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REPUBLIC OF ZAMBIA

Development of Operational Guidelines for Investments in Multi-purpose Small Dams

APPRAISAL REPORT

FINAL August 2012

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LIST of ABBREVIATIONS and ACRONYMS

AfDB	African Development Bank
AMCOW:	African Ministerial Conference on Water
AWF:	African Water Facility
CBO:	Community Based Organisations
CFU:	Conservation Farming Unit
DWA	Department of Water Affairs
ECZ:	Environmental Council of Zambia
FAO:	Food and Agriculture Organisation
GPN:	General Procurement Notice
GRZ:	Government of the Republic of Zambia
JICA:	Japan International Cooperation Agency
IWRM:	Integrated Water Resources Management
IWRM/WE:	Integrated Water Resources Management and Water Efficiency Implementation Plan
LA:	Local Authority
MACO:	Ministry of Agriculture and Cooperatives
MLEWD:	Ministry of Lands, Energy and Water Development
M&E:	Monitoring and Evaluation
NCB:	National Competitive Bidding
NCG:	Nordic Consulting Group
NEPAD:	New Partnership for Africa's Development
NGO:	Non-Governmental Organisation
NWRMA:	National Water Resources Management Authority
MTENR:	Ministry of Tourism, Environment and Natural Resources
O&M:	Operation and Maintenance
QCBS:	Quality and Cost Based Selection
PAR:	Project Appraisal Report
PDC:	Provincial Development Committee
PIU:	Project Implementation Unit
PPP:	Public-Private Partnership
PSC	Project Steering Committee
R&D:	Research and Development
RFP	Request for Proposal
RMC:	Regional Member Country
SADC:	Southern African Development Community
SPN.	Specific Procurement Notice
TA:	Technical Assistance
ToR:	Terms of Reference
UNZA:	University of Zambia
ZGCA:	Coffee Growers' Association of Zambia
ZNFU:	The Zambian National Farmers Union
ZWP:	Zambia Water Partnership

CURRENCY:

Local Currency	:	Zambian Kwacha (ZMK)
1 Euro (€)	:	6556 ZMK (local exchange rate December 2011)

Logical Framework Analysis

HIERARCHY of OBJECTIVES	EXPECTED RESULTS	REACH BENEFICIARIES	PERFORMANCE INDICATORS	INDICATIVE TARGETS and TIMEFRAME	RISKS MITIGATON MEASURES
GOAL: Contribute to enhanced water security at community level through effective development of water resources that is fundamental to economic growth and poverty reduction in accordance with the Sixth National Development Plan (SNDP) 2011-2015	**IMPACT:** (Economic growth, reduced poverty, improved well-being from increased water storage related livelihoods in Zambia	Beneficiaries: (ii) MLEWD-DWA and water related authorities national and provincial and local government level; (ii) People in project communities; (iii) People in communities benefitting from long-term up-scaling under the IWRM/WE towards 2030; (iv) Local entrepreneurs, private enterprises, small scale farmers, and other economic actors (v) donors; (vi) Associations: PPP, coffee growers, export growers, UNZA, conservation farming, ZNFU, Commodity boards; advisors	Indicators: Contribution of Agricultural water use livelihoods to overall GDP from water related economic activities Source: DWA/PIU, progress reports, baseline and socio-economic surveys and impact assessment, PCR, Post Project Evaluation Periodicity: Annual	By 2030: Up-scaled development of small dams under the Africa Water Vision 2025, the Zambia IWRM/WE (2007-2030) contributing to better water security, economic development, reduced poverty for approximately. one million people	Risk: Weak political support hampering project recognition and achievements Mitigation: The President of Zambia and GRZ already demonstrated political support to water sector development through IWRM/WE 2007-30 Risk: Weak donor and investor involvement in financial mobilisation Mitigation: Development of bankable projects to comfort donors and investors Risk; Weak Community Response to project interventions Mitigation: Ample focus on engaging with communities
PURPOSE/OBJECTIVES: (i) Support the GRZ to develop, test, and adopt updated guidelines for programming, design, financing, construction, and O&M of multi-purpose small dams;	**OUTCOMES:** (i) Functional operational and field tested guidelines to govern small dam development approved and adopted by GRZ; (ii) Upgraded dams in 4 field testing sites (3 rehabilitated and 1 new); (iii) Improved capacity of GRZ to optimise, govern and finance small dams development; (iv) 5 'bankable' small dam projects (new &	(i) Some 40,000 people benefitting from 3 dams rehabilitated and 1 new dam constructed during field testing; (ii) Some 50,000 people benefitted from 5 dams designed and funding mobilised for construction.by the project	Indicators: (i) Guidelines successfully tested on 3 existing and one new small dam projects; (ii) Updated guidelines, adopted, and effectively in use by GRZ; (iii) Design of 5 small dam projects and support GRZ in organisation of donors round table to finance small dam investments Sources: Supervision reports,	By 2020: (i) Operational small dams guidelines; (ii) 9 small dams - new & rehabilitated (4 by field test, 5 bankable projects designed & funding mobilised;	

	rehabilitated) prepared		MLEWD-DWA. ZAFO Periodicity: Annual		
ACTIVITIES: Four interrelated Project Components: – Component A: Development of new guidelines for community driven development of multi-purpose small dams, – Component B: Field testing and finalisation of guidelines for multi-purpose small dams; – Component C: Preparation and organisation of donors' conference for up-scaled development of small multi-purpose dams – Component D: Project management, coordination, capacity building and performance monitoring **Total Inputs:** AWF: € 950,000, GRZ: € 150,000	**OUTPUTS:** A: Effective guidelines for development of small dams B: (i) Guidelines applied on optimisation and rehabilitation of 4 small dams (3 existing and 1 new); (iii) Revised guidelines prepared and validation workshop completed. C: Investment planning and design of 5 new/rehabilitated dams and funding mobilised D: Project implementation effectively managed monitored and completed. Project engaged with UNZA including funding support to 3 MSc. and 1 PhD students obtaining their degrees on project related subjects.	Same as above	Indicators: (i) Approval of all required reports and planning documents; (Upgraded guidelines internalised and used by DWA and partner authorities; (ii) Improved water security in 4 communities where guidelines were field tested (40,000 beneficiaries); (iii) Successful design of bankable projects for 5 dams (approx. 50,000 beneficiaries 3 MSc.and 1 PhD students obtained their degrees. Source: MEWD, DWA-PIU, Supervision reports, PCR, , progress reports, evaluation Periodicity: Quarterly, annual, and post project evaluation.	By 2016: (i) All direct outputs of the project activities attained; (ii) Guidelines finalised and adopted, investments effectively carried out 4 projects (40,000 beneficiaries); (iii) Bankable investment planning and detailed design of 5 small dam projects; and funding mobilised, post graduate UNZA students finalised project related thesis.	Risk: Weak DWA staff capacity insufficient to effectively manage the project and promote the proposed up-scaling investments. Mitigation: Project aimed to support DWA in using the guidelines Risk: Hydrological and siltation risks due to climate change and variations and poor catchment management. Mitigation: to be addressed in new guidelines.

Executive Summary

The Government of the Republic of Zambia (GRZ) recognises that effective development of the Nation's water resources is fundamental to its economic growth and poverty reduction. In this connection, small water reservoirs located in semi-arid areas have important functions of sustaining livelihoods of local communities through multiple uses, such as: (i) enhanced domestic water security; (ii) increased agriculture yields of smallholder farming; (iii) fish farming opportunities; (iv) water for livestock; and (v) several water dependent activities such as brick-making, tree growing, food processing, mini hydropower systems. Small-dams are also beneficial instruments for climate change adaptation through flood impact attenuation.

Attention at the highest political level has been paid to the development of small dams in Zambia by the Zambia's new president, Michael Sata, who, in November 2011, proclaimed that: "the new government will invest in the construction of more water dams and water harvesting technologies in order to harvest more water for irrigation in a bid to increase food production and food security in the country".

Most of the approximately 3,000 small low cost earth dams in Zambia are situated in the drought prone semi-arid areas of the Eastern, Lusaka, Central and Southern provinces, where water needs to be stored for sustainable livestock, agriculture and domestic use. In a recent survey by the Ministry of Energy and Water Development, many dams have suffered from irregular maintenance and repair and are considered to be in a state of disrepair.

Whereas the Government of Zambia has developed the requisite water sector framework documents for effective water resources management and development, the anticipated investments are not taking place, in particular, those for water storage infrastructure. Furthermore the effectiveness of investments in water reservoirs in Zambia is hampered by lack of appropriates guidelines to govern investment planning, operation and management of multi-purpose small dams. Consequently potential investors do not have the confidence required to deploy their resources in this critical development area. The most recent manual on small dams used in Zambia is the "Manual on Small Earth Dams - A guide to Siting, Design and Construction" FAO (2010). This manual mainly focuses on technical aspects and procurement guidelines for tender preparation, evaluation and award of contract, and construction management and is meant for engineers, technicians and extension workers involved in agriculture, commercial farming, and construction. This appraisal report has undertaken a rapid assessment of the existing manuals and has identified the areas that need to be further elaborated and included in the proposed updated guidelines. The most important aspects that will need to be include community participation and ownership, economic analysis, funds mobilisation, climate change and environmental management.

The Government, in cooperation with the African Water Facility (AWF) has identified a project to modernise and update the GRZ guidelines that govern and promote investments in multi-purpose small dams with the view to attracting the massive investments required in small dams' development. The proposed project is being undertaken against a backdrop of the increasing hydro-climatic variability and a renewed focus within the GRZ on the development of multi-purpose small reservoirs, particularly in the drought-prone areas of Eastern, Luapula, Central and Southern provinces. The project will be carried out in close cooperation with associated water development programmes funded by GRZ and donors. The overarching goal of the project is to increase water security at the community level and contribute to economic growth and poverty reduction.

The objective of the Project is to upgrade and carry out field testing of national guidelines for community driven planning, design and implementation of multi-purpose small dams in Zambia, Such guidelines are essential to effectively guide GRZ in engaging with external support partners to accelerate the investments in multi-purpose small dams for improved water security in the country. Thus the project will add significant value to the strategic up-scaling of dam development and contribute to the attainment of the MDG goals and the ambitions of the Africa Water Vision. The Project will contribute to design planning and funds mobilisation to spur new and on-going water development

programmes such as the Integrated Water Resources Management and Water Efficiency Implementation Plan (2007-30). The project also involves direct investments in connection with the field testing of the guidelines that will include rehabilitation and rehabilitation of three existing dams and construction of one new small dam directly benefitting some 40,000 people.

Implementation of the project will be undertaken over a period of 3 years after approval. The estimated total cost of the project is Euro 1,100,000 and the AWF will provide grant financing of Euro 950,000 covering 86% of the project costs. The in-kind contributions of the Government of Zambia are estimated as Euro 150,000 representing 14% of project cost.

The Government of Zambia will be the Grant Recipient and the Ministry of Lands, Energy and Water Development (MLEWD) the Executing Agency. The project will be implemented by a Project Implementation Unit (PIU) hosted at the DWA for day-to-day execution and coordination.
In view of the immense benefits that will accrue to Zambia as a result of implementing this project it is recommended that an AWF grant not exceeding Euro 950,000 be approved for the GRZ to undertake the project.

1.0 BACKGROUND

1.1 Project Rationale and Origin

1.1.1 The Zambia Ministry of Lands, Energy and Water Development (MLEWD) has requested AWF to support GRZ's concerted water development efforts that will contribute to enhanced socio-economic development and improve the livelihoods of populations in the semi-arid regions of the country.

1.1.2 The requested project has been identified under the framework of the Integrated Water Resources Management and Water Efficiency Implementation (IWRM/WE) Plan 2007-30, and was further substantiated by the Zambia Water Resources Strategy on Managing Water for Sustainable Growth and Poverty Reduction (2009). The requested project will not be a standalone intervention but be part of concerted water resources development efforts pursued by the Government of Zambia (GRZ) and supported by a number of cooperating partners in the sector including the World Bank, AfDB, and several multi-national and bilateral donors.

1.1.3 The African Water Facility (AWF) undertook a mission to appraise the proposed project in September 2011 and the current report has been prepared on the basis of the agreements and recommendations reached with government.

1.2 Sector Status and Priorities

1.2.1 In an interview, Zambia's president Michael Sata[1], stated: *"like many other countries in the SADC region, Zambia has been hit hard by climate change which has changed the rainfall pattern. As a result, many Zambian small and medium scale farmers have been unable to irrigate their crops due to lack of sufficient funds to construct dams for irrigation"*. The high attention paid to development of small dams in Zambia was well articulated by President who further announced that "*the new Government will invest in the construction of more water dams and water harvesting technologies in order to harvest more water for irrigation in a bid to increase food production and food security in the country*" Against this backdrop the proposed project has a role to play to guide and assist the GOZ's efforts to boost that development of small dams in Zambia

1.2.2 Zambia is relatively well endowed with water compared to other countries in the Southern African Development Community (SADC). However, the country faces considerable variability between different parts of the country, seasonally and annually. The renewable water resource per capita is estimated at 8,726 m^3 per year, well above the average for sub-Saharan Africa of 6,957 m^3per person per year and the global average of 8,210 m^3 per person per year[2]. Despite its favourable water resources endowment, Zambia has over the years faced a number of challenges in to managing the country's water resources and these have resulted in inadequate supplies to meet various needs, pollution, inadequate information for decision making, inefficient use of the resource, inadequate financing and limited stakeholder awareness and participation. There is now a clear understanding that these challenges can be solved through applying the principles of integrated water resources management including investments in hydraulic infrastructure especially reservoirs.

1.2.3 The proposed project corresponds well to the focal areas of intervention of the Africa Water Vision 2025 for equitable and sustainable use of water for socio-economic development and the priorities of AMCOW and NEPAD on accelerated structural investments to enhance water and energy security, and adaptation to climate change and variability risks. The project is also supporting the achievement of Zambia's national development goal of reducing poverty and reaching middle income country status by 2030.

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[1] Michael Malakata 2nd November 2011: Interview with Zambia's President Michael Sata (http://waterjournalistsafrica.wordpress.com/2011/11/02/zambia-government-to-invest-in-construction-of-water-harvesting-technologies/)

[2] World Resources Institute http://www.wri.org/

1.2.4 The GRZ recognises that small water reservoirs and diversion weirs located in semi-arid areas (see map Annex 4) have important functions of sustaining livelihoods of local communities through multiple uses, such as: (i) enhanced domestic water security, (ii) increased agriculture yields of smallholder farming, (iii) fish farming opportunities, (iv) water for livestock, and (v) several water dependent activities such as brick-making, tree growing, food processing, mini hydropower systems (if feasible), etc. Another beneficial effect of small dams is groundwater recharge. Dams are also beneficial instruments for climate change adaptation through flood impact attenuation.

1.2.5 The Government is engaged in a number of water sector reforms that will improve the enabling environment for effective water resources management and development. A revised Water Resources Management Act[3] has been passed as part of the sector reforms on the view to maximize the economic and social benefits of Zambia's water resources. The Act includes inter alia the establishment of new institutional structures to increase efficiency, comprising: (i) an autonomous National Water Resources Management Authority (NWRMA) responsible for all executive WRM functions (to replace the existing Water Board); (ii) Catchment Councils substituting the present Provincial setup for water management; (iii) Sub-Catchment Councils complementary to the District setup; (iv) Water User Associations; (v) a Water Resources Development Fund to make investments that will benefit the poor (e.g. dam and canal construction for small scale irrigation schemes); and (vi) the Department of Water Resources to substitute the present DWA and be responsible for policy formulation and guidance as well as international rivers. It will take time to make all these reforms effective, but the proposed project will these long-term water sector reforms.

1.2.6 In 2004, the Zambian government, through the then Ministry of Energy and Water Development (MEWD) (now MLEWD[4]), with facilitation of the Zambia Water Partnership (ZWP), launched an Integrated Water Resources and Water Efficiency Plan for sustainable management of the country's water resources. The two most recent analyses of the status of the water sector situation in Zambia are: (i) Integrated Water Resources Management and Water Efficiency (IWRM/WE) 2007-2030[5]; and (ii) Zambia - Managing Water for Sustainable Growth (2009)[6]. The WRM part of the Sixth National Development Plan (SNDP) 2011-2015 for Zambia recognises that effective development of Zambia's water resources is fundamental to its economic growth and poverty reduction. All the four mentioned areas are well covered under the on-going cooperation between GRZ, the World Bank and other key water sector development partners. The proposed Project falls well within the programmes incorporated in the current FNDP.

1.2.7 The key government authorities related to the development of small dams are (i) The Ministry of Lands, Energy and Water Development (MLEWD) and its Department of Water Affairs (DWA). The Department is divided into: Ground Water Resources; Surface Water Resources; and Water Resources Management; and (ii) The Ministry of Agriculture and Cooperatives (MACO). The role of MACO is to promote sustainable agricultural productivity, to ensure food security, income generation, creation of employment opportunities and poverty reduction. Several other ministries and organizations/stakeholders are also critical to the development of multi-purpose small dams in Zambia. One of these is the Ministry of Tourism, Environment and Natural Resources (MTENR), which, through the Environmental Council of Zambia (ECZ) supervises all new investments to ensure the mitigation of environmental effects.

[3] The Water Resources Management Act, 2011 [No. 21 of 2011]
[4] Now Ministry of Lands Energy and Water Development (MLEWD)
[5] IWRM/WE - Implementation Plan Volume 1 : Main Report (2007-2030) Ministry of Energy and Water Development, April 2008
6 Zambia - Managing Water for Sustainable Growth - World Bank Country Water Resources Assistance Strategy for Zambia (August 2009)

1.3 Problem Definition and Opportunities

Climate Vulnerability and Adaptation

1.3.1 Although Zambia is well endowed with water relative to other countries in Southern Africa, there is considerable variability both between different parts of the country, seasonally and annually. Historically, Zambia has been affected by droughts and floods and in recent decades the frequency and severity of these climatic hazards have increased. In the last seven years of this decade, Zambia has had to endure droughts in the rainy seasons of 2000/01, 2001/02 and 2004/05 while floods have occurred in 2005/06 and 2006/07. The impacts of these droughts/floods have included widespread crop failure/loss, outbreaks of human and animal diseases, dislocation of human populations and destruction of property and infrastructure. This hydro-meteorological variability is likely to be exacerbated by climate change in the future which will have adverse consequences for water resources management, as well as in the design, operation and investments in water infrastructure. WRM and infrastructure investments in water reservoirs are crucial in reducing vulnerability to droughts and floods and potential impacts of climate change.

Water Storage Capacity Situation

1.3.2 Zambia's water resources are largely undeveloped and the economic development of the country is directly dependent upon secure availability and sustainable sources of water. Small dams are widespread across Zambia. A recent dam inventory for Zambia suggests that there are some 3000 low cost earth dams (3m to 15m[7]high) and water impoundment earth bunds (up to 3 m high), which is by far less than needed to ensure a perennial access to water resources in many semi-arid parts of the country. Most of these dams are situated in the drought prone areas of the Eastern (1000 mm/yr.), Luapula (1050 mm/yr.), Central (800 mm/yr.) and Southern (740 mm/yr.) provinces, where water needs to be conserved for sustainable livestock, agriculture and domestic use. Most of the existing dams have been developed by government or private farmers. These structures are used either separately or combined, for fish farming, livestock and domestic water purposes, drainage sumps, groundwater recharge, flood amelioration and conservation storage or hydropower where feasible.

1.3.3 The appraisal team has not been able to obtain precise statistics on the size distribution of small reservoirs in Zambia. However a recent study provides information about the situation in the Southern Province. Based on this information combined with data on typical correlations between dam areas (ha) and capacity (m^3) a tentative estimate of size distribution of dams is presented in Annex 5 as a basis for Figure 1.1 below. Table 1 shows the assumed correlation between dam area, height and capacity for the same sample of dams. The majority of small dams (74%) appears be in the range of 3,000 to 30,000 m^3. Another 14% of the dams is between 30,000 and 80,000 m^3 while the remaining dams (13%) are beyond 80,000 m^3. The average capacity of small dams in the province is estimated at 18,000 m^3. Assuming that the size distribution in Southern Province is by and large equivalent to that in other drought prone provinces, the figure should give an indication of the size range of small dams in Zambia. Since the dams to be included in the project remains to be chosen, the calculations in this appraisal report will be based on a typical dam size of 30,000 m^3.

[7] The majority of small dams in Zambia are assumed to be in the order of 5,000-30,000 m^3 (3 to 5 m high) (see Figure 1.1 and Table 1.1)

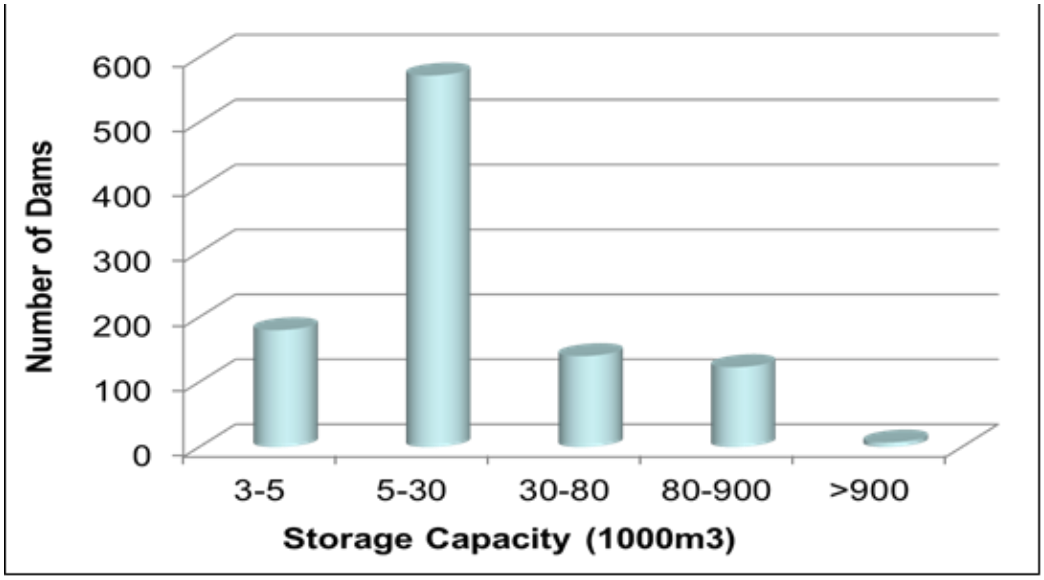


Figure 1.1: Distribution of size of existing small reservoirs Southern Province

Table 1.1 Approximate correlations between dam area, capacity and height

Reservoir size (ha)	Dam height (m)	Capacity (1000m^3)
0.5 – 1	1-3	3-5
1– 5	3-5	5-30
5 – 10	5-7	30-80
10 – 100	7-12	80-900
> 100	>12	>900

1.3.4 While the aggregated storage capacity of the small dams in Zambia is unknown, most of the dams have suffered from poor design, irregular maintenance and repair and are considered to be in a state of disrepair. Remoteness remains a constraint for irrigation development, and little investment has so far been attracted. Nevertheless, many of the dams that are still in operation could provide good opportunities for rehabilitation and upgrading to include multi-purpose opportunities and use of low cost technology to increase their socio-economic benefits to the communities.

Economic Viability of Multi-purpose Reservoirs in Zambia

1.3.5 Most existing small and medium dam projects have focused on a single use with benefits from other water uses often foregone or undervalued. The Government's strategies to improve water and food security involve rehabilitation of existing reservoirs, construction of new dams, and promote the development of multi-purpose systems particularly in the drought-prone areas of Eastern, Lusaka, Central and Southern provinces. This is aimed to optimise the collective benefits of the new and rehabilitated reservoirs. For example, support for the construction of 4 small dams per year for economic production, complemented by the rehabilitation and expansion of existing dams, is one of the core indicators under the former FNDP (now replaced by the sixth plan SNDP). As a result, Government has previously increased allocation to small dams from less than US$1 million in 2004 to over US$3 million in 2007.

1.3.6 An important study was conducted in 2010 to assess the efficacy of public expenditures on the improvement of rural livelihoods with focus on investments in small scale water resources infrastructure[8]. This study has examined the costs and economic viability of rehabilitation of some 42 dams between 2005 and 2009. The analysis of household income of small dam users showed that it exceeds the net additional income required to make rehabilitation and also investment in new dams justifiable. It confirms that rehabilitation and upgrading with irrigation systems are economically attractive options. Construction of new dams, with the given assumption about number of users,

[8] GRZ: Economic Analysis of the Impact of Small Dams on Rural Poverty in Zambia. Nordic Consulting Group (NCG) (18 September 2010)

discount rate and years, would also be economically viable. The proposed Project will duly take into account the outcomes of this study and other recent small dam development initiatives that justify increased investments in multi-purpose small water reservoirs.

Planning and Capacity Building for Development of Small Dams in Zambia

1.3.7 From the information provided by the Nordic Consulting Group (NCG) economic analysis (see footnote), there is no uniform planning procedure for construction or rehabilitation of small dams in Zambia, and no overall responsible line agency. Most planning of construction and rehabilitation of small dams is done in partnership between the Government, the traditional chiefs and the local community within the government planning systems. District Councils are in principle always involved in the construction or rehabilitation of works and financing of small dams should be included in District Plans and Provincial Plans. District plans, which include small dams, are submitted to the Provincial Development Committee (PDC) for approval. The Department of Water Affairs (DWA) is mainly involved in major rehabilitation and new construction. As a rule of thumb, a project should not take more than 2 years, and small dams are typically constructed over 2-3 months. DWA is accountable for national programmes even if the funds are spent in the provinces. The procurement of the dam construction will be based on applicable GRZ procedures for small l dam projects managed by DWA aligned with the AfDB rules and practices for community driven construction projects.

1.3.8 The Ministry in collaboration with the Zambia Water Partnership is engaged in the implementation of the Integrated Water Resources Management and Water Efficiency IWRM/WE Implementation Plan. The integrated water resources component of this initiative is supporting IWRM activities in the MEWD, strengthening the water rights systems administered by the Water Board, groundwater monitoring in pilot areas, IWRM capacity building through the University of Zambia (UNZA); piloting of decentralised water resources management structures and rehabilitation and construction of small dams and weirs. UNZA plays and important role as a knowledge management centre and the project will support the involvement of the University in guiding the development of multi-purpose small dams by providing grants for earmarked research and development R&D activities for M.Sc. and PhD students.

Current Guidelines for Construction of Small Dams

1.3.9 The effectiveness of investments in small, medium and large dams in Zambia is apparently hampered by lack of appropriate guidelines. DWA previously used a manual for "self-help dams" called "A Guide to design and construction of medium sized earth dams in Rhodesia" (1979), which was complementary to the Agritex "Handbook of Basic Instructions for Dam Construction". The latter stipulates that site selection is to be done on basic criteria: catchment area less than 3 km^2, and the area "reasonably free of soil erosion". The manual then gives technical design specifications. All community work would be on unpaid voluntary basis whereas the assisting agency would provide various materials and equipment.

1.3.10 The most recent manual used in Zambia is the "Manual on small earth dams. A guide to siting, design and construction" prepared by FAO (2010) with the assistance of the World Bank funded Country Water Resources Assistance Strategy in Zambia. This manual focuses on physical planning and dam designs meant specifically for engineers, technicians and extension workers involved in agriculture, commercial farmers and contractors – all with some understanding of engineering of dams, irrigation and water supply. The manual also pay some attention to the importance of community participation and recommends strongly establishment of dam committees at an early stage and takes into consideration social and gender aspects, but these factors need to be further concretised. The manual furthermore includes an annex on fish production in dams. The cost-benefit analysis chapter will need to be better adapted to the situation and relevant experience in Zambia.

1.3.11 The current guidelines on small dams have a strong focus on technical design issues and agricultural water supply. These will need to be updated to address a broader spectrum of issues including: (i) community driven water resources management and development; (ii) public awareness on infrastructure development and O&M requirements; (iii) economic analysis and multi-purpose

optimisation; (iv) financial mobilisation and partnership development; (v) integration of climate change issues; (vi) environmental management and social equity aspects; (vii) development impact monitoring and knowledge management; and (viii) new methods for reservoir mapping and national dam inventory management. The above issues will be addressed by the project in of the upgraded guidelines. These will undergo practical field testing by engaging in 4 selected multi-purpose small dam projects (3 on upgrading of existing dams and construction of 1 new dam)..

1.4 Beneficiaries and Stakeholders

The project will actively involve local populations and stakeholders in the project areas. The anticipated beneficiary groups and benefits of this project will include the following:

- Key government authorities concerned with small dams development will have a robust framework to guide their work in small dams development. The institutions include (i) The Ministry of Lands, Energy and Water Development (MLEWD) and its Department of Water Affairs (DWA); (ii) the Ministry of Agriculture and Cooperatives (MACO); (iii) Ministry of Tourism, Environment and Natural Resources (MTENR) and its Environmental Council of Zambia (ECZ); and (iv) and other authorities and public development partners involved in water resources management and development in Zambia
- Some 40,000 people benefitting from 4 dams (1 new constructed and 3rehabilitated) during the course of the field testing. The selection of districts and dam sites of the test dams will be performed in a participatory way as part of the project following the proposed new procedures. At least one of the dams will be in the Southern Province;
- Some 50,000 people will benefit from 5 dams that will be designed for investment by others partners;
- Local entrepreneurs, water services providers, small scale farmers and small scale economic actors depending on water will have the benefit of increased opportunities to work;
- Private sector actors engaged in water infrastructure development such as "out-grower" arrangements for cotton, sugar and other products, which offer farmers access to water, inputs and markets, the supply of irrigation equipment, and extension services;
- People in other communities benefitting from long-term up-scaling under the IWRM/WE towards 2030;
- Bi- and multi-lateral development cooperation partners (such as the World Bank and AfDB) and national/international investors;
- Associations such as Public-private partnerships (PPP),Coffee Growers' Association of Zambia (ZGCA), the Zambia Export Growers' Association and the Conservation Farming Unit (CFU);The Zambian National Farmers Union (ZNFU) (large- and small-scale farmers); Statutory commodity-based boards ;
- University of Zambia (UNZA) involved in R&D and technological transfer on multi-purpose dam optimisation techniques. The project will provide scholarship earmarked project related research topics for 2-3 M.Sc. and one PhD student from UNZA;
- Consultants and advisors involved in designing the construction and operation of the next generation of dams in Africa and globally will benefit from the lessons produced by this demonstration project.

1.5 Justification of AWF Intervention

1.5.1 The project is closely aligned with the **Facility's strategic plan** 2012-16 which prioritises i.e. achieving greater impact through increased investments, enhanced water governance and effective knowledge uptake as expressed. The project responds directly to the AWF overarching strategic objective to leverage investments and associated strategic priorities defined as: (i) Prepare Bankable Projects for effective and sustainable investments; (ii) Enhance Water Governance; and (iii) Promote Water Knowledge. The project will recognise and support the on-going water sector development plans in Zambia and is duly embedded in GRZ's investment strategy for the development and management of water resources.

1.5.2 Community based sustainable management and development of local watersheds in the poorest areas is crucial for the sustainability of local livelihoods and their **adaptation to climate change** and variability. Addressing the challenges of securing livelihoods and increasing the resilience of rural households to the impacts associated with climate change can be accomplished through implementation of small scale, multi-purpose water resource development including development of small dams, local mini- and small-scale hydropower plants, smallholder irrigation schemes, flood protection, etc.

1.5.3 The Facility the GRZ objectives of developing a systematic approach to the development of small reservoirs having in mind the significant quantity of water stored in numerous small reservoirs that will have significant combined **socio-economic effects** as well as environmental impacts. Hence, reservoirs will not be developed as a stand-alone project funded by different agencies, but will provide a platform for concerted and strategic investment programmes that will benefit from uniform approaches and economy of scale. Concerning the latter, the project will engage with associated programmes funded by GRZ and its development partners.

2.0 THE PROJECT

2.1 Goal and Impacts

Goal

2.1.1 The overarching goal of this project is to contribute to economic growth, poverty reduction, improved water related livelihoods in Zambia through accelerated development of water storage infrastructure for improved land and water management, enhanced water security and associated economic activities and reduced risk of floods and droughts in the targeted communities.

Impacts

2.1.2 The impacts of the project will include a contribution to economic growth and poverty reduction through enhanced performance by the GRZ to attain increased water security in semi-arid areas of the country due to increased number of sustainable rehabilitated or constructed new multi-purpose reservoirs

2.1.3 In brief, the investments per capita (beneficiary) has been estimated to USD 5 for rehabilitation of existing and USD15 for construction of new multi-purpose dams (typical 30,000 m^3 reservoir capacity about 3-5 m dam height). The impacts and associated monitoring indicators are summarized in the Logical Framework Analysis.

Objectives

2.1.4 The objective of the Project is to develop and field test guidelines for community driven planning, design and implementation of multi-purpose small dams. The purpose of the guidelines is to provide guidance and demonstration of their use to support the efforts of the central and local authorities and financial partners in the development of small multi-purpose dams.

Table 2.1: Summary of direct beneficiaries

Project intervention	No of dams	Beneficiaries per dam	Total No of beneficiaries
Component B: Directly benefitting from investments linked to field testing of guidelines (2012-16)	4	10,000	40,000
Component C: Benefiting from prepared design and bankable projects for financial mobilisation for implementation by GRZ by 2016.	5	10,000	50,000
Total	9		90,000

2.2 Outcomes

The overall project outcomes will include: (i) GRZ's governance of small dams development strengthened by means of new and field tested guidelines to guide water storage investments; (ii) increased access to water for multi-use including agriculture, fisheries, domestic supply through 1 new dam constructed and 3 existing dams rehabilitated and upgraded to multi-purpose reservoirs benefitting the targeted societies; (iii) Small dams bankable investment plans comprising designs and implementation arrangements prepared and facilitation of funds mobilisation for 5 existing and new dams; to pave the way for accelerated dam development governed by GRZ in semi-arid areas.

2.3 Outputs

2.3.1 The project outputs are defined under the following four components:

- Component A: Development of new guidelines for community driven development of multi-purpose small dams;
- **Output:** Effective guidelines for development of small dams
- Component B: Field testing on 4 sites (3 existing dams and 1 new) for the finalisation of the new guidelines;
- **Output:** three (3) existing dams rehabilitated and one (1) new dam constructed
- Component C: Preparation for bankable designs of 5 small dams (rehabilitation/new) and support GRZ prepare for mobilisation of funding for up-scaling;
- **Output:** Five (5) dams designed for investment
- Component D: Project management, coordination, and performance monitoring.

2.4 Activities

The activities have been specified more in detail in the draft ToR for the consultancy services (Annex 7) and the following sections provides the highlights of the scope of activities.

Component A: Upgrading of guidelines for multi-purpose small dams

Overview

2.4.1 The upgraded guidelines will be developed and tested in close cooperation with DWA and other GRZ counterpart staff in in order to ensure the required familiarity and ownership. The knowledge transfer will take place through "learning by doing" and using associated workshops to discuss and improve the guidelines. The existing guidelines shall be reviewed and expanded to include emerging innovative approaches, such as.: (i) programmatic approaches to long-term planning and financing of small dam development projects, (ii) new methods for reservoir mapping and national dam inventory management like the Earth Observation (EO); (iii) strategic programs for up-scaling the development of multi-purpose small dams; (iv) reinforced community involvement, (v) more focus on project implementation organisation and management, (vi) increased emphasis on safeguarding measures including climate change and environmental issues; (vii) multi-purpose optimisation. The new guidelines will tentatively include the following two Modules:

- Module 1: Guidelines on **strategic development** of multi-purpose small dams at national, basin, and provincial level including enabling institutional capacity and legal framework at national level, and environmental and social safeguarding to govern strategic up-scaling programs for small dams including partnership development and financial mobilisation. Also consider stipulating a programmatic approach to long-term planning, design, implementation and operation of the dams in this module;
- Module 2: Guidelines on **project level** (and cluster of projects) planning, community interaction, construction and operation of multi-purpose small dams.

A.1 Review existing guidelines and prepare input to Module 1

- Institutional Framework and Strategic Management of National Water Security;
- Reservoir mapping and national dam inventory management;
- Cross-cutting issues including environmental and social safeguarding and climate change adaptation;
- Strategic up-scaling programs for multi-purpose small dams;
- Strategic partnerships and financial mobilisation.

A.2. Review exiting guidelines and prepare input to Module 2

- Project implementation organisation and management;
- Project implementation organisation and management;
- Supplementary guidelines for strengthened community involvement and gender issues;
- Enhanced gathering of community information;

- Safeguarding and permits;
- Site selection and preliminary investigations;
- User demands and multi-purpose optimisation;
- Provide models for cost estimates, economic analysis, and cost recovery;
- Guidelines for hydro-meteorological assessments and climate change adaptation;
- Preliminary technical detailed designs, dam construction, special cases, finishing; and
- Operation and maintenance (O&M) and dam Safety

A.3 Preparation of complete draft guidelines (Module 1 and 2)**:**

Component B: Testing and finalisation of guidelines for small dams development

2.4.2 This component includes testing of guidelines in cooperation with GRZ as a basis for required adjustments, completion, approval and adoption by the government. The field testing of the guidelines will therefore focus on the two levels: (i) strategic development level and (ii) project level management and implementation modalities. The latter will include selection, rehabilitation and multi-purpose optimisation of 3 existing small dams and construction of one new for increased benefits and sustainable operations. The structural interventions of this activity will comprise retrofitting of the existing small dams including necessary investments to facilitate multi-purpose operations.

B.1 Testing draft guidelines for Module 1

(a) Test the use of the following strategic guidelines:
- Institutional Framework and Strategic Management of National Water Security;
- Reservoir mapping and national dam inventory management;
- Assess the current small dam inventory and updating mechanisms and the usefulness of new methodology for dynamic surveillance and management (Earth Observation (EO) Tools);
- Strategic up-scaling programs for multi-purpose small dams;
- Test the draft guidelines on the 4 multi-purpose small dam projects (construction of 1 new dam and rehabilitation of 3 ones). to
- Strategic partnerships and financial mobilisation;
- The proposed guidelines will be tested in connection with the 4 small dam projects (1 new dam and rehabilitation of 3 dams).

(b) Assessment of Module 1 and propose improvements

B.2 Field testing of draft guidelines for Module 2

(a) Preparation of implementation of 4 multi-purpose small dam projects (3 rehabilitation and 1 new)

This activity will use the draft guidelines to address the following issues:
- Project implementation organisation and management;
- Supplementary guidelines for strengthened community involvement;
- Enhanced gathering of community information;
- Environmental and social safeguarding and permits;
- Site selection and preliminary investigations;
- User demands and multi-purpose optimisation;
- Provide models for cost estimates, economic analysis, and cost recovery;
- Guidelines for hydro-meteorological assessments and climate change adaptation
- Preliminary technical detailed designs, dam construction, special cases, finishing and repair works;
- Operation and maintenance (O&M) and dam Safety.

(*b) Supervise the implementation of the works at the 4 small dams (1 new and 3 rehabilitated)*

(c) Evaluate experiences from field testing of draft guidelines and propose improvements

Component C: Preparation of bankable multi-purpose small dam projects for up-scaling

2.4.3 The Project is intended to prepare the ground for longer term impacts by 2030 by preparing bankable designs for some 5 new multi-purpose small dam projects and associated funding mobilisation initiatives together with GRZ, LG, and local beneficiaries. This is meant to serve as a spring-board for further long-term up-scaling and replication governed by GRZ. The methodology for this component shall basically follow those stipulated in the final guidelines (Component A) adopted by GRZ.

C.1 Participatory selection of 5 dam projects and preparation of bankable designs following cost-benefit and financial analysis according to the upgraded guidelines. Projects to be selected in cooperation with DWA and other water development related authorities and stakeholders.

C.2 Engage with potential donors, investors and entrepreneurs in cooperation with GRZ. This shall also include exploring opportunities for GEF financing given their allocation for Zambia reportedly in the order of USD 11.3 million (ref ONEC.3)

C.3 Support GRZ to initiate the implementation of funded projects

Component D: Project Management, Coordination, and Performance Monitoring

2.4.4 Component D aims to facilitate efficient and effective coordination and management of project implementation. This will be achieved by assisting DWA with adequate project staffing (technical and fiduciary), operational support and equipment and guided by a detailed Project Implementation Plan including Monitoring and Evaluation arrangements. This component will by and large comprise: Launching Workshop; procurement of consultants, project inception, administration of grant for scholarship to address earmarked research topics for 2-3 M.Sc. and one PhD student from UNZA; Steering Committee meetings, management and coordination, supervision & reporting, and audit arranged and funded by AWF.

2.5 Risks and Assumptions

2.5.1 Poor political support may hamper project recognition and achievements. Such risk is likely to be very low since the new President has made known his intentions regarding the development of small dams in Zambia and proclaimed that the new government will invest in the construction of more water dams and water harvesting technologies. In addition, GRZ has demonstrated political support to water sector development through the IWRM and WE Plans for the period 2007-30.

2.5.2 Inadequate staff capacity within DWA/PIU to manage the project may delay the implementation and reduce the effectiveness of the proposed up-scaling initiatives. To reduce this risk the project will engage with DWA to facilitate the application of the guidelines and allocation of needed staff resources. Such risk is moderate since the project has high priority within GRZ, DWA and cooperating water sector partners who will improve the likelihood of sufficient allocation of staff and other resources to ensure successful and timely project implementation.

2.5.3 Poor community response to project interventions and weak involvement is a critical risk factor since community driven dam development is supposed to be a key feature of the project. To mitigate this risk the prospective communities will be sensitised and community enthusiasm and preparedness will be one of the selection criteria for the dams to be included in the project.

2.5.4 Weak donor and investor buy-in which may jeopardise the mobilisation of required financial resources for up-scaling the investments in small dams. The project will contribute to encourage investors and donors by presenting successful small dams projects and preparation of credible bankable investment projects.

2.5.5 Hydrological and environmental risks due to climate change and variation combined with a weak hydrological data and knowledge base. This poses a risk of poor dam design and low technical and economic performance. The new Guidelines will pay due attention to the hydro-meteorological assessment, hydrological data analysis of the project sites and catchments including erosion and siltation issues to mitigate the hydrological risks.

2.6 Costs and Financing

2.6.1 Annex 2 provides a preliminary cost estimate. Table 2.2 and Table 2.3 indicate the costs by component and per category of expenditures and estimated cost by sources of funding.

Table 2.2: Project Cost Estimate by Component and Foreign vs. Local Costs (Euros '000)

Description	Total	Foreign Costs AWF	Local Costs AWF	Local Costs GRZ
I CONSULTANCY SERVICES				
1. Consultancy Remuneration				
A. Upgrading of Guidelines Small Dams	83	83	0	0
B. Field Testing and finalisation of Guidelines	260	260	0	0
C. Preparation of Bankable Small Multi-purpose Dam Projects for Up-scaling	126	126	0	0
D: Project Inception, Management & Monitoring	83	83	0	0
2. Consultancy Reimbursable	99	99		
TOTAL I CONSULTANCY SERVICES	651	651	0	0
TOTAL II SMALL DAMS GOODS & WORKS	185	0	185	0
TOTAL III PROJECT MANAGEMENT DWA/PIU	164	28	0	136
TOTAL I, II, and III	1 000	679	185	136
Price Contingency	50	34	9	7
Foreign Exchange Contingency	50	34	9	7
GRAND TOTAL	1 100	746	204	150
Contributions		950		150
Percent contribution		86 %		14 %

Table 2.3: Project Cost by Category of Expenditure and Sources of Financing (Euros'000)

Component	Total Cost	AWF		GRZ
		Foreign Costs	Local Costs	Local Costs
Services	651	651	0	0
Works	167	0	167	0
Goods	19	0	19	0
Project Management	164	28	0	136
Total Base Cost	1 000	679	185	136
Price Contingency	50	34	9	7
Foreign Exchange Contingency	50	34	9	7
Total Project Cost	1 100	746	204	150
Total Contributions		950		150
Percentage Contribution		86 %		14 %

2.6.2 Since the dams to be included in the project will be identified and selected as part of the project it has been necessary to estimate the costs for rehabilitation and construction of dams on the basis of experience from typical small dams. The estimated costs for rehabilitation of existing dams and construction new ones have been based on assumptions derived from various sources. The costing basis used in this appraisal is for a typical dam capacity of 30,000 m^3 and the cost of multi-purpose upgrading is assumed to be EUR 35,000 per m^3, whereas the cost of construction of a new dam is EUR 80,000 per m^3. The number of local people benefitting from a 30,000 m^3 reservoir is typically in the order of 10,000 people. Needless to say, there are uncertainties in these figures and the actual cost estimate and number of beneficiaries will be based on the selection and design of the dams to be included in the project. The total cost of the project is estimated at Euro 1,100,000. The project will be financed by the AWF grant of Euro 950,000 and an in-kind contribution from the Government of Zambia estimated as Euro 150,000 (representing 14% of project cost). Part of the GRZ contribution will be in terms of counterpart staff time, labour, and provision of office space, transport, and utilities. The tentative costs of the various components are shown in the table above.

3.0 PROJECT IMPLEMENTATION

3.1 Recipient and Executing Agency

The recipient and Executing Agency of the grant shall be the Ministry of Lands, Energy and Water Development (MLEWD). The Department of Water Affairs (DWA) will be responsible for the implementation of the project by a Project Implementation Unit (PIU) hosted at the Department. As an oversight function the project will use the same **Steering Committee** as the World Bank project which includes representatives of relevant Ministries and Departments concerned with water resources development. The committee shall also include members from GRZ programmes and donors involved in the development of small dams' projects.

3.2 Implementation Arrangements

3.2.1 The DWA Headquarters will take the lead in all aspects of implementation through the PIU and provide coordination and support at national level and engage with the provincial offices. The Department has sound experience in the implementation of similar donor cooperation projects. For example, the Department has rehabilitated several dams in the country with funding from the World Bank, and other agencies. The DWA will work through its Provincial Water Engineers at the provincial offices in the concerned provinces. The manpower level of key employees of DWA in Lusaka and in the provinces consists of engineers, hydrologists, technicians, and support staff that will be involved in project implementation.

3.2.2 One consulting firm will be recruited to support the DWA in implementing the project activities that are presented in Section 2.4. The draft ToR for this assignment (Annex 7) is submitted in a separate document. This will include studies, preparation of manuals, feasibility studies, preparation ofnecessary designs, specifications, tender documents, and construction supervision for the 4 test dams. A joint venture between a regional African firm and a Zambian consulting firm will be targeted, given the high level of expertise that exists within Zambia and the proven ability of nationals to work freely in all regions of the country.

3.3 Implementation Schedule

The duration of the project implementation is 36 months from the date of approval. The tentative implementation schedule is shown in Annex 6.

3.4 Procurement Arrangements

3.4.1 All procurement arrangements of this project will be in accordance with AWF Operational Procedures, Bank Rules and Procedures for Procurement of Goods and Works and Rules of Procedure for the use of Consultants. The use of relevant Bank Standard Bidding documents is mandatory. Procurement arrangements are summarized in Table 3.1 and described below.

Table 3.1: Procurement Arrangements (EUR '000)

Description	AWF Funding				GRZ	Total
	QCBS	SSS	NCB	Shopping	Other*	
Works and Goods			204			204
Services	607					607
Project Management				140	150	290
TOTAL	607	0	204	140	150	1 100
*In-kind contribution from GRZ						

** Government in kind contribution to the project*

3.4.2 ***Civil Works*** contracts (mainly rehabilitation of exiting dams and construction of a new small dam) are amounting to EUR 204,000. This will be tendered and implemented as one contract and procurement of the contractor will be done through National Competitive Bidding (NCB). There are local contractors in Zambia sufficiently qualified and in sufficient numbers to ensure competitive bidding.

3.4.3 ***Goods*** contracts which will cover the procurement of hydraulic equipment related to dam construction and operations. This will be based on Shopping.

3.4.4 ***Consultancy Services*** contract amounting to EUR 646,000 including reimbursable expenditures shall be procured through Quality and Cost Based Selection (QCBS)**.**

3.4.5 ***Project Management*** including travel, surveys, documentation, communication, workshop expenses, and Steering Committee meetings funded by AWF amounting to 109,000 Euro shall be procured through Direct Negotiation**.** The GRZ contribution to project management amounting to EUR 150,000 will be in the form of in-kind contribution.

3.4.6 ***Advertising:*** General and Specific Procurement Notices (GPN and SPN) for goods, works and services will be prepared by the DWA and subject to review and no objection by the AWF before submission for publication and advertised in local media, in accordance with the Bank's procurement rules and procedures.

3.4.7 ***Executing Agency:*** The DWA-PIU will be responsible for the procurement of works, goods and services. To support this role the PIU will include a procurement officer appointed by the GRZ. The DWA has implemented many development projects throughout Zambia for a variety of donors, and its senior management is familiar with the harmonized MDB procurement procedures. In addition, a

multilateral procurement environment has already been set-up within the GRZ as part of the operating procedures of the multi-donor Capacity Building Trust Fund that was established by the AfDB.

3.4.8 ***Procurement Plan:*** The Recipient shall, prior to Grant Effectiveness, prepare and submit a Procurement Plan acceptable to the AWF, setting forth (a) the particular contracts for goods, works and consulting services during the life of the project; (b) the proposed modes of procurement; and (c) the related AWF review procedures (prior or post review). The Procurement Plan shall also set out in detail the miscellaneous items to be paid for from the Special Account. In order to expedite procurement activities, advance procurement actions will be utilised by the project where appropriate, and shall be noted in the Procurement Plan. The Recipient shall update the Procurement Plan annually or as needed throughout the duration of the project. Any revisions to the Procurement Plan will be subject to prior approval by the AWF.

3.5 Disbursement Arrangements and Expenditure Schedule

3.5.1 The conditions precedent to first disbursement of funds is the entry into force of the Agreement and the satisfaction of the following conditions by the Recipient: (i) Opening of a special account in Euros to receive the resources of the Grant; and (ii) the appointment of a Coordinator.

3.5.2 The proposed disbursement arrangement for the project as indicated in the table below will be under the Special Account Method. The Government of Zambia will open a Euro account for the project in a reputable Bank acceptable to the African Development Bank. It is proposed to transfer the funds to the project account in 3 tranches, according to the schedule shown in Table 3.2. Obligations of the AWF to make the first disbursement of the Grant shall be conditional upon the nomination acceptable to the AWF of the Project Coordinator and establishment of a PIU, opening of a Special Euro Account for the project, and preparation of a procurement plan. The replenishment of the tranches will be subject to AfDB financial regulations. Conditions for second and later disbursement will include an update to the Cash Flow Projections for the remainder of the project.

Table 3.2: AWF Disbursement Schedule AWF Funds

Description	Part 1	Part 2	Part 3	Total
Amount (EUR '000)	285	570	95	950
Percentage	30 %	60 %	10 %	100 %
Approximate time after Approval (months)	1	16	30	

3.6 Financial Management Arrangements

3.6.1 The Financial Management of the project will be carried out by the DWA, who shall be responsible for budgeting, accounting, internal control, funds flow and financial reporting. The internal controls of the DWA will apply, with the accounting to be done in line with international accounting standards. In accordance with the foregoing, the DWA will be required to produce Financial Reports for the project every six months in a format to be agreed with the AWF. The reports will be submitted to the AWF for review no later than 45 days after the end of each six month period, as part of the semi-annual progress report.

3.6.2 The Bank financial regulations require the project accounts to be kept separately, indicating expenditure by component category and source of financing. Statements of expenditure and supporting documents will be presented by the consultants and contractors to the PIU and copied to the PSC, and should be kept for review by the Bank and for submission for justification during the request for replenishment. These documents, as well as the financial reports, shall be reviewed and audited twice by an independent auditor to ensure that the funds provided have been spent for the intended purpose. The AWF will recruit and retain an auditor for the project and will cover the cost from its administrative budget. There shall be at least two audits during the life of the project. Financial Management will also be part of the AWF supervision missions.

3.7 Monitoring and Reporting Arrangements

3.7.1 The monitoring of the consultant's activities will be done by the PIU. For project supervision and reporting, the PIU in cooperation with the provincial offices of DWA will have the capacity to supervise the field projects effectively. The PSC will review implementation progress through its regular meetings. The Logical Framework matrix included in this PAR, and as modified in the Inception Report, shall serve as a basis for the result based assessment of the outputs of the project during implementation and after completion.

3.7.2 The AWF will also monitor project implementation through communication and correspondence with the consultants and contractors, as well as review the progress reports. In addition, the AWF may undertake field supervision missions as the need to do so arises. The AfDB Field Office in Lusaka will assist the Facility in undertaking project supervision and the options for supervision support by local consulting firm or individuals will also be considered. The DWA/PIU shall adhere to the reporting requirements and schedule outlined in Table 3.3. The AWF Progress and PCR reporting formats will be used in preparing these reports.

Table 3.3: AWF Reporting Requirement

Documents to be Submitted to the AWF	Prepared By	Reporting Schedule (after grant approval)	AWF Action
1. Inception Report	PIU/Consultant	Month 6	Review and advise
2. **Component A**: New Small Dams Development Guidelines			
Draft Small Dams Guidelines	Consultant/PIU	Month 10	Review and advise
Final Small Dams Guidelines	Consultant/PIU	Month 28	Review and advise
3. **Component B:** Field Testing			
Design and Tender Docs 3 existing and 1 new dam	Consultant/PIU	Month 14	Review and advise
4. **Component C**: Preparation of 5 bankable projects for up-scaling	Consultant/PIU	Month 32	Review and approve
Component D:			
5. Procurement Documents	DWA	As required	Review and "no objection"
6.Annual Progress Report (with financial reports)	DWA	Months 9, 21, 30	Review and acceptance
7. Project Completion Report (PCR)	DWA	After completion	Review and acceptance
8. Consultant Bi-Monthly Reports	Consultant	Every 2nd month PIU	For information
9. Minutes of Steering Committee	DWA	Within 7 days of meeting	Review and comment
10. Minutes of other meeting	DWA	Within 7 days of meeting	For information

4.0 EFFECTIVENESS, EFFICIENCY AND SUSTAINABILITY

4.1 Effectiveness and Efficiency

4.1.1 All technical and implementation related alternatives were reviewed during the August 2011 AWF appraisal mission, which included discussions with DWA and other authorities and stakeholders, and consultations with the World Bank Resident Office in Zambia. The alternatives selected were considered to be the most viable, effective and efficient methods of project execution. Furthermore, the project has gone through standard AWF internal review processes, and the GRZ through the DWA has also reviewed and endorsed a draft version of this appraisal report.

4.1.2 The implementation arrangements presented in Chapter 3 with the use of a PIU at the DWA in charge of the implementation of the project, and undertaking procurement was selected as the most viable way of executing the project. DWA has the proven ability to implement water projects that

together with the new guidelines and model approaches will contribute to sustainable post-project interventions.

4.2 Sustainability

Project design has been streamlined with current AWF strategic priorities and sustainability measures. Under the new AWF strategy, all projects must have some relevance to leveraging resources for investments and ensure financially viable operations. For this reason, the project is focused on investment planning. Furthermore, the structural investments in pilot project have been selected to serve as model projects to demonstrate innovative approaches to financial mobilization and further up-scaling into sustainable dam projects. The potential risks that would threaten the sustainability of the interventions of the small dam projects, including technical, economic and institutional factors including mitigation measures are addressed in Chapter 2.5.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

5.1.1 The Project aims to enhance water security in the country and is well aligned with the policies, investment strategies and programs for water development in Zambia. The development goal of the project is to contribute to economic growth and poverty reduction in Zambia through accelerated development of water storage infrastructure for enhanced water security and associated services and economic activities at community level leading to improved livelihoods in the affected communities. The project is also aligned with the objectives and priority areas of the Facility's strategic plan for 2012-16 and it supports the Bank Group's strategy which aims to promote economic growth and poverty alleviation of RMCs.

5.1.2 The project will support the GRZ to develop, adopt, and effectively use upgraded guidelines for the planning, design, financing and implementation of multi-purpose small dam investments. Moreover, it shall actively assist GRZ to attract more development partners who will invest in the water resources development. In this way the project will contribute to sustainable development of water storage infrastructure and associated socio-economic activities by leveraging financial mobilisation.

5.1.3 The project that will be conducted over a period of 36 months and has been designed to achieve optimum impact on water storage investments in Zambia within its relatively limited resources in comparison to overall needs. The project will upgrade 3 and build one new small dam (for 40,000 beneficiaries) as part of the field testing of the guidelines. It will also catalyse the funding for immediate construction of 5 new dams (50,000 direct beneficiaries) and pave the way for long-term up-scaling of development of small dams in Zambia towards 2030.

5.1.4 The PAR addresses a number of risks related to the implementation of project and associated measures to mitigate those risks. These are mainly centred on ensuring sufficient GRZ and local community involvement and allocation of required staff and other resources for dam construction and long term operations. Another factor is the risk of low response from donors and investment partners that will be mitigated by preparation of bankable projects based on the new guidelines and pilot demonstrations to ensure a sound credibility of the project proposals.

5.1.5 The estimated total cost of the project is EUR 1,100,000 and the AWF will provide grant financing of EUR 950,000 covering 86% of the project costs. The in-kind contributions of the Government of Zambia are estimated as Euro 150,000 representing 14% of project cost.

5.2 Recommendations

5.2.1 In view of the immense benefits of the project it is recommended that a grant not exceeding Euro 950,000 out of a total budget of EUR 1,100,000 from the AWF resources be extended to the Government of Zambia for the implementation of the project described in this appraisal report.

5.2.2 The conditions precedent to grant effectiveness and first disbursement of funds is the entry into force of the Agreement and the satisfaction of the following conditions by the Recipient: (i) Opening of a Special Account to receive the resources of the Grant; (ii) The appointment of a Coordinator in charge of the PIU; and (iii) Preparation of Procurement Plan acceptable to AWF.

ANNEX 1: REFERENCES

1. Danida (2006): A handbook for technicians, farmers and others on site investigations, designs, cost estimates, construction and maintenance of small earth dams. By Erik Nissen-Petersen for Danish International Development Assistance (Danida) Water from Small Dams;

2. GRZ (2010): Economic Analysis of the Impact of Small Dams on Rural Poverty in Zambia; (2010) By Jens Sjørslev (NCG, Denmark) together with Jens Claussen (NCG, Norway);

3. GRZ Sixth National Development Plan (SNDP) 2011-2015 for Zambia;

4. FAO (2010): Manual on Small Earth Dams GRZ: The Water Resources Management Act, 2011 Arrangement Of Sections Part I;

5. Zambezi River Basin Mapping Operational Documentation Small Reservoirs Mapping Eoworld Final_Draft Technical Note 12/01/2012; NEO BV Amersfoort, the Netherlands www.neo.nl

6. Dams and Development Project (DDP) Issue-Based Workshop No. 3 Financing Dams and Sustainable Development. Proceedings and Submissions United Nations Environment Programme Dams and Development Project. July 2004

7. Appropriate Decision Making Procedures for New Dams - Particularly for Irrigation, Drainage and Flood Management International Commission on Irrigation and Drainage New Delhi, India, August 2004

8. Michael Malakata November 02, 2011: Interview with Zambia's President Michael Sata http://waterjournalistsafrica.wordpress.com/2011/11/02/zambia-government-to-invest-in-construction-of-water-harvesting-technologies/

ANNEX 2: PRELIMINARY PROJECT COST ESTIMATE

1. STAFF TIME BUDGET

ref	Component /Activity	TL	Small dam engineer	WRM environment	Irrigated Agriculture	Small business & economy	Community social gender	Land Surveyor GIS	Superv. engineer	Total		Total
	Origin:	Regional	National	National	National	National	National	National	National	Regional	National	
A	**Guidelines for community driven multi-purpose dams**	**6**	**1,4**	**0,8**	**1,5**	**0,7**	**0,8**	**0,2**	**0,1**	**6**	**5,8**	11,8
A.1	Review existing guidelines and prepare for Module 1	1	0,4	0,2	1	0,2	0,2	0	0	1	2	3
A.2	Review exiting guidelines and prepare input to Module 2	2	0,5	0,3	0,5	0,3	0,4	0,1	0,1	2	2,2	4,2
A.3	Preparation of complete draft guidelines (Module 1 and 2)	3	0,5	0,3	0,3	0,2	0,2	0,1	0	3	1,6	4,6
B	**Testing and finalisation of guidelines for small dams**	**8,2**	**9,6**	**4,6**	**3,6**	**3,7**	**7,1**	**5,1**	**12**	**7,7**	**45,7**	53,4
B.1	Testing guidelines Module 1											0
(a)	Test the use of strategic guidelines Module 1	2	0,2	1	0,8	0,5	0,6	0,5	0	2	3,6	5,6
(b)	(b) Assessment of Module 1	1,5	0,4	0,3	0,4	0,5	0,2	0	0	1,5	1,8	3,3
B.2	Field testing guide Module 2	0,5										0
(a)	Preparation 3 rehab and 1 new dam projects	2,7	4	0,8	0	0,4	4	4	0	2,7	13,2	15,9
(b)	(b) Supervise the upgrading/ construction of small dams	0,5	5	2	2	2	2	0,6	12	0,5	25,6	26,1
(c)	Evaluate results field testing	1		0,5	0,4	0,3	0,3	0	0	1	1,5	2,5
C	**Preparation of Bankable Multi-Purpose Dams for Up-**	**7,4**	**6**	**1**	**1**	**3**	**1**	**1**	**0**	**7,4**	**13**	**20,4**
C.1	Selection of 5 dams & bankable designs	4,2	5	1	1	1	1	1	0	4,2	10	14,2
C.2	Engage in funding mobilisation	3,2	1	0	0	2	0	0	0	3,2	3	6,2
D	**Project Management**	**6**	**1**	**1**	**1**	**1**	**0,5**	**0**	**0**	**6**	**4,5**	**10,5**
D.1	Project Inception	1	1	1	1	1	0,5			1	4,5	5,5
D.2	TL Project Implementation Managment and Reporting	5								5	0	5
	Total	**27,6**	**18**	**7,4**	**7,1**	**8,4**	**9,4**	**6,3**	**12,1**	**27,1**	**69**	96,1

2. PRELIMINARY COST ESTIMATE (EUR '000)

Description	Unit	Quantity	Unit Cost	Total	Foreign Costs AWF	Local Costs AWF	Local Costs GRZ
I CONSULTANCY SERVICES							
A. Upgrading of Guidelines Small Dams							
Regional Consultants	m/m	6	10	60	60	0	0
National Consultants	m/m	5,8	4	23	23	0	0
Sub.Total A				**83**	**83**	**0**	**0**
B. Field Testing and finalisation of Guidelines							
Regional Consultants	m/m	7,7	10	77	77		
National Consultants	m/m	45,7	4	183	183		
Sub-Total B				**260**	**260**	**0**	**0**
C. Preparation of Bankable Small Multi-purpose Dam Projects for Up-scaling							
Regional Consultants	m/m	7,4	10	74	74	0	
National Consultants	m/m	13	4	52	52	0	
Sub-Total C				**126**	**126**	**0**	**0**
D: Project Inception, Management & Monitoring							
Regional Consultants	m/m	6	10	60	60	0	0
National Consultants	m/m	4,5	5	23	23	0	0
Sub-Total D				**83**	**83**	**0**	**0**
Sub Total 1 Renumeration				**552**	**552**	**0**	**0**
2 Reimbursable expenses							
Allowances Local Consultants (included in fees)							
Travel international	No	10	2	20	20	0	0
Travel local	Item			15	15	0	0
Surveys	item			15	15	0	0
Documentation	Item			10	10	0	0
Communication	Item			10	10	0	0
Roundtable and workshops	Item			29	29	0	0
Sub-Total 2 Reimbursables				**99**	**99**		
TOTAL I CONSULTANCY SERVICES				**651**	**651**	**0**	**0**
II SMALL DAM CONSTRUCTION							
Small Dam Works & Goods							
Multi-purpose uograding	No.	3	35	105	0	105	0
New small dam	No.	1	80	80	0	80	0
TOTAL II SMALL DAMS GOODS & WORKS				**185**	**0**	**185**	**0**
III PROJECT MANAGEMENT							
PIU	m/m	36	2	72	0	0	72
Support staff	m/m	36	0,2	7	0	0	7
Allowances	Item			35	0	0	35
Meetings	Item			22	0	0	22
Scolarships 3 MSc.+ 1 PhD	No	4	7	28	28	0	0
TOTAL III PROJECT MANAGMENT				**164**	**28**	**0**	**136**
TOTAL 1,2 & 3				**1 000**	**679**	**185**	**136**
Price Contingency				50	34	9	7
Foreign Exch. Contingency				50	34	9	7
GRAND TOTAL				**1 100**	**746**	**204**	**150**
Cotributions					**950**		**150**
Percent contribution					86 %		14 %

ANNEX 3: RAPID ASSESSMENT OF NEEDS FOR COMPLEMENTING EXISTING GUIDELINES

GUIDELINE ISSUE	FAO (2010)	New Guide
A. GUIDELINES FOR STRATEGIC WATER STORAGE MANAGEMENT AND DEVELOPMENT AT NATIONAL, BASIN, AND PROVINCIAL LEVEL ("Module 1")		
Institutional Framework and Strategic Management of National Water Security		
– Legal and institutional framework at national, provincial, basin, and district levels, responsibilities		+++
– National water storage and water security status comprising small/medium and large dams		+++
Reservoir Mapping and National Dam Inventory Management		
– Ground-based Small Dam Inventory Management	++	+
– Earth Observation (EO) Tools (dynamic surveillance)		+++
Strategic Up-scaling Programs for Multi-purpose small Dams		+++
– Strategic programmatic approaches		+++
– Screening, prioritisation, and clustering of dams		+++
– Establishment of small dam development programs		+++
– Programme implementation		+++
Partnership Development and Financial Mobilisation		
– Financial mobilisation and partnership building with local society and actors		+++
– Financing flows for enhanced investments in multi-purpose small dams		+++
B. GUIDELINES FOR PROJECT MANAGEMENT, IMPLEMENTATION AND OPERATIONS ("Module 2")		
Project Implementation Organisation and Management		
– Project Organisation (community driven implementation)		+++
– Implementation schedules		+++
– Procurement guidelines	+	++
– Disbursement arrangements and expenditure schedules		+++
– Financial management		+++
– Performance monitoring, impact assessment, and knowledge management		+++
Community Involvement		
– Sensitisation of community response and ownership	+	++
– Community Engagement in Project Management	+	++
– Ownership Responsibility and Dam Committees	++	+
– Community Involvement in Siting and Preliminary Investigations	+	++
– Community involvement in dam construction and operations	+	++
Community Information		
– Information on villages, organisational setup, informants, dam committee, extension workers, local farmers. Questionnaire, GPS, Google Earth assisted.	+	++
– Sampling of households and users		+++
– Survey sample of household and small scale water users		+++
Safeguarding, Permits and Risk Assessment		
– Social equity aspects	+	++
– Gender aspects	++	+
– Environmental issues	+	++
– Land tenure and Resettlement issues		+++
– Permits and licenses		+++
– Risk Assessments	+	++

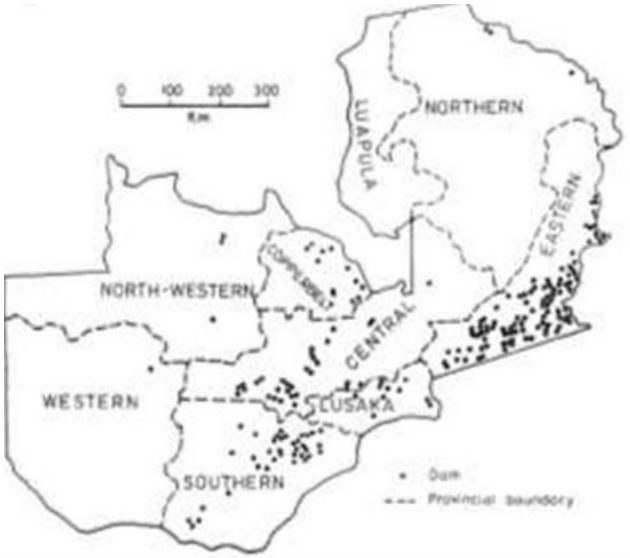
Site Selection and Preliminary Investigations		
– Technical Field visits	**+++**	
– Aerial photography, Google Earth & preliminary surveys	**+++**	
User Demands and Multi-purpose Optimisation		
– WS&S		**+++**
– Irrigation	**++**	**+**
– Fish farming	**+**	**++**
– Livestock	**++**	**+**
– Other (navigation, tourism, water sports, hydropower, ground-water recharge)		**+++**
– Multi-purpose optimisation and dam operations		**+++**
Cost Estimates and Economic Analysis		
– Cost Estimates for dam construction/rehabilitation	**+**	**++**
– Cost Estimates multi-purpose investments	**+**	**++**
– Cost-Benefit Analysis	**+**	**++**
– O&M Costs and Cost recovery requirements	**+**	**++**
Hydro-meteorological and Climate Change Assessments		
– Catchment area assessment	**+++**	
– Hydrological assessment, yield analysis, peak floods	**+++**	
– Erosion, sediment transport and siltation	**+**	**++**
– Climate change adaptation measures		**+++**
Preliminary Technical Designs		
– Earth embankments, Earth works	**+++**	
– Spillway dimensions	**+++**	
– Storage capacity calculation	**+++**	
Detailed Design		
– Contour survey, revised capacity, revised volume earthworks, design drawings, outlet works, embankment, freeboard, core depth and thickness, crest width, settlement, stone pitching and training banks, seepage, filters drains	**+++**	
Dam Construction		
– Setting out dam site, plant, equipment, compaction equipment, techniques, site clearing and preparation, settlement, spillway, constructing the embankment	**+++**	
Special Cases (Technical)		
– Earth embankment on rock foundation, earth embankment using poor earthwork material, an existing embankment with seepage problems, masonry centre spill dams, bulldozer dams, dams in low rainfall areas, capacity in raised dam	**+++**	
Finishing and Repair Works		
– Inspection requirements, training banks, other works, maintenance procedures, trees and bushes, erosion, termites and animal burrows	**+++**	
– Structural defects (slumping and sliding of the downstream face, foundation slope movements, piping, breaching, an eroded spillway, wave action)	**+++**	
– Non structural defects (dam reservoir fails to fill up, dam silts up)	**+++**	
Operation and Maintenance (O&M) and Dam Safety		
– Operation and Maintenance Procedures	**++**	**+**
– Dam Safety Issues	**+**	**++**

+: Marginal focus

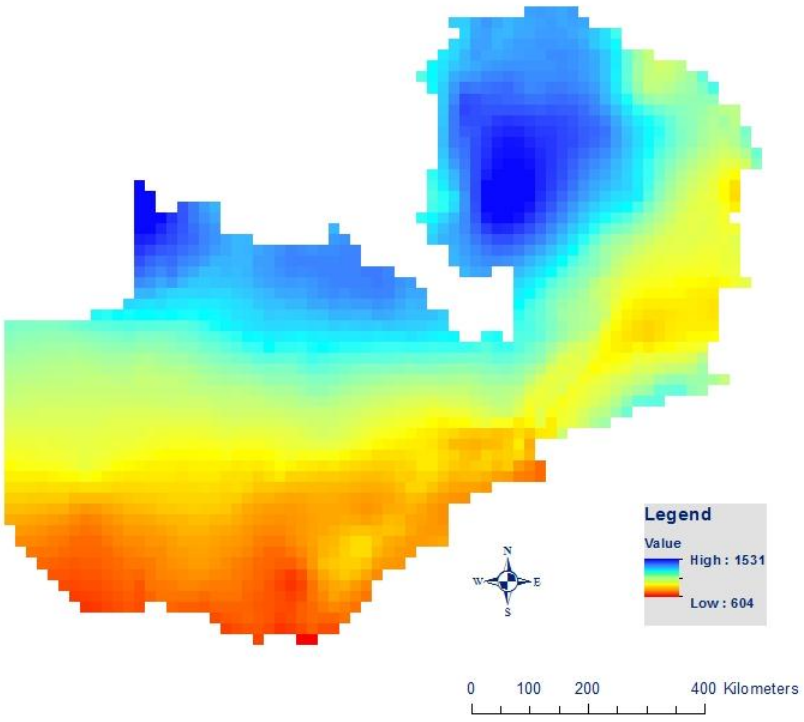
++: Some focus

+++: Main focus

ANNEX 4: MAPS OF DAMS AND PRECIPITATION IN ZAMBIA



Known dams in Zambia 1997[9]



[9] Economic Analysis of the Impact of Small Dams on Rural Poverty in Zambia - NCG Sept 2010

ANNEX 5: INDICATIVE SIZE DISTRIBUTION OF SMALL DAMS IN SOUTHERN PROVINCE

Reservoir size (ha)	Number of reservoirs	% of total	Approx. Capacity range (1000m^3)		Approx. Dam height (m)
0.5 – 1	180	18 %	3	5	1-3
1– 5	572	56 %	5	30	3-5
5 – 10	140	14 %	30	80	5-7
10 – 100	123	12 %	80	900	7-12
> 100	7	1 %	>900		>12
Total	1022	100 %			

Total area (ha)	1 380
Total Volume km^3	0,018
Total Volume m^3	18 000 000
No of dams	1 022
Average dam capacity	**17 613**

Ref:

Based on: *Zambezi River Basin Mapping Operational Documentation Small Reservoirs*

Mapping Eoworld Final Draft Technical Note 12/01/2012; NEO BV www.neo.nl

ANNEX 6 TENTATIVE TIME SCHEDULE

Activity	Time in 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	25	26	27	28	29	30	31	32	33	34	35	36		
A. Guidelines community driven small dams																																						
– Review exiting guidelines as input Module 1							x	x																														
– Review existing guidelines as input Module 2							x	x																														
– Draft and final guidelines M1 &M2									x	x																	x											
B. Testing Guidelines for small dams																																						
– Testing draft Module 1											x	x	x	x																								
– Field testing draft Module 2																																						
○ Design and prep. 4 dams - 1 new 3 rehab											x	x	x	x																								
○ Works & supervision 4 dams															x	x	x	x	x	x	x	x	x	x	x													
– Evaluate field testing results																										x												
C. Preparation of bankable projects																																						
– Bankable designs 5 dams (15,000-150,00 m^3)																												x	x	x	x	x						
– Funding mobilisation																																x	x	x				
D. Project Management																																						
– Launching Workshop	x																																					
– Procurement of consultants		x	x	x																																		
– Project Inception					x	x																																
– Steering Committee meetings							x													x															x			
– Management and coordination							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
– Supervision missions										x										x															x			
– Audit by AWF																			x															x				
– MTR End of Project Review																				x																		x

ANNEX 7: TENTATIVE TOR FOR CONSULTANCY SERVICES

Development and Testing of Guidelines for Multi-purpose small Dams in Zambia

1. Background

The Government of the Republic of Zambia (GRZ), in cooperation with the African Water Facility (AWF) has initiated a project on development of small dams with a focus on development and testing of new guidelines to govern and promote investments in multi-purpose small dams. The project is being undertaken against a backdrop of increasing hydro-climatic variability and a renewed focus within the GRZ on the development of multi-purpose small reservoirs, particularly in the drought-prone areas of Eastern, Luapula, Central and Southern provinces. The overarching goal of the project is to promote economic growth and poverty reduction.

The Government of Zambia (GRZ) recognizes that effective development of the Nation's water resources is fundamental to its economic growth and poverty reduction[10]. In this connection, small water reservoirs located in semi-arid areas have important functions of sustaining livelihoods of local communities through multiple uses, such as: (i) enhanced domestic water security, (ii) increased agriculture yields of smallholder farming, (iii) fish farming opportunities, (iv) water for livestock, and (v) several water dependent activities such as brick-making, tree growing, food processing, mini hydropower systems (if feasible), etc. Another beneficial effect of small dams is groundwater recharge. Dams are also beneficial instruments for climate change adaptation through flood impact attenuation, etc.

A recent dam inventory for Zambia suggests that there are approximately 3000 low cost earth dams (3 to 15 m high) and water impoundment earth bunds (up to 3 meters high), which is far by far less than needed to ensure a perennial access to water resources in many semi-arid parts of the country. The majority of these dams are situated in the drought prone areas of the Eastern, Luapula, Central and Southern provinces, where water needs to be conserved for sustainable livestock, agriculture and domestic use. Most of these have been developed by government or private farmers. These reservoirs are used either separately or combined, for irrigation, fish farming, livestock and domestic water supply, groundwater recharge, flood amelioration and conservation storage. Many dams most have suffered from irregular maintenance and repair and are considered to be in a state of disrepair.

The effectiveness of investments in small, medium and large dams in Zambia is apparently hampered by lack of appropriates guidelines. DWA previously used a manual for "self-help dams" called "A Guide to design and construction of medium sized earth dams in Rhodesia", which was complementary to the Agritex "Hand book of Basic Instructions for Dam Construction". The most recent manual used in Zambia is the "Manual on Small Earth Dams - A guide to Siting, Design and Construction" (2010). The "Manual on small earth dams" prepared by FAO in 2010 mainly focuses on technical aspects and procurement guidelines for tender preparation, evaluation and award of contract, and construction management and meant for engineers, technicians and extension workers involved in agriculture, commercial farmers, and contractors. It is assumed that the users have some engineering background in design, siting and construction of small dams, irrigation systems, water supplies in Africa. The manual also provide useful guidance on costing of dams, cost benefit analysis,

[10] The two most recent analyses and policy documents are: (i) IWRM/WE - Implementation Plan Volume 1 : Main Report (2007-2030) Ministry of Energy and Water Development, (April 2008), and (ii) Zambia - Managing Water for Sustainable Growth. World Bank Country Water Resources Assistance Strategy for Zambia (August 2009)

construction contract supervision, community participation, social and gender issues, dam operations, environmental issues, and fish production. The Facility has rapidly assessed the FAO manual against the need for more comprehensive guidance to enable programmatic approaches by identifying key issues that will need specific attention under this consultancy (Annex 1 of the Appraisal Report).

The purpose of this consultancy is to assist GRZ preparing the urgently needed guidelines for community driven development of small dams as instruments for GRZ, local stakeholders and funding agencies to speed up the construction and rehabilitation of such dams for the benefit of the local communities in semi-arid regions. An important target of the project, apart from the delivery and testing of the guidelines, is its contribution to speed up the development of small dams towards 2030.

2. Objective

The project is aimed to strengthen the government's involvement in rural poverty reduction and improvement of the rural living conditions and livelihoods. This will be enabled by enhanced investments in small dams aimed to increase water security and provide water availability in semi-arid areas of the country that will benefit the populations and small scale economic activities. The consultancy shall contribute to the above by supporting the development of new guidelines for dam development that will be tested in the field followed by preparation and launching of action plan for up-scaled development of small dams towards 2030.

3. Scope of Work

The scope of work of this consultancy shall include the following main components:

- Component A: Development of new guidelines for community driven development of multi-purpose small dams
- Component B: Field testing and finalisation of the new guidelines
- Component C: Preparation of bankable projects for up-scaled development of multi-purpose small dams

4. Activities

Component A: Development of new guidelines for community driven development of multi-purpose small dams

Under this component the consultant shall prepare coherent and practical guidelines to facilitate systematic and effective planning, financing and development of multi-purpose small dams. The most recent manual used in Zambia is the "Manual on small earth dams" prepared by FAO in 2010 that mainly focuses on physical planning and dam designs meant specifically for engineers, technicians and extension workers involved in agriculture, commercial farmers and contractors. The new guidelines shall be developed against the backdrop of the rapid assessment of the existing manual (Annex 1 of the Project Appraisal Report) that shall be reviewed and expanded to include emerging innovative approaches. such as.: (i) programmatic approaches to long-term planning and financing of small dam development projects, (ii) new methods for reservoir mapping and national dam inventory management like the Earth Observation (EO); (iii) strategic programs for up-scaling the development of multi-purpose small dams; (iv) reinforced community involvement, (v) more focus on project implementation organisation and management, (vi) increased emphasis on safeguarding measures; (vii) multi-purpose optimisation, as further described in the list of tasks. The upgraded guidelines will tentatively include the following two Modules:

- Module 1: Guidelines on strategic development of small dams at national, basin, and provincial level including enabling institutional capacity and legal framework at national level, and environmental and social safeguarding to govern strategic up-scaling programs for small dams including partnership development and financial mobilisation;
- Module 2: Guidelines on project level planning, construction and operation of multi-purpose small dams.

A.0 Project Inception

Due to the complexity of the project it will be necessary with an inception exercise supported a rapid assessment. This will be to review and validate the scope and implementation modalities of the project to ensure that the agreed project interventions will be delivered and lead the envisaged outputs and poverty reduction benefits. The findings and recommendations shall be presented in an Inception Report that also will include a proposed detailed implementation plan. The draft inception report will be submitted to the GRZ for validation and then finalised.

A.1 Review existing guidelines and prepare input to Module 1: Guidelines for strategic water storage management and development at national, basin, and provincial level related to:

1) **Institutional Framework and Strategic Management of National Water Security**
- Review legal and institutional framework at national, provincial, basin, and district levels, responsibilities, and practices related to decision making, planning and implementation of dam development programmes in Zambia
- Assess the national water storage capacity and water security status comprising small/medium and large dams and prepare guidelines for monitoring and updating

2) **Reservoir mapping and national dam inventory management**
- Ground-based Small Dam Inventory Management
- Earth Observation (EO) Tools (dynamic surveillance)

3) **Environmental and social safeguarding and climate change adaptation**
- Review existing Acts, Legislation, Policy and Standards related to environmental (water, land and forest) and social impact assessment (land acquisition) and climate change adaptation (Clean Development Mechanism) applicable for such projects in Zambia
- Suggest Key Performance Indicators (KPI) for development of baseline data for impact assessment, mitigation and adaptation and prepare guidelines to predict impacts and incorporate mitigation and adaptation measures along with cost indicators
- Guideline to resolve the possibility of land and water conflict with the increase in population and change in land use due to small dams.

4) **Strategic up-scaling programs for multi-purpose small dams**
- Outline approach to strategic programmatic approaches
- Provide model approaches for screening, prioritisation, and clustering of dams
- Prepare guidance on establishment of small dam development programs
- Provide guidance on programme implementation modalities

5) **Strategic partnerships and financial mobilisation**
- Guidelines for encouraging local individuals, small scale entrepreneurs, service providers, and micro-enterprises to engage in water related services for the new and rehabilitated reservoirs
- Describe approaches to improve financing flows for investments in multi-purpose small dams from GRZ, donors, PPP (national, local and foreign) and consider opportunities for private financial institutions to build on the Equator Principles[11].

A.2. Review existing manuals and guidelines and prepare input to Module 2: project safeguarding, management, implementation and operations

1) **Project implementation organisation and management**
- Review permits and approvals required from Government of Zambia and funding agency from environmental and climate change adaptation angle for construction, management and operation of small dam projects. Provide guidance to obtain these licenses and permits
- Prepare guidance on integration of environmental, gender, social and climate issues in management, implementation and operation of project

2) **Project implementation organisation and management**

[11] The "Equator Principles" An industry approach for financial institutions in determining, assessing and managing environmental & social risk in project financing. Downloaded from http://www.equator-principles.com/principles.shtml

- Prepare model arrangements for project implementation organisation taking into account the need for community driven approaches to planning and implementation of small dams
- Indicative project implementation schedules for different dam projects new vs. rehabilitation of existing dams, size, multi-purpose complexity, etc.
- Review applicable procurement guidelines for works, goods and services and adopt them into the guidelines
- Prepare disbursement guidelines taking into account relevant disbursement mechanisms suitable for small dam development projects including model accounting arrangements and expenditure schedules and associated financial management arrangements
- Prepare a model for performance monitoring and impact assessment with special attention on an initial impact evaluation process (a mechanism used by the World Bank) to establish the baseline situation and a related implementation and impact monitoring plan, with provision for action to help ensure sustainability.

3) Supplementary guidelines for strengthened community involvement

- Prepare model approaches to sensitisation and motivation of community involvement and enhanced local ownership to the dams
- Prepare guidelines to ensure a strong community role in project implementation management and how to assist stakeholders to participate in locating, planning, construction, and management of multi-purpose small reservoirs
- Propose supplementary tools to promote the establishment of dam committees and a strong community involvement (including NGOs and CBOs) in the dam siting and preliminary investigations as well as in the dam construction and operations like water allocation, public consultations, economic and financial sustainability, and other responsibilities that are crucial for good functioning of the reservoirs
- Prepare a guiding tool for organisation of community awareness workshops and establishment of effective local water management committees. The committees will be in charge of the reservoir operations

4) Enhanced gathering of community information

- Prepare guidelines for gathering and reliable information on villages, including organisational setup for dams, and to systematic information collection from informants, dam committee, agricultural extension workers, and local farmers. Prepare model questionnaires and guidance on use of assisting tools like GPS and Google Earth.
- Provide guidance on sampling surveys on households and other small scale water users

5) Safeguarding and permits

- Review applicable safeguarding tools required by GRZ and funding agencies such as social and environmental impacts assessments, gender mainstreaming, social equity, land tenure and resettlement issues, etc.
- Provide guidance on how to obtain the required licenses and permits (water and land rights, dam construction, etc.)
- Propose guidance on risk assessment

6) Site selection and preliminary investigations

- These issues are well covered in the FAO manual. Just review and take cognisance of them

7) User demands and multi-purpose optimisation

- Provide supplementary guidelines on assessment of various sector water demands like irrigation WS&S, fish farming, livestock, and other purposes like navigation, tourism, water sports, hydropower, ground-water recharge, etc.
- Provide guidelines on multi-purpose optimisation and dam operations
- Multi-purpose optimisation and dam operations

8) Provide models for cost estimates, economic analysis, and cost recovery

- Use the new guidelines as an opportunity to develop some estimation approaches and typical construction and O&M costs (in Zambia) for building of new dams and retrofitting of existing ones. Cost Estimates for dam construction/rehabilitation
- Prepare guidance and cost estimates models for upgrading the dam into multi-purpose

operations. Also include applicable tools for analysis of cost-benefit and cost recovery aspects
- Propose mechanisms to strengthen the financial management and revenue collection functions to ensure sustainability, by introducing innovative user fee management concepts

9) Guidelines for hydro-meteorological assessments and climate change adaptation

- Provide supplementary guidance on catchment area assessment, hydrological assessment, yield analysis, and calculation of peak floods
- Strengthen the erosion, sediment transport and siltation assessment guide in existing manual;
- Include guidance on climate proofing and climate change adaptation measures related to dam development to ensure that project results will not be hampered by potential climate risks

10) Preliminary technical detailed designs, dam construction, special cases, finishing and repair works

- These issues are well covered in the FAO manual. Just review and take cognisance of them.

11) Operation and maintenance (O&M) and dam Safety

- Operation and Maintenance Procedures are basically well covered in the FAO manual
- Provide supplementary guidelines to address and integrate dam safety issues
- Prepare supplementary guidance on sustainable operation and maintenance of dam systems including economic and financial management

A.3 Preparation of complete guidelines document (Module 1 and 2):

- Based on the inputs from A.1 and A.2 prepare a draft user-friendly guideline document (comprising 2 modules or sections), prepare a draft user-friendly guideline document (comprising 2 modules) on community driven development of multi-purpose small dams. Given the close relations between the FAO Manual and the upgraded guidelines the consultant shall consider ways of harmonising the two, preferably in one document in agreement with DWA, and the Technical Services Branch of the Department of Agriculture, and FAO.
- Submit the Draft Guidelines for review clearance
- Arrange a workshop for presentation and review of the draft guidelines
- Prepare a revised interim version that will provide the basis for Component B of the consultancy. (The revised and final versions to be submitted and approved after field testing)

Component B: Field testing and finalisation of the new guidelines

Under this component the consultant shall in cooperation with GRZ test the use of the guidelines as a basis for necessary adjustments, completion, approval and adoption by the government. As seen from Component A, the guidelines will probably comprise address the two "Modules". The field testing of the guidelines will therefore focus on the two levels: (i) strategic development level and (ii) project level management and implementation modalities. The latter will include selection, rehabilitation and re-optimisation of 4 existing small dams through introducing additional (multi-purpose) uses for increased benefits and rehabilitation. The structural interventions of this activity will comprise retrofitting of the existing small dams including necessary investments to facilitate multi-purpose operations. Due to time and constraints the field testing will not include planning and construction of new dams.

B.1 Testing of draft guidelines Module 1 on strategic water storage management and development at national, basin, and provincial level:

1) Institutional Framework and Strategic Management of National Water Security

- Assess the appropriateness and functioning of the institutional framework at national, provincial, basin, and district levels for water storage development programmes in Zambia
- Assess the existing national water storage situation, water security status, future targets and prioritised development actions

2) Reservoir mapping and national dam inventory management

- Assess the current small dam inventory and updating mechanisms and the usefulness of new methodology for dynamic surveillance and management (Earth Observation (EO) Tools)

B.2. Testing of draft guidelines Module 2 on project management, implementation and operations

and evaluate the experience from using the guidelines

(a) Design and implementation of 4 multi-purpose small dam projects (3 rehabilitation and 1 new) based on the draft guidelines.
The location of the dam projects shall be selected in close cooperation with DWA and the identified communities. Among guideline elements to be tested are:

- Project implementation organisation and management
- Supplementary guidelines for strengthened community involvement
- Enhanced gathering of community information
- Environmental and social safeguarding and permits
- Site selection and preliminary investigations
- User demands and multi-purpose optimisation
- Provide models for cost estimates, economic analysis, and cost recovery
- Guidelines for hydro-meteorological assessments and climate change adaptation
- Preliminary technical detailed designs, dam construction, special cases, finishing and repair works
- Operation and maintenance (O&M) and dam Safety

After selection and design the consultant shall
(b) Supervise the implement the upgrading/construction of the 4 small dams (1 new 3 rehab)

(c) B.3 Evaluation of experiences from the field testing of the draft guidelines and propose improvements:

- Prepare revised versions of the guidelines (two modules) on the basis of the experience from the field testing of the on community driven development of multi-purpose small dams.
- Arranged approval workshops for review and clearance of the revised guidelines and prepare the final version for approval.

Component C: Programme for up-scaled development of multi-purpose small dams

The Project is also intended to pave the way for long-term impacts (up to 2030) in terms of increased water security in semi-arid areas of the country by rehabilitated or constructed new multi-purpose reservoirs. Although GRZ has made considerable efforts to speed up the development and rehabilitation of small dams in semi-arid areas, it is assumed that there are still some 700 small dams that still remain to be upgraded. The Project is intended to prepare bankable designs for some 5 new multi-purpose small dam projects and associated funding mobilisation initiatives together with GRZ, LG, and local beneficiaries. This will serve as a spring-board for further long-term up-scaling and replication governed by GRZ. The methodology for this component shall basically follow those stipulated in the final guidelines (Component A) adopted by GRZ.

C.1 Participatory selection of dam projects and preparation of bankable designs for 5 project supported by cost-benefit and financial analysis. Projects to be selected in cooperation with DWA and other water development related authorities and stakeholders.

C.2 Engage with potential donors, investors and entrepreneurs in cooperation with GRZ

Cooperate with GRZ to mobilising i funding for the 5 bankable projects that will pave the way for GRZ's long-term up-scaling of the country's investments in small-multi-purpose dams. This activity may include a donor round table if found appropriate. This activity shall also include exploring opportunities for GEF financing given their allocation for Zambia reportedly in the order of USD 11.3 million.
C.3 Support GRZ to initiate the implementation of funded projects

Outputs

- An Inception Report with a Work Plan outlining the initial assessment, agreed scope, methodology to be employed to be confirmed at an Inception Meeting of the Committee
- Draft Guidelines on the overall analysis, including detailed outline and analysis of social and economic benefits, and identification of factors influencing sustainability
- Final Guidelines incorporating comments received on the draft report
- Draft bankable design of 5 multi-purpose small dam projects, community mobilisation, GRZ assisted in mobilising funding for these projects. Financing arrangements/modalities based on interaction with funding partners and implementation plan for the 5 bankable projects

All reports are to be submitted electronically, along with five hard copies. The consultant will allow 3 weeks for review and a further 2 weeks to incorporate any comments.

Expertise required

For the execution of the Project as one contract, the Consultant shall provide a broad range of expertise as indicated in the table below, and the team should preferably have a balanced composition of local and international experts. It is assumed that given the nature of the project all team members apart from the one with the TL responsibility are national (Zambia experts). The team leader should be an expert with broad experience in new approaches for development of multi-purpose small dams through a strong community involvement. The consultant shall make available personnel with the qualifications and experience necessary to perform project tasks to a high standard necessary for the completion of each project component and the entire Project. A group of regional/non-regional (TL) and Zambian consultants is foreseen; covering at a minimum the following indicated subjects:

- Team Leader (regional/non-regional consultant)
- Small dam development/soil engineering
- WRM, catchment management/hydrology/environment
- Irrigated agricultural/natural resource economics
- Small scale business development and funding mobilisation
- Community involvement, social and gender issues
- Land Surveyor GIS
- Construction supervision engineer

One of the staff shall be the TL who is expected to have analytical skills as well as knowledge and understanding of management and development of rural livelihoods and water infrastructure in Zambia. Previous experience undertaking similar work in Zambia or within the region would be an advantage. The candidate should have fluency in English and proven ability to lead and work in a multi-disciplinary team.

Duration of Assignment

The assignment will be over a 31 months period. Total consultant time is preliminarily estimated at some 26 man-months for the regional consultant (TL) and some 60 staff months for the national experts.

Payment Schedule

Payments shall be based on the following:

15% on signing of the contract
25% on completion of the draft inception report
45% on submission of the draft final report
15% on completion of the final report

All reports are to be submitted electronically, along with five hard copies. The consultant will allow two weeks for review and a further one week to incorporate any comments.

Reporting
The Consultant will report to [*to be filled in*] for contractual matters and to [*to be filled in*] for day to day administration.