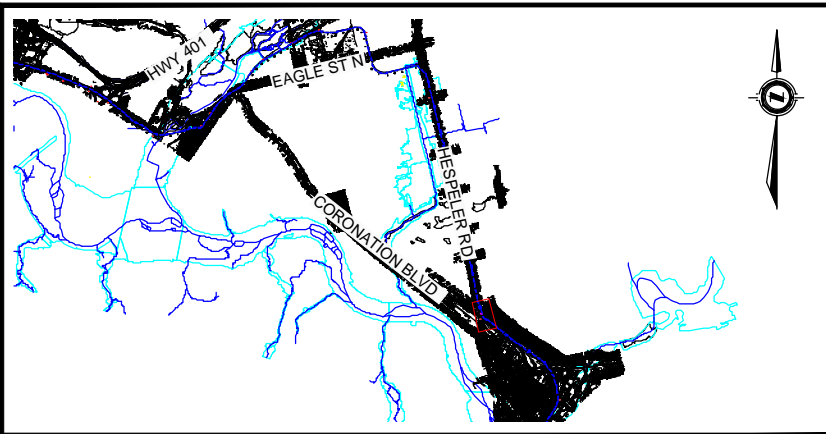


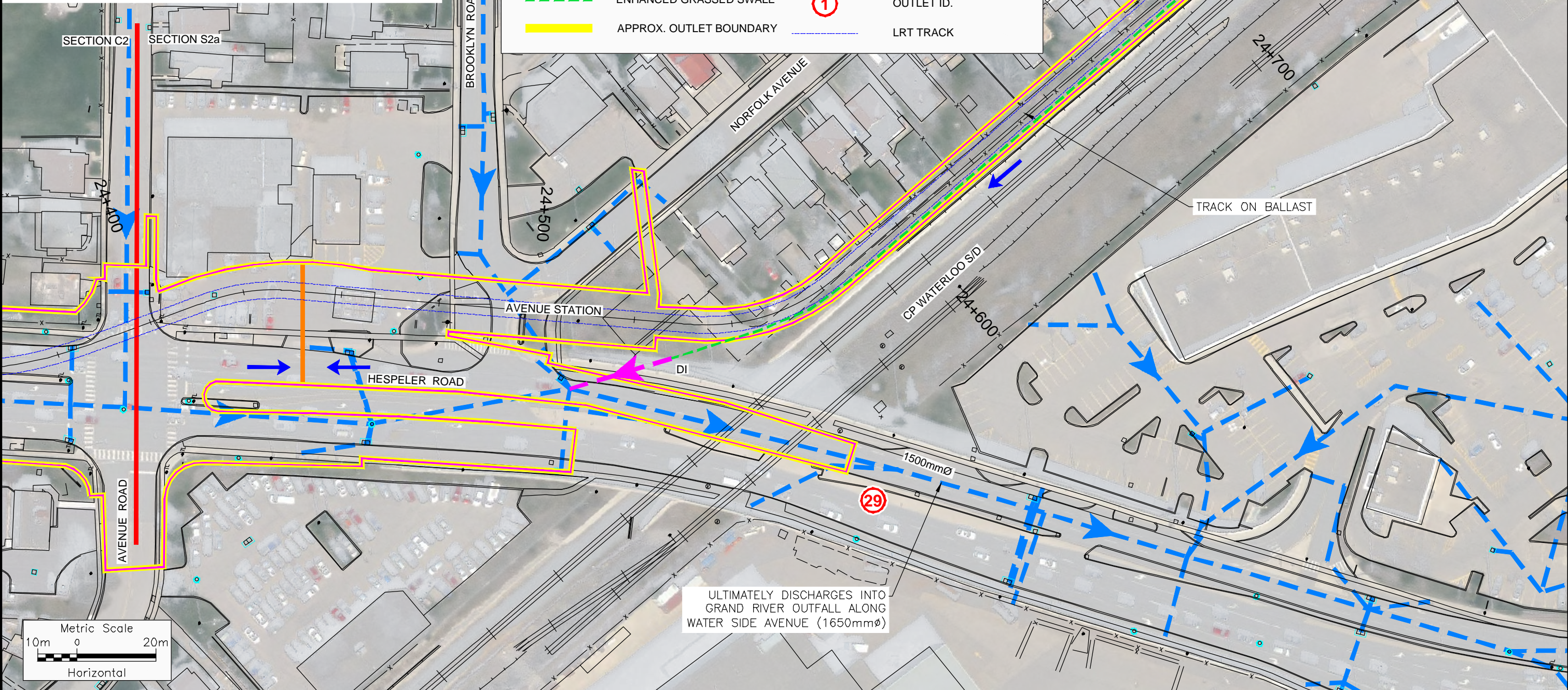
LEGEND			
	DITCH / WATERCOURSE		EXISTING STORM SEWER
	CULVERT		PROPOSED STORM SEWER
	PROP. LRT OUTLINE		FLOODPLAIN
	LOW POINT		FLOW DIRECTION
	HIGH POINT		CULVERT ID
	SECTION DIVIDE		FLOOD FRINGE
	ENHANCED GRASSED SWALE		OUTLET ID.
	APPROX. OUTLET BOUNDARY		LRT TRACK



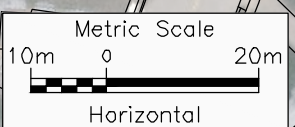
PROPOSED DRAINAGE CONCEPT PLAN - SECTION C2
 STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE



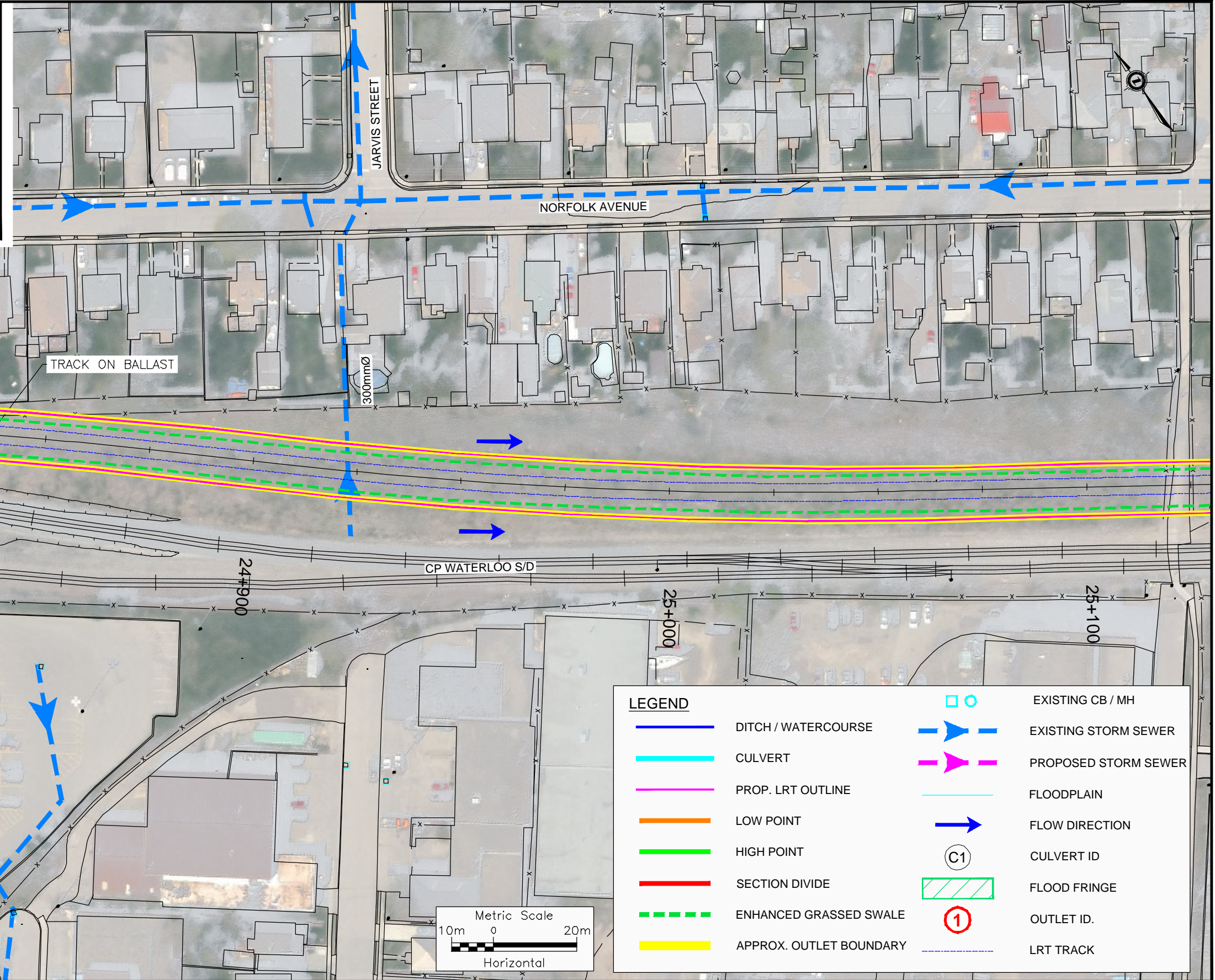
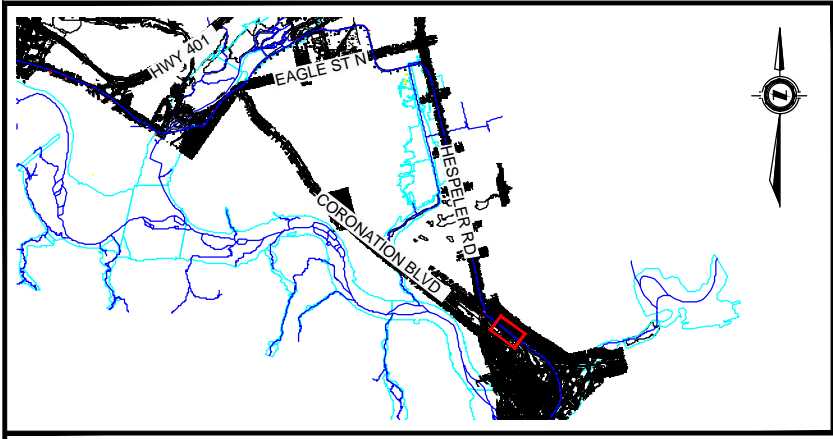
LEGEND			
	DITCH / WATERCOURSE		EXISTING STORM SEWER
	CULVERT		PROPOSED STORM SEWER
	PROP. LRT OUTLINE		FLOODPLAIN
	LOW POINT		FLOW DIRECTION
	HIGH POINT		CULVERT ID
	SECTION DIVIDE		FLOOD FRINGE
	ENHANCED GRASSED SWALE		OUTLET ID.
	APPROX. OUTLET BOUNDARY		LRT TRACK



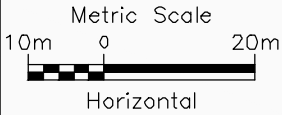
ULTIMATELY DISCHARGES INTO GRAND RIVER OUTFALL ALONG WATER SIDE AVENUE (1650mmØ)



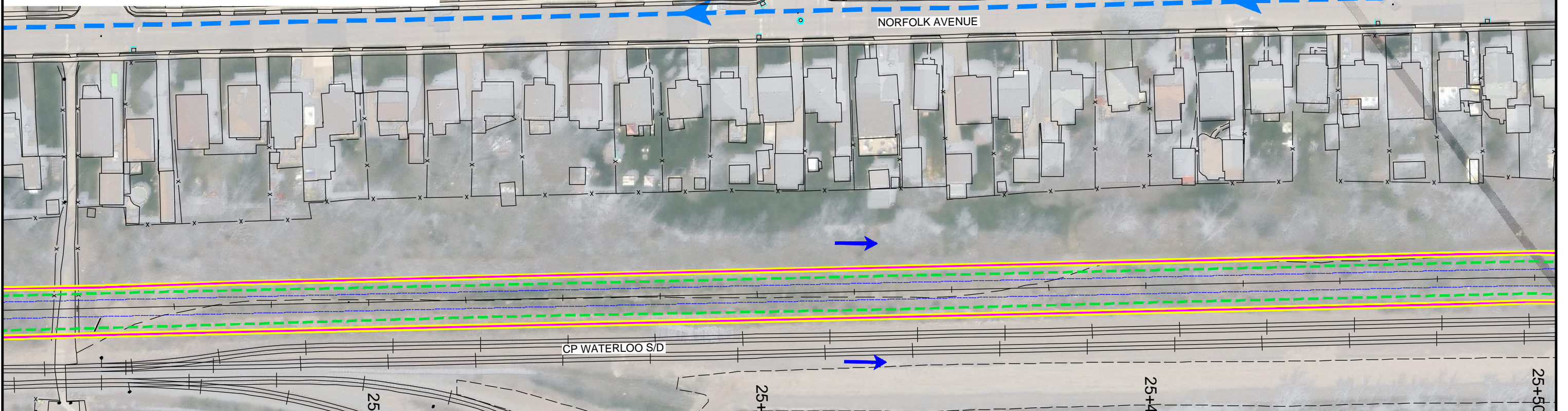
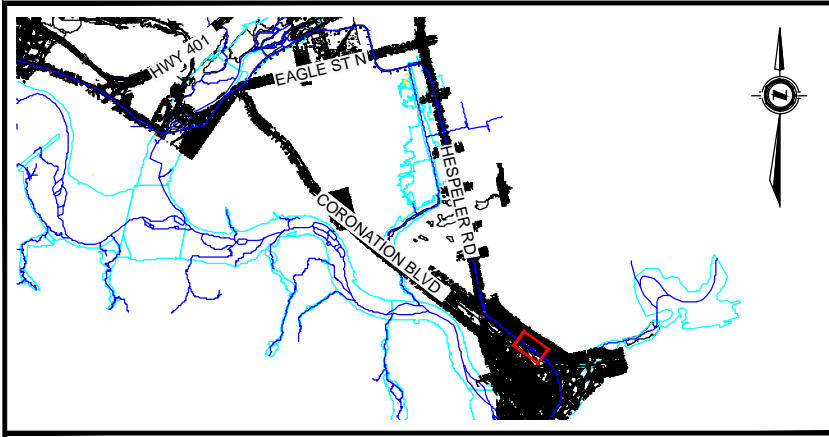
PROPOSED DRAINAGE CONCEPT PLAN - SECTION C2 & S2a
 STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE



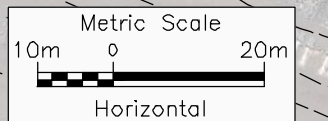
LEGEND			
	DITCH / WATERCOURSE		EXISTING CB / MH
	CULVERT		EXISTING STORM SEWER
	PROP. LRT OUTLINE		PROPOSED STORM SEWER
	LOW POINT		FLOODPLAIN
	HIGH POINT		FLOW DIRECTION
	SECTION DIVIDE		CULVERT ID
	ENHANCED GRASSED SWALE		FLOOD FRINGE
	APPROX. OUTLET BOUNDARY		OUTLET ID.
			LRT TRACK



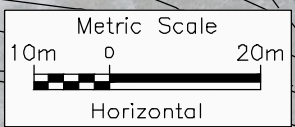
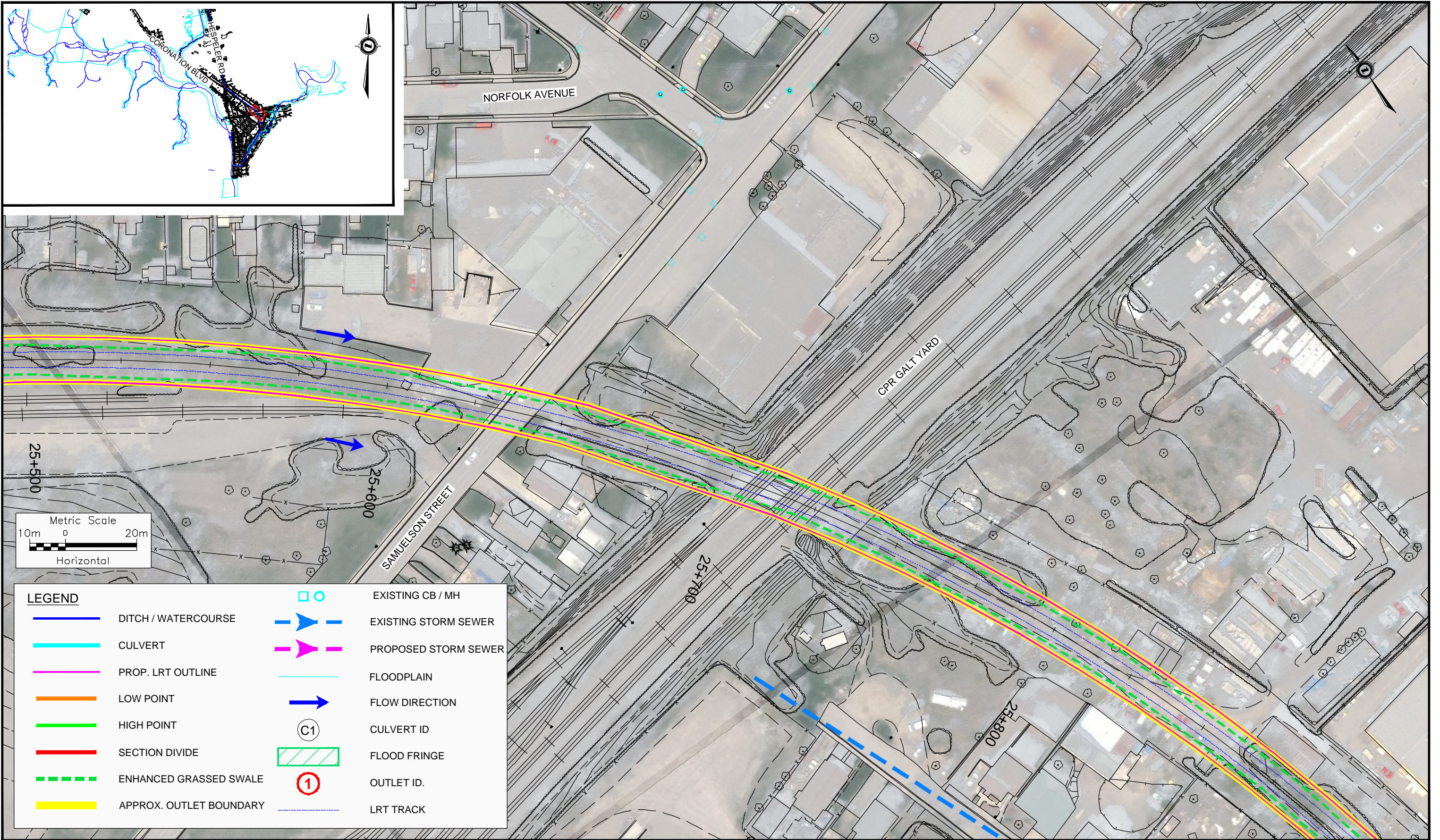
PROPOSED DRAINAGE CONCEPT PLAN - SECTION S2a
 STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE



LEGEND			
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	CULVERT		PROPOSED STORM SEWER
	PROP. LRT OUTLINE		FLOODPLAIN
	LOW POINT		FLOW DIRECTION
	HIGH POINT		CULVERT ID
	SECTION DIVIDE		FLOOD FRINGE
	ENHANCED GRASSED SWALE		OUTLET ID.
	APPROX. OUTLET BOUNDARY		LRT TRACK



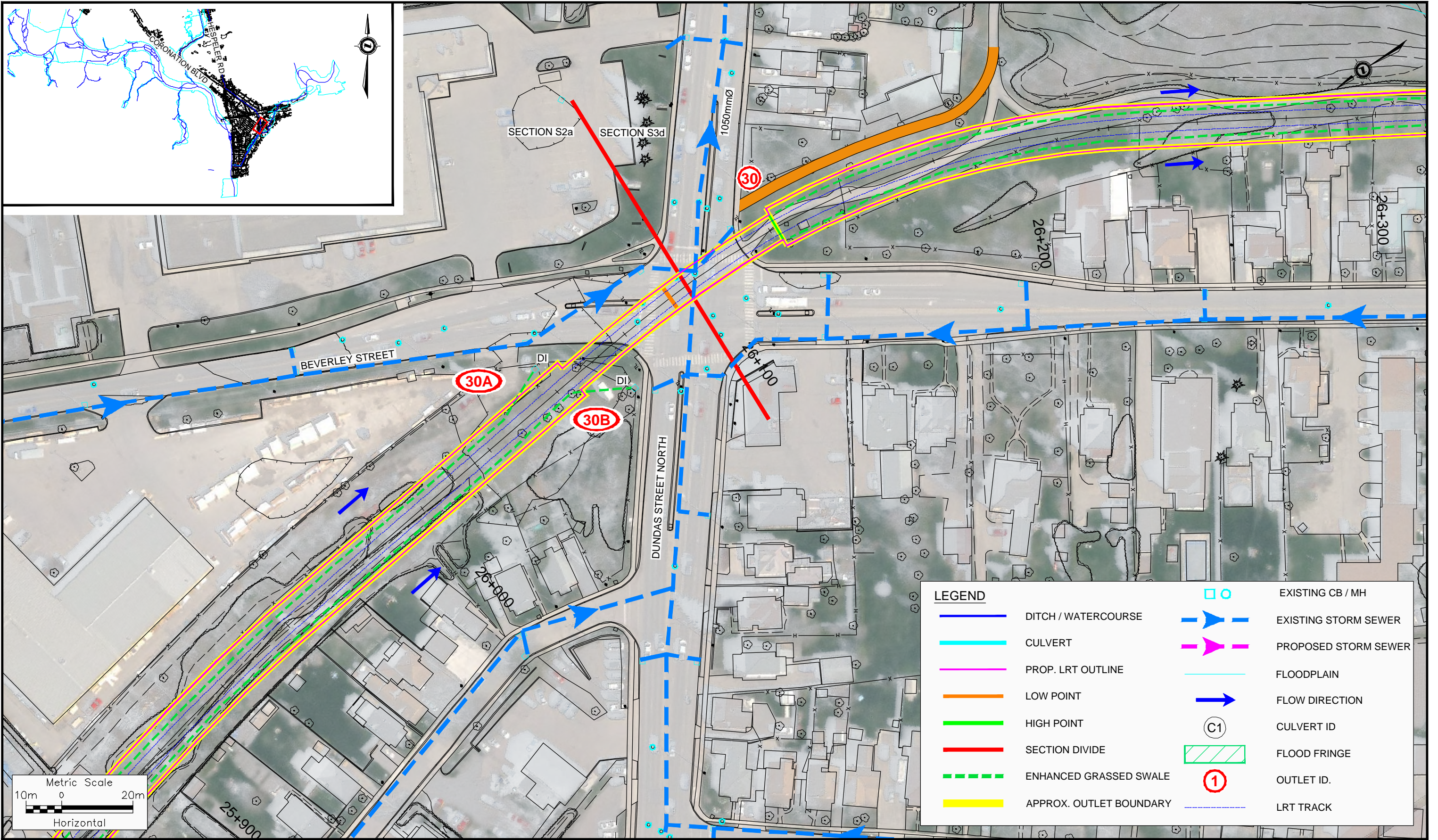
PROPOSED DRAINAGE CONCEPT PLAN - SECTION S2a
 STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE



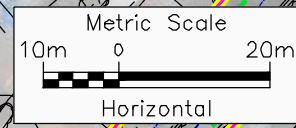
LEGEND			
	DITCH / WATERCOURSE		EXISTING CB / MH
	CULVERT		EXISTING STORM SEWER
	PROP. LRT OUTLINE		PROPOSED STORM SEWER
	LOW POINT		FLOODPLAIN
	HIGH POINT		FLOW DIRECTION
	SECTION DIVIDE		CULVERT ID
	ENHANCED GRASSED SWALE		FLOOD FRINGE
	APPROX. OUTLET BOUNDARY		OUTLET ID.
			LRT TRACK



PROPOSED DRAINAGE CONCEPT PLAN - SECTION S2a
 STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE



LEGEND			
	DITCH / WATERCOURSE		EXISTING STORM SEWER
	CULVERT		PROPOSED STORM SEWER
	PROP. LRT OUTLINE		FLOODPLAIN
	LOW POINT		FLOW DIRECTION
	HIGH POINT		CULVERT ID
	SECTION DIVIDE		FLOOD FRINGE
	ENHANCED GRASSED SWALE		OUTLET ID.
	APPROX. OUTLET BOUNDARY		LRT TRACK

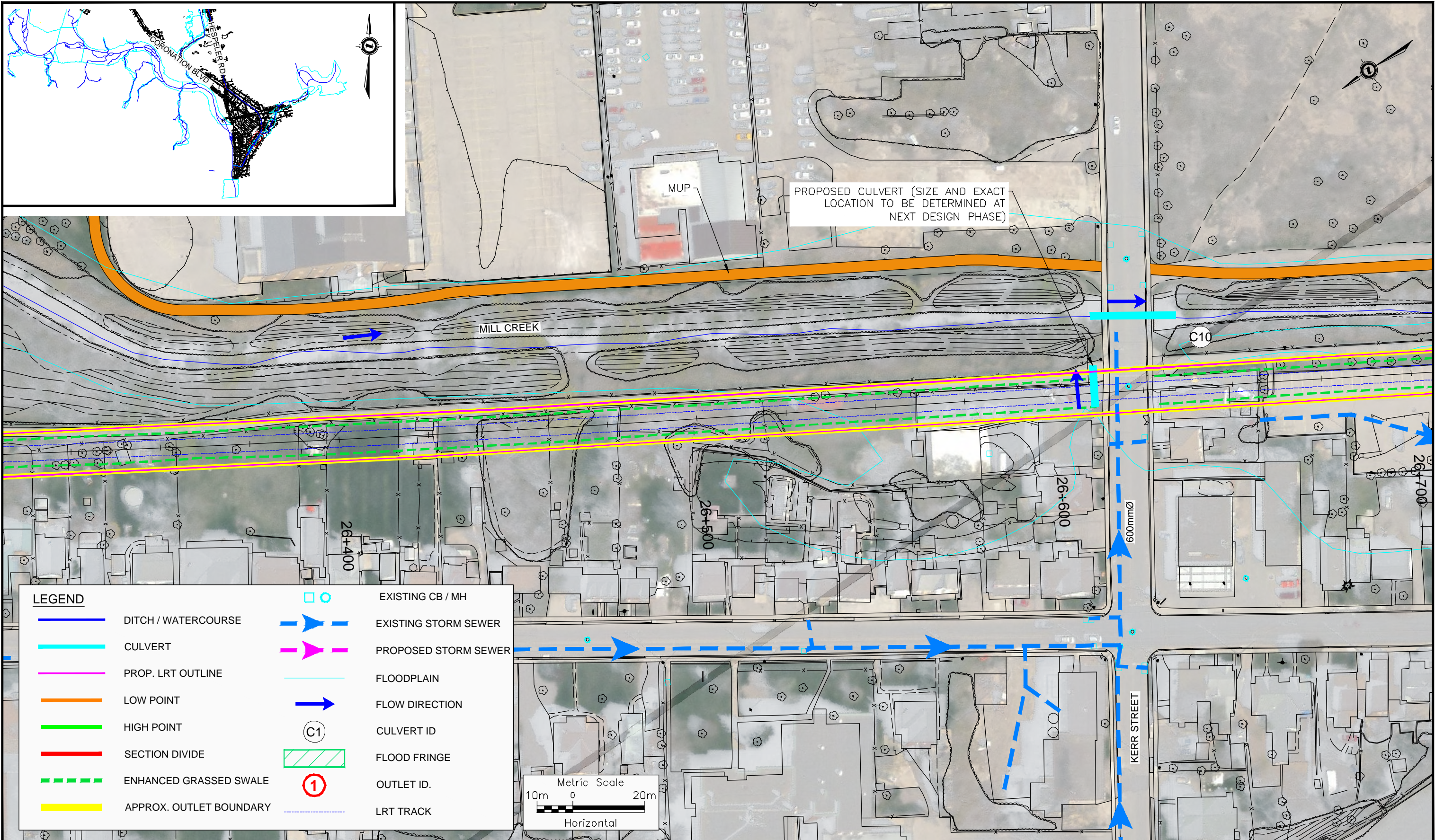


PROPOSED DRAINAGE CONCEPT PLAN - SECTION S2a & S3d

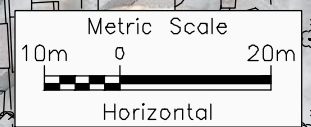
STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE

EXHIBIT

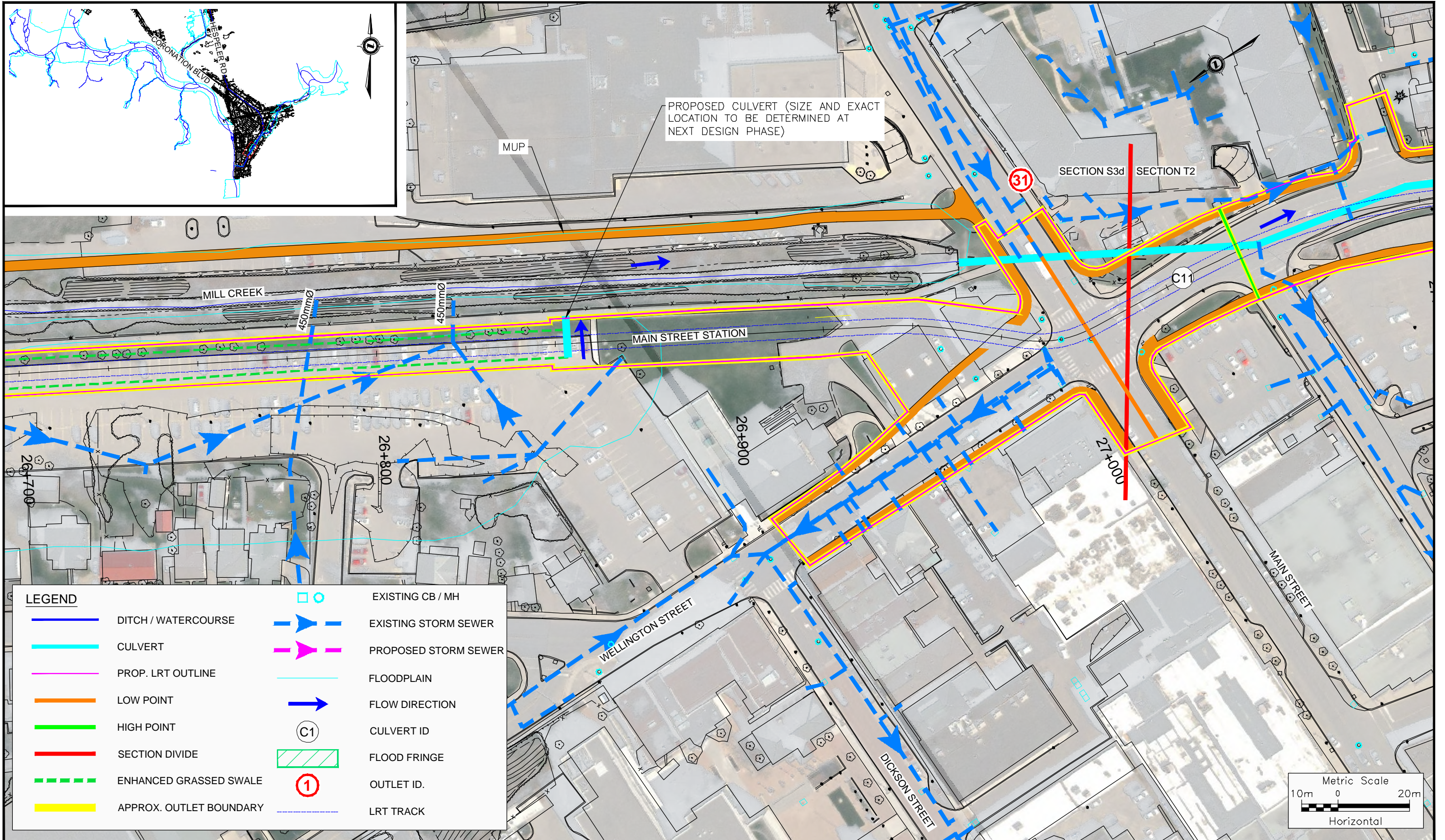
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LEGEND	
	DITCH / WATERCOURSE
	CULVERT
	PROP. LRT OUTLINE
	LOW POINT
	HIGH POINT
	SECTION DIVIDE
	ENHANCED GRASSED SWALE
	APPROX. OUTLET BOUNDARY
	EXISTING STORM SEWER
	PROPOSED STORM SEWER
	FLOODPLAIN
	FLOW DIRECTION
	CULVERT ID
	FLOOD FRINGE
	OUTLET ID.
	LRT TRACK
	EXISTING CB / MH



PROPOSED DRAINAGE CONCEPT PLAN - SECTION S3d
 STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE



PROPOSED CULVERT (SIZE AND EXACT LOCATION TO BE DETERMINED AT NEXT DESIGN PHASE)

MUP

31

SECTION S3d

SECTION T2

C11

MILL CREEK

MAIN STREET STATION

26+900

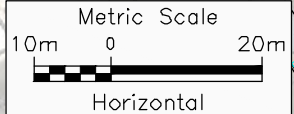
27+000

WELLINGTON STREET

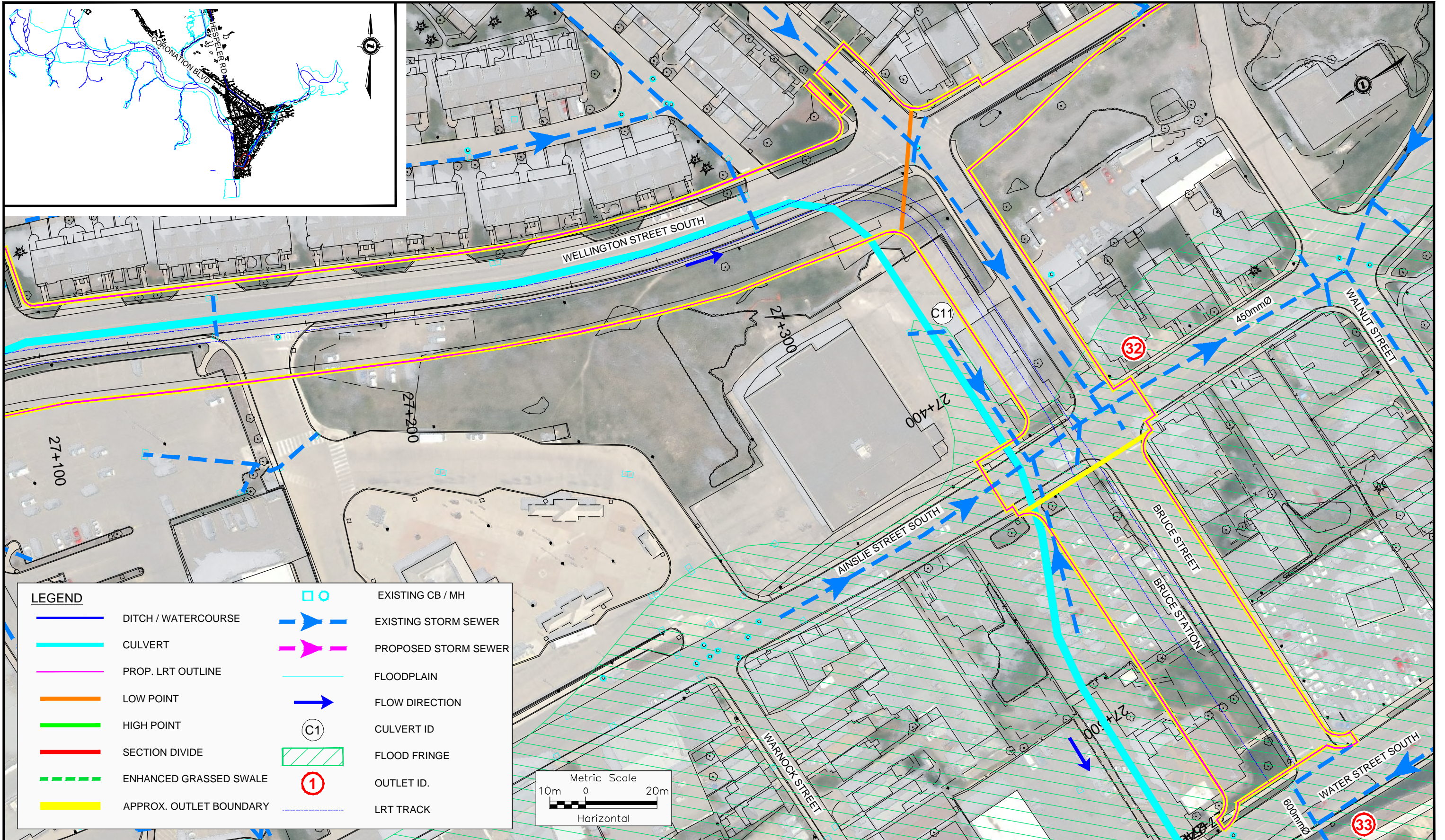
DICKSON STREET

MAIN STREET

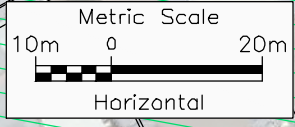
LEGEND			
	DITCH / WATERCOURSE		EXISTING CB / MH
	CULVERT		EXISTING STORM SEWER
	PROP. LRT OUTLINE		PROPOSED STORM SEWER
	LOW POINT		FLOODPLAIN
	HIGH POINT		FLOW DIRECTION
	SECTION DIVIDE		CULVERT ID
	ENHANCED GRASSED SWALE		FLOOD FRINGE
	APPROX. OUTLET BOUNDARY		OUTLET ID.
			LRT TRACK



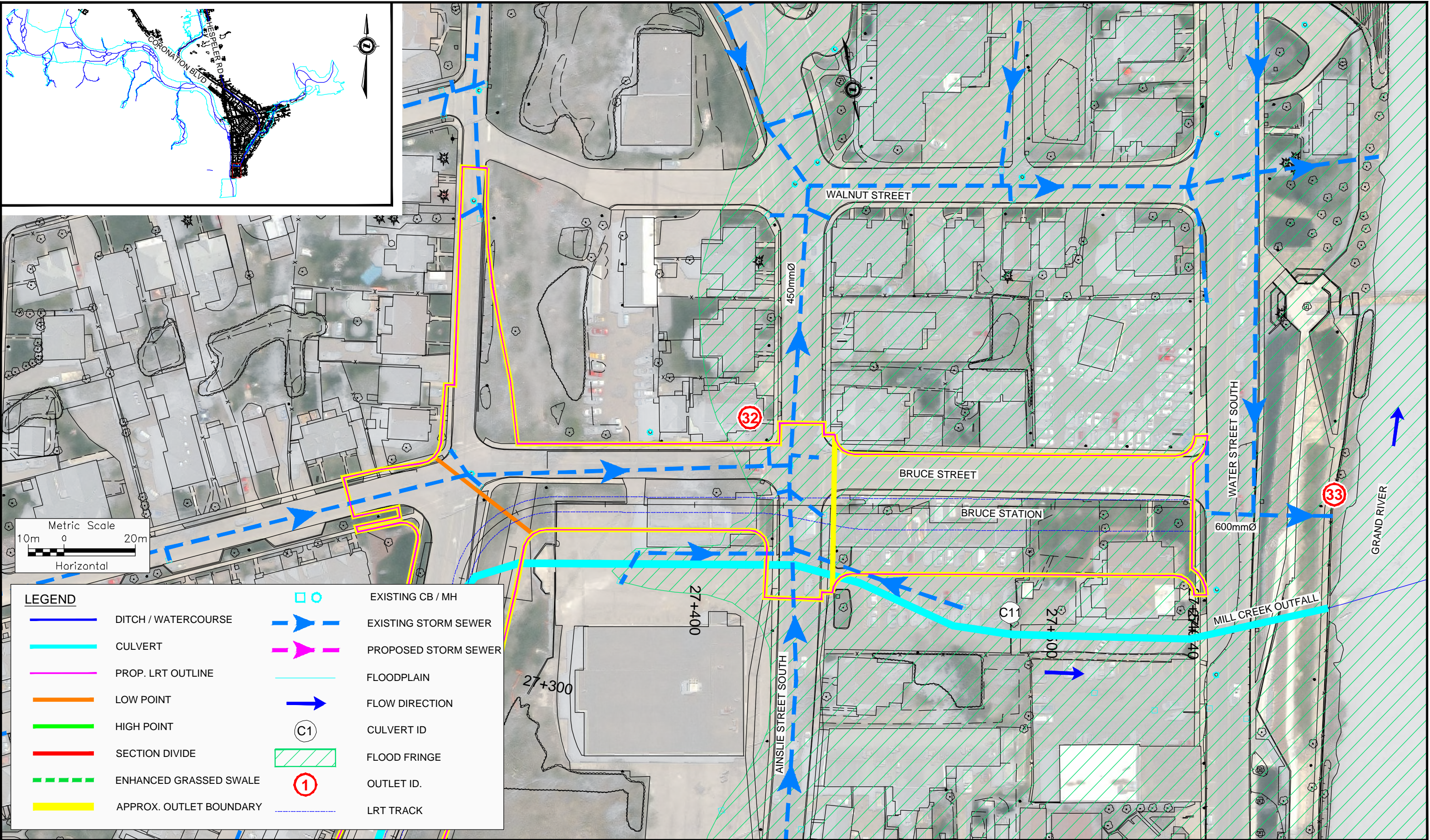
PROPOSED DRAINAGE CONCEPT PLAN - SECTION S3d & T2
 STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE



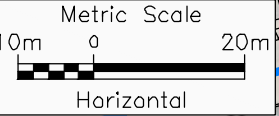
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	CULVERT		PROPOSED STORM SEWER
	PROP. LRT OUTLINE		FLOODPLAIN
	LOW POINT		FLOW DIRECTION
	HIGH POINT		CULVERT ID
	SECTION DIVIDE		FLOOD FRINGE
	ENHANCED GRASSED SWALE		OUTLET ID.
	APPROX. OUTLET BOUNDARY		LRT TRACK
	EXISTING CB / MH		



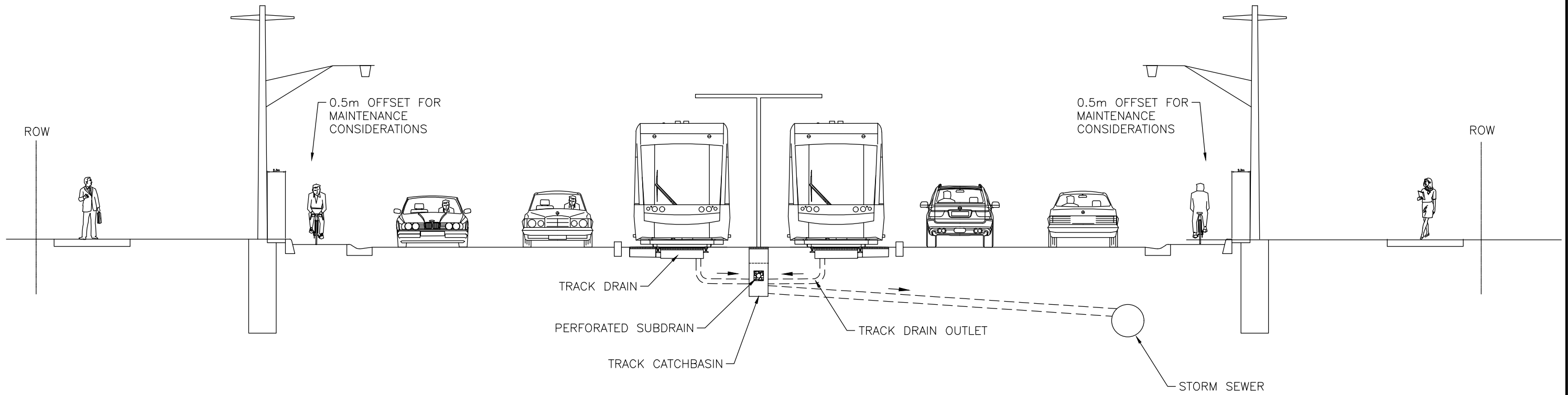
PROPOSED DRAINAGE CONCEPT PLAN - SECTION S3d & T2
 STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE



LEGEND			
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	CULVERT		PROPOSED STORM SEWER
	PROP. LRT OUTLINE		FLOODPLAIN
	LOW POINT		FLOW DIRECTION
	HIGH POINT		CULVERT ID
	SECTION DIVIDE		FLOOD FRINGE
	ENHANCED GRASSED SWALE		OUTLET ID.
	APPROX. OUTLET BOUNDARY		LRT TRACK



PROPOSED DRAINAGE CONCEPT PLAN - SECTION T2
 STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE



TYPICAL CROSS-SECTION

FOR DRAINAGE DETAILS SEE EXHIBIT 5.2

N.T.S.



TYPICAL CROSS SECTION - ON-STREET EMBEDDED LRT DRAINAGE SYSTEM

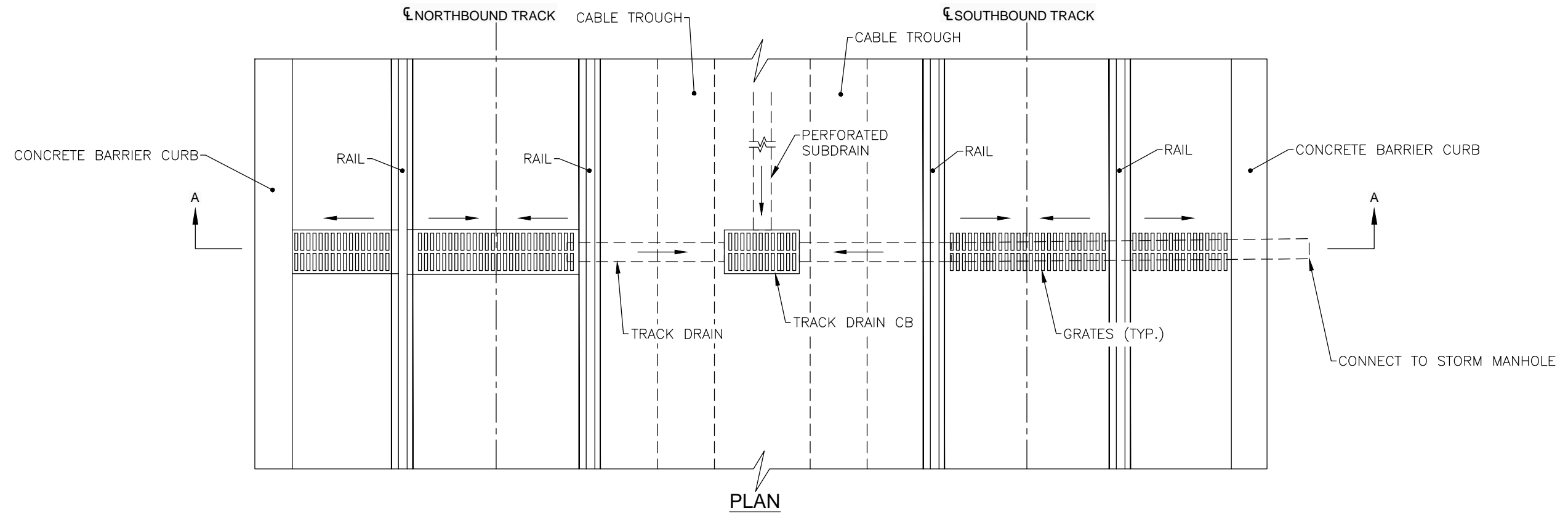
EXHIBIT

STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE

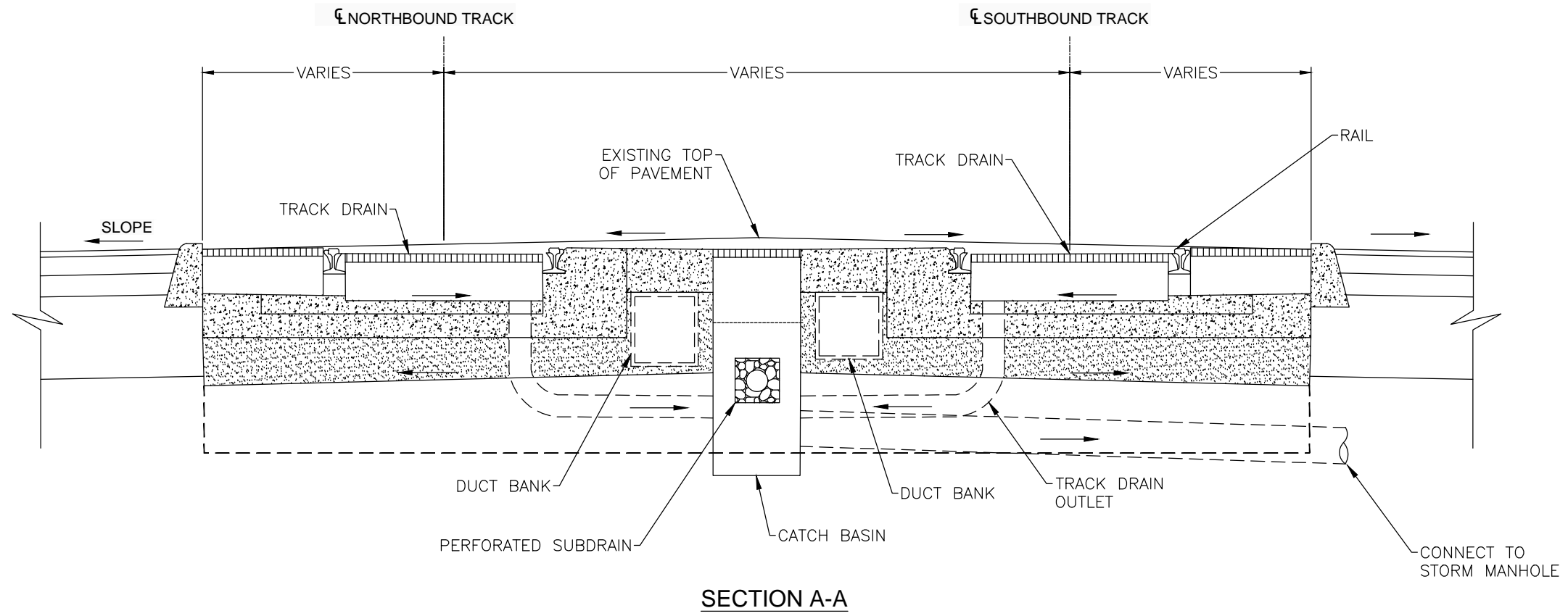
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MODIFIED: Sep. 13, 2019 3:57 PM

DRAWING NAME: \\CATORPP501.CORP.PEWAN.NET\PROJECTS\JUM\2015\151-07859-00 (ION STAGE 2 TPAP)\6.1 DRAWINGS (CADD)\DRAINAGE\TYPICAL CROSS SECTIONS - TRACK DRAINAGE SYSTEM.DWG



N.T.S.



N.T.S.



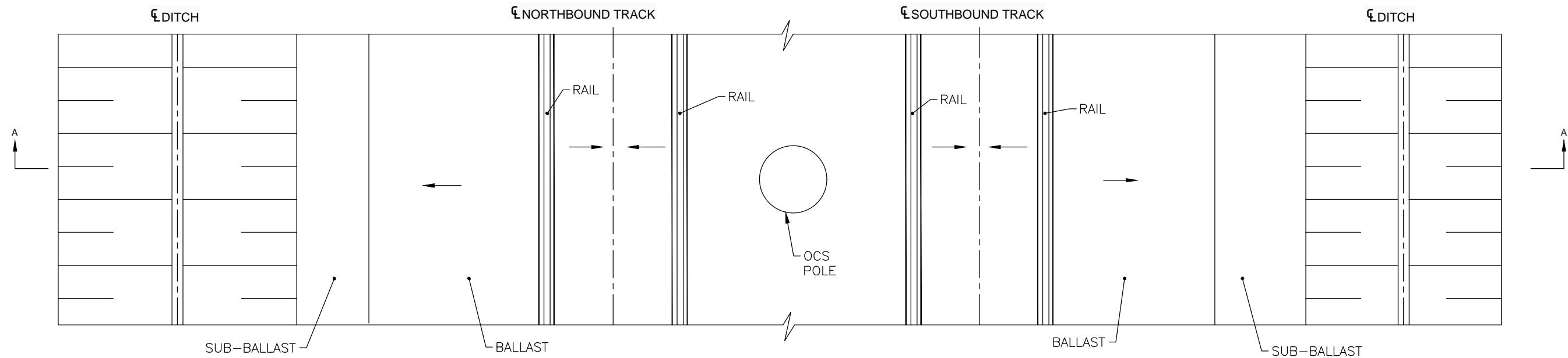
TYPICAL CROSS SECTION - ON-STREET EMBEDDED LRT DRAINAGE SYSTEM DETAILS

STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE

EXHIBIT

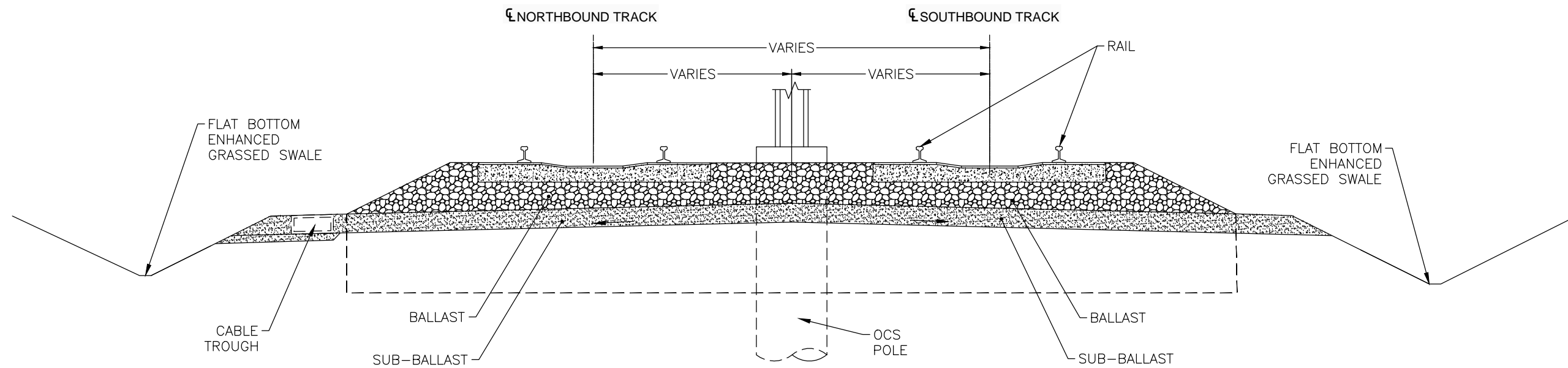
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MODIFIED: Sep. 16, 2019 11:03 AM



PLAN

N.T.S.



SECTION A-A

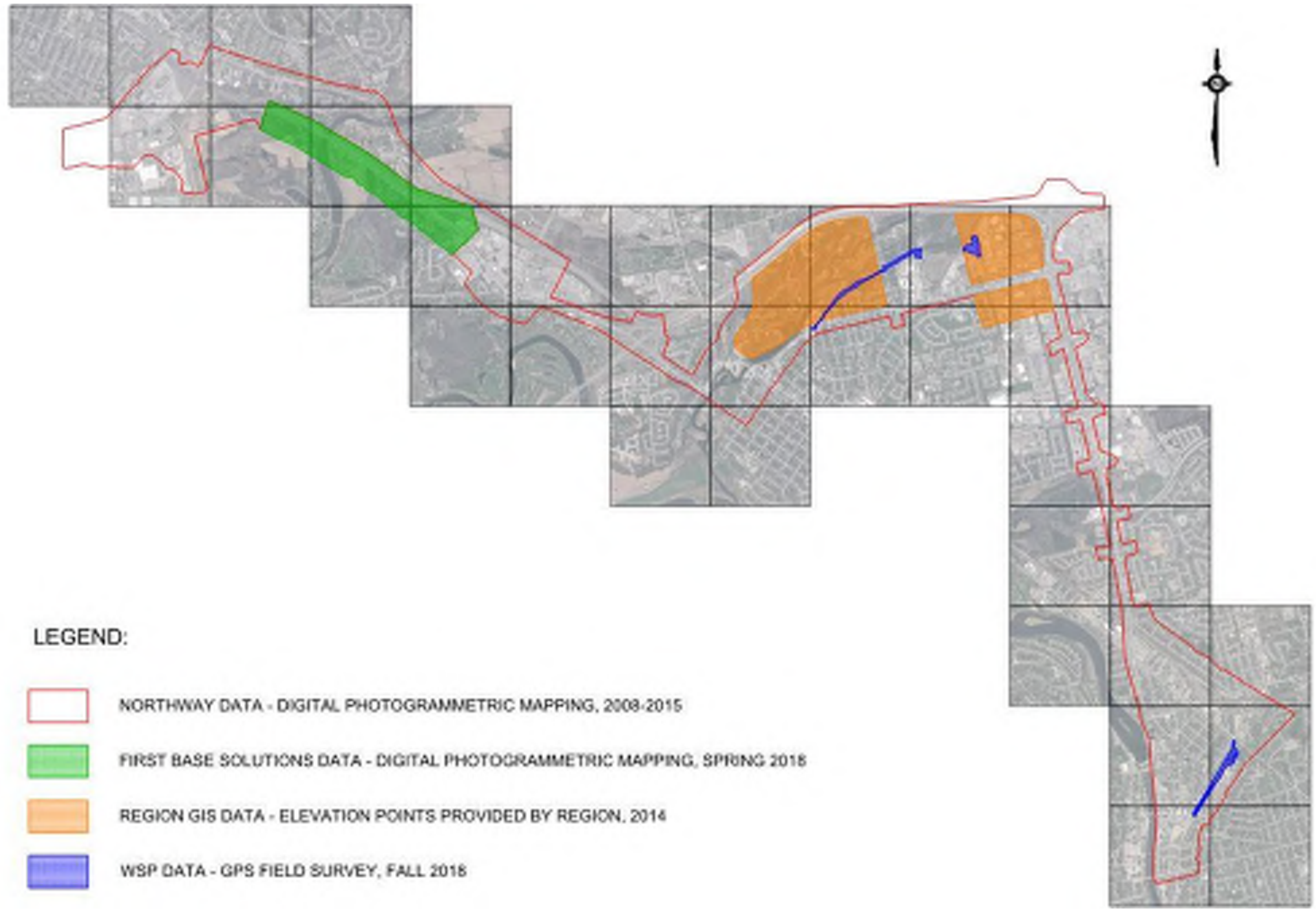
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TYPICAL CROSS SECTION - BALLASTED TRACK DRAINAGE
STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE

EXHIBIT

5.3



LEGEND:

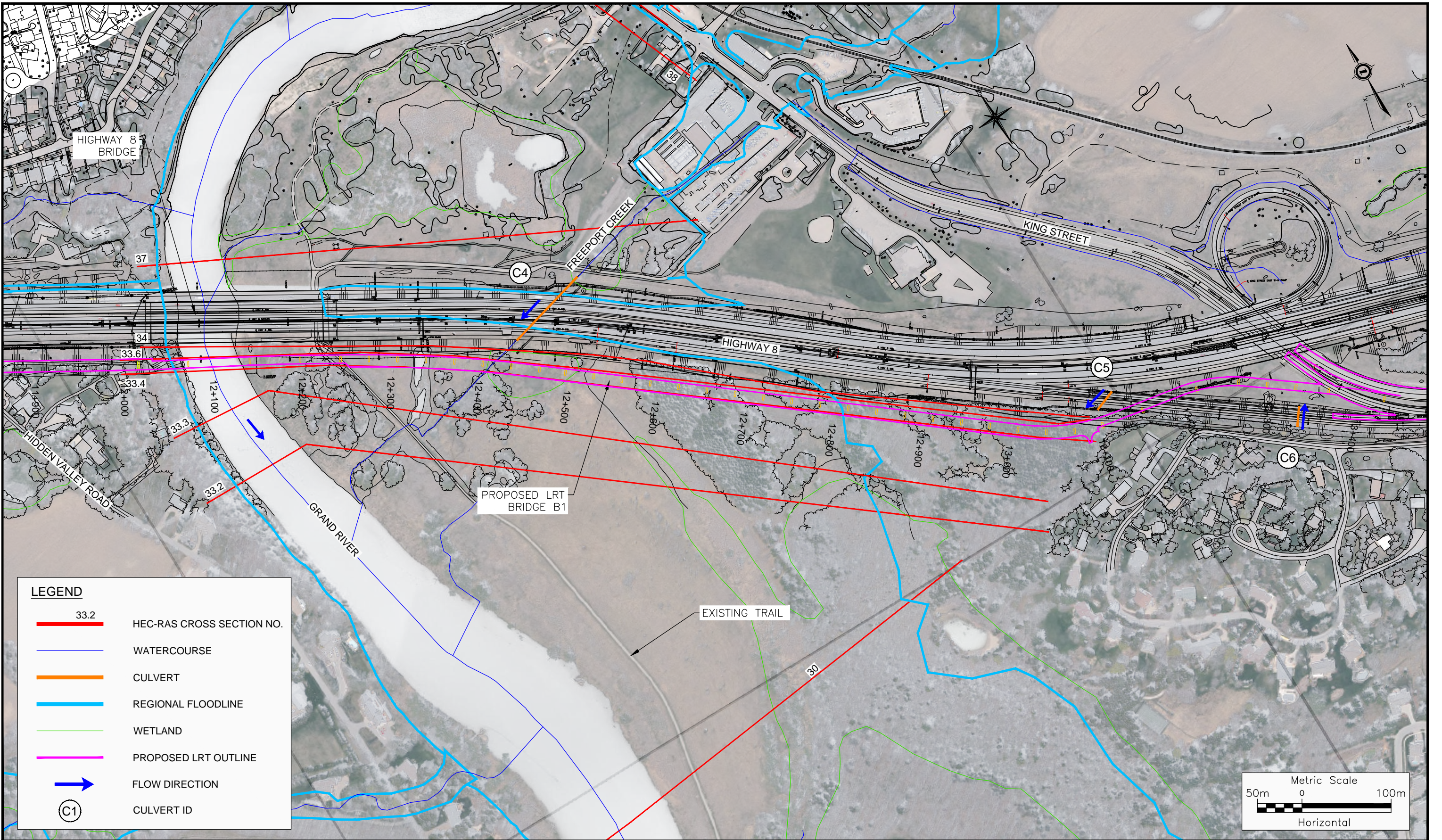
-  NORTHWAY DATA - DIGITAL PHOTOGRAMMETRIC MAPPING, 2008-2015
-  FIRST BASE SOLUTIONS DATA - DIGITAL PHOTOGRAMMETRIC MAPPING, SPRING 2018
-  REGION GIS DATA - ELEVATION POINTS PROVIDED BY REGION, 2014
-  WSP DATA - GPS FIELD SURVEY, FALL 2018



SURFACE MODEL SOURCES

STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE

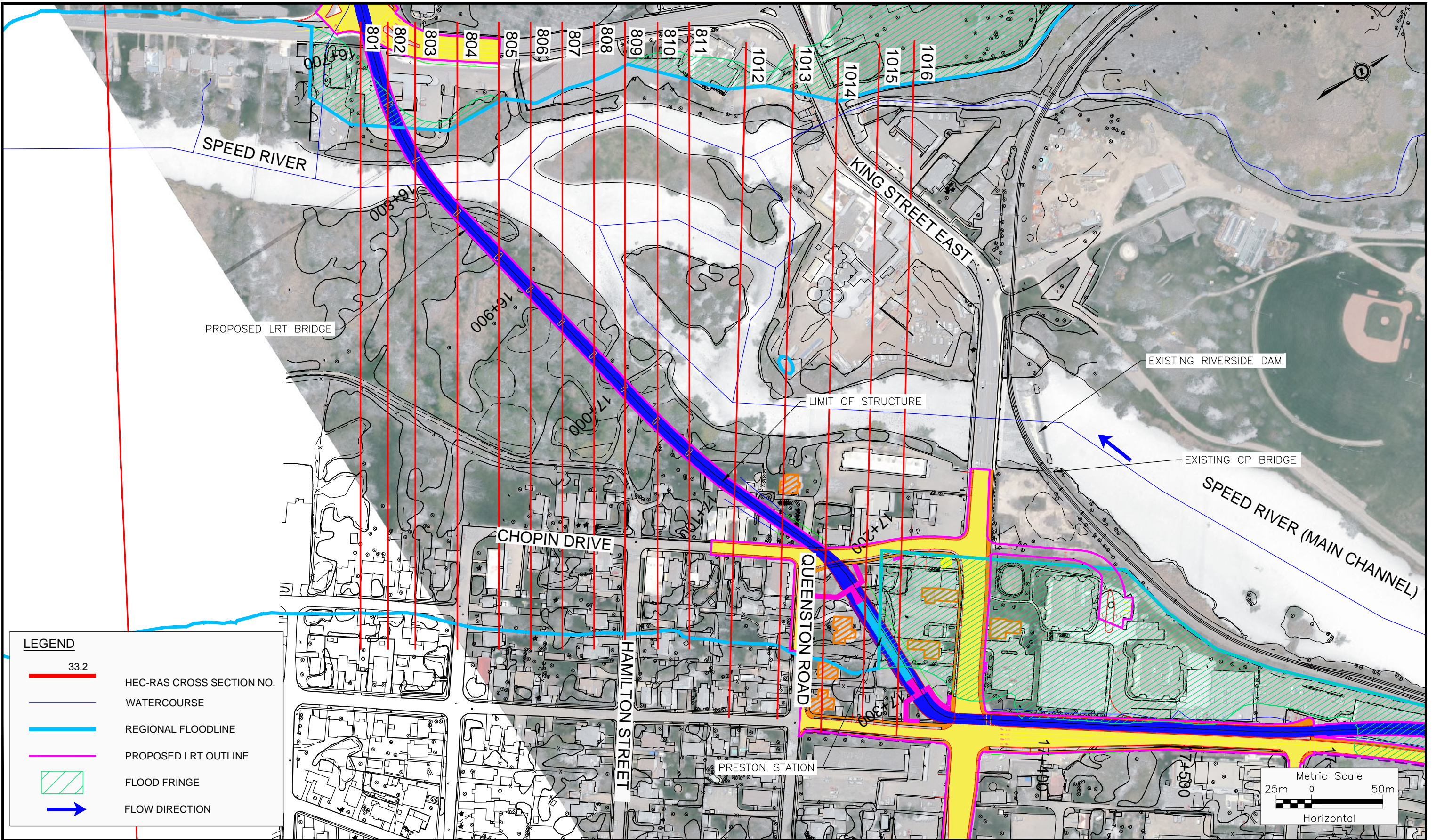
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LEGEND	
	33.2 HEC-RAS CROSS SECTION NO.
	WATERCOURSE
	CULVERT
	REGIONAL FLOODLINE
	WETLAND
	PROPOSED LRT OUTLINE
	FLOW DIRECTION
	CULVERT ID

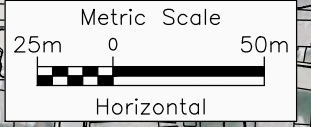


GRAND RIVER - PROPOSED LRT CROSSING FLOODPLAIN
 STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE



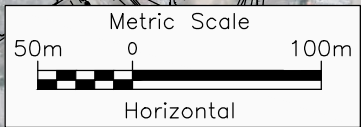
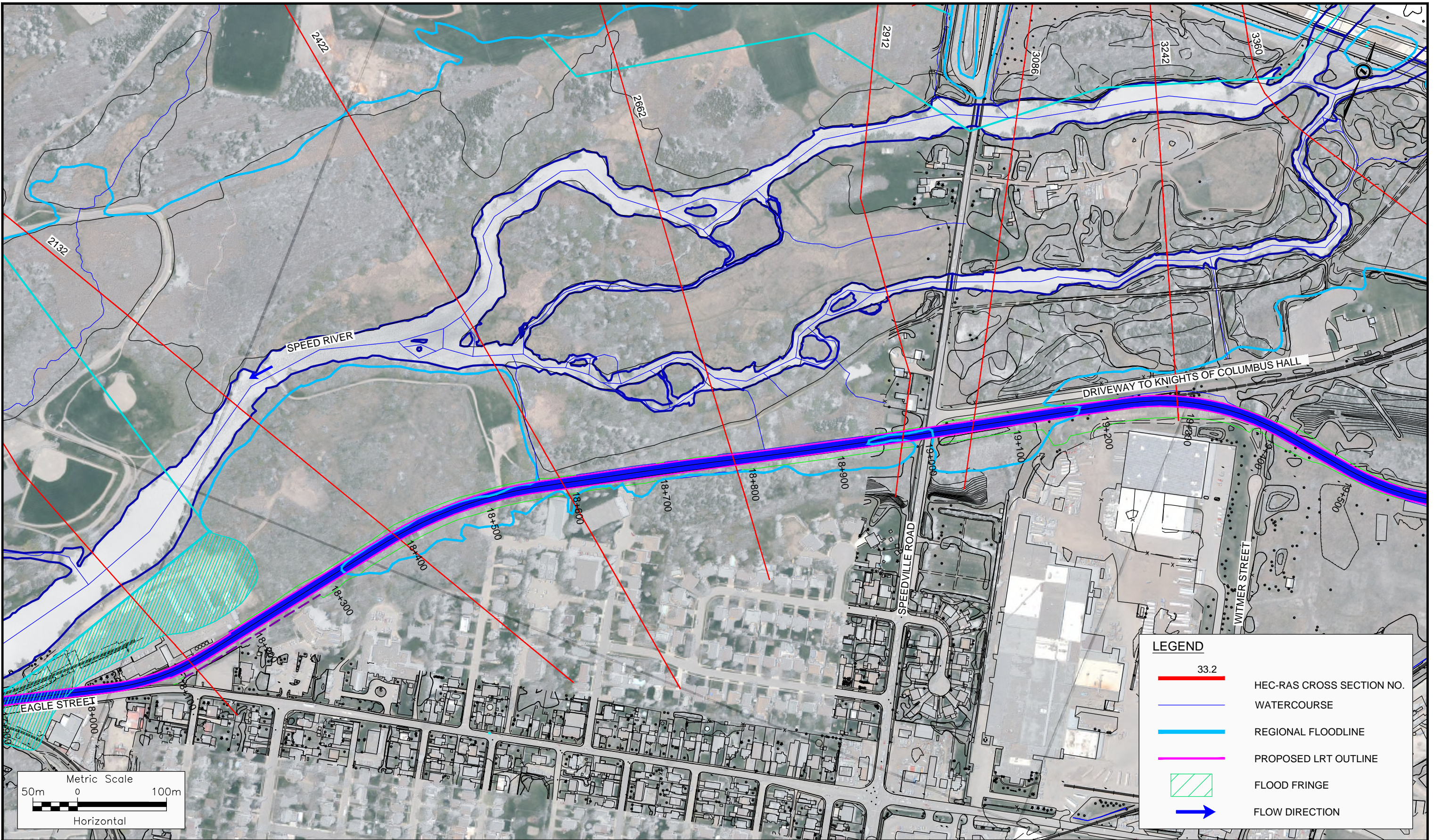
LEGEND


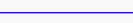




- 33.2 HEC-RAS CROSS SECTION NO.
- WATERCOURSE
- REGIONAL FLOODLINE
- PROPOSED LRT OUTLINE
- FLOOD FRINGE
- FLOW DIRECTION



SPEED RIVER - PROPOSED LRT CROSSING FLOODPLAIN
STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE

DRAWING NAME: \\CORP_PBWAN.NET\CA\CATOR\100\CATOR\PROJECTS\UUM\2015\151-07859-00 (ON STAGE 2 TPAP)\6.1 DRAWINGS (CADD)\DRAINAGE\PROPOSED SPEED RIVER CROSS SECTIONS\PROPOSED SPEED RIVER CROSS SECTIONS\LOCATIONS\B\W\4.30 PM



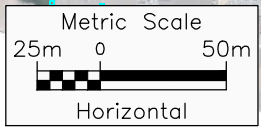
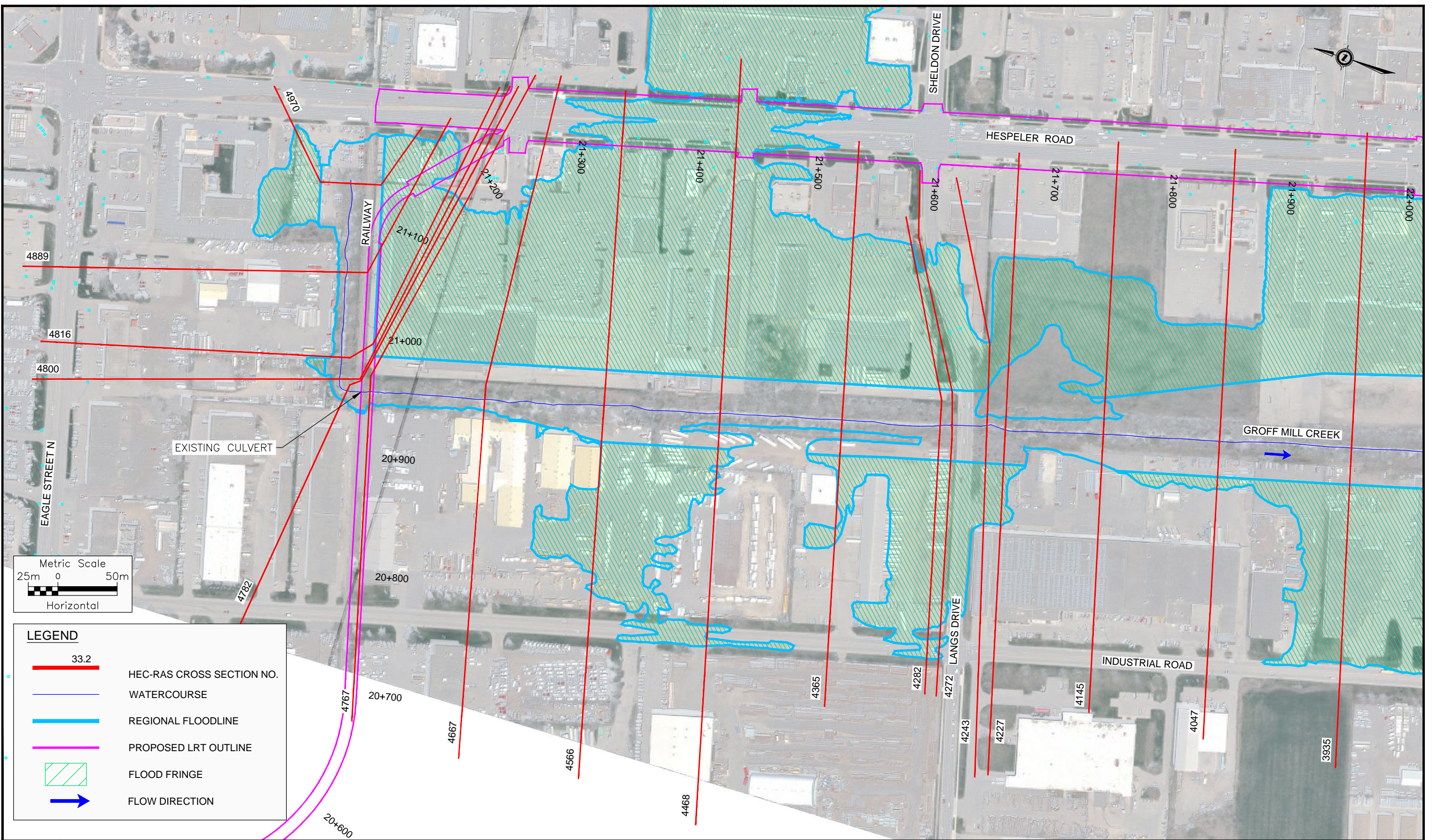
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	33.2 HEC-RAS CROSS SECTION NO.
	WATERCOURSE
	REGIONAL FLOODLINE
	PROPOSED LRT OUTLINE
	FLOOD FRINGE
	FLOW DIRECTION



SPEED RIVER - PROPOSED LRT CROSSING FLOODPLAIN
STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE

EXHIBIT

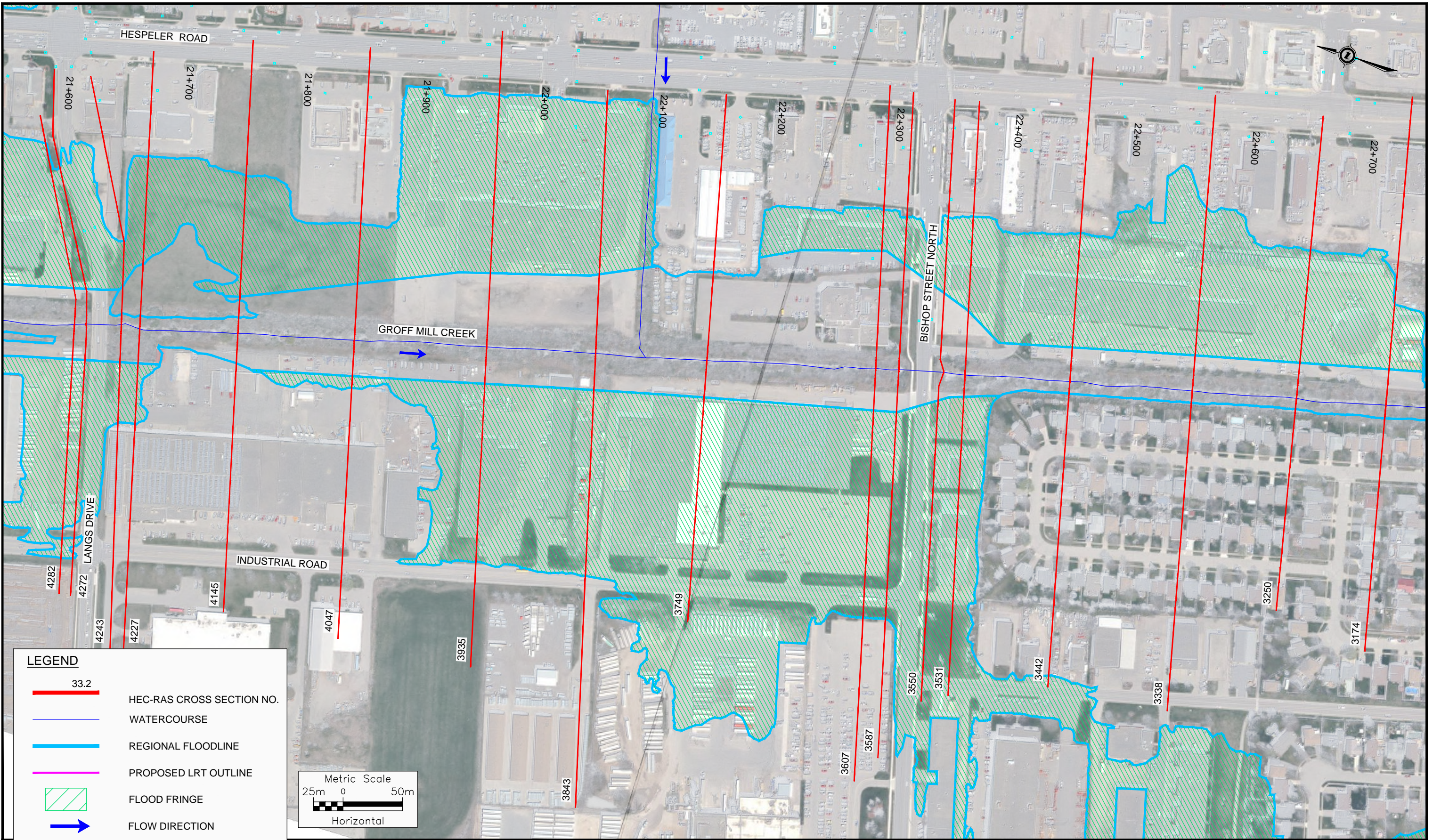
6.4



LEGEND	
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	WATERCOURSE
	REGIONAL FLOODLINE
	PROPOSED LRT OUTLINE
	FLOOD FRINGE
	FLOW DIRECTION

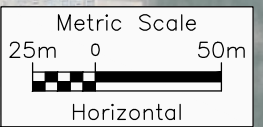


GROFF MILL CREEK - PROPOSED LRT CROSSING FLOODPLAIN
 STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE

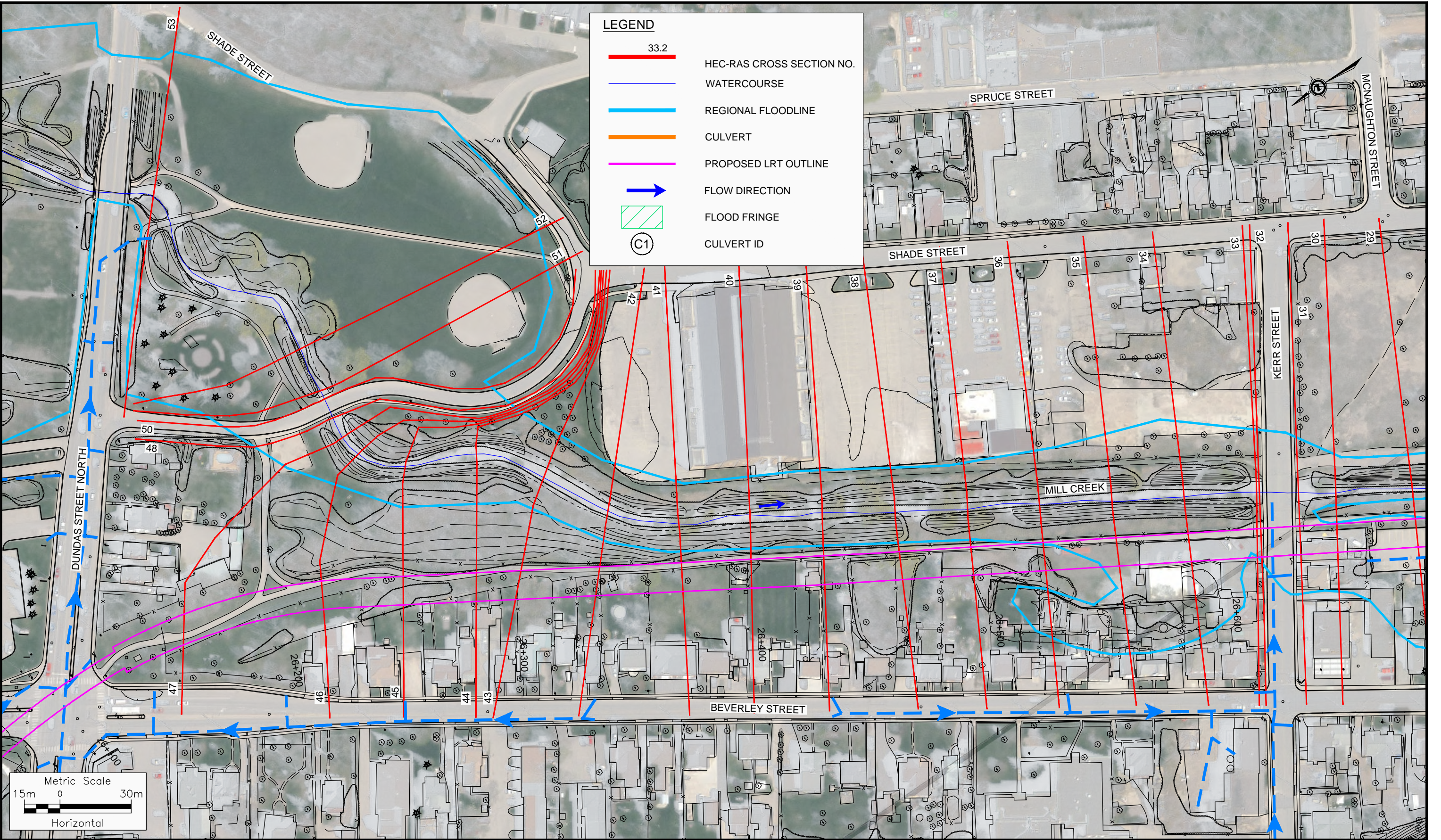


LEGEND

- 33.2 HEC-RAS CROSS SECTION NO.
- WATERCOURSE
- REGIONAL FLOODLINE
- PROPOSED LRT OUTLINE
- FLOOD FRINGE
- ➔ FLOW DIRECTION



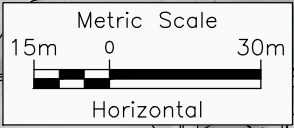
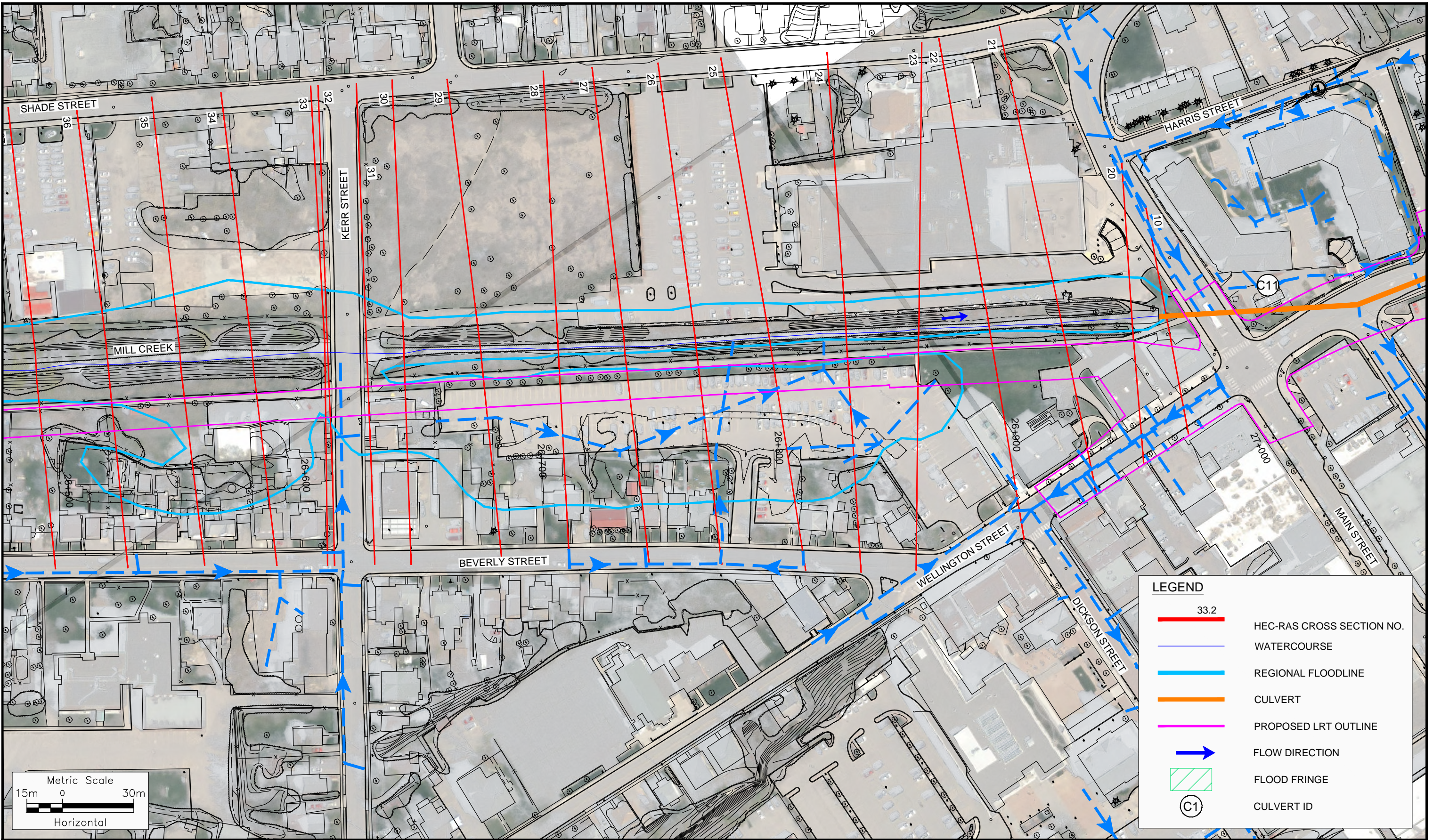
GROFF MILL CREEK - PROPOSED LRT CROSSING FLOODPLAIN
STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE



MILL CREEK - PROPOSED LRT CROSSING FLOODPLAIN

STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE

DRAWING NAME: \\CATORPP501\CORP\PEWAN\NET\PROJECTS\IUM\2015\151-07859-00 (ION STAGE 2 TPAP)\6.1 DRAWINGS (CADD)\DRAINAGE\MILL CREEK CROSS SECTIONS\HEC-RAS SECTION LOCATIONS-MILL CREEK.DWG MODIFIED: Sep. 12, 2019 5:03 PM

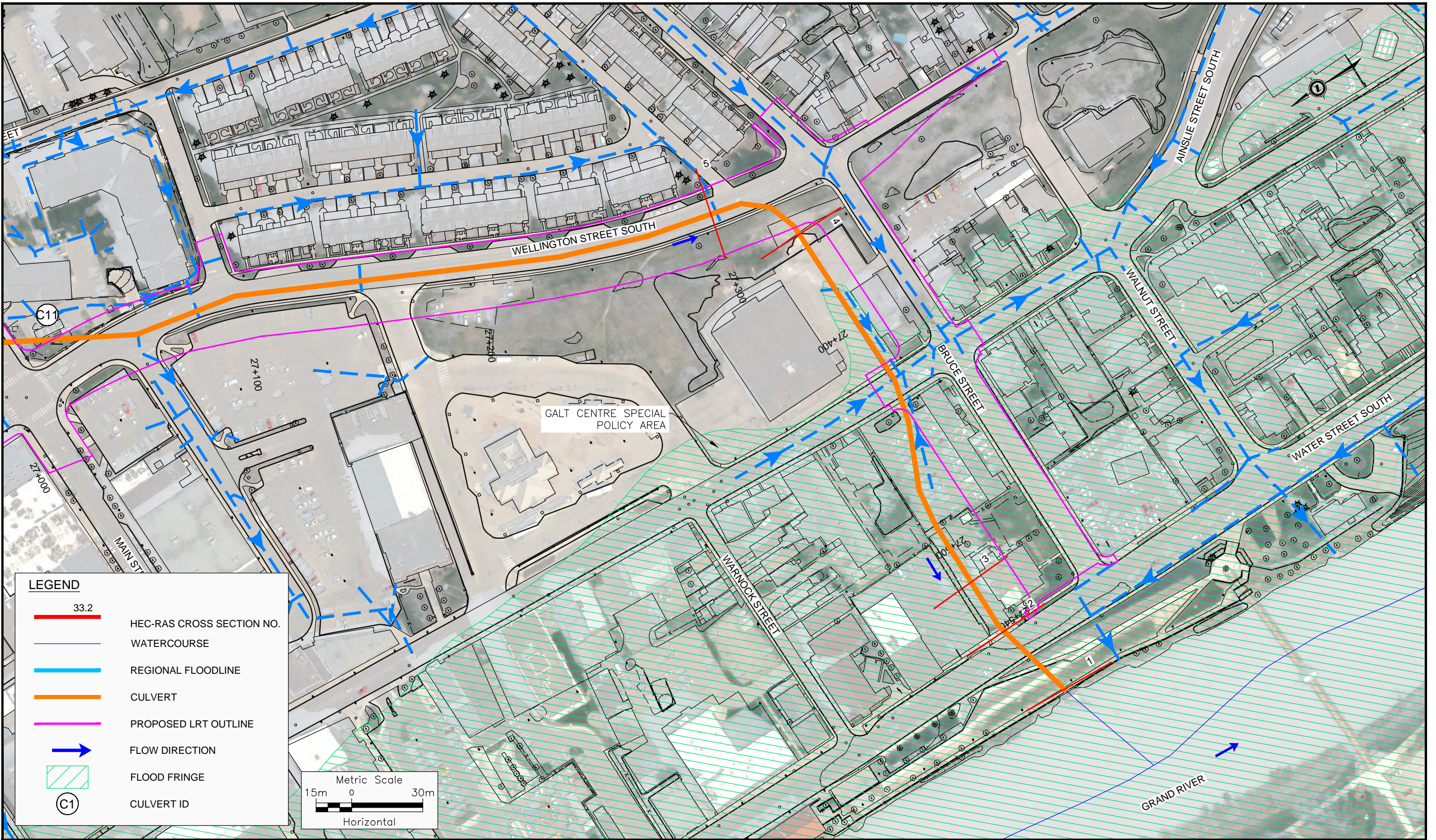


LEGEND

- 33.2 HEC-RAS CROSS SECTION NO.
- WATERCOURSE
- REGIONAL FLOODLINE
- CULVERT
- PROPOSED LRT OUTLINE
- FLOW DIRECTION
- FLOOD FRINGE
- C1 CULVERT ID



MILL CREEK - PROPOSED LRT CROSSING FLOODPLAIN
STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE



MILL CREEK - PROPOSED LRT CROSSING FLOODPLAIN
STAGE 2 ION: LIGHT RAIL TRANSIT (LRT) FROM KITCHENER TO CAMBRIDGE

