WELMOED DEVELOPMENT

PORTION 28 OF FARM 468, LYNEDOCH, WITHIN THE STELLENBOSCH MUNICIPAL AREA, WESTERN CAPE

ENGINEERING SERVICES REPORT

REVISION 00

APRIL 2024

Uniqon Developers (Pty) Ltd.

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ENGINEERING SERVICES REPORT FOR THE WELMOED DEVELOPMENT ON PORTION 28 OF FARM 468, LYNEDOCH, WITHIN THE STELLENBOSCH MUNICIPAL AREA, WESTERN CAPE

1. Background

UDS Africa was appointed by Mr Etienne Coetzer to compile a services report in support of the development application for a proposed mixed use development on portion 28 of farm 468, Lynedoch. The site covers an area of 45.48 Ha and is currently undeveloped. The site is zoned for agricultural use.

The purpose of this report is to address the requirements of Stellenbosch Municipality with regard to the provision of engineering services for the proposed development. The infrastructure design of the development is based on the technical requirements and guidelines as stated in the Guidelines for Human Settlements Planning and Design (Red Book: July 2019) and to the requirements and standards of Stellenbosch Municipality.

2. Locality

The site is located in Lynedoch, within the Stellenbosch Municipal area. The site is bordered to the north, east and west agricultural land and to the south by Lynedoch Road. Below is a locality plan for reference (outlined in red, area highlighted in yellow).

Figure 1: Locality plan of Portion 28 of Farm 468

3. The development

The proposed development will be large residential in nature, with a clubhouse, commercial and school component. Please refer to **Annexure A** for a copy of the site development plan prepared by Urban Studio Architects and Urban Designers. Below is a summary of the land uses to from part of the proposed development:

USE	AREA	UNITS
School	1.78 Ha	
Commercial	0.50 Ha	
Clubhouse	0.18Ha	
Mixed use/ Residential (80/Ha)	6.58 Ha	515
Residential (40/Ha)	8.74 Ha	355
Residential (allotment villas)	10.31 Ha	14

Table 1: Summary of land uses

A capacity analysis was completed by GLS Consulting (Pty) Ltd for the proposed development in March 2024. A copy of the report can be found under **Annexure B**.

4. Water Demand

4.1 Water demand for proposed development

The water demand for the proposed development is calculated (in accordance with the Guidelines for Human Settlement Planning and Design) as follows:

WATER DEMAND						
DEVELOPMENT	**Units**	**Area (m^2)**	**l/ unit/ day**	**l/ 100m^2**	**TOTAL (l/d)**	**TOTAL (l/s)**
School		17 800	12000/ ha		21 360	0.247
Commercial		5 000	20 800/ha		10 400	0.120
Clubhouse		1 800	12 000/ ha		2 160	0.025
Residential (80 units per Ha)	515		300		154 500	1.788
Residential (40 units per Ha)	355		450		159 750	1.849
Residential (allotment villas)	14		2 000		28 000	0.324
TOTAL					**376 170**	**4.353**
Annual Average Daily Demand (AADD)	376 170 l/d 4.353 l/s					
Peak factor	4.00					
Peak demand	1 504 680 l/d 17.415 l/s					
Fire flow requirement	25 l/s @ 10m					

Table 2: Water demand calculation

The internal water reticulation network of the proposed development to comply with the minimum specifications as indicated in the “Red Book - Guidelines for Human Settlement Planning and Design” and the municipal standards from Stellenbosch Bay Municipality.

4.2 Existing services

The closest water reticulation network is a 50mm pipe located along Baden Powell Drive. It is proposed that bulk services SPW3.1 & SFW1.5 are constructed in order to supply the development with both domestic and fire water. The Skilpadvlei and Faure reservoirs have sufficient spare capacity to accommodate the development.

A 200mm connection will be made from SPW3.1 and a 250mm connection from SFW1.5. The minimum diameter of the internal water network will be 200mm HDPE PE100 PN12.5 pipes for the northern portion and 250mm HDPE PE100 PN12.5 pipes for the southern portion. A PRV will be required to regulate the water pressure from the Skilpadvlei connection.

The developer intends to construct the development in 14 phases. Refer to **Annexure C** for a copy of the proposed phasing plan.

The total water demand can be apportioned as 355.70 kL/d for the lower lying area to be supplied from the Faure system and 20.47 kL/d for the higher lying area supplied from the Skilpadvlei Reservoir. The Faure system can only supply the development up to the 60 to 70m contour (phase 1 to 13). The Skilpadvlei system will have to be constructed to supply Phase 14.

Refer to **Figure 2** below, showing the location of the existing and bulk network upgrades.

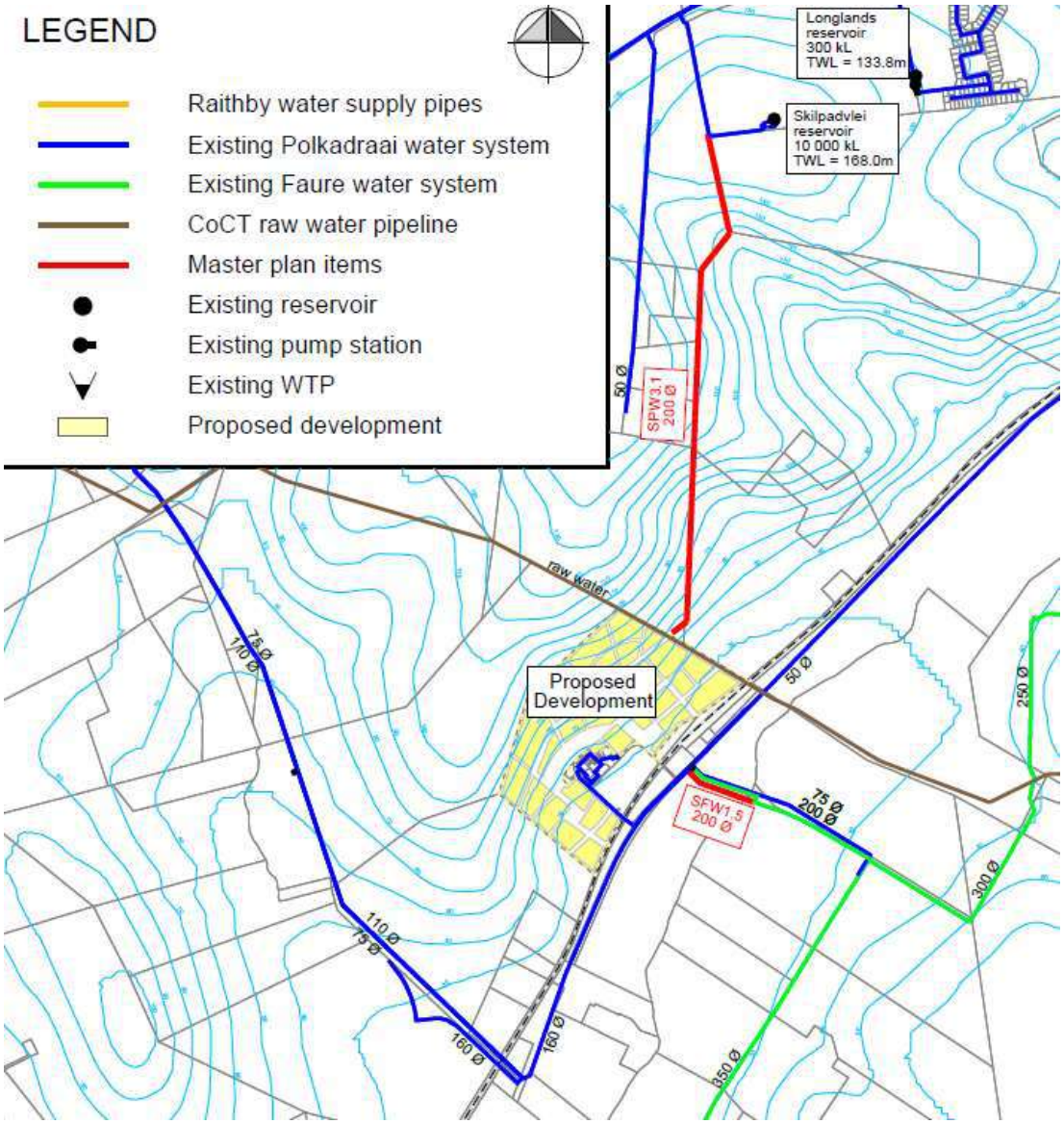

Figure 2: Existing water reticulation services

The cost of the abovementioned bulk services amount to R5 590 000 (Excluding VAT, but includes contingencies and fees). The associated costs hereof is expected to be deductible from the Development Contributions payable by the client.

SPW3.1 will be constructed over private land and a minimum 3m wide servitude will be required.

5. Sewerage

5.1 Sewer demand for proposed development

The sewerage flow for the proposed development is calculated (in accordance with the Guidelines for Human Settlement Planning and Design) as follows:

SEWER FLOW	
Average Dry Weather Flow (ADWF) (70% of annual average daily water demand)	263 319 l/d (3.048 l/s)
Peak Factor	4.00
Peak Dry Weather Flow (PDWF)	12.191 l/s
Peak Wet Weather Flow (PWWF)	14.019 l/s

Table 3: Sewer demand calculation

The internal sewer reticulation network of the proposed development to comply with the minimum specification as given in the “Red Book - Guidelines for Human Settlement Planning and Design” and the municipal standards from Stellenbosch Municipality.

5.2 Existing services

Currently there are no existing municipal sewer services in close proximity to the site.

The GLS capacity report confirmed that there is sufficient capacity available at the Blaauwklippen pump station, however it is required that master plan items SSS5.1, SSS5.2 & SSS4.1 are constructed in order to convey sewerage to the Blaauwklippen pump station.

The internal network will consist of 160mm Class 34 uPVC pipes connected to SSS5.2 (new 12 l/s pump station) with a 200mm Class 34 uPVC collector pipe.

The cost of the abovementioned bulk services (SSS5.1 & SSS5.2) amount to R10 289 000 (Excluding VAT, but includes contingencies and fees). Item SSS4.1 is currently in the process of being implemented by Stellenbosch Municipality (tender phase).

Items SSS5.1 & SSS5.2 will be constructed over private land for approximately 2.4km with the remaining 2.6km section of the pipeline falling within the Baden Powell Road Reserve. A minimum 3m wide servitude will be required where the pipeline is constructed over private property. Refer to **figure 3** below showing the locality of the proposed bulk services.

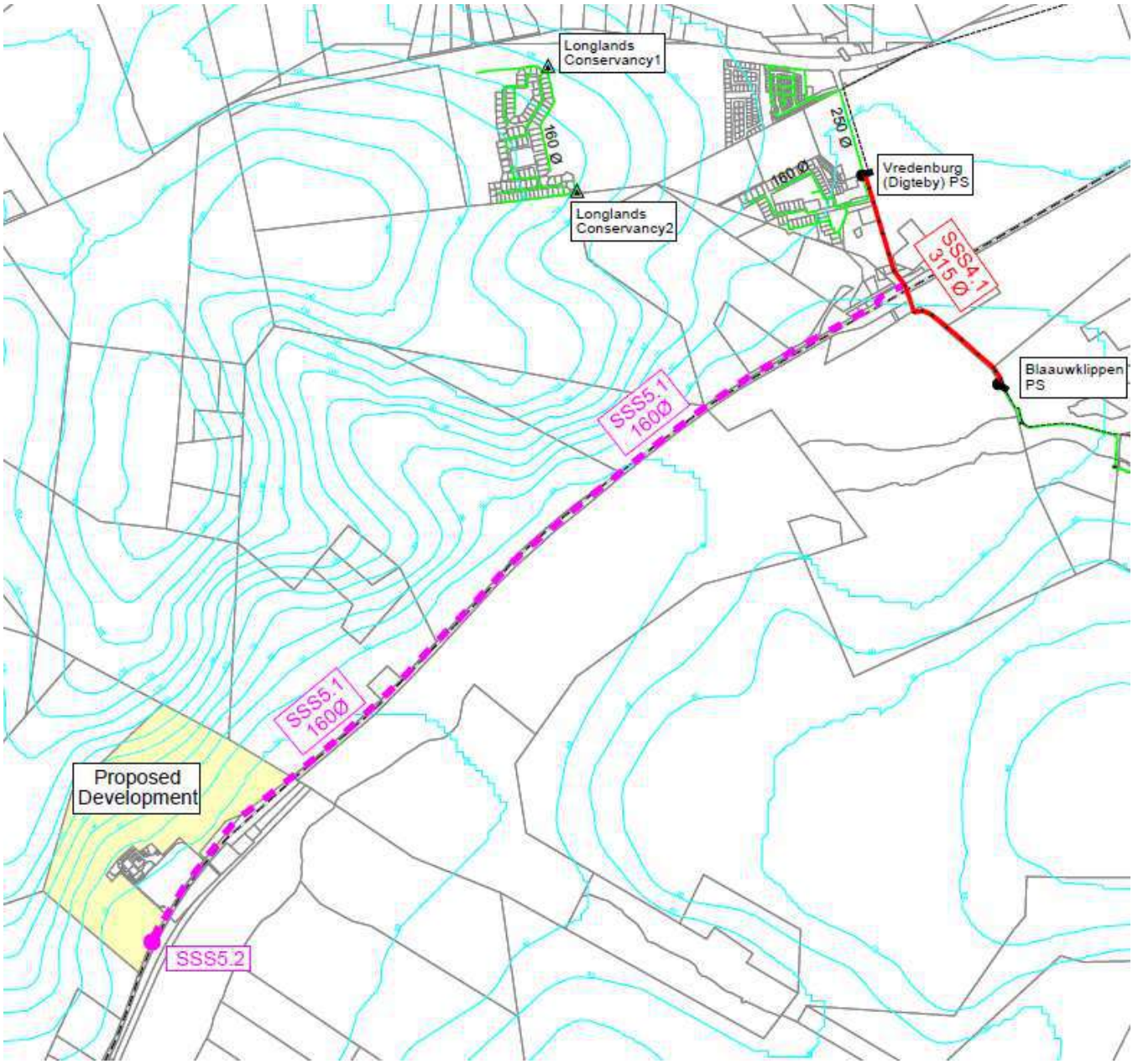

Figure 3: Existing and new sewer reticulation services

6. Stormwater

A stormwater management plan was completed by UDS Africa in order to model the impact of the proposed development on existing stormwater services, as well as proposing both stormwater quantity and quality treatment measures that needs to be provided on site. This will be submitted as a separate report to the Engineering Services Report.

7. Road Network

A full traffic impact assessment was completed by UDS Africa to model the impact of the development on the existing road network. This will be submitted as a separate report to the Engineering Services Report.

8. Solid waste

Dedicated refuse collection areas will be provided at each of the development pockets. It is proposed that refuse removal will take place by private collection on specified collection days at each of the dedicated refuse sites. Accommodation of for refuse removal vehicles will be ensured as well as compliance with their relevant requirements. Below is a summary of the anticipated annual solid waste generation:

USE	AREA	TOTAL PER ANNUM
School	490 pupils @ 30 L/ annum	14.70m^3
Commercial	1m^3/ week	52m^3
Clubhouse	1m^3/ week	52m^3
Mixed use/ Residential (80/Ha)	240 L/ week	6 427.20m^3
Residential (40/Ha)	240 L/ week	4 430.40m^3
Residential (allotment villas)	240L/ week	174.72m^3
TOTAL		11 151.02m^3

9. Conclusion

From the abovementioned information provided, it is concluded that the site can be serviced from an engineering perspective. We trust that the information provided will be sufficient for the purposes of the application.

All aspects of this report will be confirmed in the detail design stage of the project. Please do not hesitate to contact the undersigned should you require any additional information.

Yours faithfully,

Compiled by:

Ruaan Siebrits (Pr Tech Eng)

Attachments:

Annexure A – Site development plan
Annexure B – GLS Report
Annexure C – Phasing plan

ANNEXURE A

PORTION 28 LAND USE TABLE			
	Site area	**45.48 Ha**	
	Land use	**Area**	**Units**
	School Component (A2)	1.78 Ha	
	Commercial (A1,B5)	0.50 Ha	
	Clubhouse Component(B5)	0.18 Ha	
	Mixed Use Component (B1-4)	0.7 Ha	515 units
	Residential (@80 du/ha)	5.88 Ha	
	Residential (@40 du/ha)	8.74 Ha	355 units
	Alottment Villas	10.31 Ha	14 units
	Total (excluding areas below)	**28.09 Ha**	**884 units**
	Detention & SW area	1.15 Ha	
	Indigenous slopes	6.43 Ha	
	Roads & squares	4.86 Ha	
	Private open space	4.04 Ha	

ANNEXURE B

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: Marius de la Rey, Garreth Young

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
• 520 High density residential units (80 units/ha) @ 300 L/d/unit		=	156,0 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	=	377,7 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 377,7 kL/d for portion 28 of Farm 468 can be apportioned 355,7 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 264,4 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.

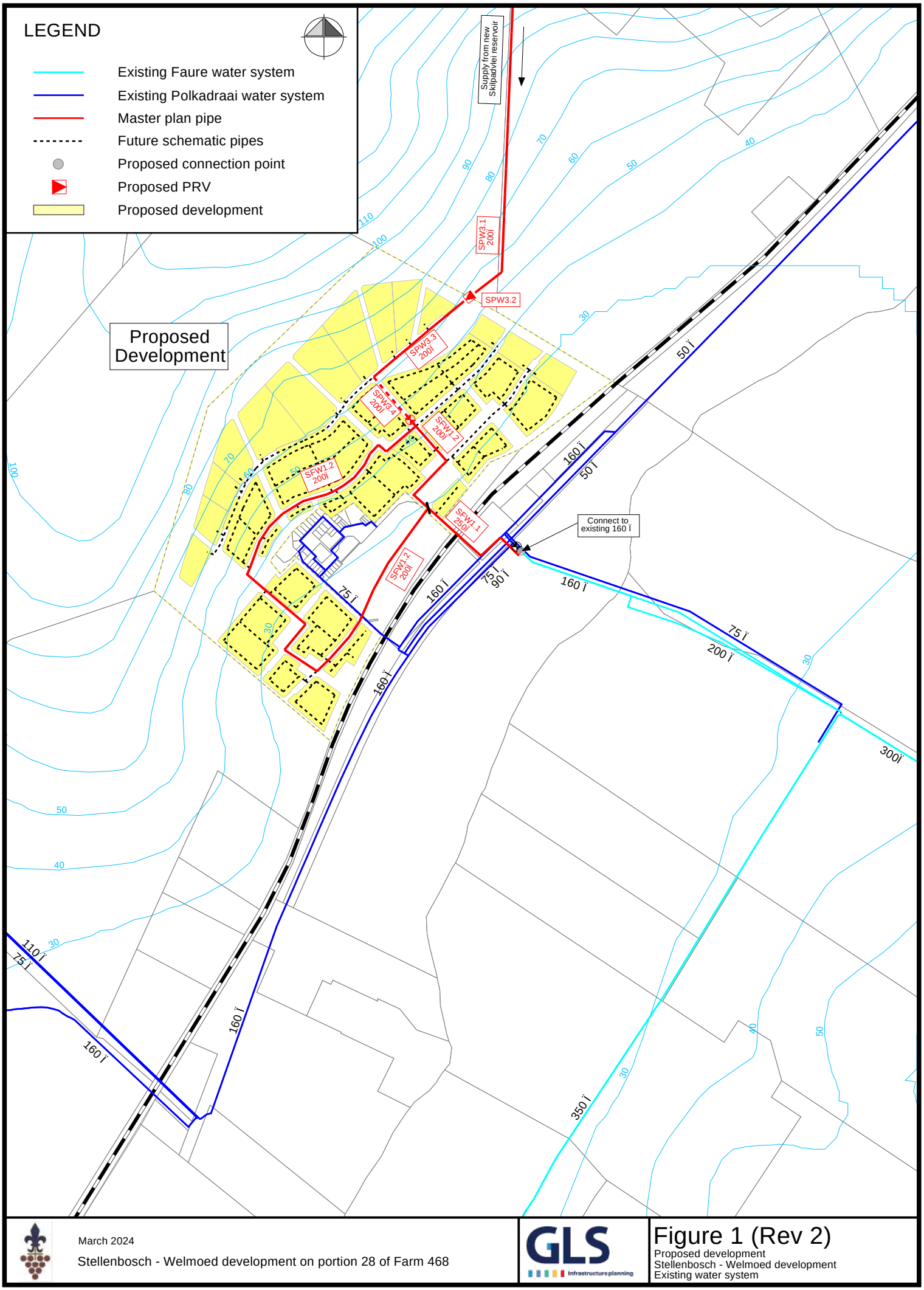
Yours sincerely,

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

_____
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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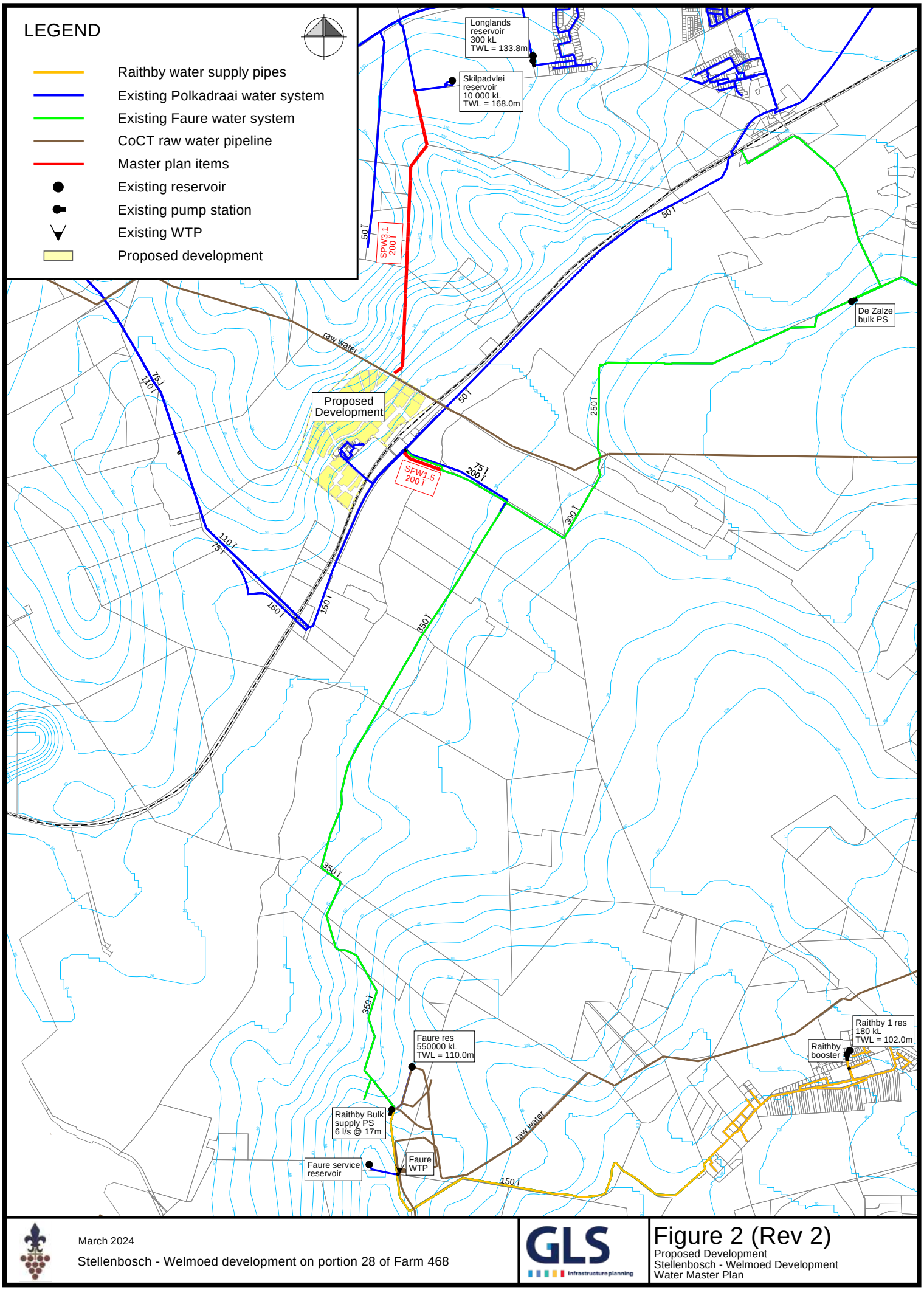
Figure 1 (Rev 2)

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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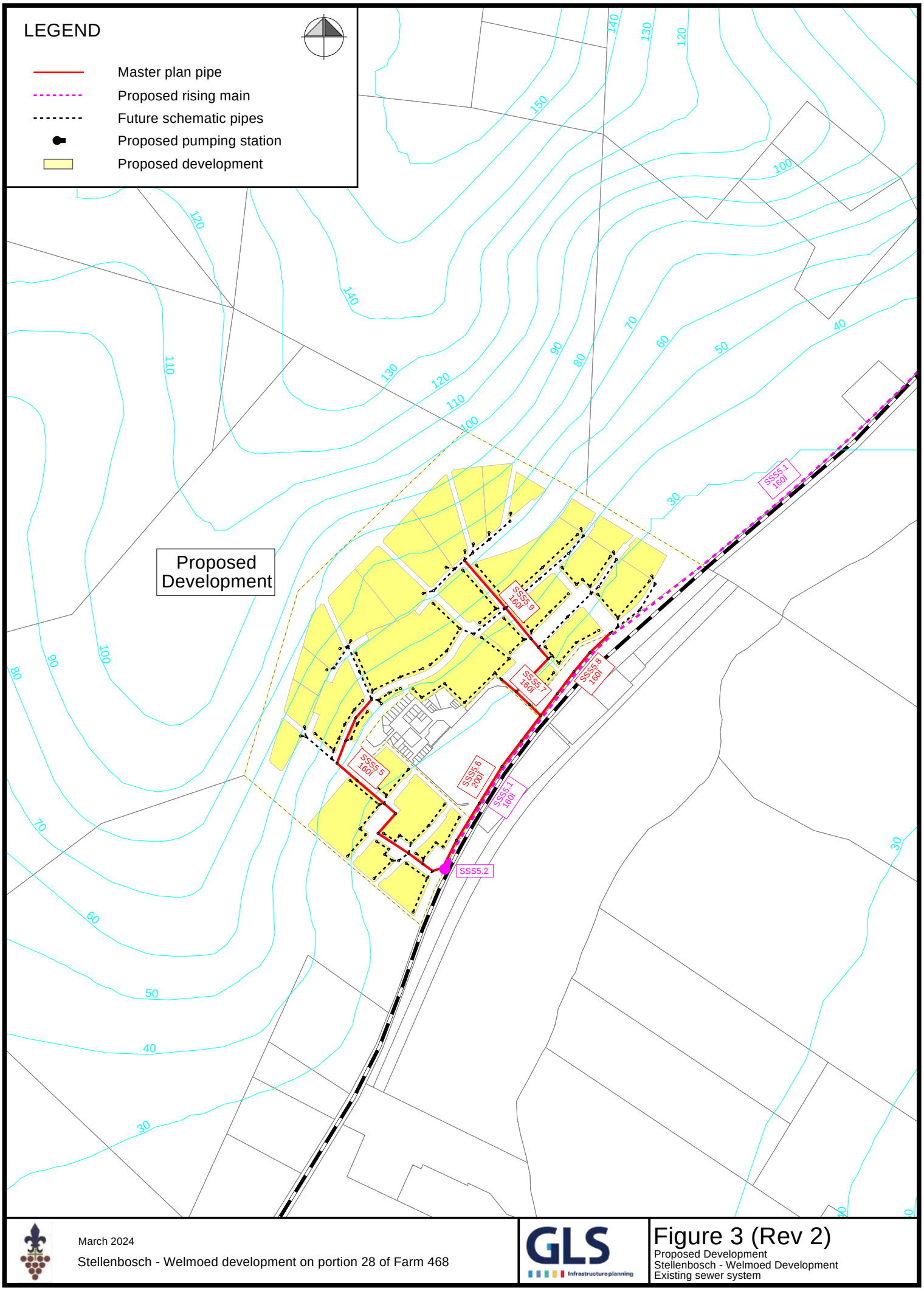
Figure 2 (Rev 2)

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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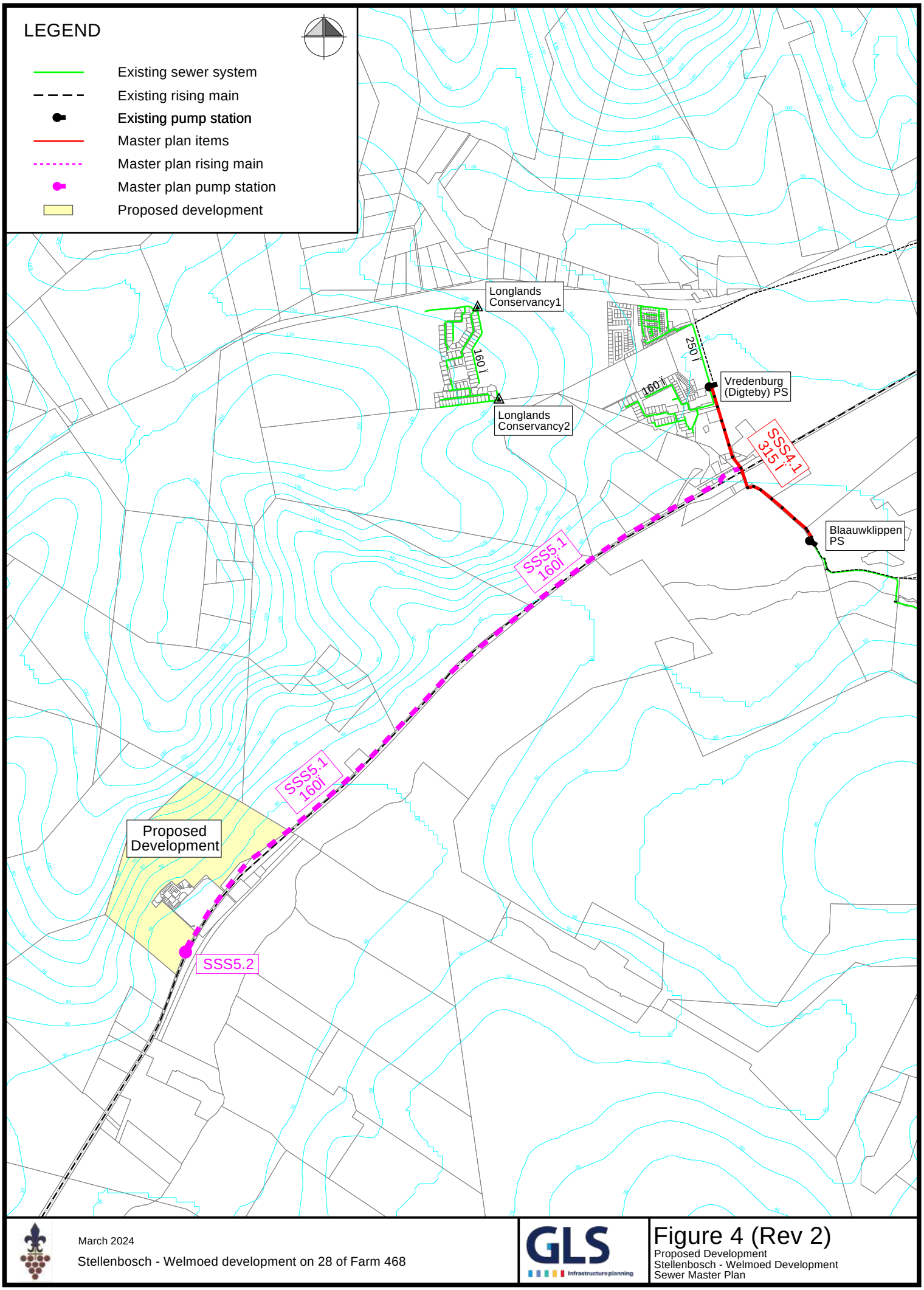
Figure 3 (Rev 2)

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

ANNEXURE C

Subdivision (Erf) reference	Land use	Phase	Comment
1	Private open space, street, place of assembly	1	
2	Educational, school	1	
3	Commercial, business	1	
4	Residential, business, mixed-use	1	
5	Private open space, street	2	
6	Private open space, outdoor sport, stormwater management	6	
7	Residential, business, mixed-use	2	
8	Residential, business, mixed-use	3	
9	Private open space, street	4	
10	Residential, business, mixed-use	4	
11	Place of assembly, business, mixed-use	4	
12	Residential	5	
13	Private open space, outdoor sport	6	
14	Private open space, street	7	
15	Residential	7	
16	Residential	8	
17	Private open space, street	9	
18	Private open space, outdoor sport, stormwater management	9	
19	Residential	10	
20	Residential	10	
21	Residential	11	
22	Private open space, outdoor sport, stormwater management	9	
23	Residential	12	
24	Private open space, outdoor sport	14	
25	Residential	13	
26	Residential	19	
27	Private open space, street	15	
28	Residential	16	
29	Residential	17	
30	Residential	18	
31	Private open space, outdoor sport, stormwater management	15	
32	Private open space, outdoor sport	17	
33	Private open space, outdoor sport	20	
34	Private open space, street	21	
35	Private open space, street	21	
36	Residential	22	
37	Residential	23	
38	Residential	24	
39	Residential	25	
40	Residential	26	
41	Residential	27	
42	Private open space, outdoor sport, street	28	
43	Residential	29	
44	Residential	30	
45	Private open space, outdoor sport, street	31	
46	Residential	32	
47	Private open space, outdoor sport, street	33	
Remainder Road	Public road	1	

PORTION 28 LAND USE TABLE			
	Site area	**45.48 Ha**	
	Land use	**Area**	**Units**
	School Component (A2)	1.78 Ha	
	Commercial (A1,B5)	0.50 Ha	
	Clubhouse Component(B5)	0.18 Ha	
	Mixed Use Component (B1-4)	0.7 Ha	515 units
	Residential (@80 du/ha)	5.88 Ha	
	Residential (@40 du/ha)	8.74 Ha	355 units
	Alottment Villas	10.31 Ha	14 units
	Total (excluding areas below)	**28.09 Ha**	**884 units**
	Detention & SW area	1.15 Ha	
	Indigenous slopes	6.43 Ha	
	Roads & squares	4.86 Ha	
	Private open space	4.04 Ha