

06 July 2022

Ref:Sinakho/S222150-05

The Municipal Manager
 Water Branch
 Buffalo City Municipality
 P.O. Box 134
 East London
 5200

Attention: Mr S Mamane

Dear Sir

NAHOON VALLEY RIDGE DEVELOPMENT – WATER SUPPLY INFRASTRUCTURE DESIGN FOR APPROVAL

We confirm that we have been appointed by Redline Group for the provision of Civil Engineering Services for a new private town housing complex consisting of 39 erven in Nahoon Valley Ridge on Erf 76533 and 76533, the location is indicated on the attached Locality Plan and the Site Layout is indicated on the attached Architects Layout Plan. The erven are in the process of being consolidated and we have completed the design of the Water Reticulation for the development.

The BCMM Water Branch *Guidelines and Standards for the Design of Water Supply* have been used as the basis of the design of the relevant water infrastructure required for this development.

1. Design Parameters

The relevant design parameters used have been summarised in Table 1 below.

Table 1: Design Parameters

Description	Unit	Value
Ave Daily Water Demand Per Household	Litres	500
Summer Peak Factor (SP _F)		1.5
Instantaneous Peak Factor		3.2
Fire flow	l/min	900 – 1,500
Max allowable flow velocity during fire flow	m/s	3.0

Description	Unit	Value
Min residual pressure under peak demand conditions	m	25.0
Min residual pressure under fire flow conditions	m	15.0
Max spacing of fire hydrants	m	240
Min internal diameter of pipe with fire hydrant for pipe length < 50m	mm	76
Minimum cover to pipelines under: Sidewalks	m	0,6
Minimum cover to pipelines under: Roadways	m	1,0

Drawings now submitted for your Department's approval prior to implementation are as follows:

Locality Image	Setplan Image showing location of Erven
2022-AR-DES-0001	Essential Dimensions Site Layout Plan
S222150-WRL-01	Water Reticulation Layout
S222150-HC-01	Erf Connection Details
S222150-WD-01	50mmØ & 75mm Ø Water Valve Chamber Details
S222150-WD-02	110mmØ Water Valve Chamber Details
S222150-WD-03	Thrust Block Details
S222150-WD-04	Twin Booster/Suction Hydrant Connection & Above Ground Fire Hydrant Details
C002-03-17	Water Layout Plan – as built for Nahoon Valley Development

We refer to the above project in respect to the water related infrastructure and comment as follows:

2. Design of Water Infrastructure:

- The Average Annual Daily Demand (AADD) was calculated for the full development which consists of 39 erven as follows:

$$\begin{aligned} \text{AADD} &= 500 \times 39 \\ &= 19,500 \text{ } \ell \end{aligned}$$

Therefore, the total design Average Annual Daily Water Demand (AADD) would be 19.5 kilolitres per day.

- Design Flow Rate (DFR) was calculated as 2 x Annual Average Demand as follows:

$$\begin{aligned} \text{DFR} &= 2 \times (\text{AADD}) \\ &= 2 \times 19,500 \\ &= 39,000 \text{ } \ell \\ &= 39.0 \text{ k}\ell \end{aligned}$$

The total Design Flow Rate is therefore 39 kilolitres per day.

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- An allowance of 10% needs to be made to account for water losses Flow as follows:

$$\begin{aligned} \text{GAADD} &= (\text{DFR}) \times 1.1 \\ &= 42.90 \text{ k}\ell \end{aligned}$$

- Daily Peak Flow Rate for the development was calculated as follows:

$$\begin{aligned} \text{DPFR} &= (\text{GAADD}) \times 3.2 \\ &= 137.28 \text{ k}\ell \\ &= 1.59 \text{ }\ell/\text{sec} \end{aligned}$$

- Daily Summer Peak Flow Rate for the development was calculated as follows:

$$\begin{aligned} \text{DSPFR} &= (\text{GAADD}) \times 3.2 \times 1.5 \\ &= 205.92 \text{ k}\ell \\ &= 2.38 \text{ }\ell/\text{sec} \end{aligned}$$

Therefore, the total Daily Summer Peak Flow Rate for these households would be 2.38 ℓ/sec .

- Fire Flow Rate for the development was assumed to be between 900 and 1,200 litres per minute and the reticulation would need to cater for the Design Summer Peak Flow rate plus Fire Flow. A fire flow rate of 20 ℓ/sec was assumed and the peak flow in the pipes was therefore calculated as follows:

$$\begin{aligned} \text{Peak Flow in Pipes} &= \text{DSPFR} + \text{Fire Flow} \\ &= 2.38 + 20 \text{ }\ell/\text{sec} \\ &= 22.38 \text{ }\ell/\text{sec} \end{aligned}$$

Therefore, the total Daily Summer Peak Flow Rate for these households would be 2.38 ℓ/sec .

3. Pipe Sizing:

The pipe sizing has been calculated for a number of scenarios as follows:

- Maximum Velocity during Fire Flow in 110mm diameter pipe at entrance to property:

$$\begin{aligned} \text{Max Flow Rate} &= 22.38 \text{ }\ell/\text{sec} \\ \text{Max Velocity} &= 2.36 \text{ m/sec} \end{aligned}$$

The maximum velocity in the 110mm diameter pipe under conditions of fire flow plus peak flow is therefore 2.36 m/sec which is less than the allowable flow rate of 3.0 m/sec.

- Maximum Velocity in gravity main in 50mm diameter pipe (supporting a maximum of eight town houses):

Max Flow Rate = 0.49 l/sec

Max Velocity = 0.25 m/sec

The maximum velocity in the 50mm diameter pipe under conditions of peak flow and serving the maximum of eight sites is therefore 0.25 m/sec which is less than the allowable flow rate of 1.0 m/sec.

All pipes would be uPVC Class 12 pipes with Cast Iron fittings, except for bends which would be uPVC Class 16.

4. Fire Flow:

The BCM Guideline and Standards for Design Water Supply defines Nahoon Valley Development in East London as Low Fire Risk Areas. The requirements are therefore as follows:

- Total fire flow – 2 hour duration at 900 to 2000 litres per minute and 900 to 1200 litre per hydrant.
- Minimum pressure – 15 meter (1.5 bar) and 7m (0.7 bar) per hydrant.
- Low Fire Risk areas require hydrants to be a maximum of 240 metres apart.

The layout plan indicates three fire hydrants on the which would be sufficient for the development and in addition, a fire booster point has been provided at the entrance to the site.

5. Bulk Connection:

The development of Nahoon Valley accounted for these two sites and hence the existing water reticulation in this area provides for this development. Drawing C002-03-17 indicates the layout plan of the existing water reticulation and the recommendation is that this development connect to the existing 160mm diameter pipe.

We trust that you are satisfied with the above design and are happy to meet and discuss the matter further should this be necessary.

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DL de Wet, Pr.Eng. BSc (Eng) MSc (Eng)
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Reg No. 2005/036498/23



Please let us know if you have any queries relating to the drawings above or clarification input. Your feedback and approval of the drawings is eagerly anticipated.

Yours faithfully

A handwritten signature in black ink, appearing to read 'D L de Wet', with a long horizontal flourish underneath.

D L de Wet Pr.Eng.

Encl:

Drawings x 9

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