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1.0 EXECUTIVE SUMMARY

1.1 Financing Agreement No. 6581/SW:

The Financing Agreement No. 6581/SW between the European Commission and the Kingdom of Swaziland for the Lower Usuthu Smallholder Irrigation Project- LUSIP-Phase I (SW/7008/003) EDF VIII, prescribes a mid-term review after 3 years pre-implementation period. Continuation of further 4 years construction period and availability of Euro 5.9 million for PMU and FD&ES of construction will be conditional on acceptance of the recommendations of the mid-term review.

1.2 GOS Policy:

The Government of Swaziland (GOS) has identified the development of smallholder agriculture from subsistence farming to commercialization and intensification farming as the main element in its policy to alleviate poverty. The smallholder farmers in the Lower Usuthu Basin are the poorest in the country. The main constraint is the lack of water as the dry flow of the Lower Usuthu River has been fully allocated to the existing farmers. In support of the GOS policy, Lower Usuthu Smallholder Irrigation Project (LUSIP) has been developed the objective of which is to reduce poverty and improve the standard of living of the population in the Lower Usuthu Basin. LUSIP will develop 6500 ha of irrigated agriculture in Lubovane Block in phase I and will develop additional 5000 ha in Matata Block in phase II of the project.

1.3 Project Components:

**UPSTREAM DEVELOPMENT:**

The project consists of a Diversion Weir across the Lower Usuthu river at Bulungapoort with an Intake and Sand Trap, 21 km long Feeder Canal, 48m high RCC Mhlathuzane Dam, 48m high Golome Dam, 9.5m high Saddle Dam forming 155m cubic meters Lubovane reservoir (10% of which is dead storage), 21.9 km long Main Canal South (MCS), 14 km long St. Philips Canal (SPC), Mphofu Balancing Dam, secondary & tertiary distribution network and balancing reservoirs. The above components will be completed under phase I. Under phase II, extension of the MSC to Matata Block and secondary & tertiary distribution in the Matata Block will be carried out. The Diversion Weir, Feeder Canal, Dams, Lubovane Reservoir, MSC have been sized to cater both for phase I & phase II.

**DOWNSTREAM DEVELOPMENT:**

The Downstream Development and Agricultural Commercialization, mainly financed by IFAD, includes development policy and legal framework for land, water, resettlement and farmers organizations; participatory planning and irrigated farm development; development of irrigation management institutions, including water user associations, water service provider to operate the proposed water distribution system; and agricultural
commercialization. The Environmental Mitigation component, financed by IFAD, DBSA and the GOS, include finalization of the Comprehensive Mitigation Plan. (IFAD), Resettlement planning and implementation, including compensation. (GOS), Public Health. (IFAD), environmental conservation, monitoring and external reviews. (IFAD / DBSA).

1.4 Project Financing:

The total cost of phase I is 134 m Euro financed by EDF grant (Euro11.45m), ADB Loan (ZAR 98.5m), BADEA Loan (US$11.68m), DBSA Loan (ZAR72.3m), EIB Loan (Euro22.5m), ICDF Loan (US$5 m), IFAD Loan (SDR11.9), GOS Budget (SZL 408.7m). The EIB financing of Euro 22.5 m is for phase I only and an additional 16m Euro is available for phase II. GOS are committed to make up any shortfall in funding.

1.5 Project Management:

The Project Management component financed by EDF, IFAD and DBSA, include PMU (Project Manager, Engineering Manager, Project Accountant & ULG Consortium Contract staff) and FD &ES Consultant financed by EDF, long-term Environmental Monitor (DBSA), ADEMU (IFAD) including ADEMU Manager and long-term internationally / regionally recruited technical assistance team.

1.6 Present Status of the Project: (Mid August 2006)

The present status (mid August 2006) of various construction contracts is as under:
The Contract for the Diversion Weir, Intake & Sand Trap, funded by ADB, was awarded to the Contractor GROUP 5 of South Africa at a total contract price of SZL 34,732,904.80. The Contractor has commenced work at the site since 26th June 2006. The Feeder Canal Contract, funded by BADEA, was awarded to CMC de Ravenna of Italy at a total contract value of SZL 171,633,346.63. The Contractor began work on 30th May 2006. The Mhlathuzane Dam, Golome Dam, Saddle Dam, Spillway & River Diversion Works, funded by EIB & (DBSA + ICDF), Contract was awarded to CGI JV at a total contract value of SZL 278,402,324.28. The joint venture consists of Concor of South Africa, Group 5 of South Africa and Inyatsi of Swaziland. The construction is advancing at the site and the core trenches for the Mhlathuzane Dam and Golome Dam have been excavated. Gnome river diversion has also been excavated. The Main South Canal is under contract negotiation and the total contract value is likely to be SZL 230 million. The secondary & tertiary distribution systems are at planning stage.

Under the Downstream Works, the Comprehensive Mitigation Plan has been compiled and approved, 112 graves have been relocated, asset survey of all household to be resettled has been completed, 65 farmers group have been formed, application for sugar quota for 6500 ha has been submitted, irrigation district has been formed, 34 plant species have been harvested and recorded, community consultation process has started, 15 environmental groups will be formed and the health laboratory will be functional shortly,
development of water supply master plan is in progress, 500 sanitation facilities are being planned in homesteads.

1.7 Recommendations:

A total of 17 recommendations have been made under the following headings, the details of which are available under 15.0.

1. Project to Complete.
2. Project Management Unit.
3. Renovation of the Ongoing Technical Assistance Contracts Funded by EDF.
4. Design of the Project.
5. Institutional Framework for O&M.
6. Operation & Maintenance Cost of the Scheme.
7. Land.
8. Ubombo Sugar Mill - Big Bend.
10. Delays in Payments.
11. Agricultural Diversification & Development.
12. Siphofaneni Development.
15. Electric Connection to Balancing Reservoirs.
17. Water Users Associations.
2.0 OBJECTIVE OF THE REPORT:

The Financing Agreement No. 6581/SW between the European Commission and the Kingdom of Swaziland committed financing of Euro 11,450,000 from 7th. and 8th. EDF resources to finance the Project Management Unit (PMU) established for the Lower Usuthu Smallholder Irrigation Project (LUSIP). The Agreement commenced on 31 December 2003 and shall end by 30th. December 2011. The Agreement finances the independent Contract of the Project Manager of the PMU, Engineering Manager & other support staff in the PMU contracted under the ULG Consortium Contract and the Final Design & Engineering Supervision Consultant’s Contract (Coyne et Bellier).

The EC support project is scheduled for 8 years (31.12.2003 to 30.12.2011) and a mid-term review after 3 years of pre- implementation period is called for on which basis the decision shall be taken to proceed with the construction period for stage IA. The pre-construction activities have a cost tag of Euro 5.55 million and the remaining 5.9 million Euro meant for construction activities will be available conditionally on acceptance of the recommendations of the mid-term evaluation report.

A one man Mission was contracted by the EC through intecsa – inarsa, s.a & Hydratec Consortium. The Mission was in Swaziland from 27th. July 2006 to 16th. August 2006. The Mission visited the project sites, sugar estates, met Swaziland Sugar Association & several stakeholders, Principal Secretaries of the various ministries of the Government, European Commission, Project leaders, FD & ES Consultant and studied several reports and documents to conclude this report. The support and assistance provided by all is very gratefully acknowledged and highly appreciated.
3.0 BACKGROUND:

The GOS has identified the smallholder’s development of the agricultural sector as the main element in its policy to alleviate poverty. The Lower Usuthu Basin area is one of the poorest in the country with an average per capita income of Euro 130/year compared to the country average of Euro 317/year. The major constraint experienced by these poor farmers is the lack of irrigation water as dry season river flow of the Lower Usuthu River has already been fully allocated to the existing irrigators. LUSIP will address this constraint by storing flood water in an off-river 155 million m³ reservoir at Lubovane that will provide irrigation water for 6500ha in the Lower Usuthu Basin at the end of first phase (2002-2010) and additional 5000ha on completion of the second phase by 2015.

The main objective of the LUSIP is to reduce poverty and to improve the standard of living of the smallholder farmers in the Lower Usuthu Basin by commercialization and intensification of irrigated agriculture from the subsistence farming currently practiced. The project is expected to provide 750,000 person days of on-farm employment and 36,000 days of non-farm employment annually by 2010. In addition, significant indirect benefits such as micro business development, micro industrial growth, transport development, farm machinery and repair business, trading business, labour demand and generous social benefits are expected from this development. The main direct beneficiaries of the project will be the 2,600 farm household (15,300 persons) on the project who are expected to have their standard of living significantly raised through commercial irrigated agriculture and their income is likely to increase five fold. In addition they will also have access to improved drinking water and improved health facilities.

The groundwater aquifers of Swaziland are generally of low permeability and even well sited and well designed boreholes produce only small quantity of water. Most boreholes yield less than a liter per second which may suffice for drinking water supplies but not for irrigation on any scale. In order to facilitate sustainable socio-economic development in rural communities the GOS has declared goal of delivering water to all by 2022.
4.0 IRRIGATION POLICY, PROJECT RELEVANCE & LUSIP COHERENCE:

The Government of Swaziland’s policy for agriculture and irrigation is framed in the extensive National Development Strategy launched in 1999 the important element of which is food security at the household and community levels and commercialization of agriculture on SNL. The National Development Strategy further states that success of these elements will largely depend on expansion of smallholder’s irrigation in support of commercially grown irrigated crops under strict cost recovery conditions. The strategy document emphasizes to uplift SNL farmers from subsistence levels to commercial farming levels and sugar cane production as a vehicle for growth and development. The National Development Strategy recognizes that any significant expansion of irrigation will depend on development of new water resources and the development of shared water resources. LUSIP is in relevance with GOS’s development strategy.

It is estimated that there are approximately 67,000 ha under irrigation in Swaziland, most of which is concentrated in the large-scale commercial farming on TDL while smallholder’s irrigation is usually on SNL and covers approximately 3400 ha. There has been a significant growth in the smallholders irrigation development mainly for commercial sugar production and Ubombo Sugar Mill located at Big Bend had facilitated earlier about 1200 ha in the smallholders irrigation for sugar in the lower Usuthu area. An additional potential for irrigation exists for about 66,000 ha out of which about 53,000 ha are in the Usuthu and Ngwavuma Basins, while about 8000 ha are in Komati Basin.

A total mean annual runoff from Swaziland has been estimated to be 2600 million m³ out of which approximately half was attributed to the Usuthu River system. Most of the mean annual runoff occurs during the peak flood season (Nov-May) and any irrigation development programme would require the provision of dam storage.

The Usuthu River Basin forms a part of the Maputo basin and is shared with two other SADC members South Africa and Mozambique as per “1995 SADC Protocol on Shared Watercourse Systems” which resulted from Agenda 21 of the United Nations Conference on Environment and Development. Swaziland has its share of water in the Usuthu river. The construction of the project will claim and utilize its share of water. An Interim Water Agreement for the use of water from the Usuthu River has been signed by the GOS with the South Africa and Mozambique. This Agreement is to be ratified in 2010. LUSIP’s development is relevant that it strengthens GOS claim of its share of water from the basin distribution.

Persistent drought has been hitting Swaziland for the last 4/5 years and the GOS has embarked a programme to construct more earth dams to help farmers and communities with the availability of water. LUSIP is another big leap in support of the GOS programme to provide water to the communities and to promote irrigated agriculture.
The GOS, in its policy, has identified the development of the smallholder irrigators in the lower Usuthu basin, in order to alleviate poverty and to improve their standards of living through commercialization of irrigated agriculture. LUSIP is highly relevant to the GOS poverty alleviation policies.

A number of important dams have been constructed on major water courses by the GOS. The Komati Development Project has been implemented by the Komati Basin Water Authority and Swaziland’s chief component of this development is the Maguga Dam. Five major rivers of Swaziland are targeted for development and under the Water Act of 2002, five River Basin Authorities will be formed for these five rivers. The LUSIP’s development is coherent to GOS policies of irrigation development. A National Irrigation Policy of the GOS is also in the process of formulation and finalization.
5.0 SUGAR & LUSIP FARMERS:

The sugar industry in Swaziland is totally regulated by the Swaziland Sugar Association (SSA) established by the Sugar Act of 1967. The SSA has the sole rights to import and export sugar, control production through creation of quota without which no one may grow sugar cane and issues licenses to mill sugar cane and refine raw sugar. The quotas are issued by the Quota Board which has a majority membership of government appointed representatives. In the national economy sugar contributes approximately 20% to the GDP. It provides about 11% of the export earnings and generates approximately 9% of the total tax revenue and provides about 10% of the jobs in the formal sector.

In the 2003/04 season, Swaziland produced approximately 620,000 tons of sugar from about 48,000 ha of irrigated cane farming. LUSIP phase I and II with 11,500 ha of irrigated farming are anticipated to produce approximately 120,000 tons of sugar which is an increment of approximately 20% of the total sugar produced in the country at present.

Swaziland’s sugar is produced by three sugar mills-the Simunye and Mhlume mills located in the North-East and the Ubombo mill located in the South at Big Bend which is close to the LUSIP area. Each mill produces roughly one third of the total sugar production. About 60% of the cane is produced by the millers themselves as miller cum planters and the balance is produced by the independent farmers.

The sugar industry in the Lower Usuthu Basin is based around the Ubombo Sugar Mill located at Big Bend. There are more than 17,500 ha under sugar cultivation in the Lower Usuthu area out of which more than 8000 ha are cultivated by the Ubombo estate and the remaining by the smallholder irrigation farmers. The Ubombo Sugar Mill encourages and provides technical support to the smallholder farmers for the cultivation of cane crop. The services provided by the Ubombo Sugar Mill include:

- Assistance with application for sugar quota from the SSA;
- assistance with water permit from the Water Apportionment Board;
- the provision of financial guarantees for bank loans to finance irrigation development and crop establishment;
- guaranteeing the loan repayment through ‘stop-order’ deductions from the crop proceeds;
- sugar cane varieties selection and establishment;
- extension support for pest and disease control;
- technical support services;
- guaranteed marketing of cane crop; and
- supervision of land development on behalf of farmers.

The above support is a great incentive to the smallholder farmers who obviously are driven to sugar cultivation as the first choice. The Ubombo Sugar Mill located at Big Bend is the nearest mill to the LUSIP area and the LUSIP farmers have only preferred choice to carry their cane crop to the Ubombo Sugar Mill. The Ubombo Sugar Mill is currently operating at full capacity and cannot accommodate increased agricultural
expansion of 11,500 ha of phase I & II of LUSIP unless the mill management expand their milling capacity. The expansion involves investment and time delay. It is important to open a dialogue with the mill management and develop a high level coordination with the mill management so as to ensure timely expansion of the mill matching the cane crop harvesting.

Transportation of cane to the mill is another cost which has a direct bearing on the profitability of the sugar cultivation venture. A distance of 20-30 kms from the mill can be considered a reasonable distance but more than that there is a proportional erosion in the profitability. Under Phase I of LUSIP, the areas close to the Big Bend main road can be profitability cultivated while the interior areas of LUSIP such as the areas around Mphofu Dam, Mamba, Madubeni etc which are approximately 40-50km away from the mill. There is a need to review the road network system in the area to develop direct shorter all weather road network for easy and economical cane transportation. Phase II, Matata Block is close to the Ubombo Sugar Mill and will be ideal for sugar cultivation. The Phase II, therefore, deserves to be developed faster and should be on priority.
6.0 THE PROJECT:

6.1 OBJECTIVES:

The overall objective of LUSIP is the reduction of poverty and sustained improvement in the economy and living standard of the communities in the Lower Usuthu Basin through commercialization and intensification of irrigated agriculture. These communities are one of the poorest in the country.

6.2 GENERAL DESCRIPTION OF THE PROJECT:

The project consists of a masonry diversion weir on the Lower Usuthu river at Bulungapoort, an intake and a sand trap to divert Lower Usuthu river water into a feeder canal which leads to the off river Lubovane Reservoir. This reservoir is formed by constructing three dams, first RCC dam on river Mhlathuzane, second rockfill dam on river Golome and the third a low level saddle dam. The off-take canal from the Lubovane Reservoir going South called the Main South Canal (MSC) will irrigate 6500 ha in the Lubovane block in phase I and additional 5000 ha in Matata Block in phase II from its extension to a branch canal. From the main canals, further secondary and tertiary distribution systems will be planned to feed the balancing reservoirs in the Water Users Association’s respective holdings who will take further responsibility of managing the water system for irrigation of their fields.

The branch canal, its secondary and tertiary distribution and irrigation of 5000 ha in Matata Block forms phase II component of the LUSIP. However, the Diversion Weir, Feeder Canal, Lubovane Reservoir, MSC canal are sized to cater for both phase I and phase II.

In addition to the above irrigation works, the project also includes environmental measures, water supply & sanitation and commercialization of agriculture.

6.3 PROJECT COMPONENTS:

LUSIP comprises of the following four main components:

a) Upstream Works and Distribution Systems;

b) Downstream Development and Agricultural Commercialization;

c) Environmental Mitigation;

d) Project Co-ordination and Management

(a) Upstream Works and Distribution Systems:

These works are financed by ADB, BADEA, DBSA, EDF, EIB, ICDF and GOS. The Upstream Development component will provide the main irrigation water delivery from the Lower Usuthu River to the farm and comprises of the following:
i) A 218m long masonry diversion weir across the Lower Usuthu river at Bulungapoort with an intake and sand trap.

ii) A 21km long concrete lined trapezoidal section Feeder Canal to carry a maximum flow of 13.5 m$^3$/s.

iii) Mhlathuzane Dam. An RCC dam 300m long with a maximum height of 48m with outlets and longitudinal grouting, drainage and inspection gallery in the dam.

iv) Golome Dam. A rockfill dam 665m long and 48m high above current river bed level.

v) Saddle Dam. A homogeneous earth fill embankment 900m long with a maximum height of 9.5m.

vi) Spillway. A 400m long spillway comprising of 45m wide main spillway and a 75m wide auxiliary spillway.

vii) Main Canal South (MCS). A 21.9 km concrete lined trapezoidal section canal with a capacity of 6.4 m$^3$/s.

viii) St. Philips Canal (SPC). A 14 km long concrete lined trapezoidal section canal with a capacity of 1.2 m$^3$/s.

ix) Mphofu Balancing Dam. A 320m long and 7m high masonry gravity arch dam.

x) Distribution network and balancing reservoirs.

(b) Downstream Development and Agricultural Commercialization:

This component is primarily financed by IFAD. The Downstream Development and Agricultural Commercialization component comprises of four sub-components:

i) Development policy and Legal framework for land, water, resettlement and farmers organizations;

ii) Participatory Planning and Irrigated Farm Development;

iii) Development of Irrigation Management institutions, including water user associations, water service provider to operate the proposed water distribution system;

iv) Agricultural Commercialization.

(c) Environmental Mitigation:

This component is financed by IFAD, DBSA and the GOS. This component has the following four sub-components.

i) Finalization of the Comprehensive Mitigation Plan. (IFAD)

ii) Resettlement planning and implementation, including compensation. (GOS)

iii) Public Health. (IFAD)

iv) Environmental conservation, monitoring and external reviews. (IFAD / DBSA)
(d) Project Coordination and Management:

This component is financed by EDF, IFAD and DBSA and has the following support:

i) PMU (PD, Engineering Manager, Project Accountant & ULG Contract staff) (EDF)

ii) Long term Environment Monitor. (DBSA)

iii) ADEMU (IFAD) including ADEMU Manager and long-term internationally/regionally recruited technical assistance team.

iv) Final Design & Engineering Supervision Consultancy firm. (EDF)

6.4 FINANCING:

The total phase 1 investment cost which comprises of the construction of civil works, diversion weir, feeder canal, off-river reservoir and three dams, main South canal and on-farm development for phase 1 only (6500ha) is 134 m Euro. The project is funded through agreed loans and grant from the following:

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<td><strong>Total</strong></td>
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The EIB funding of 22.5 m Euro as above is for Phase I only and an additional 16 m Euro is available for Phase II. The GOS are committed to make up any shortfall in funding.

The EDF funds of 11.45 m Euro will finance the PMU and the Final Design & Engineering Supervision contractor. This includes the compensation packages for the Project Director, Engineering Manager & support staff under ULG Consortium Contract and the contract cost of the Final Design and Engineering Supervising Contractor (Coyne et Bellier). The GOS funds cover infrastructure construction, resettlement and other social costs.
6.5 PRESENT STATUS OF THE PROJECT: (Mid August 2006)

6.5.1 UP STREAM WORKS:

DIVERSION WEIR, INTAKE & SAND TRAP:

This component is funded by the ADB. The Contractor GROUP 5 of South Africa who was awarded the Contract for a total contract price of SZL 34,732,904.80 has commenced work at the site since 26th. June 2006.

FEEDER CANAL:

Funded by BADEA, the Contract was awarded to CMC de Ravenna of Italy at a total contract value of SZL 171,633,346.63. The Contractor began work on 30th. May 2006 after some delay because of land compensation issues.

MHLATHUZANE DAM, GOLOME DAM, SADDLE DAM, SPILLWAY & RIVR DIVERSION WORKS:

Funded by EIB & (DBSA + ICDF), the Contract was awarded to CGI JV at a total contract value of SZL 278,402,324.28 The joint venture consists of Concor of South Africa, Group 5 of South Africa and Inyatsi of Swaziland. The construction is advancing at the site and the core trenches for the Mhlathuzane Dam and Golome Dam have been excavated. Glome river diversion has also been excavated.

MAIN SOUTH CANAL (MSC):

Tender Evaluation Report has been submitted to EIB for approval. On receipt of approval negotiations will be carried out with two contractors. The total contract value is likely to be approximately SZL 230 million.

SECONDARY & TERTIARY DISTRIBUTION SYSTEMS:

These are under planning awaiting the formulation of the Water Users Associations which work is ongoing.

6.5.2 DOWN STREAM WORKS:

COMPREHENSIVE MITIGATION PLAN (CMP):

The CMP has been compiled and approved. The document is awaiting public review.

RESETTLEMENT:

112 graves have been relocated and 250 graves will be relocated by December 2006. 58 homesteads will be constructed by December 2006. Asset survey of all households to be resettled completed. Architects engaged to develop concept design for housing.
**FARM DEVELOPMENT:**

65 farmer groups have been formed. Resource maps for all communities have been produced to inform formation of farmer groups. Application for sugar quota for 6500 ha of land under irrigation has been made.

**IRRIGATION DISTRICT:**

Founding committee for irrigation district formed and trained and the irrigational district will be operational.

**ENVIRONMENT MANAGEMENT:**

All endangered species in reservoir and construction area rescued. 34 plant species have been harvested and recorded. 15 Environmental Management groups will be formed.

**PUBLIC HEALTH:**

MOU with the MOHSW has been approved for the health laboratory to be functional. Development of Water Supply Master Plan is in progress. 500 sanitation facilities will be installed at homesteads in 2006 for which survey to draw lessons from sanitation project at Gamedze chiefdom has been completed.
7.0 **DESIGN FEATURES:**

LUSIP has been long in the pipeline. The pre-feasibility study was carried out in 1996, a detailed feasibility study in 1997/1998 and an environmental impact assessment (EIA) was carried out in 1999/2000. The basic document for an appraisal of LUSIP is the 1998 feasibility study carried out by GFA-Agrar of Germany and the Coyne et Bellier’s TOR are mainly based on the conclusions of GFA-Agrar. Several other supporting studies were also carried out by other consultants. Coyne et Bellier, the Final Design and Engineering Supervision Consultant reviewed the reports, studied alternatives and prepared the final designs of the LUSIP which were later approved by the relevant stakeholders.

7.1 **DIVERSION WEIR DESIGN:**

The Diversion Weir is designed to be constructed across the Lower Usuthu river at Bulungapoort, about 14 km upstream of Siphofaneni. The Weir is a structural masonry structure, 218m long, average height 2.5 m and of Ogee shaped. The Weir will have a steep inclined u/s face at 5V:1H and d/s slope will be a gradual 1V:2H. The foundations are generally exposed and consist of clean, crystalline granite. The Weir will be keyed into this foundation to a maximum depth of 1m. The crest level is at 252.5 m compared to the average river bed level of 250.0m. The central 10m section of the Weir will have a crest level of 252.3m and a 1V:3H d/s slope.

7.2 **INTAKE:**

The Intake, an open side channel type, is located on the right bank of the Lower Usuthu River immediately upstream of the Diversion Weir. The intake arrangement consists of a concrete deflection wall protruding into the river flow, like a bridge pier, to ensure that sediments in suspension do not settle at the intake opening. From the open intake, water enters a flushing channel with four large capacity gates at the downstream end of the channel to enable regular scouring of the channel. The upper water layers of the cleaner water flow over a submerged spillway protected with a trash rack, through a transition section and then flow into the 1,200 m long, 3.3 m diameter horse-shoe shaped cut and cover pressure tunnel. The Intake is designed to be protected from abnormal flood levels by means of masonry deflection walls at level 258.0 that corresponds to approximately 200 years return flood flow of 4370 m³/s which is more than double the maximum observed flood.

7.3 **SAND TRAP:**

At the pressure tunnel exit portal, the Avio type level control gate, stilling basin, sand trap and flow regulating gates are located. The sand trap is a 25m long single chamber conventional concrete structure which forms an extension of the 20m long Avio gate stilling basin. The Avio gate ensures that even an 8m variation in the level of the Lower Usuthu river will result in negligible level variation in the sand trap. This characteristic is very important in maintaining a constant head on the three flow regulating gates, located
immediately downstream of the sand trap, which will be used to set the required flows into the Feeder Canal. The sand trap is designed to settle suspended particles greater than 1mm diameter. Settled particles will be scoured out from the invert of the sand trap by a continuous flushing system using 2 m³/s of flow.

7.4 FEEDER CANAL:

The Feeder Canal is a 21 km long concrete lined, trapezoidal section sized to carry a maximum flow of 13.5 m³/s. The design include a 1,200m long horse-shoe shaped 3.3m diameter cut and cover tunnel, concrete lined for part of the length, and a 710m long siphon consisting of two 2m diameter steel pipes and a 1.1m diameter steel pipe together with associated intake, discharge and canal reject structures. Three irrigation off-takes serving 22,164 ha are designed in the final third of the Feeder Canal which terminates at a discharge structure where flow is finally discharged into the Lubovane Reservoir. Three district road bridges, a number of farm road bridges and pedestrian crossings, community water service points, two Partial flumes to measure flow and numerous cross drainage structures are designed on the Feeder Canal.

7.5 MHLATHUZANE DAM:

The Mhlathuzane dam has been designed as a roller compacted concrete (RCC) dam, 300m long with a maximum height of 48m above the original river bed level. The RCC dam cross section will have an upstream face and a stepped downstream face both constructed in conventional concrete with the roller compacted concrete making the body of the dam. Although a RCC dam costs almost double the cost of a rock fill dam but the RCC construction is very fast and can be completed in one dry season thereby avoiding a diversion tunnel which takes long time to excavate and will be more expensive. Two box culverts are incorporated in the design. These will initially be used for diversion of river flow but in the long run will form the bottom outlets of the dam. One culvert will contain the 1.3 m diameter compensation outlet pipe while the other will be lined and release water to simulate annual floods. The compensation outlet will be equipped with a butterfly valve and sleeve valve while flood releases will be controlled by a roller gate. A longitudinal gallery has been designed within the dam to allow for drilling and grouting during construction, to serve the purpose of drainage gallery and inspection gallery during the lifetime of the dam. The longitudinal gallery is with an axis 4m back from the upstream face of the dam.

7.6 GOLOME DAM:

The Golome dam has been designed as a rock fill dam with an impervious central core zone, protected by upstream and downstream filters. The rock fill, in both upstream and downstream shoulders which serves the purpose of supporting the central impervious core zone, will be sourced from the spillway excavation. The dam will be 665m long and 48m high above the current river bed level. The Golome dam will contain the outlet works on the right bank which feeds the Main South Canal (MSC). The outlet works consist of an intake trash screen, a 1.7 m pressure conduit, gate tower and gate house,
valve house, stilling basin and a Parshall flume to measure flow. The 1.7 m diameter pressure pipe bifurcates into two 1.5m diameter pipes with two butterfly valves. Two 1.2 m diameter sleeve valves form the regulating valves controlling discharge into a stilling basin. The rock fill type construction is economical and will also use the close by excavated material from the spillway otherwise it will be another problem to dispose off the spillway excavated material in an environmentally friendly way.

7.7 SADDLE DAM:

The saddle dam saddles a low-lying length section between the last two hills of the Lubovane ridge. The saddle dam is 900 m long and will have a maximum height of 9.5 m above foundation level. It will be a homogeneous earth fill embankment with riprap slope protection on both upstream and downstream faces.

7.8 SPILLWAY:

The 400m long spillway is located between the Mhlathuzane and Golome dams. The spillway comprises of a 45m wide main spillway and a 75m wide auxiliary spillway which are separated by a concrete dividing wall both upstream and downstream of the control section. With a sill set 2.5 m above the main spillway sill, the auxiliary spillway will probably function only twice in a 100 years. The main spillway chute with a 25% gradient down towards the Mhlathuzane river will be concrete lined since it will be frequently in use but the auxiliary spillway, also sloping at 25% gradient, will be unlined. The auxiliary spillway chute narrows from 75 m at the control section to about 35 m at its intersection with the Mhlathuzane river. The main spillway chute discharges into a 40 m long stilling basin which dissipates energy and render smooth entry of water into the Mhlathuzane river. The excavated rocky material will be utilized in the rock fill dam.

7.9 RIVER DIVERSION WORKS:

In the first rainy season, the flow of Golome river will be diverted through the diversion channel into the Mhlathuzane river. The diversion channel is located about 500m upstream of Golome dam and connects the two rivers through a moderately steep ridge. A coffer dam will be constructed on the Golome river and will be incorporated later into the upstream heel of the Golome dam. The coffer dam foundation will be made of the same standard as that of Golome dam. The coffer dam will be constructed as a zoned structure with a central impervious core and filter zones both upstream and downstream of it. The shoulders will be of rock fill sourced from spillway excavation or diversion channel excavation. The crest level of the coffer dam will be at elevation 200masl. During the second year of construction, flows in the Golome river (through the diversion channel) and in the Mhlathuzane river will pass through 2 no. culverts constructed in the dam wall. The dam wall will be kept intentionally low so as to permit overtopping in the event of an exceptional flood.
7.10 LUBOVANE RESERVOIR:

The Lubovane Reservoir is formed by damming the Mhlathuze river and the Golome river by the RCC Mhlathuze dam and the rock fill Golome dam and also by saddling the long low level stretch between the hills. The gross storage capacity of the Lubovane reservoir is 155 million m³ out of which 10% is the dead storage. There are lot of trees and thick vegetation in the reservoir area which should be cleared but during discussions it was pointed out that a decision has been made not to do so as it involves a cost of about SZL17 million. This decision is not supported and it is recommended that the reservoir area should be cleared of vegetation as far as possible.

Although there may not be many commercial trees but still the reservoir is full of trees which is cheap fuel and which will go waste by being submerged. Also the dead vegetation may pollute the water quality. The dead uprooted trees are likely to float on the reservoir surface creating an environmental hazard, obstruction and possible threat to structures.

7.11 MAIN CANAL SOUTH (MCS):

The Main Canal South (MCS), 21.9 km long concrete lined trapezoidal section, has its origin at the Golome dam outlet and has a capacity of 6.4 m³/s. The canal has a final capacity of 4.3 m³/s at the tail end. The design includes a 839m long inverted siphon consisting of two 1.6m diameter steel pipes, together with the associated intake, discharge and canal reject structures. Seven irrigation off-takes serving 3,283 ha are located along the MCS which terminates to a regulating structure where flow can either be directed to the St. Phillips Canal or to the Phase II Matata siphon. The design includes two district road bridges, seven farm road bridges, 14 pedestrian crossings, several community water service points, a Parshall flume to measure flow and numerous cross drainage structures.

7.12 ST. PHILIPS CANAL (SPC):

The St. Philips Canal, 14km long concrete lined trapezoidal section, has its origin at the terminal regulation structure on MCS. The canal has a constant capacity of 1.2 m³/s. Five irrigation off-takes serving 958 ha are located along the SPC which terminates at the Mphofu balancing dam, from where a further 941 ha are irrigated. The design includes one district road bridge, eleven farm road bridges, nine pedestrian crossings, community water service points, a Parshall flume to measure flow and numerous cross drainage structures.

7.13 MPHOFU BALANCING DAM:

The balancing dam is constructed across the Mphofu river which has a catchment area of 47 sq.km. It consists of a 7m high masonry gravity arch across the river, abutting against two masonry headwalls which each retain a flank embankment. The dam crest length is 320m and the maximum depth of stored water at full supply level is 7m.
7.14 **MODEL TESTING:**

EDF is funding the hydraulic model testing of the following at the University of Stellenbosch in South Africa as per contract with the FD & ES Consultant.

(i) The intake structure at the weir  
(ii) The Lubovane Dam Spillway  
(iii) The Main South Canal outlet works located within Golome Dam.

The results of the hydraulic model testing may confirm the design or minor alterations may be necessitated. The preliminary results are expected in end September and the final draft report is expected in November 2006.

7.15 **CONCLUSION:**

Having reviewed the project design, visiting the project sites, studying several reports and documents, discussions with the FD&ES Consultant and the PMU, reviewing the comments and proposals of the Dam Consultant, Independent Dam Review Panel and responses of the FD &ES Consultant, the Mission after having carefully studied all pros and cons is satisfied and supports the design concepts and views of the FD & ES Consultant. The Mission is of the view that the design of the project is well prepared and is appropriate to the needs of the Project.
The objective of the EDF funding was to establish a lean and effective project management structure in order to ensure an efficient implementation of phase I of the LUSIP. The Project Management Unit (PMU) was established within Swaziland Water and Agricultural Development Enterprise (SWADE), previously Swaziland Komati Project Enterprise (SKPE) which was officially changed to SWADE on 11.2.2005. The SWADE is governed by a Board of Directors under the ministerial control of the Ministry of Natural Resources & Energy. The Board contains representatives of the Ministry of Finance, Ministry of Economic Planning & Development, Ministry of Agriculture & Cooperative, Ministry of Natural Resources & Energy, representatives of the sugar millers and representatives of the LUSIP communities. The National Authorising Officer who is the Permanent Secretary Ministry of Economic Planning & Development has contracted all technical services required including Final Design & Engineering Supervision Consultant as per the requirement of the Financial Agreement. The PMU came in existence on 1.4.2003 the date when the Project Manager (which is the contracted designation of the post) who is the head of the PMU joined his duties.

This Project Management Unit will undertake effectively the overall management of the project. The Project Management Unit (PMU) is headed by a Project Manager recruited independently who is supported by an Engineering Manager and other support staff recruited through ULG Consortium Contract. Short-term consultants are engaged as and when required. The Final Design & Engineering Supervising Consultant (Coyne et Bellier) has been contracted to undertake the responsibility of the final detailed design and to supervise the construction of the phase I of the project. The day to day site supervision will be carried out by the FD&ES Consultant which is based at site and their work will be supervised by the Engineering Manager who reports to the Project Manager.

The Project Manager reports to the Supervisor who is the Chief Executive Officer of the Swaziland Water & Agriculture Development Enterprise (SWADE). All other staff in the PMU reports to the Project Manager. The organization chart of the PMU is at Annexures.

The Project Manager signed a 4 years contract for a contract price of SZL 5,862,993 (Euro739,310) and joined his duties on 1st. April 2003. His period of contract ends on 31st. March 2007.

As per the latest project construction schedule attached at Annexure, all components of Phase I of LUSIP are likely to be completed by November 2009. Thereafter, the scheme will be commissioned and put into operation. A scheme of this magnitude should be on a trial run for at least one year, which should include at least one flood season, to ensure that there are no teething troubles and that the scheme is enjoying trouble free operation. PMU will be in existence till then.

The Engineering Manager supervises the work of FD&ES Consultant and has the responsibility of all engineering construction and verifying the contractor’s bills. The
construction of the project phase I is programmed to be completed by November 2009.
Some slippage of construction schedule is not uncommon in a project of this magnitude
and also settlement of final claims of contractors take time. The contract of the
Engineering Manager expires on 1.3.2009 but his services may be required up to
1.7.2010.

The present contract of the FD&ES Consultant is for final design and construction
supervision of phase I. This scope of work includes the design of the distribution canal
for Matata Block of phase II. But does not include the final design of secondary and
tertiary distributions and the balancing reservoirs of the Matata Block phase II of LUSIP.
Also it does not include the construction supervision of phase II.

CONCLUSION:

The Mission is of the view that the structure, composition and location of the PMU is
appropriate. The PMU has been doing a fairly effective job and its performance has been
satisfactory.

The Mission recommends that the Contract of the Project Manager be extended up to
1.4.2011.

The Mission also recommends that the Contract of the Engineering Manager be extended
up to 1.7.2010.

The Mission further recommends that in preparation to the execution of phase II,
egotiations may be carried out with the FD&ES Consultant for completing the designs
of secondary and tertiary distribution and balancing reservoirs of phase II (Matata Block)
and the construction supervision of phase II.

The above recommendations are confined to the construction of phase I only. If the
construction of phase II commences in between, the situation will need a review since the
Financial Agreement No. 6581/SW between the European Commission and the Kingdom
of Swaziland is only for phase I.
9.0 PROGRAMME MONITORING:

The Project Manager would coordinate the preparation of overall project progress reports in a form to be approved by the financing partners. The reports would include key qualitative and quantitative information; incremental progress and progress relative to planned schedule.

The PMU/SWADE quarterly reports contain the principal events in the quarter, LUSIP progress to date, activities in the next quarter, issues arising, financial aspects and conclusions. But the report does not reflect the physical performance of works with respect to the planned schedule and the description of the element of delay or advancement graphically. Also it does not reflect the status of actual expenditure compared to planned expenditure as well as forecast of expenditures.

With the Gantt Chart as prepared for Upstream works, the report should include the actual physical progress of works on the Gantt chart which will enable to identify the delay or advancement of performance. The report should also highlight graphical representation of expenditure such as planned expenditure, actual expenditure and forecast expenditure. The quarterly forecast will assist the donors and the GOS to plan and organize financing. Pictorial progress may also be added to make reporting self sufficient.

The beneficiaries and the contracting authority monitor the programme from reports and field visits which is appropriate. The office of EU monitors the programme from reports and occasional field visit which is in order. The beneficiaries, the contracting authority, the concerned ministries and the donors may advise the PMU to include in their quarterly and annual report any specific activity pertaining to their programme monitoring which they will like to see in the reports and preferably a format of reporting may be agreed upon by all stakeholders.
10.0 LOGICAL FRAMEWORK:

A Logical Framework is a documentary tool for planning and managing a development project and it provides the basis for subsequent monitoring and evaluation of the project. The Logical Framework should be brief and aims to present information about the key components of the project in a clear, concise, logical, systematic and measurable terms.

As per Article 1 of the Financial Agreement No. 6581/SW between the European Commission & the Kingdom of Swaziland, the Commission shall contribute by way of grant from the resources of the European Development Fund towards the financing of the project SW/7008/003- Lower Usuthu Smallholder Irrigation Project (LUSIP) - Phase I. Annex 1 of the Financial Agreement contains the Logical Framework for the project.

PROJECT- LOWER USUTHU SMALLHOLDER IRRIGATION PROJECT

As mentioned in the Logical Framework:

OVERALL OBJECTIVE:

The overall objective has been correctly defined as under:

“Sustainable increase in farmer revenues and reduction in absolute poverty of the population in the Lower Usuthu Basin of Swaziland.”

PROJECT PURPOSE:

The purpose of the project has been mentioned as to establish an effective management structure in order to guarantee efficient and effective implementation of the project. The purpose of the project is to transform the economy of the Lower Usuthu Basin farmers from subsistence farming to sustainable commercial and intensification farming and to improve their standard of living. The project purpose mentioned therein is inconsistent to the overall objective.

RESULTS:

The results as mentioned in the logical framework are as under:

1. Design review and detail design reports established.
2. Works contract accepted and awarded.
3. Works constructed.
4. Global monitoring and project coordination ensured.
5. Effective project management realized.

The above results are incoherent to the project ‘Overall Objective’ and the ‘Project Purpose’.
In order to achieve the project purpose, the following results may be desired.

1. Upstream engineering works completed and water flows into the Balancing Reservoirs.
2. Farmer owned irrigation schemes operational.
3. Cane crop marketing assured.
4. Supportive social & health environment developed and functioning.
5. Entrepreneurial skills & environment promoted.

The Objectively Verified Indicators (OVI) of the ‘Overall Objective’ in the Logical Framework have been well chosen and appears to be satisfactory but the OVIs of the ‘Project Purpose’ and the ‘Results’ are not relevant as these are not tuned to the appropriate subject.

It appears that the author has prepared this Logical Framework keeping in view the financing of the EDF as a project since it aims at providing efficient project management structure to guarantee efficient and effective implementation of the project. With the change in the project definition, the structure of the log frame undergoes a change. There are, however, seven donors involved in the project and none of their Financing Agreements has a log frame except the EDF.

LOGICAL FRAMEWORK OF LUSIP:

The first Feasibility Study of LUSIP carried out by the GFA- AGRAR of Germany in 1998 contained the log frame and then the IFAD’s Appraisal Report of 2001 also included a Log frame. Finally a revised log frame was prepared in May 2004 at the start of the PMU.

After a series of workshops, discussions and consultations, the PMU has finally adopted a logical framework as at Annexure. It runs into 20 pages and is heavily loaded with Downstream Works components. The Upstream Works and Distribution systems covering all engineering construction which involves heavy financial outlay and on which all consequences of the project depend, contain only a few lines.

Although the Mission would prefer a concise (2/3 pages), balanced, effective and a productive log frame for LUSIP but since this PMU Log Frame has been built by the project teams and a number of participants through a series of workshops and this is the one being followed, the Mission recommends it to be followed by the stakeholders unless a decision is made to review it for consideration of modification.
11.0 PROJECT COST & BENEFITS – VIABILITY:

The latest study of the Financial & Economic Viability of LUSIP was carried out in June 2005 by the ULG Consortium “Review of the Financial & Economic Viability of LUSIP – JUNE 2005 Study”, which makes an assessment of the Economic and Financial Viability of LUSIP.

11.1 ECONOMIC VIABILITY:

As per the report, a comparison in economic prices of project benefits with project cost for the irrigated production of sugar generates a negative rate of return using the base assumptions in terms of sugar price and exchange rate. The addition of livestock and health benefits to the base sugar model is insufficient to generate a positive economic rate of return to the investment. The inclusion of inter-planted beans and the switching of 15% of the irrigated area from sugar to banana production generates a positive rate of return (4.02% ERR). The further inclusion of non-productive off-farm benefits generates an ERR of 6.15%.

The base case- including 85% sugar, 15% bananas, inter-cropped beans, livestock benefits, health benefits, cogeneration benefits as well as a non-farm multiplier of 2 gives an ERR of 6.15%. A sensitivity analysis shows that the key variables for ERR are world price of sugar and the exchange rate SZL to US$. An increase in capital cost has a relatively modest impact on the ERR.

11.2 FINANCIAL VIABILITY:

As per the report, the financial returns from the farm model of 2.5 ha, which will be the approximate farm size of a family shareholding in the scheme, using the evaluation of individual crops, provide a financial internal rate of return of 29.3% and an NPV at 10% of SZL 154,088. With the annual cost of loan capital at an interest rate of 15%, it makes the farm financially viable at any level of loan financing.

The impact on income and poverty alleviation is also demonstrated by the household income model. The model assumes that the household can provide around 330 man-days of agriculture labour per year. The average annual household income over the full 45 years of farming activity is estimated SZL 30,915 which is 759% above the without project household income of SZL 3,600 per year. The project will thus have a major impact on alleviating income based poverty in the area.

11.3 CONCLUSION:

The total cost of phase I of LUSIP is 134m Euro and the phase II is estimated to cost 364m SZL (46.7 m Euro) totaling 180.7 m Euro for phase I & II to benefit a population of approximately 16,000 giving a per capita investment of 11294 Euro which is very high. The project cost is high because of the topography and geology of the country.
But to irrigate the Lower Usuthu Basin farms, perhaps, LUSIP is the only answer as there is no ground water available for irrigation and all the dry river flow of the Lower Usuthu river is already fully allocated. The project is therefore essential for the development, commercialization & intensification of irrigated agriculture and poverty alleviation of the Lower Usuthu Basin.

Although the calculated ERR of 6.15% may be considered rather low but that cannot be the sole criteria for an investment decision. The profitable financial returns at the farm level have a major impact on poverty alleviation of the households. The LUSIP also will deliver benefits of job creation where it will provide 750,000 person-days of on-farm employment and 36,000 person-days of non-farm employment annually by 2010. In addition to the direct benefits of the farm income and the employment, the project is likely to induce significant multiplier effects. As more small farmers commercialize, there is likely to be a spin off in demand for growth and development of micro businesses such as small farming implements, mechanical repairs, small transport, trading services, local consumer goods, expansion of businesses etc which will further stimulate the labour demand and further generation of employment.

As experienced in other areas, Swazi household farmers are likely to grow a range of food crops such as maize grain, vegetables, cassava, sorghum and other crops for themselves and sales during dry season which will form an important contribution to household nutritional diet and possible additional income. This will support national health and reduction in diseases and malnutrition. In addition the farmers are likely to raise fish, the high protein diet, in the Lubovane reservoir as well as in their local balancing reservoirs to meet family needs and for possible additional income. Possibility of dairy development and livestock expansion is also envisaged with the availability of water. The LUSIP project, by definition, is a rural development social project and its completion is going to generate long-term benefits to the farmers of the Lower Usuthu Basin and to the national economy.
12.0 EFFECTIVENESS:

PLANNED BENEFITS DELIVERED:

The planned benefits of LUSIP, as conceived, is to reduce poverty and improve the standard of living of the population in the Lower Usuthu Basin which area is the poorest in the country with an average per capita income of Euro 130/year compared to the country’s average of Euro 317/year. This is planned to be achieved by commercialization of irrigated agriculture in 11,500 ha of the Lower Usuthu Basin covered under phase I & II of LUSIP. These benefits will be achieved only on completion of the project when the farmers start getting the irrigation water in their farms.

The LUSIP also will deliver benefits of job creation where it will provide 750,000 person-days of on-farm employment and 36,000 person-days of non-farm employment annually by 2010. However, with the Contractors on site on the commencement of construction work of Diversion Weir, Dams & the Feeder Canal, local jobs are being created and this job creation will further expand as the work progresses and another contractor constructing the Main South Canal arrives at site to commence work.

The additional planned benefits for these communities is the clean potable drinking water and health facilities which will be provided to them and for which the work is in progress and the real benefits will be achieved on completion of the project.

PERFORMANCE OF TECHNICAL ASSISTANCE & SHORT-TERM CONSULTANTS:

The technical assistance provided under EDF financing is the independent contracting of the Project Manager, ULG Consortium’s Contract of the supporting staff in the PMU and the services of the Final Design & Engineering Supervision Consultant. (Coyne et Bellier).

The Project Manager is a highly experienced irrigation engineer and as head of the PMU, has managed the activities well. The establishment of management infrastructure, awarding of contracts for the Diversion weir, Dams, Feeder Canal, commencement of construction works at all these sites, coordination with the govt. and seven financing partners, coordination with all stakeholders, upstream and downstream activities, project activities reporting and the overall management of the project have been successfully achieved so far and is continuing appropriately. The Engineering Manager and the support staff in the PMU has done equally well. The Final Design & Engineering Supervision Consultant (Coyne et Belllier) has completed final designs of the works in progress and is in the process of preparing other designs. The completion of final designs of the Balancing Reservoirs will be carried out only after ADEMU completes formulation of the Water User Associations. The performance of the FD&ES Consultant has been satisfactory. Overall, the Technical Assistance has performed creditably.
The role of some of the short-term consultants provided under the Technical Assistance Contract is rather confusing, duplicating and overlapping. For example the short-term Consultant Dam Engineer’s job description is described as:

“The Specialist Dams Engineer will provide the Management Engineer, through the Project Manager, expert advice and recommendations on investigations and designs for dams and their construction. The Dams Engineer visit Swaziland and the project site at critical junctures in the programme for study and design of the proposed irrigation system, particularly during conceptualization and operational studies; review the need for and cost-effectiveness of the proposed lining of canals; review the estimates of irrigation water requirements; and review the design proposals for operational control systems with particular reference to ease of operation and maintenance at all levels.”

It is not clear as to who is referred to as the Management Engineer. The job description above mainly relates to irrigation system and canals. The above role is the responsibility of the Final Design & Engineering Supervision Consultant and there should be no need to appoint another Consultant/Specialist for expert advice.

Likewise, the responsibilities of the hydrologist are defined as to advise the Management Engineer. The defined role is the responsibility of the Final Design & Engineering Supervision Consultant and there should be no need for this consultancy.
13.0 IMPACT OF THE PROJECT:

By 2011 LUSIP is expected to provide:

* At least 5 times increase in the existing income of at least 2000 farming households as well as improved access to water, health and credit.
* A reduction in the prevalence of chronic malnutrition among children under five.
* 6,500 ha of intensive irrigated agriculture.
* 750,000 person days/year of on-farm employment created and 36,000 person days/year of non-farm employment created.
* Water User Associations paying 100% of on-farm operating and maintenance costs.
* Environmental mitigation measures implemented to the satisfaction of the Swaziland Environment Authority.

It is rather early to assess the full impact of the project at this stage. But the project has certainly generated a hope of a better tomorrow among the effected communities. The farmers are enthusiastic about the project and the commencement of work at various sites by the Contractors has generated an assured feeling among the effected communities that their lives are going to improve.

The negative impact of the project is that the Lubovane Reservoir is going to inundate approximately 385 ha of agricultural fields mainly used for small-scale subsistence farming and 1704 ha of grazing land. The canal network will occupy approximately 30 ha of agricultural fields and 263 ha of grazing lands. The loss of grazing land may adversely affect livestock in the area. In addition, other negative impacts are the relocation and resettlement of effected people and resulting negative social impacts.
**14.0 SUSTAINABILITY OF THE PROJECT:**

**14.1 INTEREST & SUPPORT:**

LUSIP has been planned to reduce poverty and to improve the standard of living of the population of the Lower Usuthu Basin which area is the poorest in the country. The major constraint for the development of the area is the crucial lack of water because there is no underground water and the dry river flow of the Lower Usuthu River has been fully allocated to the existing farmers. The project will provide irrigation water throughout the year to irrigate 11,500 ha in the Lower Usuthu Basin and thus assist the smallholder farmers in the area to improve their economy and standard of living. The farmers in the area are enthusiastic about the project and are happy at the commencement of work in the field. There is a full political and ministerial support and the project enjoys full interest and support of the stakeholders. The GOS is fully committed to the project.

**14.2 GOVERNMENT FUNDING:**

The revised Financing Plan of the Lower Usuthu Smallholder Irrigation Project prepared by the PMU in May 2006 as at Annexure, estimate the total cost of the project as 1167.49 million SZL (145.94 m Euro) out of which GOS will finance 499 million SZL (43%). These funds will be required to be budgeted in the GOS Budget of 2007/08, 2008/09, 2009/10. Part payments from the GOS financing may be called for in the financial year 2006/07 depending upon the progress of construction of the Head works, Feeder Canal, Mhlathuzane, Golome & Saddle Dams, Main South Canal as well as payments required for resettlement. The Comparative Budget Summary of the estimates of 2006/07, 2007/08, 2008/09 as at Annexure reflect reducing revenue, increasing deficit and increasing gross local financing compared to 2006/07. Although the demand of the project financing will create pressure on the Budget of the following years, yet the GOS is fully committed to the project and the GOS share of financing will be forthcoming. The importance of timely payment to the Contractors need not be over emphasized as the delay, generally, has serious repercussions on the construction schedule and the overall cost of the project.

**14.3 INSTITUTIONAL FRAMEWORK FOR O&M:**

An urgent decision is required to be made about which institution is going to undertake the responsibility of the operation and maintenance of the Lower Usuthu Smallholder Irrigation Scheme so that preparations in that direction may commence. This O&M framework decision may have influence on other similar future river developments and thus needs to be carefully studied.

The water management institutions are defined in the Water Act 2002. Under the Water Act 2002, the Minister shall within five years establish five River Basin Authorities to implement a management plan under the Water Resources Master Plan dealing with a specific geographical basin area. The powers, duties and functions of the River Basin Authorities shall include, along with others, to levy and collect rates and also to have
control over Irrigation Districts, Project Boards and User Associations. SWADE (Swaziland Water & Agriculture Development Enterprise) is an institution formed by an act of Parliament and is currently responsible for the implementation of the LUSIP through the PMU. SWADE does not appear to have a reference in the Water Act 2002.

The Mission recommends that an experienced O&M consultant be engaged urgently to study and recommend an institutional framework for the operation and maintenance of the scheme. The TOR of the consultant should include development of an institutional and legal framework, organizational structure, manpower required with their credentials, job descriptions and emolument packages, O&M budget estimates, tools, plant & spares requirement for efficient maintenance, development of maintenance procedures etc.

14.4 OPERATION & MAINTENANCE COST:

LUSIP is structurally a complex project with Diversion Weir, Intake structure, Sand trap, 21 km long Feeder Canal with three district road bridges, a number of farm road bridges and several pedestrian crossing bridges, community water points and numerous cross drainage structures, discharge and canal reject structure and three irrigation off-takes. 48m high RCC Mhlathuzane Dam, 48m high rock fill Golome Dam, 900m long Saddle Dam, 400m long Spillway, River Diversion Works, 21.9 km long MSC with two district road bridges, seven farm road bridges, fourteen pedestrian bridges, community water service points, numerous cross drainage structures, seven irrigation off-takes, 14 km long St. Philips Canal with several bridges, cross drainage structures etc and the Balancing Reservoirs. All these structures have to be maintained well to keep them in proper functional order.

Also the cost of water to the existing farmers who are pumping directly from the Lower Usuthu River in dry flow conditions under their water right and the cost of water to the LUSIP farmers should be equated. Charging the same rate from the LUSIP farmers, bulk of the LUSIP maintenance cost may have to be borne by the GOS Budget.

14.5 UBOMBO SUGAR MILL:

Sugar is going to be the prime crop of interest with the farmers because it is deemed profitable and has assured marketing with the nearby ubombo sugar mill at Big Bend. The preference of sugar crop with the farmers is also because the sugar mill provide support services to the farmers such as assistance with applications for sugar quotas from the Swaziland Sugar Association, assistance with water permits from the Water Apportionment Board, provision of financial guarantees for bank loans required to finance irrigation development and crop establishment, technical support services etc. Under LUSIP, 11500 ha which are going to be developed for agriculture will primarily be under sugar cultivation. The Ubombo Sugar Mill at Big Bend is operating at nearly full capacity and cannot absorb this increased agricultural expansion unless the sugar mill management expands their mill capacity. It is understood that the Ubombo Mill management is interested to expand their mill capacity and also they will prefer to have a
close linkage with the producer farmers. It is important to develop a dialogue with the mill management so that their expansion plan matches the cane crop harvesting.

14.6 TRANSPORTATION NETWORK:

Apart from the economic price of sugar, transportation of cane to the sugar mill has an important bearing on the profitability. A distance of 20-25 kms from the mill may be a stretched distance to transport cane but more than that erodes proportionate profitability. The condition of roads also adds to the problem. The interiors of the project area such as the areas surrounding Mphofu Dam, Mamba, Madubeni are approximately 40-45 kms from the mill and may be a drain on the profitability of the farmers unless the GOS develop a direct all weather road network to the mill to facilitate economic cane transportation.
15.0 RECOMMENDATIONS:

15.1 PROJECT TO COMPLETE:

LUSIP has been planned to provide water to the Lower Usuthu Basin smallholder irrigation farmers in order to reduce their poverty and improve their standard of living. Although LUSIP’S per capita investment cost of Euro 11,294 is relatively high (Phase I & II cost of 180.7 m Euro for 16,000 people) but perhaps that appears to be the only option to bring water to those communities. There is no groundwater and there is no surface water in the river available for these communities as all the dry river flow has already been fully allocated to existing farmers. The only option is to store the flood flow and utilize the same for irrigation of the 11,500ha.

Also Swaziland needs to exploit fully its river water share available from the tripartite river basin water sharing between South Africa and Mozambique to support its claims. An Interim Agreement for water sharing of Lower Usuthu River has already been signed by the GOS with SA & Mozambique which will be ratified in 2010. Swaziland will strengthen its claim on its share with the completion of this project failing which Swazi’s share may be difficult to justify. The project enjoys all round support and high aspirations among the communities. LUSIP is a social rural development project and has major social dimensions.

Phase II, Matata Block is close to the Ubombo sugar mill and will be the ideal location for sugar cultivation. This area needs to be rapidly developed for irrigation. The design of Diversion Weir, Dams, Lubovane Reservoir, Feeder Canal, and Main South Canal has already been sized to meet the requirement of phase II. EIB has already earmarked 16 m Euro for phase II.

The Mission recommends that the project should proceed to its logical completion with the completion of phase I & phase II. Phase II should be completed as early as possible and preferably its construction should commence along side of the construction of the Main South Canal.

15.2 PROJECT MANGEMENT UNIT:

Having analyzed the need, duties and responsibilities of the functionaries of the Project Management Unit, the Mission is of the view that the structure, composition and location of the PMU are appropriate. The staff manning the PMU is well qualified, highly experienced and has been doing a good job.

As per the latest construction schedule, the phase I of the LUSIP is likely to be completed by November 2009. A scheme of this magnitude should run for at least a year, to cover at least one flood year, to sort out any teething troubles and to undertake remedial measures of any construction operational defects. In addition, in a construction project of this magnitude and complexities the slippage in the construction schedule is not uncommon.
Pending decision of the construction of Phase II, the PMU is anticipated to be in existence up to March 2011.

15.3 RENOVATION OF THE ONGOING TECHNICAL ASSISTANCE CONTRACTS FUNDED BY EDF

As per Agreement No. 6581/SW between the European Commission and the Kingdom of Swaziland, the 7th & 8th EDF fund of 11.45m Euro finance the following technical assistance Contracts. (The implementation of the Agreement is to be completed by 30th December 2011)

- Individual Contract of the Project Manager, LUSIP.
- Contract of ULG Consortium- Provision of Technical Assistance to the PMU --Services of the Engineering Manager & support staff.
- Final Design & Engineering Supervision Consultant.

The Mission is satisfied with the performance of the PMU and recommends that the Contract of the Project Manager which expires on 31.3.2007 be extended up to 1.4.2011.

The Engineering Manager is to supervise the construction of engineering works which will continue till November 2009. Additional six months may be required to cover any slippage in schedule of completion of works and settlement of final claims of the Contractors. The Mission, therefore, recommends that the Contract of the Engineering Manager which expires on 28.2.2009 be extended up to 1.7.2010.

The Mission recommends that the Contract of the Final Design & Engineering Supervision Consultant (Coyne et Bellier) be financed till completion. The Mission further recommends that the additional design work of secondary and tertiary distribution of phase II and the construction supervision of phase II may be negotiated with the FD & ES Consultant (Coyne & Bellier) appropriately in preparation to the execution of phase II.

15.4 DESIGN OF THE PROJECT:

The final designs of the project have been prepared by the Final Design & Engineering Supervision Consultant (Coyne & Bellier). There has been some short-term consultancy input and the input of the Dam Review Panel. Having reviewed the project design, studying several reports and documents, visiting the project sites, discussions with the FD&ES Consultant and the PMU, reviewing the comments and proposals of the Dam Consultant, Independent Dam Review Panel and responses of the FD &ES Consultant, the Mission after having carefully studied all pros and cons is satisfied and supports the design concepts and views of the FD & ES Consultant. The Mission is of the view that the design of the project is well prepared and is appropriate to the Project needs.

The Mission further recommends that the detailed design of the secondary and tertiary distribution of phase II should also be completed in preparation to the execution of this
work. This additional design work and the construction supervision of phase II may be negotiated with the Design & Supervision Consultant (Coyne & Bellier) who has undertaken the design as well as the construction supervision of phase I and is already at site.

It is noted that the reservoir area is not going to be cleared of trees and vegetation. Although there may not be many commercial trees but still the reservoir is full of trees which is cheap fuel and which will go waste by being submerged. Also the dead vegetation may pollute the water quality. The dead uprooted trees will be floating on the reservoir surface creating an environmental hazard, obstruction and possible threat to structures. It is recommended that the reservoir area should be cleared as far as possible before it starts filling.

15.5 INSTITUTIONAL FRAMEWORK FOR O&M:

The institution which will undertake the O&M of the LUSIP needs to be identified and prepared for the task ahead. The Mission recommends that an experienced O&M Consultant be engaged urgently to study and recommend an institutional framework for the operation and maintenance of the scheme. The TOR of the Consultant should include development of an institutional and legal framework, organizational structure, manpower required with their credentials, job descriptions and emolument packages, O&M budget estimates, tools, plant & spares requirement for efficient maintenance, development of maintenance procedures etc.

15.6 OPERATION & MAINTENANCE COST OF THE SCHEME:

The Mission recommends that the cost of water to the existing farmers who are pumping directly from the Lower Usuthu River in dry flow condition under their water rights and the cost of water to the LUSIP farmers should be equated. While charging the same rate from the LUSIP farmers, bulk of the LUSIP’s operation & maintenance cost may have to be borne by the GOS Budget.

15.7 LAND:

The Government of Swaziland’s policy of development of water resources is strictly based on the principle of cost recovery and the farmers are required to operate on a business like operation. As it is, the farmer needs to be encouraged to operate his farming venture like a business. The farmer should be able to plan, develop and invest in his farm, organize finance, seek loans and be able to present a collateral if required. The farmers are required to invest in their farms and develop them to standard agricultural production level. Also they will be required to invest in the in-farm equipment needed to irrigate the farm as well as to bear all in-farm operation and maintenance expense. Most of the smallholder farmers are on SNL (Swazi Nation Land). The lack of individual property rights on SNL is incompatible with objectives of intensification and commercialization of irrigated agriculture because the absence of such rights is a disincentive to investment. It becomes important that the farmer should have title of the land to equip him worthy of
collateral. Alternatively, the farmer must have some assurance of a long-term lease of the land and protection of his investment into the farm to bring it up to the standard of agricultural development. Such long-term assurance should also assist him equivalent of a collateral to organize financing for his development needs.

15.8 UBOMBO SUGAR MILL- BIG BEND

Because of incentives from the Sugar Mill and guaranteed marketing, sugar is going to be the prime crop with the farmers. The Ubombo Sugar Mill is running almost at full capacity and will not be able to absorb additional 11,500 ha of sugar cane farming of LUSIP unless the Mill management expand the milling capacity and expand it rapidly.

The Mission recommends that a small high power coordination committee under the chairmanship of the National Accounting Officer (Permanent Secretary, Ministry of Economic Planning & Development) with members from the Ubombo Sugar Mill management, PMU, Ministry of Agriculture and other stakeholders be formed to facilitate expansion of the Sugar Mill and to ensure that the expanded mill capacity is available for the first cane harvest.

15.9 TRANSPORTATION NETWORK:

Transportation of cane to the sugar mill is an additional cost to the farmer which has a critical bearing on his profitability. The interiors of the project area are quite far from the mill and a direct shorter all weather road network will be required for economic transportation of cane.

The Mission recommends that a Road Planning Consultant be engaged who should study the economic cane transportation to the mill in consultation with the Sugar Mill management and develop an all weather road network in the project area of phase I & phase II for economic cane transportation and social rural development.

15.10 DELAYS IN PAYMENT:

It has been noted with embarrassment that some contractor’s payment has been delayed by the EU and some unpaid invoices even date back to the 4th quarter of 2004. It is very sad and embarrassing state of affairs. The EU cannot expect others to respect dead lines when itself it is miserably failing to adhere to its own defined dead lines. The EU must exhibit itself as a role model employer and protect its image of an efficient administration. The matter needs to be taken up at a higher level and the situation needs to be rectified forthwith. Productive procedure needs to be developed for a smooth and efficient payment system respecting payment dead lines.

Further it has been noted that the contractor has charged interest on the EC delayed payment and that interest has been recognized as additional cost to the project paid by GOS as per their commitment to bear additional cost. The Mission does not support the concept of interest charges as additional cost of the project but considers it rather a
‘penalty charge’ for the delay which should be payable by the defaulting party and not by the GOS.

15.11 AGRICULTURAL DIVERSIFICATION & DEVELOPMENT:

While sugar is likely to be the prime crop of interest among the smallholder farmers, a beginning need to be made for diversification to other possible cash crops and diversification of productivity within the agriculture sector. The crops such as cassava, sorghum, pulses, mushroom, banana and the development of livestock, dairying, piggery and poultry may be considered. The farmers may grow their own food crop & vegetables for the family’s nutrition. The Ministry of Agriculture may carry out research and identify suitable alternate crops which could possibly be appropriately grown in the project areas at least partially to commence with. The Ministry of Agriculture’s Extension Services may carry the laboratory research to the farmer in the field and educate the farmers to the benefits of diversification of crops.

The development of agriculture in the country is the constitutional role of the Ministry of Agriculture who has the expertise and know how. Any other institution undertaking this role will be duplicating the efforts and a drain on the financial and human resources. Even if a special separate institution is warranted to be established, it should be under the authority of the Ministry of Agriculture. The agricultural development under the LUSIP is the constitutional role of the Ministry of Agriculture and should be undertaken by it.

15.12 SIPHOFANENI DEVELOPMENT:

Haphazard growth is likely to develop in Siphofaneni. Already signs of such haphazard developments have started to appear. Siphofaneni, being situated on the inter-regional highway to Durban, deserve to be a nicely developed township. The Mission recommends that the Town Planning Department take charge of planning the growth and development of Siphofaneni.

15.13 FINANCIAL POOL:

The Main South Canal (MSC) construction Contract value is of the order of SZL 230 million. EIB is likely to fund about 30%. The remaining 70% is the funding share of the GOS. The MSC is an important distribution component of the project system and needs to be assured a constant cash flow so that there is no hold up of work at any stage otherwise apart from the consequences of delay; the Contractor is likely to claim damages for the hold up period. The project is being financed by seven other donors and the payment of Contractor’s bill can be problematic. Regular and constant cash flow is very essential to have an efficient construction progress.

The Mission recommends that considerations be given to establish a financial pool with the PMU, under the financial authority of the Permanent Secretary, Ministry of Natural Resources and Energy, from which payment to the contractors may be made. The donors may contribute their financing share to the pool.
15.14 **SWAZI HUMAN RESOURCE DEVELOPMENT:**

Investment in human resource development is long-term wealth creation and is an ideal national investment. LUSIP is a good educational school for Swazi nationals to get experience and training in project management, dams, canals and engineering construction. The Mission recommends that Swazi nationals be recruited to understudy the Project Manager, Engineering Manager & FD & ES Consultant. Donor financing for this training may be possible.

15.15 **ELECTRIC CONNECTION TO BALANCING RESERVOIRS:**

The scope of the project ends at the balancing reservoirs and the farmers have to bear the in-farm cost of development. The farmers will need electricity at the balancing reservoir to pump water to their sprinklers. The power connection may have to be brought from the nearest transmission mains and extra cost of transmission lines and transformer etc may be required by the power utility. This cost may be beyond the farmer's means.

The Mission recommends that the cost of power up to the Balancing Reservoirs may be absorbed by the project.

15.16 **DOWNSTREAM WORK:**

The downstream works of mobilizing farmers and development of Water User Associations is rather delayed for more than a year and a half. With the result, the FD&ES Consultant is unable to complete the engineering planning and design of distribution works and balancing reservoirs.

The Mission recommends that an extra push is required to complete this work as early as possible so as to bring it as close to the schedule as possible.

15.17 **WATER USER ASSOCIATIONS:**

A concern is viewed on the legal aspect and legal strength of the Water User Associations. The Water User Associations have no strong legal cohesion. But instead, cooperatives have stronger legal bond and is preferable as an entity. It is the choice of the farmers themselves to choose the legal entity they wish to adopt. The Mission recommends that consideration be given to the formation of cooperatives and farmers be guided accordingly.
### 16.0 ANNEXURES:

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Dlamini Foster & Associates
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18.0 ACRONYMS & ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ADB</td>
<td>African Development Bank</td>
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<tr>
<td>ADEMU</td>
<td>Agriculture Development &amp; Environmental Management Unit</td>
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<tr>
<td>BADEA</td>
<td>Arab Bank for Economic Development in Africa</td>
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<tr>
<td>CB</td>
<td>Coyne et Bellier</td>
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<tr>
<td>DBSA</td>
<td>Development Bank of South Africa</td>
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<tr>
<td>DFID</td>
<td>Department of International Development (UK)</td>
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<tr>
<td>DBSA</td>
<td>Development Bank of South Africa</td>
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<tr>
<td>D/S</td>
<td>Downstream</td>
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<tr>
<td>DRR</td>
<td>Design Review Report</td>
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<td>EDF</td>
<td>European Development Fund</td>
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<td>EIB</td>
<td>European Investment Bank</td>
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<tr>
<td>ERR</td>
<td>Economic Rate of Return</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>FD&amp;ES</td>
<td>Final Design &amp; Engineering Supervision</td>
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<tr>
<td>FRR</td>
<td>Financial Rate of Return</td>
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<td>GOS</td>
<td>Government of Swaziland</td>
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<td>ha</td>
<td>Hectare</td>
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<tr>
<td>ICDF</td>
<td>International Cooperation &amp; Development Fund</td>
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<tr>
<td>IFAD</td>
<td>International Fund for Agricultural Development</td>
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<tr>
<td>LUSIP</td>
<td>Lower Usuthu Smallholder Irrigation Project</td>
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<tr>
<td>M&amp;E</td>
<td>Monitoring and Evaluation</td>
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<tr>
<td>MCS</td>
<td>Main Canal South</td>
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<tr>
<td>MOH/SHW</td>
<td>Ministry of Health and Social Welfare</td>
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<tr>
<td>MEUR</td>
<td>Million Euro</td>
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<tr>
<td>MEPD</td>
<td>Ministry of Economic Planning &amp; Development</td>
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<td>MNRE</td>
<td>Ministry of Natural Resources &amp; Energy</td>
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<td>MOAC</td>
<td>Ministry of Agriculture &amp; Cooperatives</td>
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<tr>
<td>MOF</td>
<td>Ministry of Finance</td>
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<tr>
<td>NAO</td>
<td>National Authorising Officer of EDF (Permanent Secretary MEPD)</td>
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<tr>
<td>NGO</td>
<td>Non Government Organization</td>
</tr>
<tr>
<td>NPV</td>
<td>Net Present Value</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operation &amp; Maintenance</td>
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<tr>
<td>PDA</td>
<td>Project Development Area</td>
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<tr>
<td>PMU</td>
<td>Project Management Unit</td>
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<tr>
<td>RCC</td>
<td>Roller Compacted Concrete</td>
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<td>SADC</td>
<td>Southern African Development Community</td>
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<td>SDR</td>
<td>Special Drawing Rights</td>
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<tr>
<td>SEA</td>
<td>Swaziland Environment Authority</td>
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<tr>
<td>SKPE</td>
<td>Swaziland Komati Project Enterprise (Changed to SWADE on 11.2.2005)</td>
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<tr>
<td>SNL</td>
<td>Swazi Nation Land</td>
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<td>SPC</td>
<td>St. Philips Canal</td>
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<td>SSA</td>
<td>Swaziland Sugar Association</td>
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<td>SWADE</td>
<td>Swaziland Water &amp; Agricultural Development Enterprise</td>
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<td>Acronym</td>
<td>Description</td>
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<tr>
<td>SZL</td>
<td>Swaziland Lilangeni</td>
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<tr>
<td>TDL</td>
<td>Title Deed Land</td>
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<tr>
<td>TOR</td>
<td>Terms of Reference</td>
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<tr>
<td>US$</td>
<td>United States Dollar</td>
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<td>U/S</td>
<td>Upstream</td>
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<tr>
<td>WUG</td>
<td>Water User Group</td>
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<tr>
<td>VIP</td>
<td>Ventilated Improved Pit (latrine)</td>
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<tr>
<td>ZAR</td>
<td>South African Rand</td>
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