U10329C

TECHNICAL REPORT AND PROJECT IMPLEMENTATION PLAN

PROPOSED WATER SUPPLY SCHEME

FOR

BOTSWANA, MIDDELPUTS AREA

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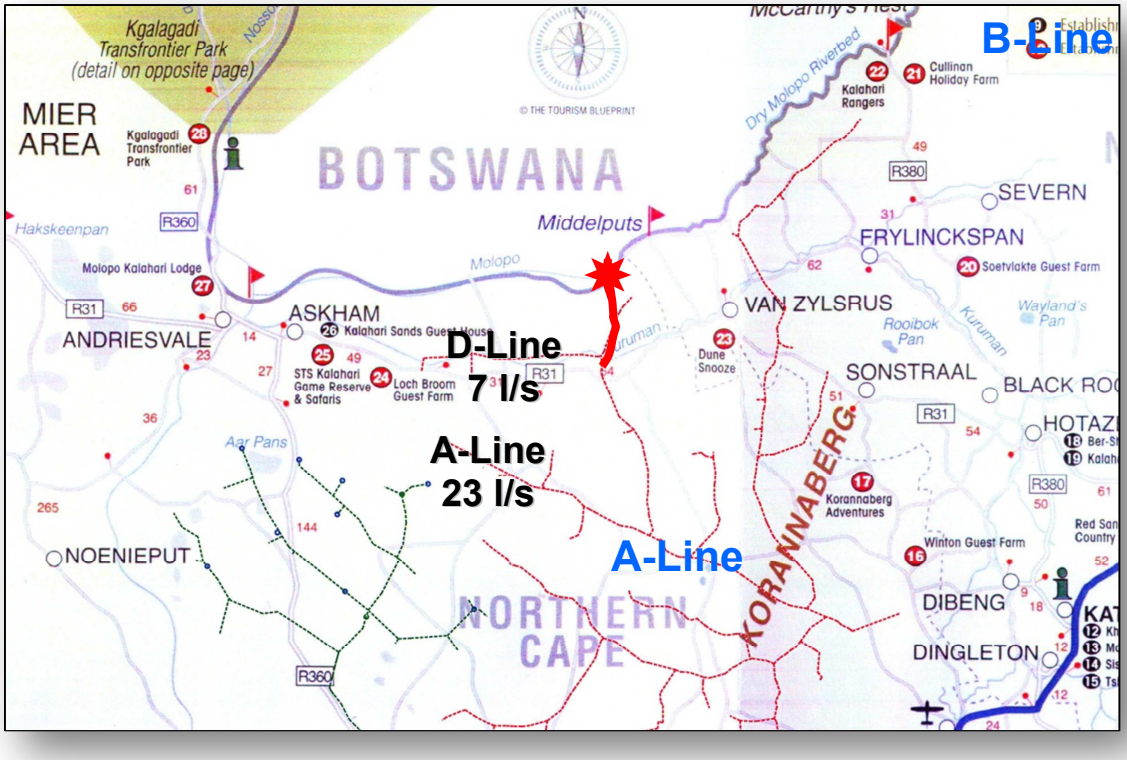
1. INTRODUCTION

The Middelputs area is located adjacent to the Botswana Border. The area is rural and live stock farming is the main income source. The Botswana Government identified the need for potable water for the Middelputs area as a priority.

Consequently, BVi Consulting Engineers in Upington were appointed by the Kalahari East Water Users Association to investigate, design and draw up contract documents for the construction of a pipeline to extract potable water from the the Kalahari-East Water Supply Scheme, to serve the Middelputs area.

In order to achieve this, the D-Line of the Kalahari East Water Supply Scheme was identified as an extraction point to deliver the required 7l/s to the Middelputs area.

The Kalahari-East Water Supply Scheme



2. DESCRIPTION OF THE PROJECT

The source of water will be an extraction point on the D-Line of the Kalahari East Water Supply Scheme.

The pipeline system comprises the following distinct components:

- **GRAVITY MAIN PIPE LINE**

  A 250mm diameter PVC **gravity main** will be utilized. The water will flow under gravity for a distance of approximately 19km. The gravity main will be fitted with pressure reducing and pressure relief valve combinations to improve the economy of the pipeline by enabling the use of longer lengths of lower pressure class pipe.

3. LAND USE

The route which the project will follow is adjacent to an existing pipeline for the first 14km. This route is already registered as a servitude. For the last 5km the route will be next to a subordinate road, nr. 340. The land owners will be informed of the planned development and permission will be obtained.

It is unlikely that the land use of this area will change in future.

4. IMPACT ON THE ENVIRONMENT AND WATER RELATED MATTERS

No Environmental Impact Study is required as the new pipeline will be constructed next to the existing D-Line pipeline for approximately 14km where it will turn to follow the existing subordinate road, nr. 304, for approximately 5km.

Direct impact on the environment will be minimal. Certain mitigation measures will however be required during construction to minimize the effect of temporary human residence. Issues such as sewage disposal, solid waste disposal and consumption of firewood are issues that will need special attention.

4.1 Recommendations:

The following recommendations with regards to minimizing the impact on the environment by this project were made:

i. It is recommended that the applicant ensures that all the regulations required by the following are adhered to:

   - The National Water Act, 1998 (Act 36 of 1998)
   - The Environmental Conservation Act, 1989 (Act 73 of 1989)
   - The National Forestry Act, 1998 (Act 84 of 1998)
   - The National Heritage Resources Act, 1999 (Act 25 of 1999)

ii. Where the proposed pipeline will cross natural watercourses, it must be buried at least 1,5m below the riverbed.

iii. On completion of the contract, all ablution facilities such as pit latrines must be filled up and rehabilitated by the contractor.

iv. No toilets (pit latrines) will be put up within a radius of 100m from a water source.

v. Solid waste containers must be provided by the contractor and emptied at regular intervals at an approved solid waste disposal site.

vi. The visual impact of the pipeline where it is above the surface should be minimized.

5. GEOTECHNICAL / GEOLOGICAL DISCUSSION

No Geotechnical report is required as the pipeline will be constructed next to the existing D-Line pipeline of the Kalahari East Water Supply Scheme for the first 14km. Test pits will be excavated for the last 5km of pipeline to familiarize the potential contractors with the geology of the area.

The geology of the area consists mainly of sand dunes, with flat parts for the last ±3km.

From an engineering point of view, it is estimated that 10% of the trench excavations will be classified as hard rock and 90% will be classified as soft material.

6. TRAFFIC IMPACT STUDY

Not required, the area is rural and the project does not intersect any official traffic routes. Precautionary safety measures with respect to road traffic will be implemented during the construction period when the contractors vehicles will utilize the gravel road for haul purposes.

7. DESIGN STANDARDS

The project was designed taking into account all regulatory requirements as well as the conventional design standards used in the civil engineering industry.

The following design standards were utilized for this project:

- Standard Specifications for Civil Engineering Construction: SABS 1200 series
- Guidelines for Human Settlement Planning and Design: CSIR 2000
- General Conditions of Contract for use in connection with Works of Civil Engineering Construction: SAICE 1990
- SABS 0162: Code of Practice for structural use of Steel: SABS 1984
- SABS 241: Specification for Water for Domestic Use: SABS 2001
- National Building Regulations: Act 29 of 1996
- SANS 815 / SABS 815:1978 - Shouldered-end pipes and fittings, and couplings
- SANS 10112 / SABS 0112:2003 - The installation of polyethylene and poly(vinyl chloride)(PVC-U and PVC-M) pipes
- National Water Act 1998, and Regulations
- National Environmental Management Act 1998, and Regulations
- Occupational Health and Safety Act 1993, and Regulations
- Specifications which were project specific

8. POSSIBLE PROBLEMS THAT MAY ARISE AS A RESULT OF THE PROJECT

With the physical project itself, no problems are foreseen at this stage. Maintenance of the project will be included in the maintenance program of Kalahari East Water Utility.

Some environmental issues may however become a problem during the construction period should they not be managed sufficiently from the commencement of the construction phase. The following issues are applicable:

- During the construction phase, it will be required for the contractor to provide a campsite(s) with ablution facilities for his workers. If not properly managed, these facilities may result in serious pollution issues arising.

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9. LIAISON WITH PARTIES CONCERNED

Currently there is liaison with the following parties being stakeholders in the project:

- Botswana Government – Project Sponsor/Beneficiary
- Kalahari East Water Supply Scheme - Client
- Department of Water Affairs (SA)
- Department of Agriculture, Land Reform, Environment and Conservation (SA)
- Siyanda District Municipality (SA)
- Landowners

10. COMPARISON OF ALTERNATIVES

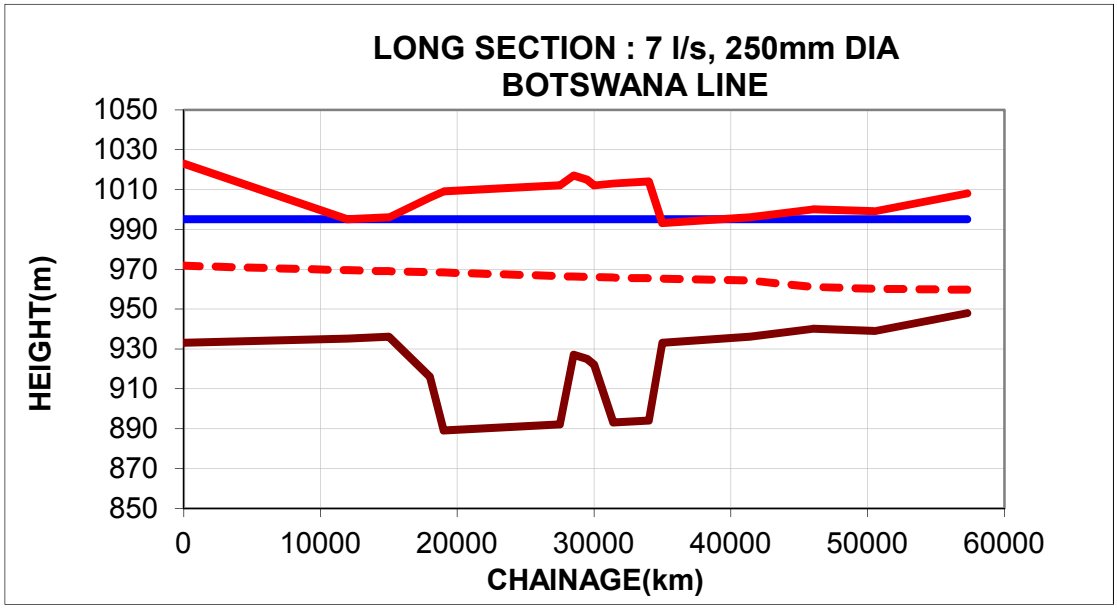
Two possible alternatives were investigated with regards to cost, practical application and sustainability of supply:

Two possible options were identified, i.e.:

1. 250mm Gravity Main
2. 160mm Gravity Main with pump station

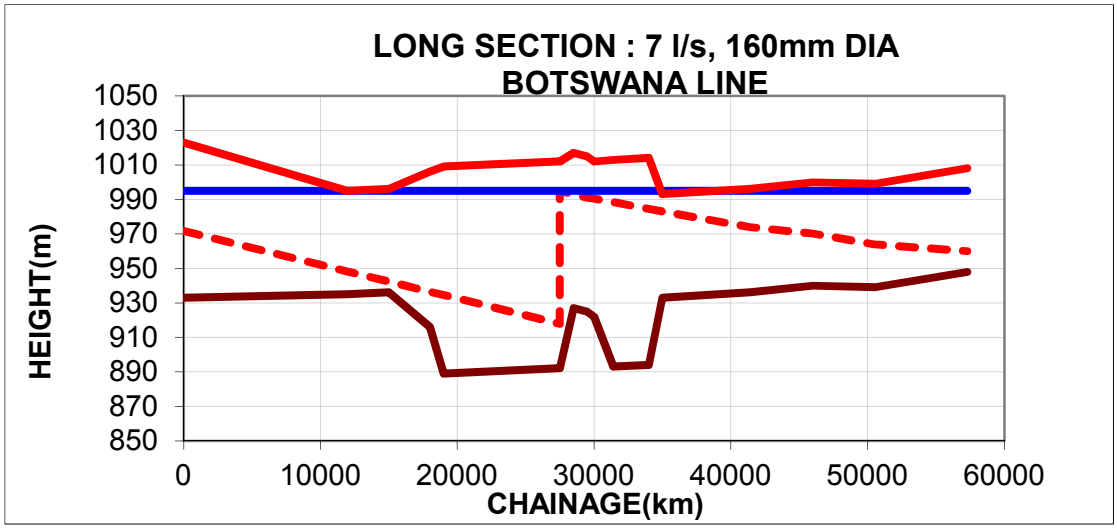
10.1 250mm Gravity Main:

A 250mm diameter pipeline is needed to convey 7l/s under gravity to Middelputs. From there a 160mm diameter pipeline is needed to serve the last town as a result of the low available pressure.



10.2 160mm Gravity Main with pump station:

A 160mm diameter pipeline is needed to convey 7l/s to Middelputs. From there a 110mm diameter lined is needed to serve the last town. A pump station must boost the flow in this case.



10.3 Motivation for the chosen alternative

After having considered the two possible options for the sustainable delivery of water to the Middelputs area, it was decided that a 250mm gravity main pipeline from the extraction point on the D-Line will be the optimal option for the following reasons:

- The 250mm gravity main will be able to deliver the desired 7l/s to Middelputs as well as to the last town if extended later under gravitation. Thus, no pumpstation is needed to boost the flow to the last town.

- The 250mm gravity main will also be more cost effective from a maintenance perspective, taking into account the additional mechanical maintenance required for a pump station.

11. TIME PLAN WITH MILESTONES

NR	DESCRIPTION	DATE
1.	Appointment of Professional Service Provider	03/11/2011
2.	Finalize contract between BWU and KEWUA	25/11/2011
3.	Preparation and advertising of documentation for Tenders/Quotes	05/12/2011
4.	Evaluation of quotations and recommendation	27/01/2012
5.	Approval of project cost	03/02/2012
6.	Appointment of Contractors	13/02/2012
7.	Handing over of site – Construction starts	20/02/2012
8.	Handing over - Construction complete	29/06/2012

12. COST ESTIMATE

The construction costs for the 250mm ø gravity main are estimated to be as follows:

Summary of Project Cost

1.	SECTION 1 : PRELIMINARY AND GENERAL	R 1,399,293.25
2.	SECTION 2 : PIPE TRENCHES - RISING MAIN	R 1,977,586.73
3.	SECTION 3 : PIPE LINE - GRAVITY LINE	R 4,041,642.00
4.	SECTION 4 : MISCELLANEOUS ITEMS	R 977,237.53
	SUB-TOTAL	**R 8,395,759.51**

Contingencies: 10%	R 839,575.95
Professional Fees, Full time site supervision and Disbursements:	R 1,290,000.00
TOTAL	**R 10,525,335.46**
VAT @ 14%	R 1,473,546.96
TOTAL ESTIMATED PROJECT COST	**R 11,998,882.42**

13. SPECIAL CONDITIONS OF CONTRACT

Not applicable. The General Conditions of Contract for Civil Engineering Construction Works (1990 Edition) will apply to the project.

14. EXPROPRIATION ISSUES

The route for the pipeline is adjacent to an existing pipeline within a servitude, thus no expropriation issues is foreseen. The landowners will be notified of the planned development and permission will be obtained.

15. SUMMARY AND RECOMMENDATIONS

This document serves as a technical report to convey to the client, the Kalahari East Water Users Association, in broad terms what is suggested to ensure a long-term sustainable water supply to the Middelputs area.

It is recommended that a permanent pipeline extracting water from the Kalahari–East pipeline (D-Line) be constructed to assist the Botswana Government with water related challenges in the Middelputs area.