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26 March 2018

Chief Engineer: Water Services Planning
City of Ekurhuleni
P O Box 215
BOKSBURG
1460

Attention: Mr. Mthokozisi Mlotshwa

Dear Sir,

PROPOSED RESIDENTIAL DEVELOPMENT OF LEACHVILLE X2- BRAKPAN: ASSESSMENT OF IMPACT ON SEWER SYSTEM AND REQUIRED WORKS

As requested by JT Evolve on behalf of their client, Metroprojects Developments (Pty) Ltd, we have investigated the capacity of the sewer system to drain the proposed development and comment as follows:

1. EXTENT OF DEVELOPMENT

As indicated in the information provided to us, the proposed development will comprise of the following land use distribution:

LAND USE	NUMBER OF STANDS/UNITS	TOTAL SITE AREA (ha)	DENSITY (Units/ha)
RESIDENTIAL 3	810	47.281 (90%)	40
STREETS	-	5.253 (10%)	-
TOTAL	**810**	**52.534**	**40**

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The location and layout of existing sewer services in the vicinity of the site is indicated on Figure A. The current sewer drainage areas of the area under discussion are indicated on Figure B. We confirm that the site is located within the urban development boundary, as defined in the 2010/2011 Metropolitan Spatial Development Framework (MSDF).

We can also confirm that provision was not made for the proposed development in the Vlakplaats sewer master plan. Therefore, the master plan will be updated accordingly.

2. SEWER SYSTEM

2.1 Sewage flow:

The water demand and resulting sewage flow for the proposed development is estimated as follows:

LAND USE	UNIT	QTY	UNIT DEMAND (kl/day)	TOTAL (kl/day)
RESIDENTIAL 3	No.	810	0.68	550.8
SUB-TOTAL				**550.8 kl/d**
PLUS UAW (15% OF TOTAL AADD)				**97.2 kl/d**
TOTAL AVERAGE DEMAND (AADD)				**648.0 kl/d**
PEAK DAILY DRY WEATHER SEWAGE FLOW				**9 l/s**

The unit water demand for each unit of development was combined with a unique sewer unit hydrograph for the specific land use (derived over history for the flow pattern of similar types of development) and yielded a peak dry weather sewage flow of approximately 9 ℓ/s for the development.

2.2 Existing Sewer Services, Proposed Connection Point and Proposed Upgrading

Drainage areas (See Figure B)

The proposed development currently falls within the Leachville X2 pump station drainage area. The Leachville X2 pump station pumps into the Vlakplaats WWTP drainage area. Currently the sewage flow drains simultaneously to the Vlakplaats- and Waterval WWTP via the diversion structure and bypass system upstream of the Vlakplaats WWTP. No changes to the current drainage area boundaries are foreseen between the current- and ultimate future drainage scenarios that will affect the developments.

Sewage pump station capacities

The current pumping capacity of the Leachville X2 pump station is unknown but it is estimated to be approximately 35 ℓ/s. We hereby recommend that a set of flow measurements is to be taken at the pump station to confirm its current pumping capacity. The required pumping capacity to accommodate the existing flow can be calculated as follows:

Required pumping capacity = Max inflow / 0.7
= 11 / 0.7
= 15.7 l/s

With the inclusion of the additional flow from the proposed development, the required pumping capacity will increase to approximately 23 ℓ/s. Should the requested flow measurements indicate a pumping capacity of less than 23 ℓ/s, the pump station must be upgraded as per the master plan (Master plan item number MP – PS_Leachville X2) to deliver 75 ℓ/s. If the flow measurements indicate a pumping capacity in excess of 23 ℓ/s, no upgrading to the pump station is required.

Main outfall sewers

Existing main outfall sewers:

The most critical affected main outfall sewers are as follows:

- The 675Ø Rooikraal bulk outfall sewer that drains southwards from Marlands (point D to point E on Figure C)
- The 1200/1350Ø Mapleton/Vlakplaats bulk outfall sewer which in a south western direction (point F to point H on Figure D).

According to our hydraulic analysis both of these pipes are already flowing at full capacity in dry weather flow conditions and experience overflows during wet weather conditions. The additional sewage generated by the proposed development will exacerbate the existing capacity problems experienced in these sewers.

According to the master plan, the 675Ø Witfield/Marlands bulk outfall sewer must be replaced by a new 1200Ø pipe (master plan items MP – EW_7.2, EW_7.3 and EW_8.1, a portion of master plan project VP5) from point D to point E as indicated on Figure C. Before upgrading of the pipe is planned, however, we recommend that a detailed condition survey be conducted. If the survey indicates that the pipe is still in a good condition, the option of constructing a parallel 1050Ø can be considered.

Furthermore, we recommend that the 1200/1350Ø Mapleton/Vlakplaats bulk outfall sewer needs to be surveyed as part of master plan project VP6 in the near future, as indicated from Point F to point H on Figure D.

Future planned main outfall sewers:

No future planned main outfall sewers are affected by or required for the proposed development to proceed.

Connection to existing system, network pipe capacities and required works

Required works and recommended connection points:

The proposed connection points to the existing system are via the new 160Ø pipes (at points A, B and C) to the existing 160Ø sewer pipes, as indicated on Figure A.

Existing network pipe capacities:

According to the master plan, the 160Ø sewer pipe (MP Item – LV_1.4i) must be replaced by a new 250Ø pipe as indicated on Figure A. Before upgrading of the pipe is planned, however, we recommend that a detailed condition survey be conducted.

Apart from the abovementioned required upgrade, no existing network sewers will be affected by the additional sewage flow.

Future provisions:

Due to the general cadastral layout and natural topography of the area no provision has to be made for any further future developments to drain through the site.

Wastewater treatment plants

Vlakplaats WWTP:

The Vlakplaats WWTP currently has a treatment capacity of 83 Mℓ/day. The current dry weather inflow into the plant is measured at approximately 90 Mℓ/day with the measured wet weather inflow reaching flows of up to 113 Mℓ/day. The plant, however, is capped at 83 Mℓ/d and all excess flow is currently bypassed to the Waterval WWTP.

Waterval WWTP:

The Waterval WWTP currently has a treatment capacity of 155 Mℓ/day. The current dry weather inflow into the plant is measured at approximately 260 Mℓ/day with the measured wet weather inflow reaching flows of up to 380 Mℓ/day. ERWAT has recently completed the extension of the plant from 105 Mℓ/day to 155 Mℓ/day. The plant will, however, have to be extended further as soon as possible. The effect that the additional sewage flow from the proposed development has on the required extension of the plant is insignificantly small.

3. DEVELOPER CONTRIBUTIONS TO UPGRADING OF INFRASTRUCTURE

GLS hereby confirms that any contributions of the developer to the required construction of infrastructure and/or the upgrading of the existing infrastructure, whether it be in the form of a cash contribution, or in the form of constructing sections of new infrastructure, is a matter to be discussed and agreed upon between the developer and the City of Ekurhuleni (CoE) and ERWAT.

4. SUMMARY RECOMMENDATIONS

In summary we comment as follows:

- The proposed development is to be incorporated into the Leachville X2 pump station drainage area
- A set of flow measurements at the Leachville X2 sewage pump station is required to determine its current pumping capacity
- If the current pumping capacity is less than 23 ℓ/s, the pump station does not have sufficient spare capacity to accommodate the additional sewage flow in which case the pump station must be upgraded to deliver 75 ℓ/s (MP – PS_Leachville X2)
- Upgrading requirements to the existing 675Ø Rooikraal outfall sewer are indicated in Figure C
- Survey/Investigation requirements to the existing 1200/1350Ø Mapleton outfall sewer are indicated in Figure D

- The requirement to construct/survey the above mentioned sewers is already an existing priority and was not caused by the possible increase in sewage flow due to the proposed development
- The 250Ø sewer pipe (MP-Item LV_1.4i) needs to be upgraded, as indicated on Figure A.
- The proposed connection points to the existing system are via the new 160Ø pipe (at points A, B and C) to the existing 160Ø sewer pipes, as indicated on Figure A
- Due to the cadastral layout and natural topography of the area no provision has to be made for any further future developments to drain through the development site
- Further extension of the Waterval WWTP is a critical requirement for all future development within its catchment area.

We trust you will find the abovementioned sufficient in terms of your request. Should you have any further queries, please do not hesitate to contact us. The contact person regarding the above is Dian Pretorius.

Yours sincerely,
GLS CONSULTING

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Per: JL (LOUIS) STRIJDOM