

A close-up photograph of a rusty metal grate. The grate is made of a grid of rectangular openings. The word "STOP" is embossed in large, bold, capital letters across the center of the grate. The metal is heavily corroded, with a thick layer of reddish-brown rust covering most of the surface. The lighting is dramatic, with strong highlights on the raised edges of the letters and deep shadows in the recesses of the grate and the rust. The background is blurred, showing more of the grate's pattern.

**Appendix A: Design Criteria
Technical Memorandum**



Stantec

Stantec Consulting Ltd.
400-655 Tye Road,
Victoria, BC V9A 6X5

June 18, 2013
File: 111700446

Attention: Rob Hillis, Engineering Supervisor
District of West Kelowna,
2760 Cameron Road,
West Kelowna, BC V1Z 2T6

Dear Mr Hillis,

Reference: District of West Kelowna Sewer Master Plan: Software Selection and Design Criteria

The following technical memo is intended to outline the SWMM (Storm Water Management Model) software and the design criteria to be used during the District of West Kelowna (DWK) Sewer Master Plan, for the DWK review and approval.

SWMM Software Options and Recommendations

There are numerous SWMM software products on the market available for use as part of this project. All the SWMM software products are based on the EPA (United States Environmental Protection Agency) SWMM modelling process, which is a dynamic rainfall runoff/subsurface runoff simulation model. This software has two components: a hydrologic component which is used to estimate stormwater runoff volumes and timings for various catchment areas dependent on the topography of a region, and a hydraulics component which models how the water/sewage is conveyed through the system of closed pipes, open channels, ponds, storage, and various flow regulators. When used for Sanitary Sewer plans, only the hydraulics component of the software is utilized, and flow inputs into the system are based on the use/zoning designation of each property (residential/commercial/institutional/industrial).

As mentioned above, the SWMM software products on the market are all derived from the EPA SWMM model, with varying interfaces. Popular software products include PCSWMM and InfoSWMM. Section 3.5.3 of the Terms of Reference for the project, as issued by the District in December 2012, details the requirements for the compatibility of the software in terms of compatibility. The District require the software selected to be compatible with the District's GIS systems, which is assumed to be ArcGIS by ESRI, and also to be similar in operation to InfoWater by Innovyze. Considering this requirement, it is recommended that InfoSWMM by Innovyze be selected as the software for the project. This will bring the following benefits to the District;

- Be fully integrated with Arc GIS. InfoSWMM is built directly into the ArcGIS interface,
- Is very similar in interface to InfoWater and as such will require limited additional training for District staff once they are competent in the operation of InfoWater.

The budget cost to purchase the software is \$9,000 for a regular fixed-seat license, as per a quote from the software supplier.

Reference: District of West Kelowna Sewer Master Plan: Software Selection and Design Criteria

The head representative for Innovyze has offered to provide a technical webinar demonstration to members of Stantec and the District prior to purchasing the software to demonstrate the capabilities, the smooth interface with ArcGIS, and to answer any questions that may require answering before making the capital outlay for the software. **It is recommended that this webinar offer be accepted and attended by key personnel.**

Design Criteria

The design criteria to be used for the project was discussed at the project start-up meeting on June 5th, 2013. The following outlines the criteria discussed:

- Existing Conditions:
 - o Lots without a sewer connection will not be included in the "Existing Conditions" model.
 - o Population calculations will be based on the existing legal layout of the District and zoning as detailed in the DWK Official Community Plan (OCP).
 - o Flows will be based on the following criteria, as taken from the DWK Engineering Specifications:
 - Single Family Homes = 3 People per lot.
 - Multi-family Low = 85 People/ha.
 - Multi-family Medium = 12 People/ha.
 - Multi-family High = 320-960 (dependent on storey's)
 - Mobile Home = 45 People/ha.
 - Industrial = 50 People/ha.
 - Institutional = 50 People/ha.
 - Commercial = 75 People/ha.
 - (Large sanitary contributors may be discussed on an individual basis with the District as the project progresses).
 - o Average Dry Weather Flow per capita = 350L/day.
 - o Peaking Factor = Harmon's Equation.
 - o Inflow and Infiltration (I & I) Rates to be as follows:

June 18, 2013
Rob Hillis, Engineering Supervisor
Page 3 of 3

Reference: District of West Kelowna Sewer Master Plan: Software Selection and Design Criteria

- New pipes not in water table = 5,000L/ha/d
 - New pipe in water table = 8,000L/ha/day
 - Old pipes = 10,000L/ha/day
- Future Growth Projections:
- o The above design criteria will be used in the future growth projections to estimate 3 scenarios
 - 10 year horizon assuming a uniform growth rate of 2% per annum as per DWK Official Community Plan Section 2.3.1,
 - 20 year horizon assuming a uniform growth rate of 2% per annum as per DWK Official Community Plan Section 2.3.1,
 - Ultimate Build-out conditions, assuming the District is subdivided to the maximum density detailed in the OCP.

If you wish to discuss any of the above criteria, please feel free to contact the undersigned.

Regards,

Stantec Consulting Ltd.

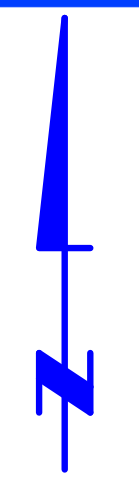
Shaun Swarbrick, P.Eng
Civil Engineer
Tel: (250) 389-2545
Fax: (250) 382-0514
shaun.swarbrick@stantec.com

Attachment: 1T

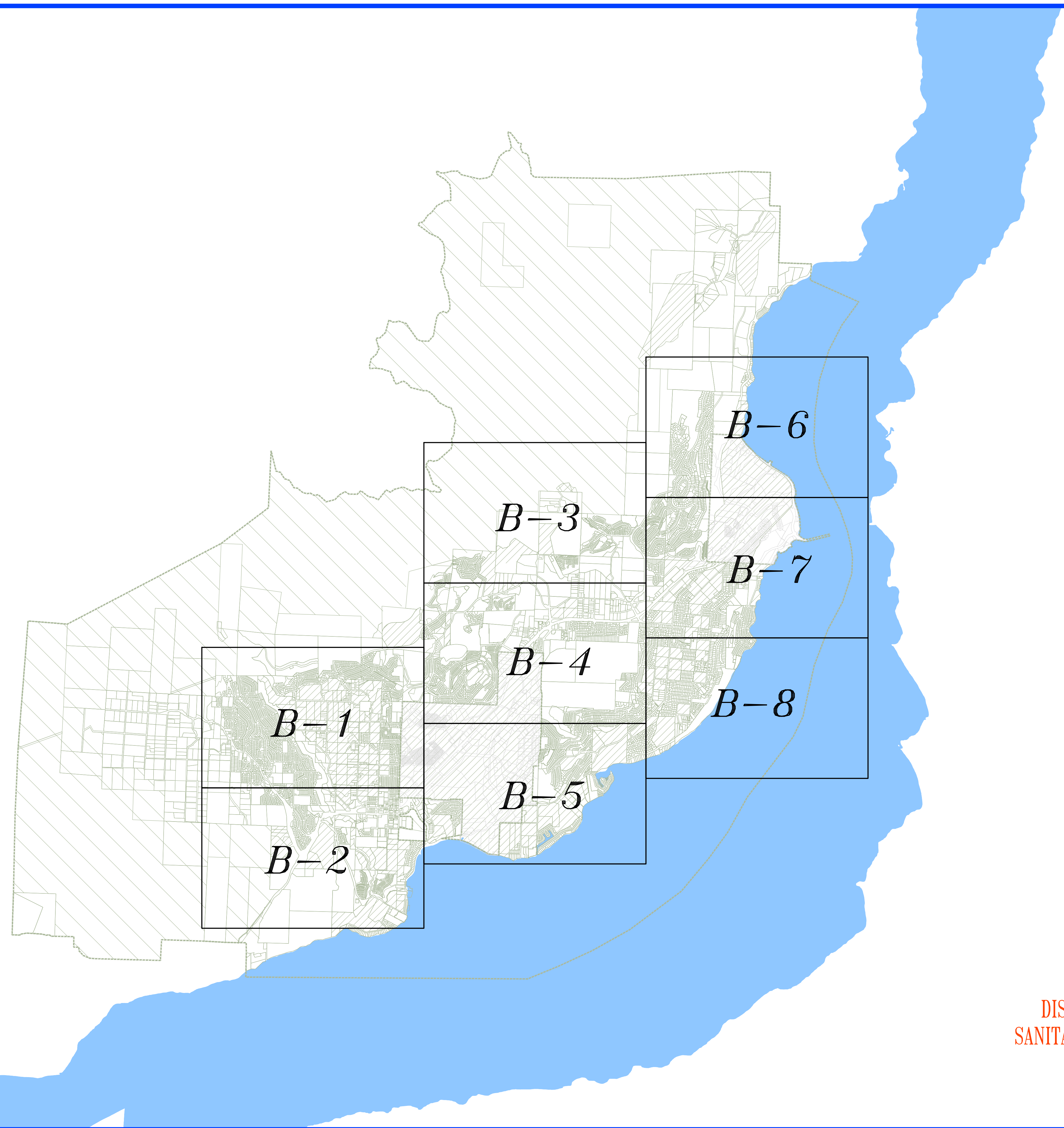
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Appendix B: Node Locations

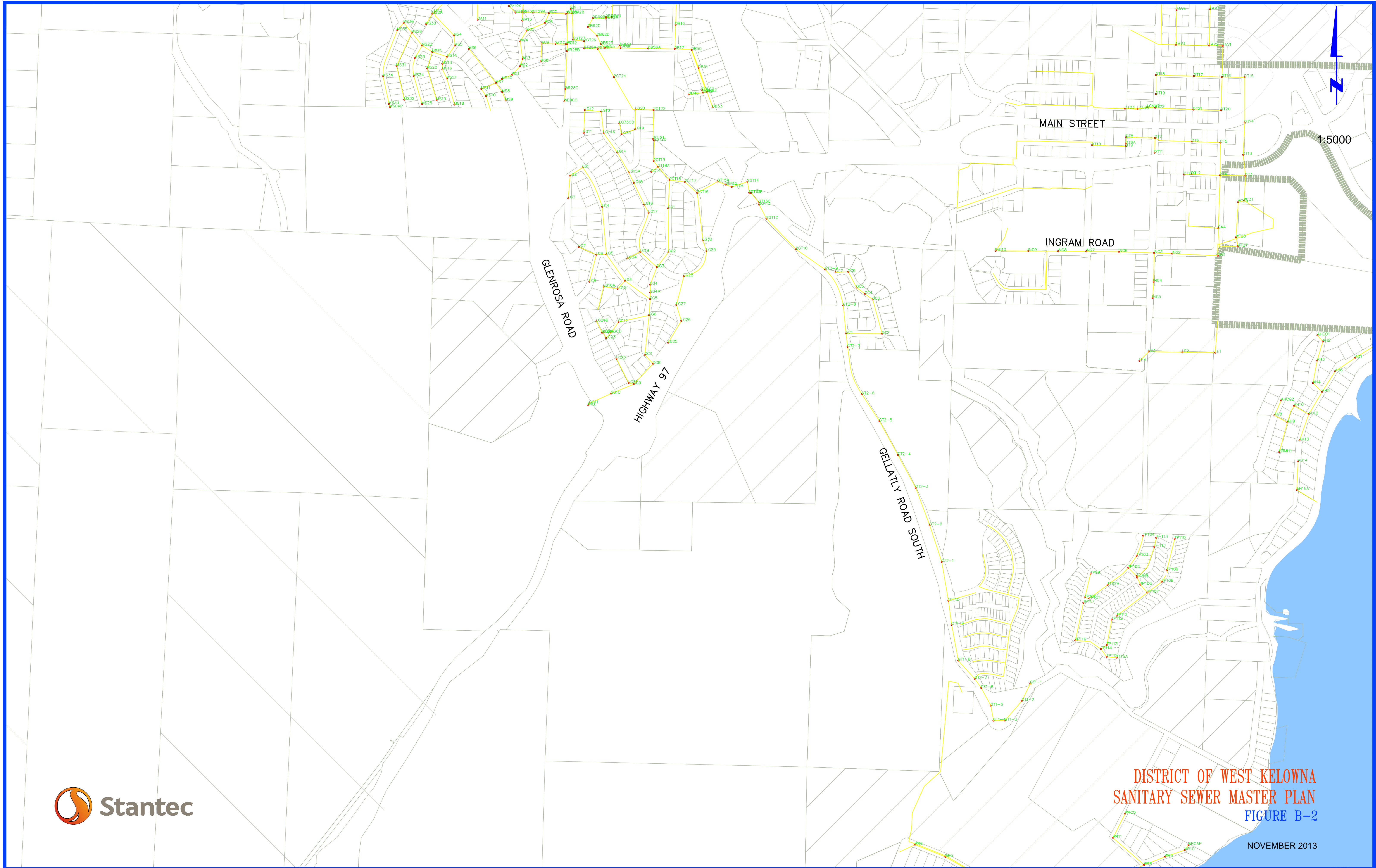


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DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
APPENDIX B KEY PLAN

NOVEMBER 2013

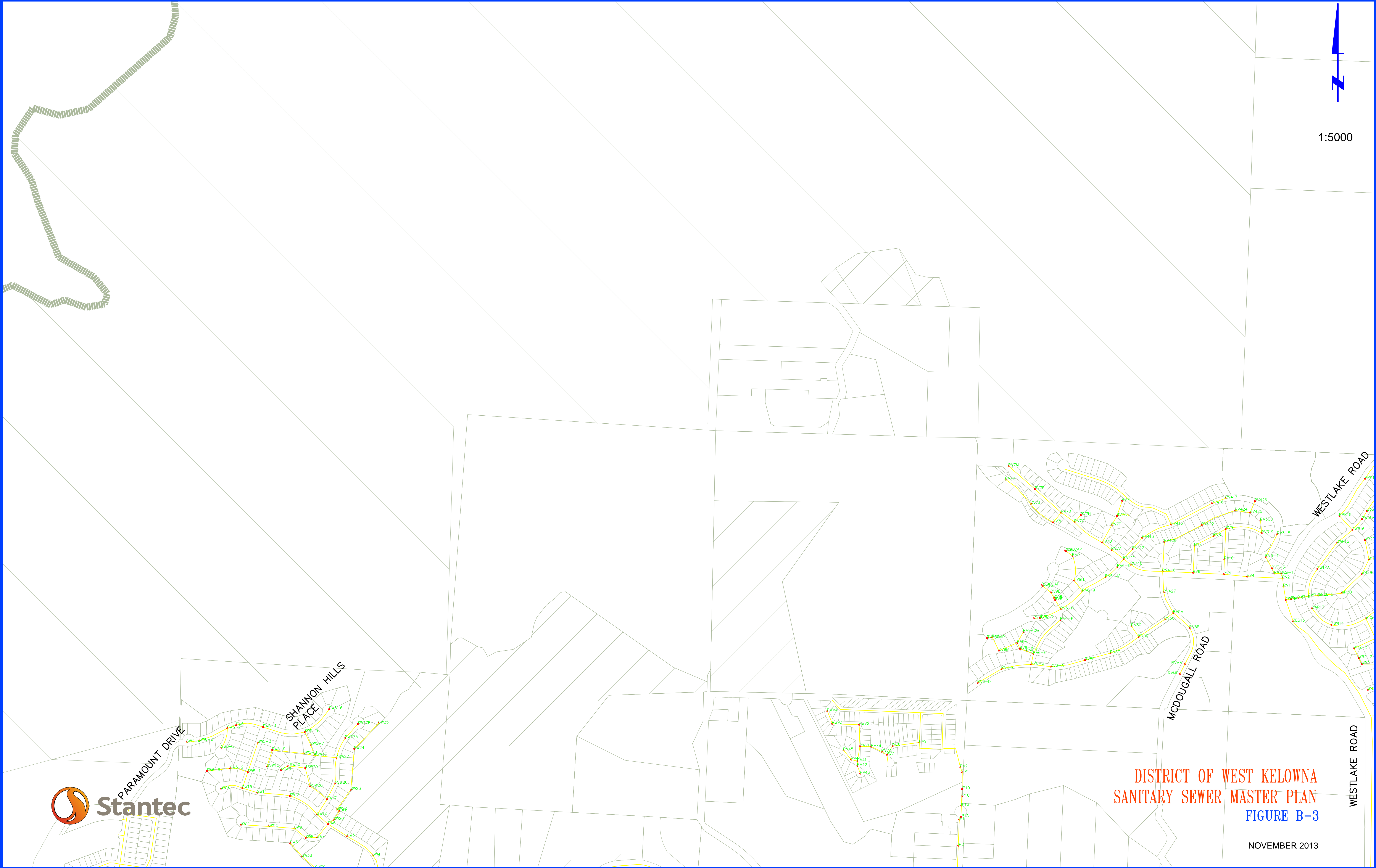


DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 FIGURE B-2

NOVEMBER 2013

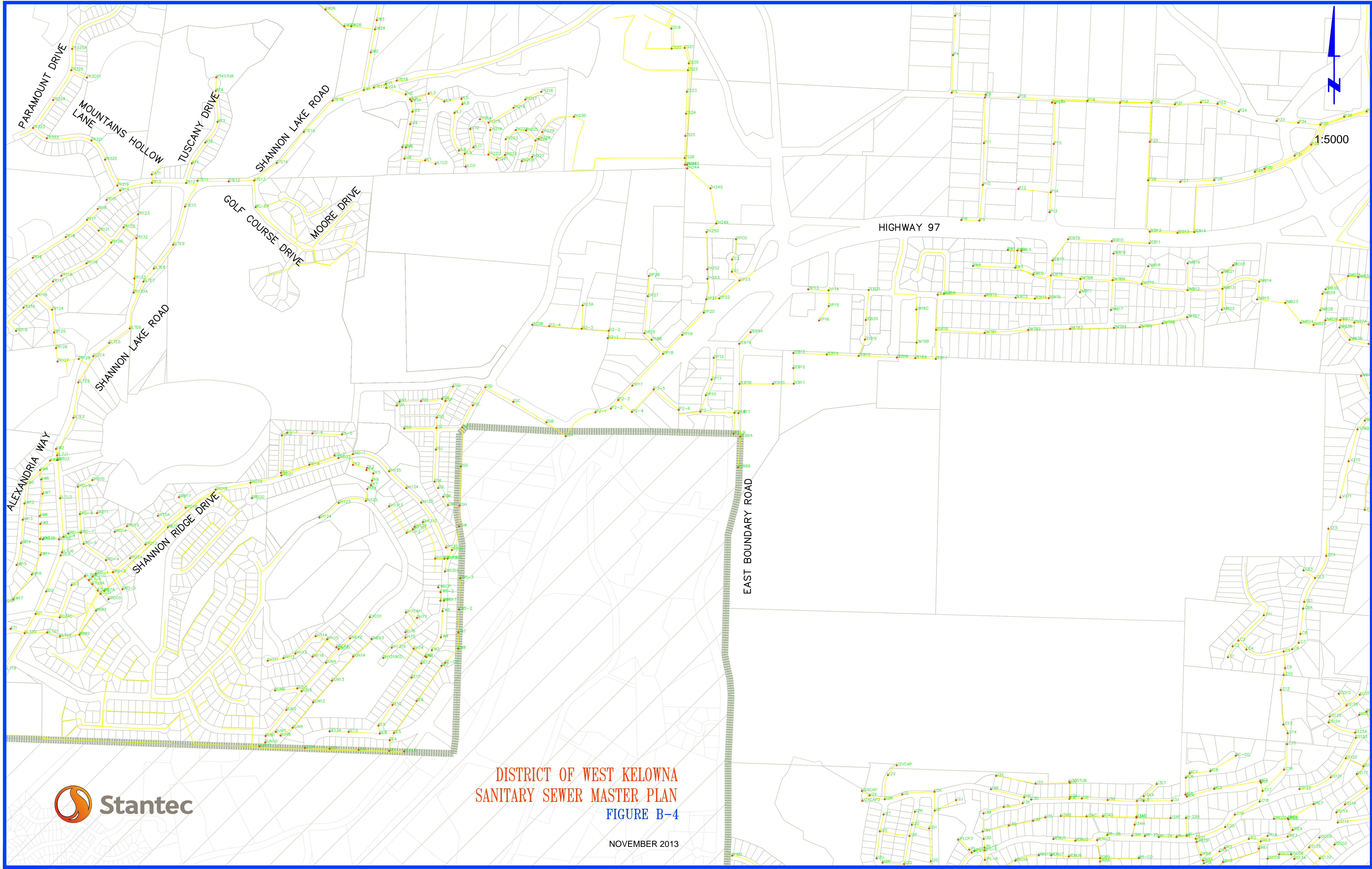


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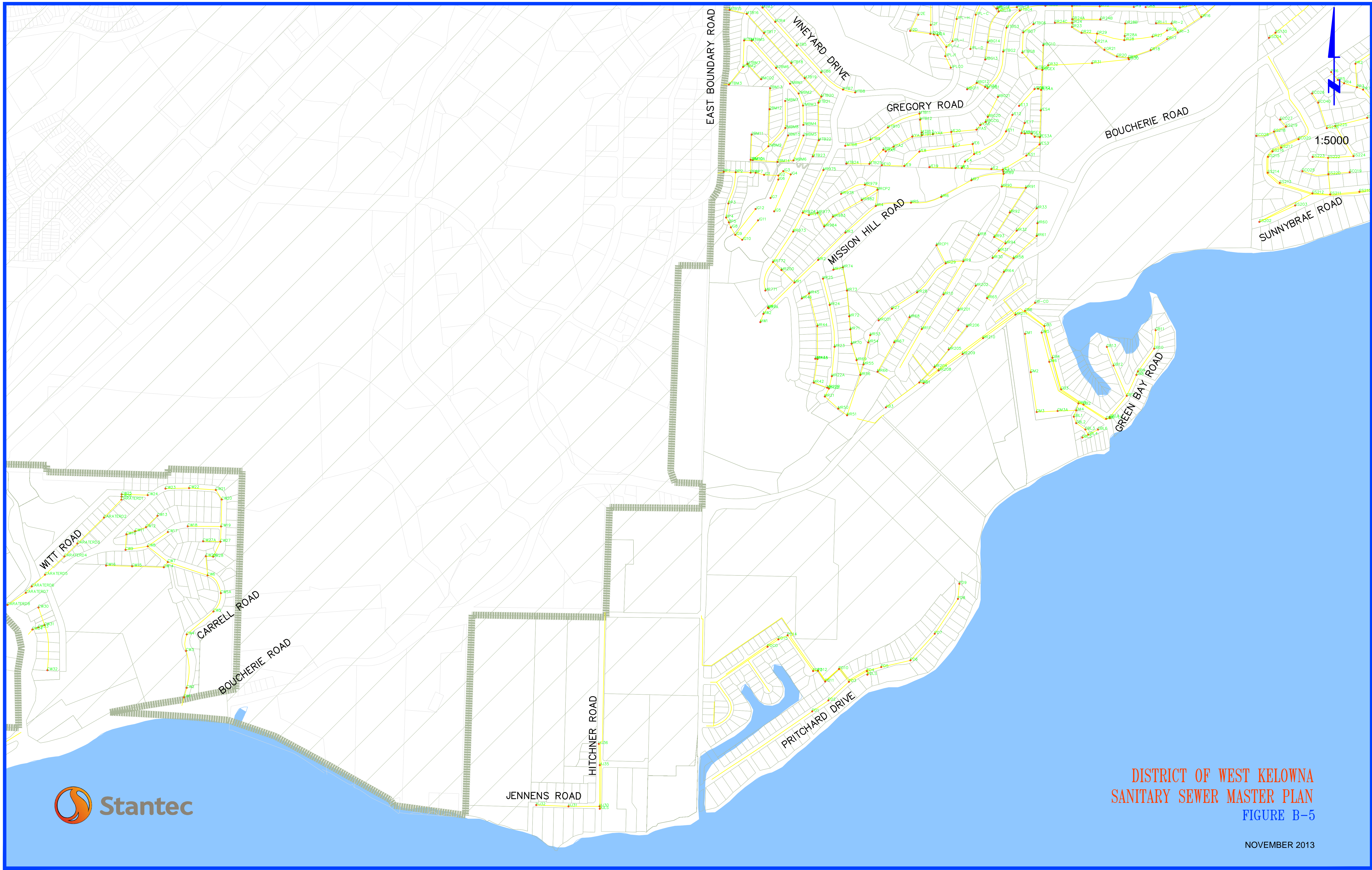
DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
FIGURE B-3

NOVEMBER 2013



DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 FIGURE B-4

NOVEMBER 2013

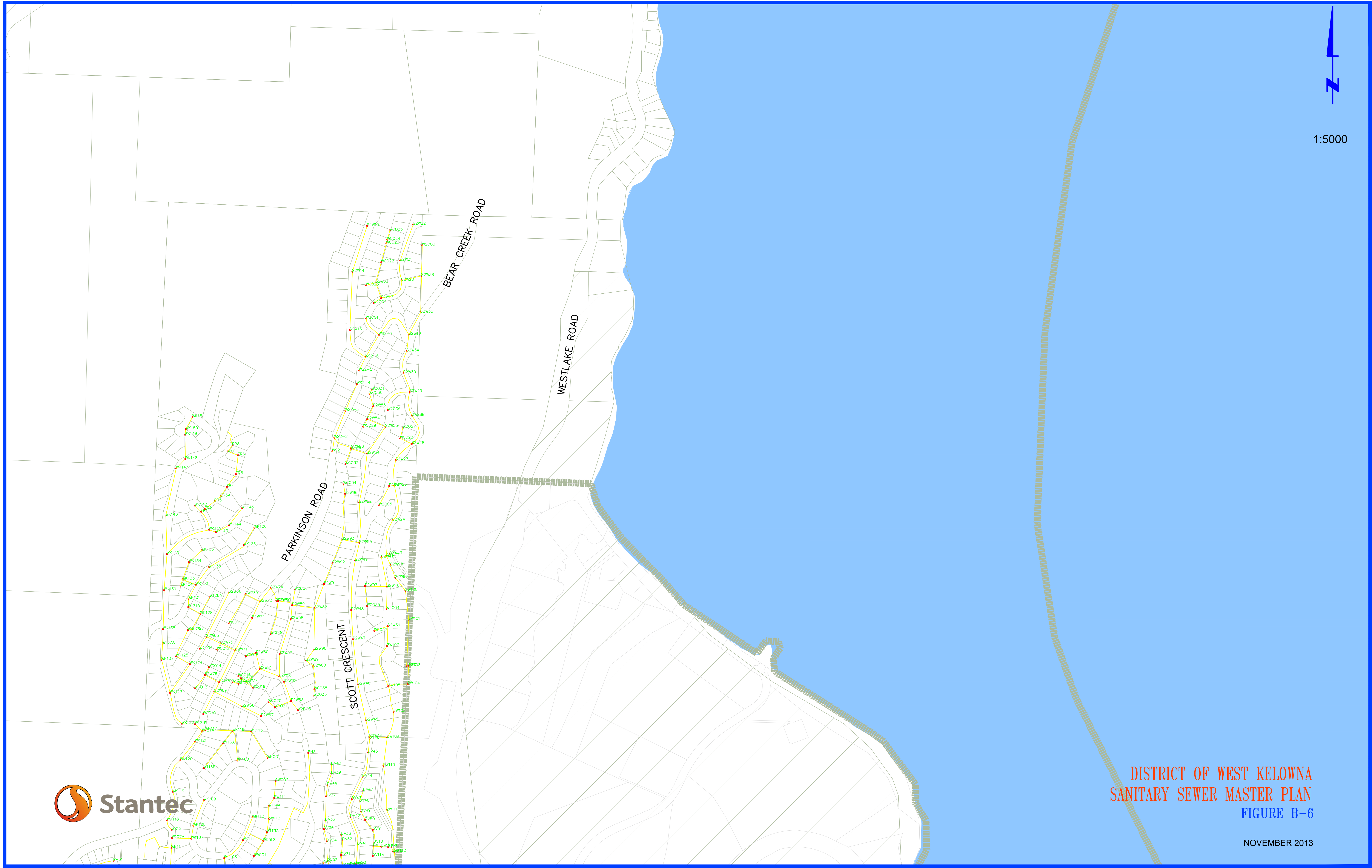


DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 FIGURE B-5

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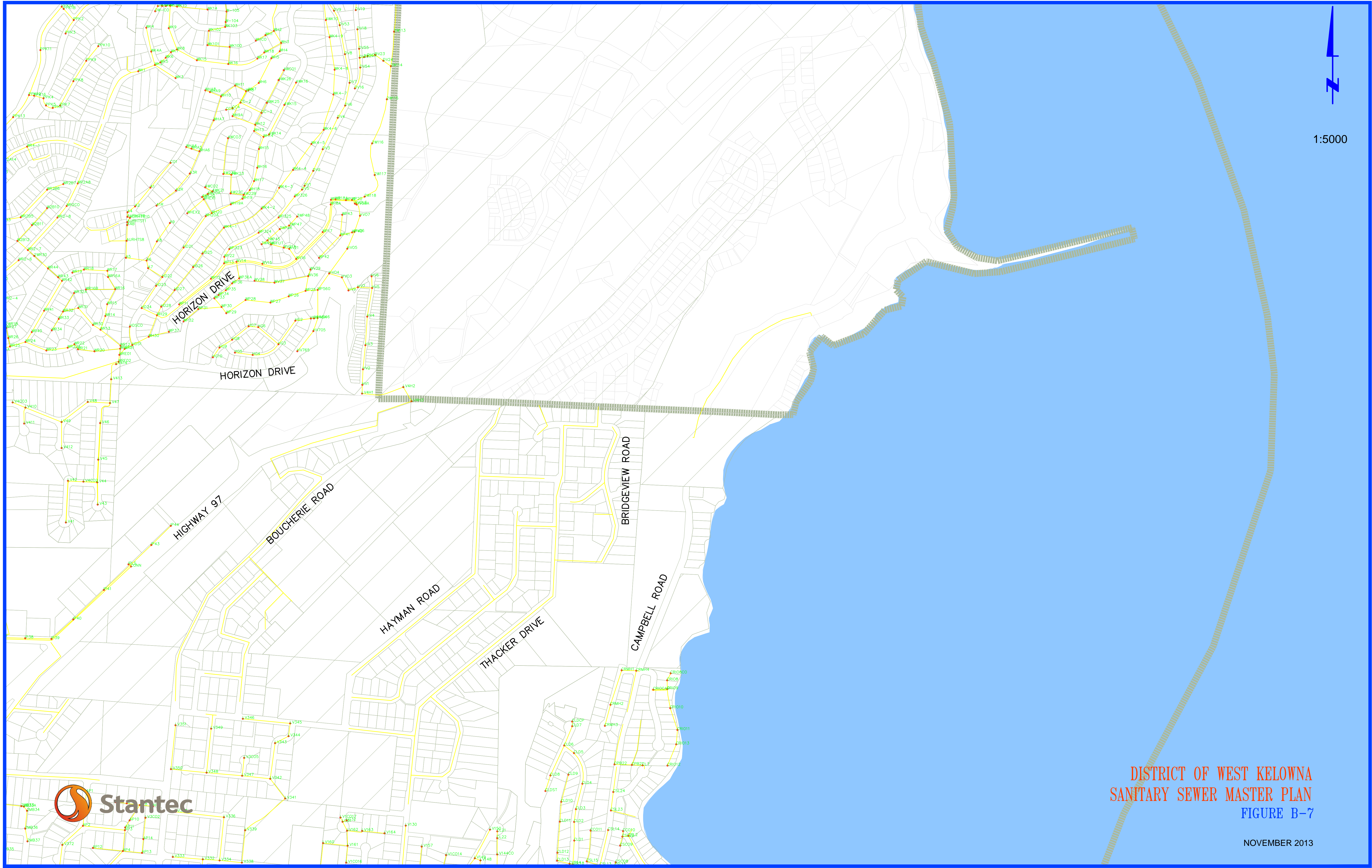


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DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
FIGURE B-6

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DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
FIGURE B-7

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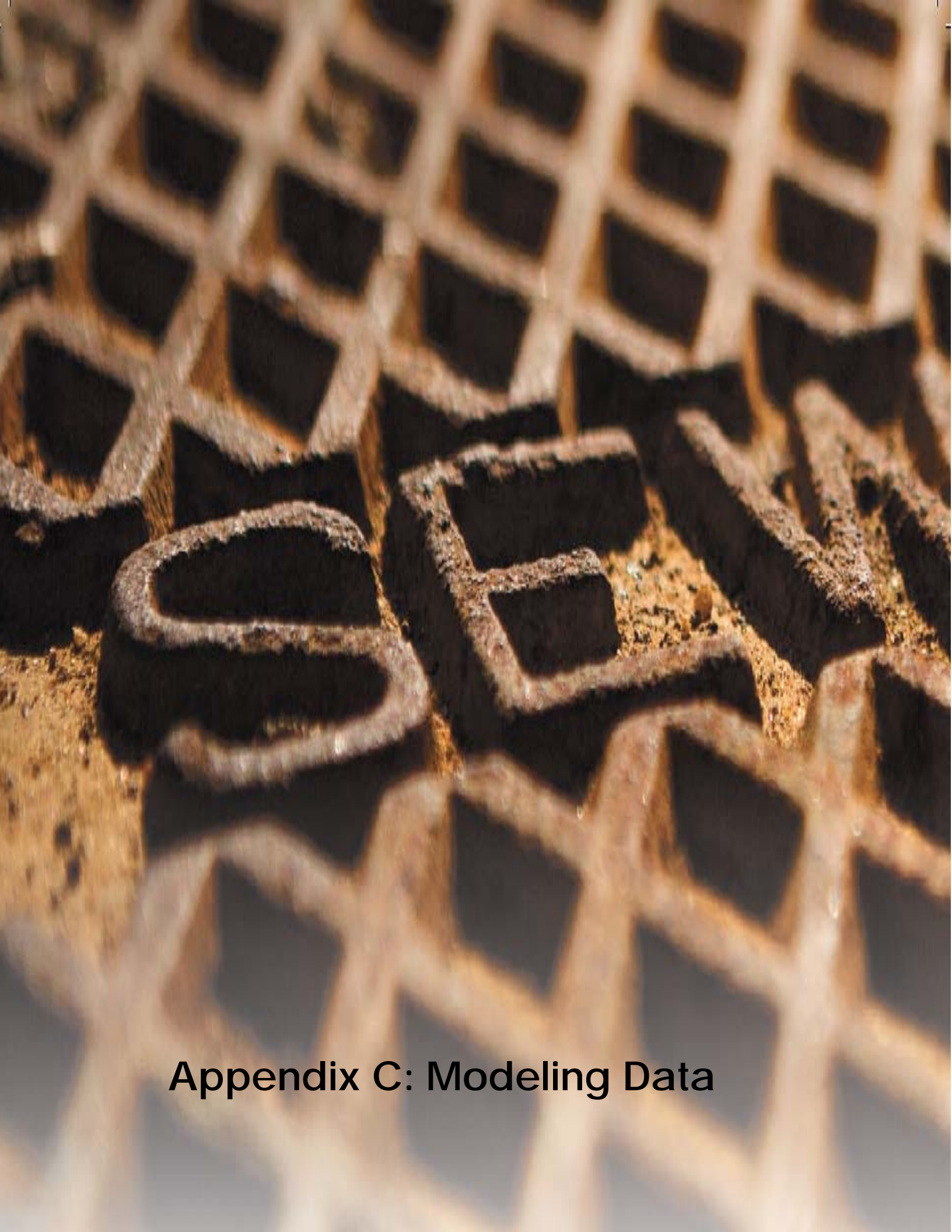


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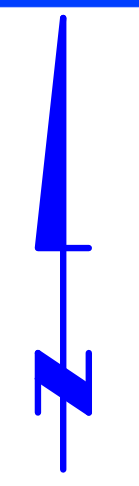


DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
FIGURE B-8

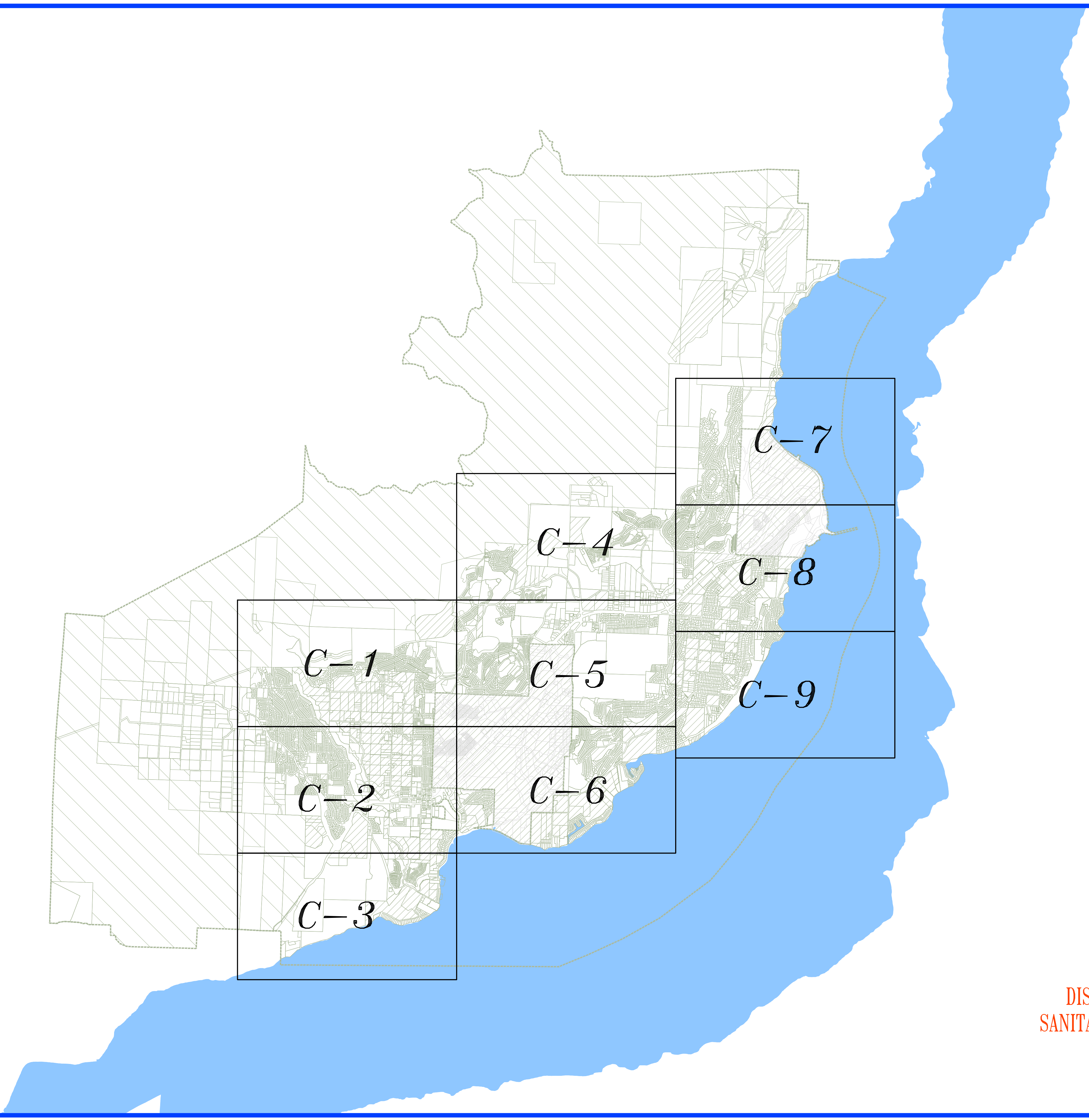
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Appendix C: Modeling Data

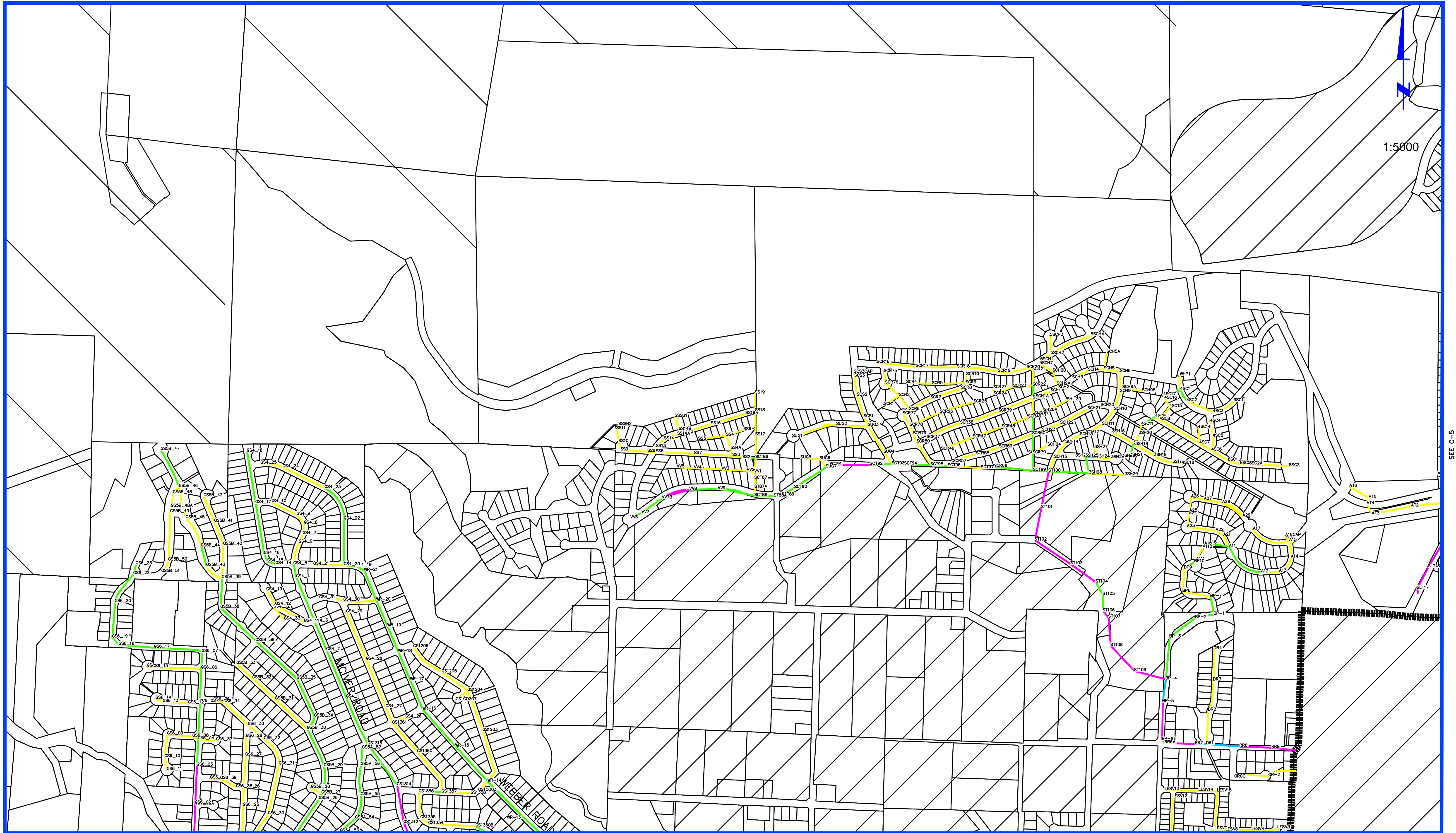


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DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
APPENDIX C KEY PLAN

NOVEMBER 2013



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SEE C-5

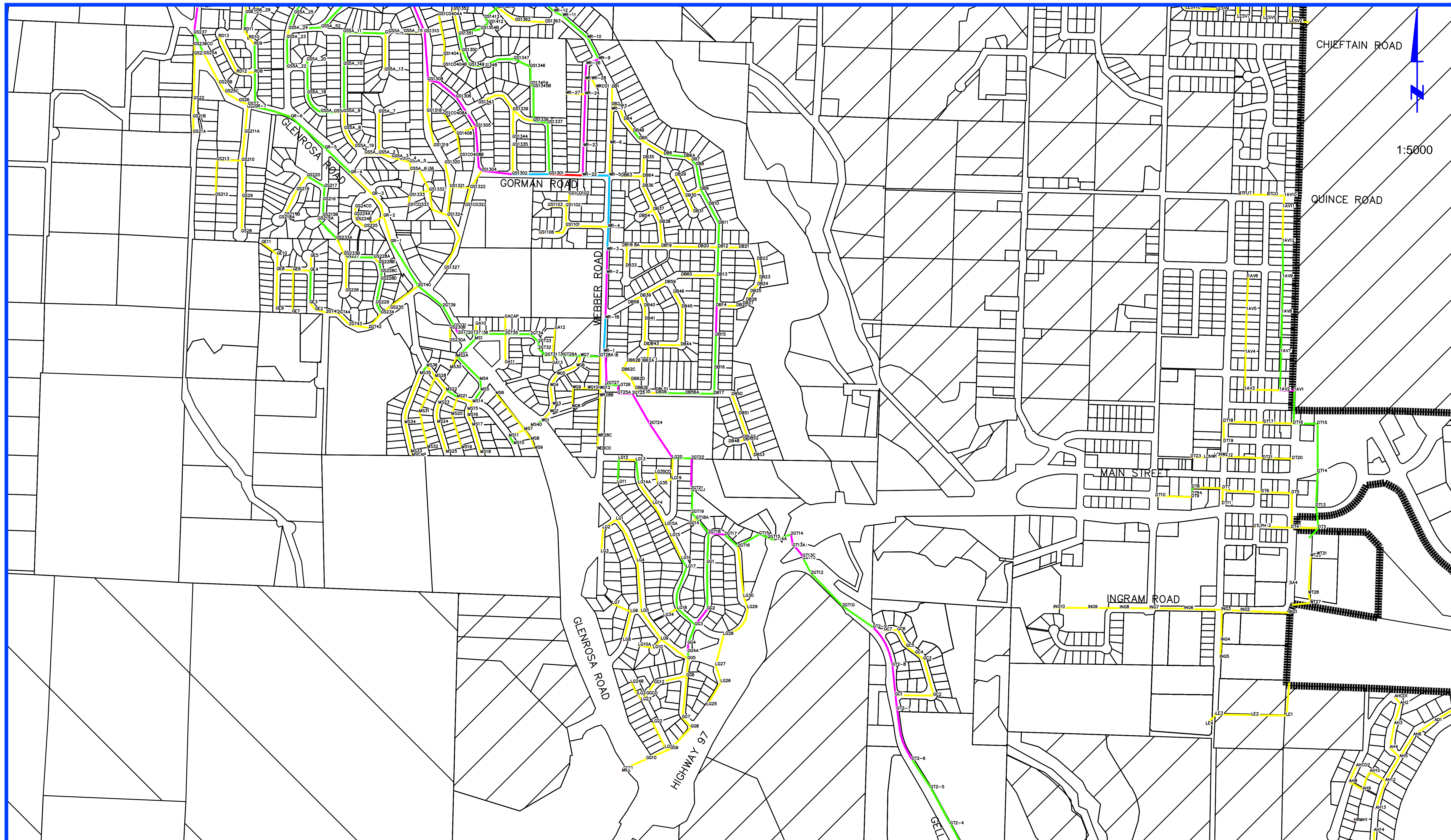
SEE C-2



LEGEND
 FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Green
20 TO 40	Magenta
40 TO 60	Cyan
60 TO 100	Red

**DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 EXISTING CONDITIONS**
 FIGURE C-1
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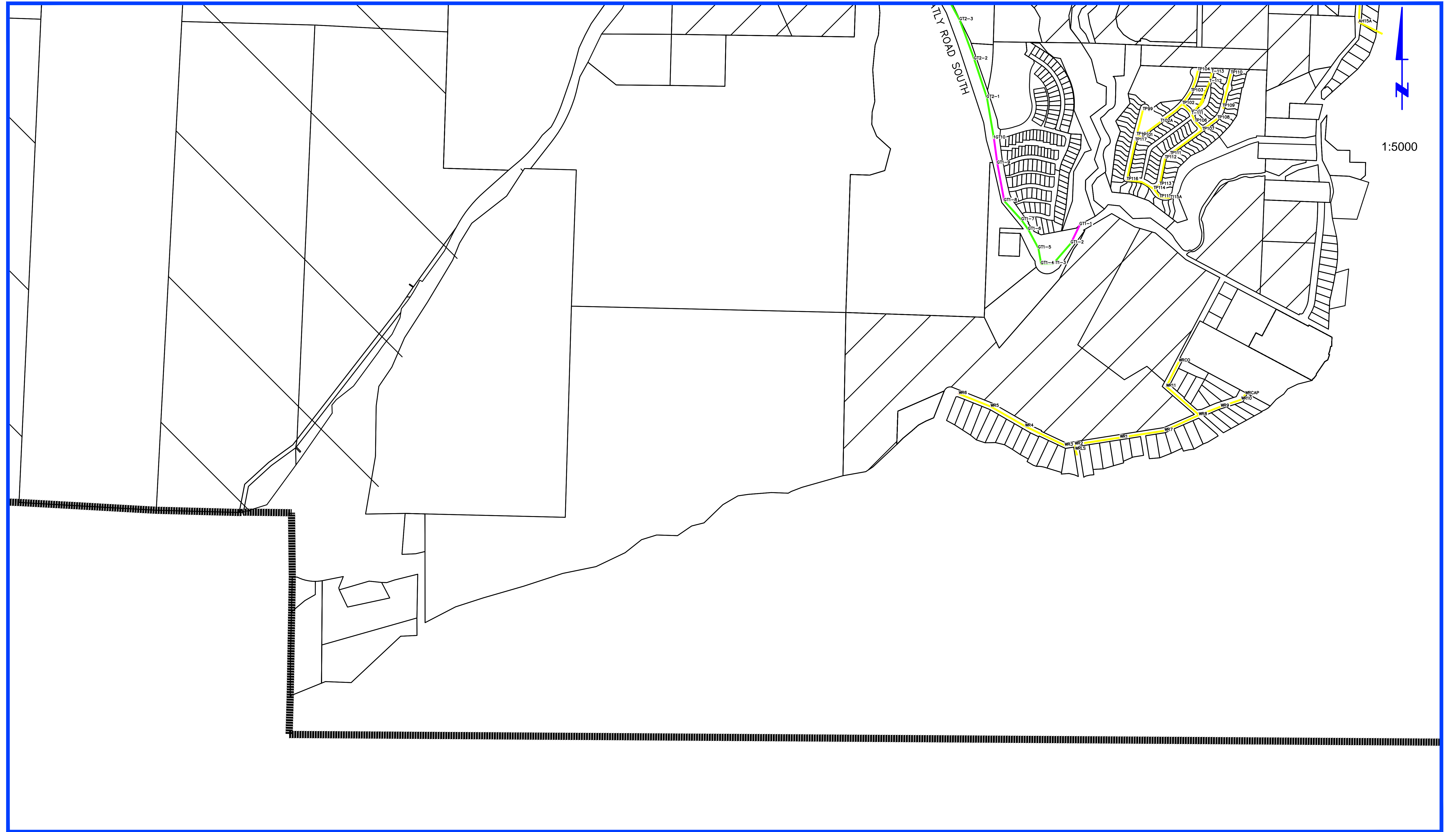
LEGEND

- FLOW AS % OF PIPE CAPACITY
- 0 TO 10
 - 10 TO 20
 - 20 TO 40
 - 40 TO 60
 - 60 TO 100

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 EXISTING CONDITIONS

FIGURE C-2

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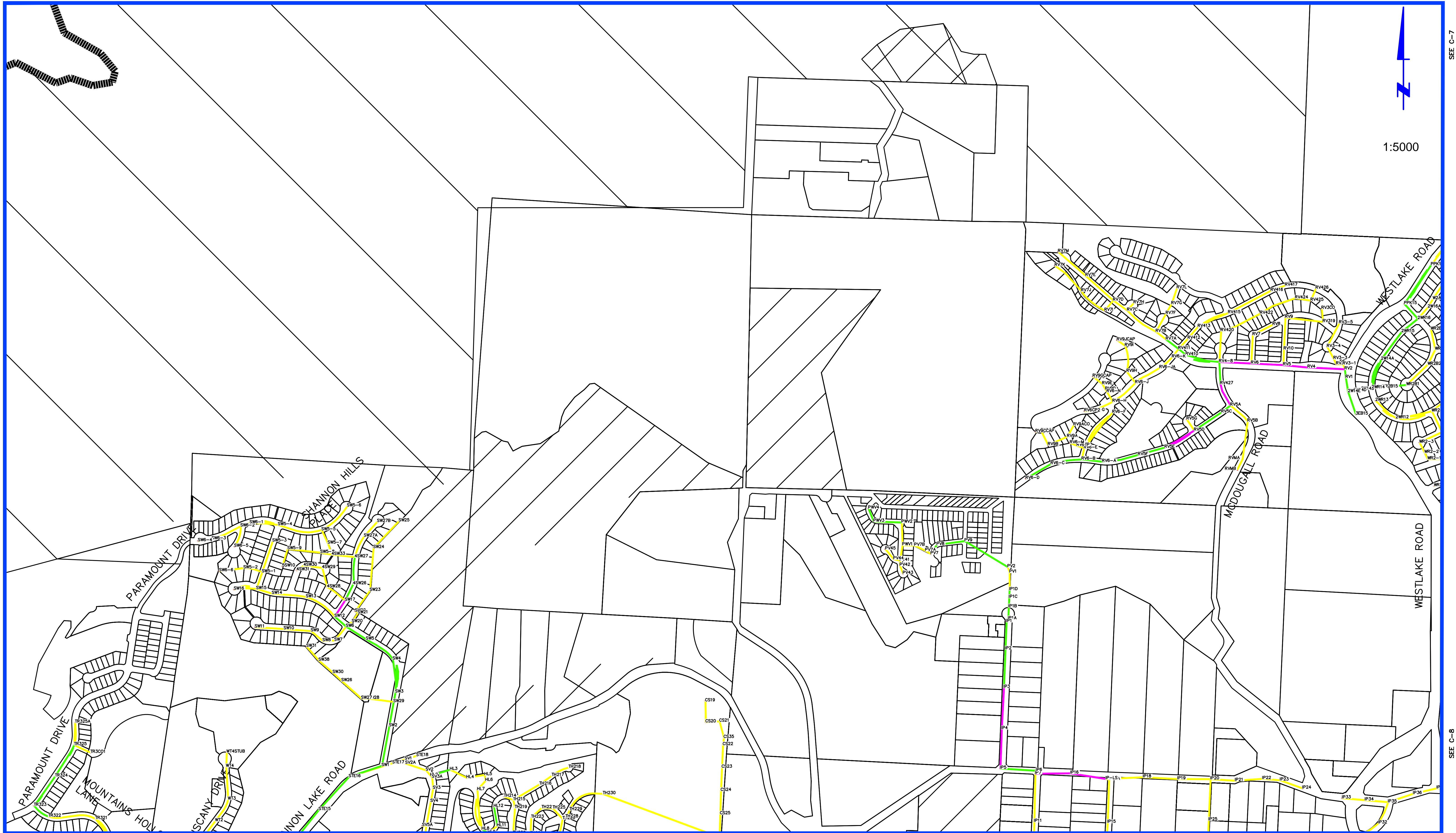
LEGEND

FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Green
20 TO 40	Magenta
40 TO 60	Cyan
60 TO 100	Red

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 EXISTING CONDITIONS

FIGURE C-3
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SEE C-7

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SEE C-5

SEE C-8



LEGEND

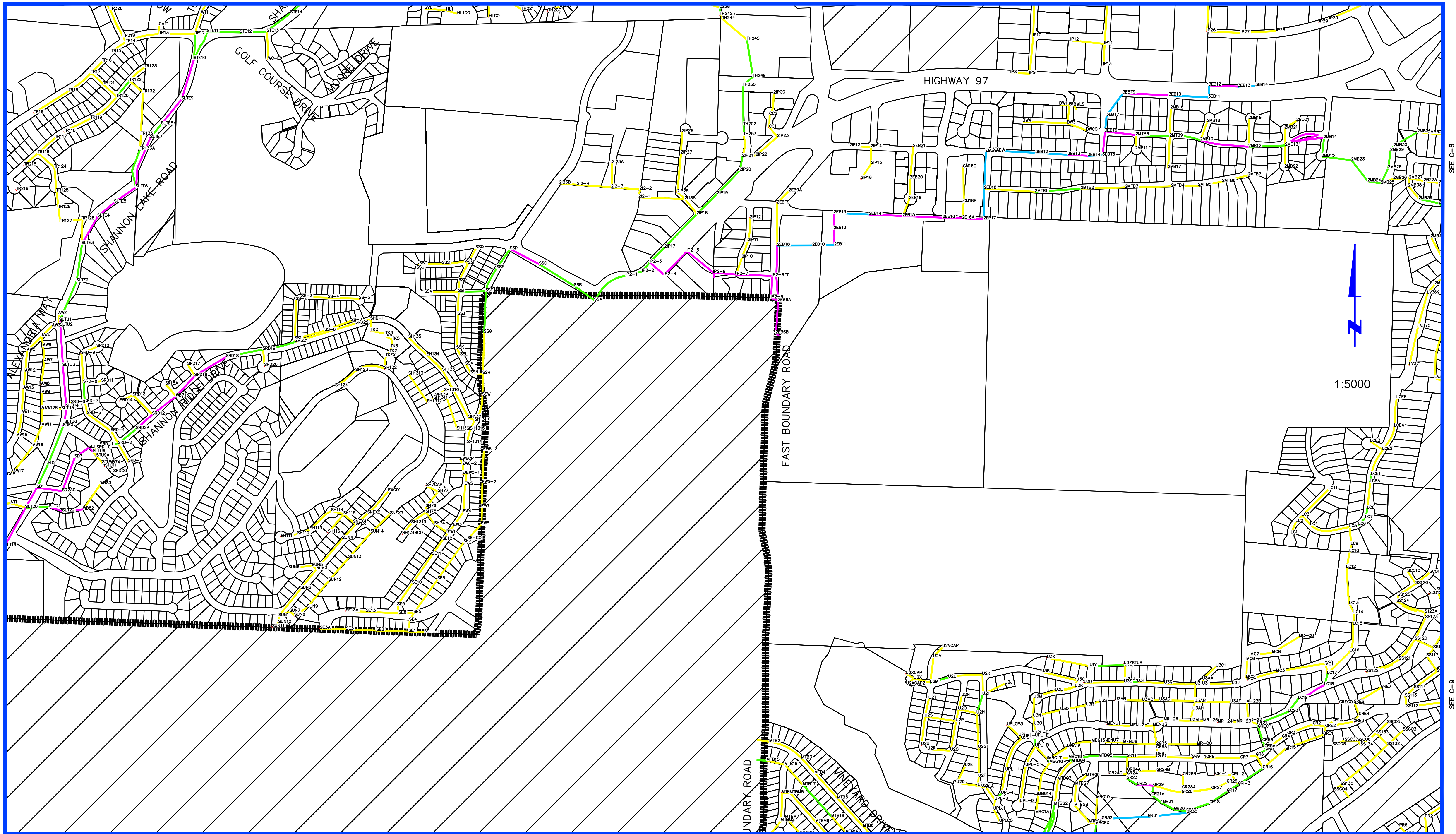
FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Green
20 TO 40	Purple
40 TO 60	Blue
60 TO 100	Red

**DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
EXISTING CONDITIONS**

FIGURE C-4

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LEGEND

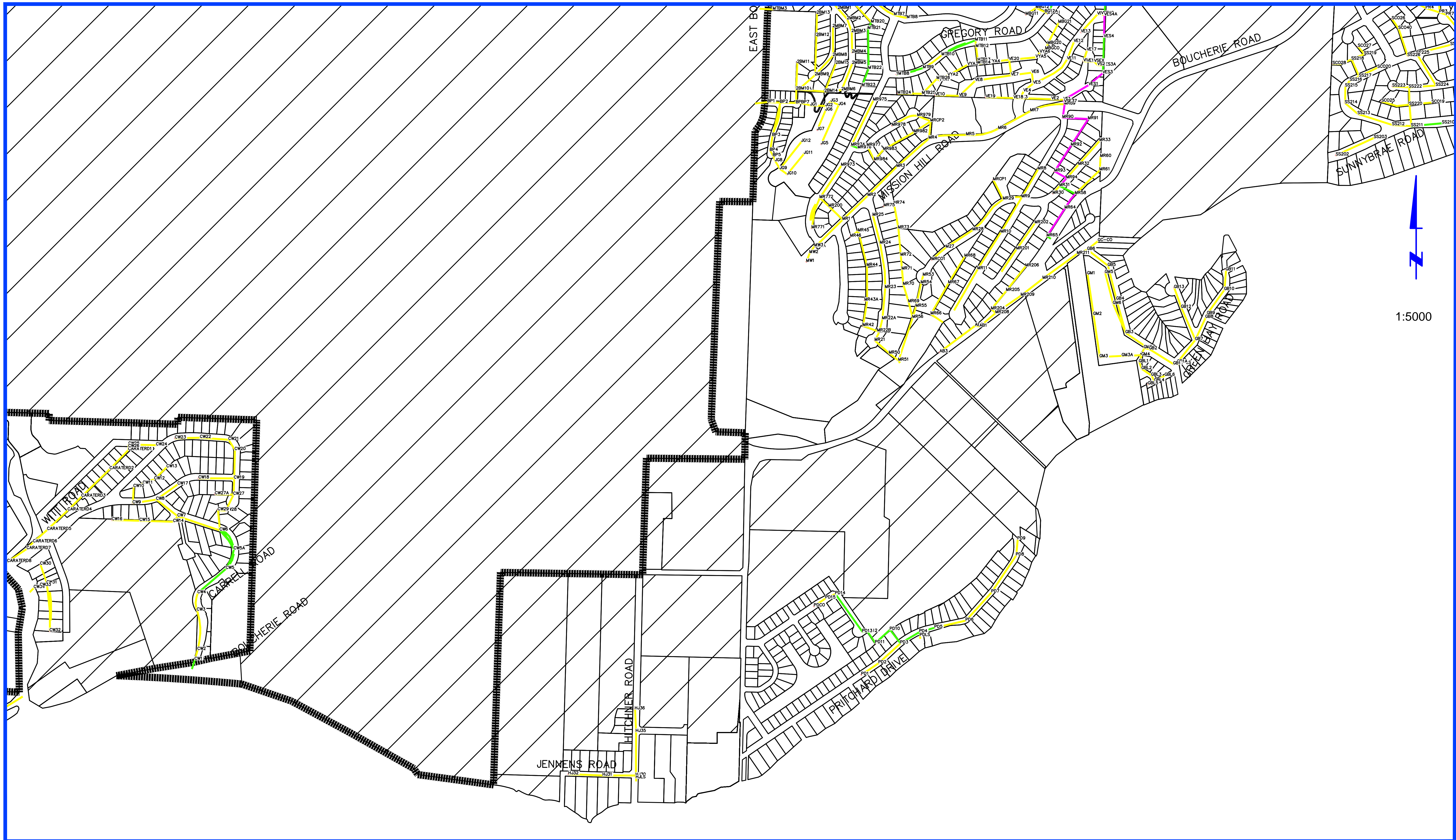
FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow line
10 TO 20	Light Green line
20 TO 40	Green line
40 TO 60	Light Blue line
60 TO 100	Dark Blue line

**DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
EXISTING CONDITIONS**

FIGURE C-5

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LEGEND
 FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Green
20 TO 40	Magenta
40 TO 60	Cyan
60 TO 100	Red

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 EXISTING CONDITIONS
 FIGURE C-6
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SEE C-4

SEE C-8



LEGEND

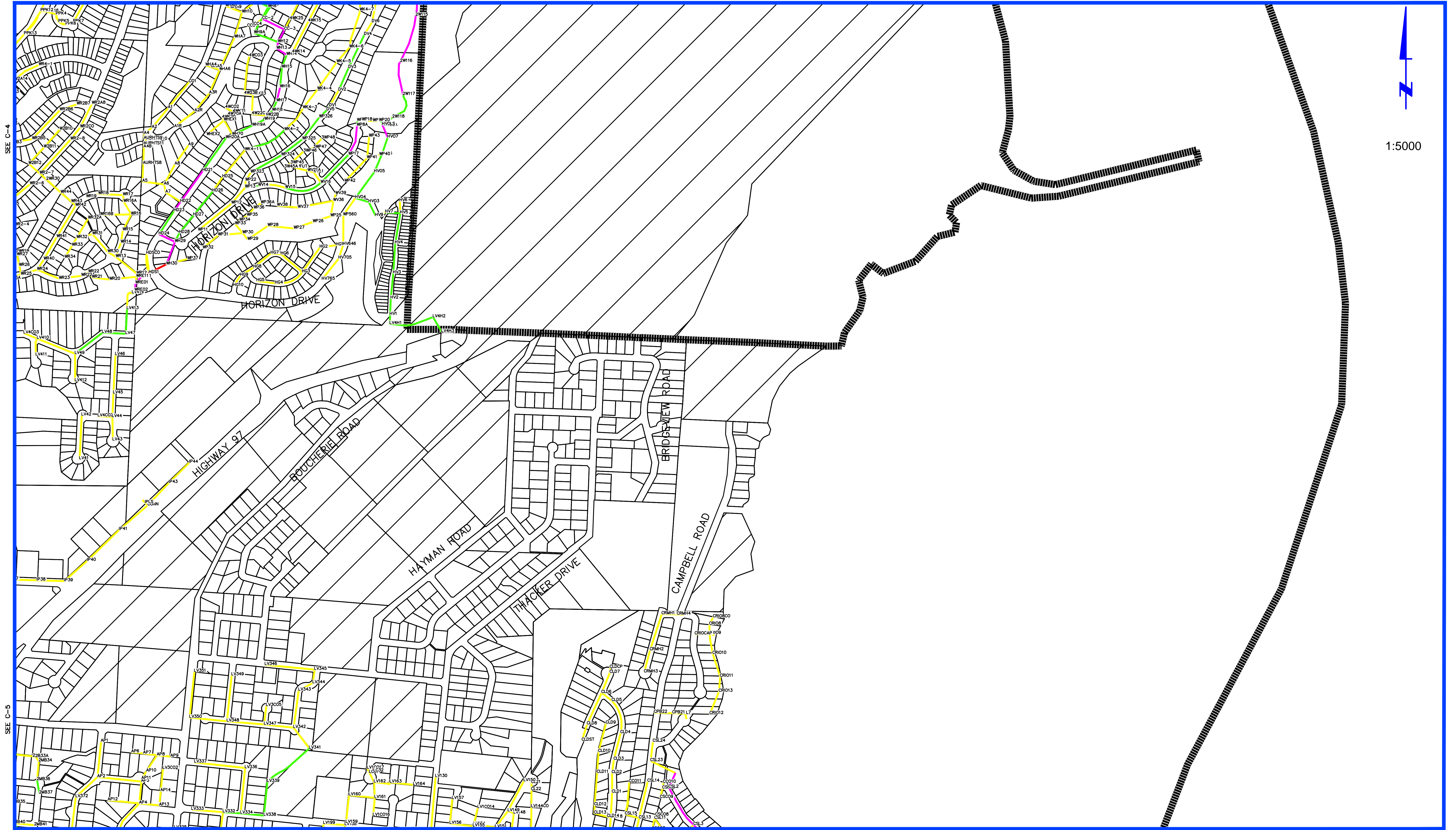
FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow line
10 TO 20	Green line
20 TO 40	Magenta line
40 TO 60	Cyan line
60 TO 100	Red line

**DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
EXISTING CONDITIONS**

FIGURE C-7

NOVEMBER 2013



SEE C-4

SEE C-5



LEGEND

FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow line
10 TO 20	Light Green line
20 TO 40	Magenta line
40 TO 60	Cyan line
60 TO 100	Red line

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 EXISTING CONDITIONS

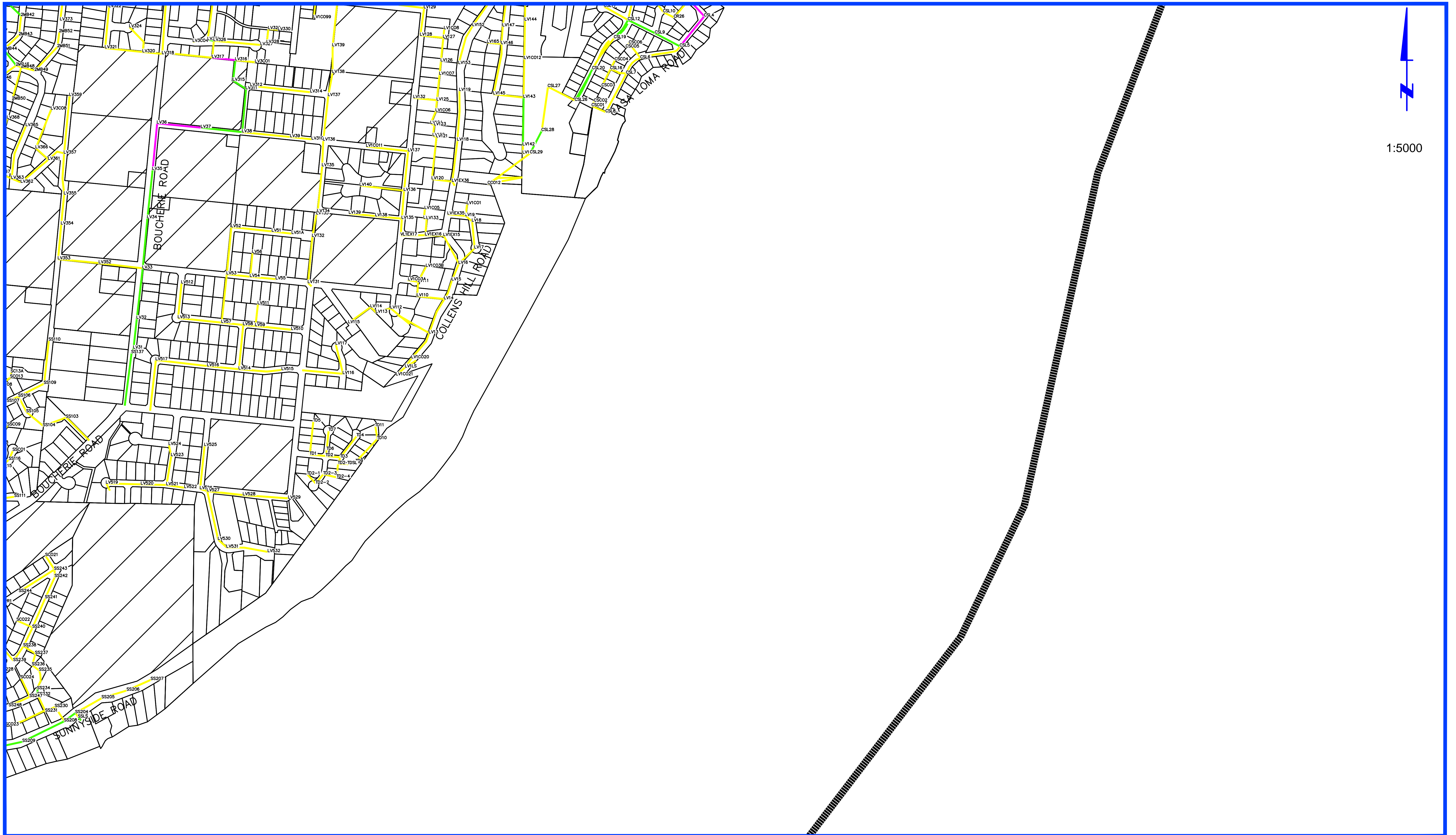
FIGURE C-8

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SEE C-8

SEE C-5

SEE C-6

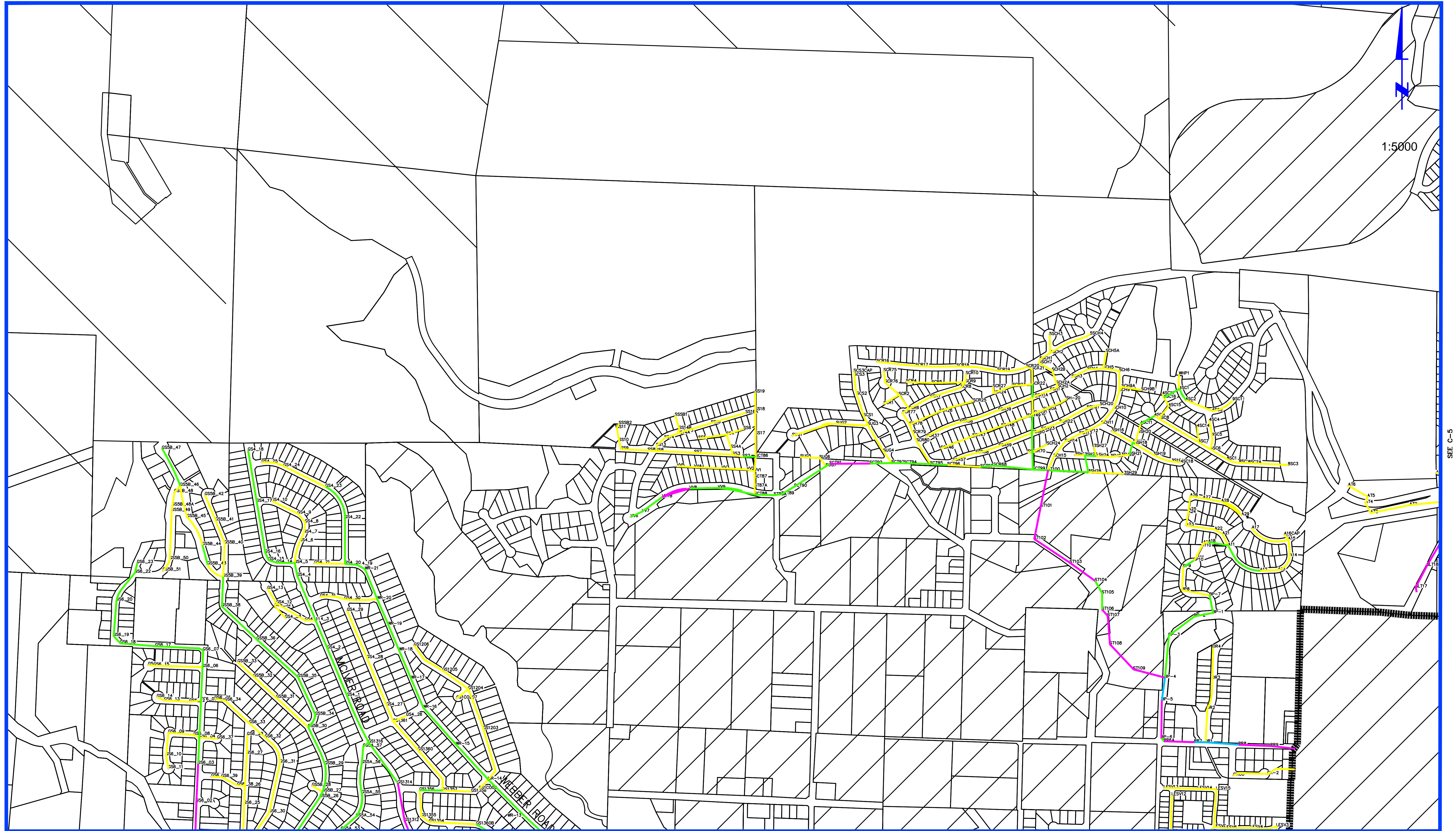


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LEGEND
 FLOW AS % OF PIPE CAPACITY
 0 TO 10
 10 TO 20
 20 TO 40
 40 TO 60
 60 TO 100

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 EXISTING CONDITIONS
 FIGURE C-9
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SEE C-5

SEE C-2



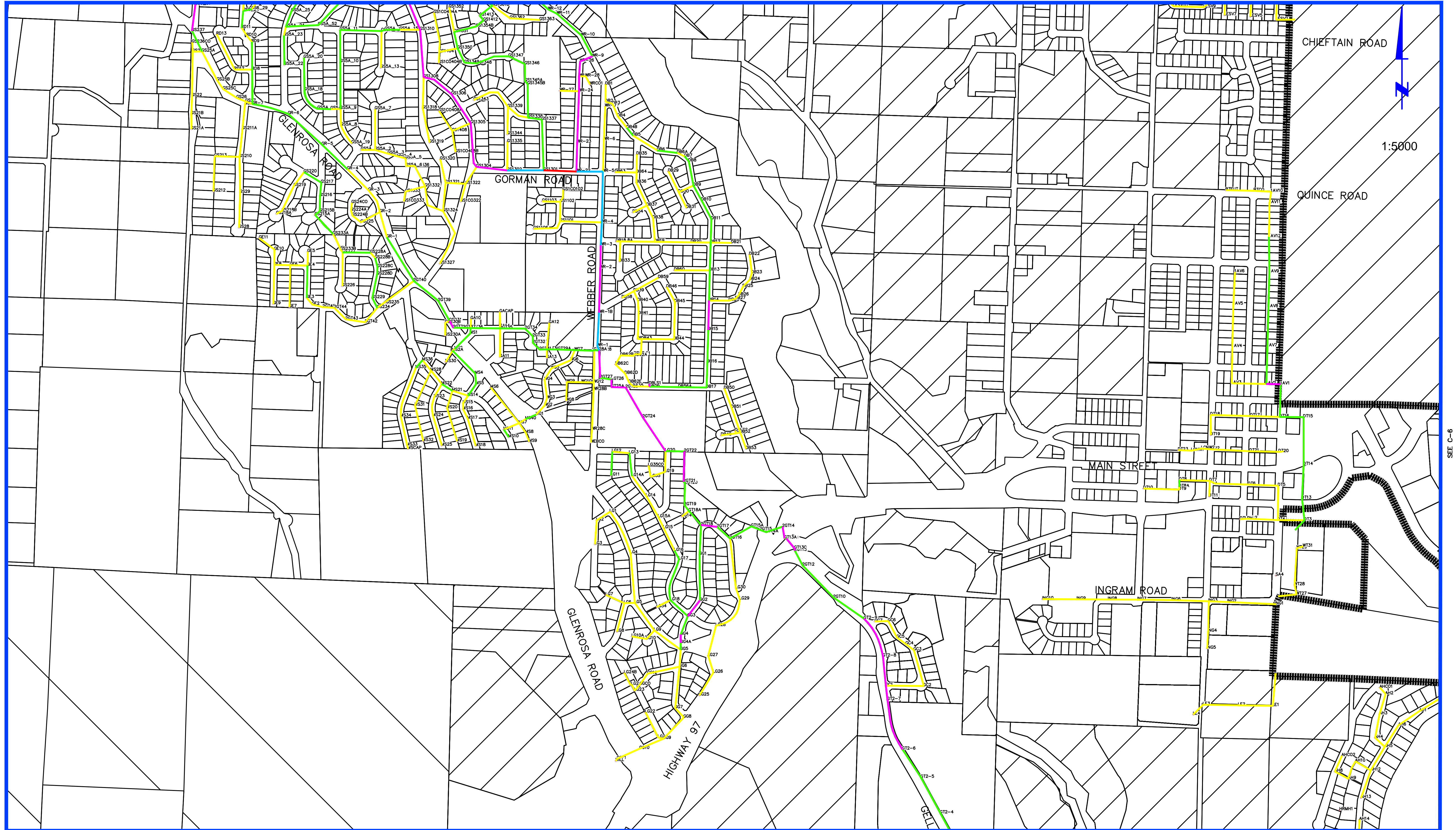
LEGEND
 FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Green
20 TO 40	Magenta
40 TO 60	Cyan
60 TO 100	Red

**DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 10 YEAR HORIZON**

FIGURE C-1

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SEE C-6



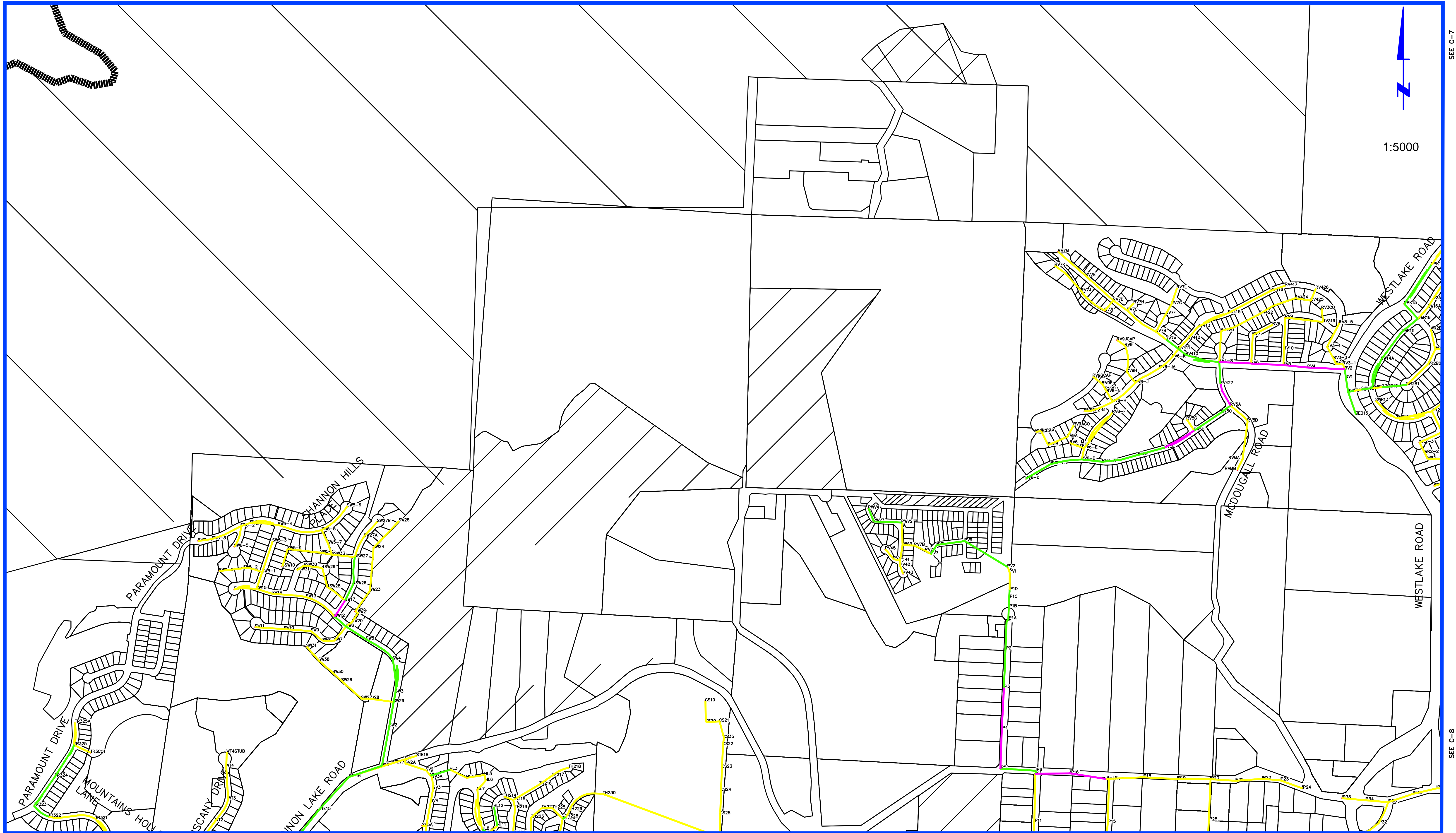
LEGEND

FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Green
20 TO 40	Magenta
40 TO 60	Cyan
60 TO 100	Red

**DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
10 YEAR HORIZON**

FIGURE C-2
NOVEMBER 2013



SEE C-7

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SEE C-5

SEE C-8

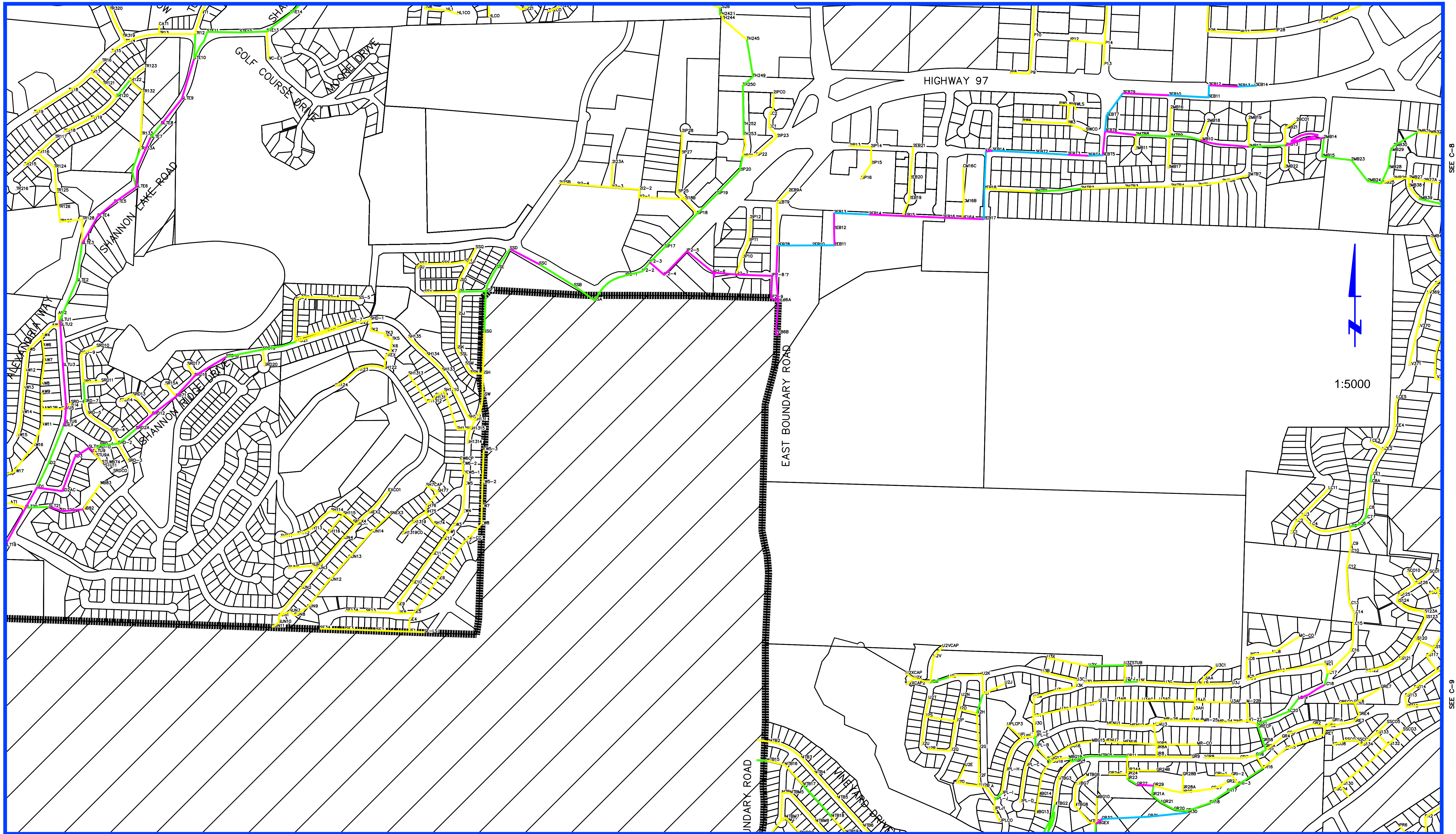


LEGEND
FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Green
20 TO 40	Magenta
40 TO 60	Cyan
60 TO 100	Red

DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
10 YEAR HORIZON

FIGURE C-4
NOVEMBER 2013



SEE C-1

SEE C-8

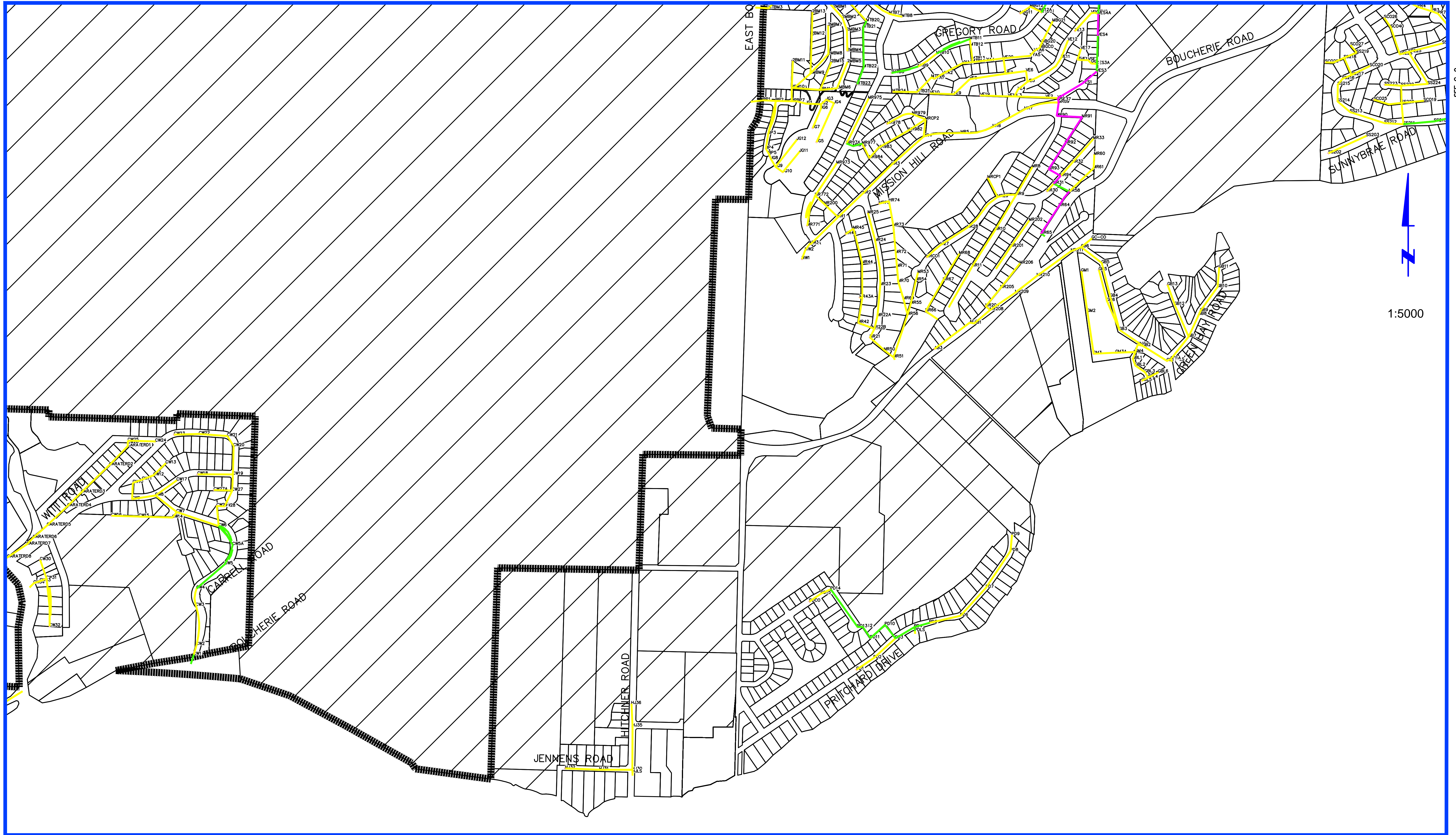
SEE C-9



LEGEND
 FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Light Green
20 TO 40	Magenta
40 TO 60	Light Blue
60 TO 100	Red

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 10 YEAR HORIZON
 FIGURE C-5
 NOVEMBER 2013



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LEGEND

FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Light Green
20 TO 40	Light Blue
40 TO 60	Light Purple
60 TO 100	Red

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 10 YEAR HORIZON

FIGURE C-6
 NOVEMBER 2013



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SEE C-4

SEE C-8



LEGEND

FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow line
10 TO 20	Green line
20 TO 40	Magenta line
40 TO 60	Cyan line
60 TO 100	Red line

**DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
10 YEAR HORIZON**

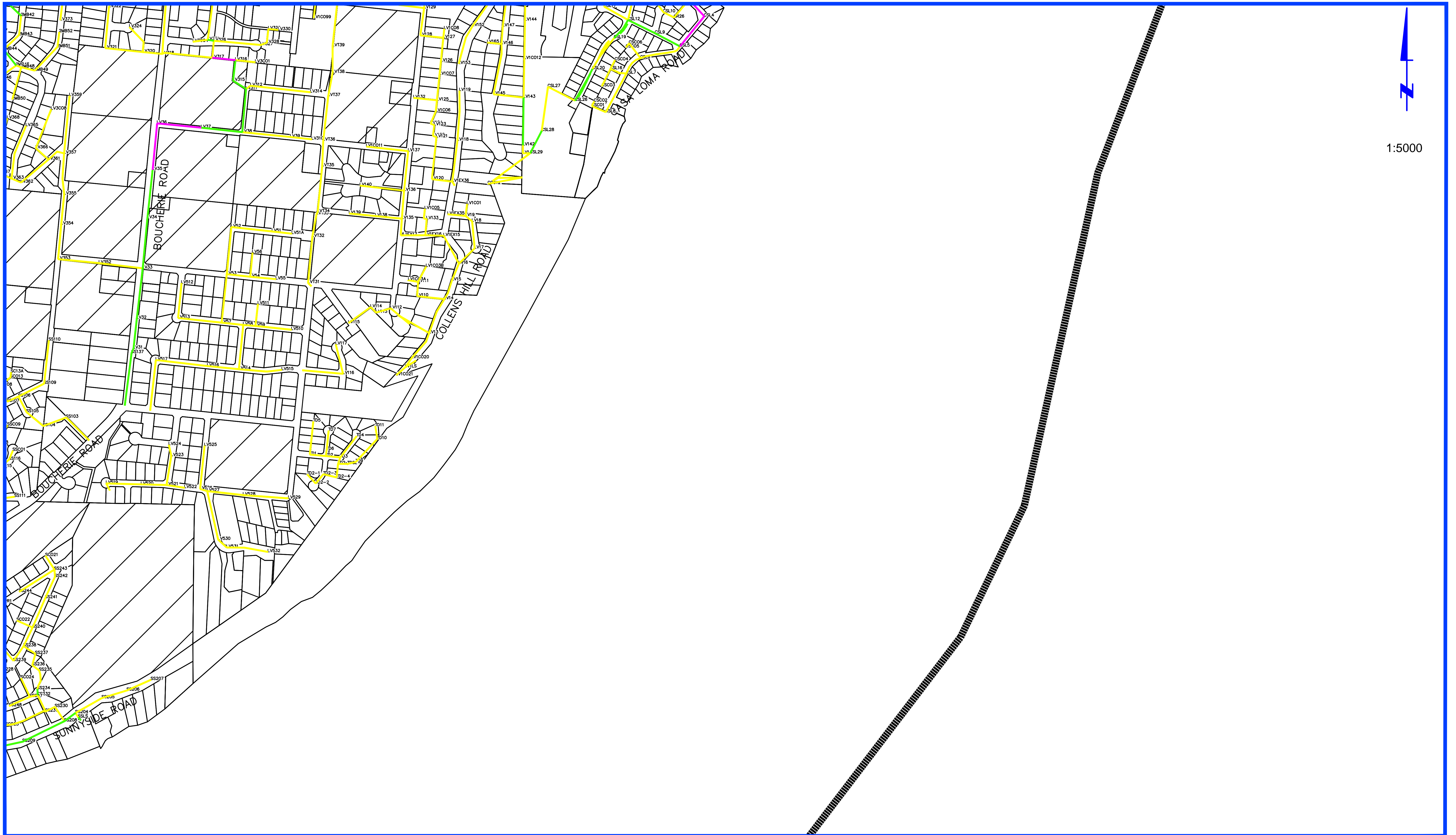
FIGURE C-7

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SEE C-8

SEE C-5

SEE C-6



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LEGEND

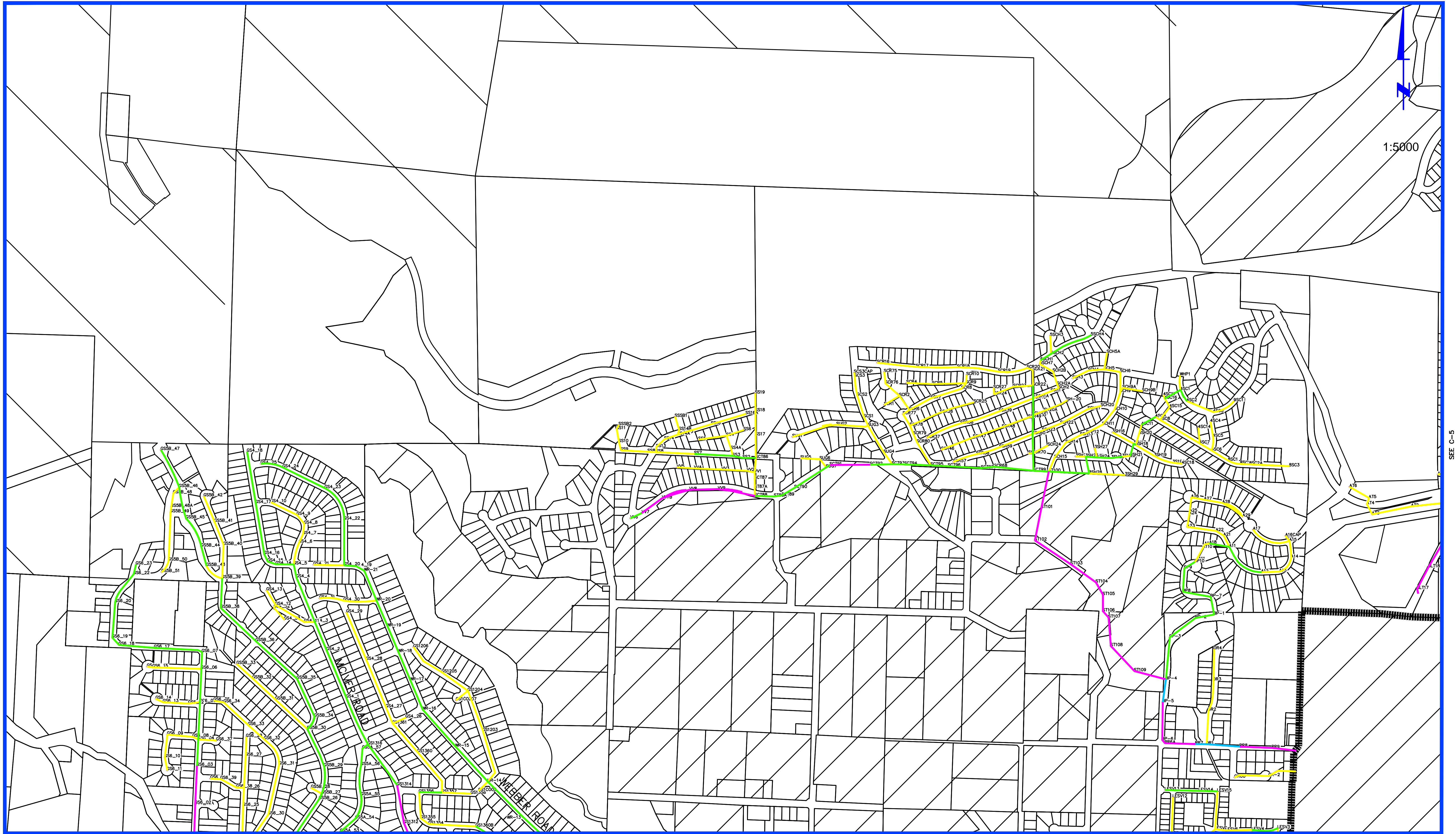
FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Green
20 TO 40	Purple
40 TO 60	Blue
60 TO 100	Red

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 10 YEAR HORIZON

FIGURE C-9

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SEE C-2



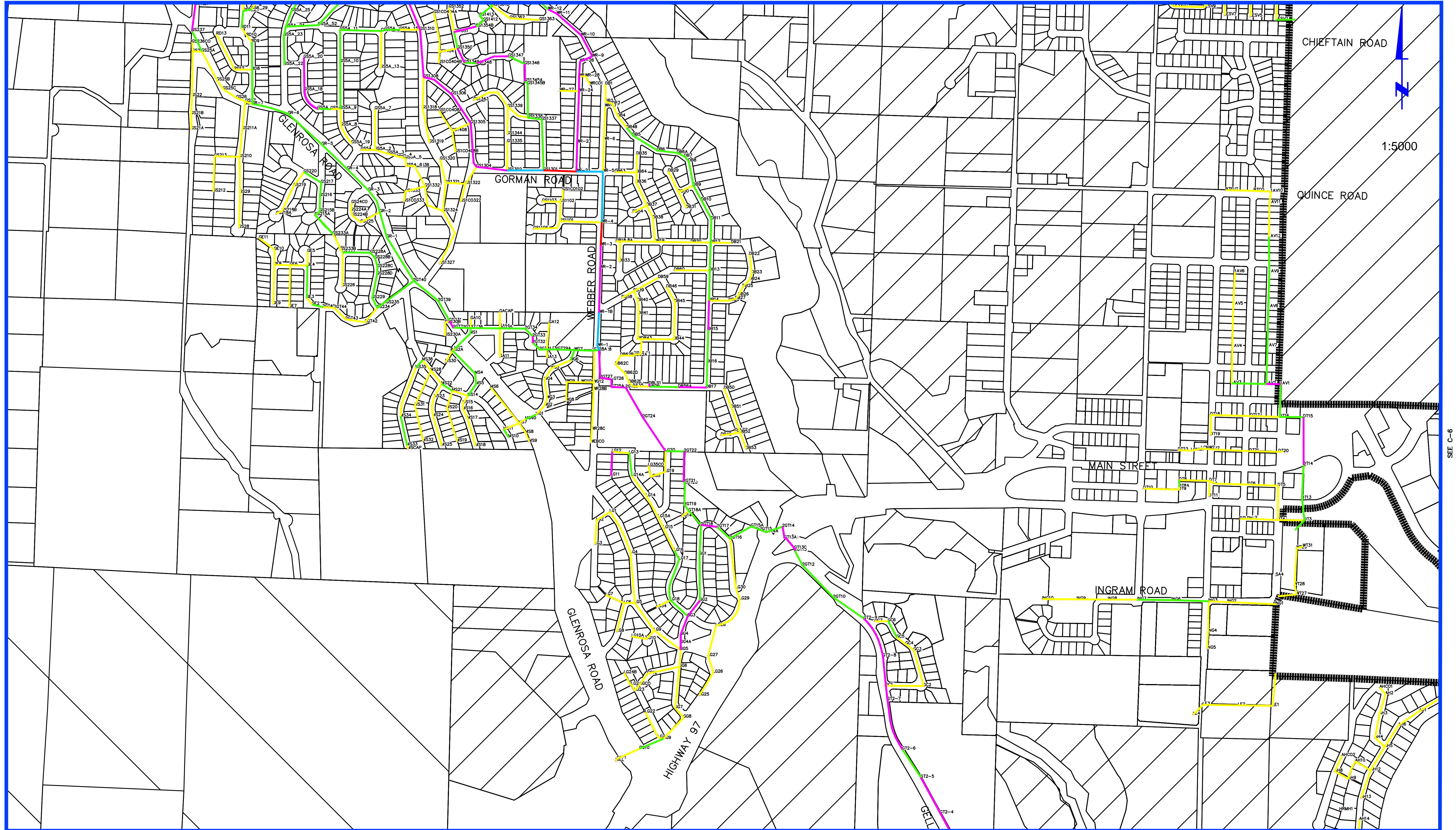
LEGEND
 FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Green
20 TO 40	Magenta
40 TO 60	Cyan
60 TO 100	Red

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 20 YEAR HORIZON

FIGURE C-1

NOVEMBER 2013



SEE C-6



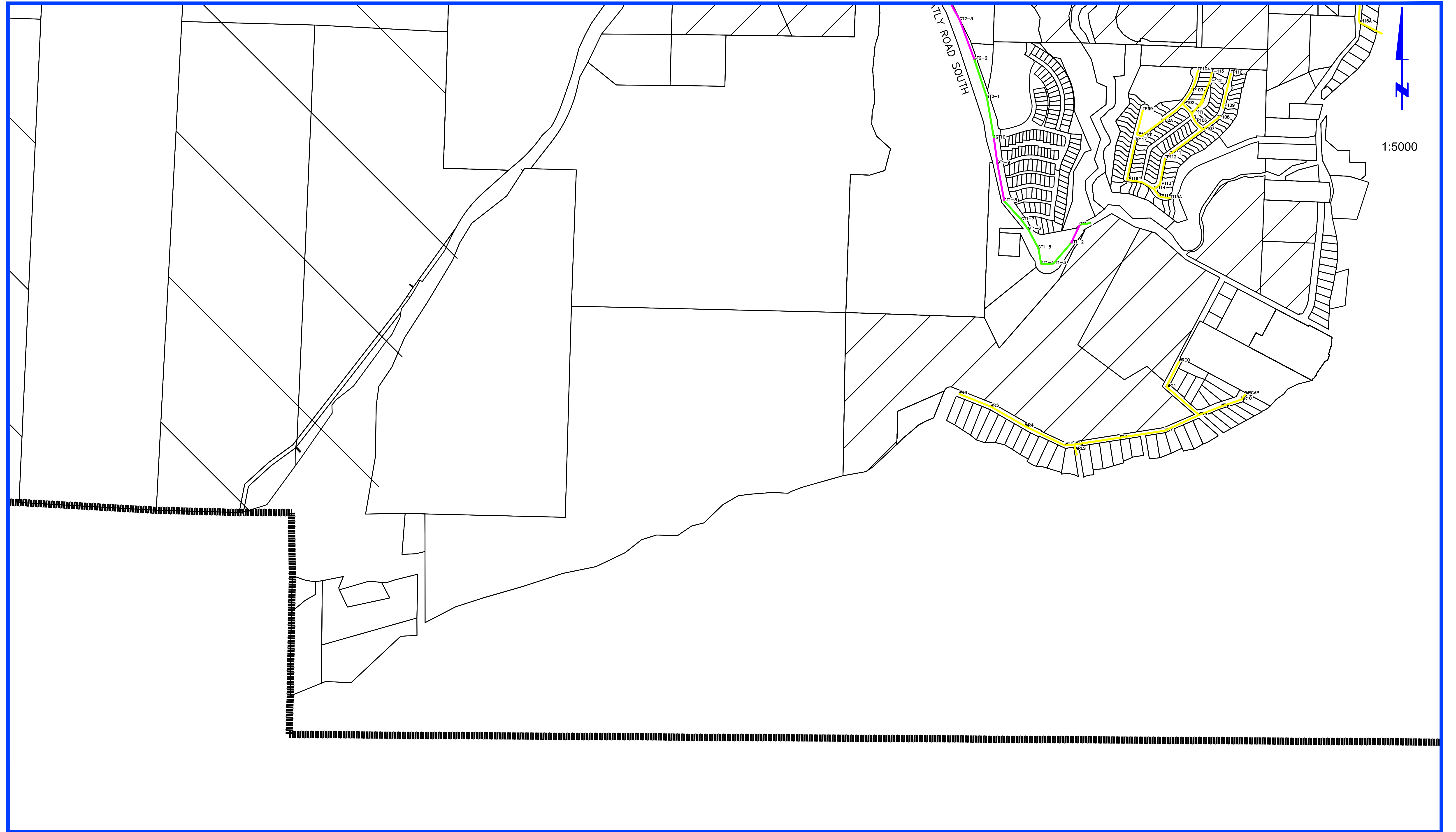
LEGEND

- FLOW AS % OF PIPE CAPACITY
- 0 TO 10
 - 10 TO 20
 - 20 TO 40
 - 40 TO 60
 - 60 TO 100

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 20 YEAR HORIZON

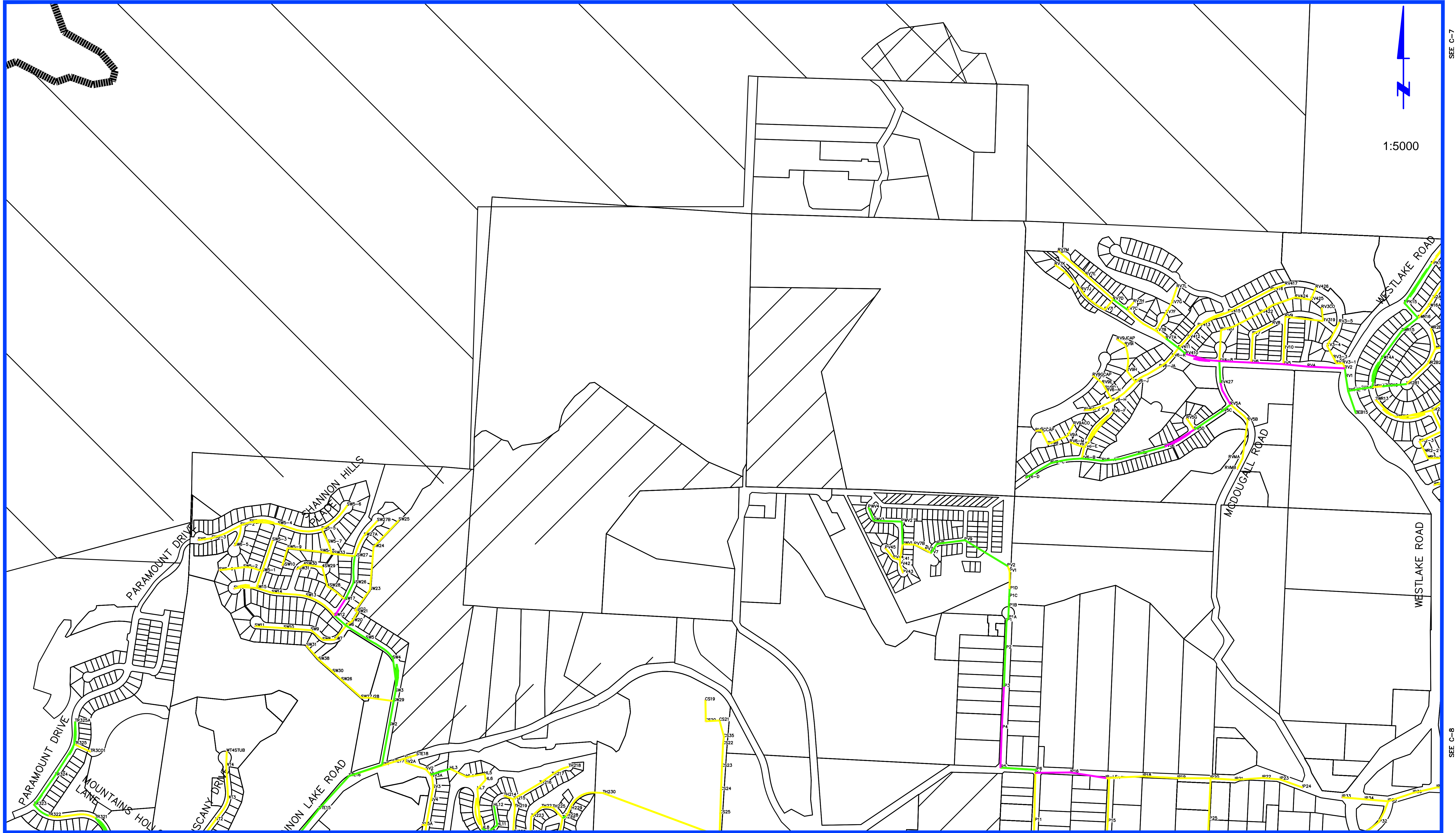
FIGURE C-2

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LEGEND
 FLOW AS % OF PIPE CAPACITY
 0 TO 10
 10 TO 20
 20 TO 40
 40 TO 60
 60 TO 100

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 20 YEAR HORIZON
 FIGURE C-3
 NOVEMBER 2013



SEE C-5



LEGEND

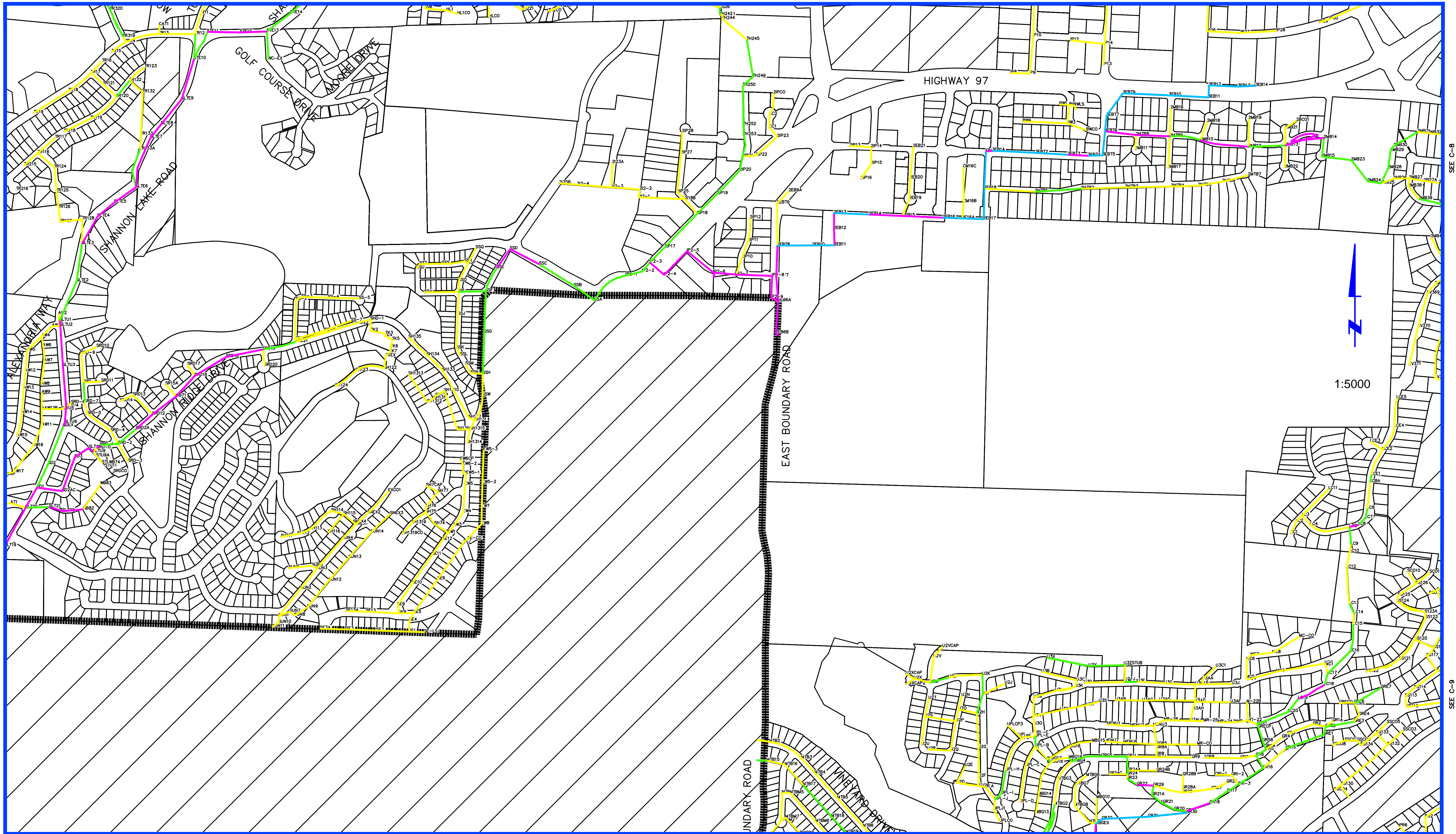
FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Green
20 TO 40	Magenta
40 TO 60	Cyan
60 TO 100	Red

**DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
20 YEAR HORIZON**

FIGURE C-4

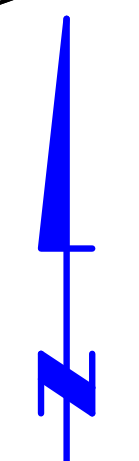
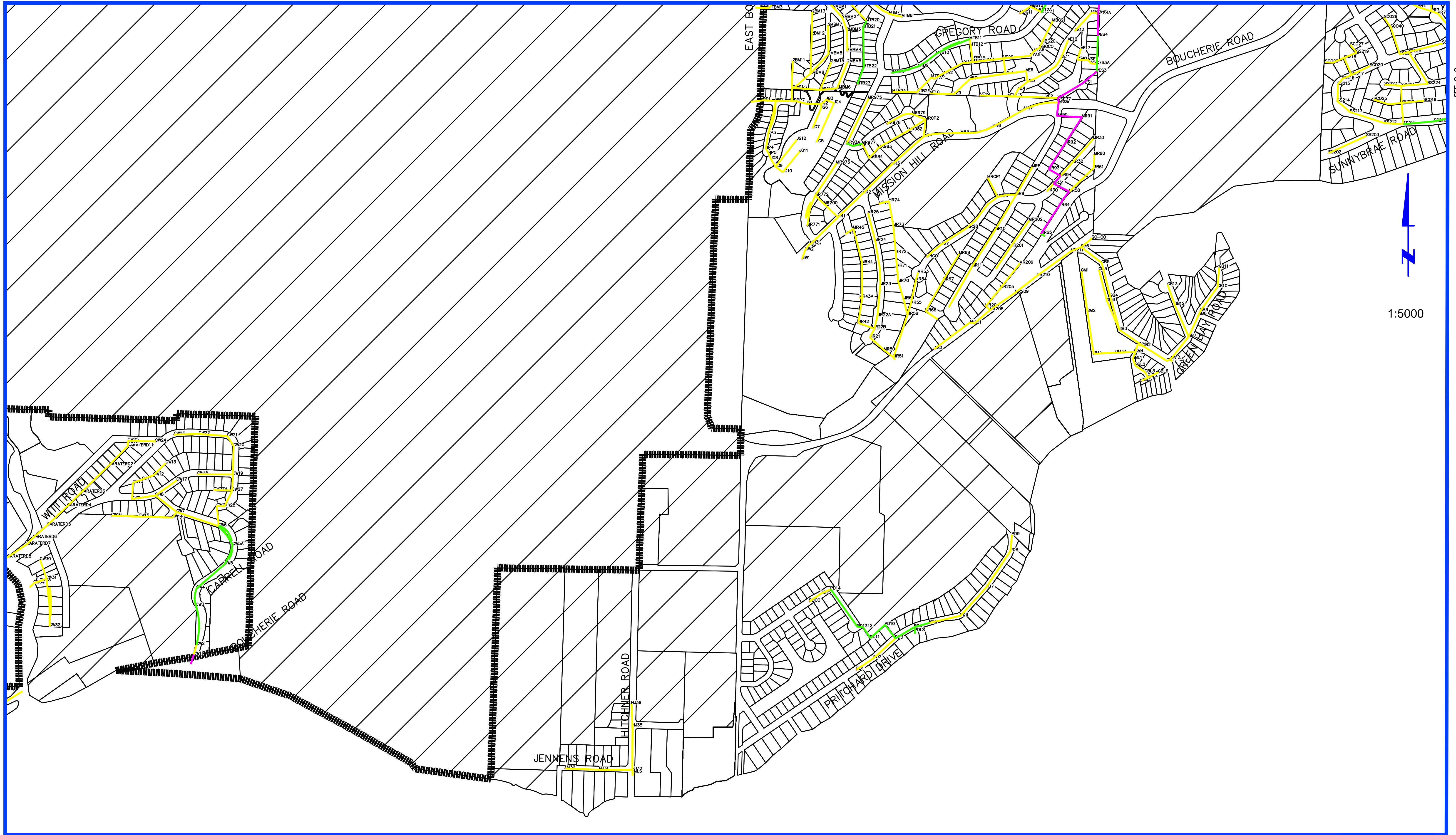
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LEGEND
 FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow line
10 TO 20	Green line
20 TO 40	Magenta line
40 TO 60	Cyan line
60 TO 100	Red line

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 20 YEAR HORIZON
 FIGURE C-5
 NOVEMBER 2013



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LEGEND

FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Green
20 TO 40	Purple
40 TO 60	Blue
60 TO 100	Red

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 20 YEAR HORIZON

FIGURE C-6
 NOVEMBER 2013



SEE C-4

SEE C-8



LEGEND

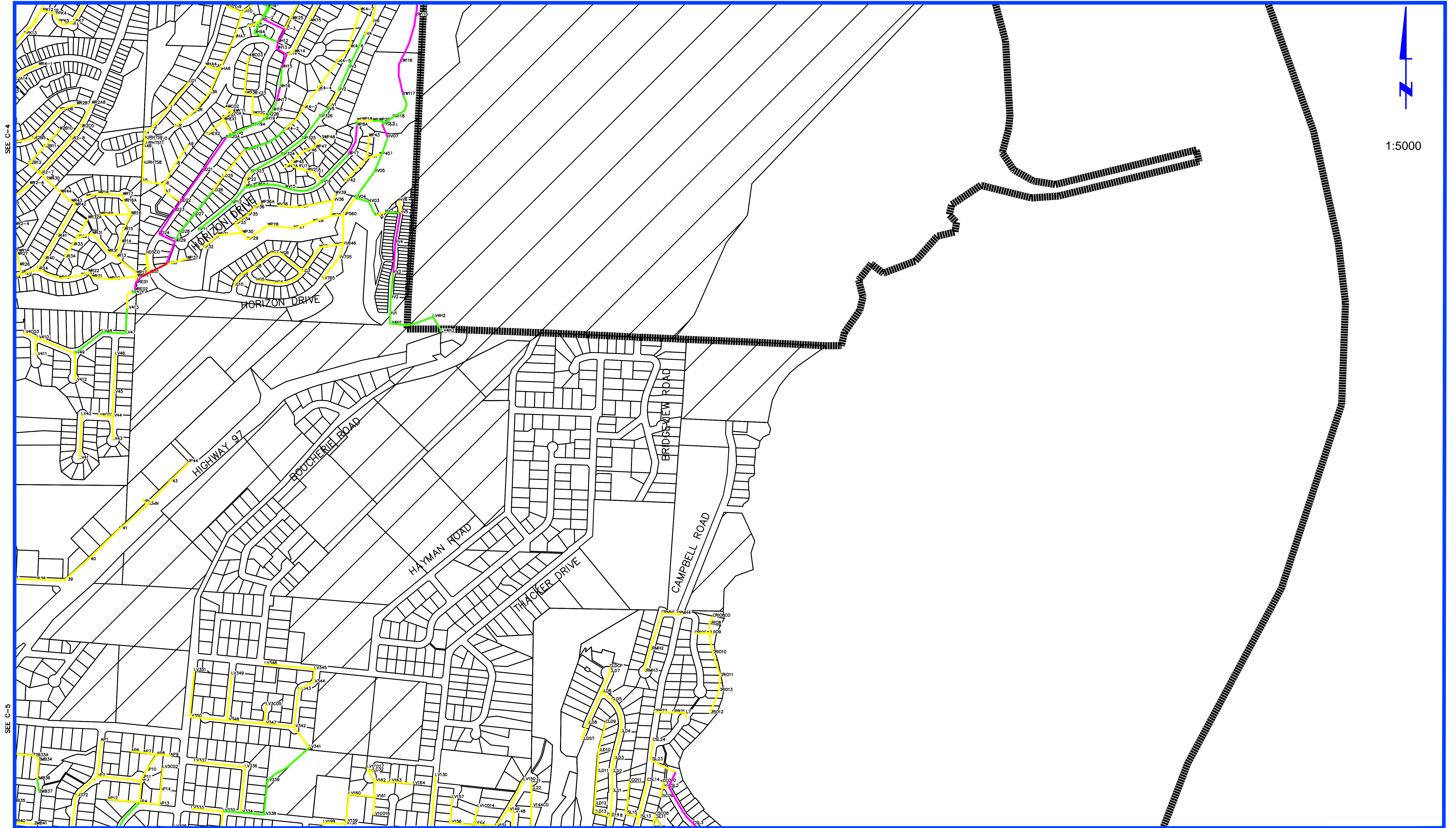
FLOW AS % OF PIPE CAPACITY

0 TO 10	
10 TO 20	
20 TO 40	
40 TO 60	
60 TO 100	

**DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
20 YEAR HORIZON**

FIGURE C-7

NOVEMBER 2013



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LEGEND

FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow line
10 TO 20	Green line
20 TO 40	Magenta line
40 TO 60	Cyan line
60 TO 100	Red line

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 20 YEAR HORIZON

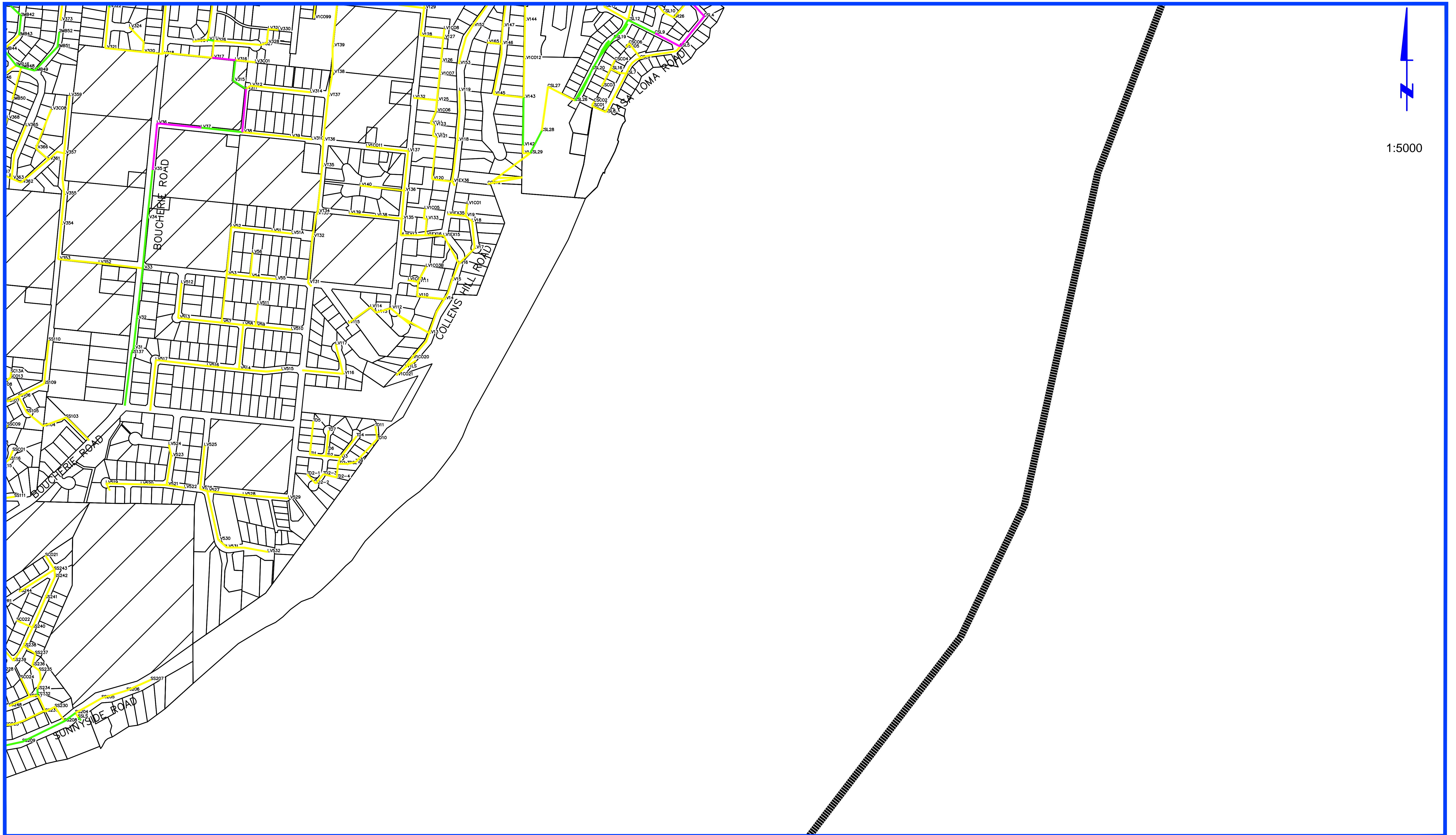
FIGURE C-8

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SEE C-8

SEE C-5

SEE C-6



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LEGEND

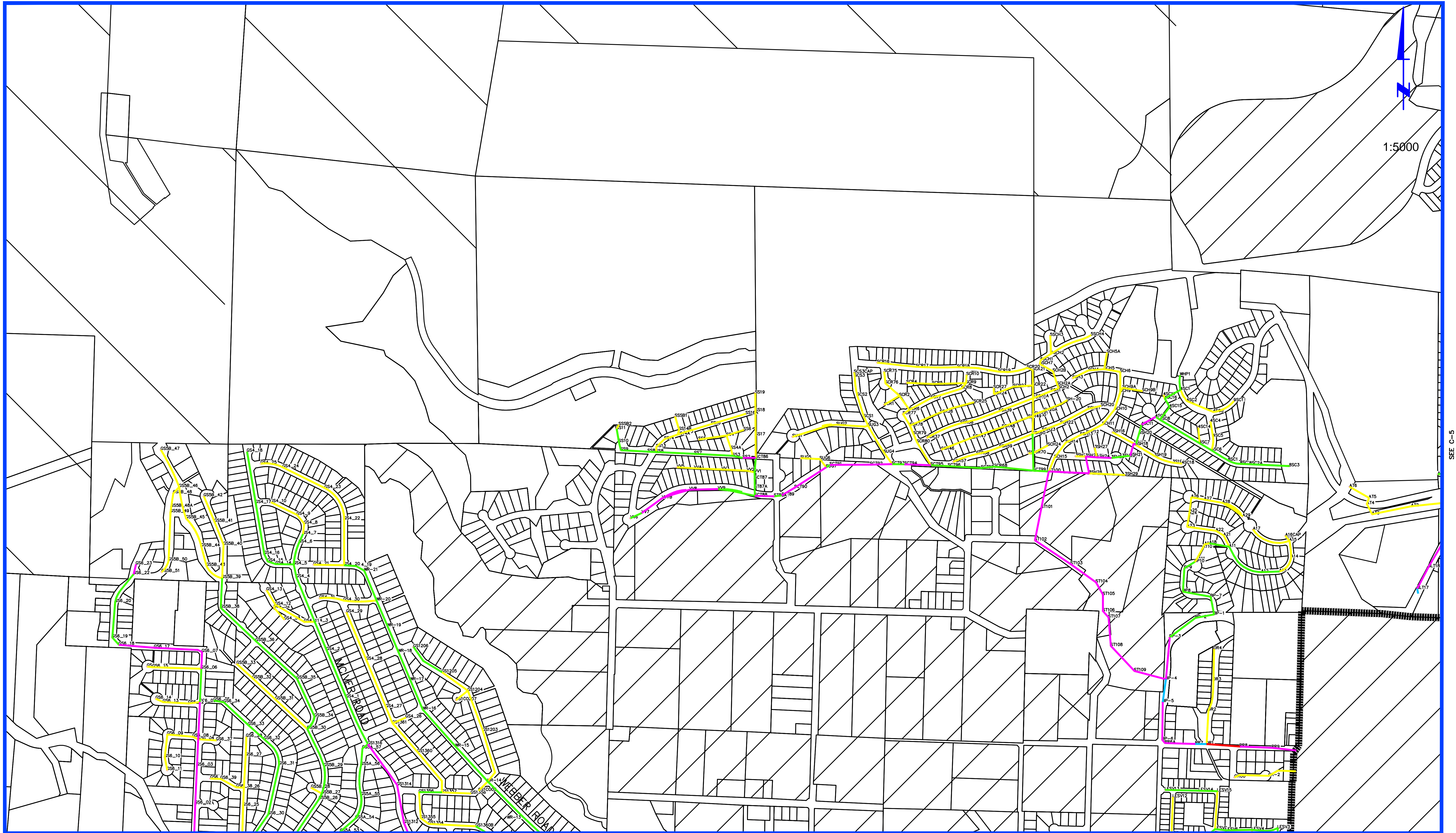
FLOW AS % OF PIPE CAPACITY

0 TO 10	
10 TO 20	
20 TO 40	
40 TO 60	
60 TO 100	

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 20 YEAR HORIZON

FIGURE C-9

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SEE C-5

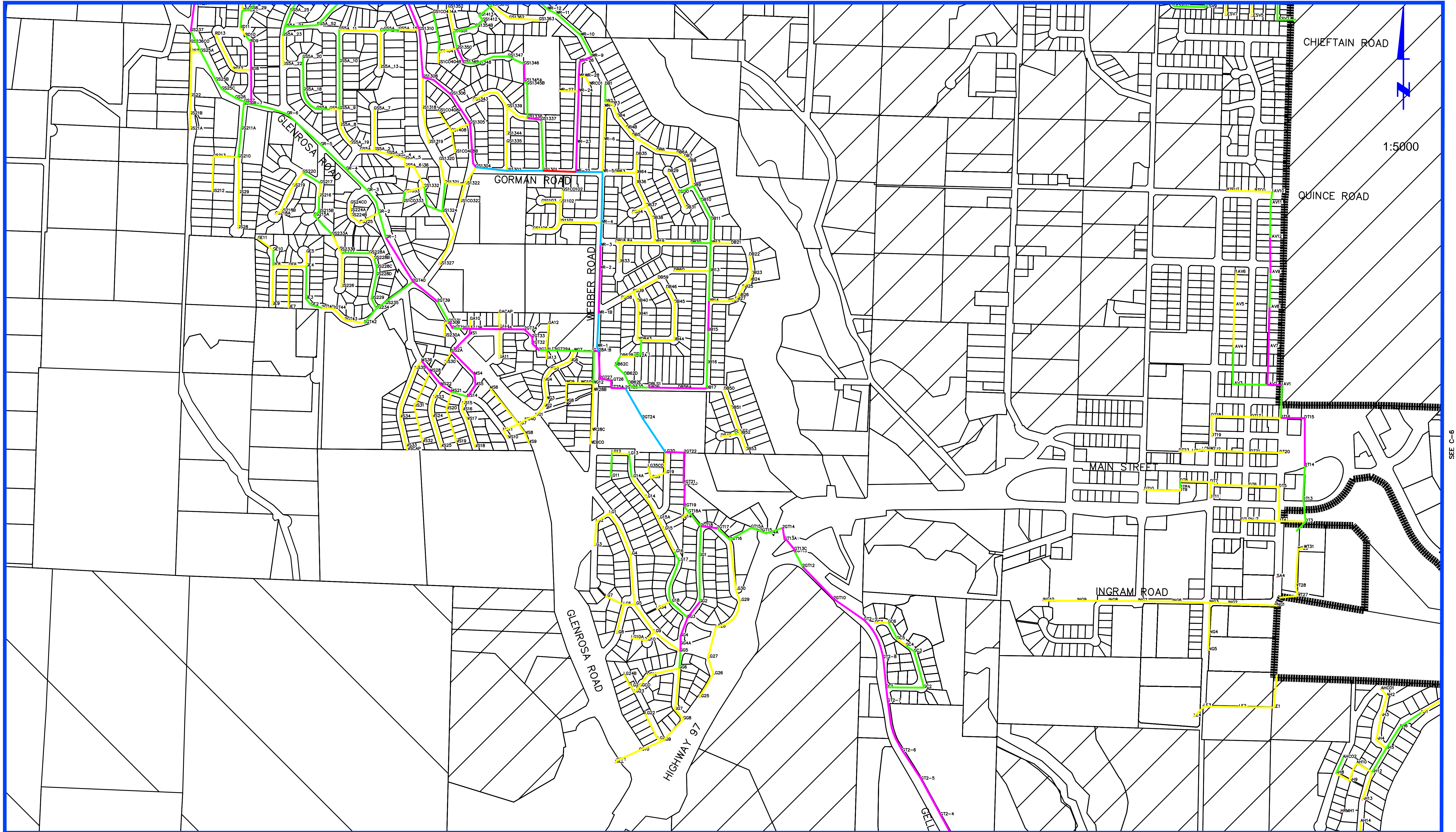
SEE C-2



LEGEND
 FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Green
20 TO 40	Magenta
40 TO 60	Cyan
60 TO 100	Red

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 ULTIMATE BUILD-OUT CONDITION
 FIGURE C-1
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SEE C-6



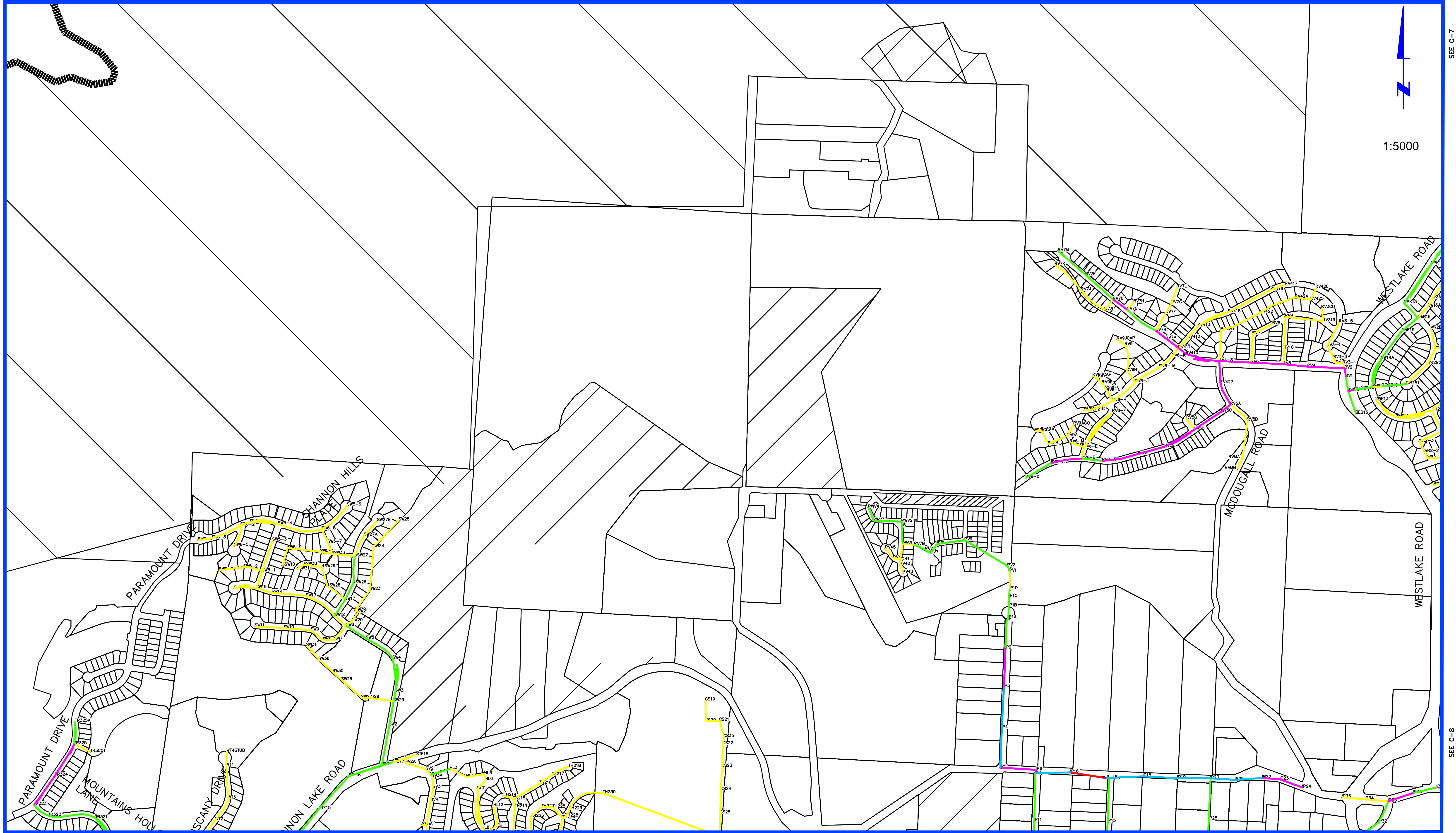
LEGEND

FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Light Green
20 TO 40	Magenta
40 TO 60	Cyan
60 TO 100	Red

**DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
ULTIMATE BUILD-OUT CONDITION**

FIGURE C-2
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SEE C-7

SEE C-8

SEE C-5



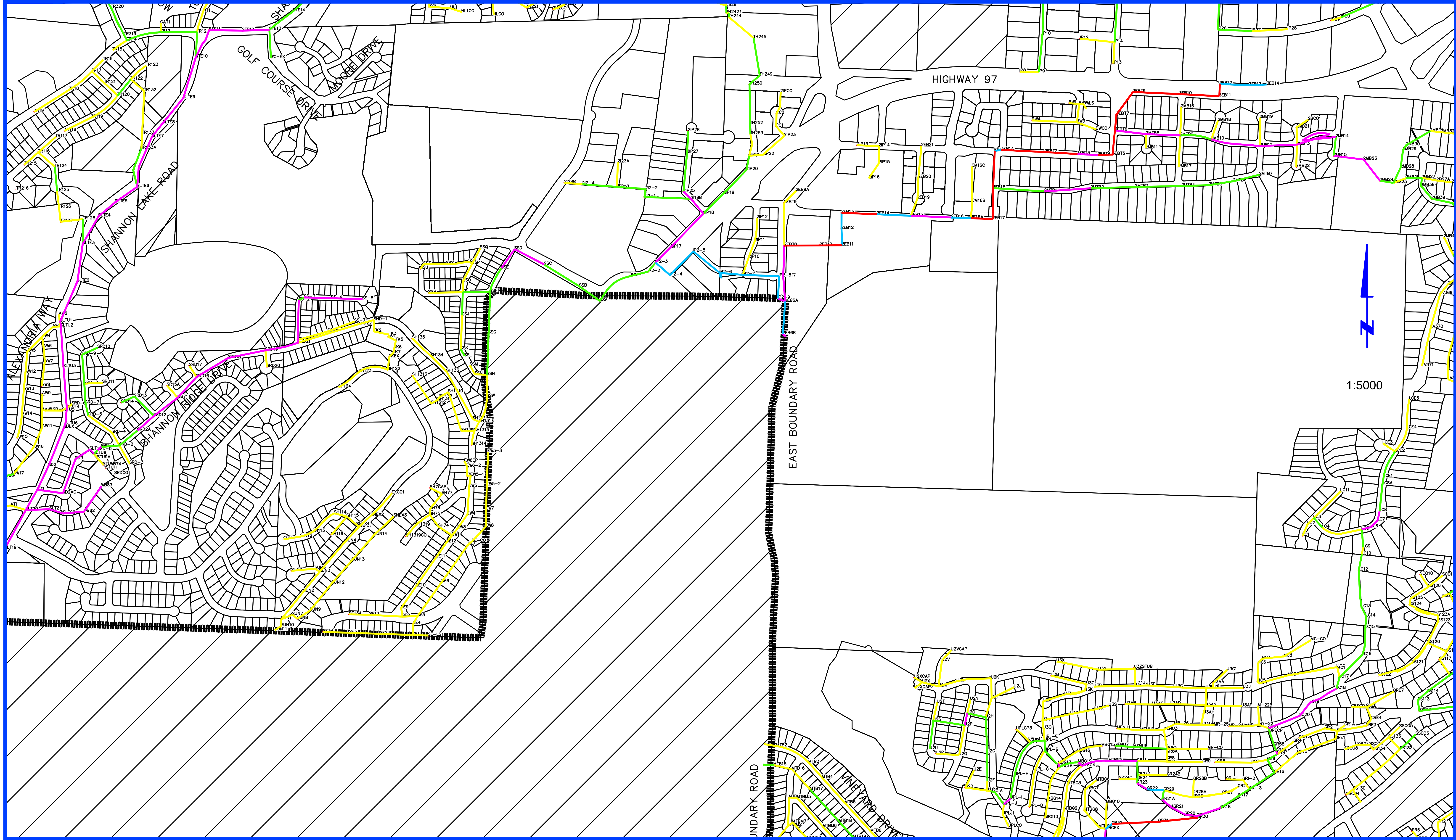
LEGEND
FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Green
20 TO 40	Magenta
40 TO 60	Cyan
60 TO 100	Red

DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
ULTIMATE BUILD-OUT CONDITION

FIGURE C-4

NOVEMBER 2013



SEE C-1

SEE C-8

SEE C-9



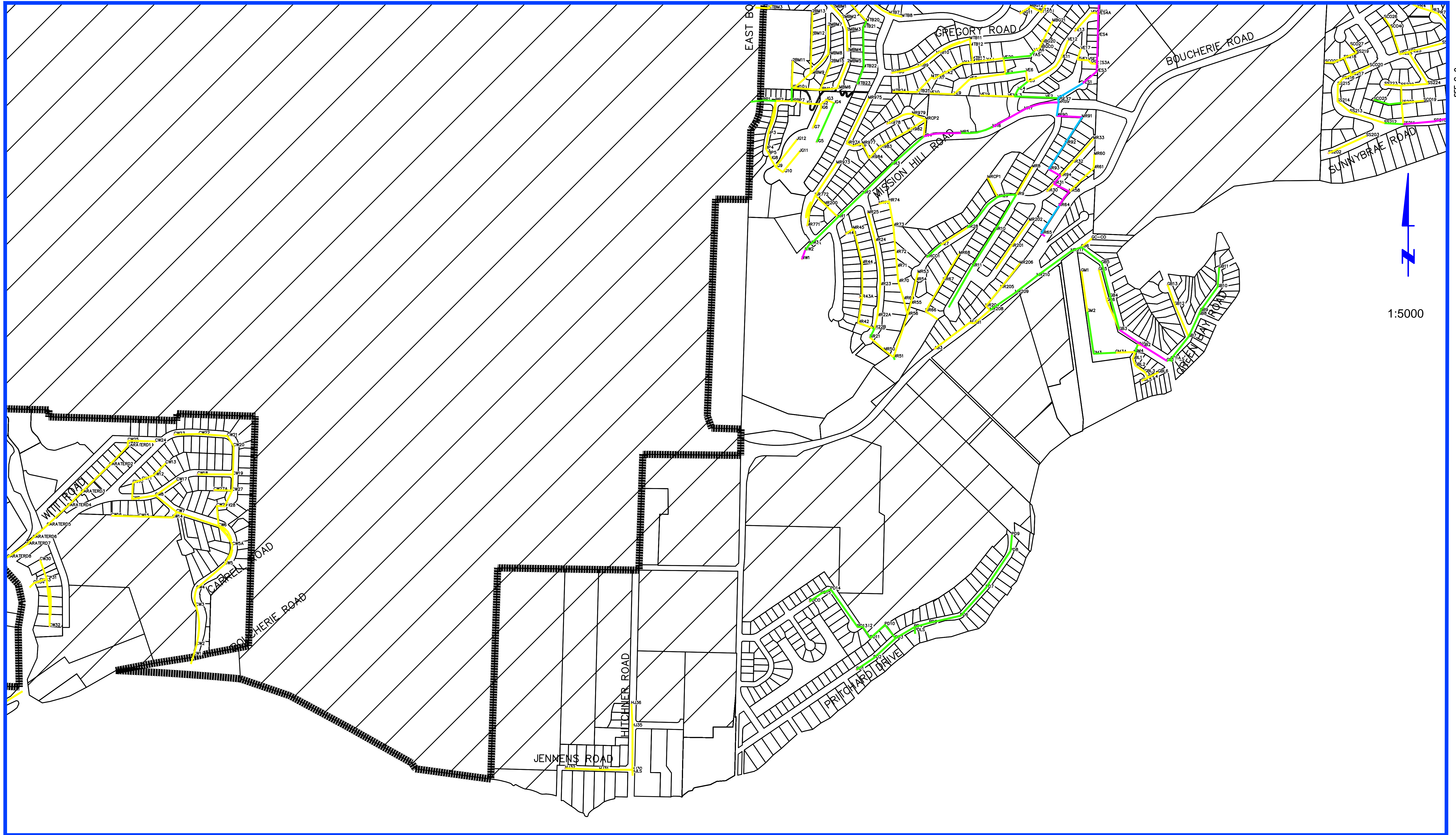
LEGEND
FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Light Green
20 TO 40	Green
40 TO 60	Light Blue
60 TO 100	Red

**DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
ULTIMATE BUILD-OUT CONDITION**

FIGURE C-5

NOVEMBER 2013



1:5000



LEGEND
FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow
10 TO 20	Light Green
20 TO 40	Green
40 TO 60	Light Blue
60 TO 100	Red

DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
ULTIMATE BUILD-OUT CONDITION

FIGURE C-6
NOVEMBER 2013



SEE C-4

SEE C-8



LEGEND

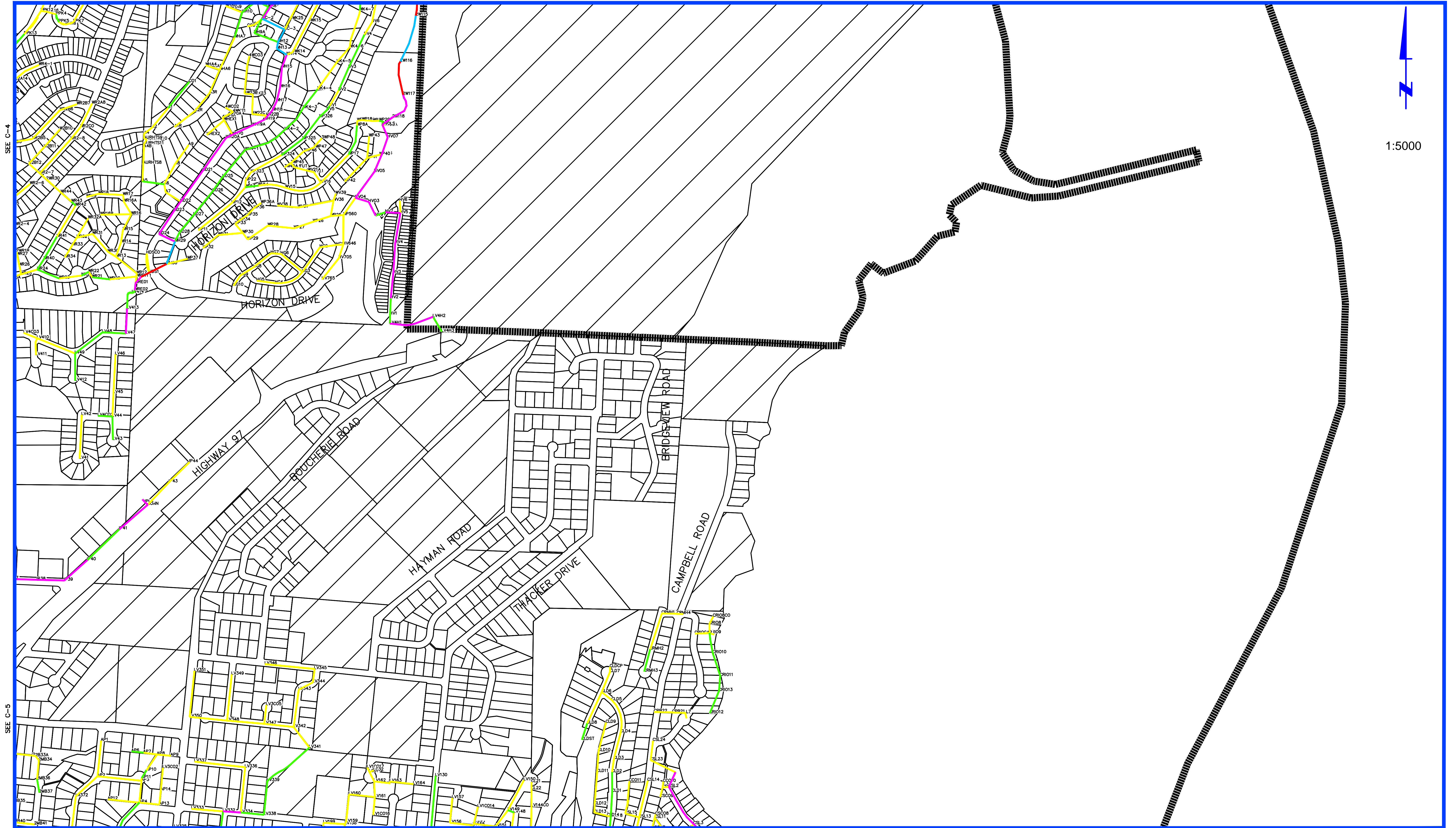
FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow line
10 TO 20	Green line
20 TO 40	Magenta line
40 TO 60	Cyan line
60 TO 100	Red line

**DISTRICT OF WEST KELOWNA
SANITARY SEWER MASTER PLAN
ULTIMATE BUILD-OUT CONDITION**

FIGURE C-7

NOVEMBER 2013



1:5000

SEE C-4

SEE C-5



LEGEND

FLOW AS % OF PIPE CAPACITY

0 TO 10	Yellow line
10 TO 20	Light Green line
20 TO 40	Magenta line
40 TO 60	Cyan line
60 TO 100	Red line

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 ULTIMATE BUILD-OUT CONDITION

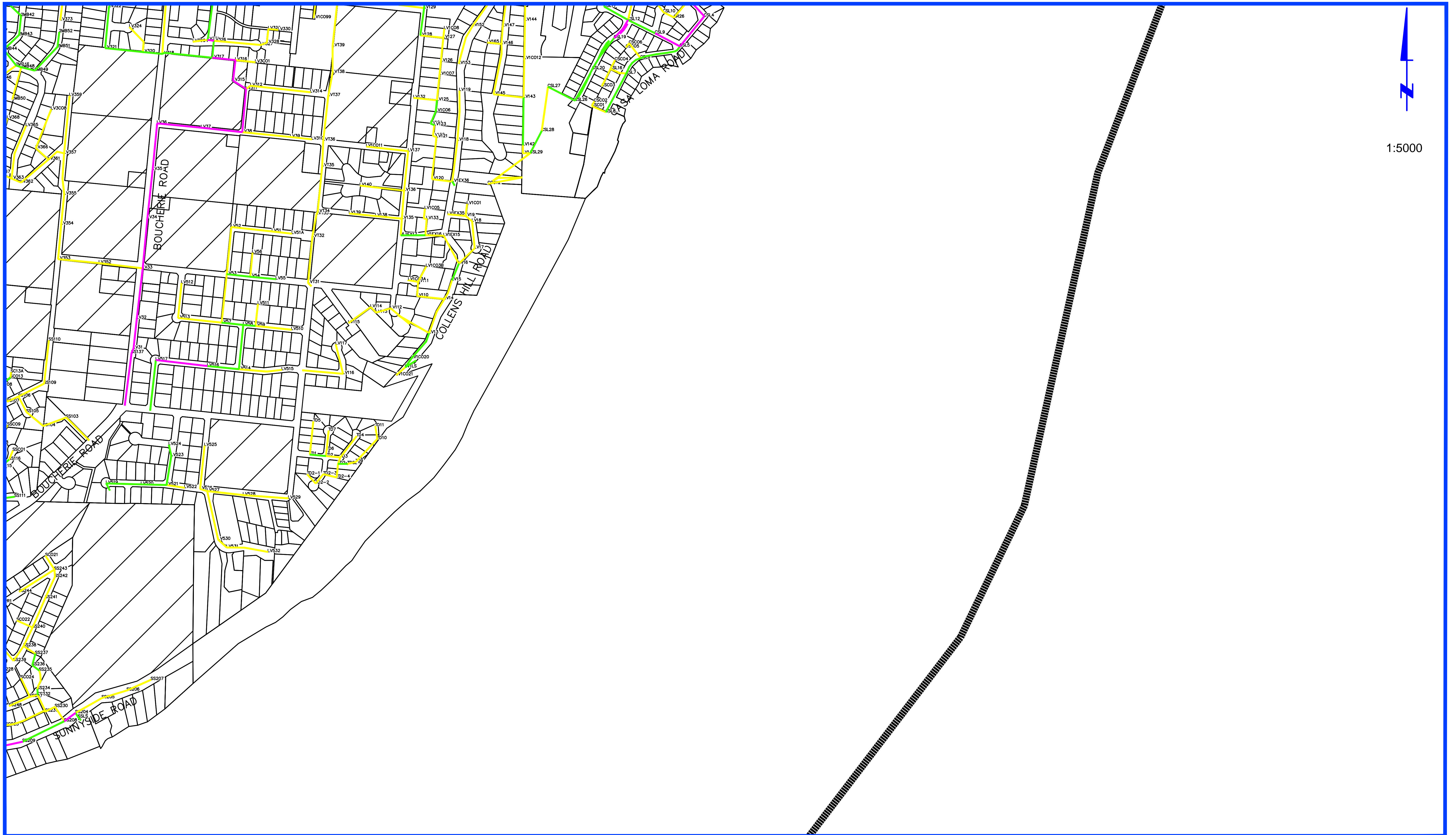
FIGURE C-8

NOVEMBER 2013

SEE C-8

SEE C-5

SEE C-6



1:5000



LEGEND
 FLOW AS % OF PIPE CAPACITY
 0 TO 10
 10 TO 20
 20 TO 40
 40 TO 60
 60 TO 100

DISTRICT OF WEST KELOWNA
 SANITARY SEWER MASTER PLAN
 ULTIMATE BUILD-OUT CONDITION
 FIGURE C-9
 NOVEMBER 2013