the dam fill/construction materials shall be tested for compaction and permeability. Aggregates shall be tested on the likelihood of developing Alkali Aggregate Reactions when applied to concrete structures.

Task 3.3 Dam /Diversion Structures Design

The Consultant should prepare:

- (i) The detailed design of the dam of the selected type with due considerations of topography, geotechnical patterns and availability of construction materials;
- (ii) Detailed structural and hydraulic designs for the dam site, spillway, intakes, bottom outlet, gates, energy dissipating mechanisms and other appurtenant structures with respect to maximum flood estimates and maximum scour depth with consideration of both structural and hydraulic safety;
- (iii) Detailed structural and hydraulic designs for the diversion structures during construction period with respect to maximum flood estimates keeping the geologic and geotechnical information into consideration;
- (iv) Update of the cost estimates;
- (v) Operating, maintenance and surveillance manuals for outlet structures, for flood control, power and environmental releases.

Task 3.4 Power Generation and Evacuation system design

The Consultant will:

- (i) Prepare final power plant designs, specifications of the power plant features including: civil works related to the power plant, the hydro-mechanical and electro mechanical works;
- (ii) Prepare detailed designs and specifications (incl. conductors, cables, insulators, hardware, accessories, transmission towers and construction specifications) for the transmission line to evacuate electricity produced to the SEC network;
- (iii) Prepare layouts of the proposed power plant (including intakes, headrace and tailrace canals, penstocks, powerhouse, etc.), and transmission line infrastructure using Computer Aided Design software;
- (iv) Prepare a schedule of quantities and cost estimates for the hydro-mechanical, electro mechanical and transmission equipment and works.

Task 3.5 Preparation of Draft O& M, Instrumentation and Emergency preparedness plan

Building on Task 2.8 and with reference to AfDB and MDBs' guidelines on dam safety, the consultant will prepare the following broad framework plans (which will be reviewed by the PoE).

- (i) A draft Operation & Maintenance (O&M) plan (containing: General Information; Salient Project Features; Operation Guidelines and Procedures; Monitoring Programme; Safety Inspections; Directory of Drawings, Records, etc);
- (ii) A draft instrumentation plan;
- (iii) A draft Emergency Preparedness Plan (containing (a) issues of organization, communication, procedure for evacuation, local facilities, etc. and (b) Dam break analysis, Inundation map, emergency warning system and plan, safety equipment, warning levels and response matrix for different deficiency levels and other information specific to the reservoir).

5. COMPOSITION OF THE FEASIBILITY STUDY TEAM

The study team should comprise experienced professionals, and include national/regional/international consultants as necessary to ensure study relevance and effectiveness in light of prevailing local conditions. The team should reflect an appropriate mix of disciplines, education, skills and experience, an understanding of underlying development issues, and regional experience. The team should be made up of specialists each with a university degrees in the relevant discipline and the required years of experience in undertaking studies related to large hydraulic infrastructure, urban water supply, irrigation development and watershed management projects.

The following list of personnel is indicative, but all quoted specific skills and expertise must be represented in the team proposed by the Consultant. When a same expert cumulates several domains of skills for

occupying several positions, the corresponding CV must clearly evidence such capabilities through education background and experiences.

Project Manager (Team Leader): In charge of the overall management of the Consultant's team. Senior Civil Engineering Expert with a Master's Degree, specialized in dam engineering with at least 15 years of experience in projects of similar nature and scale within the frame of international contracts.

Dam Engineer: At least an MSc in Civil Engineering with specialization in Dam Engineering. A minimum of 10 years of experience in designing dams and hydraulic structures.

Civil Engineer: At least a Bsc in Civil Engineering. Minimum of 15 years of multidisciplinary experience in designing various infrastructures associated to dam and water management projects.

Hydromechanical Engineer: Master's Degree in Mechanical Engineering. Minimum of 10 years of experience in designing hydromechanical structures and equipment associated to dams and hydropower plants.

Hydropower Engineer: Minimum of Bachelor's Degree in mechanical/electrical engineering. Minimum 10 years of experience in designing hydropower power plants. He/she should have a good understanding of the electricity sector in countries of the SADC region.

Geotechnical Engineer: At least a Master's Degree in Civil Engineering with a specialization in Geotechnical Engineering with at least 10 years of experience in conducting onsite reconnaissance activities, geotechnical investigations and studies for the design of dams.

Hydrologist: A minimum of Master's Degree in Hydrology, Water Resources Engineering with a minimum of 10 years of experience in the field of water resources planning, flood analysis and reservoir management. He/she must demonstrate confirmed experience in relevant data acquisition, compilation and analysis for projects of similar nature in Africa.

Geologist: Minimum of Master's Degree in geology with minimum 15 years of experience in reconnaissance surveys, geological data analysis and interpretation for dam projects. He/she must demonstrate a previous experience in Africa and knowledge of the regional geological features.

Project Economist: At least a Master's Degree in Economy or any relevant field with a minimum of 10 years of experience in the analysis and evaluation of large infrastructure projects of the water sector.

Environmentalist: Postgraduate qualification in Environmental management or related fields and at least 10 years work experience in Environmental Assessments. Knowledge of Development Finance Institutions social and environmental safeguards is a must as well as consultative approaches and methods for mitigating socio-environmental impacts of large infrastructure projects. He/she must demonstrate a good knowledge of other cross-cutting issues like Climate Change effects, Gender and Inclusive development.

Hydraulic Engineer - Hydraulician: A minimum of Master's Degree in hydraulics with a minimum of 7 years of experience and specific references in flood risk assessment and mapping.

Water Supply Sector Engineer: A minimum of Master's Degree in Civil Engineering with specialization in hydraulics with a minimum of 10 years of experience in designing water supply schemes in Africa.

Agro-development Specialist: A minimum of Master’s Degree in agronomy or agro-economics with a minimum of 10 years of experience in the socio-economic evaluation and design of agriculture projects in Southern Africa.

Institutional specialist: Advanced Degree/Master in Business Administration with a minimum of 10 years of experience in advisory services to public services institutions and utilities in Southern Africa.

6. CALENDAR AND DURATION

The overall duration of the Feasibility Studies activities is estimated at 24 months. The indicative breakdown in phases is the following:

Phase 1: Preliminary scoping Study: 5 months including two months for the government decisions/comments on the draft final phase I report and approval of the final report completion;

Phase 2: Project Preliminary Design: 12 months including two months for the government decisions/comments on the draft final phase II report and approval of the final report completion;

Phase 3: Project Detailed Design: 7 months including two months for the government decisions/comments on the draft final phase III report and approval of the final report completion

The Consultant may propose a different sequence with motivated justifications or demonstration of advantages in terms of duration. In this case, the Consultant should also adjust the schedule of deliverables. The indicative calendar in Annex 1 illustrates the suggested timing and sequence of Feasibility Studies Phases and main activities.

7. DELIVERABLES, SUPERVISION AND COORDINATION

7.1 Deliverables

At critical times of the Feasibility Studies progress, the Consultant will deliver reports and hold presentation meetings with the Client and stakeholders as per the following table/schedule. Final reports will be delivered in hard copies with a soft version on an appropriate support (CD or USB key). Draft reports and other interim reports and quarterly progress notes will be delivered in soft version only.

Phase #	Report/Presentation Meeting to DWA	Description	No of Copies
1	Draft Scoping Study Report (Month 3)	Contains results and findings on the hydrology and water resources assessment, water demand analysis and assessment of alternatives. It includes the justified and motivated selection of the solution to be retained.	Soft Copy
1	Presentation Meeting to DWA (Month 4)		
1	Final Scoping Study Report (Month 5)	It is the final version of the draft report incorporating remarks from the Client and Stakeholders and the minutes of the presentation meeting regarding the retained solution to be further designed.	5 Hard Copies + Soft
2	Interim Report on Phase 2 (Month 8)	It presents the progress at mid-term of the design/feasibility study activities	Soft Copy
2	Draft Design/Feasibility Report (Month 15)	The report will contain design documents describing the approach and results, the geotechnical baseline report (GBR), and all relevant annexes. A meeting with the client will be held at Month 16 for presenting and discussing the report.	Soft Copy
2	Presentation Meeting to DWA (Month 16)		

Phase #	Report/Presentation Meeting to DWA	Description	No of Copies
2	Final Design/Feasibility Report (Month 18)	The report is the final version of Draft Design/Feasibility Report incorporating and reflecting the remarks and comments from the Client and stakeholders. It will contain a complete technical description of the recommended schemes, including justification, analysis, computation, drawings, figures and maps as well as detailed reports on all subjects treated in the scope of the study, such as social and environmental impacts of the project. It also forms the decision point for engaging into the detailed design Phase 3.	5 Hard Copies + Soft
3	Draft Detailed Design Report (Month 21)	Covering Detailed design study of the project incorporating Client and stakeholders' comments.	Soft Copy
3	Final Detailed Design Report (Month 24)	It is the comprehensive final Detailed Design Report comprising all technical documentation, drawings, computation notes, BOQ and Technical Specifications	10 Hard Copies + Soft
1,2,3	Quarterly progress notes (1 st week of every quarter)	10 pages maximum comprising a narrative and bar charts or other graphic presentation, showing details of the Consultant's progress, changes in the assignment schedule, impediments and proposed remedies will be submitted on a quarterly basis. Notes should include a financial summary, indicating amounts invoiced, amounts disbursed, and any other pertinent financial details.	by Email

7.2 Supervision, coordination and consultation

The Executing Agency will be the Ministry of Natural Resources and Energy (MNRE). The Department of Water Affairs (DWA) will manage and supervise the project. DWA will recruit a full time Project Coordinator.

A Project Steering Committee comprising senior representatives from the concerned Ministries and Utilities will review the reports, select the best option on the basis of the Consultant findings and recommendations, and provide guidance to the Executing Agency.

The project will impact positively and negatively a number of stakeholders, and the selection of the option as well as the feasibility study should be supported by a transparent consultation process. For this purpose, the MNRE shall establish a Consultative Committee composed of the main stakeholders, inclusive of Civil Society representatives.

Meetings as needed at key dates during the Feasibility Study will be organized by the Executing Agency for coordination between the Consultant and the other consultants in charge of the ESIA studies and the advisory services funded by CRIDF.

An Independent Panel of Experts (POE) (Dam Safety and ESIA compliance) will be involved in the studies under funding to be secured by the Executing Agency.

The Steering Committee (SC) and the Consultative Committee (CC) with the time to time participation of other consultants will hold general coordination/consultative meetings as per the following schedule:

<i>Event</i>	<i>Month No.</i>	<i>Attending Parties</i>	<i>Objective</i>
Phase 1	M + 2	Consultant FS , EA, SC	Kick-off meeting for FS inception
Phase 1	M + 4	Consultant FS, EA, SC, CC	Presentation of Phase 1 Draft report
Phase 2	M + 9	Consultant FS, EA, SC, Consultant ESIA, other Consultants, POE	Information on progress and orientation of the project design and studies

Phase 2	M + 16	Consultant FS, EA, SC, CC, Consultant ESIA	Presentation of Draft FS report
Phase 3	M + 22	Consultant FS, EA, SC, POE	Presentation of Draft Detailed Design report

From time to time in accordance with the AWF/Bank's rules, field inspection missions will be carried out for monitoring and follow-up purposes.

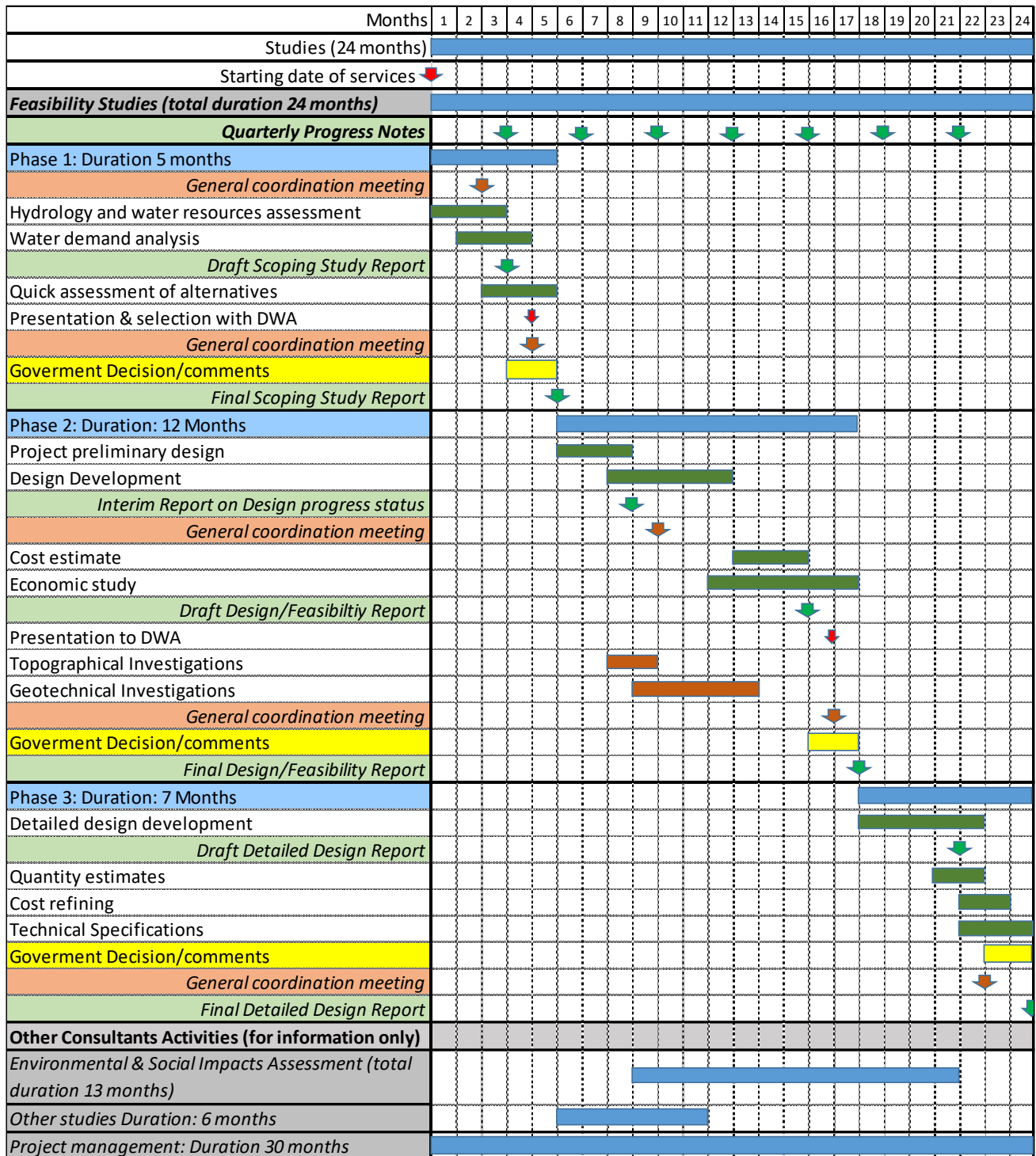
8. DATA AND SERVICES TO BE PROVIDED BY THE CLIENT

Data and documentation on hydrological, meteorological, water quality and other relevant aspects of the river basin including previous studies reports available in the MNRE will be availed to the consultant. . In addition, the Client will:

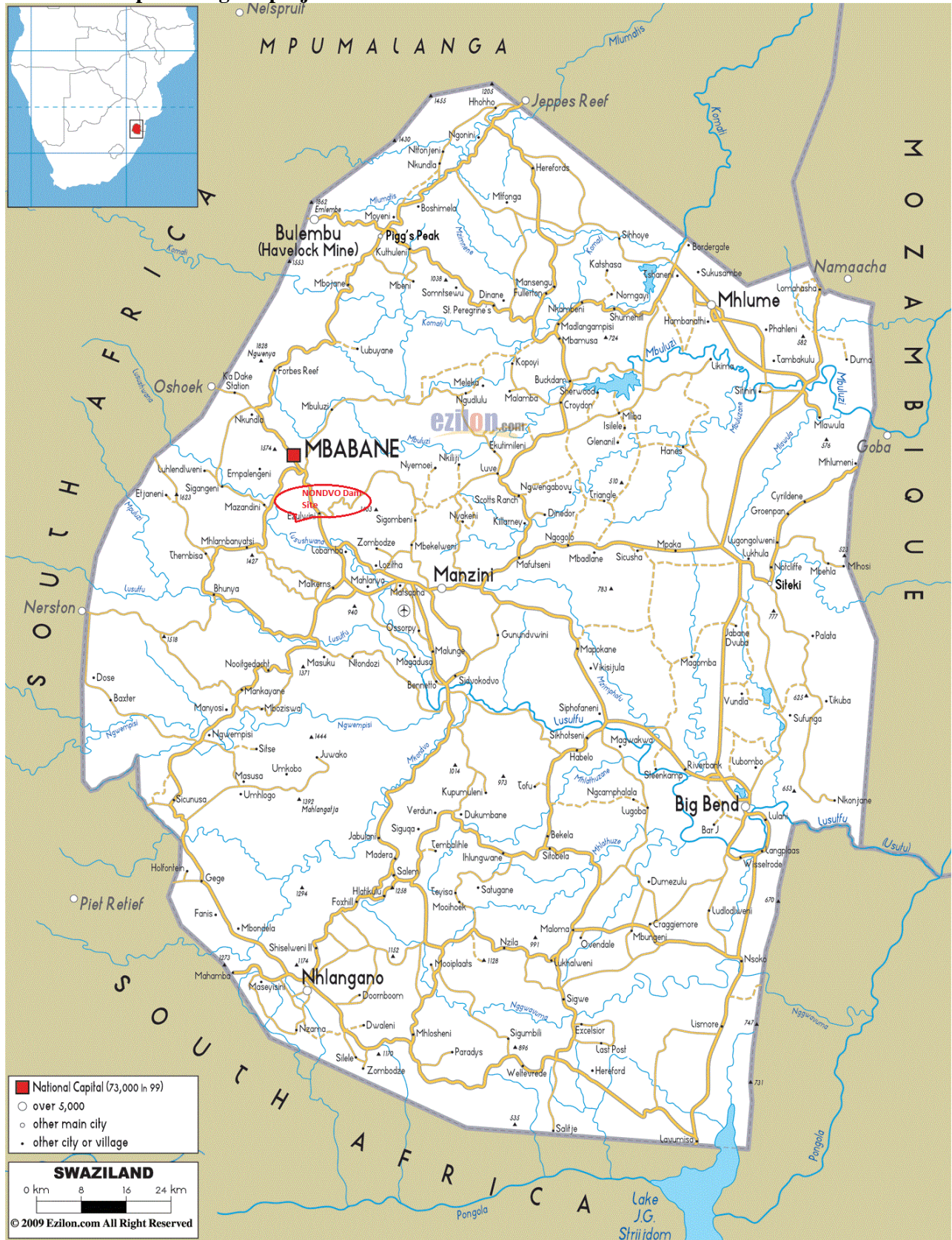
- (i) Facilitate in establishing communication with the relevant institutions;
- (ii) Liaise and assist the consultant in obtaining any other information and documents required from other government agencies in Swaziland and SADC countries and which the Client considers essential for conducting of the assignment;
- (iii) Provide assistance to obtain work permits for staff of the Consultant if required;
- (iv) Provide assistance in obtaining Customs and Tax Exemptions as detailed in Special Conditions of the Consultancy Agreement and General Conditions of Service;
- (v) Arrange consultative meetings and ensure linkage with relevant regional authorities; and

The Consultant shall operate their own project office and shall bear all accommodation, local transportation, visas, and other costs and incidental expenses necessary to carry out the assignment.

Annex 1: Nondvo Dam Feasibility Studies Indicative Calendar



Annexe 2: Map showing the project location



Annex 3

Estimate of Nondvo dam site investigations for feasibility and detailed design studies

1. EXTEND OF REQUIRED INVESTIGATIONS

a. FOR THE PHASE 1: PRELIMINARY SCOPING STUDY

An initial exploratory study is required on the possible identified sites. It will be performed through desk study of available maps and reports and existing data. It will only require limited verifications on site with surface geological mapping, limited trenching to facilitate mapping, and limited drilling to identify critical features which could restrict the feasibility of a dam. No laboratory testing is needed at this phase.

This will be performed by the Consultant team with his own experts in the field of geology and geotechnical sciences.

b. FOR THE PHASE 2: FEASIBILITY STUDY

The most appropriate potential dam site will be selected at this stage and will be subject to the following investigations during the course of the feasibility summarized as follows:

- Identification of borrow areas
- Surveying of borehole and test pit locations (in borrow areas and at sites of works);
- Drilling for overburden and rock characterization;
- In situ permeability tests in bedrock;
- Clay sampling with Shelby tubes;
- Standard penetration tests (SPT) in overburden;
- Dynamic cone penetration tests (DCPT) in overburden;
- Bedrock structural description logs;
- Downhole acoustic and optic televiewer surveys;
- Test pitting;
- Portable hammer sounding (pionjar);
- Resistivity survey (To be confirmed if needed)
- Laboratory testing on soil and rock samples;

Table A (Bill of quantities): Summary of the required investigations

No.	Description	Unit	Provisional quantity	Unit cost (Euro Equivalent)	Total cost (Euro Equivalent)	Remark
1.	Mobilization and management of activities					
1.1	Mobilization, including access to the site, transport and put in operation of equipment, local camp and facilities, catering for staff, desk work and reporting activities etc...	LS	1			
1.1	Demobilization	LS	1			
2	Geophysical investigations					
2.1	Seismic refraction 1.5 km long profiles	Nb.	4			
2.2.	Seismic refraction 500 m long profiles	Nb.	2			
3	Test pits for soil identification					
3.1	Air photo analysis in order to identify and delineate potential borrow material sources	LS	1			See explanations below for Materials needed quantities
3.1	Test pits for soil identification in borrow areas	Nb.	30			With mini excavator. Digging depth approx 3.5 m
3.2	Test pits for soil identification along the dam axis	Nb.	7			
3.3	Test pits for soil identification along spillway axis	Nb.	4			
3.4	Test pits for soil identification at location of the power plant	Nb.	3			
3.5	Test pits for soil identification under the switchyard	Nb.	2			
3.6	Test pits for soil identification at the location of the intake of the water supply conveyance system	Nb.	3			
4	Portable hammer sounding (PIONJAR)					
4.1	Along the dam axis	Nb.	4			
4.2	At the site of the power house	Nb.	2			
4.3	On each abutment on the river banks	Nb.	2 + 2			
5	Boreholes and drillings					
5.1	Along the dam axis	Nb.	8			Depth: - 50 m (or till bedrock is reached if first)
5.2	At the left and right dam abutments on the river banks	Nb.	2 +2			Depth: - 80 m (or till bedrock is reached if first)
5.3	80 m Up Stream of dam axis	Nb.	3			Depth: -40 m
5.4	80 m Down Stream of dam axis	Nb.	3			Depth: -40 m
5.5	Along the spillway axis	Nb.	4			Depth: - 25 m
5.6	At the site of the power house	Nb.	2			Depth: - 50 m (or till bedrock is reached if first)

No.	Description	Unit	Provisional quantity	Unit cost (Euro Equivalent)	Total cost (Euro Equivalent)	Remark
5.7	At the site of the switchyard	Nb.	2			Depth: -15 m
5.8	At the site of the intake of the water supply conveyance system	Nb.	3			
6	Overburden in situ testing					
6.1	Standard penetration test (SPT)					
6.1.1	At dam boreholes	Nb.	7			
6.1.2	At spillway boreholes	Nb.	4			
6.1.3	At the power house boreholes	Nb.	3			
6.1.4	At the switchyard boreholes	Nb.	2			
6.1.5	At the site of the intake of the water supply conveyance system	Nb.	2			
6.2	Dynamic cone penetration test (DCPT)					
6.2.1	At dam boreholes	Nb.	4			
6.2.2	At spillway boreholes	Nb.	1			
6.2.3	At the power house boreholes	Nb.	1			
6.2.4	At the switchyard boreholes	Nb.	1			
7	In situ rock testing					
7.1	Lugeon test 5 pressure step					
7.1.1	At dam boreholes	Nb.	5			
7.1.2	At spillway boreholes	Nb.	2			
7.1.3	At the power house boreholes	Nb.	2			
7.2	Lugeon 1 pressure step					
7.2.1	At dam boreholes	Nb.	4			
7.2.2	At spillway boreholes	Nb.	2			
7.1.7	At the power house boreholes	Nb.	2			
8	Laboratory testing					
8.1	Soil testing					
8.2	Particle size 3 analysis	Nb.	70			
8.3	Native moisture content	Nb.	30			
8.4	Proctor compaction test	Nb.	5			
8.5	Relative density	Nb.	10			
8.6	Hydrometer analysis	Nb.	5			
8.7	Atterberg limits	Nb.	17			
8.8	Swedish fall cone test	Nb.	2			

No.	Description	Unit	Provisional quantity	Unit cost (Euro Equivalent)	Total cost (Euro Equivalent)	Remark
8.9	One dimensional consolidation test	Nb.	2			
9	Test on aggregates for Concrete					
9.1	Grain size analysis	Nb.	5			
9.2	Test for organic impurities in fine aggregate	Nb.	10			
9.3	Relative density and absorption of fine aggregate	Nb.	4			
9.4	Low-density granular material in aggregate	Nb.	2			
9.5	Mortar-strength properties in fine aggregate	Nb.	8			
10	Rock testing					
10.1	Mechanical tests for cut and support design (tests on intact rock cores)					
10.1.1	Compressive strength and elastic moduli	Nb.	6			
10.1.2	Compressive strength	Nb.	8			
10.1.3	Cerchar test (abrasivity index)	Nb.	6			
10.2	Tests for concrete coarse aggregate (tests on crushed rock)		4			
10.2.1	Petrographic description (thin section)	Nb.	4			
10.2.2	Potential of acid generating rock (modified acid/base accounting method) and sulphide content	Nb.	4			
10.2.3	Alkali aggregate reaction - short and long term	Nb.	5			
10.2.4	Micro-Deval	Nb.	3			
10.2.5	Los Angeles	Nb.	4			
10.2.6	Soundness of fine and of coarse aggregates by use of magnesium sulphate	Nb.	3			
10.2.6	Relative density and absorption of fine and coarse aggregate	Nb.	3			

2. INFORMATION ON INVESTIGATION METHODS

Seismic refraction survey: Seismic refraction will be performed at various places at the dam site for several profiles across the river bed and banks and in the proposed axis of the spillway and the part of the dam housing the power plant. Profiles across the river will be 1.5 km long and profiles under the spillway and the power plant 500m long.

Test Pitting: Test pits are to be excavated at the sites of the main structures (dam, powerhouse, switchyard, spillway and channels etc...) and at the borrow areas (granular and till). The materials encountered during the excavations must be visually assessed and described. Whenever possible, grab samples retrieved from the test pits will be taken to the Site Laboratory (or the Laboratory designated by the Consultant) for natural moisture content determinations and particle size analyses down to the 200 mesh size (0.075 mm). Once the excavation and sampling is completed, the test pits must be backfilled and compacted with particular care using the excavated material.

To note that borrow areas should have the sufficient potential to provide approximately 0.3 to 1 million m³ of material. Usage will be 78% for dam body shell, 19% for dam body cores and 3% for both coarse and fine drain fills as far the dam itself is concerned and if the type of earth fill dam is confirmed. Aggregates for concrete will be approximately 3'000 m³, and 10'000 m³ of rocks will be needed for rip rap and dam/reservoir banks/slopes protections. Location of borrow areas will minimize transportation costs and will be possibly located within the future impounded area. The excavated material for the dam foundations and spillway can be utilized after proper processing.

For each borrow area identified with a promising potential, the Consultant will define the location and the number of test pits. Identification will include the following standard tasks: Visual description of the encountered soils: Cobble and boulder percentages determined visually; Sampling of the encountered soils: At least one 20 kg to 30 kg grab sample to be collected within the strata encountered underneath the layer of topsoil or oxidized soil for the realisation of particle size analyses and standard Proctor compaction tests. In the borrow area test pits, 1 kg of soil should generally be taken at each meter in order to determine the soil native moisture content; Taking note of all pertinent information regarding groundwater infiltration and wall stability (sloughing); Taking photographs of the test pit as well as the excavation cuttings; and supervising the backfilling of the test pit while making sure the superficial topsoil layer is put back at grade level.

Portable hammer sounding (PIONJAR Type): PIONJAR sounding consists of driving a steel rod, 25 mm in diameter, into the subsoil until a practical refusal is obtained or a specified depth is reached.

Boreholes and drilling: Boreholes must be drilled under the supervision of a field inspector, with production of daily reports on drilling procedures, sampling and in situ testing. Drilling methods and equipment will be suitable for the intended depth and the nature of soils/rocks (Winkie drilling or Diamond drilling).

The characteristics and identifications of drills will be as follow (Headings of the test result sheet):

Site	Drill Nb.	Coordinates		Azimut (°)	Hole inclination (°)	Drilling (Depth) m			
		South	East			Planned	Drilled	Overburden	Rock

The tests performed in the boreholes are/will be reported as follows for the in situ testing as defined below (Headings of the test result sheet):

Site	Drill Nb.	Hole inclination (°)	Overburden in Situ Testing			Rock in situ testing Water tests		Camera
			STP	DCPT	Shelby	Lugeon (5 pressure steps)	1 pressure step	

Overburden in Situ Testing will encompass the following:

Standard Penetration Test (SPT)

A partial characterization of the soil as well as the profile of soil resistance will be obtained by standard penetration tests at all borehole locations. The tests will be carried out in accordance with ASTM D1586-08 or other applicable standard.

Dynamic Cone Penetration Test (DCPT)

The determination of soil resistance will be obtained by dynamic cone penetration tests (DCPT) in selected boreholes (See table above)). The tests will be performed in accordance with ASTM D5778-95 (2000) or other applicable standard.

Rock in Situ Testing will encompass the following:

Water Pressure Tests

Water pressure tests will be performed with the objective of evaluating the rock mass permeability in almost all the (inclined) boreholes.

The water tests will be performed with an arrangement of 2 packers that isolate approximately 5 m section of the hole. They will be generally performed using the Lugeon procedure, which normally consists of measuring the water absorption at 5 pressure steps. The water absorption is measured for each pressure step. The water pressure for each test is determined using the following parameters: 25 kPa/m of rock and 20 kPa/m of soil.

Downhole Acoustic and Optic Televiewer Surveys

Special camera equipment will be used in order to better define the rock mass structure. This equipment will allow the viewing of discontinuities, such as joints, faults and intrusions, as well as the presence of gouge and discontinuity openings. Televiewer surveys using acoustic and optical probes will be carried out inside selected boreholes in order to measure the position, thickness and orientation (strike and dip) of structural features.

A complete description of the surveying method, the related results and a general description of the main structural features identified at the site of the dam, of the spillway and the powerhouse will be established for the report.

Hole Backfilling procedures:

After completion of all the tests, the holes in bedrock will be backfilled with a mixture of water and Portland cement. The backfilling operation will be carried out from the bottom of the hole up to the bedrock level before retrieving the casing from the hole. The location of the borehole will be adequately materialized on the site and reported on corresponding maps with coordinates.

Rock core structural description

For every borehole driven into the bedrock, 2 logs will be prepared. One log (borehole log) includes a subsoil description followed by a brief description of the bedrock. The second is a structural log with a detailed description of the discontinuities of the rock mass encountered in the borehole such as joint roughness, foliation, joint infilling thickness and type of material, joint weathering, etc.

The structural log describes the rock parameters and provides a better knowledge of the rock mass. Using these parameters and the well known Quality (Q) and Rock Mass Rating (RMR) rock mass classifications, the rock mass can be classified for comparison and for design purposes.

In situ investigation drawings and report

Drawings will be prepared to show the extent of the site investigations at the dam and related structures and at the borrow areas. Boreholes and sites of tests and borrowing areas will be referenced with the utilized coordinates system. A comprehensive investigation report will be established fully documented and illustrated including photographic/film report.

Laboratory testing

Soil Testing

Laboratory tests will be performed on soil samples retrieved from the boreholes and the test pits which are executed at the sites of the investigations. These tests generally consist of the following summarized in the table below

- Particle size analysis (sieve analysis) down to the No. 200 (0.075 mm) sieve;
- Determination of native moisture content;
- Standard Proctor compaction test;
- Relative density determination;
- Hydrometer testing;
- Determination of Atterberg limits;
- Swedish fall cone test; and
- One dimension consolidation test.

Table of the soil lab-tests to be performed per site

Site	Type and Nb of soundings	Particle size analysis	Native moisture content	Standard proctor compaction test	Relative density	Hydrometer analysis	Atterberg limits	Swedish fall cone test	One dimensional consolidation test
Dam Axis (+ embankments)	7 test pits 12 boreholes	7 12	4				4		
Spillway	4 test pits 4 boreholes	4 2					5		
Power house	3 test pits 2 boreholes	3 2							
Switchyard	2 test pits 2 boreholes	2 2						2	2
Borrow areas	30 test pits	30	26	5	10	5	8		
Water Conveyance Intake	3 test pits 3 boreholes	3 3							
	Total	70	30	5	10	5	17	2	2

Testing on rock samples

Laboratory tests will be carried out on rock samples recovered from boreholes. The objectives of these tests are to determine mechanical properties of the rock as required for design and validate the use of crushed rock as concrete coarse aggregate.

Aggregates for concrete

Specific tests will be carried out on sand samples recovered from selected test pits in selected borrow areas in order to validate the use of the sand as concrete fine aggregate.

Next table indicates the type and the numbers of these tests.

TYPE OF TEST	NUMBER OF TESTS
Grain size analysis	5
Test for organic impurities in fine aggregate	15
Relative density and absorption of fine aggregate	4
Low-density granular material in aggregate	2
Mortar strength properties of fine aggregate	8

Annex 4: Terms of reference for the ESIA Studies

The Kingdom of Swaziland

**Ministry of Natural Resources and Energy
Department of Water Affairs**

African Development Bank / African Water Facility

**NONDVO MULTIPURPOSE DAM
ENVIRONMENTAL and SOCIAL IMPACTS ASSESSMENT (ESIA) STUDIES**

TERMS OF REFERENCE FOR THE CONSULTANT SERVICES

August 2015

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1. BACKGROUND

Swaziland is a landlocked, small open economy in Southern Africa. It has an area of 17,364 km² and a population of 1.2 million inhabitants. The country is largely mountainous with 75.8% of the population living in rural areas with livelihoods predominantly dependent on subsistence agriculture. It borders Mozambique and South Africa: the nearest ports are Maputo, which is 149 km away, and Durban, about 541 km away. With a Gross Domestic Product (GDP) per capita of about US\$ 3,500 in 2014, Swaziland is classified as a lower middle income country.

Swaziland has relatively well-developed infrastructure in comparison to other Sub-Saharan African countries, but there are a number of critical areas that require further improvement, especially for poor rural communities which can contribute to making growth more inclusive. In terms of water and sanitation, approximately 280,000 people lack access to potable water supply, while 430,000 – nearly 40 percent of the population – lack access to basic sanitation (Data 2013). Addressing issues of basic water supply and sanitation, especially in rural areas and small towns, is clearly a poverty reduction priority for the country. Ensuring adequate water supply to the fast growing area of the two main cities of Mbabane and Manzini will also contribute to develop productive activities and to economic growth. Though Swaziland's National Development Strategy was targeting universal access to safe water supply, sanitation, and solid waste management by 2015, the country lags far behind this ambitious goal.

The Government of Swaziland, Ministry of Natural Resources and Energy, Department of Water Affairs intends to assess the feasibility for the construction of the Nondvo dam on a tributary of the Lusushwana River. The objective of the dam is to store water in order to provide potable water to the two cities of Mbabane and Manzini which are currently suffering intermittent water shortage. On the meantime, the stored water could also be used for irrigation and for improving the output of runoff the river hydropower plants further downstream.

The choice of the Nondvo dam results from a multi criteria selection process developed during the execution of the Joint Maputo River Basin Water Resources Study (JMRBWS)¹³ jointly undertaken by the Kingdom of Swaziland, the Republic of South Africa and the Republic of Mozambique. The study, financed by the European Union in 2008 to the Southern African Development Community (SADC) presented water resources development options which could be developed by the different member states within their territories in the Maputo Basin.

In Swaziland, all “normal flow” in the rivers, most of them being of transboundary type, has been allocated under the arrangements of the international treaties. “Normal flow” is water that has been calculated as being available 80% of the time during the driest month of the year which is the month of September. The only water that can be made available for allocation is surplus flow (during floods and rainy season) through harnessing in large storage reservoirs. This means that at the moment no water allocation to any new developments can be made as the water demand far exceeds the ‘normal flow’. This is a major challenge because further social and economic development in the country will be impeded by this lack of one of the most critical resources.

In Swaziland, previous studies indicated that the country could consider building the Nondvo dam to yield about 92 Mm³ of water for increasing the potable water supply to the two cities of Mbabane and Manzini with a current population estimated at 100'000 and 200'000 inhabitants respectively¹⁴. The additional resources mobilized through the Nondvo dam could also satisfy other demands for agriculture and hydropower generation along the Mbabane – Manzini corridor including rapid growing Matsapha and Ezulwini areas where the major part of industries and other economic activities of the country are

¹³ 2008 Skoy Plancenter Ltd in association with Diversity and Transformation Solution (D&TS), Ninham Shand, and Water for Africa

¹⁴ Last (UNDP) census results available for 2007 only at the Central Statistical Office (CSO) of Swaziland. Extended “metro areas” of Mbabane and Manzini were totaling 283,000 and 320'000 inhabitants respectively in 2007.

concentrated or under development (Science and Technology Park, International Convention Centre, several new townships).

2. SCOPE OF THE PROJECT

2.1 Project Rationale

The nature of the hydrological network of Swaziland, comprising rivers shared between several states upstream and downstream, coupled with highly seasonal patterns with relatively long periods of drought makes the management of the country surface waters very difficult and vulnerable to climatic changes. The economic and demographic growths of the country, the changes in the water usage patterns induce a significant increase of the demand and needs. The size of existing infrastructure and the capacity of equipment will soon become unable to satisfy the demand.

As a response to these constraints, the main scope of the project is to better exploit surface water by storing the surplus available during flooding periods above allocated abstraction limits established by the Tripartite Agreement signed with South Africa and Mozambique. The stored water will then be released along the year for the various downstream usages comprising water supply (domestic and industrial), hydropower generation as a non-consumptive usage and irrigation. During previous studies, the Nondvo dam site was also selected given its proximity to the cities of Mbabane and Manzini where the future water demand is the highest.

The project scope will therefore comprise the following:

- Design of an adequate infrastructure or modification of existing ones for storing surplus of water during flooding period with a technically, economically and environmentally optimized capacity;
- Assessment of alternatives to the construction of a new dam for retaining the best solution;
- Feasibility study of the retained solution up to the stage of detailed design of the storage structure and the conveyance system down to the water intake for water treatment. The water treatment installations downstream of the project will be studied at the level of basic design;
- Environmental and Socio Impacts Assessment (ESIA) studies of the designed project including Environmental and Social Management Plan (ESMP) and Resettlement Actions Plan (RAP);

Additional Technical Assistance and Advisory Services aiming at reinforcing capacity and skills of the Swaziland water sector institutions on the aspects of i) Climate Change Resilience, ii) PPP and financing strategy and iii) Transboundary Rivers issues are part of the project but will be performed through different assignments under the financing and rules of the CRIDF.

The Consultant in charge of the ESIA Studies will be required to establish the appropriate collaboration and dialog with the Consultants in charge of the Feasibility Studies and other studies and advisory services in order to adequately incorporate their inputs in the overall assessment.

2.2 Technical description of the main components of the project

The project will comprise the necessary infrastructure (most probably a dam) for storing water within a catchment area part of the Lusushwana River basin in order to increase availability of water for multipurpose usages during extremely dry seasons and to prevent flushing too much water through the main river bed in extreme rainfall cases. Thus, this system would at the same time be a response to the effects of climate change, which results in higher frequencies and more pronounced intensities of extreme weather conditions, i.e. floods and droughts.

The proposed storage project that the technical studies will determine as the most appropriate option would consist of a dam and its appurtenant structures, a conveyance mean to provide water to the potable water urban system (including treatment and distribution facilities) operated by the Swaziland Water Services Corporation, an hydropower plant if deemed feasible and additional irrigated surfaces downstream along the Lusushwana River to its confluence with the Usuthu River. The project components can be summarized as follows:

- a) A head dam (type to be determined by the technical and feasibility studies) with a storage capacity able to satisfy the various demands projected up to year 2045 combined with necessary systems for controlling water intakes, water releases and floods evacuation. Its location would be in the catchment basin of the Nondvo River which is a tributary of the Lusushwana River. The location, size of the dam and the dimension of the reservoir will be established by the Feasibility Studies.
- b) Other components include
 - A small hydro component which could be installed at the foot of the dam or further downstream if economically attractive and feasible.
 - An appropriate conveyance mean to conduct the water to the treatment facilities of the potable water distribution urban system.

3. OBJECTIVES OF THE STUDY

The overall objective is to carry out an Environmental and Social Impacts Assessment (ESIA) study and prepare a Resettlement Action Plan (RAP) and Environmental and Social Management Plan (ESMP) for the Nondvo multipurpose water resources development project. This will include establishment of a socio-environmental baseline, assessment of proposed development options, scoping; prediction of the magnitude and significance of environmental and social impacts, recommending mitigation measures for identified impacts, and devising how they can be incorporated into project design and implementation plans. The study will be undertaken within the frame of guidelines and safeguards applied by International Financing Institutions (especially the African Development Bank- ADB) and in compliance with the laws of the Kingdom of Swaziland. The compliance of the ESIA, RAP and ESMP will be assessed by an environmental expert, member of the Panel of Experts to be set up for the project by the Executing Agency.

Given the relatively high density of population and spread of urbanization in Swaziland, the area of the project has been identified with important physical constraints that the ESIA must address. They are:

- Existence and development of public infrastructures in the area potentially impacted by the project like: schools, public buildings, roads and bridges;
- The number of households and cultivated plots requiring resettlement and/or compensation can be significantly impacted by the level of the storage reservoir;
- An existing, however no longer operated railway line of Swaziland Railway must be rerouted for the prospect of its re opening for future mining ore transportation;
- Needs for proper river basin protection plan and measures to reduce soil erosion and silting of the future reservoir and preserve water quality.

In the light of the above and in view to minimize impacts and requirements for resettling and compensating impacted population, one of the early recommendation from the ESIA will be to inform the Authorities on the extend and limits of the project impacted area in order that they can legally implement measures to stop the further urbanization and infrastructure new developments.

The ESIA will aim at achieving a fair balance of mitigation measures, incentives and compensations for both the displaced people (because of the reservoir development) and the reinstalled populations. In this context, the Consultant will develop the appropriate approach and dialog with impacted populations and stakeholders as a tool for early identification, assessment, and resolution of complaints.

4. SCOPE OF WORKS OF THE ESIA STUDY

As a guidance for the Consultant's studies, the Annex 1 provides a description of the thematic structure of the ESIA. However, it is indicative only and does not release the Consultant from its obligations to conduct the studies in compliance with the state of the art, the safeguards and guidelines recommended by international Development Institutions and the best recognized practices and the laws and procedures required by the Ministry of Tourism and Environment. The Consultant is also invited to deepen investigations and studies for aspects and domains that his surveys, enquiries and studies will identify as critical for this particular project.

4.1 Task 1: Establishment of a Socio-Environmental Baseline

4.1.1 Task 1.1: Description of the Proposed Project

The Consultant shall review existing documentation and provide and describe all project components including associated facilities and infrastructure (drawing from the conceptual project formulation from the feasibility study consultant). The description shall indicate components requiring land acquisition and resettlement; and give an overall estimate of land acquisition and resettlement. In addition, the description shall provide information on, but not limited to, the general design of the dam and reservoir, the uses benefiting from the reservoir (water supply, hydropower generation, irrigation) size and characteristics of the catchment, and aspects related to operation and maintenance of the reservoir and dam.

4.1.2 Task 1.2: Description of the Environmental condition of the Project Area

The baseline surveys are intended to provide a measure of existing environment and the socio-economic situation against which future changes due to the project can be monitored. The consultant shall describe and analyze the physical, biological and socio-cultural conditions prevailing in the project area, highlighting relevant environmental and social issues. The description will include the characteristic of proposed project area and cover areas potentially affected by impacts, the potential compensation area, and area affected by alternatives. Monitoring indicators will be developed.

The Consultant shall collect, evaluate and present baseline data and information on the relevant environmental characteristics of the present environment in the area of influence of the proposed dam and irrigation areas foreseen downstream but upstream of the confluence with the Lusuthu River and related activities, determined from actual site visits, site specific and regional baseline studies in physical, biological, and socio-economic domains. Collection of baseline data should be designed to satisfy information requirements and focused on relevant aspects that are likely to be affected by the proposed project. In addition to field investigations, the consultant will review information from secondary sources, such as the reports from previous studies.

Key socio-economic issues to be considered include demographic profile with social categories, number of households/families, types of housing, health and education profile, migration patterns, if any; Land ownership and holding; Existing cropping pattern and changes in the potential areas for development of irrigation ; Agricultural practices including traditional knowledge on endemic species; Improvement in crop production and productivity; Employment profile; Income profile; Other economic activities prevailing in the peri-urban area of Manzini and Matsapha cities ; Availability of social and economic infrastructure; Gender issues; revenue disparities, health problems, land use patterns and civil society structures. The level of detail should be sufficient to convey the general nature of environmental and social resources condition of the affected areas.

4.2 Task 2: Socio-Environmental Scoping

The Consultant shall carry out an environmental scoping exercise, as per the requirements of the Swaziland environmental regulations to define the important issues and impacts that need to be studied and incorporated in the ToR for the study. The scoping, which will involve stakeholder consultation will cover the physical, biological, socio-economic and cultural environments of the proposed project.

The exercise shall focus on the following areas amongst others:

- Impacts on the flora and fauna.
- Likely change in the river regime;
- Impact due to change in hydrological cycle;
- Impact on siltation preferably using quantitative techniques;
- Impact on water quality (surface and ground water);
- Impact on ground water levels and recharge potential;
- Impact due to change in waste assimilation capacity of the river system;
- Impacts on the drainage and water resources;
- Impacts on landscape and general aesthetics;

- Impacts on recreation;
- Erosion concerns and associated siltation;
- Impacts on land use and agriculture;
- Impacts on protected areas, swamps, as well as other relevant natural and critical habitats;
- Impacts on cultural property;
- Water issues for livestock purposes;
- Impacts on property, settlements and community facilities;
- Land uptake and resettlements;
- Disease burden and associated health impacts, HIV/AIDS issues, safety issues;
- Induced development resulting from the implementation of the project;
- Gender related issues ;
- Potential cumulative impact assessment issues, appropriate boundaries for analysis, and identifying relevant past, present, and future actions;
- Security implications.

As part of the scoping exercise, the Consultant will consult the affected population and other relevant stakeholders using an appropriate methodology. The outcome of the Public Consultations shall be recorded in the Scoping Report. The findings of these consultations will also be made accessible to the relevant stakeholders, including potentially affected persons.

4.3 Task 3. Policy, Legislative, Regulatory and Administrative Considerations

The Consultant shall identify and describe the pertinent regulations and standards - both local and international (AfDB safeguard policies, World Bank Safeguard Policies, identifying which of these should be triggered), governing the environmental quality, health and safety, protection of sensitive areas, protection of endangered species, land use control at the national and local levels and ecological and socio-economic issues. The examination of the legislation should include the relevant international conventions and treaties to which the Swaziland government is signatory. All applicable legislation, regulations, policies and standards in relation to the construction and operation of the project should be highlighted. The consultant shall assess the relevant government agencies involved in environmental and social management issues, to ensure that the ESMP will be effectively implemented. Thereafter, the Consultant shall identify the project activities that should comply with the identified regulations.

4.4 Task 4: Analysis of alternatives to the proposed project

The objective of comparative analysis will be to appraise the merits and demerits of realistic alternatives, thereby providing decision makers and the public with a clear basis for choosing between options. The consultant will assess alternatives that were examined in the course of developing the proposed project (by the feasibility study) and identify other alternatives which would achieve the same objective. The Consultant will systematically compare feasible alternatives to the proposed project site, technology, design, and operation--including the "without project" situation in terms of their potential environmental impacts; the feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training, and monitoring requirements. For each of the alternatives, the analysis shall quantify the environmental costs and benefits to the extent possible, and attach economic values where feasible. This will include analysis of (i) costs and benefits of environmental impacts; (ii) costs, benefits, and cost-effectiveness of mitigation measures; and (iii) discussion of impacts that have not been expressed in monetary values, in quantitative terms where possible.

4.5 Task 5: Determination of the potential impacts of the proposed project

Following the scoping and baseline assessment, the consultant will predict and assess the environmental and social benefits and negative impacts of the Project as well as any environmental enhancement that may occur. The assessment will distinguish between positive and negative impacts, direct and indirect impacts, and immediate and long-term impacts as well as impacts that are unavoidable or irreversible.

Wherever possible, impacts will be described quantitatively, in terms of costs and benefits. For each potential impact, the consultant should determine the magnitude, the consequences (who it will affect and how), the probability of reversing the impact, and the probability that the impact can be avoided. Once the impacts have been analyzed, their significance will be determined, i.e., whether they are acceptable, require mitigation, or are unacceptable. Potential impacts will include but not limited to:

- Social and ecological effects of reservoir inundation (loss of agricultural, forestry and grazing land, population resettlement, impact on flora and fauna, impact on historic and cultural sites, etc.);
- Effects on the hydrology and water quality of the river;
- Effects related to construction works: soil erosion, construction spoils (disposal of), sanitary conditions and health risks associated with construction camp and workers coming into the area, social and cultural conflicts between imported workers and local people;
- Effects related to project operation: pollution by agrochemicals impacts on soils (waterlogging, salinization, etc.), changes in groundwater levels inside and outside command area, changes in surface water quality and risks of eutrophication, potential for increased incidence of water-borne and water-related diseases;
- Effects on riverine fisheries and potential for creating a reservoir fisheries resource;
- Impacts of altering river flow regimes on the ecology of the floodplain, and the economic activities/land use on the floodplain (agriculture, livestock production, run off the river hydropower generation, water abstraction for water supply, etc.);
- Impact on the river morpho-dynamic and secondary effects on ecosystems and ecosystems services;
- Impact of modifying water supply on urban and rural users;
- Potential environmental and social impacts by planned and unplanned immigration into the area;
- Effect of existing and predicted land use in the watershed on the functioning and longevity of the dam, reservoir and infrastructures associated to the project;
- Impacts on the route of the railway line that the authorities want to rehabilitate in the future and consequential needs and costs for relocation;
- Effects of climate change and variability on the planned project during project implementation. Support will be provided from the Technical Assistance and Advisory Services performed by CRIDF on the aspect of Climate Change Resilience;
- Cumulative impacts and their contribution to the overall cumulative effect.

4.6 Task 6: Formulation of Mitigation Measures

In coordination with the consultant in charge of the Feasibility Study, the Consultant will jointly identify cost-effective measures to mitigate (preventing, minimizing, compensating or enhancing beneficial impacts) anticipated environmental and social changes and impacts during project implementation and operation, or further reduce the residual environmental and social changes inherent in the selected project design and propose optimized alternatives as necessary. The scope will include technical, social, and institutional measures to be implemented as integral elements of the project. The measures will inform technical designs of the project components (under the feasibility study). The extent to which the different mitigation measures will reduce the scale of impacts arising from the project will be evaluated, and unavoidable residual impacts identified. The measures will be incorporated in the Environmental and Social Management Plan (ESMP).

4.7 Task 7: Preparation of Dam Safety Plans

The studies of the project comprise the establishment of Dam Safety Plans covering all aspects related to the World Bank dam safety safeguard operational policy according to OP4.37, and the plans shall make an integral part of the ESMP. The Consultant for the ESIA will liaise with the Technical Consultant who is in charge of related activities (flood routing ...) for harmonizing approach and results and recommendations. The plans will be reviewed by the Dam Safety Panel of Experts (PoE) set-up by the EA. The plans shall include:

- i) Operation and Maintenance Plan including the first impoundment and dam safety inspection procedures;
- ii) Dam safety monitoring and instrumentation plan;
- iii) Emergency preparedness plan; and

- iv) Quality control plan.

4.8 Task 8: Development of Environmental and Social Management Plan (ESMP)

The objective of this task is to describe how the mitigation and other measures to enhance the benefits of Environmental and social protection will be managed, who will implement them, and when and where they will be implemented. As part of the ESMP preparation, the consultant will assess the institutional needs required to implement environmental assessment recommendations and recommend steps to strengthen or expand them so that the management and monitoring plans in the environmental assessment can be implemented. The consultant will also prepare a detailed schedule to monitor the implementation of mitigation measures and the impacts of the project during construction and operation. The ESMP shall not only include recommendations for actions and the procedures for their implementation in the short and long term, but must also set out the costs for its implementation. It should show how management and mitigation methods are phased with project implementation and when costs will be incurred. The participation of various agencies, NGO and public organizations constitutes a key element of this study. The Environmental and Social Management Plan shall be discussed with all the parties concerned. The Consultant will show the extent of the consultations undertaken in order to obtain the opinion of these persons/organizations.

Elements to be included in the ESMP will include but not limited to the following:

- Summary of Potential Impacts;
- Description of Planned Mitigation Measures (incl. dam safety requirements);
- Description of Planned Environmental Monitoring;
- Description of Planned Public Consultation Process;
- Description of the Responsibilities and Authorities for Implementation of Mitigation;
- Measures and Monitoring Requirements;
- Description of Responsibilities for Reporting and Review;
- Work Plan including staffing chart, proposed schedules of participation by various members of the project team, and activities and inputs of various government agencies;
- Detailed Cost Estimates;
- Mechanisms for feedback and adjustment.

Elements to be included in the Monitoring Program will include but not limited to the following:

- Realistic sampling program (temporal and spatial);
- Sampling methods relevant to source;
- Collection of quality data;
- Comparable new data with other relevant data used in environmental assessment;
- Cost-effective data collection;
- Quality control in measurement and analysis;
- Innovations (e.g., in tracing contaminants and automated stations);
- Appropriate databases;
- Multidisciplinary data interpretation to provide useful information;
- Reporting for internal management and external checks;
- Allowance for, and response to, input from third parties;
- Presentation in the public arena (external assessment).

4.9 Task 9: Development of a Resettlement Action Plan (RAP)

The purpose of this task is to develop a detailed plan that lays out all the activities to be done to implement the resettlement program. The RAP includes and addresses the resettlement of people to be displaced because of the construction works. The RAP will be developed based on up-to-date information about the number and characteristics of affected people, the impacts on the displaced populations and other adversely affected groups, resettlement alternatives and appropriate mitigation measures, as well as legal issues involved in resettlement. Using appropriate and standard methods, the RAP shall identify the full range of people to be affected by the project and justify their displacement after consideration of alternatives that would minimize or avoid displacement. It shall outline eligibility criteria for affected parties, establish rates of compensation for lost assets, and describe levels of

assistance for relocation of affected households. Compensation measures will be aligned with regulation and practices established by the Swaziland authorities (Ministry of Tourism and Environment).

In addition, the RAP shall document elements including but not limited to:

- Identification of affected people and Impacts
- Socio-economic profile of communities within the project area eligible for compensation
- The legal framework for land acquisition and compensation; including i) Establishing rates of compensation; ii) determining eligibility for compensation and resettlement assistance including development initiatives aimed at improving the socioeconomic well-being of affected populations; iii) establishing mechanisms to resolve grievances among affected populations related to compensation and legibility;
- An entitlement matrix listing all likely effects, both permanent and of temporary land acquisition;
- A compensation framework, which details compensation guidelines established by the government, methodology for valuation, proposed types and levels of compensation to be paid, compensation and assistance eligibility criteria, which groups of affected people are entitled to which forms of compensation and how and when compensation will be paid;
- A description of resettlement assistance and livelihood restoration activities;
- Preparation of an institutional framework that designates responsibilities to prepare the detailed assets inventories, provide compensation, undertake relocation work, take responsibilities for income restoration, supervise, manage and monitor the implementation of land acquisition and resettlement. Recommend an institutional strengthening strategy and/or formulation and training of resettlement units in the executing agencies.
- Identification of alternative relocation sites, where affected person might have to be resettled;
- A description of organizational responsibilities for the different aspects of a resettlement;
- A framework for stakeholder engagement and development planning, taking into consideration the gender concerns and vulnerable groups;
- Description of livelihood restoration mechanisms;
- A description of the procedures for addressing complaints, disputes and grievances;
- An implementation schedule covering all resettlement activities from project preparation through implementation, including a description of the linkage between resettlement implementation and the initiation of civil works as well as agencies responsible for each activity;
- A budget comprising itemized cost estimates for all resettlement activities, including planning and implementation, management and administration, monitoring and evaluation, and contingencies; specification of sources of funding and approval processes;
- A monitoring, evaluation and reporting plan, with provision for corrective actions to address issues as they arise.

4.10 Task 10. Preparation of the ESIA Report

The consultant will prepare an Environment and Social Impact Assessment report, with the Baseline report, ESMP and RAP as appendices. The report shall be in the English Language and should be clear and concise. These reports will be subject to the compliance review, comments and suggestions from the Environmental Expert member of the Panel of Experts to be set up by the Executing Agency. The Annex 1 provides a guidance and example of the thematic structure of the report. The report should include but not limited to the following:

- Executive or non-technical summary;
- Introduction;
- Policy, legal and administrative framework;
- Project description and justification;
- Description of the project environment;
- Project alternatives;
- Anticipated environmental impacts and mitigation/enhancement measures;
- Environmental hazard management;
- Environmental and Social Management Plan – ESMP;
- Public consultations;
- Conclusions;

- Appendices;
- Annexes: (i) Baseline Report (ii) ESMP and (iii) RAP.

5. CONSULTATION PROCESS

The project will result in significant changes when a reservoir, dam and all appurtenant structures are completed. It is important that during the performance of the studies, a consultation process with potentially affected people is conducted by the Consultant. It shall ensure that there has been provision in its planning of activities for timely and effective stakeholder review and comment on:

- The proposed scope of the ESIA (the issues and impacts to be considered);
- Methodologies for the collection of environmental and social information;
- The findings of environmental and social studies carried out in relation to the ESIA, or whose findings are relevant to the conclusions and recommendations of the ESIA;
- Options and proposals to mitigate the potential impacts of the project;
- Provisional conclusions and recommendations of the ESIA, prior to finalization;
- The final conclusions and recommendations of the ESIA.

The Consultant and the EA shall encourage stakeholder participation, emphasizing gender consideration, through advertising campaigns and information in the media and where possible, in the collection of data for the ESIA, and in the development of options and proposals to mitigate the potential impacts of the project.

The Consultant shall also consult assist the Executing Agency in preparing the documents needed to consult the riparian countries in accordance with international treaties and agreements with respect to the findings of the environmental and social studies work. Such consultations shall take place at appropriate milestones, and notably towards the end of the Scoping of Environmental Issues. (Environmental/Social Screening Report).

The Consultant shall detail in its methodology the extent of and approach to the consultation process.

INDICATIVE CALENDAR OF THE ESIA STUDY

The indicative duration of the study is 13 months. The suggested breakdown will comprise a sequence of 2 Phases as illustrated in **Annex 2: Schedule of ESIA Study and Deliverables**

Phase 1: 5 months broadly covering:

- Information and data collection;
- Socio-environmental investigations;
- Scoping of environmental issues;
- Preliminary report preparation.

Phase 2: 8 months broadly covering:

- Consultative process and enquiries;
- Report preparation;
- Presentation to Authorities/stakeholders and adjustments;
- Issuance of final report;
- Application for certification (by local environmental authorities)

The ESIA study will be conducted in parallel with the Feasibility Study for the purpose of harmonization and exchange of information and results amongst the 2 assigned consultants.

6. COMPOSITION OF THE CONSULTANT TEAM

The Consultant should demonstrate past experience in conducting ESIA's and preparing RAPs for multipurpose water storage infrastructure projects for the last ten years. The team will be led by a Senior Environmental Assessment Specialist with a clear strategic understanding of project objectives from a regional and multipurpose perspective. The areas of expertise required include: environmental and social impact assessment, large water and hydraulic works, aquatic and terrestrial ecology, public health, and

public consultation. The Consultant may optimize their personnel to demonstrate the competences required for the assignment. The personnel of the Consultant should have a wide practical experience in the areas mentioned. The use of regional/national experts among the core personnel is required. The qualifications of the key experts are as follows:

Chief environmentalist Study director: Senior Environmental and Social Assessment Specialist/Expert At least a MSc in Environmental Science or Natural Resource Management, with at least 15 years of experience in managing ESIA studies for large Water Resources infrastructure. Familiarity with AfDB or Multilateral Development Banks environmental and social safeguards policies is a necessity. He will oversee and manage administrative, contractual and financial matters of the consultancy assignment.

Environmentalist: Senior Environmentalist, with at least a MSc in Environmental Science or Natural Resource Management with minimum of 10 years of experience in coordinating ESIA studies designing and implementing public/stakeholder consultation and participation processes for similar projects preferably in Southern Africa. He will lead the overall effort on this ESIA project, and will provide specialist knowledge on all matters affecting the development of the ESIA and RAP. He will be responsible for preparation of the ESIA, overall coordination of support and expertise within the project team, with respect to delivering a positive ESIA, including scoping process and review process, as well as eventual trans-boundary ESIA aspects.

Basin Protection Specialist: At least a Bachelor in rural or environmental engineering and at least 10 years of experience in the region on water resources and watershed management projects with demonstrated knowledge of local conditions prevailing in Southern Africa.

Expert Participative Approach and Consultation: At least a Bachelor in social sciences (anthropology, sociology, social work or economics), Masters or higher qualifications. Minimum of 10 years of experience in preparing and implementing social impact assessments, resettlement and compensation plans for large projects, preferably in Southern Africa. Familiarity with AfDB and MDB's environmental and social safeguards policies is a necessity as well as knowledge and experience in the field of gender issues and inclusivity.

Ecologist: Bachelor or higher qualifications in Ecology with previous experience in preparing ESIA's. Senior specialist with at least 10 years of experience in environmental assessments, management and the preparation of ESIA's and ESMP's. He/she should have experience in projects in the water resources management and demonstrated experience ecological assessments appropriate to dams and rivers, and preferably in Southern Africa.

River Morpho-dynamic specialist: MSC or higher qualifications in hydraulics or any relevant discipline with minimum 10 years of experience in morpho-dynamic analysis, river basin management plans and environmental impact assessment of hydraulic structures.

7. OUTPUTS AND DELIVERABLES

Quarterly succinct progress notes will be supplied to the EA for informing on the preliminary findings and critical issues identified. Progress notes will be submitted to the EA by email only (Soft copies). The schedule of Annex 2 illustrates the deadlines for the deliveries.

At the end of month 3, the Consultant will issue an Environmental/Social Screening Report for initiating the process of information and consultation with the national environmental authorities with the aim to confirm or adjust the scope of the studies.

The draft outline of the ESIA report (including ESMP and RAP) will be prepared at the end of month 5. The draft final version of the report will be prepared at the end of month 11 for presentation, discussion with the EA and stakeholders. The adjusted final report will be submitted to Government environmental authorities at the end of months 13 for obtaining approval and certification. The final version of the

report (and appendixes) will be supplied to the EA in 7 hard copies accompanied with soft version (CD or memory stick).

8. SUPERVISION AND COORDINATION ARRANGEMENTS

The Consultant will be directly supervised by the DWA project Team on behalf of the MNRE. At the National level, the Consultant will report to the DWA who will assure communication and information to the Steering and Consultative Committees. Results from the study will be communicated to the **AWF** by the DWA through progress reports.

The Consultant will liaise with the consultant in charge of the feasibility study as well as experts from CRIDF (engaged in Climate Resilience aspects assessment) on aspects of socio-environmental impacts in order that the project design duly takes into account the identified constraints. The ESIA consultant is also expected to guide and advise the EA for adjusting the project design in order to mitigate adverse Impacts.

9. DATA AND SERVICES TO BE PROVIDED BY THE CLIENT

Data and documentation of relevance with the development of an ESIA study and other relevant aspects of the project including previous studies reports available in the MNRE will be availed to the consultant. In addition, the Client will:

- (vi) Facilitate in establishing communication with the relevant institutions in charge of environmental matters in Swaziland;
- (vii) Liaise and assist the consultant in obtaining any other information and documents required from other government agencies in Swaziland and SADC countries and which the Client considers essential for conducting of the assignment;
- (viii) Provide assistance to obtain work permits for staff of the Consultant if required;
- (ix) Provide assistance in obtaining Customs and Tax Exemptions as detailed in Special Conditions of the Consultancy Agreement and General Conditions of Service;
- (x) Arrange consultative meetings and ensure linkage with relevant regional authorities;
- (xi) Facilitate dissemination of information and awareness of the project to potentially impacted stakeholders through local media and advertising.

The Consultant shall operate their own project office and shall bear all accommodation, local transportation, visas, and other costs and incidental expenses necessary to carry out the assignment.

Annex 1: Thematic structure of the ESIA

This Appendix is provided as a guidance for the Consultant for conducting the studies and for establishing the ESIA report. It only gives an example of the structure of the ESIA report but does not limit the scope of the studies to the listed subjects, the Consultant remaining responsible for including, developing and deepening other aspects and domains that his surveys, enquiries and studies will identify as critical for the particular project.

Policy, Legal and Administrative Framework

This chapter concerns the policy, legal and administrative framework within which the ESIA is carried out. It presents the relevant environmental and social policies of the national (in Swaziland) legal requirements and related constraints (e.g. practices that may discriminate or exclude any stakeholder group) relevant to the project. It provides information on the environmental requirements of any co-financiers, and identifies relevant international environmental/social agreements to which the country is signatory.

Project Description and Justification

The first part of this chapter shall describe the proposed project and its geographic, ecological, social, economic and temporal context: project location, various project components, capacity, construction activities, facilities, staffing, working conditions, availability and source of raw materials, production methods, products, schedule of works, land tenure, land use system, potential beneficiaries, affected groups (directly and indirectly), and offsite investments that may be required. It shall at least include a map showing the project location and area of influence.

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 sectors concerned by the project, explain the problems or the needs to be satisfied and present the constraints associated with the project implementation. The technical features of the project (layout, location of main works, capacities and size, technical and operational specifications, etc...) will derive from the Feasibility Studies performed by the technical Consultant, thus requiring that both Consultants exchange, discuss and harmonize the findings of their respective studies and activities.

Description of the Project Environment

This chapter shall first determine the limits of the study area that shall be defined in order to encompass all project direct and indirect impacts. The description and analysis of the physical, biological and human conditions shall address relevant environmental and social issues within this area, including any changes anticipated before project implementation.

Within the human environment, key issues that shall be considered include population characteristics and trends, revenue disparities, gender differences, health problems, natural resource access and ownership, land use patterns and civil society organization level. A particular attention shall be given to the rare, threatened, sensitive or valorized environmental and social components.

The information presented shall be relevant to decisions about project location, design, operations as well as environmental and social management. Maps, figures and tables shall be included in this chapter to better illustrate the various environmental and social components.

Project Alternatives

This part of the ESIA Report consists in analyzing the various feasible alternatives of the project, including the "without project" option and the option of replacing the dam with other investments in the catchment to satisfy and achieve the same objectives. The selected alternative shall be the most environmentally and socially sustainable, taking into account the technical and economic feasibility. The evaluation of possible alternatives are deemed to be performed by the technical Consultant for the Feasibility Studies through a multi-criteria screening process.

Anticipated Impacts and Mitigation/Enhancement Measures

This chapter presents a detailed analysis of beneficial and adverse impacts of various components of the selected project alternative on the physical, biological and human (social, cultural and economic) environments. The below long-list of impacts and concerns of different relevance for the Nondvo project will serve as a check list for the assessment of E&S impacts.

- Increase in economic activity and employment;
- Induced development due to new opportunities such as in fisheries and dam related projects (water supply, irrigation, hydropower, tourism etc.);
- Possible disruption of existing activities particularly floodplain agriculture and artisanal fisheries downstream;
- Loss of livelihood for those who are living and/or cultivating the land in the flooded areas;
- Disruption of activities in catchment areas, particularly if they represent potential sources of pollution for the reservoir or generate silts and sediments;
- Development of additional skills for those taking advantage of new opportunities;
- Uncertainty and increased perturbations due to a lack of information and communication;
- Development of new infrastructures;
- Destruction of existing infrastructures in the dam and reservoir area;
- Reliable water supply for irrigation, domestic and other uses;
- Contamination of domestic water supplies due to the mismanagement of the reservoir;
- Increased pressures on existing social services due to migration and resettlement;
- Degradation of air quality by dust, heavy machinery atmospheric emissions and waste disposal and increase in ambient noise during the construction period;
- Flood control, design of cofferdams and temporary diversion works;
- Interruption of surface water flows during and after construction;
- Possible changes in the level of groundwater table resulting from changes in the drainage and water flow;
- Contamination of surface and underground waters and soils by spilling of wastewater and hazardous materials;
- Alteration of water flow downstream impairing agricultural activities on floodplains;
- Proliferation of aquatic weeds in reservoir and downstream impairing dam discharge, irrigation schemes and fisheries;
- Degradation of the reservoir water quality;
- Runoff erosion resulting in sedimentation problems;
- Landslides and other types of soil movements in the works areas;
- Soil compaction and erosion during construction;
- Soil erosion and potential landslides due to water level changes in the reservoir;
- Loss of productive soils by flooding;
- Soil destabilization as a result of excavation;
- Destruction of ecosystems of particular interest;
- Degradation of ecologically sensitive areas;
- Loss of biodiversity;
- Destruction of vegetation;
- Loss of forest products (fuel wood, timber, non- timber forest products, medicinal plants);
- Impact on the fish species;
- Creation of a new fish habitat in the reservoir facilitating fisheries development;
- Loss of existing wildlife and fish habitats;

- Disruption of wildlife migrations;
- Increase in poaching due to non-resident workers;
- Adverse impact on fishes due to changes in water flow and limnology, disruption of fish migrations, and degradation of water quality;
- Loss of sites of cultural, archaeological or historical importance by flooding/impounding;
- Loss of productive land and natural resources in impounded areas;
- Disruption of natural resources exploitation activities, particularly fisheries;
- Derangement of livestock grazing and traditional agriculture, particularly flood recession agriculture;
- Insufficient arable land to satisfy subsistence agricultural needs;
- Loss of territory for local populations;
- Changes in land and water uses, access and rights, that can lead to social conflicts;
- Increased pressure on natural resources due to migration;
- Social conflicts associated with the venue of migrant workers and new settlers (divorces, ethnic tension, etc.);
- Degradation of the visual quality of the landscape due to land clearing, construction works, new infrastructures, etc.
- Health and safety impacts;
- Etc.

The methodology of assessment, based on a rigorous scientific method, shall be first presented. Then all environmental and social, direct and indirect, short and long-term, temporary and permanent impacts shall be described and assessed, indicating their importance level and their probability of occurrence. The importance level may be assessed on the basis of the nature, extent, intensity and duration of the impact, as well as on the sensitivity of the concerned environmental and social components and perceptions of the public. Irreversible or unavoidable impacts shall be clearly identified. Cumulative effects shall also be addressed taking into account other projects or actions planned in the study area.

Appropriate mitigation measures shall be identified to prevent, minimize, mitigate or compensate for adverse environmental and/or social impacts. Moreover, enhancement measures shall be developed in order to improve project environmental and social performance. Roles and responsibilities to implement measures shall be clearly defined. The cost of the measures shall be estimated, including the cost for environmental and social capacity building and gender mainstreaming, if necessary. Residual impacts shall be presented.

The below long-list is meant to serve as a guiding check-list for the assessment of E&S impacts and mitigation measures.

- Give preference to local employment (men and women) and local inputs (food, basic material) to the extent possible;
- Offer appropriate compensations or alternative income opportunities to men and women having a reduced access to or losing productive means;
- Ensure that the poor and other vulnerable groups can continue to safely satisfy their basic needs;
- Provide adversely affected people, men and women, with the training required to benefit from new opportunities;
- Plan information, education and communication activities during and after project implementation to increase awareness of all users (men and women) on safety measures that shall be followed;
- Before construction, consult concerned ministries to verify the adequacy of current and

proposed infrastructures;

- Involve the population (men and women) in the maintenance and management of new infrastructures to ensure their sustainability;
- Ensure adequate social services, including drinking water supplies and sanitation facilities, for addressing the basic needs of the local populations, non-resident workers and migrants;
- Assist social service administrations in coordinating their efforts to offer additional services and improve service delivery if required;
- Promote safety net measures to protect the poor and other vulnerable groups against a service price increase;
- Establish quality control for water supplies and sanitation facilities;
- Near the residential areas, avoid noisy works after regular working hours;
- Maintain vehicles and machinery in good condition in order to minimize gas emissions and noise;
- Use dust and noise attenuators, such as vegetation hedges along transport corridors in order to minimize noise and the aerial transport of dust;
- Plan and set up on-site sanitary facilities for the disposal of wastewater;
- Maintain vehicles, machinery and equipment in good condition in order to avoid leaks and spill of hazardous materials (hydrocarbons, chemical products, etc.);
- Ensure a safe management of hazardous materials (hydrocarbons, chemical products, etc.);
- Take all precautions during the refueling of vehicles and machinery, and forbid the refueling near water bodies;
- Avoid crossing permanent waterways; if necessary, locate the crossing where the banks are stable and the waterway the narrowest;
- Conserve the vegetation along water bodies and near wetlands;
- Plan emergency response measures in case of accidental spill;
- Assess the relevance of clearing the vegetation before flooding the reservoir;
- Avoid areas sensitive to erosion;
- Carry out the construction works in the dry season;
- Limit the circulation of heavy machinery to minimal areas;
- Avoid establishing access roads along steep slopes; instead, locate the access roads perpendicularly or diagonally to the slope;
- Use existing borrow pits rather than creating new ones; after the works, restore borrow pits by stabilizing slopes and facilitating vegetation regeneration;
- Stabilize the soils in order to reduce potential erosion;
- At the end of construction works, level off the soils and facilitate vegetation regeneration;
- Implement integrated watershed management in order to control soil erosion;
- Prevent land clearing in watershed and facilitate the reforestation of cleared areas;
- Design the works in order to release sediments (hydraulic release);
- Dredge accumulated sediments;
- Regulate water flow to minimize soil salinization or concentration of chemical products;
- Design the project by taking into account ecosystems of particular interest and ecologically sensitive areas;
- Protect equal areas of ecosystems of particular interest to offset losses;
- Establish a perimeter of protection around sensitive ecosystems such as wetlands and

- unique habitats sheltering endangered species;
- Minimize the length of work in ecologically sensitive areas;
 - Design the project by taking into account wildlife reproduction areas and migration corridors;
 - Do not carry out any work in reproduction areas during the reproduction periods;
 - Minimize sedimentation in spawning grounds downstream;
 - Relocate animals before flooding the reservoir;
 - Control illegal fishing and hunting, particularly by non-resident workers;
 - Maintain a minimum water flow for fishes and aquatic life;
 - Provide appropriate means of passage for fishes;
 - Facilitate the development of culture fisheries in reservoir as a mean of compensation;
 - Before construction, carry out an archaeological search in the potential areas containing artefacts and preserve discovered artefacts;
 - Negotiate with traditional authorities the preservation of important cultural, religious, historical and aesthetic sites and resources and agree on potential compensation for the communities;
 - During construction, ensure an archaeological surveillance in the potential areas containing artefacts and in case of a discovery, advise the concerned authorities;
 - Involve traditional authorities in monitoring cultural, religious, historical and aesthetic sites and resources during the various phases of the project;
 - Provide equivalent or better housing and accompanying facilities to involuntarily displaced men and women in accordance with consultation results;
 - Plan adequate settlement areas with appropriate housing and services (water and sanitation) for non-resident workers and their families;
 - Provide temporary food supplies to involuntarily displaced men and women, as needed;
 - Provide complementary training /support to men and women to facilitate adjustment during the transition period;
 - In accordance with priorities of displaced men and women, ensure appropriate funding for resettlement as well as for productive land compensation to men and women owning or occupying/cultivating the land;
 - Establish access mechanisms to land in the watershed in order to control unorganized settlements;
 - Take into account the various land uses while designing the project in order to minimize the loss of land, particularly productive land;
 - Involve traditional authorities in the design of the project, particularly in siting settlements and in defining flooded areas;
 - Wherever possible, compensate the loss of land by protecting an equivalent land area in the region;
 - Offer compensation or alternative revenue opportunities to men and women losing land and/or productive means, e.g. to owners and those occupying/cultivating the land;
 - Develop alternative grazing areas to compensate for those lost;
 - Integrate land management priorities into land planning instruments to take into account various land uses;
 - Clearly define water rights and establish water user fees in consultation with concerned stakeholders;
 - Build on the respective knowledge and experience of women and men in water management;
 - Etc.

Environmental Hazard Management

This chapter shall describe the security measures and propose a preliminary contingency plan for the construction and operation phases of the project (possible contingency situations, major actions to properly react to accidents, responsibilities and means of communications).

The ESIA shall include an analysis of the technological accident risk: identification of hazard and potential consequences, estimation of the consequences' magnitude and frequency, and risk estimation and evaluation.

The main risks of the project are related to:

- Health impacts (Vector-borne and other communicable diseases, HIV and sexually transmitted infections Injuries and Malnutrition). Activities associated with construction works such as the manipulation of fuel, waste and hazardous materials;
- Flooding and management of the reservoir;
- Changes in land and water uses, access and rights, that can lead to social conflicts;
- Social conflicts associated with the venue of migrant workers and new settlers (divorces, ethnic tension, etc.);
- Dam rupture, causing sudden flooding of the downstream area and resulting in the loss of human lives and serious economic damages. This aspect will be analyzed by the feasibility study including factoring of Climate Change influence on patterns of floods. The ESIA will summarize the main findings of the dam rupture analysis.
- Etc.

In order to prevent or minimize these hazards, appropriate risk management measures shall be designed and implemented.

Environmental and Social Monitoring Plan (ESMP)

The first section of this chapter shall describe the surveillance measures aiming at ensuring that the proposed mitigation and enhancement measures are effectively implemented. The second section concerns the environmental and social monitoring activities designed to measure and evaluate the project impacts on some key environmental and social components of concern and to implement remedial measures, if necessary. Indicators, roles and responsibilities shall be clearly defined. The cost of the program shall be estimated, including the cost for environmental and social capacity building if necessary.

Public Consultations

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. The Consultant should establish a consultation mechanism with local administrative authorities and traditional authorities to ensure that their views are considered during the planning and implementation phases. Men and women should have the opportunity to organise themselves in groups representing their collective interests. The detailed record of the consultation meetings shall be presented in annex to the ESIA Report.

Conclusion

The Conclusion 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 condition or external requirement for ensuring the success of the project.

Annexes

- List of the professionals and organizations having contributed to the preparation of the ESIA Report;
- List of consulted documents, including project-related reports;
- Baseline data referred to in the Report;

- Record of consultation meetings with primary and secondary stakeholders;
- The specific studies prepared in the framework of the ESIA;
- Any other document that the Consultant considers useful for substantiating the ESIA study results.

Annex 2: Schedule of ESIA Study and Deliverables

Months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
FS and ESIA Studies (24 months)																									
ESIA Study																									
Starting date of services									↓																
Quarterly Progress Notes									↓			↓							↓						
Environmental & Social Impacts Assessment (total duration 13 months)																									
Step 1 Duration: 5 Months																									
Information and data collection																									
Socio environmental investigations																									
Scoping of environmental issues																									
Environmental/Social Screening Report																									
Preliminary report preparation																									
Draft outline of the ESIA report																									
Step 2 Duration: 8 Months																									
Consultative process and enquiries																									
Report preparation																									
Draft final version of the ESIA report																									
Presentation to Authorities and adjustments																									
Issuance of final report																									
Final version of the ESIA report																									
Application for certification																									
Other Consultants Activities (for information only)																									
Feasibility Studies (total duration 24 months)																									
Step 1: Duration 5 months																									
Step 2: Duration: 12 Months																									
Topographical Investigations																									
Geotechnical Investigations																									
Step 3: Duration: 7 Months																									
Other technical assistance and capacity building activities. Duration: 6 months																									
Project management: Duration 30 months																									

Annex 3.5: Map of the project area.



Annex 5: AWF's communication and visibility guidelines

Communication and brand visibility greatly matter to the AWF. The AWF views communication as a strategic function firmly tied to its strategies and business objectives. Steady communication with AWF stakeholders helps build credibility and secure their trust and esteem, which in turn, helps AWF build and protect its reputation. Communications is also about disclosure. The AWF is a multi-donor fund, and is accountable to a Governing Council that expects the AWF to hold itself to the highest level of accountability and transparency. The AWF is committed to making every effort to disclose, share and report information useful and relevant to its stakeholders and the greater public. This entails effectively communicating its achievements, progress, and results by using all means available, in a timely manner. All these elements are important for business and essential to attract and retain donors, and for AWF to maintaining its social license to operate.

Brand awareness is about making sure the public knows AWF exists and can tell the AWF apart from other water funds or organisations. The brand is a visual, memorable trigger, or a logo, that embodies the AWF and captures its core identity. Brand awareness is achieved over time, through activities meant to increase brand visibility, by repeated use and exposure of the logo at strategic places and times. The AWF logo is used as a seal or a signature used to signal AWF financial support or special collaboration.

The AWF has established **Communication and Visibility Guidelines** to the attention of partners, AfDB regional offices and grant recipients to help AWF more effectively achieve its brand and communications objectives, as laid out in the AWF Long Term Communications Strategy 2006 approved by the AWF Governing Council in 2006.

1. GENERAL REQUIREMENTS

- 1.1 At an early stage, when preparing communication activities related to an AWF supported event of project, contact the Communication Officer at AWF Secretariat, copying the AWF Project Manager.
- 1.2 At a minimum, and wherever possible, the AWF logo should be applied to outreach materials that pertain to AWF supported projects or events. The proper use of the logo should be discussed with the AWF Communication Officer.
- 1.3 The AWF should be verbally mentioned as donor of the project it is funding at public speaking events where the project is discussed, and also be mentioned as donor in any Power Point presentations relevant to the project funded by the AWF, using the name and the logo of the AWF appropriately.
- 1.4 The logo is to be obtained upon request from the AWF Communication Officer.
- 1.5 Documents and publications related to an AWF supported project or sponsored publication should contain the AWF logo, as well as this phrase on the cover page: *"This project/program/study is funded by the African Water Facility"*.
- 1.6 Implementing and Implementing agencies should always have a link to the AWF website on the page of their website relevant to an AWF-funded project/activity. The website is: www.africanwaterfacility.org
- 1.7 The AWF asks that grant recipients report back to the AWF Secretariat, any special mention, award nominations or recognition that the project may have received.

2. VALIDATION PROCESS

- 2.1 The AWF management is responsible for the final clearance of AWF communications products/outputs.

3. PRESS RELEASES & MEDIA ADVISORIES

- 3.1 The AWF will issue an AWF-branded press release every time a project is approved and/or signed, and when completed (handover).
- 3.2 AWF press releases must always include a quote from the Coordinator of the AWF, which must be cleared by the Coordinator.

- 3.3 The AWF encourages and appreciates initiatives to issue joint press releases with its grant recipients. A standard joint press release can be issued at any time agreed with the AWF (between launch and completion).
- 3.4 When the grant recipient wishes to produce a press release, liaising with the AWF Communication Officer is required, as well as receiving a quote from the AWF Coordinator, as appropriate, and getting approval and clearance.
- 3.5 The AWF should be included in the title and/or first paragraph of the press release, as appropriate.
- 3.6 The press release should incorporate the AWF logo, mention that funding was provided by the AWF, and mention the amount of the AWF funding.
- 3.7 If a press conference is planned, the press release should include the name of an AWF senior representative who will be present at the press conference, when relevant.
- 3.8 All press releases must bear the name and contact information of the AWF Communication Officer, and if possible that of the communication/media representative from the grant recipient.
- 3.9 The AWF boilerplate text (“About the AWF”) must be added to the text, including the AWF web site address. Please contact the AWF Communication Officer for the latest version.
- 3.10 The AWF has final validation of all its press releases, following a review process involving reviewers.
- 3.11 The rules above also apply to media advisories.

4 PRESS CONFERENCES

- 4.1 Press conferences to launch projects funded by the AWF should be organized in cooperation with the AWF, as much as possible.
- 4.2 The invitations should bear an AWF logo.
- 4.3 The AWF logo of a visible size should appear on any banner or poster to be displayed at the site of the conference.
- 4.4 Press kits need to include a press release with the AWF logo.
- 4.5 Whenever possible, an AWF banner should be on hand and set up to serve as a backdrop for TV and photo purposes.

5 PRESS VISITS

- 5.1 When appropriate, journalists should be invited to visit the project funded by AWF, accompanied by representatives of the AWF or the AWF Focal Point in the respective authority / government of the grant recipient.

6 VISITS BY GOVERNMENT OFFICIALS, AWF DONORS

- 6.1 Visits to projects by government officials and AWF donors are encouraged. Those should be prepared in coordination with the AWF and the AWF Focal Points of the host government. This can include meetings with local beneficiaries.
- 6.2 These visits may also include government officials and AWF donors’ participation to roundtables and other events, as relevant.

7 LEAFLETS, Brochures and Newsletters

- 7.1 All leaflets and brochures relevant to the project/program financed by AWF should incorporate the basic elements of the AWF visual identity, i.e. the AWF logo -with or without tagline.
- 7.2 Leaflets and brochures produced by a grant recipient must also incorporate a definition of the AWF (boilerplate text).
- 7.3 The cover page of all documents pertaining to the project financed by the AWF must clearly identify the activity as being part of an AWF-funded activity.
- 7.4 Copies, including electronic copies of the publications, should be made available to the AWF.

8 ELECTRONIC Communication

8.1 Electronic communication disseminating information on AWF-funded projects including websites, newsletter, and social media platforms, should link to the AWF website.

9 SIGNAGE

9.1 The grant recipient should produce display panels, posters or banners to promote their AWF-funded or AWF-related activities at exhibitions and other events, placed in strategic locations for all to see.

10 Vehicles, Supplies and Equipment

10.1 AWF generally requests that vehicles, supplies and equipment funded by AWF be clearly identified, and visibly carry the AWF logo and the phrase “Provided with the support of the African Water Facility” in English, French or Portuguese, as relevant.

10.2 This requirement is subject to negotiation between AWF and the grant recipient as some supplies and equipment may be exempt.

10.3 The grant recipient must provide evidence of compliance with this rule (digital photos sent by email are recommended.)

11 Photographs and Audiovisual Productions

11.1 Professional high resolutions (300 Dpi) digital photographs of the project funded by AWF should be supplied to the AWF throughout the different phases of the project, to document the progress of actions and events related to these, and to be used in print and online publications.

11.2 All photos should be submitted with full caption and credit information.

11.3 The AWF will be entitled to use or reproduce photos submitted to it without payment of royalties.

11.4 Whenever relevant, audio-visual materials should acknowledge AWF support, by featuring the AWF logo at the beginning and/or end of the movie/documentary.

11.5 Copies of the movie(s) / documentary (ies) should be supplied to the AWF.

12 Commemorative Plaques or SIGNAGE

12.1 Whenever relevant, the grant recipient should place a permanent plaque, or some other type of large, commemorative signage on the most visible part of the building, infrastructure or nearby the project site, which received funding by AWF, beside the name of the Implementing Agency and/or name of the project, for visitors to see.

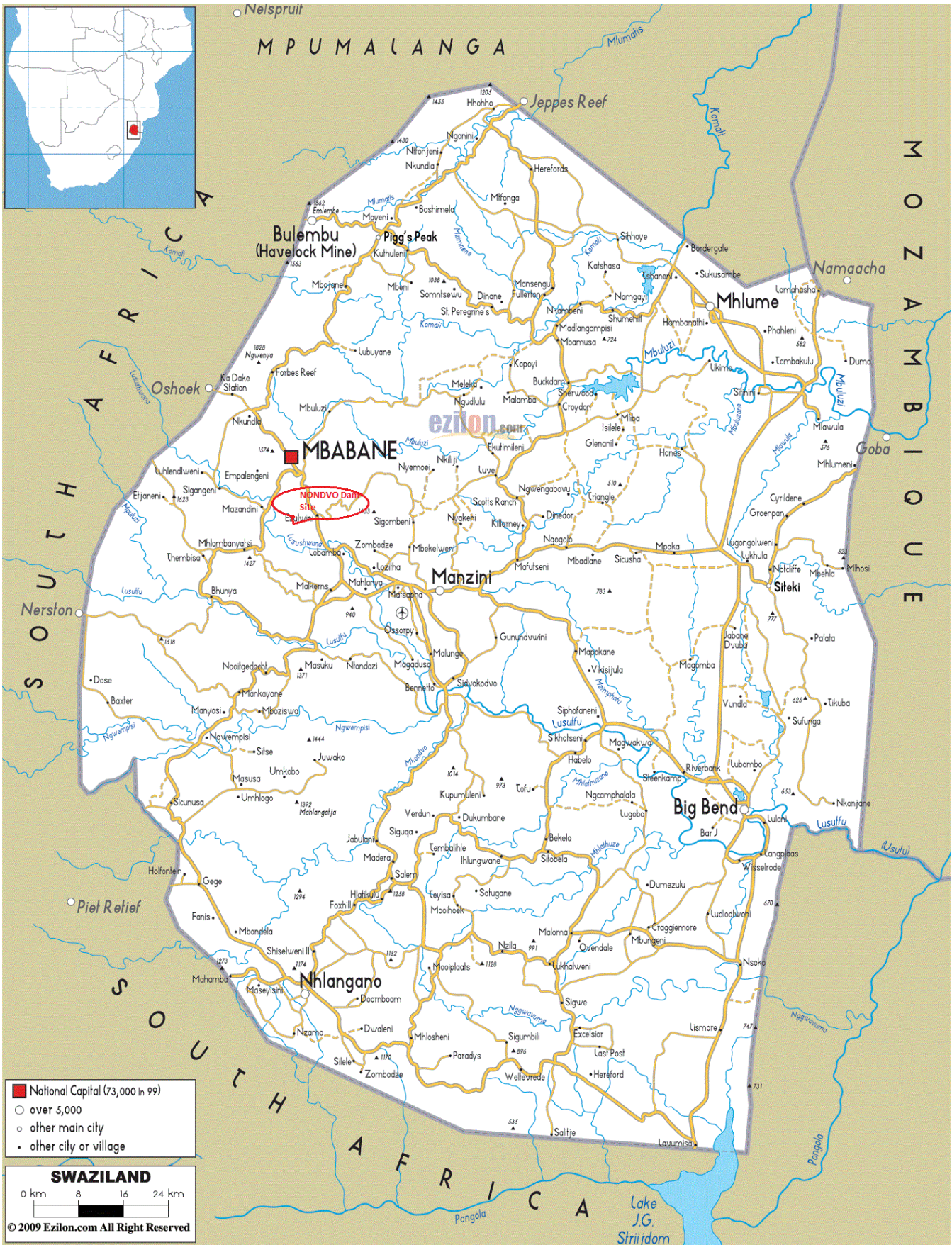
12.2 When appropriate, the plaque or signage could contain the following sentence: “This [name of the infrastructure] was funded by the African Water Facility” alongside the AWF logo.

13 Promotional Items

13.1 Before taking any decision on the production of such items, the Communication Officer at the AWF should be consulted.

13.2 Promotional items bearing the AWF logo can be distributed to support communications activities related to the project funded by AWF. This may include T-shirts, caps, pens, notebooks, USB keys, etc.

Annex 6: Map showing the project location



Annex 7: Detailed Procurement Arrangements

1. National Procedures and Regulations - Use of Country Procurement System

Public procurement in the Kingdom of Swaziland is regulated by the Public Procurement Act, 2011 which became effective in 2013. The Swaziland procurement system provides for use of standard bidding documents for procurement of goods and works by any procuring entity. These documents are undergoing major revision along with revised Procurement Regulations. As the project relates to the recruitment of consulting services, there is therefore no scope for use of national procurement procedures in the current project. Hence, the procurement of consulting services will be in accordance with Bank Rules and Procedures for the Use of Consultants, dated May 2008, revised July 2012 using the relevant Standard Bank Document, and the provisions stipulated in the Financing Agreement.

2. Procurement Arrangements

The estimated cost of the project is EUR 2,800,000 funded through a co-financing arrangement between the Bank, Government of the Kingdom of Swaziland (GoKS), and CRIDF.

A discussion with CRIDF on the use of AfDB Rules and Procedures took place during the appraisal. However, the conclusion reached was parallel-financing arrangement using separate procurement rules, was appropriate. It has been agreed that the project would comprise four components, of which one (Climate Resilience Assessment Transboundary Rivers issues, PPP and Financing Strategy) would be financed by CRIDF. The co-financing arrangement with CRIDF will therefore be on parallel financing basis.

Procurement of goods, works and acquisition of consulting services financed by the Bank will be in accordance with the Bank's Rules and Procedures: "Rules and Procedures for Procurement of Goods and Works", dated May 2008, revised July 2012; and "Rules and Procedures for the Use of Consultants", dated May 2008, revised July 2012, using the relevant Bank Standard Bidding Documents, and the provisions stipulated in the Financing Agreement. *Procurement of goods and services financed by the Government shall be done using Government Procedures.* The recipient has expressed desire to apply for advanced contracting procedures to facilitate the selection of consulting services related to Feasibility Studies, to avoid start up delays in the project.

The Department of Water Affairs shall be the implementing agency for this Project. Therefore, the responsibility for the management of the project activities, including procurement processes, shall rest with the Project Management Team within the DWA. The Ministry of Natural Resources and Energy will provide oversight.

The various items under different expenditure categories and related procurement arrangements are summarized in Table 1 below. Each contract to be financed under the Project, the different procurement methods or consultant selection methods, the need for prequalification, estimated costs, prior-review requirements, and time frame are agreed between the Borrower and the Bank project team and are provided in the Procurement Plan (see section 6 below).

Table 1: Summary of Procurement Arrangements

No	Project Categories	EUR '000 (including approx. 5% contingencies on AWF, MIC_TAF and CRIDF funding)					
		ICB	NCB	Shortlist	Other	Non-Bank Funded	Total
1	Goods						
1.1	Vehicle and consumables O&M					60,000*	60,000
2	Consultancy Services						
2.1	Feasibility Studies			1,820,000			1,820,000

No	Project Categories	EUR '000 (including approx. 5% contingencies on AWF, MIC_TAF and CRIDF funding)					
		ICB	NCB	Shortlist	Other	Non-Bank Funded	Total
2.2	EIAS Studies			460,000			460,000
2.3	CRIDF Studies (Climate Resilience Assessment transboundary, PPP and Financing Strategy)					220,000**	220,000
2.4	Project Coordinator					120,000*	120,000
2.5	Panel of Experts (PoE)					120,000*	120,000
TOTAL		-		2,280,000	-	520,000	2,800,000

* To be procured using Government of Swaziland Public Procurement National Procedures

** To be procured by CRIDF, using CRIDF Procurement Procedures

2.1 Consulting Services

- Acquisition of consultancy services related to Feasibility and EIAS studies, shall be done through shortlisting of firms, using Quality and Cost Based Selection (QCBS).
- When the amount of the contract is less than UA 200,000, the Borrower may limit the Publication of a Specific Procurement Notice (SPN) requesting for expressions of interest to national or regional newspapers. However, if foreign firms express interest they shall be considered.

3. Assessment of the Executing Agency

The Department of Water Affairs (DWA) within the Ministry of Natural Resources and Energy will be the implementing agency and will carry out day-to-day project implementation activities including procurement, financial management. The Ministry of Natural Resources and Energy will provide project oversight.

An assessment of the capacity of the Executing Agency to implement procurement actions for the project has been carried out by the Bank. The objectives of the assessment was to (a) evaluate the capability of the implementing agency and the adequacy of procurement and related systems in place; (b) assess the institutional and procedural risks that may negatively affect the ability of the agency to carry out the procurement process; (c) identify risks, develop and incorporate mitigation measures to address the identified deficiencies to minimize the identified risks.

The assessment reviewed the organisational structure and resource capacity of the DWA. The DWA does not have a procurement unit and staff dedicated for procurement activities. The procurement capacity assessment revealed that there is inadequate capacity within the DWA among staff within the DWA and that there is need for dedicated project implementation staff.

The assessment concluded that the DWA does not have sufficient capacity to handle procurement activities envisaged under the proposed Project. To that end, taking in consideration the nature and complexity of the procurement activities envisaged under the project and in order to enhance procurement capacity, the MNRE shall nominate or engage a qualified and experienced Procurement Expert, acceptable to the Bank, to be part of the project implementation team and to carry out procurement activities under the Project.

The issues concerning the procurement component for implementation of the project have been identified and the corrective measures which have been agreed are indicated in Table 2 below:

4. Risk Mitigation Measures:

The capacity and risk assessment of the Executing Agency has been done and is rated as high. This rating takes into account that the DWA's previous experience in handling AfDB financed projects. The increased workload resulting from this project will require technical support to compliment DWA capabilities to mitigate against implementation risks. This will be done through the engagement of Individual Consultants as indicated in para 2 above, as well as the nomination of a qualified individual to be dedicated for procurement activities. In addition regular supervision missions will include training sessions related to procurement activities. Once all the planned measures are addressed, the risk assessment is expected to reduce to Low. The detailed assessment and mitigation measures are in the Procurement Risks and Mitigation Table below.

Table 2: Procurement Risks and Mitigation Table

	Issue	Risk Mitigation/Corrective Measure	Responsible	When
1	Delays in procurement processing, due to limited experience and knowledge of Bank Rules & procedures	- Recruitment/Nomination of an experienced Procurement Expert to carry out procurement activities under the project - Training Sessions and clinics	DWA AfDB	Three months within Project effectiveness From Project Launching and throughout the project implementation period
2	Ambiguous or unclear procedures and roles during project implementation	Development of an implementation manual	DWA	Six months within Project effectiveness

The Project Implementation Manual will include, in addition to the procurement procedures, the SBDs to be used for each procurement method, as well as model contracts for works and goods procured.

5. General Procurement Notice

The GPN text will be discussed and agreed with the DWA at negotiations and upon approval of the Financing by the Bank Group's Board of Directors and it will be issued for publication¹⁵ in UNDB online and in the Bank's Internet Website, upon approval by the Board of Directors of the Financing Proposal.

6. Procurement Plan

The Borrower, at appraisal, developed a Procurement Plan for project implementation which provides the basis for the procurement methods. This plan has been agreed between the Borrower and the Project Team and is available at the DWA (Mbabane, Swaziland). It will also be available in the Project's database and in the Bank's external website. This Procurement Plan will be updated by the Borrower's Project Team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity. Any revisions

¹⁵ The General Procurement Notice is prepared by the Borrower and submitted to the Bank, which will arrange for its publication in the United Nations Development Business (UNDB online) and in Bank's Internet Website.

proposed to the Procurement Plan shall be submitted to the Bank prior no objection. The Borrower shall implement the Procurement Plan in the manner in which it has been agreed with the Bank.

7. Review Procedures:

For packages subject to prior review, the following documents are subject to review and approval before promulgation:

- Specific Procurement Notices;
- Tender Documents;
- Requests for Proposals;
- Tender Evaluation Reports;
- Reports on Evaluation of Consultants' Proposals, including recommendations for Contract Award.
- Draft Contracts will also be subject to the Bank's approval if they have been amended from the original drafts included in the tender documents.
- The Bank's no-objection for consultancy technical proposals' evaluation report will be required before the financial evaluation is carried out.

8. Review Thresholds

Procurement decisions subject to Prior Review under this project will be made in line with the following thresholds:

Table 3: Prior Review and Procurement Method Thresholds – Swaziland

Expenditure category	Contract value threshold (UA)	Procurement method	Contracts subject to prior review
Consulting Firms	≥ 200,000	QCBS	All
	<200,000	CQS, LCS, Single Source	All

Notes (i) Short list comprising entirely of national consultants: Short list of consultants for services, estimated to cost less than UA 200,000 equivalent per contract, may comprise entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Bank Rules and Procedures for the Use of Consultants

(ii) Contracts selected on basis of CQS should not exceed UA200,000 equivalent

(iii) Terms of Reference (TORs) for all consultancy contracts as well as all single source selections irrespective of value will be subject to prior review

Any Other Special Selection Arrangements: Prior review shall be required for packages to be procured using advance selection procedures:

9. Frequency of Procurement Post Review Mission

Due to the risks identified, the Project will require close supervision to ensure that the identified fiduciary safeguards are effective. Further, in addition to the prior review, supervision missions, bi-annual procurement post review missions will be conducted by the Bank Group. However, the Bank Group reserves the right to conduct its procurement audit at any time during the project implementation. The Executing Agency will maintain all relevant procurement records in accordance with Bank requirements for all procurements subject to post review. Information on procurement processing will be collected by the Executing Agency quarterly and shall be included in detail in the Project Quarterly Progress Report to be submitted to the Bank.

Annex 8: Financial Management Assessment Report

Introduction

The financial management (FM) assessment of the Feasibility Study for a multipurpose dam in the Mbabane Manzini corridor was carried out in accordance with the Bank's Financial Management Policy in African Development Group financed operations issued in February 2014 and Financial Management Manual - For Bank Group Public Sector Operations issued in April 2014.

The objective of the assessment was to determine whether the Executing agency, the Ministry of Natural Resources and Energy (MNRE), has acceptable FM arrangements, capable of (i) correctly and completely recording all transactions and balances relating to the project; (ii) facilitating the preparation of regular, timely and reliable financial statements; (iii) safeguarding the project's assets; and (iv) can be subjected to auditing arrangements acceptable to the Bank.

Executive Summary

The overall conclusion of the FM assessment indicates that the Executive Agency's FM arrangements meet the Bank's minimum requirements to ensure that the funds made available for project financing are used economically and efficiently and for the purpose intended. The overall FM risk rating is **Moderate**. The overall responsibility for accounting and FM (including budgeting, accounting system, internal controls, transactions processing and reporting system, and audit arrangements) rests with the Principal Accountant who is the head of the Ministry's Accounts Section under supervision and guidance of the Principal Secretary, who is the Ministry's Controlling Officer.

Disbursement of the ADB resources will be done in accordance with Bank's procedures and the Disbursement Letter will document the disbursement procedures and methods to be applied for the Grant. Disbursements under this Grant will be only through the direct Payment and the reimbursement methods.

The Executing Agency will produce quarterly progress reports, including all sources of financing and Study expenditures (within 45 days after the end of each calendar quarter). As required by the AWF Operational Procedures and to harmonize the reporting and auditing of all sources of financing of this proposed study, the Recipient shall prepare Special Purpose Project Financial Statements, in form and substance acceptable to the Bank, (i) at the mid-term (ii) and at the closing of the Study. The Special Purpose Financial Statements shall be audited by external auditors appointed by the AWF in accordance with an audit Terms of Reference approved by the Bank. The audit reports together with the management letter containing management comments will be submitted to the Bank no later than six months after the end of the mid-term and Study closure.

Use of Country System

The Bank conducted a fiduciary risk assessment and conclude that overall fiduciary risk is deemed substantial, but it was noted positive trajectory in areas of budget execution, accounting, recording and reporting, and the external scrutiny and audit. However, areas of concern includes: tax administration and the credibility of the budget. The government with support of the Bank and other development partners is implementing PFM reforms to address shortcoming in the country system. However, as mentioned above the study implementation will make use of existing structures of the Executing Agency (the MNRE) as the Ministry's FM capacity is in overall adequate to handle project FM taking into consideration size and nature of this study. All payments of study expenditures to be financed by the AWF, MIC – TAF, and CRIDF funds will be through direct payment method.

Harmonization with Other Donor

The AWF, MIC - TAF, CRIDF and Government of Swaziland will finance the proposed study and the Executing Agency will produce a single quarterly progress report (that will consist of financial reports, including all sources and uses of funds reports by project components and categories together with Physical Progress Reports) as well as a single set of project annual financial statements.

Executing Agency

The Study will be implemented within the MNRE's structures. Financial Management of the proposed Study will be responsibility of the Principal Accountant, under supervision and guidance of the Principal Secretary, who is the Ministry's Controlling Officer. The Ministry's Accounts Section capacity comprises the Principal Accountant, two Senior Accountants, three Accountants and 9 Assistant Accounts Officers. The Accounts Section has adequate staffing arrangements for managing funds and resources of the Study. In addition, the Ministry's finance staff has experience in managing financial resources for donor funded projects including the Bank operation, the Energy Sector Technical Assistance Program.

Summary of Assessed Financial Management Arrangements

The Bank conducted Financial Management (FM) assessment (through desk review) for the MNRE's Accounts Section FM arrangements for the implementation of the proposed Study (that included a review of the budgeting, accounting, internal controls, flow of funds, financial reporting and auditing arrangements). The assessment indicates that these arrangements meet the Bank's minimum requirements to ensure that the funds made available for project financing are used economically and efficiently and for the purpose intended. The overall FM risk rating is **Moderate**.

As mentioned above the Project FM will be handled within the existing structures of the MNRE.

The overall responsibility for accounting and FM (including budgeting, accounting system, internal controls, transactions processing and reporting system, and audit arrangements) rests with the Principal Accountant who is the head of the Ministry's Accounts Section under supervision and guidance of the Principal Secretary, who is the Ministry's Controlling Officer. Disbursement of the AfDB resources will be done in accordance with Bank's procedures and the Disbursement Letter will document the disbursement procedures and methods to be applied for the Grant. Disbursement will only be through the Direct Payment method (for consultancy services).

The project accounting system will be based on the existing government financial management information system, the cash based Treasury Accounting System (TAS) and it will be complemented by excel spreadsheets to facilitate production of required financial reports to monitor and effectively manage the Study. The Executing Agency will produce quarterly progress reports, including all sources of financing and Study expenditures (within 45 days after the end of each quarter). As required by the AWF Operational Procedures and to harmonize the reporting and auditing arrangements for all sources of financing of this proposed study, the Recipient shall prepare Special Purpose Project Financial Statements (that will include all co-financiers funds and Study expenditures, in form and substance acceptable to the Bank), (i) at the mid-term (ii) and at the closing of the Study. The Special Purpose Financial Statements shall be audited by external auditors appointed by the AWF in accordance with an audit Terms of Reference approved by the Bank. The audit reports together with the management letter containing management comments will be submitted to the Bank no later than six months after the end of the mid-term and Study closure.

Budget System

The annual budget of this proposed Study will be prepared based on approved annual work plans by the Executing Agency management and the Bank, which will be derived from the overall project implementation work plans. It will be inscribed in the consolidated government annual budget. The project will finance consultancy services and operating costs (to be financed through government counterpart funds) and the estimated costs have been documented in PAR.

Accounting System

The Study funds, expenditures, and resources will be accounted for using the government financial management information system, the cash based Treasury Accounting System (TAS). This system will be complemented by excel spreadsheets to facilitate production of required financial reports to monitor and effectively manage the project. The project will make use of government financial policies and manual as supplemented by the Treasury Instructions and Ministry's internal instructions.

Internal Controls System and GAC

The existing internal control system at the MNRE is adequate for this Study taking into account the volume of activities to be financed through the project proceeds and the use of direct payment disbursement method. Payment vouchers at the Ministry are reviewed by the Principal Accountant and approved by the Principal Secretary as the Controlling Officer. The activities of project will be included in the annual working plans and Procurement Plan to be approved by the Bank and the Executing Agency management.

The Internal Audit Department (IAD) reporting directly to the Ministry of Finance is understaffed and its operations are not mandated by any piece of legislation but rather by circulars issued by the Ministry of Finance. The benefits that the project may derive from the internal audit department, although appreciated, may be sub optimal, therefore, for the purpose of this operation regular supervision through desk review and field visits should be carried out by the Bank to ensure that the Executing Agency is maintain adequate systems of internal controls and key procedures are complied with.

Treasury Management (including funds flow and disbursement)

Disbursement of the AfDB resources will be done in accordance with Bank's procedures and the Disbursement Letter will document the disbursement procedures and methods to be applied for the Grant. Disbursements will only be made through the Direct Payment method (for consultancy services). The Bank will issue the Disbursement Letter that will provide details of the disbursement process. This will be discussed and finalized during project negotiations.

Financial Reporting System

The Executing Agency will be required to submit Quarterly Progress Reports (within 45 days after the end of each quarter). The contents of these reports should consist of financial reports, including all sources and uses of funds reports by project components and categories together with Physical Progress Reports linking financial information with physical progress and highlighting issues that require attention.

Furthermore, the Agency will also produce project Special Purpose Project Financial Statements (that will include all co-financiers funds and Study expenditures, in form and substance acceptable to the Bank) in accordance with the International Public Sector Accounting Standard (IPSAS) of Financial Reporting Under the Cash Basis of Accounting, which will comprise of at least: (i) a statement of cash receipts and payments which recognizes all cash receipts, cash payments and cash balances for this Study; (ii) comparison of budget and actual project expenditures, and (iii) the accounting policies adopted and explanatory notes. The explanatory notes should be presented in a systematic manner with items on statement of cash receipts and payments being cross referenced to any related information in the notes

External Audit

As required by the AWF Operational Procedures and to harmonize the reporting and auditing arrangements for all sources of financing of this proposed study, the Recipient shall prepare Special Purpose Project Financial Statements (that will include all co-financiers funds and Study expenditures, in form and substance acceptable to the Bank), in form and substance acceptable to the Bank, (i) at the mid-term (ii) and at the closing of the Study. The Special Purpose Financial Statements shall be audited by external auditors appointed by the AWF in accordance with an audit Terms of Reference approved by the Bank. The audit reports together with the management letter containing management comments will be submitted to the Bank no later than six months after the end of the mid-term and Study closure. A detailed management letter containing the auditor's assessment of the internal controls, accounting system and compliance with financial covenants in the Grant Agreements, suggestions for improvement, and management's response to the auditor's management letter will be prepared and submitted to management for follow-up action The costs of such audits shall be borne by the AWF and shall not be part of the Grant.

Conditions

There is no FM conditions for negotiations, Board presentations, and first disbursement.

The Financial covenants for this operations are the following: (a) the recipient shall maintain for the project, a financial management system acceptable to the Bank, over the life of the Study; (b) prepare a submit to the Bank a single Quarterly Progress Report within 45 days after the end of calendar quarter; and (ii) the audit reports together with the management letter containing management comments shall be submitted to the Bank no later than six months after the end of the mid-term and Study closure.

Supervision Plan

The Study will be supervised on risk-based approach. The FM supervision will be carried out by the AfDB Financial Management Specialist (FMS). These supervision will focus on the status of financial management system to verify whether the Executing Agency continues to maintain acceptable Study financial management arrangement and provide support where needed. It will include a review of Quarterly Progress Reports and audit reports, and advice to the task team on all FM issues. Based on current risk assessment this is **Moderate** on site –visit supervision will be at least once during the fiscal year and adjust when the need arises.

Financial Management Risk Analysis Summary

The table below shows the results of the risk assessment from the Risk Rating Summary.

<i>Risk Type</i>	<i>Risk Rating</i>	<i>Proposed Risk Mitigating Measures</i>	<i>Timing for Proposed Mitigation Measure Implementation</i>	<i>Conditionality (Yes/No)</i>
Inherent Risk				
<p>Country</p> <p>The country's PFM is still undergoing reforms initiatives to address a number of weaknesses including commitment management, weak internal controls, fragmented interim reporting, and system inbuilt (TAS) controls.</p> <p>Although the situation is registering improvements, qualified Audit reports, disclaimers and adverse opinion remains a concern, particularly at municipal level, where Audit reports remain outstanding for longer periods in some cases.</p> <p>Capacity constraints, which are more evident at local and municipal levels, exacerbated by high staff turnover rates</p> <p>Low level of compliance with accounting standard attributed to the limited number of Accountants.</p>	S	<p>The government of the Kingdom of Swaziland launched a Fiscal Adjustment Roadmap, which will enhance the country PFM. The PFM initiative focused on reforms in macro-fiscal, budget formulation, cash and expenditure management, accounting and fiscal report. Its implantation are still at early sate, however, the government is committed to undertake PFM reforms. This is a simple Study and its activities are clearly identified. A Project Implementation.</p>	<p>The government is marking efforts to address PFM challenges with support of the development partners.</p>	No

<p>Entity Level</p> <p>The project Executing Agency may not comply with Financial Management requirement of Bank-financed projects</p>	S	<p>The Principal Accountant will provide necessary guidance and supervising of the accounting staff in handling Study FM</p> <p>The Ministry's finance staff will be trained in FM and Disbursement requirement for Bank-financed operations prior to first disbursement.</p>	At the launch of the Study.	No
<p>Project Level</p> <p>Delays in payments of providers of goods and services may delay impacting negatively implementation of project activities.</p>	M	<p>The Ministry's Account Section staff will be trained in FM requirements and Disbursement policies and procedures of the Bank-financed projects, and Bank team will provide technical assistance as needed.</p>	At the launch of the Study	No
<p>Budgeting</p> <p>Risk that realistic annual budget may not be prepared</p>	M	<p>This project will finance project expenditure already identified and the estimated costs have been prepared and documented in the PAR, subsequently, annual budgets will be based on pre-costed annual work plans.</p>	The Study annual budget will follow the government budget timetable	No
<p>Accounting</p> <p>The public accounting system suffers from incompleteness and doubts in accuracy, consequently the Executing Agency may not accurately recording transactions relating to the project in a complete manner.</p>	M	<p>The Treasury Accounting System that will be used for accounting for Grant funds, expenditures, and resources supplemented by excel based project specific records, these will be regularly reconciled with Bank ledgers to ensure accuracy</p>		No
<p>Internal Control</p> <p>The risk is that some financial management procedures and regulations, including internal control best practices, may not be observed by the MNRE finance staff.</p>	M	<p>The Study expenditures will be incurred in accordance with Public Financial Management Act, and the government Financial Manual.</p>	For the purpose of this Grant, the Bank team will monitor compliance with key internal control procedures through site visits and desk reviews on regular basis.	No
<p>Treasury Management/ Funds Flow</p> <p>Delays in payment of consultants may impact in implementation of the project.</p>	M	<p>Funds flow is simple and the MNRE finance staff are capable of preparing withdrawal applications to be submitted to the Bank</p>	All payments to the consultants will be through direct payment method.	No
<p>Financial Reporting</p>		<p>The Executing Agency will produce single quarterly</p>	Formats and contents of quarterly progress	No

Project may not able to produce required reports to monitor and manage effectively the progress of the project.		progress reports and annual project financial statements based on formats agreed formats with the Bank	reports will be clarified at the launch of the Study	
Auditing The Study audited financial statements may not be submitted to Bank on time	M	AS required by AWF Operational Procedures, the Study Financial Statement will be audited by qualified and independent private audit firm.	The auditor of this Study will be appointed by AWF.	No
Overall Risk Rating	M			