Infrastructure planning

28 March 2024

UDS Africa
9 Electron Street
Techno Park
STELLENBOSCH
7600

Attention: Mr Cobus Louw

Dear Sir,

DEVELOPMENT OF PORTION 28 OF FARM 468 (WELMOED DEVELOPMENT), STELLENBOSCH: CAPACITY ANALYSIS OF THE BULK WATER & SEWER SERVICES

This is an update of the bulk water and sewer capacity investigation report performed for development on portion 28 of Farm 468, dated 25 July 2023. In this updated report phasing for the different development areas within the larger development node was included in order to comment on the phasing of the proposed infrastructure upgrades.

Your request for GLS Consulting to investigate and comment on the bulk water supply and sewer discharge of the proposed development (mainly residential development of portion 28 of Farm 468, Stellenbosch), refers.

This document should inter alia be read in conjunction with the Water Master Plan (performed for the Stellenbosch Municipality) dated June 2023 and the Sewer Master Plan dated June 2023.

Future development areas V1.1 to V1.9, which include the proposed development area, were conceptually taken into consideration for the June 2023 master plans for the water and sewer networks.

1. WATER DISTRIBUTION SYSTEM

1.1 *Distribution zone*

Portion 28 of Farm 468 is located on the western side of the Baden Powell Drive (R310 Main Road) adjacent to the existing Lynedoch Eco Village. The existing Lynedoch development is supplied with bulk water from the Polkadraai rural water supply scheme, with alternative supply possible from the Faure rural water supply scheme.

The master planning indicated that the development area below the 60 m contour on portion 28 of Farm 468 should be accommodated in the existing Faure water supply scheme. The connection to the existing system should be done on the 160 mm diameter pipe on the corner of the Baden Powell Drive and Annandale Road, as shown on Figure 1 attached. This will serve Phase 1 to Phase 13 of the larger development area.

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Directors: Flip du Plessis, Tsolane Mokoena

Water pressure from the Faure system is insufficient to service the higher lying areas of portion 28 of Farm 468 (areas above the 60 m contour) and it is proposed in the master planning that these areas are supplied with water directly from the recently constructed Skilpadvlei reservoir, located to the north of the proposed development, as shown on Figure 2 attached. This connection will serve Phase 14 of the development.

The development is situated inside the water priority area.

1.2 *Water demand*

The total annual average daily demand (AADD) and fire flows for the proposed development were calculated as follows:

Potion 28 of Farm 468 [(1), (2)]:

• 355 Medium density residential units (40 units/ha) @ 450 L/d/unit		=	159,8 kL/d
• 515 High density residential units (80 units/ha) @ 300 L/d/unit		=	154,5 kL/d
• 14 Allotment Villa units @ 2,0 kL/d/unit		=	28,0 kL/d
• 1,78 ha School area @ 12,0 kL/d/ha		=	21,4 kL/d
• 0,5 ha Business/commercial area @ 20,8 kL/d/ha		=	10,4 kL/d
• 0,18 ha Clubhouse facility area @ 12,0 kL/d/ha		=	2,2 kL/d
	Total	=	376,3 kL/d

- Fire flow criteria (Moderate risk) = 25 L/s @ 10 m

(1) As per Table J.2 and J.4 from Section J – Water Supply of "The Neighbourhood Planning and Design Guide" (so called "Red book").

(2) The total water demand of 376,3 kL/d for portion 28 of Farm 468 can be apportioned 354,3 kL/d for the lower lying areas supplied from the Faure system and 22,0 kL/d for the higher lying areas supplied from the Skilpadvlei reservoir in the Polkadraai system.

1.3 Present situation

1.3.1 Network capacity

The existing pipes of the Polkadraai system in the Baden Powell Drive have insufficient spare capacity to accommodate the proposed development. It is proposed that the development is supplied with water from the Faure system with a connection to the existing 160 mm diameter pipe on the corner of Baden Powell Drive and Annandale Road.

The Faure system is supplied with water from the City of Cape Town's Faure reservoir with a Top Water Level (TWL) of 110 m above mean sea level (m a.s.l.) and can only supply sufficient water pressure to development on portion 28 of Farm 468 below the 60 to 70 m contour (Phase 1 to Phase 13).

It is proposed that the development area above the 60 to 70 m contour level (Phase 14) be supplied with water from the newly constructed Skilpadvlei reservoir in the Polkadraai system.

The Faure system has sufficient spare capacity to accommodate the proposed Phases 1 to 13 of the development area below the 60 to 70 m contour level.

A small section of 160 mm diameter pipeline between the proposed connection point for the development and the existing 200 mm diameter pipeline that are located adjacent to the Annandale Road, on the eastern side of the Eerste River, will however experience a flow velocity of more than 1.2 m/s during peak demand conditions. This is not a concern, but in order to reinforce the total network it can be considered to upgrade this pipeline to a 200 mm diameter pipe in future.

A new dedicated supply pipeline should be constructed from the Skilpadvlei reservoir to the higher lying Phase 14 erven of portion 28 of Farm 468. The TWL of the Skilpadvlei reservoir is 168 m a.s.l. and a pressure reducing valve (PRV) should be constructed on this pipeline to reduce water pressure at the development.

The following main internal pipes will be required for the development:

Potion 28 of Farm 468 (area supplied from Polkadraai system)

- SPW3.3 : 260 m x 200 mm Ø internal network pipe
- SPW3.4 : 150 m x 200 mm Ø internal network pipe [(1)]

Potion 28 of Farm 468 (area supplied from Faure system)

- SFW1.1 : 280 m x 250 mm Ø internal network pipe and required to connect to existing Faure system.
- SFW1.2 : 1 550 m x 200 mm Ø internal ring feed for the development

[(1)] Internal pipe SPW3.4 is an emergency connection between the Polkadraai and Faure systems to improve redundancy of the system.

1.3.2 Reservoir capacity

The criteria for total reservoir volume used in the Stellenbosch Water Master Plan is 48 hours of the AADD (of the reservoir supply zone). There is sufficient spare capacity available at the existing Skilpadvlei and Faure reservoirs in order to accommodate the proposed development in the existing Polkadraai and Faure water systems.

1.4 *Implementation of the master plan*

The following master plan item are required to supply the higher lying erven of portion 28 of Farm 468 with water from the existing Skilpadvlei reservoir:

Network upgrade (Polkadraai system)

• SPW3.1	:	2 095 m x 200 mm Ø new supply pipe		R	4 214 000 *
• SPW3.2	:	New PRV to regulate water pressure		R	314 000 *
			Sub-total	R	4 528 000 *

The following master plan item is recommended to be implemented in order to improve network conveyance and fire flow to the development from the Faure system:

Network upgrade (Faure system)

• SFW1.5	:	310 m x 200 mm Ø replace existing 160 mm Ø pipe [(2)]	R	1 062 000 *

(* Including P & G, Contingencies and Fees, but excluding VAT - Year 2022/23 Rand Value. This is a rough estimate, which does not include major unforeseen costs).

Take note that the routes of the proposed pipelines and location of the proposed PRV are schematically shown on Figures 1 & 2 attached, but have to be finalised subsequent to detailed pipeline route and PRV position investigations.

[(2)] Master plan pipe SFW1.5 is not a minimum requirement in order to accommodate the proposed development in the existing water system.

2. SEWER NETWORK

2.1 *Drainage area*

There are no sewer services in the vicinity of the proposed development. The nearest bulk infrastructure is the recently constructed Blaauwklippen pumping system to the north of the development area, which discharges at the Stellenbosch Wastewater Treatment Plant (WWTP).

The proposed development is located inside the sewer priority area.

2.2 *Sewer flow*

The proposed development was taken into consideration for the June 2023 master plan for the sewer network.

The peak day dry weather flow (PDDWF) for the proposed development area is calculated as 263,4 kL/d.

2.3 Present situation

It is proposed that sewage from the development gravitates towards the lowest point of portion 28 of Farm 468, from where sewage should be pumped to the existing Blaauwklippen pumping station. There is sufficient capacity in the existing Blaauwklippen pumping system to accommodate the proposed development.

The following internal outfall sewers are proposed in order to accommodate the sewer flows from the respective smaller development nodes on portion 28 of Farm 468:

Internal network:

- SSS5.5 : 560 m x 160 mm Ø internal outfall sewer
- SSS5.6 : 400 m x 200 mm Ø internal outfall sewer
- SSS5.7 : 120 m x 160 mm Ø internal outfall sewer
- SSS5.8 : 250 m x 160 mm Ø internal outfall sewer
- SSS5.9 : 390 m x 160 mm Ø internal outfall sewer

2.4 *Implementation of the master plan*

The following master plan items are required to pump sewage from the proposed development to the existing Blaauwklippen bulk pumping station:

Network upgrade

• SSS5.1	:	4 100 m x 160 mm Ø new rising main	R 6 985 000 *
• SSS5.2	:	New Welmoed sewer pumping station (capacity = 12 L/s)	R 3 304 000 *
• SSS4.1	:	1 060 m x 315 mm Ø new bulk sewer (Stellenbosch Municipality is in the process to implement this item; currently in tender phase for construction)	Cost not included
		Total	R 10 289 000 *

(* Including P & G, Contingencies and Fees, but excluding VAT - Year 2022/23 Rand Value. This is a rough estimate, which does not include major unforeseen costs).

Take note that the routes of the proposed pipelines and location of the proposed pumping station are schematically shown on Figures 3 & 4 attached, but have to be finalised subsequent to detailed pipeline route and pumping station position investigations.

3. CONCLUSION

The developer of portion 28 of Farm 468 (Welmoed development) in Stellenbosch may be liable for the payment of a Development Contribution (as calculated by Stellenbosch Municipality) for bulk water and sewer infrastructure as per Council Policy.

The development of Phase 1 to Phase 13 below the 60 m contour line can be accommodated within the existing Faure rural water system without any upgrades required.

The development of Phase 14 on portion 28 of Farm 468 above the 60 m contour line should be supplied with water directly from the Skilpadvlei reservoir in the Polkadraai system. Master plan item SPW3.1 will be required to supply the development with bulk water from the Skilpadvlei reservoir and master plan item SPW3.2 will be required to manage static pressures at the development.

There are no sewer services in the vicinity of the proposed development and master plan items SSS4.1, SSS3.1 & SSS3.2 will be required to pump sewage from the proposed development area to the existing Blaauwklippen bulk sewer pumping station, located roughly 5.0 km to the north east of the proposed development.

The existing Blaauwklippen pumping station has sufficient spare capacity to accommodate the proposed development.

We trust you find this of value.

Yours sincerely,

GLS CONSULTING (PTY) LTD
REG. NO.: 2007/003039/07

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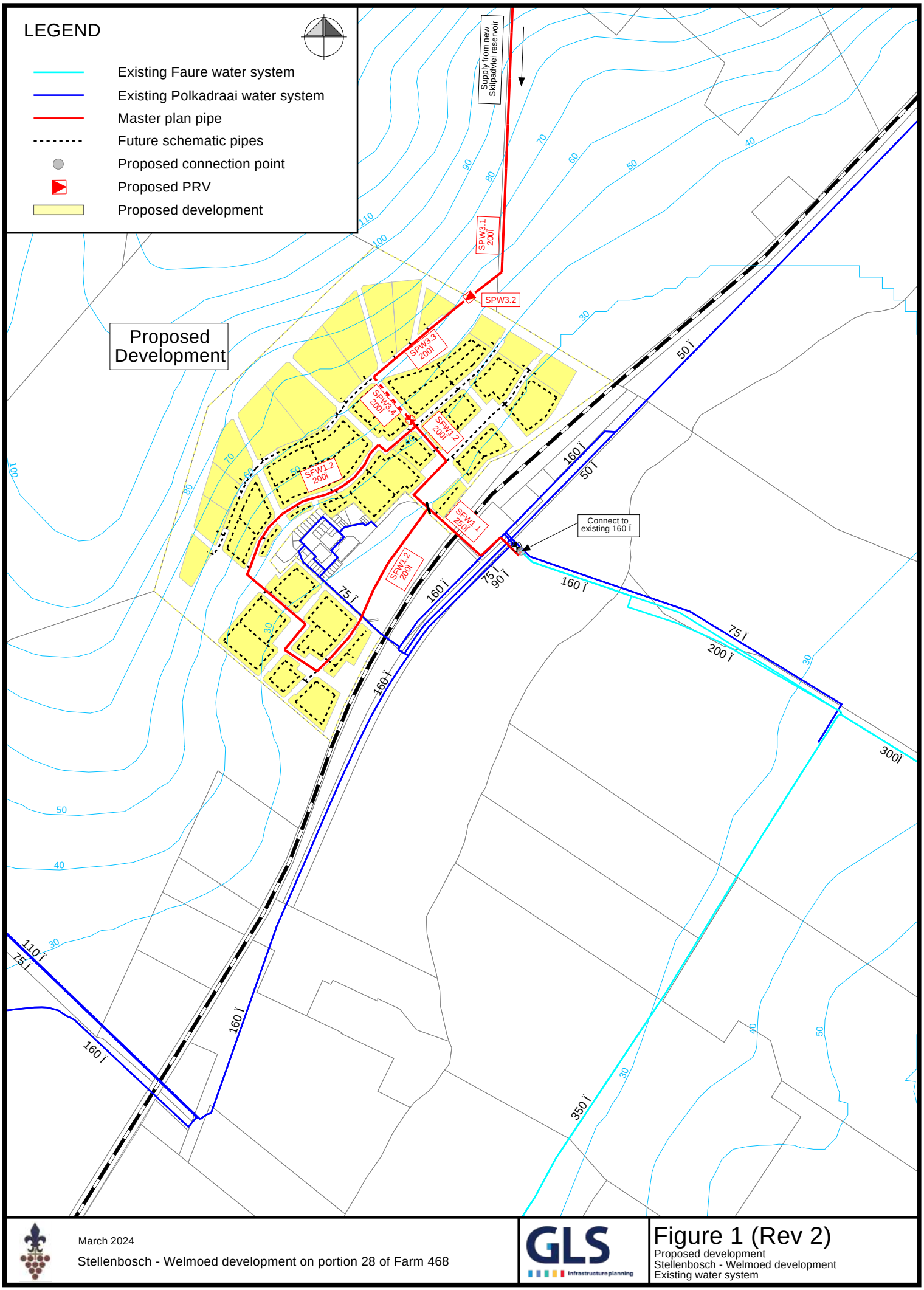
Per: PC DU PLESSIS

cc. The Director
Directorate: Infrastructure Services
Stellenbosch Municipality
P. O. Box 17
STELLENBOSCH
7599

Attention: Mr Paul Joubert



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Stellenbosch - Welmoed development on portion 28 of Farm 468

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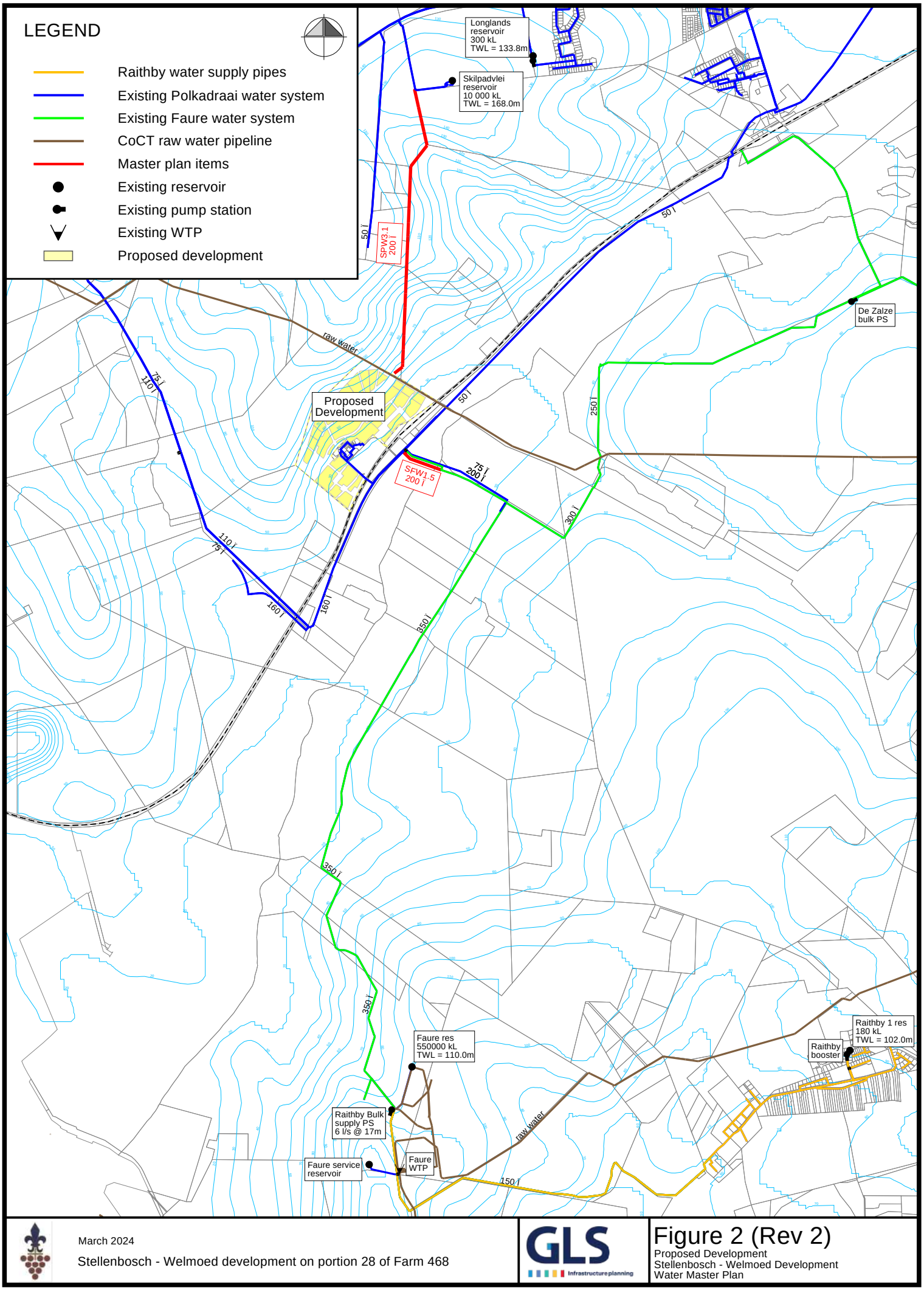
Figure 1 (Rev 2)

Proposed development
Stellenbosch - Welmoed development
Existing water system



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Stellenbosch - Welmoed development on portion 28 of Farm 468

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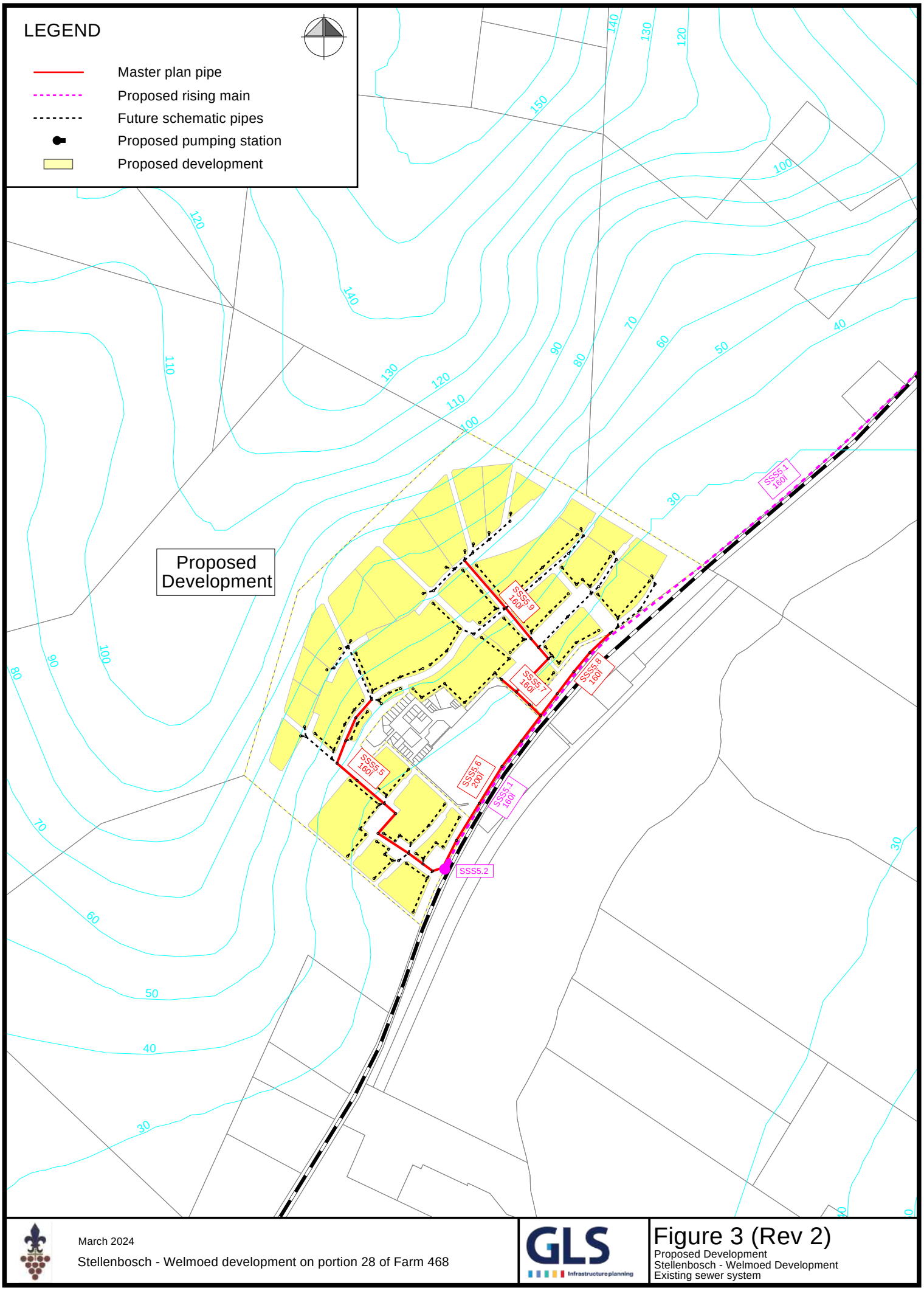
Figure 2 (Rev 2)

Proposed Development
Stellenbosch - Welmoed Development
Water Master Plan



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Stellenbosch - Welmoed development on portion 28 of Farm 468

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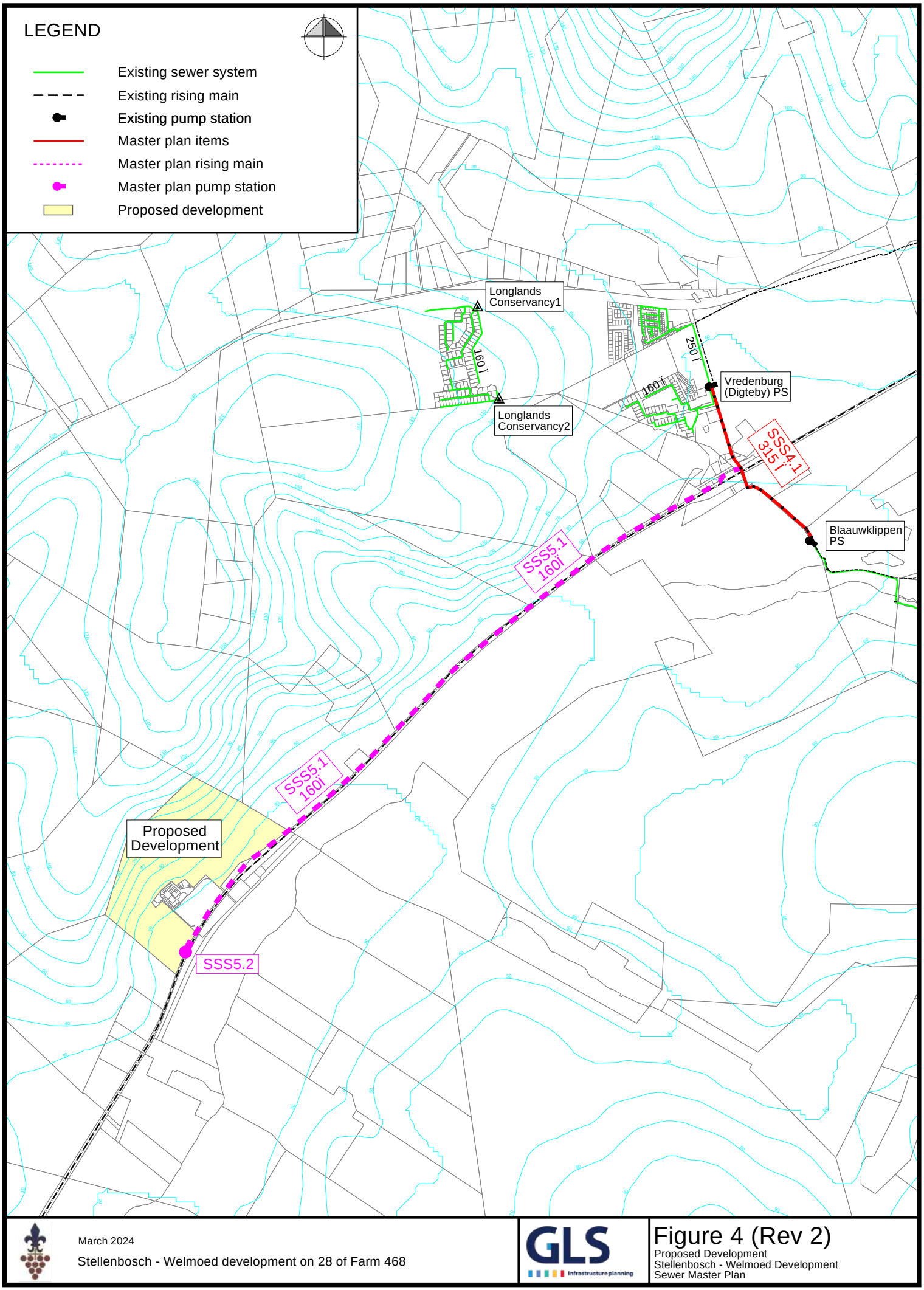
Figure 3 (Rev 2)

Proposed Development
Stellenbosch - Welmoed Development
Existing sewer system



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Stellenbosch - Welmoed development on 28 of Farm 468

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Figure 4 (Rev 2)

Proposed Development
Stellenbosch - Welmoed Development
Sewer Master Plan