

**AFRICAN DEVELOPMENT BANK**



**BOTSWANA**

**PANDAMATENGA AGRICULTURAL INFRASTRUCTURE DEVELOPMENT PROJECT**

**APPRAISAL REPORT**

**OPERATIONS, SECTOR VICE-PRESIDENCY  
AGRICULTURE AND AGRO-INDUSTRY DEPARTMENT  
OSAN.1**

**June 2008**

**BOTSWANA**  
**PANDAMATENGA AGRICULTURAL INFRASTRUCTURE DEVELOPMENT PROJECT**

**TABLE OF CONTENTS**

Project Information Sheet, Currency and Measures, Government Fiscal Year, Weights and Measures, Abbreviations and Acronyms, Executive Summary and Results Based Logical Framework Page i-v

1.	<b><u>ORIGIN AND HISTORY OF THE PROJECT</u></b>	1
2.	<b><u>THE AGRICULTURE SECTOR</u></b>	1
2.1	Salient Features	1
2.2	Institutional Framework	2
2.3	Development Partners' Intervention in the Sector and Lessons Learned	3
2.4	Relevant Sector Policies and Strategies	3
3.	<b><u>THE CROPS SUBSECTOR</u></b>	4
4.	<b><u>THE PROJECT</u></b>	6
4.1	Project Concept and Rationale	6
4.2	Project Area and Beneficiaries	7
4.3	Strategic Context	8
4.4	Project Objectives	8
4.5	Project Description	8
4.6	Production, Market and Prices	10
4.7	Environmental and Social Impacts	11
4.8	Project Costs	12
4.9	Sources of Financing and Expenditure Schedule	13
5.	<b><u>PROJECT IMPLEMENTATION</u></b>	13
5.1	Executing Agency	13
5.2	Institutional Arrangements	13
5.3	Supervision and Implementation Schedules	14
5.4	Procurement Arrangements	14
5.5	Disbursement Arrangements	16
5.6	Monitoring and Evaluation	16
5.7	Financial Reporting and Auditing	16
5.8	Aid Co-ordination, Harmonisation and Alignment	17
6.	<b><u>PROJECT SUSTAINABILITY AND RISKS</u></b>	17
6.1	Recurrent Costs	17
6.2	Project Sustainability	17
6.3	Critical Risks and Mitigating Measures	18
7.	<b><u>PROJECT BENEFITS</u></b>	18
7.1	Financial Analysis	18
7.2	Economic Analysis	19
7.3	Social Impact Analysis	19
7.4	Sensitivity Analysis	19
8.	<b><u>CONCLUSIONS AND RECOMMENDATIONS</u></b>	20

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## LIST OF TABLES

<u>No.</u>		<u>Page</u>
4.1	Summary of Cost Estimates by Component	12
4.2	Summary of Cost Estimates by Category of Expenditure	12
4.3	Sources of Finance	13
5.1	Expenditure Schedule by Components	14
5.2	Expenditure Schedule by Source of Finance	14
5.3	Procurement Arrangements	15
6.1	Source of Financing for Recurrent Costs	17

## LIST OF ANNEXES<sup>1</sup>

<u>No.</u>		<u>No. of Pages</u>
1.	Map of Botswana Showing Project Area	1
2.	Organogram for Project Implementation	1
3.	Project Implementation Schedule	1
4.	Review of Botswana Procurement Environment	1
5.	Provisional List of Goods and Services	1
6.	Summary of Economic Analysis	2
7.	List of Completed Operations in Botswana	1
8.	Status of Active Projects as at 31 March 2008	1

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<sup>1</sup> Additional information contained in the following Working Papers is available upon request. 1: Detailed Cost Tables; 2: Environmental and Social Impact Assessment (ESIA) Report; 3: Environmental and Social Management Plan; 4: Terms of Reference for ESIA Study; 5: Detailed Design Report and Drawings; 6. Terms of Reference for Detailed Design.

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**PROJECT INFORMATION SHEET**

Date: March, 2008

The information provided hereunder is intended to provide some guidance to prospective suppliers, contractors, consultants and all persons interested in the procurement of goods, works and services. Detailed information should be obtained from the Executing Agency.

- |     |   |   |   |
|-----|---|---|---|
| 1.  | COUNTRY                                     | : | Botswana  |
| 2.  | PROGRAM TITLE                               | : | Pandamatenga Agricultural Infrastructure Development Project  |
| 3.  | LOCATION                                    | : | Pandamatenga, 900 km north of Gaborone  |
| 4.  | THE BORROWER                                | : | The Republic of Botswana  |
| 5.  | EXECUTING AGENCY                            | : | Ministry of Agriculture, Department of Crop Production, Bag 003, Gaborone, Botswana<br>Tel: +267 3950 500; Fax: +267 3907 057                         |
| 6.  | DESCRIPTION                                 | : | The project has three components as follows: (i) Infrastructure Improvement (ii) Agricultural Production Development; and (iii) Project Coordination. |
| 7.  | <u>TOTAL COST</u>                           | : | UA 42.94 million  |
|     | Foreign Cost                                | : | UA 29.38 million  |
|     | Local Cost                                  | : | UA 13.56 million  |
| 8.  | <u>BANK GROUP LOAN</u><br>ADB LOAN          | : | UA 37.27 million  |
| 9.  | <u>OTHER SOURCES</u>                        |   |   |
|     | Government                                  | : | UA 5.56 million   |
|     | Beneficiaries                               | : | UA 0.11 million   |
| 10. | <u>ESTIMATED STARTING DATE AND DURATION</u> | : | 1 January 2009, for 4 years   |
| 11. | <u>PROCUREMENT</u>                          | : | Procurement of goods and works financed by ADB will be carried out using relevant   |

Bank Group Rules of Procedure as well as Government procedures where indicated

12. CONSULTANCY SERVICES REQUIRED AND STAGE OF SELECTION : Consultancy services financed by ADB will be through Shortlist.
13. ENVIRONMENTAL CATEGORY : 1. Requires Environmental and Social Impact Assessment

CURRENCY AND MEASURES (MARCH 2008)

Currency unit	:	Botswana Pula (BWP)
UA 1	:	BWP 10.4041
UA 1	:	USD 1.61055
USD 1	:	BWP 6.45097

GOVERNMENT FISCAL YEAR

1 April – 31 March

WEIGHTS AND MEASURES

1 Kilogram	=	2.2 pounds (lb)
1 Metric tonne	=	1000 kg
1 Hectare (ha)	=	2.471 acres
1 Square Kilometre	=	100 ha

## ABBREVIATIONS AND ACRONYMS

AD	Agricultural Demonstrator
ADB	African Development Bank
AIDS	Acquired Immuno-Deficiency Syndrome
AWPB	Annual Work Plan and Budget
BAMB	Botswana Agricultural Marketing Board
BDF	Botswana Defence Force
BIDPA	Botswana Institute for Development Policy Analysis
BITS	Botswana Information Technology Society
CTB	Central Tender Board
DATC	District Administrative Tender Committees
DC	District Council
DDC	District Development Committee
DEA	Department of Environmental Affairs
EIRR	Economic Internal Rate of Return
EU	European Union
FAO	Food and Agriculture Organisation
FAP	Financial Assistance Policy
GDP	Gross Domestic Product
GoB	Government of Botswana
ha	Hectare
HIV	Human Immunodeficiency Syndrome
HLCC	High Level Consultative Council
ICB	International Competitive Bidding
ICRC	Independent Complaints Review Committee
MFDP	Ministry of Finance and Development Planning
MDG	Millennium Development Goal
MLG	Ministry of Local Government
MoA	Ministry of Agriculture
mt	Metric Tonne
MTC	Ministerial Tender Committees
MWT	Ministry of Works and Transport
NAMPAADD	National Master Plan for Agricultural and Dairy Development
NCB	National Competitive Bidding
NDB	National Development Bank
NDP	National Development Plan
NGO	Non-Governmental Organisation
PAID	Pandamatenga Agriculture Infrastructure Development Project
PCT	Project Coordination Team
PSC	Project Steering Committee
PPADB	Public Procurement and Asset Disposal Board
RTC	Rural Training Centre
SACU	Southern African Customs Union
UA	Unit of Account
UNDP	United Nations Development Program
UNCITRAL	United Nations Commission on International Trade Law
USAID	United States Agency for International Development
VDC	Village Development Committee

## EXECUTIVE SUMMARY

**PROJECT BACKGROUND:** Pandamatenga area is highly suitable for arable agriculture because of a relatively high rainfall of 600mm per annum and inherently fertile soil. Since the Government allocated about 25,000 ha to farmers in 1984, frequent flooding of the farms and lack of an all-weather road network has constrained productivity. A 1998 technical report highlighted water drainage works and internal access roads as long-term remedies, and a detailed design report was subsequently produced in 2003. The Bank Group received a request from the Government of Botswana (GoB) in May 2006 to consider the financing of the project after which various missions were fielded to Botswana with the objectives of collecting additional information, and consulting with stakeholders. The project supports Government's sectoral development priorities as contained in its Long-Term Vision for Botswana (Vision 2016); will contribute to the achievement of the Millennium Development Goals related to eradication of extreme poverty and hunger (MDG 1) and ensuring environmental sustainability (MDG 7); fulfils the four specific thrusts for improving Africa's agriculture as outlined in the Comprehensive African Agricultural Development Programme (CAADP) as related to 1) sustainable land management and reliable water control system; 2) improved rural infrastructure for market access; 3) increased food supply; and 4) improved agriculture research.); fits well into FAO's Integrated Water Resources Management's approach of managing water resources; and is consistent with Bank Group's assistance strategy for Botswana during the period 2004-2008. The African Water Facility grant enabled the Ministry of Agriculture to carry out the preparatory water control and management system that has triggered the present investment.

**PROJECT DESCRIPTION:** The specific objective of the project is to develop appropriate water control/drainage system and access road network in Pandamatenga. The project comprises three components: 1) Infrastructure Development; 2) Agricultural Production Improvement; and 3) Project Coordination. The project will support the construction of drainage and road infrastructure within 27,574 ha rain-fed systems; strengthen human and logistic capacities of the MoA and farmer associations.

**PROJECT COST:** The total project cost over the four-year period, including contingencies, but excluding duties and taxes, is estimated at UA 42.94 million, of which UA 29.38 million (68.43%) is in foreign exchange and UA 13.56 million (31.57%) is local costs.

**PURPOSE OF LOAN:** ADB resources amount to UA37.27 million or 86.78% of total project cost (foreign exchange of UA 29.38 million, and local costs of UA 13.56 million) and will be used to finance most of the costs associated with the civil works, all goods and services as well as certain operating costs.

**SOURCES OF FINANCE:** GoB's contribution of UA5.56 million (12.95% of project costs) will be used for salaries of project staff, and construction of minor civil works. The farmers' contribution of UA0.11 million (0.27% of project cost) will finance operating cost and maintenance for farm machinery and associated equipment.

**PROJECT IMPLEMENTATION:** The MoA will be the Executing Agency through the Department of Crop Production. The project will be implemented within the existing framework established by the Government for Pandamatenga farms.

**CONCLUSIONS AND RECOMMENDATIONS:** The development of water drainage and access road infrastructure, as well as providing technical support would lead to increased production, minimize crop losses and increase incomes of farmers. The project is technically feasible, economically viable and socially desirable. It is recommended that an ADB loan not exceeding UA37.27 million be granted to the Government of Botswana for the purpose of implementing the above described project.

**BOTSWANA**  
**PANDAMATENGA AGRICULTURAL INFRASTRUCTURE DEVELOPMENT PROJECT**  
**RESULTS BASED LOGICAL FRAMEWORK**

HIERARCHY OF OBJECTIVES	EXPECTED RESULTS AND THEME	REACH (TARGET POPULATION)	PERFORMANCE INDICATORS	INDICATIVE TARGETS TIMEFRAME/ Existence of		ASSUMPTIONS AND RISKS
				Baseline	Target	
<b>Goal:</b> Reduce poverty in rural population	<b>Impacts</b> Reduced poverty in rural areas	Countrywide population	Poverty index	23 % (2007) to be validated by PCT	Eradicated by 2016	Continued political leadership in supporting NAMPAAADD's activities
<b>Project Purposes:</b> 1. Develop water control and drainage infrastructure 2. Improve road network	<b>Project Outcomes</b> 1. Increased crop area 2. Increased crop productivity 3. increased crop production	Includes 266 farmer households as direct effect of the project.  The indirect effect of the project will be estimated by Project coordination team (PCT) in PY1	1. area of selected arable crops 2. Crop productivity of selected arable crops	1. 25,074 ha in 2006 2.1 Crop yield (small scale farmers) <u>Sorghum</u> 0.5 mt/ha 2.2 Crop yield (large scale farmers ) <u>Sorghum</u> 2.5 mt/ha <u>Sunflower</u> 1.2 mt per ha	27,574 ha (PY4)  <u>Sorghum</u> 2.5 mt/ha by PY4  <u>Sorghum</u> 3.5 mt/ha by PY4 <u>Sunflower</u> 1.8 mt/ha by PY4	GOB maintains political stability, and ensures constant adherence to policy.
<b>Activities</b> <b>A. Infrastructure Development</b> 1. Construct Drainage system 2. Build farm Access Roads  <b>B. Agricultural Production Improvement</b> 1. Mobilized farming community and built capacity 2. Built capacity for Depts. of Research and Extension  <b>C. Project Coordination</b> Strengthened project implementation capacity of MOA, MWT and Pandamatenga District Agric Office	<b>Project Outputs</b> Better soil moisture management and road access for agricultural production  1. Maximized ecosystem protection 2. Information generation and dissemination requirements met  Enhanced capacity for project coordination, infrastructure management and maintenance enhanced in Central and District institutions	266 farmer households in project area including 33 female headed households  266 farmer households in project area including 33 female headed households  42 staff (including 17 women) of the decentralised system	1. Better water control 2. % reduction in crop losses due to stagnant water  1. % participation in training programme 2. % participation in training programme  1. % participation in training programme	1. Nil km of drainage network. 2. 50% crop loss  1. Nil km of drainage network. 2. 50% crop loss	1. 340 km of drainage net by PY3. 2. 95% reduction in crop losses by PY4  1. 90% participation in training ( PY3) 2. At least two farmer associations mobilised ( PY2) 3. At least 90% trained (PY2) At least 90% of the reach sensitized on project activities (PY3)	Beneficiaries are able to maintain structures  Possibility of non-functional monitoring system for pesticide use
<b>Input Resources:</b> (UA million) ADB Loan 37.27 GOB 5.56 <u>Beneficiaries</u> 0.11 <u>Total</u> 42.94						



## **1. ORIGIN AND HISTORY OF THE PROJECT**

1.1 In 1984, the Government of Botswana (GoB) allocated an area of 25,074 ha in Pandamatenga area (see Annex 1) to farmer associations, with the intention of boosting cereal production. The area has fertile black cotton soils (clayey vertisols) and an average rainfall of 600mm per annum, making it one of the most suitable areas for rain fed crop production in Botswana. In 1986, the area started experiencing increased rainfall intensity which resulted in frequent flooding of the fields and rendered in-field roads inaccessible during the cropping season. The flooding arose because of the high water retention capacity of the soil, as well as the very flat topography of the area which did not permit adequate water percolation and runoff, respectively. The yields projections were thus never attained in the farms. Subsequently, the government commissioned a study to determine the most cost-effective method of resolving the seasonal flood water and access road problems in the Pandamatenga farms. The resulting report highlighted water drainage works and access roads as long-term remedies. In 2003 a detailed design report was produced by a consulting firm and consisted of topographic surveys, detailed designs of the required infrastructure, and cost estimates as well as the environmental impact assessments (EIAs).

1.2 In May 2006 the Bank Group received a request from GoB to consider the financing of the PAIDP. A Project Preparation Mission visited Botswana in November 2006 to review available reports and collect additional information. A Project Appraisal Mission also visited Botswana in May 2007 to validate project information. The Appraisal Mission observed that there were outstanding activities related to updating of the 2003 EIA report for 25,074 ha, as well as the EIA and detailed designs for a supplementary 2,500 ha. In another development, an African Water Facility grant amount of EUR 1.17 million (UA 1.10 million) was approved in June 2007 to enable the MoA carry out preparatory water control and management system strategies that triggered the present investment in Pandamatenga Agricultural Infrastructure Development Project (PAIDP). Upon receipt of the Environmental and Social Impact Assessment (ESIA) report in February 2008, a Validation Mission visited Botswana in March 2008 to further update the contents of the Appraisal Report.

1.3 During the various missions, the team visited the project area and consulted extensively with the farmer associations including women, officials of the GoB, and resident development partners such as FAO, UNDP and USAID. This appraisal report was reviewed by the Government technical team and their comments have been incorporated.

## **2. THE AGRICULTURE SECTOR**

### **2.1 Salient Features**

2.1.1 Botswana has a land area of 582,000 km<sup>2</sup> with about 80% covered by the Kalahari Desert in the west and central regions. Botswana's climate is characterised as semi-arid in the northeast with mean annual rainfall of 650 mm; and arid in the southwest with less than 250 mm mean annual rainfall. The rainy season occurs during the hot months of October to April and the dry season occurs during the cooler months of May to September. Botswana is not well endowed with agricultural land. Of the 29,100 km<sup>2</sup> (or 5% of total land area) reported to be suitable for arable agriculture, less than 6,000 km<sup>2</sup> is under cultivation.

2.1.2 Botswana has a population of 1.5 million, about half of whom live in rural areas and derive their subsistence from agriculture and other rural subsistence activities. At Independence in 1966, agriculture contributed about 40% to the GDP. At the present 3.1%, the contribution of Botswana's agriculture sector is only of minor significance to the macro-economic structure of

the country. Government budgetary resources deployed in the agriculture sector gradually increased from 5.9% in 1994 to 8.4% in 1996, but slightly declined to 4.6% in 2006 as government shifted resources to other sectors such as health.

2.1.3 Agriculture in Botswana is affected by adverse weather conditions; inadequate arable land; ageing farming community; inadequate market access and marketing facilities; and lack of appropriate technology and skills. Crop failure is not only a result of low annual precipitation, but rather erratic and uneven distribution of rainfall between seasons and regions. In most cases, households that rely on arable agriculture are not in a position to meet their basic household food requirements. The production of grains (mainly sorghum and maize) varies considerably as a result of frequent droughts, from 8,200 mt to 175,000 mt with a mean annual production of 46,000 mt. Currently, farmers supply about 20% of the demand for grains, 15% of the demand for vegetables, 25% of the demand for fruits, and only 3% of the demand for dairy products (fresh milk, milk powder and other products). Even though productivity has been fraught with animal diseases, persistent shortage of water and poor grazing conditions, the livestock industry continues to be the corner stone of the agriculture sector. It contributes about 80% of agriculture's share of GDP.

2.1.4 Due to the relatively low levels of local food production, Botswana is a net importer of food. It follows therefore that the current global high prices of food and fuel reflect a potential risk of higher food prices in the local market. In fact, food prices have in the past year risen by more than 18% in the country. This has direct implication for the poor and the hungry people, particularly urban net-buyers and the rural non-food producers in the country. There are thus clear opportunities for both traditional and commercial farmers to boost food production, especially the main food crops so as to meet local demand. Opportunities also exist in value-added agro-industrial activities related to horticulture; grapes and dates production; dairy products; specialized and beef-based snacks; and ostrich farming, where niche markets are available in the EU and US. These alternatives will not, however, be feasible without the resolution of the constraints posed by water scarcity. For successful handling of perishable goods, it is essential that access roads are developed to shorten produce delivery times and sustain the cool chain for exportation of perishable goods, be they flowers, fruits or dairy products.

## **2.2 Institutional Framework**

2.2.1 The Ministry of Agriculture (MoA) is divided into five departments as follows: Headquarters; Animal Health and Production; Crop Production; Agricultural Research; and Co-operative Development. The Department of Crop Production operates in the six agricultural regions, each with a Regional Agricultural Officer at its head. The agricultural regions are further divided into 27 districts and 265 Agricultural Extension Areas for administrative and planning purposes. At the Regional level, the Regional Agricultural Officer is in practical terms the implementing arm of the Department of Crop Production (DCP) and reports to its Director. The mandate of the Department of Agricultural Research (DAR) is to develop appropriate production technologies and suitable crop varieties aimed at diversifying agricultural production while conserving the natural resource base. However, the general impression among extension professionals and practitioners is that the links between extension and research are weak which could be strengthened through extensive training for extension staff and greater exposure to applied research.

2.2.2 The District Development Committees (DDCs) consist of representatives of central Government, local authority, and sometimes NGOs that are present in the District. The DDC's main functions are to coordinate the district development planning activities, guide and implement Government-funded development programs. DDCs have the role of making overall

development decisions and arrangements on behalf of rural communities in the district.

2.2.3 Botswana Agricultural Marketing Board (BAMB) was created under a special Act in 1974 to secure a stable market for scheduled produce and to ensure efficient and fair distribution thereof throughout Botswana at prices that are equitable, avoiding undue preference or advantage; and buy all scheduled produce offered for sale by producers at a guaranteed minimum price which may be in force at the time of purchase. BAMB operates 12 depots throughout the country and has storage capacity in excess of 132,000 metric tones. BAMB serves as the buyer of last resort when local producers find no other outlet for their produce at the set minimum price. Agricultural inputs available at BAMB include sorghum, maize, millet, juko beans, tapary beans, china peas, kidney beans and soya beans. A wide range of animal feeds are also available. The private sector is also actively engaged in the agro-inputs industry, and supplies seeds, fertilizers and agrochemicals.

## **2.3 Development Partners' Interventions in the Sector and Lessons Learned**

2.3.1 In view of its middle-income status, the amount of donor support to Botswana has dwindled because the traditional donors have reduced the scale of their operations. Apart from the Bank Group, the development partners active in Botswana are the EU, USAID, and UNDP. During the period 1998 to 2003, the Department for International Development (DFID) implemented a number of grant-financed operations in Botswana aimed largely at community empowerment, improvement of livelihoods, and environmental protection. UNDP is assisting Botswana with technical assistance, including capacity building for the implementation of the poverty reduction strategy. The EU is providing substantial development grant assistance in sustainable utilization of rangeland, forests and wildlife.

2.3.2 The last Bank Group funded agriculture project ended in June 1994. The Emergency Food Relief Assistance as a result of the 2002 drought to which the Bank Group contributed USD 500,000 was concluded in October 2006. A Line of Credit of 5.5 billion Yen (UA 32.61 million) was approved for the National Development Bank of Botswana in September 2004, and signalled the resumption of lending operations in Botswana. However, the LoC was not completely drawn down as the remaining 2.5 billion Yen was cancelled in 2006 as a result of an improvement in the financial position of NDB. In February 2007, the Bank Group approved a Middle Income Country Trust Fund grant of UA 0.48 million to enable the MoA conduct an Agriculture Sector Review. During the same month, another Middle Income Country Trust Fund grant of UA 0.29 million was approved by the Bank Group to upgrade research equipment and capacity of the MoA in project implementation. In another development, an African Water Facility grant amount of EUR 1.17 million (UA 1.10 million) was approved in June 2007 to enable the MoA carry out preparatory water control and management system that has triggered the present investment in PAIDP.

2.3.3 Experiences from past and on-going interventions in Botswana indicate that project implementation delays have been linked to inadequate familiarity of project staff with Bank Group procurement procedures and financial management. The implementation of projects in Botswana has also suffered inordinate delays due to capacity constraints. Capacity in the public sectors has been eroded by, among other things, HIV/AIDS.

## **2.4 Relevant Sector Policies and Strategies**

2.4.1 The National Master Plan for Arable Agriculture and Dairy Development (NAMPAADD) was launched in October 2002 to streamline arable agriculture and dairy development programs. This Plan offers great potential for agricultural reform to diversify the economy, improve

productivity in the sector and ensure sustainable use of natural resources. NAMPAADD proposes major changes in the traditional farming methods in order to reduce uncertainty associated with natural conditions in Botswana through the adoption of modern cultivation techniques, diversification of production and development of markets. The Plan is to be implemented over a 10 year period and is expected to provide economically viable business opportunities for the private sector, while Government will create the enabling environment.

**2.4.2 Decentralisation Policy:** Decentralization in Botswana involves three major processes, of devolution from central government to Local Authorities and Land Boards; de-concentration within the central government ministries; and delegation from the ministries to other agencies and parastatals. The devolved Local Authorities are rural and urban local government bodies, that is, District Councils, Town Councils, and City Councils, which derive their authority and functions from the District Councils Act (1965) and Townships Act (1955). A major boost for decentralisation for local development and capacity building was the establishment of the District Development Committees (DDCs) and Village Development Committees (VDCs) in 1970. The weaknesses of decentralised local government include lack of human capacity and problems of retention of qualified, competent and experienced staff. The local government authorities have, nevertheless, adequate financial resources allocated to them through the national budgeting process.

**2.4.3** Botswana has an approved Gender Policy and a National Gender Plan of Action. As such the Government's efforts have focussed on elimination of all negative economic and socio-cultural practices as well as inappropriate laws which will be done through eliminating all forms of inequalities and inequities against women and men. In addition the Government's efforts are also focused on enhancement of women's health, promotion of education and skills training, promotion of gender awareness in development planning, as well as economic empowerment of women and men through diversification and job creation.

### **3. THE CROPS SUBSECTOR**

#### *General Description*

**3.1** Crop production is characterised by low-input, low-management systems that are rain fed. This involves the cultivation of a mix of crops such as sorghum (main crop) grown together with millet, maize, vegetables and pulses. Yields are generally low (sorghum at 1.05 mt/ha instead of 3.5 mt/ha; and sunflower at 1.2 mt/ha instead of 2.2 mt/ha). The prevalent farming system has three components: livestock grazing, arable farming and collection of veldt products. There are linkages between the livestock and arable cropping components. Although the rural population has declined significantly in the last 30 years, about 50% of the total population still resides in rural areas. About half of this population (350,000) depends on arable farming for its income, and about 25-30% of the economically active rural population is engaged in agriculture. Botswana farmers are classified as traditional and large scale farmers. The former practice mixed cropping, broadcast seed and depend on family labour for all farm operations. Farm size varies between 6 and 15 ha. The latter hire labour inputs, use kraal manure, fertilisers and pesticides, improved seeds and mechanize their operations. Farm size is between 300 and 1,000 ha. This group represent just 2% of the farmers.

**3.2** Only a small amount (60,000 ha) of the 291,000 ha of arable land suitable for cultivation is actually utilised as a result of water scarcity. Botswana has a potential irrigable area of about 15,000 ha in the Limpopo, Okavango and Chobe river basins. By contrast the Okavango Delta alone, notwithstanding the environmental concern, has 600,000 ha with substantial potential for irrigation. Some irrigation is taking place ranging from small NGO driven community based micro projects to larger commercial farms in excess of 50 ha. The total irrigated area at present is

estimated to be less than 1,500 ha (10% of potential).

### *Agricultural Production Infrastructure*

3.3 The soils of Botswana are generally light in texture, which means that even unpaved roads are normally passable for most of the time. However, in areas of higher rainfall, the lack of all weather access roads to many rural communities and agricultural producing areas makes it difficult for farmers to have access to markets. This limits farmer enthusiasm to maximize productivity, contributes to farmer apathy with regard to technical innovations and results in the high transaction costs faced by traders when deciding to market produce elsewhere. The existing agricultural development plan calls for all-weather roads, power lines and a source of potable water for every rain fed agricultural service centre. According to the plan for rain fed agriculture, the Agricultural Districts of highest priority for development include Barolong, Bamalete-Tlokweng, Tutume, Chobe (Pandamatenga), Ngwaketse South, Tonota, Tati, Kgatleng, Machaneng and Mahalapye. There are significant losses due to droughts, flooding, pests and diseases, poor post harvest handling and lack of value addition. Most agro-processing establishments are based in neighbouring South Africa. This external linkage results in the lack of value added to local produce and losses during transportation to these processing outposts.

### *Land Tenure and Land Use*

3.4 Under customary law, every tribesman or woman is entitled to sufficient land to meet his/her needs for housing and arable farming. Every tribesperson also has access to communal grazing lands and surface water for feeding and watering their livestock. While customary law appears to be gender-neutral the reality is quite different. Valuable resources such as land and cattle are allocated to families, lineages and households through the male heads of those units. Therefore, women have no direct control over land and cattle except through their male guardians. Unmarried women desirous of acquiring land for cultivation have to get consent from the men folk in their paternal home. Although it is not traditional to allocate land directly to unmarried women, certain districts have come to accept that socioeconomic changes made the allocation of land to a woman who is maintaining herself unavoidable. The land in the project area was leased in 1984 on a 25-year renewable basis by the Chobe Land Board. No infrastructural developments have been provided by the Chobe Land Board in terms of land lord services. The rent is nominal at about BWP2.5 per ha per annum. Land tenure is therefore secure for the purpose of the project and is also accessible to women farmers.

### *Marketing*

3.5 It is generally acknowledged that producer prices offered by BAMB are lower than those prevailing in neighbouring countries; hence attempts are made by producers to market their produce in other Southern African Customs Union (SACU). However, the cost of transportation is high in areas where rail and road links are not well developed. A large percentage of farmers sell to BAMB although they receive lower prices. During the prevailing marketing season, the prices per mt set for major produce are as follows: sorghum grade 1, BWP 1,350 (UA144.7); sorghum grade 2, BWP 1,160 (UA 124.4); millet, BWP 1,246 (UA 133.6); white maize, BWP 1,100 (UA 117.9); yellow maize, BWP 1,010 (UA 108.3); sunflower, BWP 1,517 (UA 162.6); peanut, BWP 3,600 (UA 386.0); cowpeas and black-eye beans, BWP 3,500 (UA 375.3); and white haricots, BWP 2,400 (UA 257.3). Import parity pricing policy is used in determining the prices of grain crops, while that for livestock is determined by lucrative export markets.

### *Constraints and Opportunities*

3.6 The paucity of suitable water resources has already been mentioned. This means that agriculture's share of the overall resource is less than most other countries pursuing an irrigation development strategy. Despite increasing demands, the resources that can be allocated are limited. The flat topography of the country limits new opportunities for dams for surface water, while runoff river opportunities are constrained by the seasonality of stream flows. Wastewater, though available has limited application since treating it to acceptable sanitary levels necessary to irrigate crops is likely to be uneconomic. Other constraints of the sector include low-level production technology, demographic factors and limited market opportunities for farm produce.

3.7 Opportunities exist for resolving some of the constraints of the sector. There are possibilities for increasing irrigation capacity in the country for agricultural production. The Zambezi river system, with 415 mm<sup>3</sup> per annum of water (approximately 1% of the river's flow on Botswana's border) has been indicated as the basis for a study of a possible irrigation scheme along the Kazungula-Pandamatenga road. The proposed scheme can irrigate up to 40,000 ha of suitable soils that are currently either rain fed or uncultivated. Studies have also been carried out on the possibility of irrigating lands extending west of the Shakawe-Gumare road from the Okavango River's annual inflow to Botswana. The NAMPAADD focuses on diversification into areas such as horticulture, forestry, game farming and bee keeping. For all these activities, water will be the great catalyst to unleash Botswana's great agricultural, agro-industrial and industrial potential in this second phase of its economic transformation.

## **4. THE PROJECT**

### **4.1 Project Concept and Rationale**

4.1.1 The African Water Facility Grant approved in June 2007 funded the production of the technical designs for the water control and drainage systems, roads network and environmental impact assessment study that triggered the investment in this project. The AWF is also providing support for the implementation of part of the environmental and social management programme of the project. The development of water control and drainage infrastructure as well as access road system will enable the farmers increase productivity and maximize their incomes. The increased production will contribute to the development of agro-processing industries and transport related businesses and lead to further growths in income and employment opportunities, especially in the Pandamatenga area and Chobe district in general.

4.1.2 It is worth noting that the water control and access road systems are being developed as a response to increased rainfall intensity pattern that were observed in Pandamatenga since 1990. As an adaptation to potential climate changes (such as increased wind speed and resultant soil erosion), efforts will be made to have ground cover by crop residues and live cover crops in the project area as much as possible. At full development, the vegetated area will attract birds and bees, which will in turn pollinate crops and provide pollen for the apiculturists. Plant foliage will reduce impacts of rain and wind erosion, while rooting systems of the plants will provide for proper aggregation of the soil and reduce erosion. Furthermore, the biomass of the shrubs and cover crops will serve as carbon sink.

4.1.3 The outputs in this project will also benefit from the outcomes of two current Bank funded non-lending interventions. A Middle Income Country (MIC) Trust Fund grant is financing capacity building of the Ministry of Agriculture in training its technical personnel in project management; provision of scientific analytical equipment to its Research and Extension Departments to meet the advisory needs of farmers in the project; training of farmers in bee-

keeping and conservation agriculture. The proposed conservation approach to agriculture production will ensure soil fertility through better nutrient cycling. Integrated pest and production management will rationalize agro-chemical use. Another MIC Trust Fund grant is funding the first-ever agriculture sector review by the Bank Group in Botswana. It is anticipated that this project at midterm and future interventions in the sector will be guided by the information to be derived from this exercise.

**4.1.4 Design Options Considered by Technical Consultants:** Several design considerations were examined in the various feasibility reports. It was observed that the development of water conduits in the context of large conveyance systems could obstruct the passage of wildlife. Sub-surface conduits were determined as unsustainable because of the possible damage they might cause to archaeological and cultural sites. The option of field drains having a slope of less than 2% was selected and developed. These shallow ditches with flat side slopes can be crossed by animals, farm equipment and machinery. It was considered technically sound that the watercourses should be lined.

## **4.2 Project Area and Beneficiaries**

**4.2.1** Pandamatenga area is in Chobe district and covers 280,000 km<sup>2</sup>. With its average annual rainfall and inherently fertile soils, it is most suitable for rain fed crop production. Rainfall is derived from convective processes (from across Madagascar) and averages 600mm annually, evenly distributed during the cropping season. The soils are vertisols that are inherently fertile and have high water holding capacity. Due to the flat topography of Pandamatenga, periodic flooding has become common. Crops mainly cultivated in the area include sorghum, maize, sunflower, cotton, cowpeas/beans, millet and wheat. Livestock numbers are low, owing to the fact that the area is a wildlife area. Livestock is mainly for subsistence and draught purposes.

**4.2.2** The population of Pandamatenga village in 2007 was 1,369 compared to 1,197 inhabitants in 1991. This increase may be attributed to the establishment of the arable farms in 1984, which attracted both government and casual workers to the area. There are 269 farming households of which 33 are female-headed. Pandamatenga village has more females than males, with females constituting about 55% and males 45%. This implies a potentially high female labour force for the farms. In the surroundings of the village are also smaller villages, which are dependent on Pandamatenga for social and community services. These include villages such as Dibogola - Poo and the Botswana Defence Force military camp.

**4.2.3** The direct beneficiaries of the project will be 266 farming households (including 33 female-headed households) in Pandamatenga area, made up of 245 farming households classified as traditional and 21 farming households classified as large scale. While the number of direct beneficiaries appears to be low compared to the investment, the project will have a major spill over effect on the country's economy. Indeed, as indicated variously in paragraphs 1.1, 3.1 and 3.3, the north eastern corridor of Botswana where the Pandamatenga plains (about 200,000 ha) is located, is the most suited for arable cropping. The area has the highest number of arable crop farmer community in the country, which had earlier been organised into associations. Those extremely favourable conditions combined with the efficient drainage infrastructure that will be put in place by this project will lead the project to play a vital role in terms of meeting the national demand for cereal. The Pandamatenga area already contributes 80% to 90% of the cereal produced locally (which is about 10% of the cereal consumed nationwide) and there lies the strategic importance given to the project by the Government. The implementation of the project will also contribute to the national food security targets of increasing the total crop production in Botswana by 20% in the year 2016.

### **4.3 Strategic Context**

4.3.1 The project activities lend support to NAMPAADD's plan for zonal agricultural production, agro-processing and marketing, which unlike previous agricultural programmes, targets traditional and commercial farmers to enable the traditional farmers to transform to commercial farming and assist commercial farmers to upgrade their technologies and management levels. The proposed project fits into the Long-Term Vision for Botswana (Vision 2016), as it relates to prosperity and productivity. The project is also consistent with NEPAD's CAADP and will contribute to the achievement of the Millennium Development Goal related to food security. The project also aligns itself with FAO's Integrated Water Resources Management's approach of managing water resources for production. It encourages ownership, results and outcomes, and the use of national systems in delivering results. The proposed project is consistent with the Bank Group's assistance strategy for Botswana during the period 2004-2008, whose long term objective is to support the government diversification agenda aimed at poverty reduction and employment creation. The project is in line with the CSP Pillar III related to promotion of water and energy infrastructure. The project will intervene to mainly provide water control and drainage for agricultural diversification.

4.3.2 The project fulfils the four specific thrusts for improving Africa's agriculture as outlined in the Comprehensive African Agricultural Development Programme (CAADP) as related to 1) sustainable land management and reliable water control system; 2) improved rural infrastructure for market access; 3) increased food supply; and 4) improved agriculture research. It also fits well into FAO's Integrated Water Resources Management's approach of managing water resources for food and ecosystems and contributes to the achievement of the Millennium Development Goals related to eradication of extreme poverty and hunger (MDG 1) and ensuring environmental sustainability (MDG 7). The technical design and related bills of quantities for the water control, drainage infrastructure and access roads system development had benefited from series of reviews and studies that commenced in 1990. This aspect would minimise the offtake time of the project and improve efficiency of project implementation and sustainability.

### **4.4 Project Objectives**

4.4.1 The sector goal is to contribute to the attainment of increased crop diversification, agricultural output and productivity as contained in the National Master Plan for Agricultural and Dairy Development. The specific objective of the project is to develop appropriate water control/drainage system and access road network in Pandamatenga.

### **4.5 Project Description**

4.5.1 The project will facilitate water control and access road development for rain fed agricultural production within 27,574 ha of farm land in Pandamatenga area. The project will incorporate water management and ecosystem conservation concepts in crop production, train beneficiaries and provide equipment for effective production activities. The project would run for four years and will comprise three components as follows: 1) Infrastructure Development; 2) Agricultural Production Improvement; and 3) Project Coordination.

## **COMPONENT I: INFRASTRUCTURE DEVELOPMENT**

### **a. Drainage System Subcomponent**

4.5.2 The drainage system will be upgraded for 25,074 ha and a new network will be constructed in 2,500 ha. The drainage system will consist of a system of field bunds which



discharge water into drainage channels and culverts. Two types of earthen perimeter bunds will be constructed. A total of 100 km of type-A constant level perimeter bund will be provided alongside the fields. On the remaining part of the lower boundaries of each field a type-B perimeter bund will be constructed. The total length of this bund will be 210 km. The control of the outflow for the harvested runoff is by means of 600 mm diameter piped outlets through the lowest point along the perimeter bund or by lined channels within the bunds. The total length of channels will be 340 km with about 337 km lined. Bottom widths vary from 0.5 to over 6.0 m and depths from 0.3 to 1.8 m. About 70 pipe culverts of various sizes will also be provided for access onto the fields and at drain-road junctions including replacement of the nine, 1200 mm diameter culvert across the main highway.

#### **b. Road Network Subcomponent**

4.5.3 The tracks within 25,074 ha are not motorable when saturated during the rainy season. These tracks will be redeveloped into a gravel road network and new gravel roads constructed in 2,500 ha area to provide all-weather access to each field and facilitate maintenance of the electric perimeter fence. The network will be 190 km in length and 8.0 m wide (6.0 m carriageway with 2.0 m shoulders). The road cross-section will be cambered to a slope of 3.5% from the centre-line to the sides and side ditches provided for good drainage of the road surface. The cross-section will be constructed of a treated sub-grade, overlain by a 150 mm gravel sub-base and a 150 mm gravel wearing surface. The treated sub-grade will range from loosening and re-compaction of 150 mm of existing ground for the best existing ground conditions, to replacement of a 300 mm depth of existing soil with non-expansive but plastic material where the expansive soils with worst properties occur.

#### **c. Farm Buildings and Related Infrastructure**

4.5.4 The project will also construct a farm shed/workshop for housing and maintaining farm equipment, as well as an input store/office, totalling 200m<sup>2</sup> of floor space. In addition, four water boreholes will be provided at vantage points within the farm, to provide water for farm operations and domestic needs of farmers while on the farm, since these farms are far from residential areas. The construction of items under this subcomponent will be completed during the PY 2.

### **COMPONENT II: AGRICULTURAL PRODUCTION IMPROVEMENT**

#### **a. Soil Fertility Management Initiatives Subcomponent**

4.5.5 The project will support initiatives aimed at general soil fertility management. Research activities will be intensified to evaluate the effects of new technologies, assess new methodologies and make recommendations on the most advantageous methods to be employed by farmers. Capacity building for farmers will involve short training courses in relevant disciplines, including integrated pests and disease control. Study tours, field visits and Farmer Field Days will be organised to enable farmers share experiences.

#### **b. Ecosystem Management Subcomponent**

4.5.6 The project will erect solar powered electric fences totalling 24 km to reduce the interface between humans and wildlife, but necessarily to block migration routes. The new and old fences will also be maintained regularly. The project will relocate wildlife in cropped areas and implement appropriate environmental mitigation plans as spelt out in Section 4.7 and the EIA.

### c. Capacity Building Subcomponent

4.5.7 Support will be provided to the Department of Agricultural Research in Pandamatenga to evaluate effects of new technologies, assess new methodologies and make recommendations on the effective methods. Research will be carried out on the rationalisation of fertiliser application practices, through the evaluation of alternative nutrient sources such as bio-fertilisers using plant residues, which may prove to be less expensive. Research will focus on: (a) introduction of adaptable crops and cultivars to facilitate suitable rotation systems; (b) improvement of agronomic practices for greater crop yields; and (c) monitoring of water quality in drainage system. The project will purchase farm machinery (4 tractors, 2 tine cultivators, 1 trailed boom sprayer, 2 heavy duty disc harrows, 2 pneumatic planters, 1 forage harvester, 1 combine harvester and 2 trailers) to support efforts of traditional farmers and transform their rudimentary land preparation technologies to levels of economic viability through mechanization. The equipment will be supplied with three-year stock of routine spares and will be operated by the farmers' association on rental basis. The practice of renting farm machinery by farmers is common in the area and has been proven successful. The proceeds will be paid into a special farm equipment operation and maintenance account, from which the salaries of operators trained by the equipment agents and maintenance of equipment by certified agents will be paid. Incremental benefits arising from project support will be an incentive to expand production and this will enhance the capacity of farmers to pay for rented farm equipment.

### d. Apiculture Development Subcomponent

4.5.8 Development of bee keeping for honey production as a complementary income generating activity will be supported as an outcome of a related Capacity Building Program through which farmers are being trained in business entrepreneurship. Farmers will be formed into groups and sensitized on the need for improved hives; demonstration of improved honey and wax production; external study tours will be organized for beekeepers; and honey processing equipment will be procured to support the farmer groups. Cost of this subcomponent is expected to start on the second year and would cost 0.08 million UA over the remaining life of the project.

## **COMPONENT III: PROJECT COORDINATION**

4.5.9 A Project Coordination Team (PCT) will be established in Gaborone and will comprise 10 specialists from MoA; Ministry of Finance and Development Planning (MFDP); Department of Environmental Affairs (DEA); Wildlife and National Parks Department; Roads Department of the Ministry of Works and Transport (MWT), and District Agricultural Office in Pandamatenga. The capacity of the PCT to function effectively will be enhanced by the provision of three field vehicles (one at Gaborone and two at Pandamatenga), office furniture, computers, computer software, photocopiers, printers and Internet systems.

### **4.6 Production, Market and Prices**

4.6.1 At full development of the project, a total of 58,904 mt of sorghum will be produced consisting of 6,250 mt from traditional farmers (on 2,500 ha) and 52,654 mt from large scale farmers (on 15,044 ha). Furthermore, 20,060 mt of sunflower seeds will be produced annually from 10,030 ha by large scale farmers.

4.6.2 The domestic markets offer farmers the best marketing opportunities for sorghum. In the absence of a sunflower seed processing facility in Botswana, there is a ready market for the commodity in South Africa. Investments in farm access roads will enable prompt evacuation of produce and lower transport costs and travel time. The envisaged proliferation of agro-processing facilities will reduce post-harvest losses, improve quality of produce, raise prices, and generate

employment, especially for women.

4.6.3 The prevailing producer prices offered by BAMB are BWP 1,350 and BWP 1,516 per mt of sorghum and sunflower, respectively. This equates to a revenue of BWP 8.4 million (UA 0.81 million) for traditional farmers and aggregate of UA 101.5 million (UA 9.76 million) from sorghum and sunflower for the large scale farmers. This brings total annual revenue from the project to BWP 109.9 million (UA 10.56 million) at full development. The annual incremental production of sorghum and sunflower will easily be absorbed within the local markets or exported, without any foreseeable distortion of prices.

## **4.7 Environmental and Social Impacts**

4.7.1 In accordance with the Bank Group's Environmental and Social Assessment Procedures and the Botswana's Environmental Impact Assessment of 2005, a detailed Environmental and Social Assessment Study (ESIA) has been conducted under the supervision of the Bank and MoA. The Executive Summary of the ESIA and ESMP was posted on the Bank Group Intranet on 18 February 2008 after review and acceptance by the Bank's Sustainable Development Unit (ORPC.3) and Botswana's MoA and the Department of Environmental Affairs (DEA). Public consultation workshops and Kgotla (customary courts) meetings with key governmental stakeholders and civil society at the scoping and draft final ESIA Study stage were held in Pandamatenga and Gaborone. The outcomes of the consultation process were positive.

4.7.2 Positive Impacts: Overall, the project will allow increasing Botswana's food security, agri-business development, improved employment and income (ref. creation of 60 jobs during construction phase and 600-750 seasonal jobs during operational phase) and optimize its resilience to extreme natural events. As such, this project is an excellent example of a climate adaptation initiative. In addition, the conclusion of the ESIA Study indicates that the benefits of the proposed project far outweigh the costs, when enhancement/mitigation measures are effectively and timely undertaken. In terms of positive impacts, the project will enhance the promotion of integrated water/land management (e.g. low tillage and mulching help soil structure, making soils more resistant to erosion and access to limited soil moisture), the promotion of Integrated Pest Management (e.g. organic production) and ecosystem conservation management practices (climate vulnerability assessment, wildlife management and afforestation program). Improved drainage system will also drastically reduce the incidence of water-borne and vector-borne diseases, which are the leading causes of morbidity and mortality in the project area. Finally, the project will allow the optimisation of wildlife management. Institutional strengthening programs will also be established for the key Botswana's public institutions to enforce their legal and regulatory obligations, especially as it relates to ESMP monitoring, including the Agro-Chemical Act, climate change vulnerability assessment.

4.7.3 Negative Impacts: Anticipated negative impacts of the project during the construction phase include the loss of habitat for animals, soil erosion, creation of tracks, waste generation and disposal, dust and noise generation, effects on the landscape, potential attacks by reptiles and animals; increased risks of fire, and blasting of crushed stone quarry. During the operational phase, negative impacts include potential pollution of soil and water from the use of agrochemicals, occupational health and safety issues for farm workers, non-targeted impacts of pesticides on wildlife, potential trans-boundary impacts from return drainage waters, health impacts from the influx of seasonal workers, increased pressure on the community infrastructures (schools, health centres, etc.). During the construction phase, an Environmental Code of Practice will guide the contractor(s) to ensure the integrity of the environment and social environments as well and promote respect of occupational health and safety for their workers. Other specific

mitigation measures have been proposed in the ESIA for all the negative impacts in order to avoid/minimize their severity.

**4.7.4 Institutional Arrangements for the Environmental and Social Monitoring:** The MoA in conjunction with the DEA shall be responsible for the oversight and implementation of the ESMP. Specifically, for the first two years of project implementation, the project will finance the establishment of an Environmental and Social (E&S) Unit in Pandamatenga for the monitoring of the ESMP. In PY 3, after the implementation of the institutional strengthening program and related training of MoA, the Department of Crop Production will take over the full monitoring responsibilities with the help of a full-time Environmental and Socio-Economic Affairs Officer. The DEA will also undertake, in accordance with its responsibilities under the EIA Act (2005), an audit of the ESMP implementation every 2 years. Finally, independent third-party compliance audit by a multi-disciplinary team (environmentalist, wildlife specialist, public health expert, and gender expert) at PY 3 will be undertaken to assess the level of implementation of the ESMP and the efficiency of the enhancement/mitigation measures. The costs for mainstreaming the environmental mitigation and monitoring measures have been fully costed in the project.

## 4.8 Project Costs

4.8.1 The total cost of the project including physical and price contingencies, but excluding duties and taxes, are estimated at UA 42.94 million (BWP 446.73 million at March 2008 exchange rate). This includes foreign exchange amounting to UA 29.38 million (BWP 305.66 million) representing or 68.43% of total costs. Local cost amounts to UA 13.56 million (BWP 141.07 million) or 31.57% of total costs. Summaries of cost estimates by components and by category of expenditure are provided in Tables 4.1 and 4.2, respectively. Cost estimates include 7.0% physical and 9.6% price contingencies based on prevailing local inflation rate.

**Table 4.1: Summary of Cost Estimates by Component**

Component	BWP (millions)			UA (millions)			% Foreign Cost
	Foreign Cost	Local Cost	Total Costs	Foreign Cost	Local Cost	Total Costs	
1. Infrastructure Development	230.92	105.03	335.95	22.19	10.10	32.29	68.74
2. Agric. Prod. Improvement	21.49	8.18	29.67	2.07	0.78	2.85	72.41
3. Project Coordination	1.15	6.05	7.20	0.11	0.58	0.69	16.09
<b>Total Base Cost</b>	253.56	119.26	372.82	24.37	11.46	35.83	68.02
Physical Contingencies	22.84	8.03	30.87	2.20	0.77	2.97	74.01
Price Contingencies	29.26	13.78	43.04	2.81	1.33	4.14	67.99
<b>Total Project Cost</b>	<b>305.66</b>	<b>141.07</b>	<b>446.73</b>	<b>29.38</b>	<b>13.56</b>	<b>42.94</b>	<b>68.43</b>

**Table 4.2: Summary of Cost Estimates by Category of Expenditure**

Category	BWP (millions)			UA (millions)			% Foreign Cost
	Foreign Cost	Local Cost	Total Cost	Foreign Cost	Local Cost	Total Cost	
1. Civil Works	247.53	86.96	334.49	23.79	8.35	32.14	74.01
2. Services	5.27	0.00	5.27	0.51	0.00	0.51	100.00
3. Goods	0.22	26.48	26.70	0.02	2.55	2.57	0.81
4. Operating Costs	0.54	1.61	2.15	0.05	0.16	0.21	25.10
5. Personnel	0.00	4.21	4.21	0.00	0.40	0.40	0.00
<b>Total Base Cost</b>	253.56	119.26	372.82	24.37	11.46	35.83	68.02
Physical Contingencies	22.84	8.03	30.87	2.20	0.77	2.97	74.01
Price Contingencies	29.26	13.78	43.04	2.81	1.33	4.14	67.99
<b>Total Project Cost</b>	<b>305.66</b>	<b>141.07</b>	<b>446.73</b>	<b>29.38</b>	<b>13.56</b>	<b>42.94</b>	<b>68.43</b>

## 4.9 Sources of Financing and Expenditure Schedule

The project will be financed with an ADB loan amounting to UA 37.27 million or 86.78% of total project cost. The loan will finance a majority of the costs associated with the civil works (drains, site supervision infrastructure and roads within the 2,500 ha area), and all goods and services. The Government of Botswana (GoB) will contribute UA 5.56 million or 12.95% of total costs, mainly as salaries of project staff, as well as construction of fencing, farm buildings, boreholes and roads in and land clearance for 2,500 ha. The farmers associations will contribute UA 0.11 million or 0.27% of total costs, mainly towards operating cost and maintenance of farm machinery and associated equipment. The GoB will also finance the taxes and duties associated with project activities or provide the project with a waiver as tenable by the laws of Botswana. The sources of financing are summarised in Table 4.3

**Table 4.3: Sources of Finance**

Source of Finance	BWP (million)			UA (million)			% Total Costs
	Foreign Cost	Local Cost	Total Costs	Foreign Cost	Local Cost	Total Costs	
ADB Loan	269.07	118.60	387.67	25.86	11.41	37.27	86.78
GoB	36.30	21.59	57.89	3.49	2.07	5.56	12.95
Farmer Associations	0.30	0.88	1.18	0.03	0.08	0.11	0.27
<b>Total</b>	<b>305.67</b>	<b>141.07</b>	<b>446.74</b>	<b>29.38</b>	<b>13.56</b>	<b>42.94</b>	<b>100.0</b>

## 5. PROJECT IMPLEMENTATION

### 5.1 Executing Agency

The MoA will be the Executing Agency through the Department of Crop Production. The project will be implemented within the existing framework established by the Government for Pandamatenga Farms. The finance section of the MoA has been assessed to have the capacity to keep financial information records for the Project and has previous experience in keeping financial records for projects of such nature. The MoA is well organised to oversee project implementation both at national and farm level. However, to strengthen the link between extension and research and enhance overall capacity of the MoA, the Bank had in February 2007 approved a Capacity Building Programme for the MoA using the MIC fund. This will further provide leverage for efficient project implementation and lessen the fiscal burden of government.

### 5.2 Institutional Arrangements

5.2.1 A Project Steering Committee (PSC) will be established and its members appointed, before loan signature, to provide policy guidance to the project (see Annex 2). The PSC will be responsible to the Minister of MoA. The PSC will be chaired by the Permanent Secretary of MoA and will comprise a representative (of not lower than the grade of Director) each from MFDP; MWT; Ministry of Labour and Home Affairs; Ministry of Energy and Water Resources; Ministry of Environment, Wildlife and Tourism, Department of Women's Affairs and DEA. Other members of the PSC will be the Chairman of Chobe Land Board; Chobe District Commissioner; District Council Secretary and Chairpersons of the Farmers' Associations. The PSC will approve work plans and budget estimates for activities and monitor project implementation. The PSC will meet at least two times in a year and the activities will be financed from the proceeds of the loan.

5.2.2 The PCT will comprise specialists from MoA (all on fulltime time basis); MFDP; DEA; Roads Department of the MWT; and District Agricultural Office (see Annex 2 for details). The

Principal Land Resource Specialist of MoA in charge of Pandamatenga farms development will be the Project Coordinator. He will be supported by an Agronomist, Water Engineer and Accountant from the MoA; Procurement Specialist from the MFDP; Civil Engineer from the Roads Department; Natural Resource Specialist from the DEA; and District Agricultural Officer, Research Officer and Extension Specialist at the Pandamatenga District Office. These specialists (which include four women) are all serving Government officers and will continue to draw their emoluments from the Government of Botswana.

### 5.3 Supervision and Implementation Schedules

During implementation, the project will be supervised by the Bank Group twice annually. A Mid Term Review will be undertaken in conjunction with GoB at the end of Year 2 to review project achievements. A project completion report will be prepared by both the Borrower and Bank Group prior to loan closure. Expenditure schedules by component and by source of finance are provided in Tables 5.1 and 5.2, respectively. The project implementation schedule is presented in Annex 3.

**Table 5.1: Expenditure Schedule by Component**

Component	UA '000				
	2009	2010	2011	2012	Total
1. Infrastructure Development	8.20	20.31	10.38	0.08	38.97
2. Agricultural Production Devt	0.18	1.84	0.94	0.23	3.19
3. Project Coordination	0.22	0.18	0.18	0.20	0.78
<b>Total cost</b>	<b>8.60</b>	<b>22.33</b>	<b>11.50</b>	<b>0.51</b>	<b>42.94</b>

**Table 5.2: Expenditure Schedule by Source of Finance**

Source	UA '000				
	2009	2010	2011	2012	Total
ADB	8.31	18.74	9.94	0.27	37.27
Government	0.29	3.55	1.52	0.20	5.56
Beneficiaries	0.00	0.04	0.04	0.04	0.11
<b>Total cost</b>	<b>8.60</b>	<b>22.33</b>	<b>11.50</b>	<b>0.51</b>	<b>42.94</b>

### 5.4 Procurement Arrangements

5.4.1 Procurement arrangements for the project are summarized in Table 5.1. All procurements will be in accordance with the Bank's *Rules of Procedure for Procurement of Goods and Works* or, as appropriate, *Rules of Procedures for the Use of Consultants*, using relevant Bank Standard Bidding Documents, and subject to Bank's *prior* review, except where national procedures apply, in which case they will be subject to *post* review.

5.4.2 Civil Works: Procurement of civil works above UA1.5 million per contract will be carried out under International Competitive Bidding. Five such contracts will be awarded for the construction of drainage systems and access roads all valued at UA32.81 million. Temporary works valued at UA0.99 will be procured using Botswana national procedures. All other civil works, including construction of access road works in the 2,500 ha area, valued at UA1.78 million; erection of electric fences, valued at UA2.24 million; land clearance, and construction of farmers support building and boreholes, valued at UA1.01 million, will be financed by the Government.

**5.4.3 Goods:** All goods will be procured using Botswana national procedures. Two contracts will be awarded for procurement of farm tractors and related soil tilling implements, and workshop equipment, valued at UA0.27 million and UA0.19 million, respectively. Other goods that will be procured include vehicles and office equipment, valued at UA0.07 million and UA0.03 million respectively.

**5.4.4 Consulting and Training Services:** The procurement of consulting services valued at UA2.37 million will be undertaken on the basis of shortlist. Contracts will be awarded using Botswana national procedures for financial auditing, mid-term review, project completion report and environmental monitoring, valued in total at UA0.15 million. The District Agricultural Office (DAO) will undertake the farmers training and capacity building activities and applied research valued at UA0.35 million in line with Botswana national procedures.

**Table 5.3: Procurement Arrangements**

UA million					
Category	ICB	OTHER*	NBF**	SHORTLIST	TOTAL
<b><u>Civil Works</u></b>					
Drains	22.49 [22.49]				22.49 [22.49]
Roads (25,074 ha)	10.32 [10.32]				10.32 [10.32]
Roads (2,500 ha)			1.78		1.78[0]
Fence			2.24		2.24[0]
Farm buildings			1.01		1.01[0]
Temporary works		0.99 [0.99]			0.99 [0.99]
<b><u>Goods</u></b>					
Vehicles		0.07 [0.07]			0.07 [0.07]
Office Equipment		0.03 [0.03]			0.03 [0.03]
Tractors/Implements		0.46 [0.46]			0.46 [0.46]
<b><u>Services</u></b>					
Training/Capacity Building/ Applied research		0.35 [0.35]			0.35 [0.35]
Audit/MTR/PCR		0.15 [0.15]			0.15 [0.15]
Studies and Supervision				2.37 [2.37]	2.37 [2.37]
<b><u>Miscellaneous</u></b>					
Operation and maintenance		0.23 [0.04]			0.23 [0.04]
Personnel			0.45		0.45[0]
<b>TOTAL</b>	<b>32.81 [32.81]</b>	<b>2.32 [2.09]</b>	<b>5.44</b>	<b>2.37 [2.37]</b>	<b>42.94 [37.27]</b>

Note: Figures into brackets are the respective amounts financed by African Development Bank

\* Other refer to the use of Botswana national procedures

\*\* Non-Bank Funded are financed by the Government

**5.4.5 Miscellaneous:** Operation and maintenance activities financed by the Bank for UA0.04 million will be handled using Botswana national procedures.

**5.4.6 National Procedures and Regulations:** Botswana's national procurement laws and regulations have been reviewed and determined to be acceptable and in line with international best practice (see Annex 4).

**5.4.7 Executing Agency:** The Project Coordination Team will be responsible for the procurement of goods, works and consulting services. All procurement related documents sent to the Bank shall first be reviewed and vetted by the Public Procurement and Asset Disposal Board or the Ministerial Tender Committee as appropriate under the national regulations for the various contract ceilings.

**5.4.8 General Procurement Notice:** The text of a General Procurement Notice will be discussed and agreed with the Borrower, and this will be issued for publication in the UN's *Development Business*, upon approval by the Board of Directors of the loan proposal.

**5.4.9 Review Procedures:** The following documents are subject to review and approval by the Bank before promulgation, except where national procurement procedures apply: Specific Procurement Notices; Tender documents/Requests for Proposals; Tender evaluation/Evaluation of Proposals' reports, including recommendations for contract award; and Draft contracts, if these have been amended from drafts included in the tender invitation documents.

## **5.5 Disbursement Arrangements**

There will be two types of disbursement arrangements. Direct payment will be made by the Bank upon request by the MoA for major civil works, goods and services. Other expenses for minor works, goods and services and all the expenses under miscellaneous will be paid for by the MoA through a foreign Special Account to be opened in a commercial bank acceptable to the Bank Group. Another local Special Account will be opened in Chobe District (to which Pandamatenga belongs) to facilitate activities at the project level. The Bank Group will agree with the GoB during negotiations of the loan on which items will be paid for by any of the two methods. The provisional list of goods and services is given in Annex 5.

## **5.6 Monitoring and Evaluation**

The foundation for the overall project monitoring and evaluation systems will be extracted from the logical framework, a series of key performance indicators and project operational manual (POM) which will be prepared by the PCT shortly after project loan approval. The MoA will monitor overall operations for planning and facilitation purposes for the production aspects of the project, while MWT and DEA will monitor the implementation of the drainage and roads infrastructure for attainment of national standards. The PCT will monitor and evaluate overall impact of the project and compile the project's quarterly and annual reports for dissemination to the Bank Group, MFDP, other line ministries, and relevant districts. A mid-term review (MTR) will be undertaken at the end of year 2 to review the project's achievements and constraints, looking in particular at the following: (a) the performance of the farmers in using improved farming methods; (b) maintenance of the infrastructure fund; (c) the status of the drainage and roads as well as fences; and (e) future requirements of the farmers for support. Prior to the visit of the mid term review mission, the MoA will prepare a draft mid-term progress report. Similarly, upon completion of project investments at the end of program year four, the PCT will prepare a Borrower's project completion report.

## **5.7 Financial Reporting and Auditing**

The project will maintain an internationally acceptable accounting and internal control system for recording and reporting all project financial transactions. The financial statements will be prepared under the supervision of the Principal Finance Officer of the MoA. These include: (i) a statement of receipts and expenditures, showing the Bank Group and counterpart funds separately; (ii) a balance sheet showing accumulated funds of the project, bank balances, other assets of the project and liabilities, if any; (iii) a summary of expenditures shown under the main project headings and by main categories of expenditure, both for the prevailing fiscal year and accumulated to date; (iv) a comprehensive list of all assets purchased, with given dates, values and condition of the asset. The financial statements of the project will be audited annually by an external audit firm and submitted to the Bank Group no later than six months after the end of each financial year. The PCT will also produce quarterly progress reports.



## 5.8 Aid Co-ordination, Harmonisation and Alignment

Botswana has only UNDP, EU, USAID and FAO as major development partners. Nonetheless, a donors' forum has been established with the EU as focal point. During field missions meetings were held bilaterally to inform them about the proposed project, share their experiences, as well as build strategic partnerships, alignment and consensus. The development partners resident in Botswana have welcomed the proposed intervention and view it as a resumption of vital assistance to Botswana. Project implementation and supervision mission reports will be made available to the donor groups, and to visiting missions.

## 6 PROJECT SUSTAINABILITY AND RISKS

### 6.1 Recurrent Costs

Recurrent expenditures are estimated at about UA 0.69 million (BWP 7.17 million) with Bank contribution, being a small portion at UA 42,900, or 6.2% of full recurrent cost as presented below (see Table 6.1). Project recurrent costs comprise maintenance of drainage canals and farm access roads, farm machinery and equipment, office equipment, and emoluments of Government staff. These recurrent cost financed activities are an integral part of the project and are necessary in achieving the project's development objectives. These costs are estimated to be BWP 260 per ha at full development of the project at end of PY4. In the one-year contractual defects liability (DFL) period after completion of the civil works, the contractor will still be responsible for the maintenance of the drainage infrastructure, roads and fences. After the final handing over of the structures by the contractors i.e. in PY4, the Government will contract out and pay for the little routine maintenance of the drains, fences, access roads boreholes and all ancillary infrastructure, after which farmer associations will take over. The operating cost of farm equipment used by farmer associations will also be fully borne by them. The Bank's financing of recurrent costs decreases from a peak of 9.6% in PY2 to 3.2% in PY4. Thus the Government and beneficiaries will gradually assume a greater burden of the recurrent costs during the project period, and all recurrent costs after project completion. Income-generating activities such as the raising of proceeds from the renting of farm machinery and the generation of local employment from increased agro-processing will ensure sustainable financing of recurrent costs in the medium to long term.

**Table 6.1: Source of Financing for Recurrent Costs**

Source	UA '000				
	2009	2010	2011	2012	Total
ADB	7.2	18.0	12.0	5.7	42.9
Government	127.3	134.3	141.1	130.5	533.2
Beneficiaries	0.00	35.6	37.9	39.7	113.2
<b>Total cost</b>	<b>134.5</b>	<b>187.9</b>	<b>191.0</b>	<b>175.9</b>	<b>689.3</b>
<b>ADB as % of Total</b>	<b>5.4</b>	<b>9.6</b>	<b>6.2</b>	<b>3.2</b>	<b>6.2</b>

### 6.2 Project Sustainability

6.2.1 The project will be sustained by Government's strong commitment to the process of policy and development reforms, and beneficiary participation. The design makes provisions for decentralised entities to play key roles in project monitoring, with crucial inputs from agricultural research and extension. The building of effective linkages with agricultural support services suggests that good returns can be realised from technology adoption which, in combination with improved access to farm machinery and equipment and ancillary services and existing marketing infrastructure to increase productivity, and hence incomes of farmers. In the short- to medium-

term the major maintenance works are related to grading/re-gravelling of farm access roads, desilting of lined drains and repairs to damaged fences. The maintenance of the project infrastructure will be sustained by initial Government budgetary allocation as well as by the direct beneficiaries of the project. Prior to the DFL period, the engineering supervision consultant will provide on-site training for representatives of both the DAO and Farmers' Association in the maintenance requirements of project infrastructure. Experience of the large-scale farmers in the execution of the construction and maintenance of existing roads and drains and also maintenance of the existing fence will be an advantage. The DAO would facilitate the setting up and operation of a beneficiary infrastructure maintenance account. The incomes of the farmers would have substantially increased as a result of higher crop productivity and better prices, and will enable them bear the operation and maintenance costs of the infrastructure.

6.2.2 The O&M costs are estimated at UA 0.23 million over the project life. The Government and beneficiaries will finance 83% of these costs during the course of project implementation, while the loan will finance 17%. At the end of project implementation period the beneficiaries will not have any difficulty to finance the totality of the O&M costs due to revenues generated by the farmed crops. The project will establish beneficiary ownership of the schemes and promote scheme longevity by adopting a fully participatory process during all stages of project development. The participatory process assigns all parties clear commitments and responsibilities at each stage. By involving the farmers in the routine and recurrent maintenance of the farm access roads, fencing and drainage systems, ownership will be instilled in them from the onset, and they will see the continued maintenance of these roads as necessary to the success of their enterprise.

### **6.3 Critical Risks and Mitigation Measures**

There are three main risks that the project faces, namely: 1) Failure of Farmers Associations to buy-in into the program; 2) failure of the Farmers Associations to raise enough funds to maintain the infrastructure once it has been handed over to them; and 3) possibility of a non-functional monitoring system for fertilizers, pesticides and herbicides leading to pollution of the water systems in neighbouring Zimbabwe from the drainage water. The first risk will be mitigated by building the capacity of the farmers to effectively participate in the project activities. As a mitigation measure to the second risk, the project will enhance productivity and increase incomes which will enable farmers to maintain the structures. Regular environmental monitoring and supervision is envisaged as a mitigation of the third risk.

## **7. PROJECT BENEFITS**

### **7.1 Financial Analysis**

A crop budget was prepared for both the traditional and large-scale farmers' rain-fed production enterprises for sorghum and sunflower. The financial analysis shows that use of improved seeds, mechanisation and good agricultural practices will increase crop yields and income. Annual net income of traditional farmers are expected to increase from BWP 299 without the project to BWP 2,121 per ha per annum at full project development. Annual net income of large scale farmers will increase from its present level of BWP 833 on their current land holdings to BWP 1,511 per ha per annum at full development of the project largely because of better water control and drainage. Average annual net income per smallholder farmer (10.2 ha) is estimated at BWP 18,584, and BWP 813,600 per large farmer (1,200 ha). The slightly lower net income for large scale farmers is linked to higher operating costs (higher maintenance of machinery, access roads, water drainage infrastructure and labour hire). Conversely, their aggregate income is higher because of economies of scale considering that the total areas for the two groups are 2,500 ha and

25,074 ha, respectively.

## **7.2 Economic Analysis**

At full implementation of the project, it is estimated that 27,574 ha of arable farms will be brought under production by the farmers. The economic internal rate of return (EIRR) for the farm models used over 20 years is estimated at 18.4% indicating that the investment is economically viable considering an opportunity cost of capital of 12% used for developing countries (see Annex 6 for details).

## **7.3 Social Impact Analysis**

7.3.1 An estimated 266 households will benefit directly from the project through increased crop production and productivity. The water control infrastructure and all-season roads will result in better access to the fields at all times; faster movement of goods from the fields; reduced vehicle operating and maintenance costs; reduced travelling time; and attraction of agro-industries. The increased food production will impact positively on the country's food security. On and off farm employment opportunities will benefit a greater number of the population, including women.

7.3.2 Pandamatenga village has more females (53.1%) than males (46.9%), though it is mostly males who work as permanent staff on the commercial farms. The country has taken steps towards gender mainstreaming in the country, yet the status of women in Botswana stands to be improved. The poor income levels of the female headed households are also a result of the fact that 65-70% of these households have no cattle, in comparison with 45-50% of male headed households that do not own cattle. Women, apart from subsistence farming, are involved in harvesting veld products, such as thatch grass to sell as building material, a few engage in casual/permanent labor on the commercial farms, clerical work and so on. The Chief of Pandamatenga village is a woman. There nonetheless, remain problems where a number of women do not work but rather move to the commercial farms to stay with their husbands. This shows that there is a need to empower the women of Pandamatenga to be more proactive about sourcing sustainable livelihoods. It is expected that rising incomes of farmers will lead to off farm activities by these women.

7.3.3 The Project will encourage the Chobe Land Board to promote a preference toward women in the allocation process for the 2,500 ha to be developed by smallholders. Besides woman household heads who will be directly participating in the project activities, other women will be involved in the marketing of small quantities of farm produce at urban and market centres in the project area. Some of the women will also be involved in selling cooked foodstuffs and local brew. Women participating as members of the labour groups (at least 50%) will be paid cash incomes which will improve their livelihoods. Additionally, other direct and indirect mitigation measures are proposed and costed under this project, including provision of potable water to improve general health and reduce time spent by women and children on the drudgery of water supply and promotion of SMI/SMEs, prevention of HIV/AIDS, etc. Overall, the project will contribute to an increase in productivity of farmers' enterprise around Pandamatenga, generate higher incomes and food security for farmers as well as enhancing female participation in agriculture. These assumptions and expectations will be monitored as the project is implemented.

## **7.4 Sensitivity Analysis**

Sensitivity analyses show that the rate of return would decrease to 16.3% and 14.8%, respectively, if benefits are lagged by one and two years. A 10% increase in crop production costs

decreases EIRR to 16.4% whereas a reduction of 10% in yield per ha lowers EIRR to 14.1%. A combination of the above scenarios results in a decrease of EIRR to 12.0%, equal to the opportunity cost of capital in Botswana.

## **8. CONCLUSIONS AND RECOMMENDATIONS**

8.1 The Government of Botswana places high priority on the development of agriculture in Pandamatenga because of the area's inherent potential to increase cereal production. The project addresses the priorities of the country, as established in Vision 2016, the National Development Plan 9, and of NAMPAADD. A number of related factors will serve as catalyst for a quick and timely implementation and attainment of expected results: enhanced commercial agriculture; the rising food prices; and the enhancement of the capacity of the Ministry of Agriculture to plan and supervise project implementation. The development of drainage infrastructure and access roads as well as providing farmer with training and production support will increase production, minimize crop losses and enable farmers maximize their return on their investment. The proposed conservation approach to agriculture production to manage soil, water and ecosystem would ensure environmental integrity of the area. Though the number of immediate beneficiaries may seem small, the incremental food production from the 28,000 ha will have a great impact on the national population as a whole.

8.2 Based on the above, it is recommended that an ADB loan not exceeding UA37.27 million be granted to the Government of Botswana for the purpose of implementing the infrastructure development of Pandamatenga as well as capacity building of beneficiaries as described in this report, subject to the following conditions:

### **A. Conditions Precedent to Entry into Force**

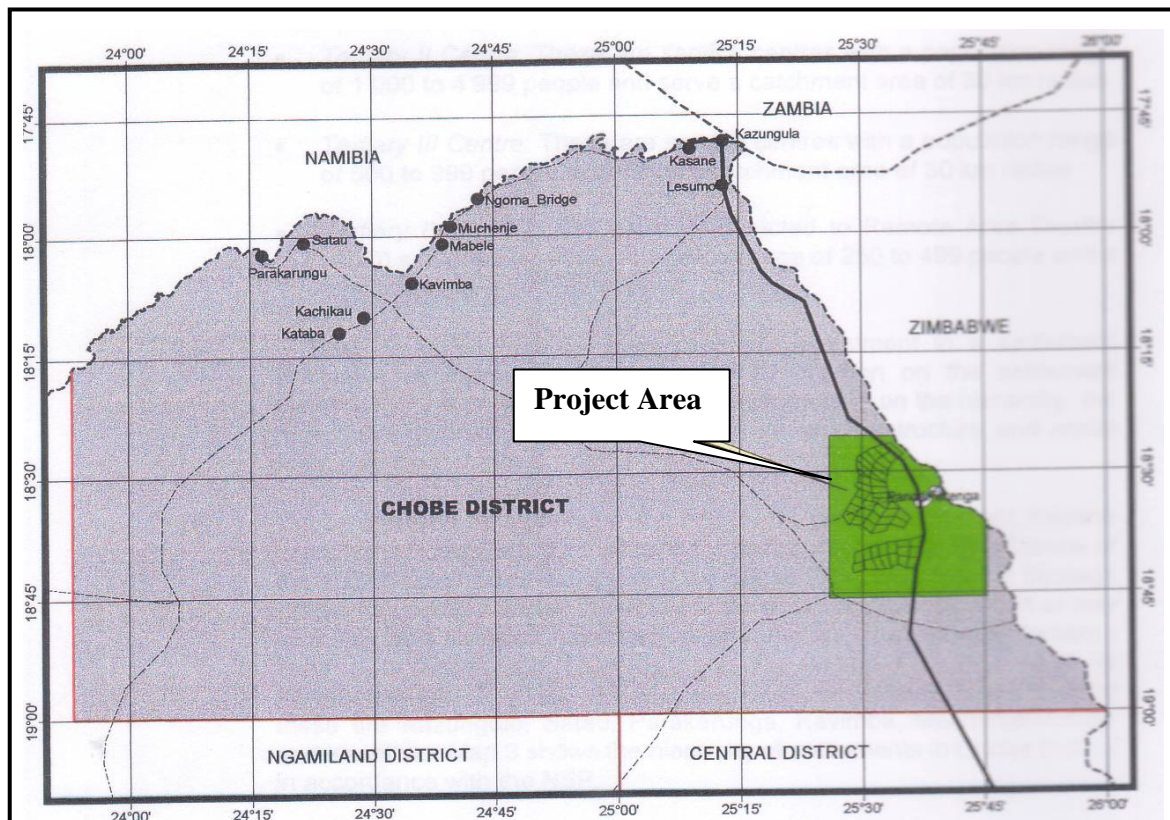
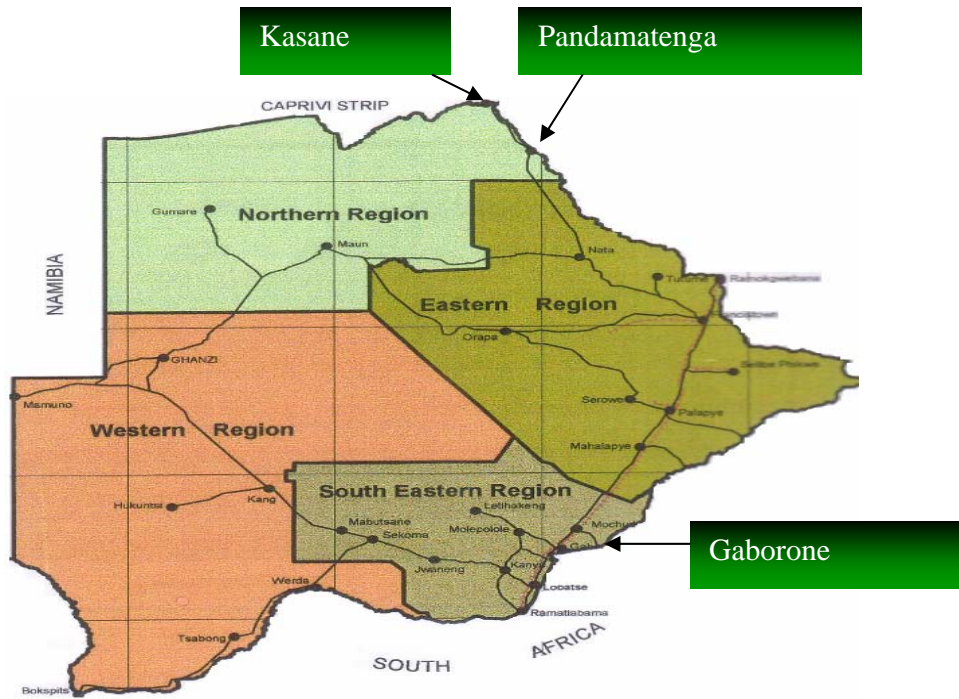
The entry into force of the Loan Agreement shall be subject to the fulfilment by the Borrower of the provisions of Section 5.01 of the General Conditions of the Fund.

### **B. Conditions Precedent to First Disbursement**

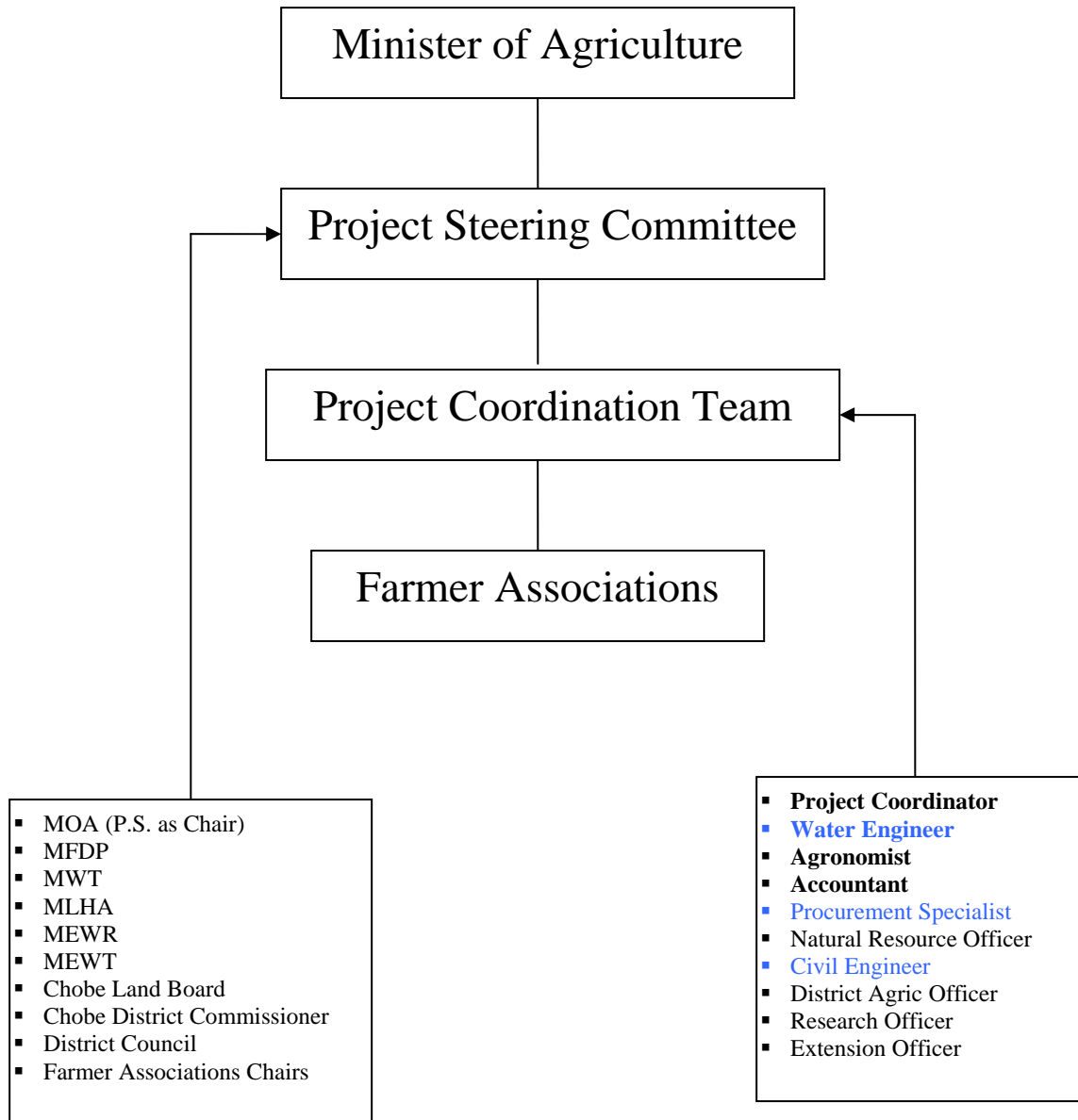
The obligations of the Bank to make the first disbursement shall be conditional upon the entry into force of the Loan Agreement as provided in (A) above; and

(i) The establishment of the PCT and appointment of the Project Coordinator, whose qualifications and experience are acceptable to the Bank (para 5.2.2)

# **BOTSWANA** **Pandamatenga Agricultural Infrastructure Development Project** **Map Showing Project Area**



**BOTSWANA**  
**PANDAMATENGA AGRICULTURAL INFRASTRUCTURE DEVELOPMENT PROJECT**  
**ORGANOGRAM FOR PROJECT IMPLEMENTATION**



Designations in bold type in the right box above are full time members of the MOA in Gaborone. Others will provide expertise through the District Agricultural Office (Research and Extension) in Pandamatenga.

**BOTSWANA**  
**PANDAMATENGA AGRICULTURAL INFRASTRUCTURE**  
**DEVELOPMENT PROJECT**

**PROJECT IMPLEMENTATION SCHEDULE**

<b>Date</b>	<b>Milestone</b>
<b>July 2008</b>	<b>Board Approval</b>
<b>January 2009</b>	<b>Launching</b>
<b>June 2009</b>	<b>Supervision</b>
<b>December 2009</b>	<b>Supervision</b>
<b>June 2010</b>	<b>Mid-Term Review</b>
<b>December 2010</b>	<b>Supervision</b>
<b>June 2011</b>	<b>Supervision</b>
<b>December 2011</b>	<b>Supervision</b>
<b>June 2012</b>	<b>Project Completion Report Preparation</b>

**BOTSWANA**  
**PANDAMATENGA AGRICULTURAL INFRASTRUCTURE DEVELOPMENT PROJECT**  
**REVIEW OF BOTSWANA'S PROCUREMENT ENVIRONMENT**

**A. PROCUREMENT REGULATIONS**

**1.0 Introduction**

This annex presents the findings of a brief assessment of the Botswana country procurement system which was carried out in April 2007 during the course of the appraisal mission of the Pandamatenga Agricultural Infrastructure Development Project.

**2.0 The country procurement system**

Due to difficulties noted with the then existing Central Tender Board (CTB) the Government of Botswana established the Public Procurement and Asset Disposal Board (PPADB) in 2002, as a result of a process to reform the public procurement program. The PPADB is an authority in charge of supervising the public procurement sector and adjudicating contracts financed from public resources. The Ministerial Tender Committees (MTCs) handle tenders of up to Pula 1.0 million (about UA 106,000), while the PPADB takes care of any tenders above that amount. The evaluation of the tenders and recommendations for contract awards are however the responsibility of the procuring entities themselves. The parastatals and local government authorities also have their own procurement systems in place.

**3.0 Assessment**

**3.1 Clarity of the legal and regulatory framework**

The Public Procurement Act that created the PPADB and which defines the rules for public procurement complies with the international best standards. Indeed, it uses the United Nations Commission on International Trade Law (UNCITRAL) 1996 guidelines as a benchmark.

**3.2 The public procurement institutions, organization and associated risks**

PPADB is essentially a small team of competent professionals who have a good grasp of public procurement, including six full-time members and one Executive Director. Its main challenge is to obtain full compliance of procuring organizations with the rules established by the PPA and regulations. Indeed the capacity of the MTCs is weak both in terms of staffing and adequate training opportunities. The same issues are observed at the District Administrative Tender Committees (DATC). In order to reach its goal as the full time regulator of government procurement, PPADB should strengthen its activities in three main areas: (i) monitoring and controls; (ii) development of procedures; (iii) capacity building and training of MTCs and DATCs.

**3.3 The procurement operations and market performance**

As a general rule, PPADB, as well as few major public enterprises and externally funded projects have qualified procurement staff. Ministries and local governments, other public enterprises and public entities do not have as qualified procurement staff as in the first group. As a result, procurement is carried out in these institutions in a manner that is less than optimal.

**3.4 The integrity of the public procurement system**

PPADB is not involved in prior review of procurement decision, which is good for the integrity of the processes. Indeed, ex-ante approval could be conflicting with its statutory functions namely the supervision of audits, reviews and complaints. In order to help safeguard the system the ICRC should disseminate integrity provisions provided for in the Public procurement Act through its sensitization and training activities.

**4.0 Conclusions**

Currently Botswana is making steady progress towards a fully transparent, efficient and decentralized procurement system. The lack of acquaintance of Botswana with Bank procedures does not hinder the use of national procedures for the smaller contracts because the national system is sound and in par with international best practice. In consideration of that, the Pandamatenga project will make use of the national procedures to the extent possible and use procurement audits to verify compliance with the national regulations whenever applied.



## Provisional List of Goods and Services

		UA Million						
		2008/09	2009/10	2010/11	2011/12	Total	Source	Category
<b>1</b>	<b>INFRASTRUCTURE DEVELOPMENT</b>							
<b>A</b>	<b><u>Water Drainage System</u></b>							
25,074 ha	Construction of water drainage channels	3.87	8.58	4.44	-	16.88	ADB	Civil Works/Drains
	Construction of water control perimeter bunds	0.61	1.37	0.75	-	2.72	ADB	Civil Works/Drains
2,500 ha	Construction of water drainage channels	-	1.51	1.02	-	2.53	ADB	Civil Works/Drains
	Construction of water control perimeter bunds	-	0.22	0.14	-	0.36	ADB	Civil Works/Drains
	<b>Subtotal</b>	<b>4.47</b>	<b>11.69</b>	<b>6.34</b>	<b>-</b>	<b>22.50</b>		
<b>B</b>	<b><u>Road Network</u></b>							
25,074 ha	Construction of access road network	2.46	5.16	2.71	-	10.32	ADB	Civil Works/Roads
2,500 ha	Construction of access road network	-	1.18	0.61	-	1.79	GOB	Civil Works/Roads
	<b>Subtotal</b>	<b>2.46</b>	<b>6.33</b>	<b>3.32</b>	<b>-</b>	<b>12.10</b>		
<b>C</b>	<b>Farm Buildings &amp; land clearance</b>							
	Land clearance	-	0.88	-	-	0.88	GOB	Civil Works/Farm buildings
	Farm buildings	-	0.13	-	-	0.13	GOB	Civil Works/Farm buildings
	<b>Subtotal</b>	<b>-</b>	<b>1.01</b>	<b>-</b>	<b>-</b>	<b>1.01</b>		
<b>D</b>	<b><u>Supervision Consultancy Engineering &amp; Enviro</u></b>	0.53	1.18	0.62	0.04	2.37	ADB	Services/Studies & Supervision
<b>E</b>	<b><u>Temporary Works</u></b>	0.74	0.10	0.11	0.04	0.99	ADB	Civil Works/Temporary works
	<b>TOTAL COMPONENT 1</b>	<b>8.20</b>	<b>20.30</b>	<b>10.38</b>	<b>0.08</b>	<b>38.96</b>		
<b>2</b>	<b>AGRICULTURAL PRODUCTION IMPROVEMENT</b>							
<b>A</b>	<b><u>Water Control and Management Initiatives</u></b>							
	IPM & SFM training for farmers	0.02	0.02	0.01	-	0.04	ADB	Services/Training
	Farmer field days	-	0.04	0.04	0.04	0.12	ADB	Services/Training
	Study tours for farmers	-	0.01	0.01	0.01	0.04	ADB	Services/Training
	Recurrent Cost (DAO office & scientific equipment)	0.01	0.01	0.01	0.01	0.03	ADB	Miscellaneous/O&M
	<b>Subtotal</b>	<b>0.02</b>	<b>0.07</b>	<b>0.07</b>	<b>0.06</b>	<b>0.22</b>		
<b>B</b>	<b><u>Ecosystem Conservation</u></b>							
	Fencing for 2,500 ha	-	1.23	0.64	-	1.87	GOB	Civil Works/Fencing
	Wildlife Removal	0.15	-	-	-	0.15	GOB	Civil Works/Fencing
	Implementation of ESMP	-	-	0.11	0.07	0.18	GOB	Civil Works/Fencing
	Environmental Monitoring	0.01	0.01	0.01	0.00	0.03	GOB	Civil Works/Fencing
	O&M (DAO Testing & survey kits)	-	0.01	0.01	0.01	0.02	ADB	Miscellaneous/O&M
	<b>Subtotal</b>	<b>0.16</b>	<b>1.24</b>	<b>0.77</b>	<b>0.08</b>	<b>2.25</b>		
<b>C</b>	<b><u>Capacity Building</u></b>							
	Research prod tech, alternate nutrients, water qual	-	0.04	0.04	0.04	0.11	ADB	Services/applied research
	Tractors & implements	-	0.24	-	-	0.24	ADB	Goods/Tractors/Implements
	Workshop equipment/tools	-	0.18	-	-	0.18	ADB	Goods/Tractors/Implements
	O&M tractor/workshop	-	0.03	0.04	0.04	0.11	BEN	Miscellaneous/O&M
	<b>Subtotal</b>	<b>-</b>	<b>0.49</b>	<b>0.07</b>	<b>0.08</b>	<b>0.64</b>		
<b>D</b>	<b><u>Apiculture Development</u></b>							
	Equipment for production and marketing	-	0.03	0.01	-	0.03	ADB	Goods/Tractors/Implements
	Demonstration for improved honey production	-	0.00	0.00	0.00	0.01	ADB	Services/applied research
	Study tours for bee keepers	-	0.01	0.01	0.01	0.03	ADB	Services/applied research
	O&M (Apiculture)	-	0.00	0.00	0.00	0.01	BEN	Miscellaneous/O&M
	<b>Subtotal</b>	<b>-</b>	<b>0.04</b>	<b>0.02</b>	<b>0.02</b>	<b>0.08</b>		
	<b>TOTAL COMPONENT 2</b>	<b>0.18</b>	<b>1.85</b>	<b>0.94</b>	<b>0.23</b>	<b>3.20</b>		
<b>3</b>	<b>PROJECT COORDINATION</b>							
	Vehicle	0.07	-	-	-	0.07	ADB	Goods/Vehicle
	Office Equipment	0.02	0.00	0.00	0.00	0.03	ADB	Goods/Office Equipment
	Audit/MTR/PCR	-	0.04	0.04	0.07	0.15	ADB	Services-Audit/MTR/PCR
	Salaries	0.06	0.06	0.07	0.06	0.24	GOB	Miscellaneous/Personnel
	Allowances	0.05	0.05	0.06	0.05	0.21	GOB	Miscellaneous/Personnel
	O&M Vehicle/Office Equipment	0.02	0.02	0.02	0.02	0.08	GOB	Miscellaneous/O&M
	<b>TOTAL COMPONENT 3</b>	<b>0.22</b>	<b>0.18</b>	<b>0.18</b>	<b>0.20</b>	<b>0.78</b>		
	<b>GRAND TOTAL</b>	<b>8.60</b>	<b>22.33</b>	<b>11.49</b>	<b>0.52</b>	<b>42.94</b>		

## SUMMARY OF ECONOMIC ANALYSIS

### **A. INTRODUCTION**

The main objective of the project is to increase crop production in Pandamatenga area from current levels of 0.5 to 2.5 metric tons of sorghum per ha for the traditional farmers and from the current 2.5 to 3.5 metric tons of sorghum and 1.2 to 1.8 tons of sunflower per ha for the large scale farms, as a result of improved infrastructure comprising drainage canals and farm access roads in addition to improved agriculture production management. The assumptions and results of the analysis are presented hereunder:

### **B. COST ESTIMATES**

The following assumptions were made in calculating the project costs:

- Both variable and standing costs were calculated for a target area of 27,574 ha and for an average yield of 2.5 tons per ha for sorghum and 1.2 tons per ha for sunflower, which are the latest producer figures for the large scale farmers. Corresponding figures for smallholder farmers growing sorghum on 2,500 ha only is 0.5 tons per ha.
- Crops prices and forecasts were provided by the Botswana Agricultural Marketing Board (BAMB) whose data serve as a reference in the country for price fixing and projections.
- 2% of the capital cost is assumed to be used for the maintenance of the drainage infrastructure and the farm access roads per annum. This is assumed to take place after the end of the implementation period of the project.
- Routine maintenance of the infrastructure in Pandamatenga is expected to cost BWP 283 per ha per annum at full development of the project.

### **C. BENEFITS**

The following assumptions have been made in calculating the benefits arising from the project:

- The prices used to compute the Economic Internal Rate of Return (EIRR) are the same as those adopted for the financial analysis with no shadow pricing because market distortions in Botswana are insignificant. There are no foreign exchange market restrictions, foreign exchange can be freely traded hence the market rate is assumed to be the equivalent to the economic rate.
- Assume 14% of the 27,054 ha of the arable farms of Pandamatenga Area are left fallow;
- Farm models were developed using data provided by the Department of Agricultural Research after consultation with the beneficiaries;
- Two crops were used in the farm model: Sorghum (60%) and sunflower (40%) are the major crops grown in Pandamatenga.

### **D. RESULT OF THE ANALYSIS**

The economic internal rate of return (EIRR) for the farm models used over 20 years is estimated at 18.4% indicating that the investment is economically viable considering an opportunity cost of capital of 12% used for developing countries. The model produces an NPV of BWP 145 million. Sensitivity analyses show that EIRR will decrease to 16.3% and 14.8%, respectively, if benefits are lagged by one and two years.

An increase of 10% in crop production costs would decrease the EIRR to 16.4% whereas a reduction of 10% in yield per ha would bring the EIRR down to 14.1%. A combination of the above scenarios would result in a decrease of the EIRR to 12.0% just equal to the opportunity cost of capital in Botswana. An increase in operation and maintenance costs of the project infrastructure by 20% would have a limited effect on the EIRR and only reduced it to 18.1%. A combination of all three scenarios would result in a decrease of the EIRR to 11.6% just below the opportunity cost of capital in Botswana.

It will take a simultaneous 20% reduction in benefits and 20% increase in costs to make the project an unviable investment, which is a very unlikely scenario. However, if only 80% of the arable land in Pandamatenga were to be cultivated of which 14% is left fallow, the EIRR will drop to 13.9% indicating that despite the decrease in production, the project remains a viable investment.

A decrease in the yield per ha is very unlikely to happen because of the roads and drainage infrastructure being constructed and production support given by the project. This will help increase substantially the production of the arable farms and keep it at a steady level after full development of the project's activities. The sensitivity analysis indicates that the EIRR is more sensitive to changes in yield per ha than to increased production costs. The rates of return remain nonetheless at viable levels.

## List of Completed Operations

Sector	Approvals					Cancellations					Net Commitment	Date Approved	Date Signed	Date Effective	Amount Signed	Disbursement	Undisbursed Balance		
	ADB	ADF	NTF	MIC	AWF	Total	ADB	ADF	NTF	AWF								MIC	Total
<b>A. Agriculture</b>																			
Arable Lands Dev.	7,200.0					7,200.0	3,817.0					3816.96	3,383.0	27/10/81	5/3/82	3/6/83	7,200.0	3,383.0	0
Arable Lands Dev.Phase I		6,171.1				6,171.1		1,017.8				1,017.81	5,153.2	30/10/81	5/3/82	3/6/83	6,171.1	5,153.2	0
Veterinary Services Dev.			3,206.0			3,206.0			168.5			168.54	3,037.5	21/6/83	8/10/83	16/10/84	3,206.0	3,037.5	0
Francistown Abattoir			7,000.0			7,000.0			2,407.3			2407.29	4,592.7	18/6/87	3/10/87	18/11/88	7,000.0	4,592.7	0
Capacity Building to MOA				293.3		293.3				0		0	293.3	27/2/07	17/5/07	17/5/07	293.3	-	293.3
Agricultural Sector Review				476.8		476.8				0		0	476.8	16/2/07	17/5/07	17/5/07	476.8	-	476.8
Water Control and Mngt. System					1,064.8	1,064.8				-		0	1,064.8	18/6/07	12/7/07	12/7/07	1,064.8	-	1064.8
<b>Sub-total-Agriculture</b>	<b>7,200.0</b>	<b>6,171.1</b>	<b>10,206.0</b>	<b>770.1</b>	<b>1,064.8</b>	<b>25,412.0</b>	<b>3,817.0</b>	<b>1,017.8</b>	<b>2,575.8</b>	<b>-</b>	<b>0</b>	<b>7,411</b>	<b>18,001.4</b>				<b>25,412</b>	<b>16,166</b>	<b>1,835</b>
<b>B. Transport</b>																			
Trans-Kgalagadi Road	18,500.0					18,500.0	45.4					45.41	18,454.6	25/11/91	13/5/92	9/9/93	18,500.0	18,454.6	0
Sebele Airport Study	650.0					650.0	12.1					12.1	637.9	8/2/1978	5/5/1978	9/5/78	650.0	637.9	0
Gaborone International Airport	8,000.0					8,000.0	129.9					129.91	7,870.1	23/10/79	20/6/80	14/7/81	8,000.0	7,870.1	0
Rural Roads Project	15,000.0					15,000.0	2,566.0					2566.04	12,434.0	23/6/83	8/10/83	31/12/87	15,000.0	12,434.0	0
Serewe-Orapa Road	22,740.0					22,740.0	13,462.9					13462.94	9,277.1	15/11/84	17/10/85	6/2/86	22,740.0	9,277.1	0
Rural Roads II	10,650.0					10,650.0	-					0	10,650.0	23/3/87	3/10/87	3/2/88	10,650.0	10,650.0	0
Nata Maun Road	7,770.0					7,770.0	-					0	7,770.0	23/6/88	2/3/89	21/3/90	7,770.0	7,770.0	0
Trans-Kgalagadi Road		10,592.1				10,592.1		477.5				477.53	10,114.6	25/11/91	13/05/92	9/9/1993	10,592.1	10,114.6	0
Lobatse Kanye Road Const.		4,605.3				4,605.3		42.5				42.5	4,562.8	12/12/75	1/4/76	7/2/77	4,605.3	4,562.8	0
Nata-Maun Studies		1,381.6				1,381.6		303.5				303.53	1,078.1	28/6/85	4/2/86	12/1/88	1,381.6	1,078.1	0
Rural Roads II		6,815.8				6,815.8		69.0				69.03	6,746.8	23/3/87	3/10/87	3/2/88	6,815.8	6,746.8	0
Road Maintenance Study		1,151.3				1,151.3		423.8				423.76	727.6	27/88/90	31/1/91	21/6/91	1,151.3	727.6	0
<b>Sub-Total-Transport</b>	<b>83,310.0</b>	<b>24,546.1</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>107,856.1</b>	<b>16,216.4</b>	<b>1,316.4</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>17532.75</b>	<b>90,323.3</b>				<b>107,856.1</b>	<b>90323.3</b>	<b>0</b>
<b>C. Water and Sanitation</b>																			
Gaborone Lobatse Water Supply	4,000.0					4,000.0	0.9					0.86	3,999.1	23/6/88	3/2/1989	30/1/90	4,000.0	3,999.1	0
North-East Rgion Water Dev.		322.4				322.4		16.5				16.46	305.9	15/10/75	1/4/1976	21/2/90	322.4	305.9	0
Gaborone Lobatse Water Supply		2,440.8				2,440.8		105.0				105	2,335.8	23/6/88	30/5/89	21/2/90	2,440.8	2,335.8	0
<b>Sub-Total-Water and Sanitation</b>	<b>4,000.0</b>	<b>2,763.2</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>6,763.2</b>	<b>0.9</b>	<b>121.5</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>122.32</b>	<b>6,640.8</b>				<b>6763.16</b>	<b>6640.83</b>	<b>0</b>
<b>D. Social</b>																			
Secondary Professional School I	8,160.0					8,160.0	5,763.2					5763.24	2,396.8	26/6/85	17/10/85	9/7/87	8,160.0	2,396.8	0
Education IV	25,074.0					25,074.0	5,837.7					5837.65	19,236.4	23/3/89	30/5/89	13/2/90	25,074.0	19,236.4	0
Education V	11,500.0					11,500.0	4,006.0					4005.98	7,494.0	29/10/90	9/5/91	20/3/92	11,500.0	7,494.0	0
Education III	25,500.0					25,500.0						0	25,500.0	25/11/87	29/02/88	2/3/89	25,500.0	25,500.0	0
Francistown Hospital Const.	17,960.0					17,960.0	3,003.9					3003.86	14,956.1	27/9/83	10/5/84		17,960.0	14,956.1	0
Secondary Teachers Tr College		7,368.4				7,368.4		149.8				149.78	7,218.6	24/8/81	5/3/82	5/2/83	7,368.4	7,218.6	0
Secondary Schs. Vocat. Training		6,447.4				6,447.4		149.2				149.19	6,298.2	26/8/85	17/10/85	30/5/85	6,447.4	6,298.2	0
Education IV		4,605.3				4,605.3		2.3				2.31	4,603.0	23/3/89	30/5/89	13/2/90	4,605.3	4,603.0	0
Education V		4,900.0				4,900.0		308.1				308.06	4,591.9	29/10/90	9/5/1991	20/3/92	4,900.0	4,591.9	0
Education V		460.5				460.5		23.6				23.63	436.9	29/10/90	31/1/91	20/3/92	460.5	436.9	0
Education III		18,807.9				18,807.9		93.5				93.47	18,714.4	25/11/87	29/2/88	2/3/89	18,807.9	18,714.4	0
Training of Health Personnel		4,144.7				4,144.7		64.9				64.93	4,079.8	15/10/75	1/4/76	6/8/76	4,144.7	4,079.8	0
<b>Sub-Total Social</b>	<b>88,194.0</b>	<b>46,734.2</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>134,928.2</b>	<b>18,610.7</b>	<b>791.4</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>19402.1</b>	<b>115,526.1</b>				<b>134,928.2</b>	<b>115,553.1</b>	<b>0</b>
<b>E. Power</b>																			
Electricity Network	20,000.0					20,000.0		6,661.1				6661.05	13,339.0	30/9/82	28/10/82	22/9/83	20,000.0	13,339.0	0
<b>Sub-Total Power</b>	<b>20,000.0</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>20,000.0</b>	<b>-</b>	<b>6,661.1</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>6661.05</b>	<b>13,339.0</b>				<b>20,000.0</b>	<b>13,339.0</b>	<b>0</b>
<b>F. Communication</b>																			
Telecommunications I	2,200.0					2,200.0		44.8				44.79	2,155.2	6/11/78	10/3/74	4/6/75	2,200.0	2,155.2	0
Telecommunications III	10,000.0					10,000.0		199.9				199.9	9,800.1	27/2/81	15/5/81	30/6/82	10,000.0	9,800.0	0
Telecommunications II	10,000.0					10,000.0	5,117.9					5117.85	4,882.2	12/11/80	18/2/81	8/6/82	10,000.0	4,882.2	0
<b>Sub-Total Communications</b>	<b>22,200.0</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>22,200.0</b>	<b>5,117.9</b>	<b>244.7</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>5362.54</b>	<b>16,837.5</b>				<b>22,200.0</b>	<b>16,837.4</b>	<b>0</b>
<b>G. Finance</b>																			
First Line of Credit to NDB	5,000.0					5,000.0	3,841.5					3841.46	1,158.5	21/12/82	5/11/83	12/5/84	5,000.0	1,158.5	0
Second Line of Credit to NDB	30,710.3					30,710.3	13,959.2					13959.23	16,751.1	10/8/04	11/2/05	9/12/05	30,710.3	16,751.1	0
Agricultural Line of Credit		4,605.3				4,605.3		2,306.6				2306.56	2,298.7	21/1/88	29/2/88	10/4/89	4,605.3	2,298.7	0
<b>Sub-Total Finance</b>	<b>35,710.3</b>	<b>4,605.3</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>40,315.6</b>	<b>17,800.7</b>	<b>2,306.6</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>20107.25</b>	<b>20,208.3</b>				<b>40,315.6</b>	<b>20,208.3</b>	<b>0</b>
<b>H. Multi sector</b>																			
Support to Vision 2016				245.7		245.7				0		0	245.7	27/10/06	1/3/07		245.7	-	245.65
Corporate Governance Code				151.6		151.6				0		0	151.6	14/11/2006	1/3/07		151.6	-	151.57
<b>Sub-Total-Multi Sector</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>397.2</b>	<b>-</b>	<b>397.2</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>397.2</b>				<b>397.2</b>	<b>-</b>	<b>397.22</b>
<b>Grand Total</b>	<b>260,614.3</b>	<b>84,819.7</b>	<b>10,206.0</b>	<b>1,167.3</b>	<b>1,064.8</b>	<b>357,872.1</b>	<b>61,563.5</b>	<b>12,459.3</b>	<b>2,575.8</b>	<b>-</b>	<b>0</b>	<b>76,599</b>	<b>281,273.5</b>				<b>357,872.1</b>	<b>279,068.3</b>	<b>2,232</b>

**BOTSWANA**  
**PANDAMATENGA AGRICULTURAL INFRASTRUCTURE DEVELOPMENT PROJECT**  
**STATUS OF ACTIVE PROJECTS AS AT 31 MARCH 2008**

<b>Project</b>	<b>Date Approved</b>	<b>Loan/Grant Amount (UA million)</b>	<b>% Disbursed</b>
1. LOC to the National Development Bank of Botswana	September 2004	39.915 (ADB Loan)	55
2. Agriculture Sector Review	16 February 2007	0.477 (MIC Grant)	0
3. Capacity Building to Min of Agriculture	27 February 2007	0.293 (MIC Grant)	0
4. Improved Water Control for Pandamatenga	18 June 2007	1.10 (AWF Grant)	74