

MOLETE RESORT: Water Supply Technical Report

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1. INTRODUCTION

1.1 THE BRIEF

GMBC appointed Lamela Consulting for the Design and the implementation of Molete Resort development project. The project consists of main areas such as Golf course, sports and recreation centre and Shalets for accommodation. The agreed scope of work between Lamela Consulting and GMBC is the provision of water reticulation for the above mentioned project.

1.2 PROJECT IDENTIFICATION

Project Name: Molete Resort development project

1.3 PROJECT LOCATION

The project is located by the Boons off the R509 road in North-West Province. The project location is shown on the table below.

No.	Area/Project name	Latitude	Longitude
1	Molete Resort	25°98'41.79"	27°23'63.76"

2. SCOPE OF APPOINTMENT

The scope of works as agreed between GMBC and Lamela consulting comprises of the following:

- Preparation of Technical Reports
- Preparation of Preliminary Design Report
- Preparation of Detailed Design Report

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- Tender Stage
- Contract Monitoring

3. POPULATION

It shall be noted that the resort mainly uses water for showers and toilets, laundry, washing up, cleaning and irrigation of lawns and landscaping. Due to the fact that Lawns and landscaping can consume large volumes of water for irrigation, Lamela consulting proposes to utilize rain water harvesting and re-using grey water for irrigation, which therefore implies that the water consumption will be based on normal household/office usage.

The table below represents the areas to be reticulated.

Table2: Water requirements

Item No	Village	No off	Water reticulation required
1	Shalets units	105	Yes
2	Informal Market Stalls	1	Yes
3	Security Check Point	1	Yes
4	Training Centre	1	Yes
5	African Village	1	Yes
6	Restaurant and Entertainment	1	Yes
7	Estate housing	1	Yes
8	Sports and Recreation centre	1	Yes
9	Conference centre	1	Yes
10	Playpark	1	Yes
11	Public Pool	1	Yes
12	Affordable accomodation	20	Yes
13	Amphitheatre	1	Yes
14	Golf course	1	No
15	Caravan park	1	Yes

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16	Admin and reception, and staff accommodation (1472m ²)	1	Yes
17	Pavalion	1	Yes

4. STATUS QUO/ EXISTING INFRASTRUCTURE

4.1. WATER SOURCE

The water source is proposed to be surface water as the ground water availability and quality is not known at this stage. Lamela consulting is proposing that a pipe line be connected from the municipality reservoir (either command /village reservoir) which will then be transferred to the Resort's reservoir. The reservoir sizing will be done on this report.

4.2. WATER DEMAND ANALYSIS

4.2.1. DESIGN CRITERIA

Table3: General Design Criteria

	Description	values
1	Design per capita water consumption: Standpipe	25 l/cap/day
2	Design per capita water consumption: Yard connection	60 l/cap/day
3	Design per capita water consumption: House connection	120 l/cap/day
4	Water treatment works loss factor	$LF_w = 10\%$
5	Conveyance water loss factor	$LF_r = 10\%$
6	Gross Annual Average Day Demand	$GAADD = (1 + LF_r) * AADD$
7	Summer peak factor	1.2 min to 1.5 max
8	Summer Daily Demand: WTW, raw water and clean water pumps	$SDD_{ww} = SPF * GAADD * (1 + LF_w)$
9	Summer Daily Demand: Bulk	$SDD_{pl} = SPF * GAADD$ Design pumping period = 20 hrs/day
10	Summer Daily Demand: Borehole pumps	$SDD_{pu} = SPF * GAADD$ Design pumping period = See below
11	Storage reservoirs	48 hrs * AADD (pumped from one source) 36 hrs * AADD (pumped from multiple sources) 24 hrs * AADD (gravity source)
12	Elevated tank/tower	4 hrs * AADD
13	Design for pipeline flow between main storage and elevated tank	2 * AADD (gravity) 2 * AADD (pumped 20 hrs/day)
14	Design peak factor for reticulations	$DPF = 2$ to 3
15	Design peak flow rate for reticulation	$DPFR = 3.0 \times SDD$
16	Residual pressures: Standpipe Yard connection House connection Maximum under static	10 m 10 m 12 m at highest point 90 m

Table 4: Design Period

COMPONENT	DESIGN PERIOD	IMPLEMENTATION PERIOD
Bulk Supply lines	10 years	10 years
Treatment works	N/A	N/A
Reservoirs	10 years	10 years
Reticulation mains	10 years	10 years
Electrical equipment	15 years	15 years
Mechanical equipment	10 years	10 years

4.2.2. WATER DEMAND

In accordance with the Technical Guidelines for the Development of Water and Sanitation Infrastructure (2nd Edition: 2004), a design water usage of 120 l/capita/day is used in the calculations of water demand in Table 7 below. For the design criteria, a loss factor of 10% and a summer peak factor of 1.5 were used.

The CSIR redbook was used in estimating the water demand for areas of common usage such as public places and office blocks , based on the floor area, figure 9 of the CSIR redbook was used to estimate the demand .

Below are some of the estimates used to get the water demand of each area.

Shallets

Design per capita water consumption: House connection	120 l/cap/day
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Number of Shalets units =105

Water consumption =105 *120*2 = 25 200 l/cap/day

Restaurant

As per the CSIR Redbook , assume 90l/seat/day, if the restaurant has 100 seats , water demand =0.19 kl/day.

Table 5: Water demand calculations

Item No	Name	Water Demand		
		AADD (kl/d)	GAADD (kl/d)	SDD (kl/d)
		2017	2017	2017
1	Shalets units	25.2	29.0	43.5
2	Informal Market Stalls	5.0	5.8	8.6
3	Security Check Point	2.0	2.3	3.5
4	Training Centre	0.5	0.6	0.9
5	African Village	1.2	1.4	2.1
6	Restaurant and Entertainment	0.5	0.6	0.9
7	Estate housing	1.0	1.2	1.7
8	Sports and Recreation centre	0.5	0.6	0.9
9	Conference centre	1.0	1.2	1.7
10	Playpark	0.5	0.6	0.9
11	Public Pool	1.0	1.2	1.7
12	Affordable accomodation	1.5	1.7	2.6
13	Amphitheatre	0.5	0.6	0.9
14	Golf course	0.0	0.0	0.0
15	Caravan park	1.0	1.2	1.7
17	Admin and reception, and staff accommodation (1472m ²)	1.8	2.1	3.1
	TOTAL	43	50	75

Note: The above estimates are inclusive of the fire fighting water demands.

4.2.3. STORAGE EVALUATION

Water supply will gravitate from the command reservoir /municipal connection point to the resort reservoir. For storage requirements, a period of 24 hours will be used. {24 hrs * AADD (gravity source)}

Storage required = 43kl/day *1 day =43kl, it shall however be noted that the above mentioned areas do not operate all at once and the whole , hence the provision of 40kl will be adequate.

5. PROPOSAL

We propose that the municipality supplies the resort with a maximum of **75kl/day** which is the summer daily demand.

6. COST RECOVERY PLAN

The municipality should put in place an acceptable billing system .water meter should be installed or prepaid system at the resort's yard and consumer care facility in order to implement effectively the water recovery program should be established.

The provision of these facilities will make it possible for the local Municipality to do cost recovery.

7. ENVIRONMENTAL ASSESMENT

An environmental assessment have been conducted for the above development project and the report is available on request.

8. OPERATION AND MAINTENANCE

The operation and maintenance will be done by the Local Municipality up to the resort's connection point. The internal pumbling will be to the resort's mantainance team

9. TIME PLAN

10.1 PROVISIONAL PROGRAM

Activities	Completion Date
- Appointment of Consultants	October 2016
- Preparation of Technical report	October 2016
- Preparation of design	November 2016
- Preparation of tender	November 2016
- Tender advertisement	December 2016
- Tender Closing	January 2016
- Evaluation of Tender	January 2016
- Tender awards	March 2016
- Site handover	April 2016
- Construction end	April 2017

10.

APPENDIX A

LOCALITY MAP

12.

APPENDIX B

DRAWINGS