Appendix B

Field Investigations

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General	
Location ID No.:	1002
Date:	2012-06-13
Time:	3:44 PM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Legget Drive
Latitude:	45.342597
Longitude:	-75.901563

Photo 1

Location:	Downstream Face
Direction:	Facing East

Photo 2

Location:	Upstream Face
Direction:	Facing West

Crossing Details			
Cell:	East		
Type:	Culvert		
Material:	CMP		
Shape:	Circular		
Invert:	Closed Footing		
Rise / Diam. (mm):	900		
Span (mm)	900		
Approx. Length (m):	12		
Inlet Type:	Projecting		
Flow Depth (mm):	0		
Flow (L/s):	0		
Cell:			
Type:			
Material:			
Shape:			
Invert:			
Rise / Diam. (mm):			
Span (mm)			
Approx. Length (m):			
Inlet Type:			
Flow Depth (mm):			
Flow (L/s):			
Cell:			
Type:			
Material:			
Shape:			
Invert:			
Rise / Diam. (mm):			
Span (mm)			
Approx. Length (m):			
Inlet Type:			
Flow Depth (mm):			
Flow (L/s):			

Low Flow Channel Details		
Location:	Downstream	
Dist (m):	2	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 1:1	R: 3:1
Avg. Width (m):	2	
Avg. Depth (m):	0.1	
Channel Roughness:	Clean, straight, veg.	
Overbank Roughness:	Medium-dense brush	
Location:	Upstream Face	
Dist (m):	2	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 3:1	R: 1:1
Avg. Width (m):	2	
Avg. Depth (m):	0.1	
Channel Roughness:	Clean, straight, veg.	
Overbank Roughness:	Medium-dense brush	

Additional Comments

Culvert is perched at both ends. No flow at this crossing.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Downstream Face
Direction:	Facing North

Photo 4

Photo Here

Location:	
Direction:	

Photo 5

Location:	Downstream Face
Direction:	Facing East

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	117060
Date:	2012-06-13
Time:	11:09 AM
Field Staff:	SBN, LJ
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Carling Road
Latitude:	45.339874
Longitude:	-75.892550

Photo 1

Location:	Downstream Face
Direction:	Facing North

Photo 2

Location:	Downstream Face
Direction:	Facing South

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	Concrete
Shape:	Box / Rectangular
Invert:	Open Footing
Rise / Diam. (mm):	1.2
Span (mm)	4.8
Approx. Length (m):	29
Inlet Type:	Head Wall
Flow Depth (mm):	300
Flow (L/s):	180

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Downstream	
Dist (m):	7	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 2:1	R: 7:1
Avg. Width (m):	4.4	
Avg. Depth (m):	0.3	
Channel Roughness:	Cobble	
Overbank Roughness:	Short grass	

Location:	Upstream Face	
Dist (m):	5.5	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 7:1	R: 3:1
Avg. Width (m):	5	
Avg. Depth (m):	0.5	
Channel Roughness:	Clean, straight, veg.	
Overbank Roughness:	Medium-dense brush	

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location: Upstream Face
Direction: Facing South

Photo 4

Location: Upstream Face
Direction: Facing North

Photo 5

Photo Here

Location:
Direction:

Photo 6

Photo Here

Location:
Direction:

Photo 7

Photo Here

Location:
Direction:

Photo 8

Photo Here

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	117100
Date:	2012-06-13
Time:	2:55 PM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Herzberg Road
Latitude:	45.340888
Longitude:	-75.898378

Photo 1

Location:	Upstream Face
Direction:	Facing East

Photo 2

Location:	Upstream Face
Direction:	Facing West

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	Concrete
Shape:	Box / Rectangular
Invert:	Closed Footing
Rise / Diam. (mm):	2000
Span (mm)	3000
Approx. Length (m):	30
Inlet Type:	Projecting
Flow Depth (mm):	100
Flow (L/s):	60

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Upstream
Dist (m):	5
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 5:1, R: 3:1
Avg. Width (m):	2.7
Avg. Depth (m):	0.1
Channel Roughness:	Gravel/Cobble
Overbank Roughness:	Medium-dense brush

Location:	Downstream Face
Dist (m):	6
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 7:1, R: 5:1
Avg. Width (m):	5.3
Avg. Depth (m):	0.5
Channel Roughness:	Clean, winding, veg.
Overbank Roughness:	High grass

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Upstream Face
Direction:	Facing East

Photo 4

Location:	Downstream Face
Direction:	Facing West

Photo 5

Location:	Downstream Face
Direction:	Facing West

Photo 6

Location:	Downstream Face
Direction:	Facing East

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	640800
Date:	2012-06-13
Time:	6:20 PM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Legget Drive
Latitude:	45.342852
Longitude:	-75.912356

Photo 1

Location:	Upstream Face
Direction:	Facing North

Photo 2

Location:	Upstream Face
Direction:	Facing South

Crossing Details

Cell:	West
Type:	Culvert
Material:	Concrete
Shape:	Circular
Invert:	Closed Footing
Rise / Diam. (mm):	1150
Span (mm)	1150
Approx. Length (m):	32
Inlet Type:	Head Wall
Flow Depth (mm):	200
Flow (L/s):	70

Cell:	East
Type:	Culvert
Material:	Concrete
Shape:	Circular
Invert:	Closed Footing
Rise / Diam. (mm):	1200
Span (mm)	1200
Approx. Length (m):	32
Inlet Type:	Head Wall
Flow Depth (mm):	200
Flow (L/s):	70

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Upstream	
Dist (m):	6	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 2:1	R: 4:1
Avg. Width (m):	3	
Avg. Depth (m):	0.2	
Channel Roughness:	Cobble	
Overbank Roughness:	High grass	

Location:	Downstream Face	
Dist (m):	5	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 3:1	R: 2:1
Avg. Width (m):	3	
Avg. Depth (m):	0.2	
Channel Roughness:	Cobble	
Overbank Roughness:	High grass	

Additional Comments

Armorstone wing wall on the upstream end.
There is sediment buildup on the downstream end of 0.3 m.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Downstream Face
Direction:	Facing East

Photo 4

Location:	Downstream Face
Direction:	Facing West

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	640830
Date:	2012-06-14
Time:	9:35 AM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Station Road
Latitude:	45.336667
Longitude:	-75.917293

Photo 1

Location:	Upstream Face
Direction:	Facing North

Photo 2

Location:	Upstream Face
Direction:	Facing West

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	CMP
Shape:	Circular
Invert:	Closed Footing
Rise / Diam. (mm):	1200
Span (mm)	1200
Approx. Length (m):	20
Inlet Type:	Projecting
Flow Depth (mm):	150
Flow (L/s):	110

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Downstream
Dist (m):	2
Low Flow Shape:	Irregular
Side Slope (H:V):	L: 7:1, R: 7:1
Avg. Width (m):	1.9
Avg. Depth (m):	0.15
Channel Roughness:	Gravel
Overbank Roughness:	High grass

Location:	Upstream Face
Dist (m):	2
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 5:1, R: 5:1
Avg. Width (m):	1.2
Avg. Depth (m):	0.15
Channel Roughness:	Gravel/Cobble
Overbank Roughness:	Medium-dense brush

Additional Comments

Culvert depth is 0.3 m in the u/s end

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Downstream Face
Direction:	Facing North

Photo 4

Location:	Downstream Face
Direction:	Facing South

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	641020
Date:	2012-06-14
Time:	9:56 AM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Railway
Name:	Station Road
Latitude:	45.336461
Longitude:	-75.917305

Photo 1

Location:	Downstream Face
Direction:	Facing South

Photo 2

Location:	Downstream Face
Direction:	Facing North

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	CMP
Shape:	Circular
Invert:	Closed Footing
Rise / Diam. (mm):	1200
Span (mm)	1200
Approx. Length (m):	25
Inlet Type:	Projecting
Flow Depth (mm):	400
Flow (L/s):	130

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Downstream	
Dist (m):	1	
Low Flow Shape:	Rectangular	
Side Slope (H:V):	L: 5:1	R: 5:1
Avg. Width (m):	1.2	
Avg. Depth (m):	0.4	
Channel Roughness:	Gravel/Cobble	
Overbank Roughness:	Medium-dense brush	

Location:	Upstream Face	
Dist (m):	2	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 2:1	R: 3:1
Avg. Width (m):	2	
Avg. Depth (m):	0.15	
Channel Roughness:	Gravel/Cobble	
Overbank Roughness:	Medium-dense brush	

Additional Comments

U/S debris buildup at culvert entrance.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Upstream Face
Direction:	Facing North

Photo 4

Location:	Upstream Face
Direction:	Facing South

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	640820
Date:	2012-06-14
Time:	10:03 AM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Steacie Drive
Latitude:	45.336268
Longitude:	-75.917286

Photo 1

Location:	Upstream Face
Direction:	Facing North

Photo 2

Location:	Upstream Face
Direction:	Facing South

Crossing Details

Cell:	Centre
Type:	Pedestrian bridge
Material:	Steel Frame
Shape:	N/A
Invert:	Open Footing
Rise / Diam. (mm):	2600
Span (mm)	12300
Approx. Length (m):	2.5
Inlet Type:	N/A
Flow Depth (mm):	200
Flow (L/s):	70

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Upstream	
Dist (m):	1	
Low Flow Shape:	Irregular	
Side Slope (H:V):	L: 4:1	R: 3:1
Avg. Width (m):	1.5	
Avg. Depth (m):	0.2	
Channel Roughness:	Boulders	
Overbank Roughness:	Medium-dense brush	

Location:	Downstream Face	
Dist (m):	1	
Low Flow Shape:	Irregular	
Side Slope (H:V):	L: 4:1	R: 3:1
Avg. Width (m):	2	
Avg. Depth (m):	0.1	
Channel Roughness:	Boulders	
Overbank Roughness:	Medium-dense brush	

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Downstream Face
Direction:	Facing South

Photo 4

Location:	Downstream Face
Direction:	Facing North

Photo 5

Location:	Upstream Face
Direction:	Facing South

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	641030
Date:	2012-06-13
Time:	7:19 PM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Walden Drive
Latitude:	45.333620
Longitude:	-75.917029

Photo 1

Location:	Upstream Face
Direction:	Facing North

Photo 2

Location:	Upstream Face
Direction:	Facing South

Crossing Details

Cell:	Centre
Type:	Pedestrian bridge
Material:	Steel Frame
Shape:	N/A
Invert:	Open Footing
Rise / Diam. (mm):	2000
Span (mm)	9000
Approx. Length (m):	2
Inlet Type:	N/A
Flow Depth (mm):	250
Flow (L/s):	110

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Upstream
Dist (m):	4
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 2:1, R: 2:1
Avg. Width (m):	2.2
Avg. Depth (m):	0.25
Channel Roughness:	Cobble
Overbank Roughness:	Medium-dense brush

Location:	Downstream Face
Dist (m):	4
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 2:1, R: 2:1
Avg. Width (m):	2
Avg. Depth (m):	0.2
Channel Roughness:	Cobble
Overbank Roughness:	Medium-dense brush

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Downstream Face
Direction:	Facing North

Photo 4

Location:	Downstream Face
Direction:	Facing South

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	647300-2647300-1
Date:	2012-06-13
Time:	3:20 PM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Legget Drive
Latitude:	45.342284
Longitude:	-75.900785

Photo 1

Location:	Upstream Face
Direction:	Facing South

Photo 2

Location:	Downstream Face
Direction:	Facing South

Crossing Details

Cell:	North
Type:	Culvert
Material:	CMP
Shape:	Circular
Invert:	Closed Footing
Rise / Diam. (mm):	1500
Span (mm)	1500
Approx. Length (m):	32
Inlet Type:	Projecting
Flow Depth (mm):	100
Flow (L/s):	15

Cell:	North
Type:	Culvert
Material:	CMP
Shape:	Circular
Invert:	Closed Footing
Rise / Diam. (mm):	1500
Span (mm)	1500
Approx. Length (m):	32
Inlet Type:	Projecting
Flow Depth (mm):	100
Flow (L/s):	15

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Upstream	
Dist (m):	4	
Low Flow Shape:	Irregular	
Side Slope (H:V):	L: 3:1	R: 3:1
Avg. Width (m):	3	
Avg. Depth (m):	0.1	
Channel Roughness:	High grass	
Overbank Roughness:	High grass	

Location:	Downstream Face	
Dist (m):	4	
Low Flow Shape:	Irregular	
Side Slope (H:V):	L: 3:1	R: 3:1
Avg. Width (m):	1	
Avg. Depth (m):	0.1	
Channel Roughness:	High grass	
Overbank Roughness:	High grass	

Additional Comments

Armourstone wing walls.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location: Upstream Face
Direction: Facing North

Photo 4

Location: Downstream Face
Direction: Facing North

Photo 5

Photo Here

Location:
Direction:

Photo 6

Photo Here

Location:
Direction:

Photo 7

Photo Here

Location:
Direction:

Photo 8

Photo Here

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	647390-2647390-1
Date:	2012-06-13
Time:	4:07 PM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Marsh Sparrow Private
Latitude:	45.344504
Longitude:	-75.902971

Photo 1

Location:	Upstream Face
Direction:	Facing North

Photo 2

Location:	Upstream Face
Direction:	Facing South

Crossing Details

Cell:	West
Type:	Culvert
Material:	CMP
Shape:	Circular
Invert:	Closed Footing
Rise / Diam. (mm):	1500
Span (mm)	1500
Approx. Length (m):	30
Inlet Type:	Projecting
Flow Depth (mm):	200
Flow (L/s):	20

Cell:	East
Type:	Culvert
Material:	CMP
Shape:	Circular
Invert:	Closed Footing
Rise / Diam. (mm):	1500
Span (mm)	1500
Approx. Length (m):	30
Inlet Type:	Projecting
Flow Depth (mm):	0
Flow (L/s):	0

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Upstream
Dist (m):	4
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 3:1, R: 3:1
Avg. Width (m):	1.7
Avg. Depth (m):	0.2
Channel Roughness:	Cobble
Overbank Roughness:	Medium-dense brush

Location:	Downstream Face
Dist (m):	4
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 3:1, R: 3:1
Avg. Width (m):	1.6
Avg. Depth (m):	0.25
Channel Roughness:	Cobble
Overbank Roughness:	Medium-dense brush

Additional Comments

East culvert invert 0.5 m above west culvert invert.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location: Downstream Face
Direction: Facing South

Photo 4

Location: Downstream Face
Direction: Facing North

Photo 5

Photo Here

Location:
Direction:

Photo 6

Photo Here

Location:
Direction:

Photo 7

Photo Here

Location:
Direction:

Photo 8

Photo Here

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	647960
Date:	2012-06-14
Time:	10:35 AM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Goulbourn Forced Road
Latitude:	45.328180
Longitude:	-75.930133

Photo 1

Location:	Upstream Face
Direction:	Facing South

Photo 2

Location:	Downstream Face
Direction:	Facing North

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	CMP
Shape:	Circular
Invert:	Closed Footing
Rise / Diam. (mm):	800
Span (mm)	800
Approx. Length (m):	25
Inlet Type:	Projecting
Flow Depth (mm):	0
Flow (L/s):	0

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Upstream	
Dist (m):	N/A	
Low Flow Shape:	Irregular	
Side Slope (H:V):	L: 7:1	R: 7:1
Avg. Width (m):	N/A	
Avg. Depth (m):	N/A	
Channel Roughness:	Cobble	
Overbank Roughness:	High grass	

Location:	Downstream Face	
Dist (m):	N/A	
Low Flow Shape:	Irregular	
Side Slope (H:V):	L: 7:1	R: 7:1
Avg. Width (m):	N/A	
Avg. Depth (m):	N/A	
Channel Roughness:	Cobble	
Overbank Roughness:	High grass	

Additional Comments

Wetland on both sides.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Downstream Face
Direction:	Facing West

Photo 4

Photo Here

Location:	
Direction:	

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	648310
Date:	2012-06-14
Time:	8:36 AM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Road
Name:	March Road
Latitude:	45.340923
Longitude:	-75.914636

Photo 1

Location:	Downstream Face
Direction:	Facing South

Photo 2

Location:	Downstream Face
Direction:	Facing North

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	Concrete
Shape:	Box / Rectangular
Invert:	Closed Footing
Rise / Diam. (mm):	1200
Span (mm)	2400
Approx. Length (m):	49
Inlet Type:	Projecting
Flow Depth (mm):	200
Flow (L/s):	70

Cell:	Centre
Type:	Culvert
Material:	CMP
Shape:	Circular
Invert:	Closed Footing
Rise / Diam. (mm):	1.2
Span (mm)	
Approx. Length (m):	15
Inlet Type:	Projecting
Flow Depth (mm):	100
Flow (L/s):	200

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Downstream
Dist (m):	3
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 3:1, R: 7:1
Avg. Width (m):	3.4
Avg. Depth (m):	0.2
Channel Roughness:	Clean, straight, veg.
Overbank Roughness:	High grass

Location:	Upstream Face
Dist (m):	1.2
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 4:1, R: 1:1
Avg. Width (m):	2
Avg. Depth (m):	0.1
Channel Roughness:	Sediment
Overbank Roughness:	Light brush

Additional Comments

Armorstone head wall downstream. Circular CMP joins concrete box culvert.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Upstream Face
Direction:	Facing North

Photo 4

Location:	Upstream Face
Direction:	Facing South

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Ottawa

AECOM

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	648450
Date:	2012-06-13
Time:	6:30 PM
Field Staff:	SBN | LJ |
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Marshes Golf Club
Latitude:	45.346117
Longitude:	-75.903708

Photo 1

Location Inaccessible

Location:	
Direction:	

Photo 2

Location:	
Direction:	

Crossing Details

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

Structure located on Marshes Golf Club property, could not access.

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

Photo 3

Location:

Direction:

Photo 4

Location:

Direction:

Photo 5

Location:

Direction:

Photo 6

Location:

Direction:

Photo 7

Location:

Direction:

Photo 8

Location:

Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	648460
Date:	2012-06-13
Time:	6:30 PM
Field Staff:	SBN / LJ
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Marshes Golf Club
Latitude:	45.346043
Longitude:	-75.905893

Photo 1

Location Inaccessible

Location:	
Direction:	

Photo 2

Location:	
Direction:	

Crossing Details

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

Structure located on Marshes Golf Club property, could not access.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:
Direction:

Photo 4

Location:
Direction:

Photo 5

Location:
Direction:

Photo 6

Location:
Direction:

Photo 7

Location:
Direction:

Photo 8

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	648470
Date:	2012-06-13
Time:	6:41 PM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Legget Drive
Latitude:	45.344095
Longitude:	-75.910278

Photo 1

Location:	Upstream Face
Direction:	Facing West

Photo 2

Location:	Upstream Face
Direction:	Facing East

Crossing Details

Cell:	Centre
Type:	Pedestrian bridge
Material:	Steel Frame
Shape:	N/A
Invert:	Open Footing
Rise / Diam. (mm):	2000
Span (mm)	10000
Approx. Length (m):	2.6
Inlet Type:	N/A
Flow Depth (mm):	200
Flow (L/s):	60

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Upstream
Dist (m):	4
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 5:1, R: 5:1
Avg. Width (m):	2.2
Avg. Depth (m):	0.20
Channel Roughness:	Clean, winding, veg.
Overbank Roughness:	High grass

Location:	Downstream Face
Dist (m):	4
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 4:1, R: 5:1
Avg. Width (m):	2.5
Avg. Depth (m):	0.25
Channel Roughness:	Clean, straight, veg.
Overbank Roughness:	High grass

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location: Downstream Face
Direction: Facing East

Photo 4

Location: Downstream Face
Direction: Facing West

Photo 5

Photo Here

Location:
Direction:

Photo 6

Photo Here

Location:
Direction:

Photo 7

Photo Here

Location:
Direction:

Photo 8

Photo Here

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	K1
Date:	2012-06-13
Time:	11:52 AM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Burke Road
Latitude:	45.340552
Longitude:	-75.885036

Crossing Details

Cell:	North
Type:	Pedestrian Bridge
Material:	Steel Frame
Shape:	N/A
Invert:	Open Footing
Rise / Diam. (mm):	2300
Span (mm)	14400
Approx. Length (m):	2.5
Inlet Type:	N/A
Flow Depth (mm):	400
Flow (L/s):	100

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Photo 1

Location:	Downstream Face
Direction:	Facing South

Photo 2

Location:	Downstream Face
Direction:	Facing North

Low Flow Channel Details

Location:	Upstream	
Dist (m):	1.4	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 3:1	R: 5:1
Avg. Width (m):	3.2	
Avg. Depth (m):	0.4	
Channel Roughness:	Gravel/Cobble	
Overbank Roughness:	Medium-dense brush	

Location:	Downstream Face	
Dist (m):	5	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 3:1	R: 7:1
Avg. Width (m):	2.5	
Avg. Depth (m):	0.45	
Channel Roughness:	Gravel/Cobble	
Overbank Roughness:	High grass	

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location: Downstream Face
Direction: Facing North

Photo 4

Location: Upstream Face
Direction: Facing South

Photo 5

Location:
Direction: Facing West

Photo 6

Photo Here

Location:
Direction:

Photo 7

Photo Here

Location:
Direction:

Photo 8

Photo Here

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	K3
Date:	2012-09-18
Time:	12:12 PM
Field Staff:	GAF / SE
Weather:	Rain
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Nordion
Latitude:	
Longitude:	

Photo 1

Location:	Upstream Face
Direction:	Facing East

Photo 2

Location:	Downstream Face
Direction:	Facing West

Crossing Details

Cell:	South
Type:	Bridge
Material:	Wood
Shape:	Irregular
Invert:	Open Footing
Rise / Diam. (mm):	1.45
Span (mm)	6.4
Approx. Length (m):	1.2
Inlet Type:	N/A
Flow Depth (mm):	0.34
Flow (L/s):	5

Cell:	North
Type:	Bridge
Material:	Wood
Shape:	Irregular
Invert:	Open Footing
Rise / Diam. (mm):	1.1
Span (mm)	5.2
Approx. Length (m):	1.2
Inlet Type:	N/A
Flow Depth (mm):	0
Flow (L/s):	0

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Downstream
Dist (m):	5
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 1:1 / R: 2:1
Avg. Width (m):	1.5
Avg. Depth (m):	0.3
Channel Roughness:	Clean, straight, veg.
Overbank Roughness:	High grass

Location:	Upstream Face
Dist (m):	5
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 1:1 / R: 3:1
Avg. Width (m):	1.5
Avg. Depth (m):	0.3
Channel Roughness:	Clean, straight
Overbank Roughness:	High grass

Additional Comments

Armorstone on north bank through south crossing. North bridge crossing broken, no low flow through channel.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Upstream Face
Direction:	Facing West

Photo 4

Location:	Downstream Face
Direction:	Facing East

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	K4
Date:	2012-09-18
Time:	12:37 PM
Field Staff:	GAF, SE
Weather:	Rain
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Nordion
Latitude:	
Longitude:	

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	CMP
Shape:	Circular
Invert:	Closed Footing
Rise / Diam. (mm):	1.2
Span (mm)	
Approx. Length (m):	10.7
Inlet Type:	Mitered
Flow Depth (mm):	0.25
Flow (L/s):	5

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Photo 1

Location:	Upstream Face
Direction:	Facing East

Photo 2

Location:	Downstream Face
Direction:	Facing East

Low Flow Channel Details

Location:	Downstream	
Dist (m):	5	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 5:1	R: 3:1
Avg. Width (m):	3	
Avg. Depth (m):	0.3	
Channel Roughness:	Clean, straight	
Overbank Roughness:	High grass	

Location:	Upstream Face	
Dist (m):	5	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 3:1	R: 3:1
Avg. Width (m):	2	
Avg. Depth (m):	0.3	
Channel Roughness:	Clean, straight, veg.	
Overbank Roughness:	Short grass	

Additional Comments

2 m mitre on upstream and downstream face. Drop of 0.25 m on downstream end. Approx. 0.75 m cover to top of path.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location: Upstream Face
Direction: Facing West

Photo 4

Photo Here

Location:
Direction:

Photo 5

Photo Here

Location:
Direction:

Photo 6

Photo Here

Location:
Direction:

Photo 7

Photo Here

Location:
Direction:

Photo 8

Photo Here

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	K5
Date:	2012-09-18
Time:	12:37 PM
Field Staff:	GAF / SE
Weather:	Rain
Watershed:	Kizell Drain
Watercourse:	Main Branch
Crossing Location:	Utility Crossing
Name:	Nordion
Latitude:	
Longitude:	

Photo 1

Location:	Downstream Face
Direction:	Facing West

Photo 2

Location:	Upstream Face
Direction:	Facing East

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	Concrete
Shape:	Box / Rectangular
Invert:	Open Footing
Rise / Diam. (mm):	0.5
Span (mm)	3.0
Approx. Length (m):	14.2
Inlet Type:	Projecting
Flow Depth (mm):	0.16
Flow (L/s):	5

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Downstream
Dist (m):	5
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 3:1 / R: 3:1
Avg. Width (m):	3
Avg. Depth (m):	0.3
Channel Roughness:	Clean, straight, veg.
Overbank Roughness:	Short grass

Location:	Upstream Face
Dist (m):	5
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 3:1 / R: 3:1
Avg. Width (m):	3
Avg. Depth (m):	0.3
Channel Roughness:	Clean, straight, veg.
Overbank Roughness:	Scattered brush

Additional Comments

Cast in place structure to accommodate sub-surface utility crossing above. Approx 4 to 5 m of fill to top of structure. Concrete casing across top of crossing (refer to photo 3).

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	
Direction:	Facing North

Photo 4

Location:	Upstream Face
Direction:	Facing West

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General	
Location ID No.:	640550
Date:	2012-06-14
Time:	2:14 PM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Legget Drive
Latitude:	45.345220
Longitude:	-75.916435

Photo 1

Location:	Downstream Face
Direction:	Facing West

Photo 2

Location:	Downstream Face
Direction:	Facing East

Crossing Details	
Cell:	Centre
Type:	Culvert
Material:	Concrete
Shape:	Box / Rectangular
Invert:	Closed Footing
Rise / Diam. (mm):	1000
Span (mm)	1900
Approx. Length (m):	40
Inlet Type:	Mitered
Flow Depth (mm):	50
Flow (L/s):	10

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Downstream	
Dist (m):	4	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 3:1	R: 3:1
Avg. Width (m):	1.1	
Avg. Depth (m):	0.05	
Channel Roughness:	Sand	
Overbank Roughness:	High grass	

Location:	Upstream Face	
Dist (m):	4	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 3:1	R: 3:1
Avg. Width (m):	1.1	
Avg. Depth (m):	0.05	
Channel Roughness:	Sand	
Overbank Roughness:	High grass	

Additional Comments

U/s side channel lined with straw matting

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Upstream Face
Direction:	Facing West

Photo 4

Location:	Upstream Face
Direction:	Facing East

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	640810
Date:	2012-06-14
Time:	1:56 PM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Hines Road
Latitude:	45.342400
Longitude:	-75.920103

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	CMP
Shape:	Arch
Invert:	Closed Footing
Rise / Diam. (mm):	1700
Span (mm)	2300
Approx. Length (m):	20
Inlet Type:	Mitered
Flow Depth (mm):	100
Flow (L/s):	20

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Photo 1

Location:	Downstream Face
Direction:	Facing East

Photo 2

Location:	Upstream Face
Direction:	Facing West

Low Flow Channel Details

Location:	Downstream	
Dist (m):	3	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 6:1	R: 6:1
Avg. Width (m):	1	
Avg. Depth (m):	0.10	
Channel Roughness:	Boulders	
Overbank Roughness:	Medium-dense brush	

Location:	Upstream Face	
Dist (m):	4	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 2:1	R: 3:1
Avg. Width (m):	1.2	
Avg. Depth (m):	0.4	
Channel Roughness:	Cobble	
Overbank Roughness:	High grass	

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Upstream Face
Direction:	Facing West

Photo 4

Location:	Upstream Face
Direction:	Facing East

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	641230
Date:	2012-06-14
Time:	12:30 PM
Field Staff:	SBN / LJ
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Innovation Drive
Latitude:	45.338070
Longitude:	-75.925258

Photo 1

Location:	
Direction:	

Photo 2

Location:	
Direction:	

Crossing Details

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

Could not locate at time of field investigation.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:
Direction:

Photo 4

Location:
Direction:

Photo 5

Location:
Direction:

Photo 6

Location:
Direction:

Photo 7

Location:
Direction:

Photo 8

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	645000
Date:	2012-06-14
Time:	11:25 AM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Railway
Name:	Goulbourn Forced Road
Latitude:	45.333910
Longitude:	-75.930840

Photo 1

Location Inaccessible

Location:	
Direction:	

Photo 2

Location:	
Direction:	

Crossing Details

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

Could not access due to close proximity to CN rail and guard dogs on private property.

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

Photo 3

Location:	
Direction:	

Photo 4

Location:	
Direction:	

Photo 5

Location:	
Direction:	

Photo 6

Location:	
Direction:	

Photo 7

Location:	
Direction:	

Photo 8

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	645030
Date:	2012-06-15
Time:	9:32 AM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Railway
Name:	Klondike Road
Latitude:	45.361678
Longitude:	-75.925249

Photo 1

Location:	Upstream Face
Direction:	Facing East

Photo 2

Location:	Upstream Face
Direction:	Facing West

Crossing Details

Cell:	East
Type:	Culvert
Material:	Concrete
Shape:	Box / Rectangular
Invert:	Closed Footing
Rise / Diam. (mm):	1360
Span (mm)	2700
Approx. Length (m):	7
Inlet Type:	Wing Wall
Flow Depth (mm):	0.02
Flow (L/s):	25

Cell:	West
Type:	Culvert
Material:	Concrete
Shape:	Box / Rectangular
Invert:	Closed Footing
Rise / Diam. (mm):	1360
Span (mm)	2700
Approx. Length (m):	7
Inlet Type:	Wing Wall
Flow Depth (mm):	0.02
Flow (L/s):	25

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Downstream	
Dist (m):	5	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 5:1	R: 5:1
Avg. Width (m):	3.2	
Avg. Depth (m):	0.3	
Channel Roughness:	Cobble	
Overbank Roughness:	High grass	

Location:	Upstream Face	
Dist (m):	20	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 5:1	R: 5:1
Avg. Width (m):	5	
Avg. Depth (m):	0.3	
Channel Roughness:	Cobble	
Overbank Roughness:	High grass	

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Downstream Face
Direction:	Facing West

Photo 4

Location:	Downstream Face
Direction:	Facing East

Photo 5

Location:	Upstream Face
Direction:	Facing North

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	647310
Date:	2012-06-14
Time:	1:24 PM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Road
Name:	March Road
Latitude:	45.343726
Longitude:	-75.918131

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	Concrete
Shape:	Box / Rectangular
Invert:	Closed Footing
Rise / Diam. (mm):	1500
Span (mm)	3100
Approx. Length (m):	40
Inlet Type:	Projecting
Flow Depth (mm):	250
Flow (L/s):	70

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Photo 1

Location:	Downstream Face
Direction:	Facing East

Photo 2

Location:	Upstream Face
Direction:	Facing West

Low Flow Channel Details

Location:	Upstream	
Dist (m):	3	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 2:1	R: 2:1
Avg. Width (m):	3.2	
Avg. Depth (m):	0.25	
Channel Roughness:	Cobble	
Overbank Roughness:	Medium-dense brush	

Location:	Downstream Face	
Dist (m):	3	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 2:1	R: 2:1
Avg. Width (m):	1.4	
Avg. Depth (m):	0.7	
Channel Roughness:	Gravel	
Overbank Roughness:	High grass	

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Downstream Face
Direction:	Facing West

Photo 4

Location:	Downstream Face
Direction:	Facing East

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	647320
Date:	2012-06-14
Time:	4:21 PM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Terry Fox Drive
Latitude:	45.350758
Longitude:	-75.918167

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	Concrete
Shape:	Box / Rectangular
Invert:	Closed Footing
Rise / Diam. (mm):	900
Span (mm)	3100
Approx. Length (m):	40
Inlet Type:	Mitered
Flow Depth (mm):	200
Flow (L/s):	110

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Photo 1

Location:	Upstream Face
Direction:	Facing North

Photo 2

Location:	Upstream Face
Direction:	Facing South

Low Flow Channel Details

Location:	Upstream	
Dist (m):	5	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 2:1	R: 2:1
Avg. Width (m):	11	
Avg. Depth (m):	0.2	
Channel Roughness:	Boulders	
Overbank Roughness:	Medium-dense brush	

Location:	Downstream Face	
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

D/S channel was too deep to measure.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Downstream Face
Direction:	Facing West

Photo 4

Location:	Downstream Face
Direction:	Facing North

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	647330
Date:	2012-06-15
Time:	7:59 AM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Shirley's Brook Drive
Latitude:	45.352602
Longitude:	-75.923592

Photo 1

Location:	Downstream Face
Direction:	Facing South

Photo 2

Location:	Downstream Face
Direction:	Facing North

Crossing Details

	North	South		
Cell:	North	South		
Type:	Culvert	Culvert		
Material:	Concrete	Concrete		
Shape:	Box / Rectangular	Box / Rectangular		
Invert:	Closed Footing	Closed Footing		
Rise / Diam. (mm):	900	900		
Span (mm)	2400	2400		
Approx. Length (m):	40	40		
Inlet Type:	Mitered	Mitered		
Flow Depth (mm):	100	100		
Flow (L/s):	10	20		

Low Flow Channel Details

Location:	Downstream	Upstream Face
Dist (m):	10	4
Low Flow Shape:	Trapezoidal	Trapezoidal
Side Slope (H:V):	L: 7:1 R: 2:1	L: 3:1 R: 3:1
Avg. Width (m):	3.2	2.4
Avg. Depth (m):	0.1	0.02
Channel Roughness:	Gravel/Cobble	Boulders
Overbank Roughness:	High grass	Short grass

Additional Comments

U/S North cell 50% blocked with rip rap.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Upstream Face
Direction:	Facing South

Photo 4

Location:	Upstream Face
Direction:	Facing North

Photo 5

Location:	Downstream Face
Direction:	Facing North

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	647370
Date:	2012-06-15
Time:	8:50 AM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Maxwell Bridge Road
Latitude:	45.359208
Longitude:	-75.934651

Photo 1

Location:	Downstream Face
Direction:	Facing East

Photo 2

Location:	Downstream Face
Direction:	Facing West

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	CMP
Shape:	Arch
Invert:	Open Footing
Rise / Diam. (mm):	2100
Span (mm)	7000
Approx. Length (m):	20
Inlet Type:	Projecting
Flow Depth (mm):	0.1
Flow (L/s):	15

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Downstream	
Dist (m):	6	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 5:1	R: 5:1
Avg. Width (m):	1.2	
Avg. Depth (m):	0.1	
Channel Roughness:	Cobble	
Overbank Roughness:	Medium-dense brush	

Location:	Upstream Face	
Dist (m):	5	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 5:1	R: 3:1
Avg. Width (m):	0.6	
Avg. Depth (m):	0.05	
Channel Roughness:	Cobble	
Overbank Roughness:	High grass	

Additional Comments

Large corrugations (40 cm)
Armorstone head wall

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Upstream Face
Direction:	Facing East

Photo 4

Location:	Upstream Face
Direction:	Facing West

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	647380
Date:	2012-06-15
Time:	9:04 AM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Marconi Avenue
Latitude:	45.359775
Longitude:	-75.928733

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	CMP
Shape:	Arch
Invert:	Open Footing
Rise / Diam. (mm):	2550
Span (mm)	8000
Approx. Length (m):	20
Inlet Type:	Wing Wall
Flow Depth (mm):	150
Flow (L/s):	50

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Photo 1

Location:	Upstream Face
Direction:	Facing South

Photo 2

Location:	Upstream Face
Direction:	Facing North

Low Flow Channel Details

Location:	Upstream	
Dist (m):	6	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 7:1	R: 5:1
Avg. Width (m):	3.2	
Avg. Depth (m):	0.15	
Channel Roughness:	Cobble	
Overbank Roughness:	Short grass	

Location:	Downstream Face	
Dist (m):	7	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 7:1	R: 2:1
Avg. Width (m):	4.1	
Avg. Depth (m):	0.4	
Channel Roughness:	Cobble	
Overbank Roughness:	High grass	

Additional Comments

Skewed 45 degrees.
Armorstone wing wall.
Large corrugations (40 cm)

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Downstream Face
Direction:	Facing South

Photo 4

Location:	Downstream Face
Direction:	Facing North

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	647650
Date:	2012-06-15
Time:	8:25 AM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Klondike Road
Latitude:	45.355713
Longitude:	-75.931517

Photo 1

Location:	Downstream Face
Direction:	Facing South

Photo 2

Location:	Downstream Face
Direction:	Facing North

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	Concrete
Shape:	Circular
Invert:	Open Footing
Rise / Diam. (mm):	1400
Span (mm)	3000
Approx. Length (m):	10
Inlet Type:	Head Wall
Flow Depth (mm):	0.05
Flow (L/s):	20

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Downstream
Dist (m):	5
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 5:1, R: 2:1
Avg. Width (m):	1.8
Avg. Depth (m):	0.05
Channel Roughness:	Gravel/Cobble
Overbank Roughness:	High grass

Location:	Upstream Face
Dist (m):	4
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 3:1, R: 4:1
Avg. Width (m):	3.4
Avg. Depth (m):	0.3
Channel Roughness:	Gravel/Cobble
Overbank Roughness:	High grass

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location: Upstream Face
Direction: Facing North

Photo 4

Location: Upstream Face
Direction: Facing South

Photo 5

Photo Here

Location:
Direction:

Photo 6

Photo Here

Location:
Direction:

Photo 7

Photo Here

Location:
Direction:

Photo 8

Photo Here

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	648620
Date:	2013-07-12
Time:	
Field Staff:	
Weather:	
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Road
Name:	March Valley Road
Latitude:	45.365100
Longitude:	-75.921649

Photo 1

Location:	
Direction:	

Photo 2

Location:	
Direction:	

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	Concrete
Shape:	Box
Invert:	Closed Footing
Rise / Diam. (mm):	1500, embedded 150 mm
Span (mm)	3000
Approx. Length (m):	15
Inlet Type:	Headwall
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	
Dist (m):	
Low Flow Shape:	
Side Slope (H:V):	
Avg. Width (m):	
Avg. Depth (m):	
Channel Roughness:	
Overbank Roughness:	

Location:	
Dist (m):	
Low Flow Shape:	
Side Slope (H:V):	
Avg. Width (m):	
Avg. Depth (m):	
Channel Roughness:	
Overbank Roughness:	

Additional Comments

Culvert replaced in July 2013.
Structure information obtained from McIntosh Perry
Contract No.: ISD13-7005, DWG No. 001 IFC
City of Ottawa (2013)

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location: Downstream Face
Direction: Facing North

Photo 4

Location: Downstream Face
Direction: Facing South

Photo 5

Location: Downstream Face
Direction: Facing East

Photo 6

Photo Here

Location:
Direction:

Photo 7

Photo Here

Location:
Direction:

Photo 8

Photo Here

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	648680
Date:	2012-06-14
Time:	11:00 AM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Goulbourn Forced Road
Latitude:	45.331983
Longitude:	-75.932785

Photo 1

Location:	Downstream Face
Direction:	Facing North

Photo 2

Location:	Downstream Face
Direction:	Facing South

Crossing Details

Cell:	Centre
Type:	Culvert
Material:	CMP
Shape:	Circular
Invert:	Closed Footing
Rise / Diam. (mm):	1200
Span (mm)	1200
Approx. Length (m):	10
Inlet Type:	Projecting
Flow Depth (mm):	0.1
Flow (L/s):	4

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Downstream
Dist (m):	1.5
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 7:1, R: 7:1
Avg. Width (m):	1.2
Avg. Depth (m):	0.5
Channel Roughness:	Gravel/Cobble
Overbank Roughness:	Medium-dense brush

Location:	Upstream Face
Dist (m):	1.5
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 3:1, R: 3:1
Avg. Width (m):	0.7
Avg. Depth (m):	0.1
Channel Roughness:	Cobble
Overbank Roughness:	Medium-dense brush

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Upstream Face
Direction:	Facing North

Photo 4

Location:	Upstream Face
Direction:	Facing South

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	SB1
Date:	2012-06-14
Time:	5:30 PM
Field Staff:	SBN / LJ
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Marshes Golf Club
Latitude:	45.350204
Longitude:	-75.915767

Photo 1

Location Inaccessible

Location:	
Direction:	

Photo 2

Location:	
Direction:	

Crossing Details

Cell:			
Type:			
Material:			
Shape:			
Invert:			
Rise / Diam. (mm):			
Span (mm)			
Approx. Length (m):			
Inlet Type:			
Flow Depth (mm):			
Flow (L/s):			

Low Flow Channel Details

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

Structure located on Marshes Golf Club property, could not access.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:
Direction:

Photo 4

Location:
Direction:

Photo 5

Location:
Direction:

Photo 6

Location:
Direction:

Photo 7

Location:
Direction:

Photo 8

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	SB2
Date:	2012-06-14
Time:	5:30 PM
Field Staff:	SBN / LJ
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Marshes Golf Club
Latitude:	45.349436
Longitude:	-75.914881

Photo 1

Location Inaccessible

Location:	
Direction:	

Photo 2

Location:	
Direction:	

Crossing Details

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

Structure located on Marshes Golf Club property, could not access.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:
Direction:

Photo 4

Location:
Direction:

Photo 5

Location:
Direction:

Photo 6

Location:
Direction:

Photo 7

Location:
Direction:

Photo 8

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

General

Location ID No.:	SB3
Date:	2012-06-14
Time:	5:30 PM
Field Staff:	SBN / LJ
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Marshes Golf Club
Latitude:	45.350001
Longitude:	-75.914345

Photo 1

Location Inaccessible

Location:	
Direction:	

Photo 2

Location:	
Direction:	

Crossing Details

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

Structure located on Marshes Golf Club property, could not access.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:
Direction:

Photo 4

Location:
Direction:

Photo 5

Location:
Direction:

Photo 6

Location:
Direction:

Photo 7

Location:
Direction:

Photo 8

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	SB4
Date:	2012-06-14
Time:	5:18 PM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Terry Fox Drive
Latitude:	45.350195
Longitude:	-75.915776

Photo 1

Location:	Downstream Face
Direction:	Facing East

Photo 2

Location:	Downstream Face
Direction:	Facing West

Crossing Details

Cell:	Centre
Type:	Pedestrian bridge
Material:	Steel Frame
Shape:	N/A
Invert:	Open Footing
Rise / Diam. (mm):	2300
Span (mm)	10200
Approx. Length (m):	2.5
Inlet Type:	N/A
Flow Depth (mm):	250
Flow (L/s):	40

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Upstream
Dist (m):	3
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 2:1, R: 2:1
Avg. Width (m):	2
Avg. Depth (m):	0.25
Channel Roughness:	Sand
Overbank Roughness:	High grass

Location:	Downstream Face
Dist (m):	3
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 3:1, R: 3:1
Avg. Width (m):	1.5
Avg. Depth (m):	0.25
Channel Roughness:	Sand
Overbank Roughness:	High grass

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location: Upstream Face
Direction: Facing West

Photo 4

Location: Downstream Face
Direction: Facing West

Photo 5

Photo Here

Location:
Direction:

Photo 6

Photo Here

Location:
Direction:

Photo 7

Photo Here

Location:
Direction:

Photo 8

Photo Here

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	SB5
Date:	2012-06-14
Time:	5:22 PM
Field Staff:	LJ / SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Terry Fox Drive
Latitude:	45.351343
Longitude:	-75.919273

Crossing Details

Cell:	Centre
Type:	Pedestrian Bridge
Material:	Steel Frame
Shape:	N/A
Invert:	Open Footing
Rise / Diam. (mm):	2500
Span (mm)	2600
Approx. Length (m):	13.6
Inlet Type:	N/A
Flow Depth (mm):	700
Flow (L/s):	0

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Photo 1

Location:	Upstream Face
Direction:	Facing South

Photo 2

Location:	Downstream Face
Direction:	Facing North

Low Flow Channel Details

Location:	Upstream	
Dist (m):	0	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 3:1	R: 3:1
Avg. Width (m):	9.7	
Avg. Depth (m):	0.7	
Channel Roughness:	Gravel/Cobble	
Overbank Roughness:	Light brush	

Location:	Downstream Face	
Dist (m):	0	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 3:1	R: 3:1
Avg. Width (m):	9.7	
Avg. Depth (m):	0.7	
Channel Roughness:	Gravel/Cobble	
Overbank Roughness:	Light brush	

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Upstream Face
Direction:	Facing Southeast

Photo 4

Photo Here

Location:	
Direction:	

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

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Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	SB6	
Date:	2012-06-15	
Time:	8:47 AM	
Field Staff:	LJ	SBN
Weather:	Sunny	
Watershed:	Shirley's Brook	
Watercourse:	Main Branch	
Crossing Location:	Road	
Name:	Klondike Road	
Latitude:	45.335713	
Longitude:	-75.931517	

Photo 1

Location Inaccessible

Location:	
Direction:	

Photo 2

Photo Here

Location:	
Direction:	

Crossing Details

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

Private property, could not access.

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

Photo 3

Location:

Direction:

Photo 4

Location:

Direction:

Photo 5

Location:

Direction:

Photo 6

Location:

Direction:

Photo 7

Location:

Direction:

Photo 8

Location:

Direction:

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Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	SB7	
Date:	2012-06-15	
Time:	10:09 AM	
Field Staff:	LJ	SBN
Weather:	Sunny	
Watershed:	Shirley's Brook	
Watercourse:	Main Branch	
Crossing Location:	Road	
Name:	Perimeter Road	
Latitude:	45.366581	
Longitude:	-75.921340	

Photo 1

Location Inaccessible

Location:	
Direction:	

Photo 2

Location:	
Direction:	

Crossing Details

Cell:			
Type:			
Material:			
Shape:			
Invert:			
Rise / Diam. (mm):			
Span (mm)			
Approx. Length (m):			
Inlet Type:			
Flow Depth (mm):			
Flow (L/s):			

Low Flow Channel Details

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

Could not access - DnD lands

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:
Direction:

Photo 4

Location:
Direction:

Photo 5

Location:
Direction:

Photo 6

Location:
Direction:

Photo 7

Location:
Direction:

Photo 8

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	SB8
Date:	2012-06-15
Time:	12:14 PM
Field Staff:	LJ, SBN
Weather:	Sunny
Watershed:	Shirley's Brook
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Perimeter Road
Latitude:	45.377020
Longitude:	-75.935227

Photo 1

Location Inaccessible

Location:	
Direction:	

Photo 2

Location:	
Direction:	

Crossing Details

Cell:			
Type:			
Material:			
Shape:			
Invert:			
Rise / Diam. (mm):			
Span (mm)			
Approx. Length (m):			
Inlet Type:			
Flow Depth (mm):			
Flow (L/s):			

Low Flow Channel Details

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		
Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

Could not access - DND lands.

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

Photo 3

Location:	
Direction:	

Photo 4

Location:	
Direction:	

Photo 5

Location:	
Direction:	

Photo 6

Location:	
Direction:	

Photo 7

Location:	
Direction:	

Photo 8

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	117010
Date:	2012-06-13
Time:	10:40 AM
Field Staff:	SBN, LJ
Weather:	Cloudy
Watershed:	Watt's Creek
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Carling Road
Latitude:	45.347632
Longitude:	-75.874408

Photo 1

Location:	Downstream Face
Direction:	Facing South

Photo 2

Location:	Downstream Face
Direction:	Facing North

Crossing Details

Cell:	Centre
Type:	Bridge
Material:	Concrete
Shape:	Box / Rectangular
Invert:	Open Footing
Rise / Diam. (mm):	3700
Span (mm)	9200
Approx. Length (m):	11
Inlet Type:	N/A
Flow Depth (mm):	0.25
Flow (L/s):	200

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Downstream	
Dist (m):	5	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 2:1	R: 2:1
Avg. Width (m):	4.7	
Avg. Depth (m):	0.25	
Channel Roughness:	Cobble	
Overbank Roughness:	Medium-dense brush	

Location:	Upstream Face	
Dist (m):	5	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 2:1	R: 2:1
Avg. Width (m):	5.7	
Avg. Depth (m):	0.4	
Channel Roughness:	Debris jam	
Overbank Roughness:	Medium-dense brush	

Additional Comments

Effective flow length is 2.5 m (debris jam).

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Downstream Face
Direction:	Facing Northeast

Photo 4

Location:	Upstream Face
Direction:	Facing South

Photo 5

Location:	Upstream Face
Direction:	Facing North

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	117110
Date:	2012-06-13
Time:	10:40 AM
Field Staff:	SBN, LJ
Weather:	Cloudy
Watershed:	Watt's Creek
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Carling Road
Latitude:	45.347632
Longitude:	-75.874408

Photo 1

Location:	Downstream Face
Direction:	Facing South

Photo 2

Location:	Downstream Face
Direction:	Facing North

Crossing Details

Cell:	Centre
Type:	Bridge
Material:	Concrete
Shape:	Box / Rectangular
Invert:	Open Footing
Rise / Diam. (mm):	3700
Span (mm)	9200
Approx. Length (m):	11
Inlet Type:	N/A
Flow Depth (mm):	0.25
Flow (L/s):	200

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Downstream
Dist (m):	5
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 2:1, R: 2:1
Avg. Width (m):	4.7
Avg. Depth (m):	0.25
Channel Roughness:	Cobble
Overbank Roughness:	Medium-dense brush

Location:	Upstream Face
Dist (m):	5
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 2:1, R: 2:1
Avg. Width (m):	5.7
Avg. Depth (m):	0.4
Channel Roughness:	Debris jam
Overbank Roughness:	Medium-dense brush

Additional Comments

Effective flow length is 2.5 m (debris jam).

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location: Downstream Face
Direction: Facing Northeast

Photo 4

Location: Upstream Face
Direction: Facing South

Photo 5

Location: Upstream Face
Direction: Facing North

Photo 6

Photo Here

Location:
Direction:

Photo 7

Photo Here

Location:
Direction:

Photo 8

Photo Here

Location:
Direction:

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Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

General

Location ID No.:	117120		
Date:	2012-06-13		
Time:	10:31 AM		
Field Staff:	SBN	LJ	
Weather:	Cloudy		
Watershed:	Watt's Creek		
Watercourse:	Main Branch		
Crossing Location:	Road		
Name:	Shirley Road		
Latitude:	45.362425		
Longitude:	-75.890775		

Photo 1

Location Inaccessible

Location:	
Direction:	

Photo 2

Location:	
Direction:	

Crossing Details

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

Inside the DND lands, could not access.

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

Photo 3

Location:

Direction:

Photo 4

Location:

Direction:

Photo 5

Location:

Direction:

Photo 6

Location:

Direction:

Photo 7

Location:

Direction:

Photo 8

Location:

Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	117160
Date:	2012-06-13
Time:	9:42 AM
Field Staff:	SBN, LJ
Weather:	Cloudy
Watershed:	Watt's Creek
Watercourse:	Main Branch
Crossing Location:	Road
Name:	Malibar Road
Latitude:	45.361635
Longitude:	-75.890246

Crossing Details

Cell:	North
Type:	Culvert
Material:	CMP
Shape:	Arch
Invert:	Open Footing
Rise / Diam. (mm):	2700
Span (mm)	4100
Approx. Length (m):	14.2
Inlet Type:	Mitered
Flow Depth (mm):	250
Flow (L/s):	600

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Photo 1

Location:	Downstream Face
Direction:	Facing West

Photo 2

Location:	Downstream Face
Direction:	Facing South

Low Flow Channel Details

Location:	Downstream	
Dist (m):	6	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 1:1	R: 5:1
Avg. Width (m):	7.4	
Avg. Depth (m):	0.5	
Channel Roughness:	Clean, straight, veg.	
Overbank Roughness:	Short grass	

Location:	Upstream Face	
Dist (m):	4	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 5:1	R: 2:1
Avg. Width (m):	4	
Avg. Depth (m):	0.25	
Channel Roughness:	Clean, winding, veg.	
Overbank Roughness:	Medium-dense brush	

Additional Comments

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location: Downstream Face
Direction: Facing North

Photo 4

Location: Upstream Face
Direction: Facing North

Photo 5

Location: Upstream Face
Direction: Facing West

Photo 6

Location: Upstream Face
Direction: Facing South

Photo 7

Photo Here

Location:
Direction:

Photo 8

Photo Here

Location:
Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Field	Value		
Location ID No.:	117270		
Date:	2012-06-13		
Time:	10:35 AM		
Field Staff:	SBN	LJ	
Weather:	Cloudy		
Watershed:	Watt's Creek		
Watercourse:	Main Branch		
Crossing Location:	Road		
Name:	Sandhill Road		
Latitude:	45.351393		
Longitude:	-75.880624		

Photo 1

Location Inaccessible

Location:	
Direction:	

Photo 2

Photo Here

Location:	
Direction:	

Crossing Details

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

Inside DND lands, could not access.

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

Photo 3

Location:

Direction:

Photo 4

Location:

Direction:

Photo 5

Location:

Direction:

Photo 6

Location:

Direction:

Photo 7

Location:

Direction:

Photo 8

Location:

Direction:

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	1001
Date:	2012-06-13
Time:	1:26 PM
Field Staff:	SBN, LJ
Weather:	Sunny
Watershed:	Watt's Creek
Watercourse:	Main Branch
Crossing Location:	Railway
Name:	Unknown
Latitude:	45.341051
Longitude:	-75.874172

Photo 1

Location:	Downstream Face
Direction:	Facing East

Photo 2

Location:	Downstream Face
Direction:	Facing North

Crossing Details

Cell:	West	
Type:	Culvert	
Material:	Concrete	
Shape:	Circular	
Invert:	Closed Footing	
Rise / Diam. (mm):	2500	
Span (mm)	N/A	
Approx. Length (m):	30	
Inlet Type:	Projecting	
Flow Depth (mm):	150	
Flow (L/s):	60	

Cell:	East	
Type:	Culvert	
Material:	Concrete	
Shape:	Circular	
Invert:	Closed Footing	
Rise / Diam. (mm):	2500	
Span (mm)	N/A	
Approx. Length (m):	30	
Inlet Type:	Projecting	
Flow Depth (mm):	150	
Flow (L/s):	60	

Cell:		
Type:		
Material:		
Shape:		
Invert:		
Rise / Diam. (mm):		
Span (mm)		
Approx. Length (m):		
Inlet Type:		
Flow Depth (mm):		
Flow (L/s):		

Low Flow Channel Details

Location:	Downstream	
Dist (m):	17.5	
Low Flow Shape:	Trapezoidal	
Side Slope (H:V):	L: 3:1	R: 3:1
Avg. Width (m):	4.3	
Avg. Depth (m):	0.15	
Channel Roughness:	Cobble	
Overbank Roughness:	Medium-dense brush	

Location:		
Dist (m):		
Low Flow Shape:		
Side Slope (H:V):	L:	R:
Avg. Width (m):		
Avg. Depth (m):		
Channel Roughness:		
Overbank Roughness:		

Additional Comments

U/S side could not be accessed.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location:	Downstream Face
Direction:	Facing South

Photo 4

Photo Here

Location:	
Direction:	

Photo 5

Photo Here

Location:	
Direction:	

Photo 6

Photo Here

Location:	
Direction:	

Photo 7

Photo Here

Location:	
Direction:	

Photo 8

Photo Here

Location:	
Direction:	

Shirley's Brook and Watt's Creek Phase 2 SWM Study

Hydraulic Structure Inventory Sheet

General

Location ID No.:	W4
Date:	2012-06-13
Time:	1:02 PM
Field Staff:	SBN, LJ
Weather:	Sunny
Watershed:	Watt's Creek
Watercourse:	Main Branch
Crossing Location:	Pedestrian
Name:	Rifle Road
Latitude:	45.341666
Longitude:	-75.873754

Photo 1

Location:	Upstream Face
Direction:	Facing South

Photo 2

Location:	Upstream Face
Direction:	Facing North

Crossing Details

Cell:	Centre
Type:	Pedestrian bridge
Material:	Steel Frame
Shape:	N/A
Invert:	Open Footing
Rise / Diam. (mm):	2400
Span (mm)	13700
Approx. Length (m):	2.5
Inlet Type:	N/A
Flow Depth (mm):	200
Flow (L/s):	590

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Cell:	
Type:	
Material:	
Shape:	
Invert:	
Rise / Diam. (mm):	
Span (mm)	
Approx. Length (m):	
Inlet Type:	
Flow Depth (mm):	
Flow (L/s):	

Low Flow Channel Details

Location:	Upstream
Dist (m):	7
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 4:1, R: 1:1
Avg. Width (m):	4.7
Avg. Depth (m):	0.20
Channel Roughness:	Cobble
Overbank Roughness:	Medium-dense brush

Location:	Downstream Face
Dist (m):	3.6
Low Flow Shape:	Trapezoidal
Side Slope (H:V):	L: 2:1, R: 1:1
Avg. Width (m):	5.5
Avg. Depth (m):	0.15
Channel Roughness:	Cobble
Overbank Roughness:	Medium-dense brush

Additional Comments

Undercutting right bank abutment.

Shirley's Brook and Watt's Creek Phase 2 SWM Study
Hydraulic Structure Inventory Sheet

Photo 3

Location: Downstream Face
Direction: Facing North

Photo 4

Photo Here

Location:
Direction:

Photo 5

Photo Here

Location:
Direction:

Photo 6

Photo Here

Location:
Direction:

Photo 7

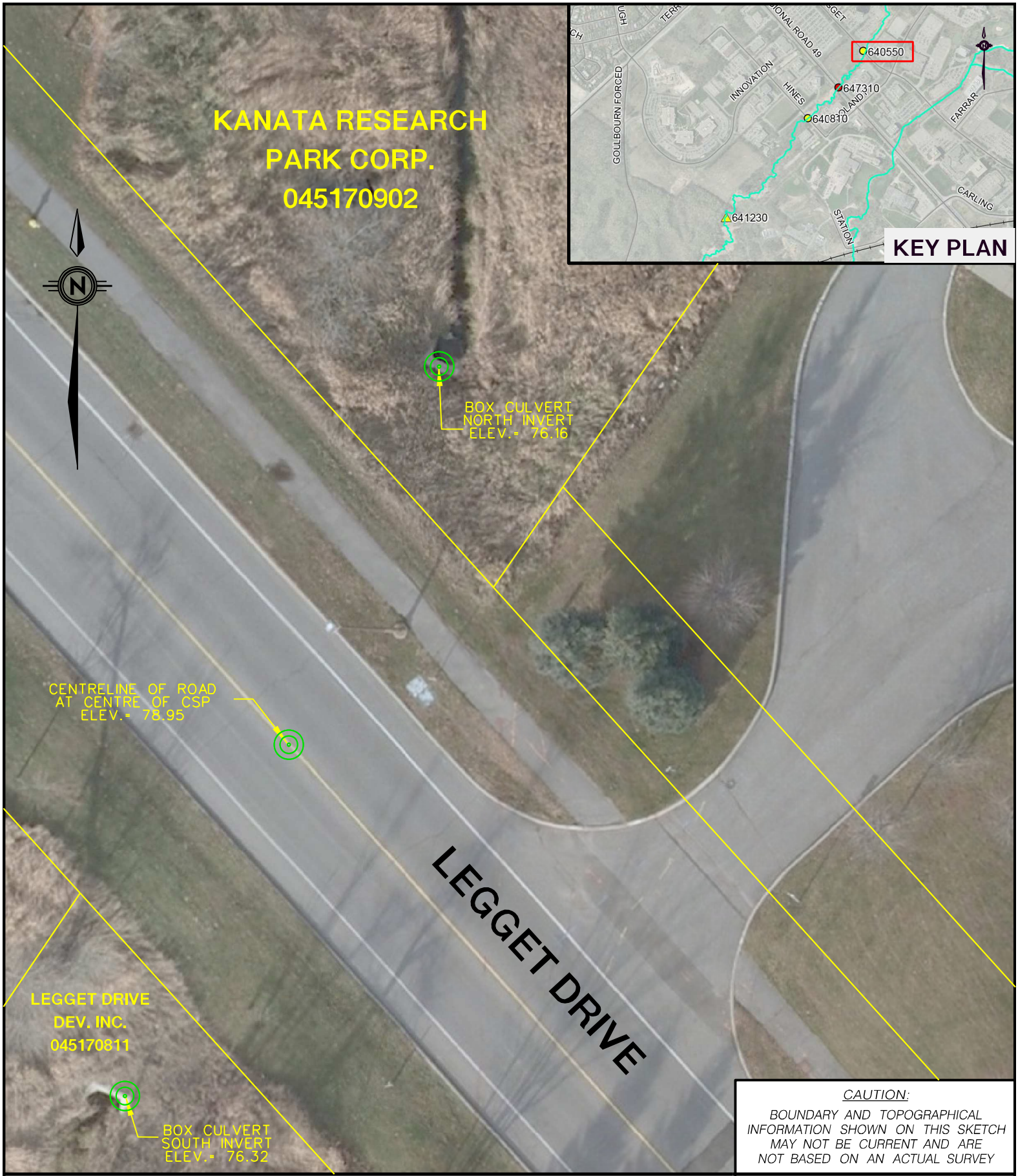
Photo Here

Location:
Direction:

Photo 8

Photo Here

Location:
Direction:



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Shirley's Brook - SN.640550

OWNER	CITY OF OTTAWA	CAD BY : M.P. GALLAGHER
		CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012	MS No. 16651_SN640550.DGN

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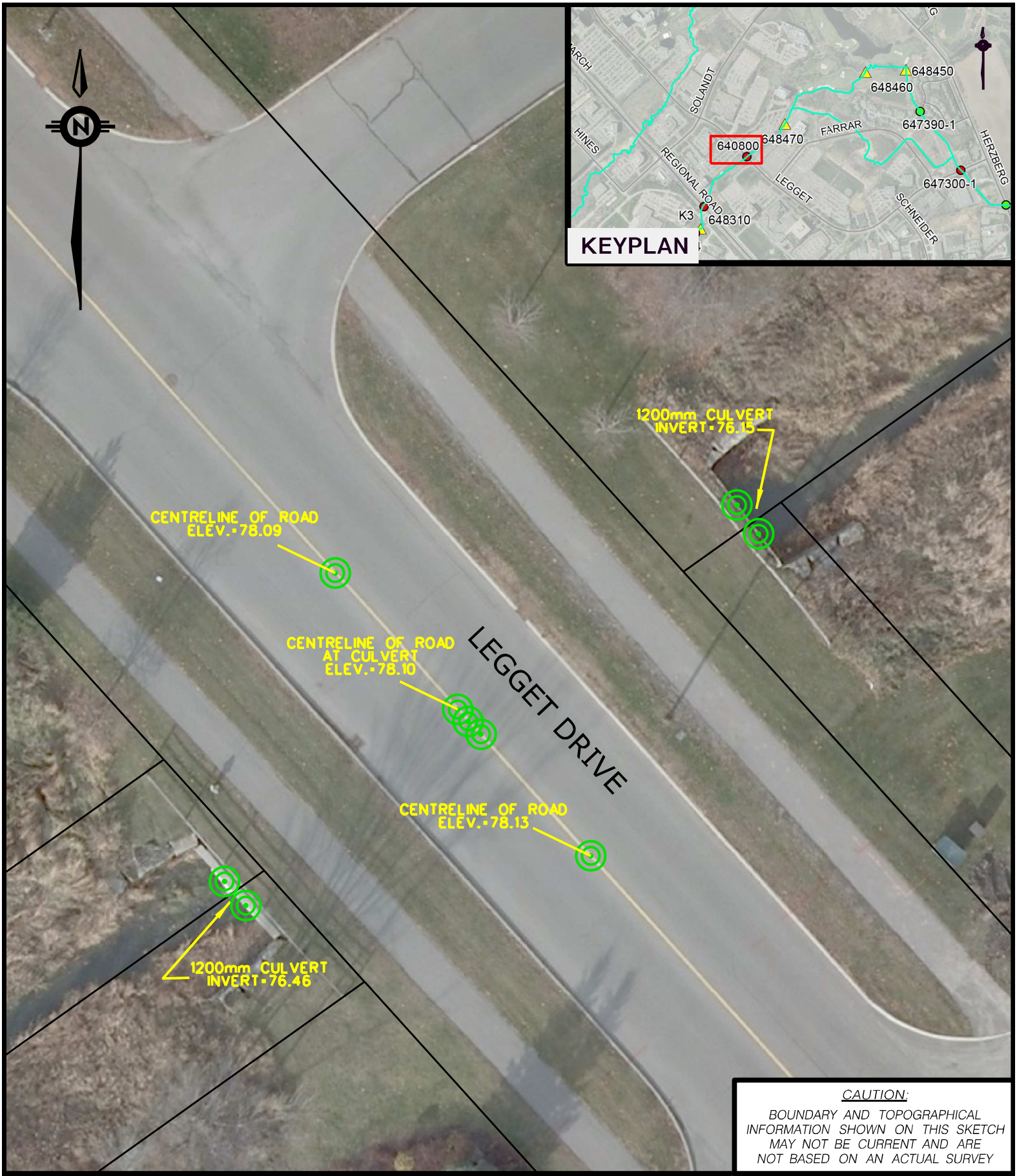

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WATT'S CREEK & KIZZEL DRAIN - SN.640800

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	MS No. 16651_SN640800.DGN

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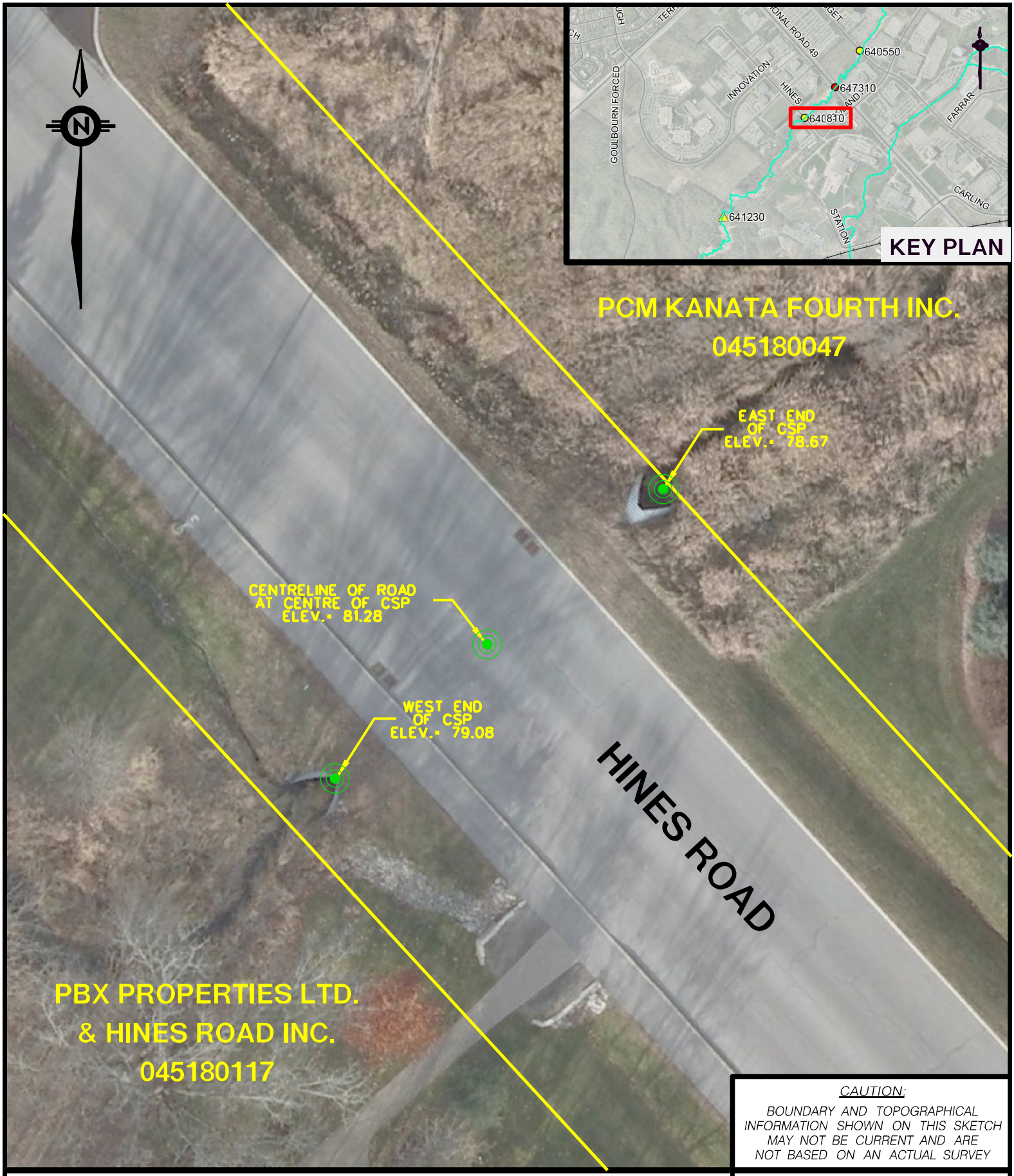

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Shirley's Brook - SN.640810

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	MS No. 16651_SN640810.DGN

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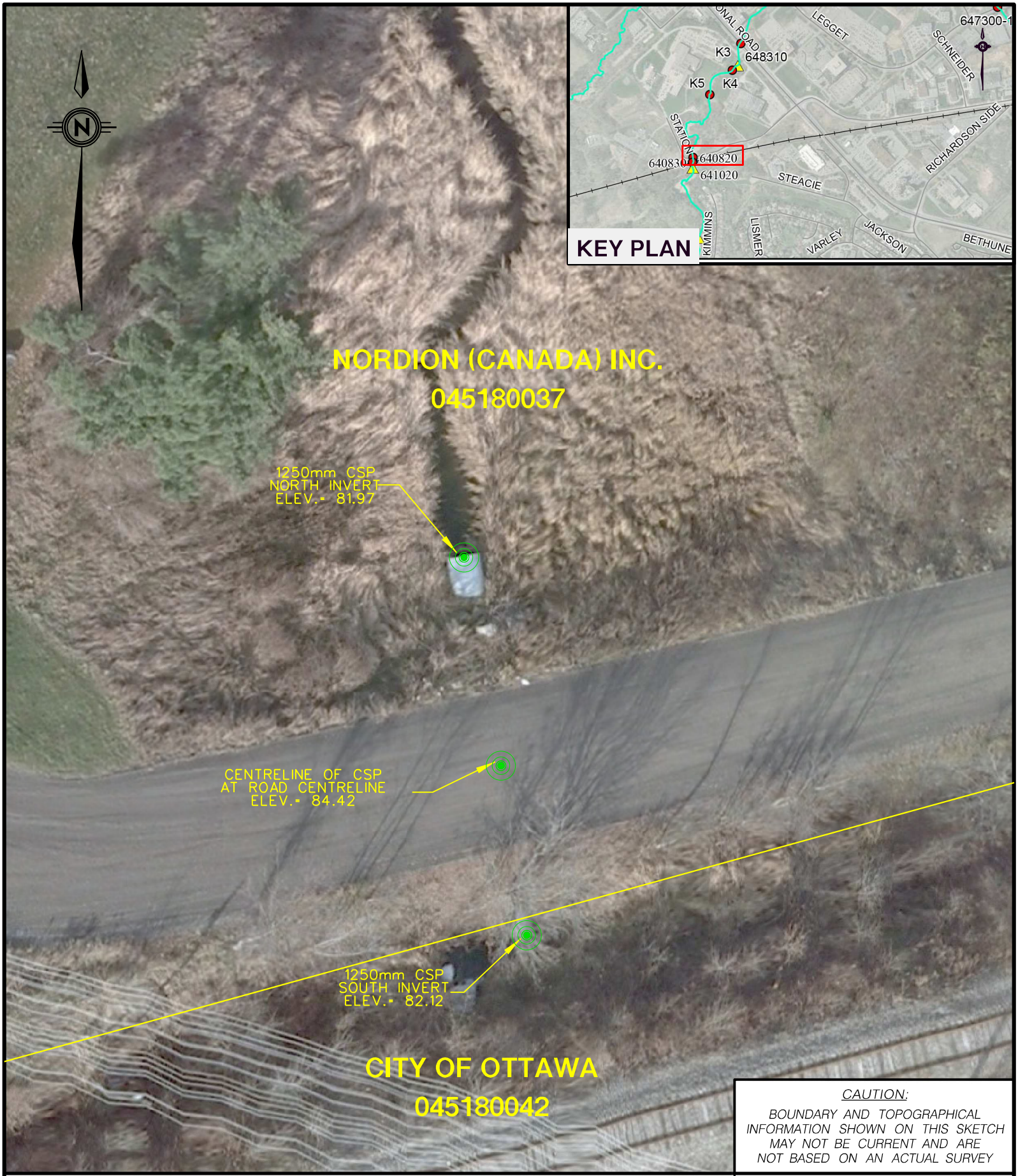

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Watt's Creek & Kizzel Drain - SN.640820

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SCALE 1:250 (METRIC) / DATE : OCT. 2012	MS No. 16651_SN640820.DGN

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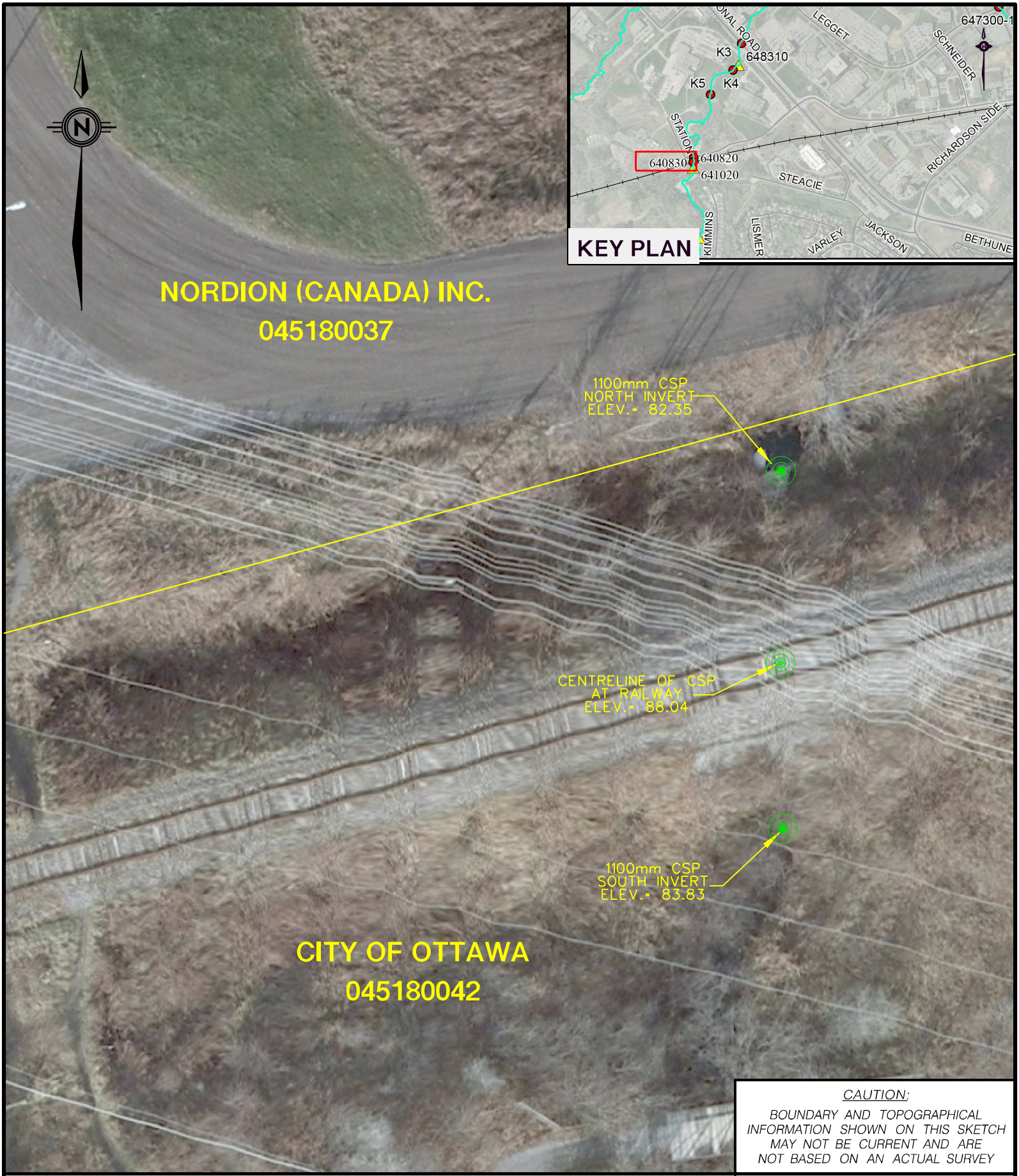

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Watt's Creek & Kizzel Drain - SN.640830

OWNER SEE PLAN		CAD BY : M.P. GALLAGHER
		CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012	MS No. 16651_SN640830.DGN

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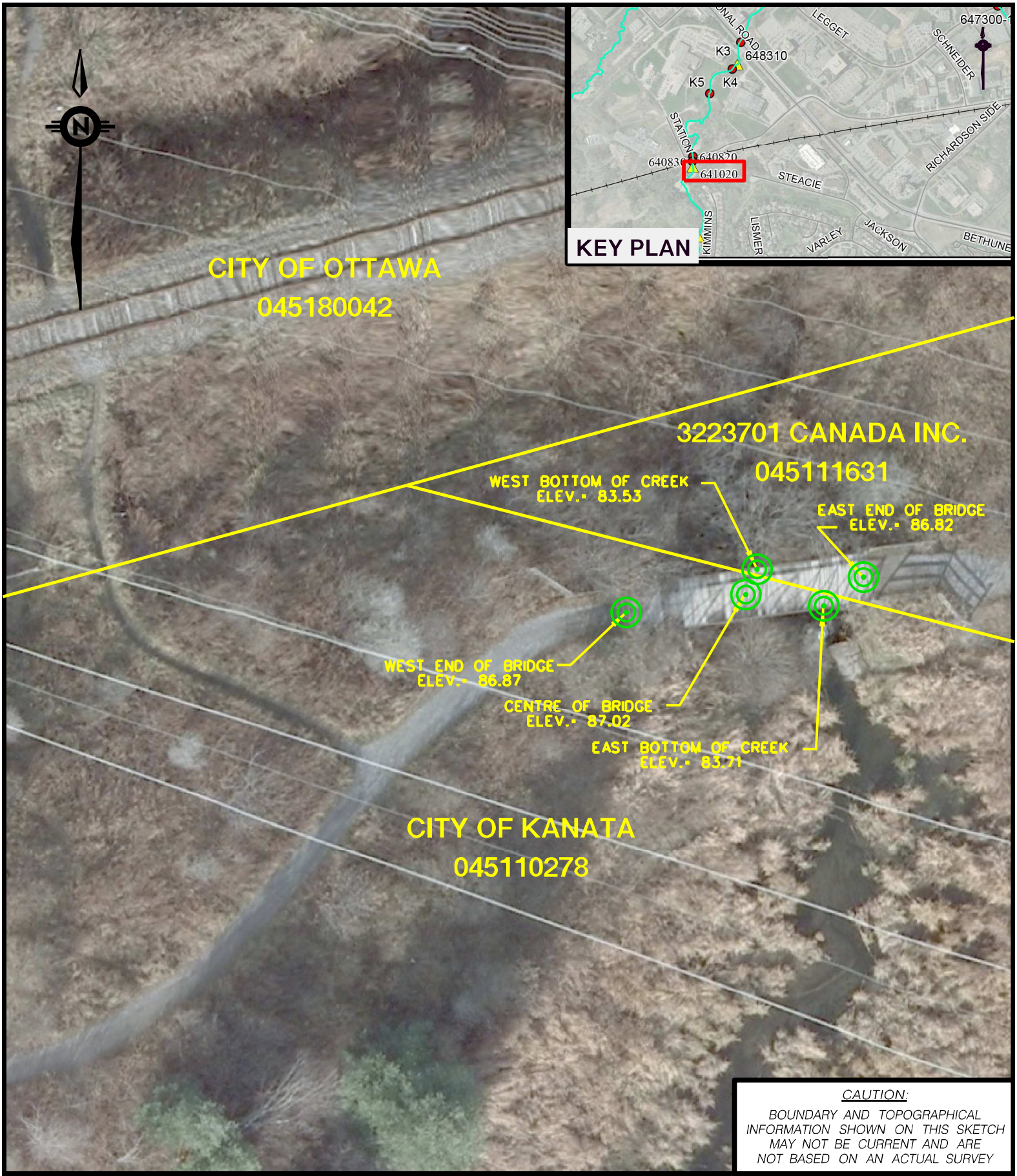

CAUTION:

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Watt's Creek & Kizzel Drain - SN.641020

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	CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012
	MS No. 16651_SN641020.DGN

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Watt's Creek & Kizzel Drain - SN.641030

OWNER CITY OF OTTAWA		CAD BY : M.P. GALLAGHER CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012	MS No. 16651_SN641030.DGN

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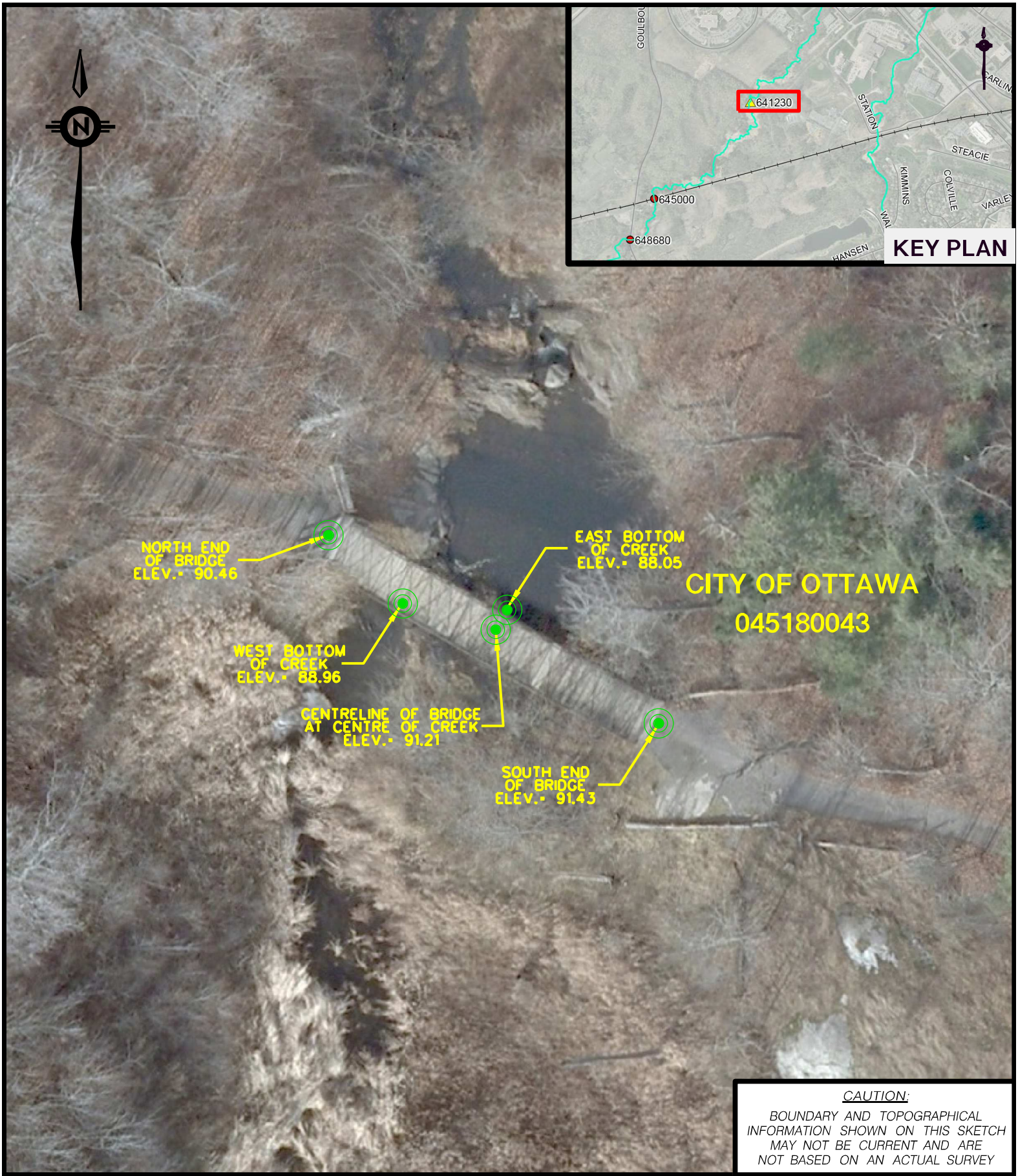

CAUTION:

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Shirley's Brook - SN.641230

OWNER KNL DEVELOPMENTS INC.	CAD BY : M.P. GALLAGHER CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012
MS No. 16651_SN641230.DGN	

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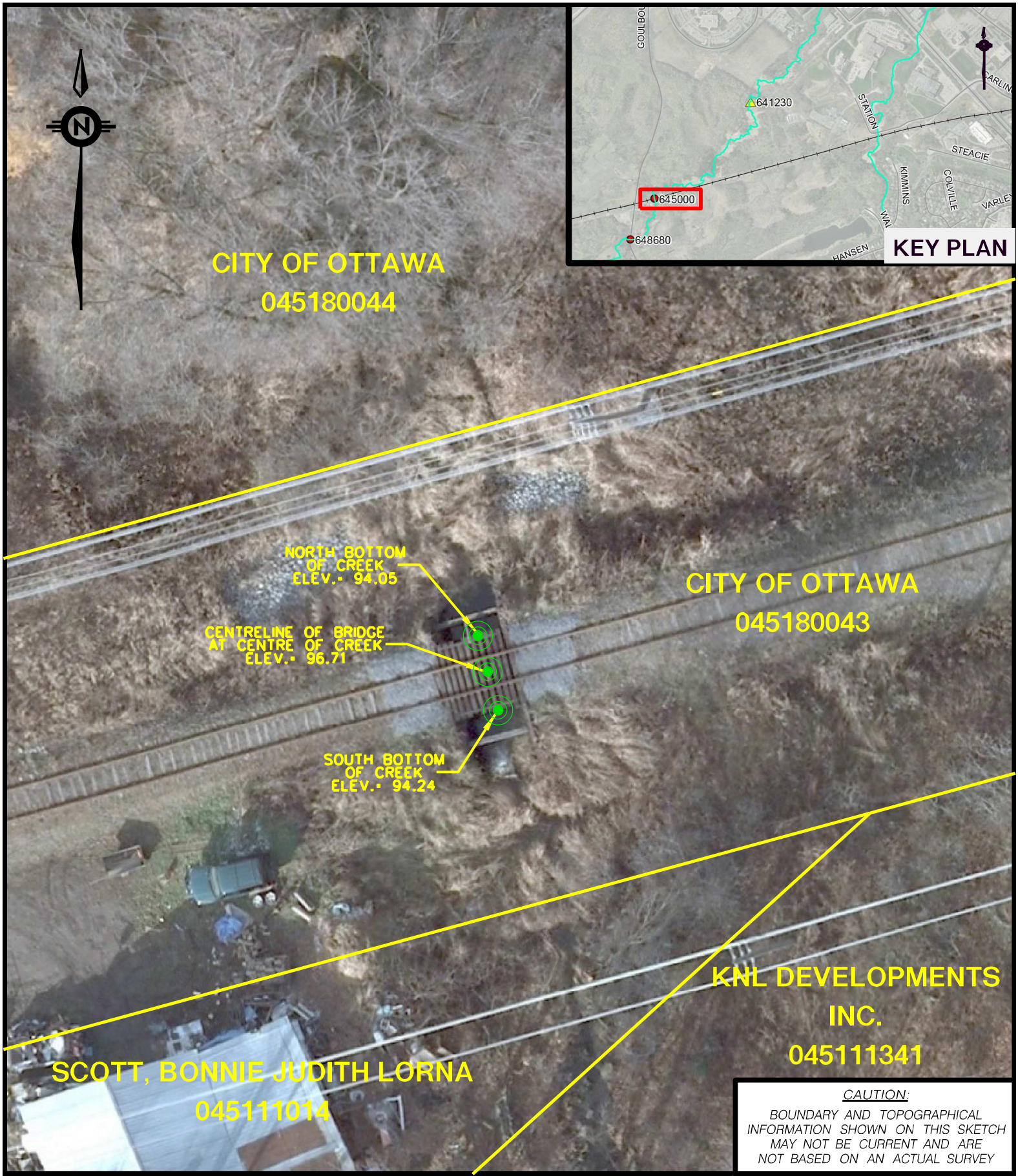

CAUTION:

BOUNDARY AND TOPOGRAPHICAL INFORMATION SHOWN ON THIS SKETCH MAY NOT BE CURRENT AND ARE NOT BASED ON AN ACTUAL SURVEY

Shirley's Brook - SN.645000

OWNER: SEE PLAN	CAD BY : M.P. GALLAGHER
	CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012
	MS No. 16651_SN645000.DGN

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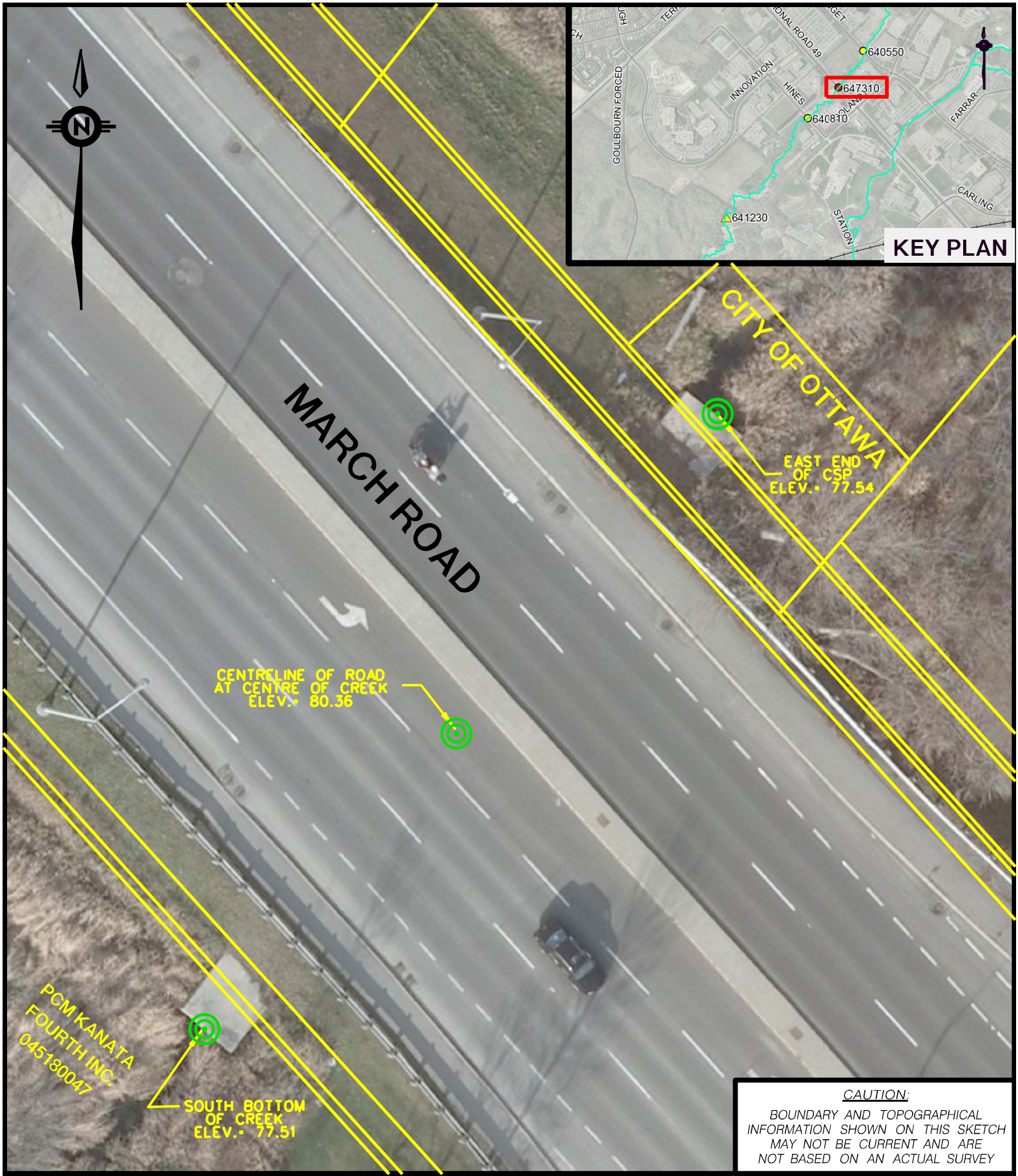

CAUTION:

BOUNDARY AND TOPOGRAPHICAL INFORMATION SHOWN ON THIS SKETCH MAY NOT BE CURRENT AND ARE NOT BASED ON AN ACTUAL SURVEY

Shirley's Brook - SN.647310

OWNER: CITY OF OTTAWA	CAD BY : M.P. GALLAGHER
	CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012
	MS No. 16651_SN647310.DGN

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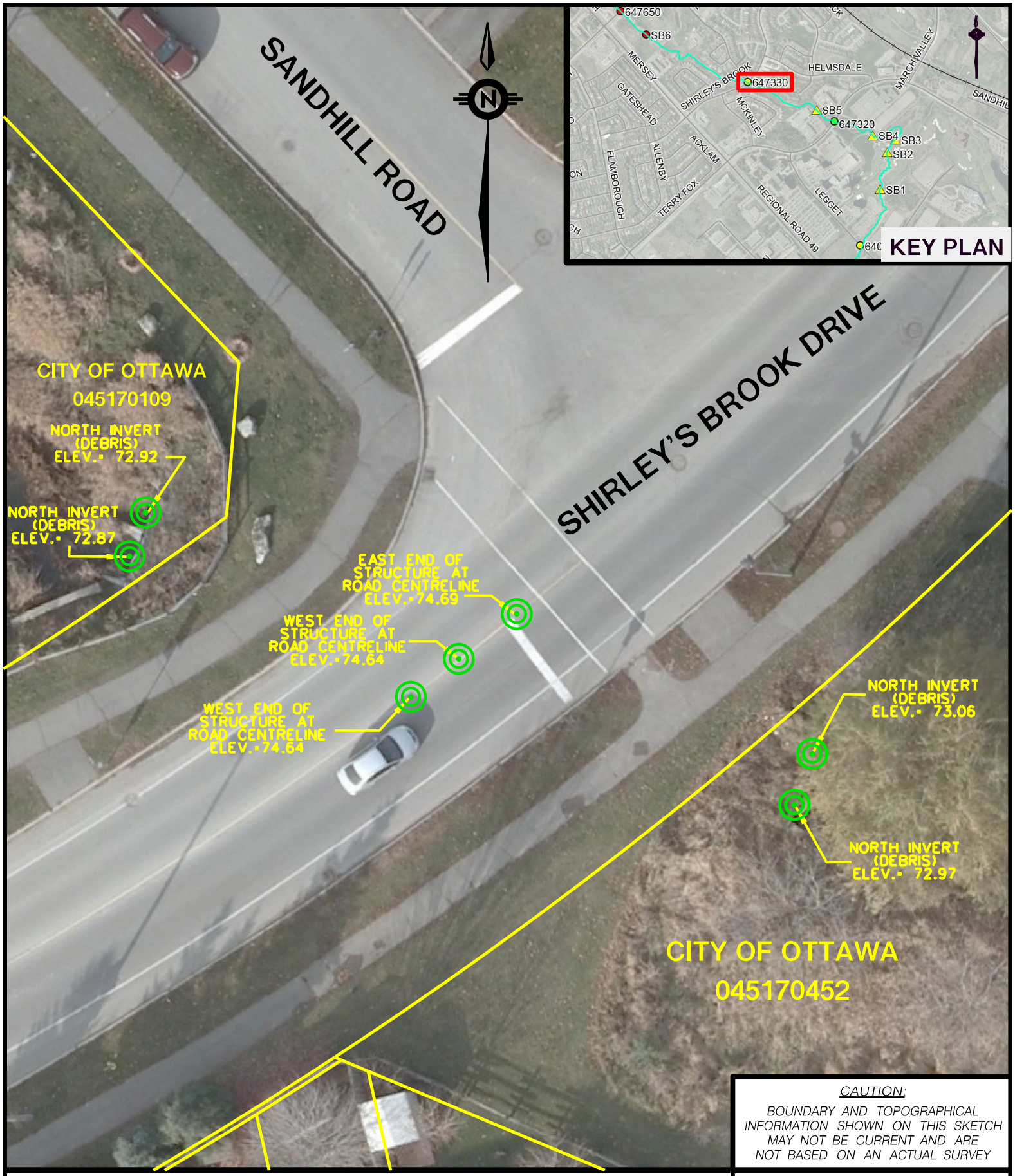

CAUTION:

BOUNDARY AND TOPOGRAPHICAL INFORMATION SHOWN ON THIS SKETCH MAY NOT BE CURRENT AND ARE NOT BASED ON AN ACTUAL SURVEY

Shirley's Brook - SN.647330

OWNER SEE PLAN		CAD BY : M.P. GALLAGHER
		CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012	MS No. 16651_SN647330.DGN

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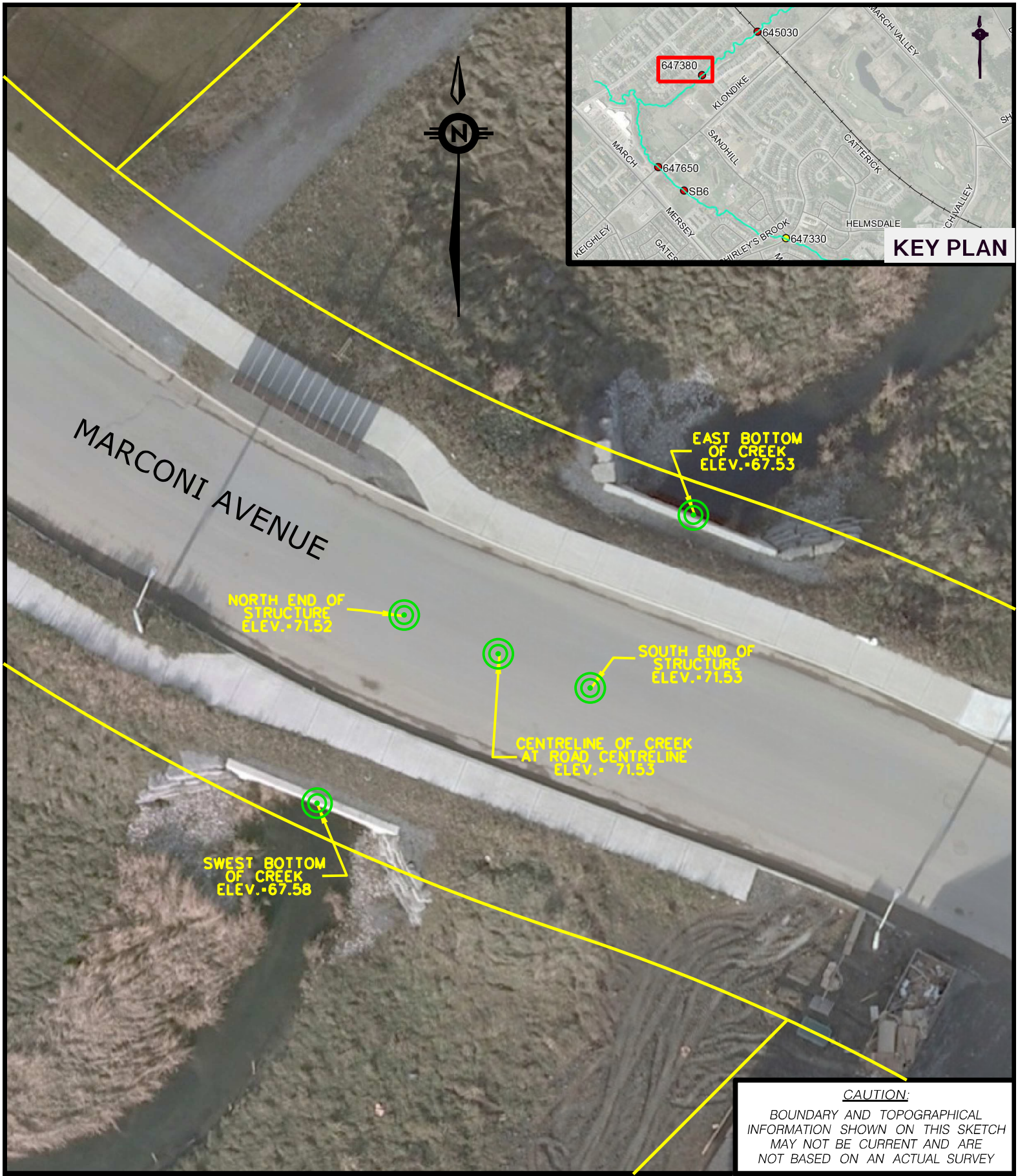

CAUTION:

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Shirley's Brook - SN.647380

OWNER CITY OF OTTAWA	CAD BY : M.P. GALLAGHER CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC) / DATE : OCT. 2012	MS No. 16651_SN647380.DGN

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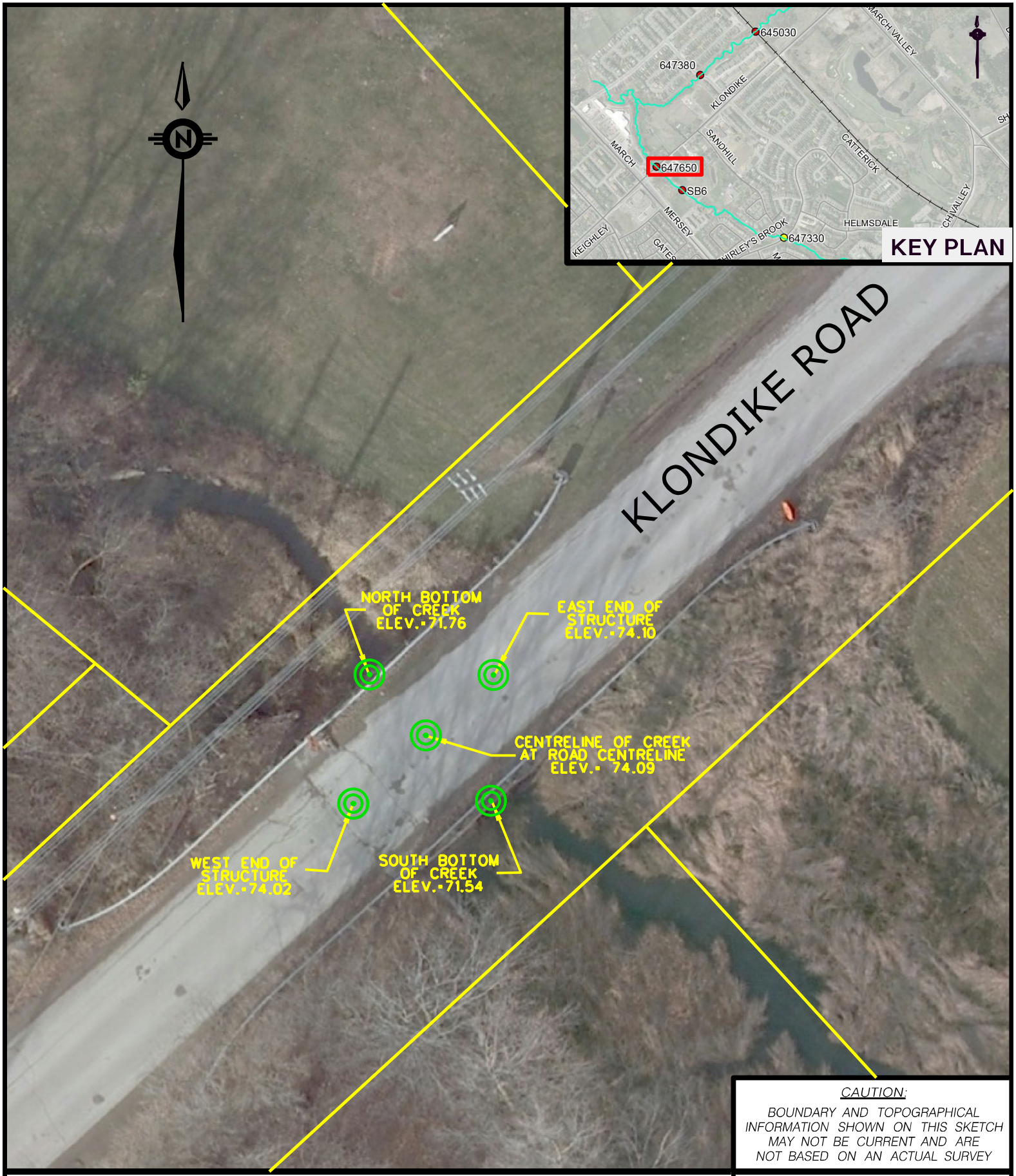

CAUTION:

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Shirley's Brook - SN.647650

OWNER CITY OF OTTAWA	CAD BY : M.P. GALLAGHER CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012
MS No. 16651_SN647650.DGN	

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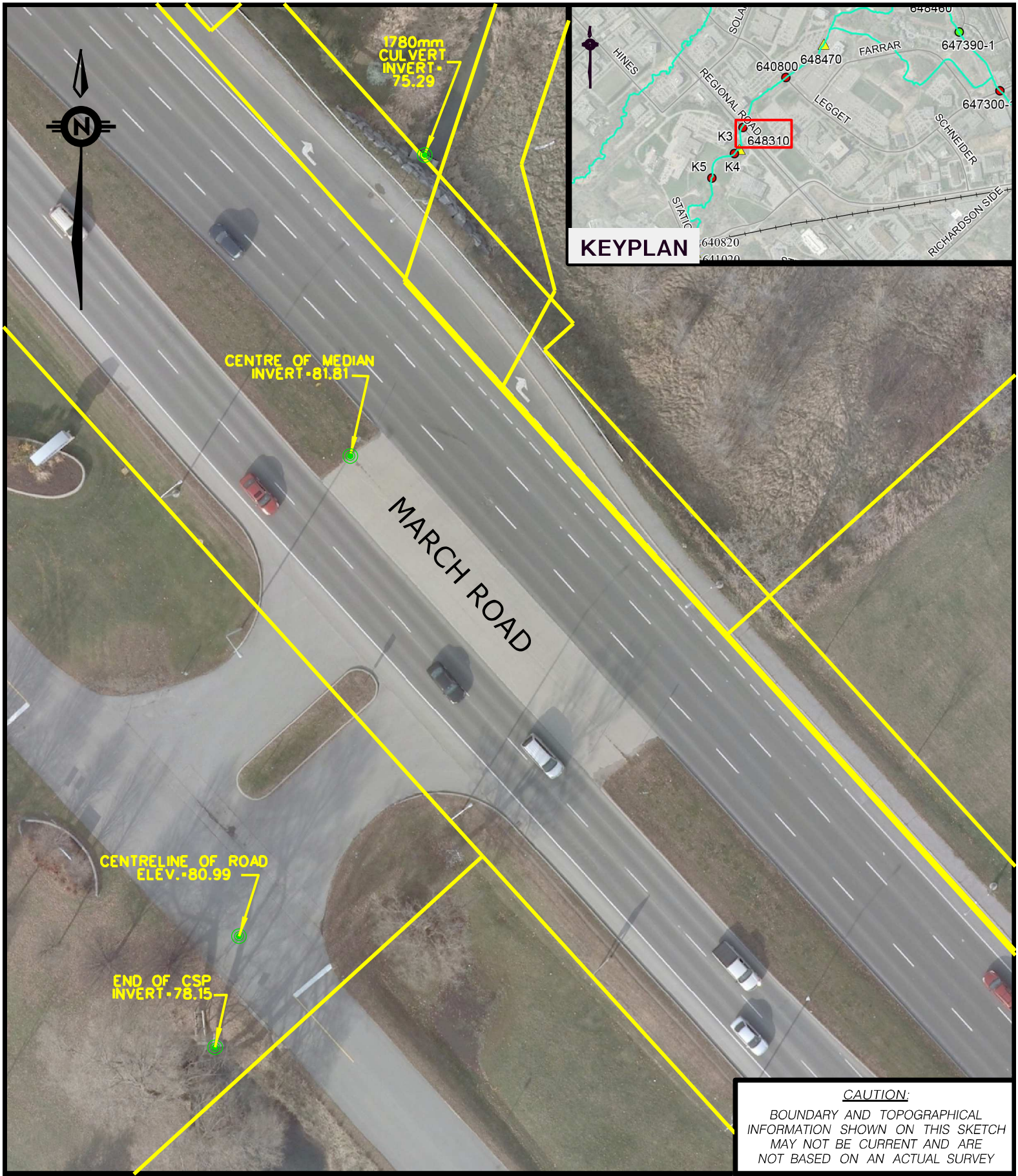

CAUTION:

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WATT'S CREEK & KIZZEL DRAIN - SN.648310

OWNER: CITY OF OTTAWA	CAD BY : M.P. GALLAGHER
	CHECKED BY : A. PETRANOVIC
SCALE 1:500 (METRIC)	DATE : OCT. 2012
	MS No. 16651_SN648310.DGN

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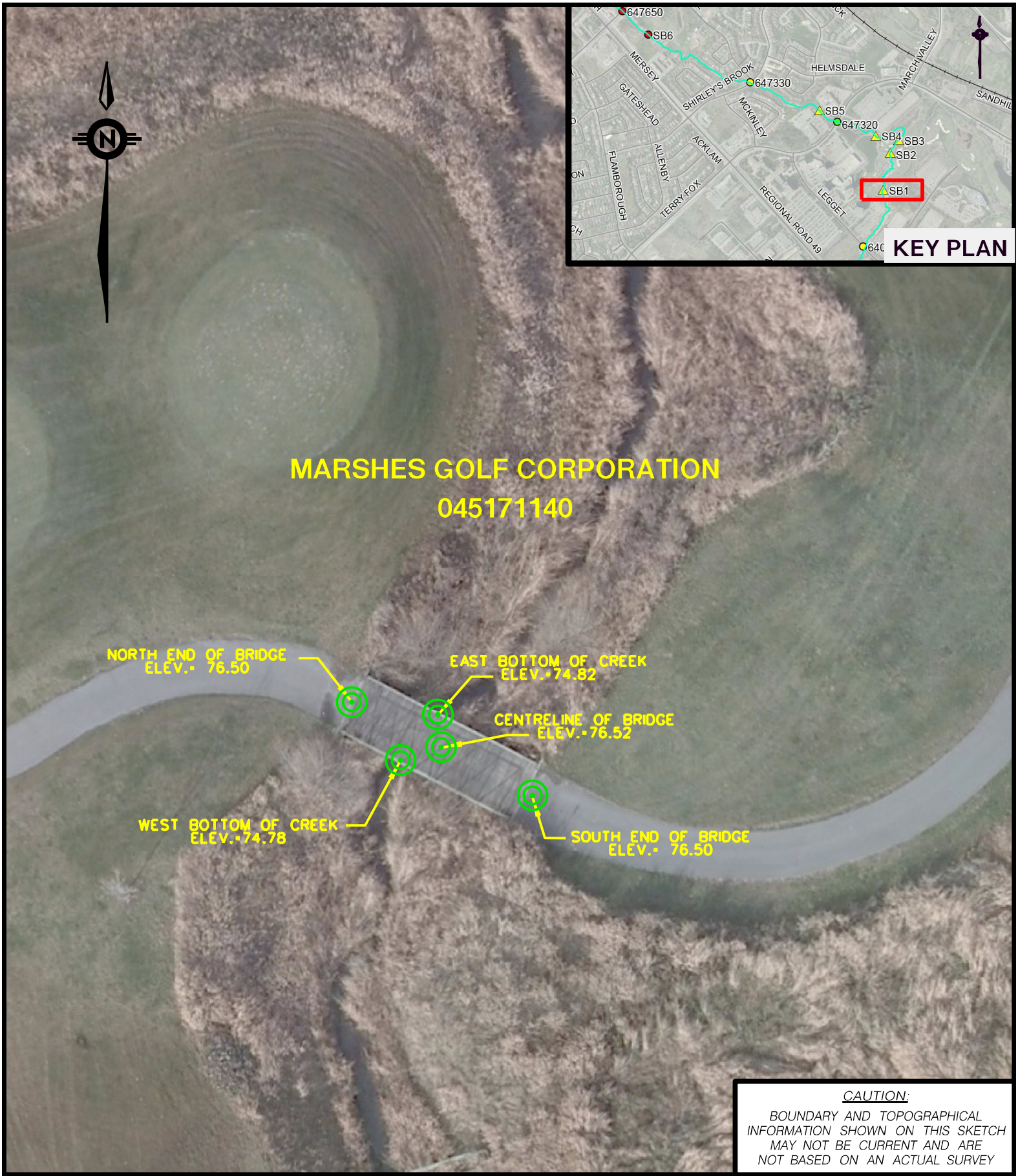

CAUTION:

BOUNDARY AND TOPOGRAPHICAL INFORMATION SHOWN ON THIS SKETCH MAY NOT BE CURRENT AND ARE NOT BASED ON AN ACTUAL SURVEY

Shirley's Brook - SN.SB1

OWNER SEE PLAN		CAD BY : M.P. GALLAGHER
		CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012	MS No. 16651_SNSB1.DGN

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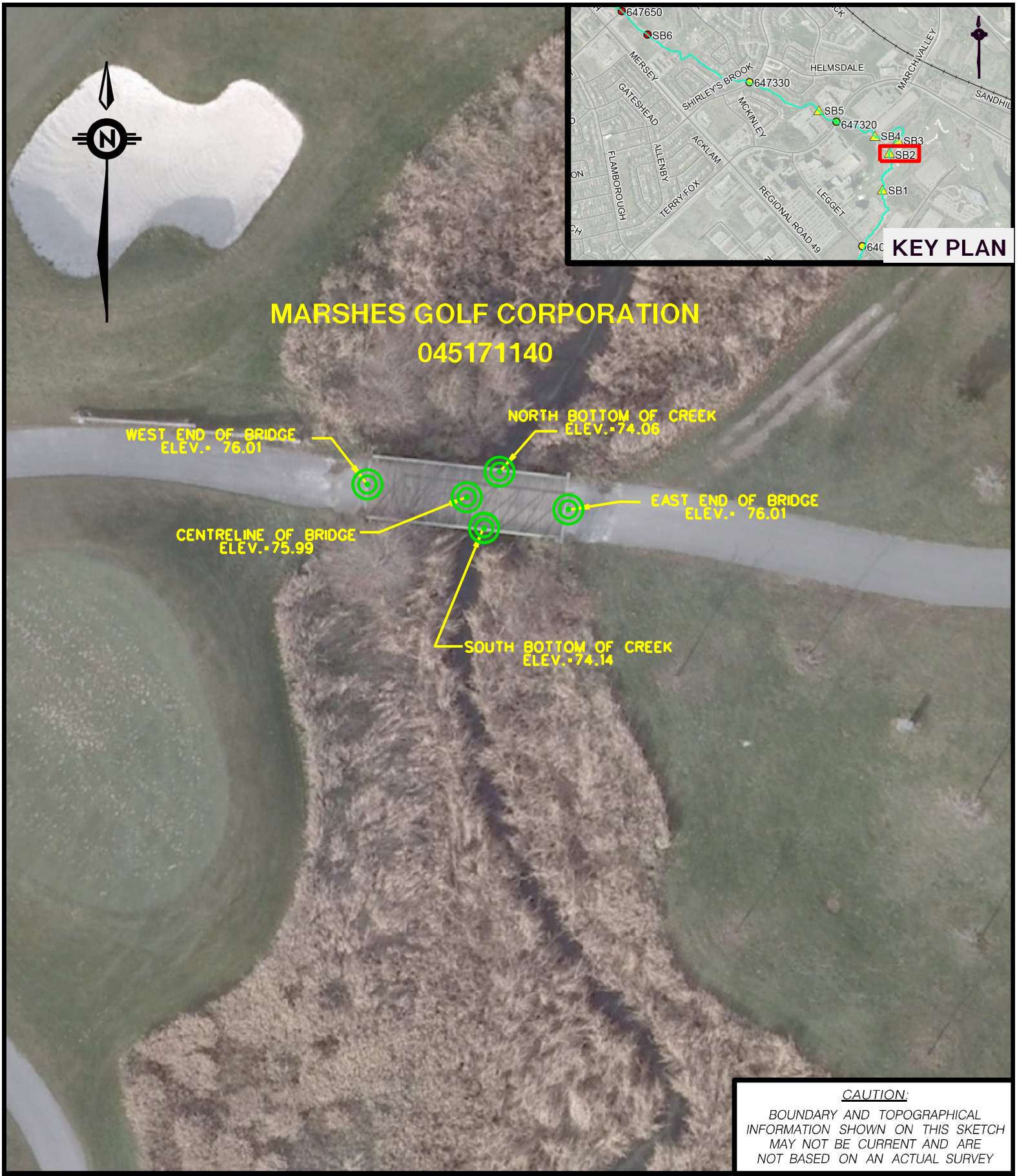

CAUTION:

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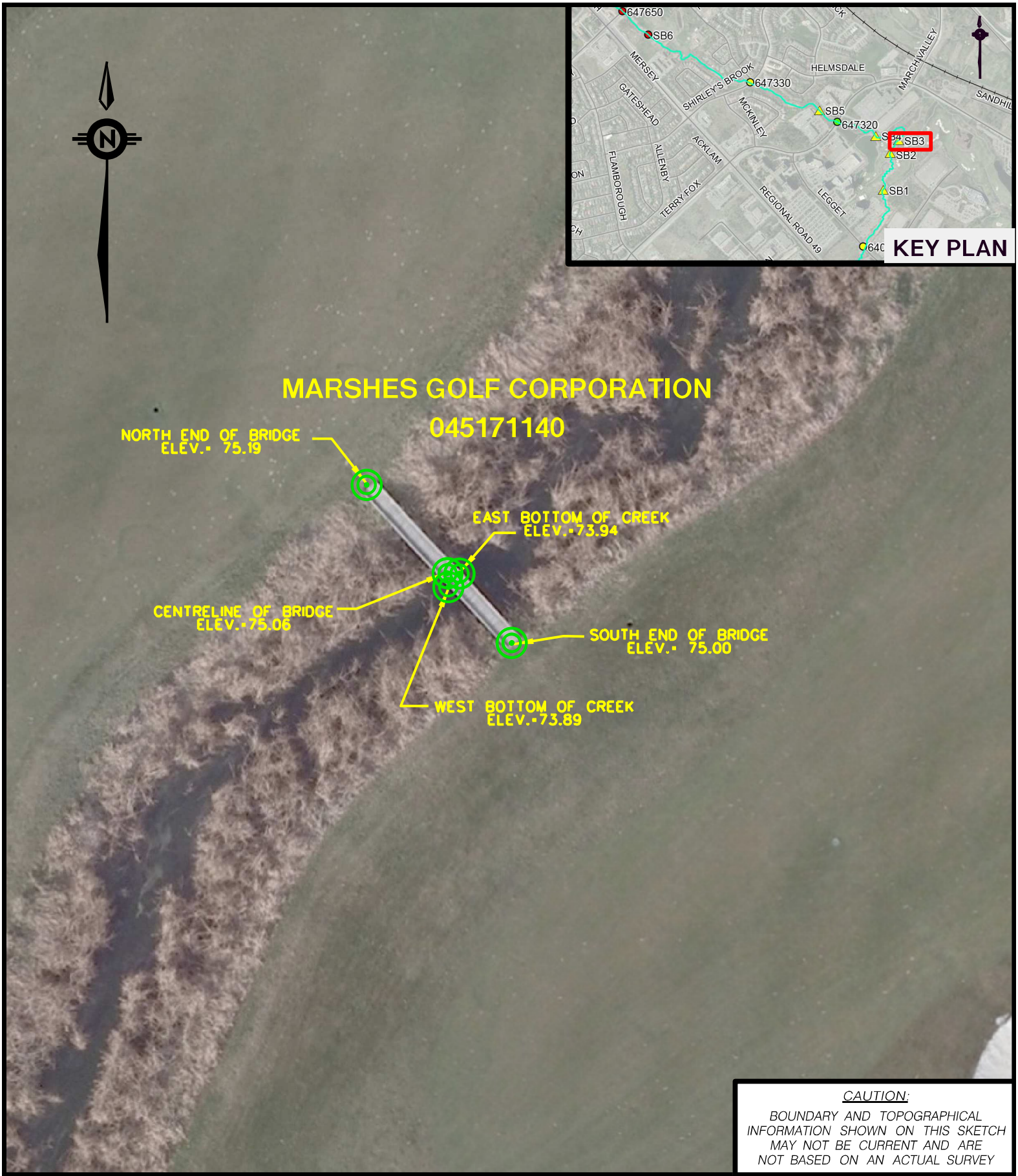
Shirley's Brook - SN.SB2

OWNER SEE PLAN	CAD BY : M.P. GALLAGHER
	CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012
	MS No. 16651_SNSB2.DGN

Ottawa
INFRASTRUCTURE SERVICES DEPARTMENT
SURVEYS & MAPPING UNIT



CAUTION:

BOUNDARY AND TOPOGRAPHICAL INFORMATION SHOWN ON THIS SKETCH MAY NOT BE CURRENT AND ARE NOT BASED ON AN ACTUAL SURVEY

Shirley's Brook - SN.SB3

OWNER SEE PLAN		CAD BY : M.P. GALLAGHER
		CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012	MS No. 16651_SNSB3.DGN

Ottawa
INFRASTRUCTURE SERVICES DEPARTMENT
SURVEYS & MAPPING UNIT

CAUTION:

BOUNDARY AND TOPOGRAPHICAL INFORMATION SHOWN ON THIS SKETCH MAY NOT BE CURRENT AND ARE NOT BASED ON AN ACTUAL SURVEY

Shirley's Brook - SN.SB4

OWNER: SEE PLAN	CAD BY : M.P. GALLAGHER
	CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012
	MS No. 16651_SNSB4.DGN

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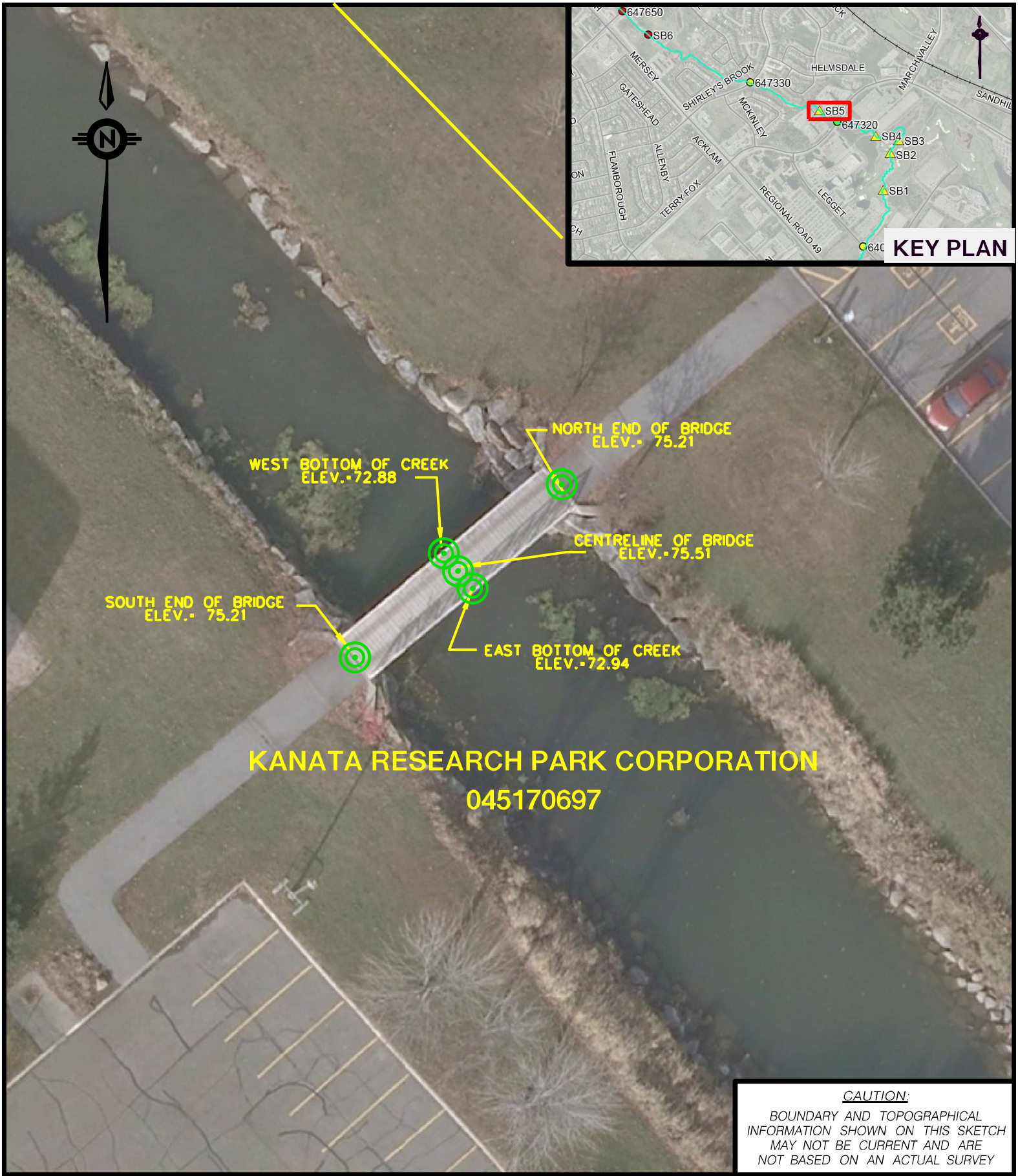
SURVEYS & MAPPING UNIT



CAUTION:

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Shirley's Brook - SN.SB5

OWNER	SEE PLAN	CAD BY : M.P. GALLAGHER
		CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012	MS No. 16651_SNSB5.DGN

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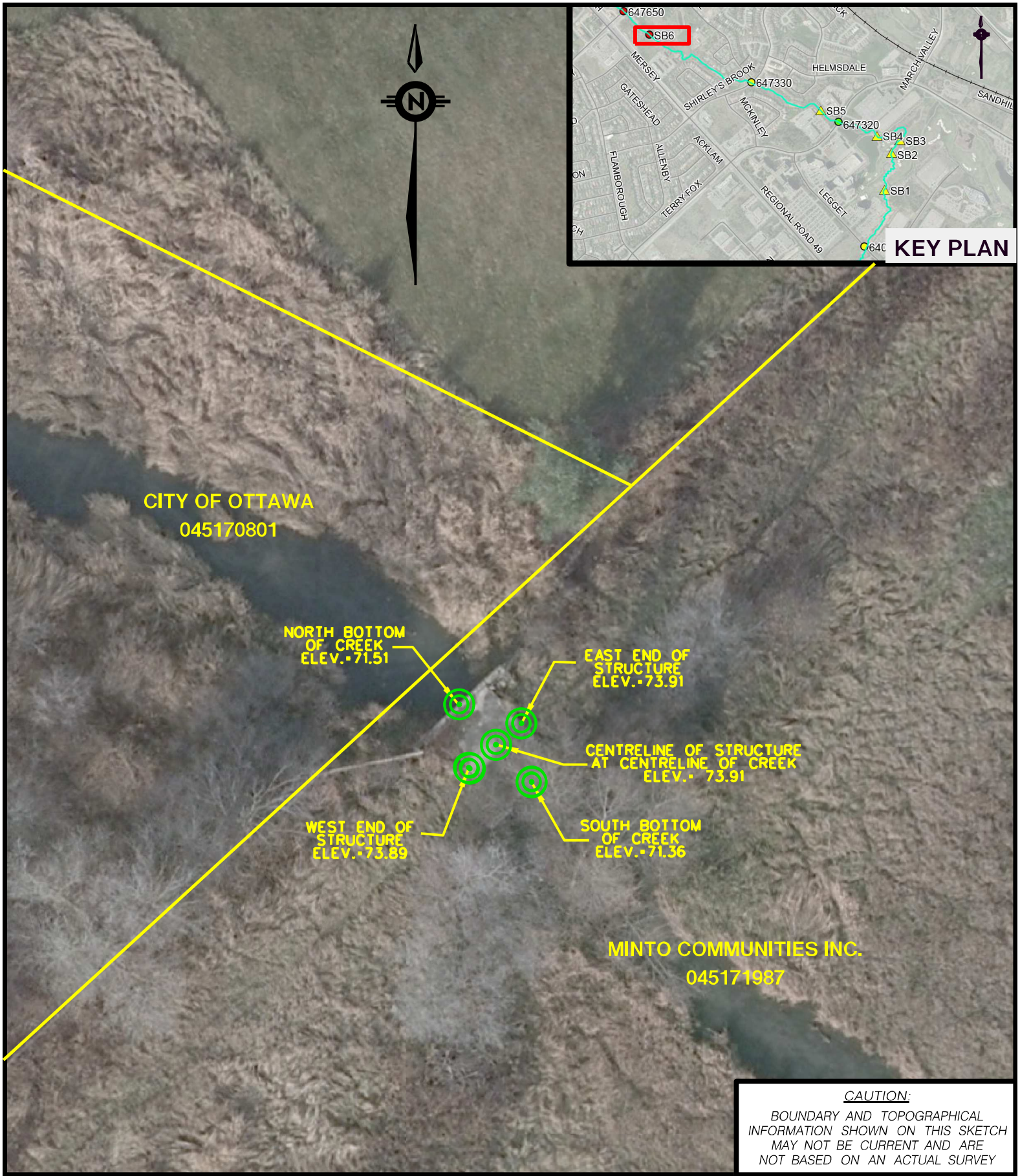

CAUTION:

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Shirley's Brook - SN.SB6

OWNER SEE PLAN	CAD BY : M.P. GALLAGHER
	CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012
	MS No. 16651_SNSB6.DGN

Ottawa
INFRASTRUCTURE SERVICES DEPARTMENT
SURVEYS & MAPPING UNIT

CAUTION:

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Shirley's Brook SN.SB8

OWNER **HIS MAJESTY THE KING IN RIGHT OF CANADA**

CAD BY : M.P. GALLAGHER

CHECKED BY : A. PETRANOVIC

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Watt's Creek & Kizzel Drain SN.117110

OWNER

CITY OF OTTAWA

CAD BY : M.P. GALLAGHER

CHECKED BY : A. PETRANOVIC

SCALE : 1:250 (METRIC)

DATE : OCT. 2012

MS No. 16651-SN117110.DGN

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Watt's Creek & Kizzel Drain SN.117120

OWNER HIS MAJESTY THE KING IN RIGHT OF CANADA

CAD BY : M.P. GALLAGHER

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Watt's Creek & Kizzel Drain SN.117160

OWNER **HIS MAJESTY THE KING IN RIGHT OF CANADA**

CAD BY : M.P. GALLAGHER

CHECKED BY : A. PETRANOVIC

SCALE : 1:250 (METRIC) | DATE : OCT. 2012 | MS No. 16651-SN117160.DGN

Ottawa

INFRASTRUCTURE SERVICES DEPARTMENT

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Watt's Creek & Kizzel Drain SN.117270

OWNER **HIS MAJESTY THE KING IN RIGHT OF CANADA**

CAD BY : M.P. GALLAGHER

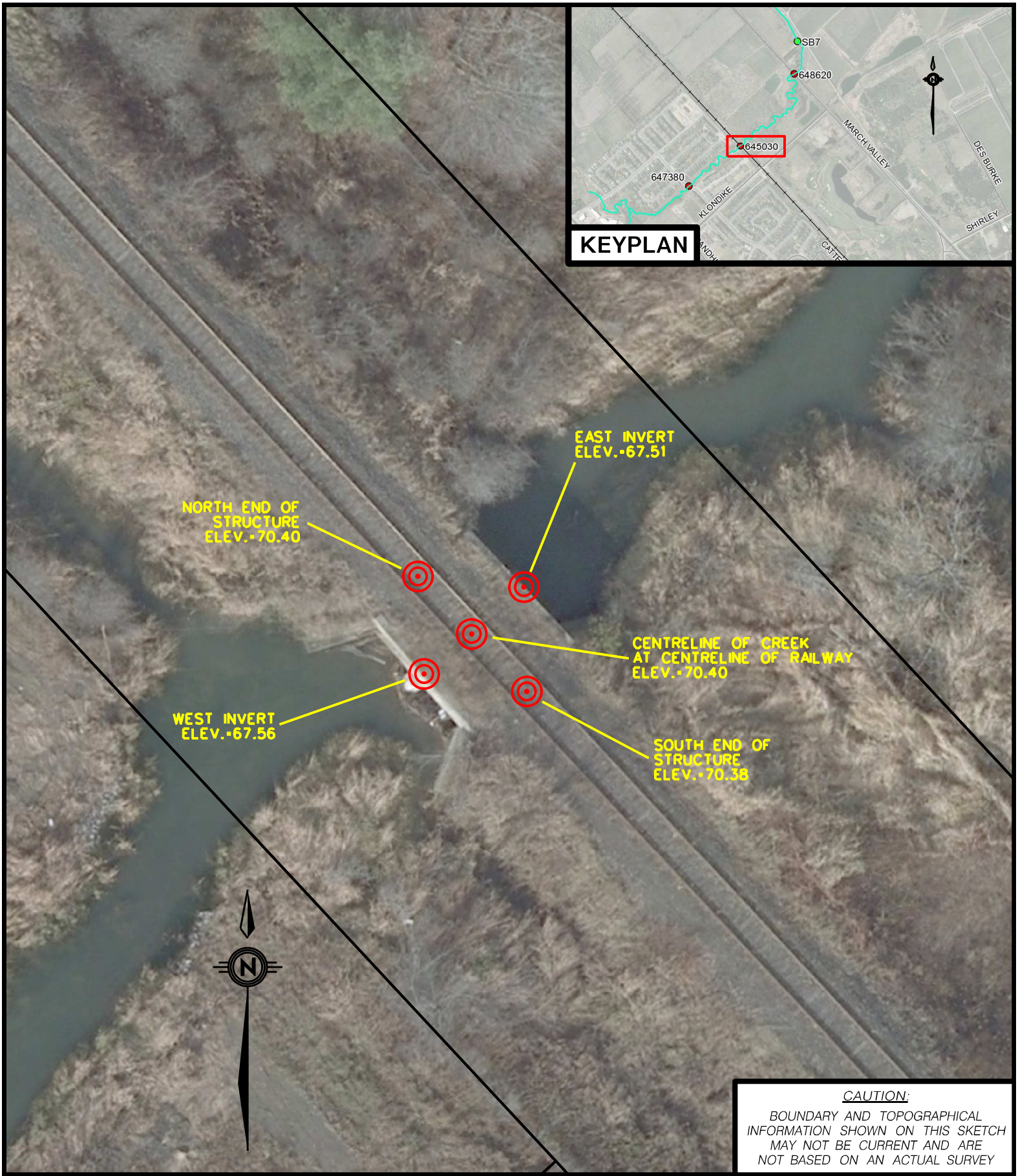
CHECKED BY : A. PETRANOVIC

SCALE : 1:250 (METRIC) | DATE : OCT. 2012 | MS No. 16651-SN117270.DGN

Ottawa

INFRASTRUCTURE SERVICES DEPARTMENT

SURVEYS & MAPPING UNIT



CAUTION:

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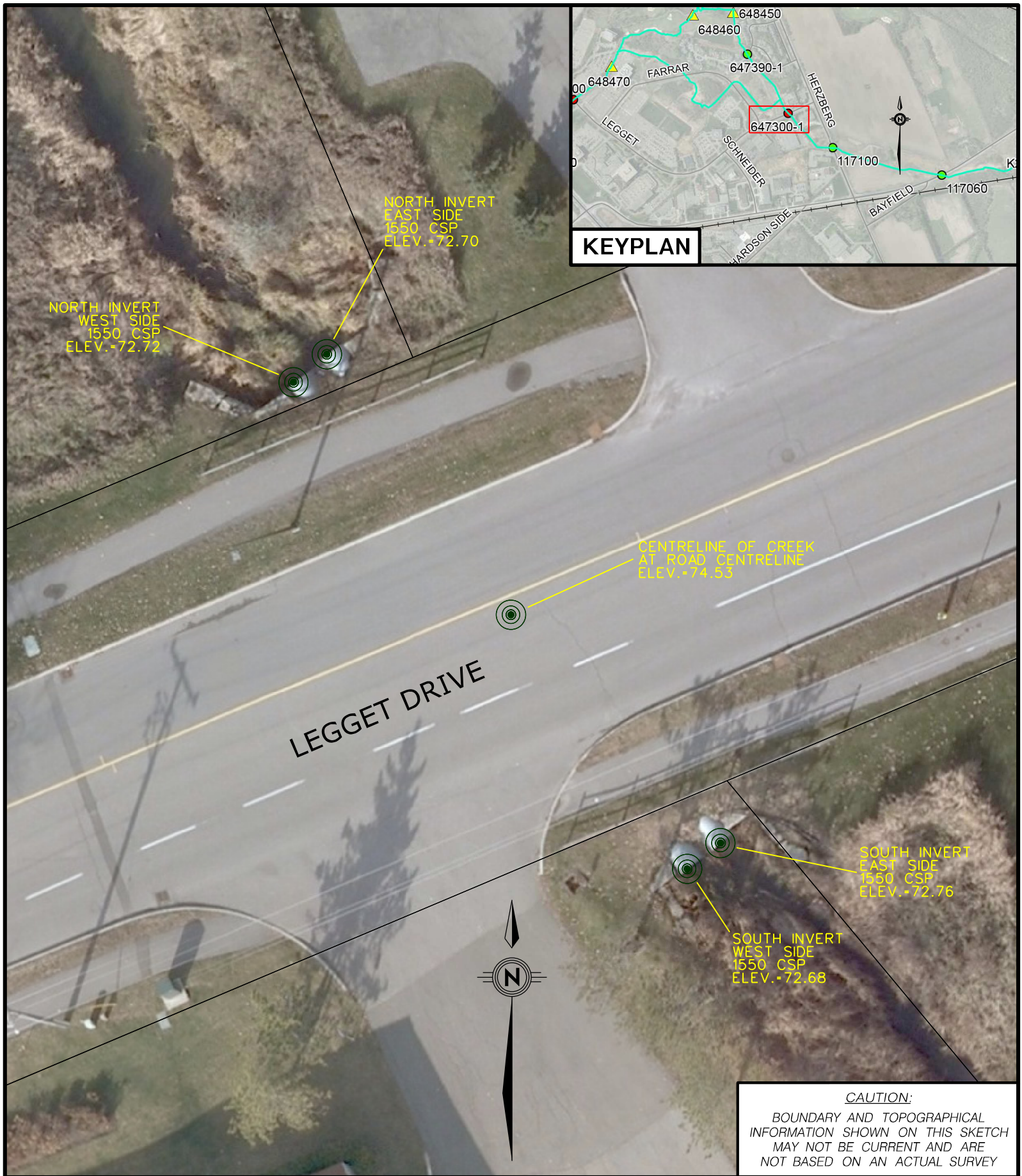
Shirley's Brook SN.645030

OWNER CITY OF OTTAWA	CAD BY : M.P. GALLAGHER	
	CHECKED BY : A. PETRANOVIC	
SCALE : 1:250 (METRIC)	DATE : OCT. 2012	MS No. 16651-SN645030.DGN

Ottawa
INFRASTRUCTURE SERVICES DEPARTMENT
SURVEYS & MAPPING UNIT



CAUTION:

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Watt's Creek & Kizzel Drain SN.647300-1

OWNER	CITY OF OTTAWA	CAD BY : M.P. GALLAGHER
		CHECKED BY : A. PETRANOVIC
SCALE : 1:250 (METRIC)	DATE : OCT. 2012	MS No. 16651-SN647300-1.DGN

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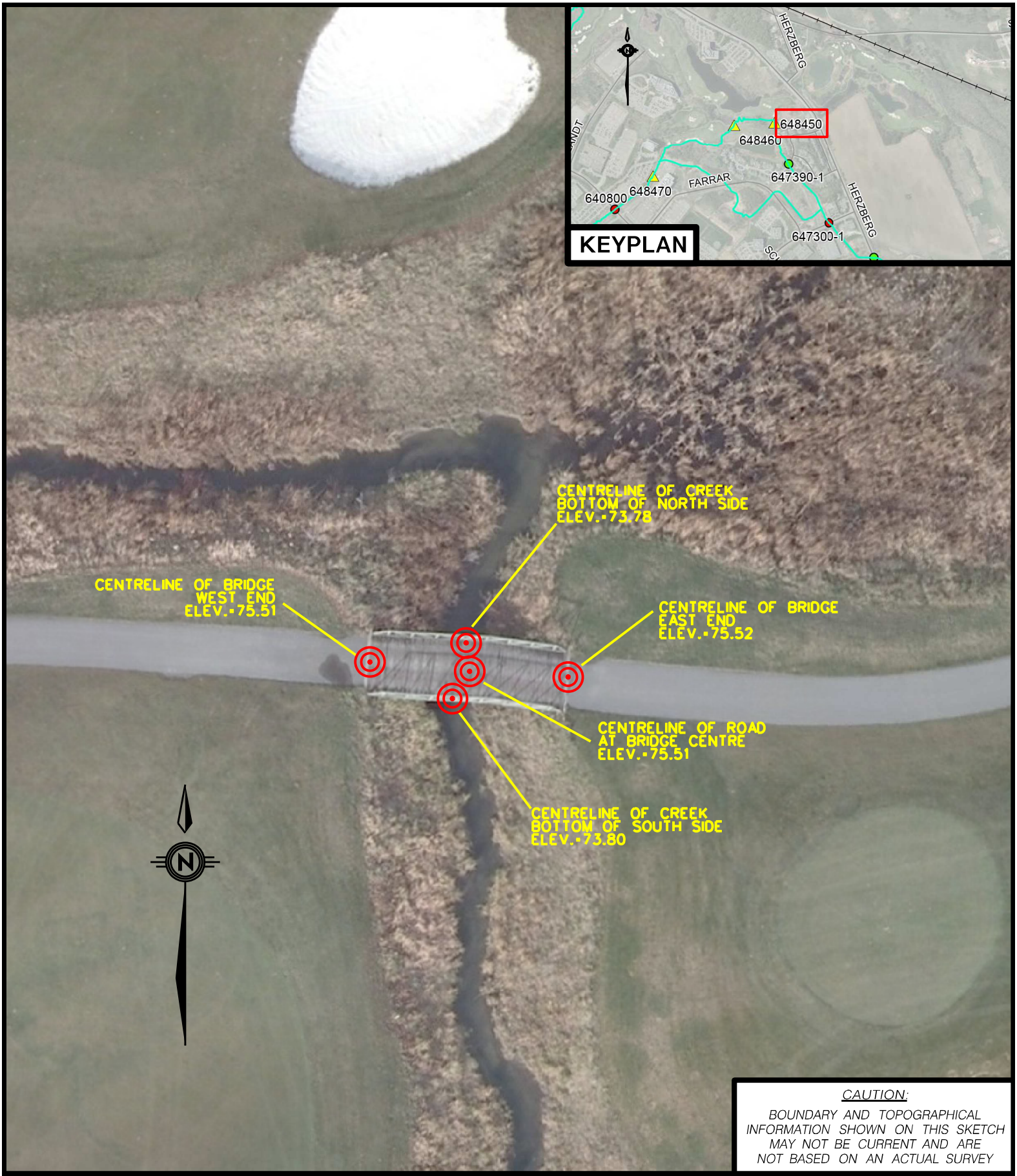
SURVEYS & MAPPING UNIT



CAUTION:

BOUNDARY AND TOPOGRAPHICAL INFORMATION SHOWN ON THIS SKETCH MAY NOT BE CURRENT AND ARE NOT BASED ON AN ACTUAL SURVEY

Watt's Creek & Kizzel Drain SN.648450

OWNER MARSHES GOLF CORPORATION
PIN 04517-1140

CAD BY : M.P. GALLAGHER

CHECKED BY : A. PETRANOVIC

SCALE : 1:250 (METRIC)

DATE : OCT. 2012

MS No. 16651-SN648450.DGN

Ottawa
INFRASTRUCTURE SERVICES DEPARTMENT
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CAUTION:

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Watt's Creek & Kizzel Drain SN.648460

OWNER MARSHES GOLF CORPORATION
PIN 04517-1140

CAD BY : M.P. GALLAGHER

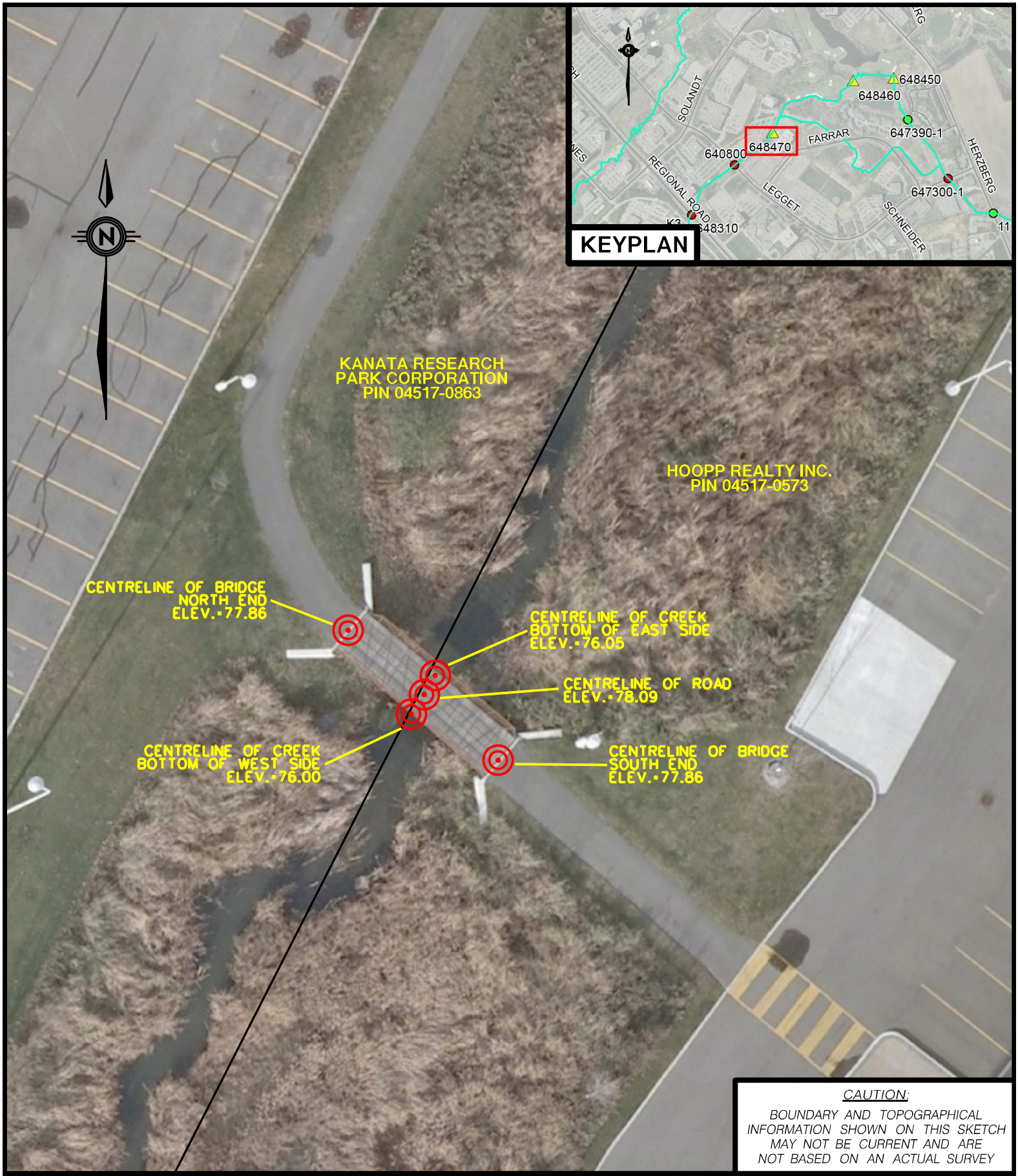
CHECKED BY : A. PETRANOVIC

SCALE : 1:250 (METRIC)

DATE : OCT. 2012

MS No. 16651-SN648460.DGN

Ottawa
INFRASTRUCTURE SERVICES DEPARTMENT
SURVEYS & MAPPING UNIT



CAUTION:

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Watt's Creek & Kizzel Drain SN.648470

OWNER

SEE PLAN

CAD BY : M.P. GALLAGHER

CHECKED BY : A. PETRANOVIC

SCALE : 1:250 (METRIC)

DATE : OCT. 2012

MS No. 16651-SN648470.DGN

Ottawa

INFRASTRUCTURE SERVICES DEPARTMENT

SURVEYS & MAPPING UNIT

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Shirley's Brook SN.648620

OWNER

CITY OF OTTAWA

CAD BY : M.P. GALLAGHER

CHECKED BY : A. PETRANOVIC

SCALE : 1:250 (METRIC)

DATE : OCT. 2012

MS No. 16651-SN648620.DGN

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INFRASTRUCTURE SERVICES DEPARTMENT

SURVEYS & MAPPING UNIT

CAUTION:

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Watt's Creek & Kizzel Drain SN.K1

OWNER

NATIONAL CAPITAL COMMISSION

CAD BY : M.P. GALLAGHER

CHECKED BY : A. PETRANOVIC

SCALE : 1:250 (METRIC)

DATE : OCT. 2012

MS No. 16651-SN-K1.DGN

Ottawa

INFRASTRUCTURE SERVICES DEPARTMENT

SURVEYS & MAPPING UNIT

CAUTION:

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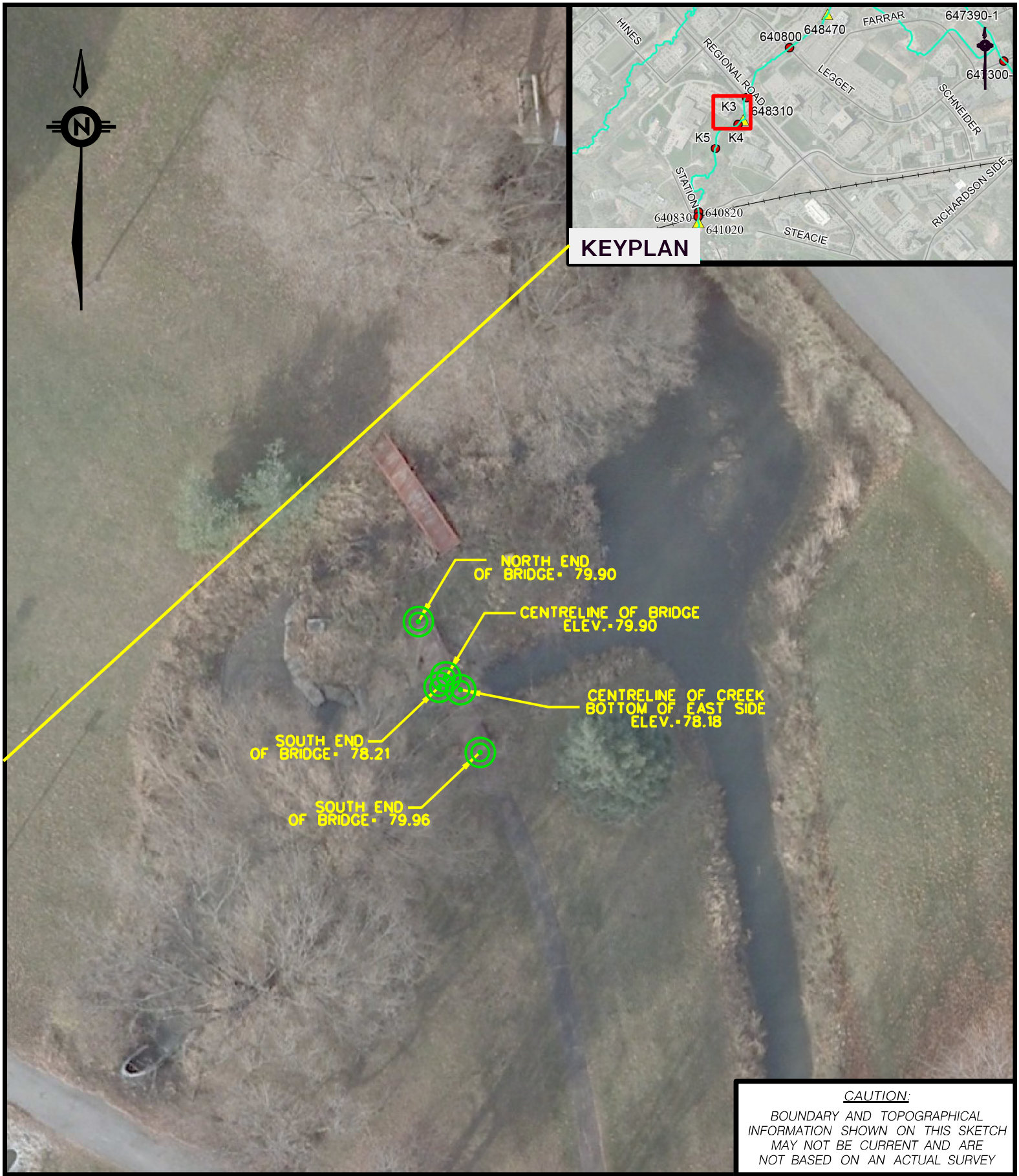
Watt's Creek & Kizzel Drain SN.K2

OWNER: CITY OF OTTAWA	CAD BY : M.P. GALLAGHER	
	CHECKED BY : A. PETRANOVIC	
SCALE : 1:250 (METRIC)	DATE : OCT. 2012	MS No. 16651-SN-K2.DGN

Ottawa

INFRASTRUCTURE SERVICES DEPARTMENT

SURVEYS & MAPPING UNIT



CAUTION:

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Watt's Creek & Kizzel Drain - SN.K3

OWNER BEST THERATRONICS LTD.		CAD BY : M.P. GALLAGHER
		CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012	MS No. 16651_SNK3.DGN

Ottawa
INFRASTRUCTURE SERVICES DEPARTMENT
SURVEYS & MAPPING UNIT

CAUTION:

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Watt's Creek & Kizzel Drain - SN.K4

OWNER

BEST THERATRONICS LTD.

CAD BY : M.P. GALLAGHER

CHECKED BY : A. PETRANOVIC

SCALE 1:250 (METRIC)

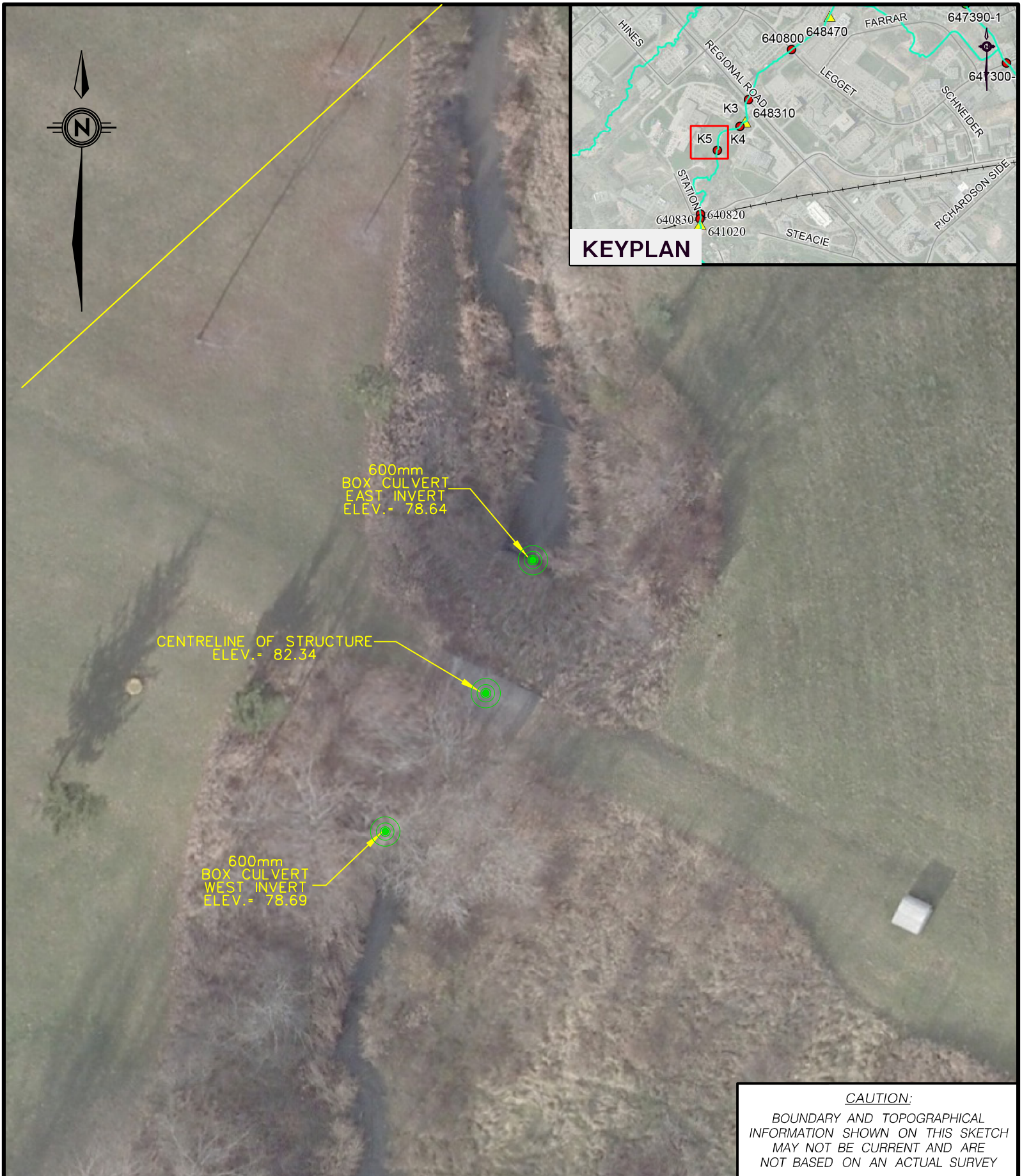
DATE : OCT. 2012

MS No. 16651_SNK4.DGN

Ottawa

INFRASTRUCTURE SERVICES DEPARTMENT

SURVEYS & MAPPING UNIT



KEYPLAN

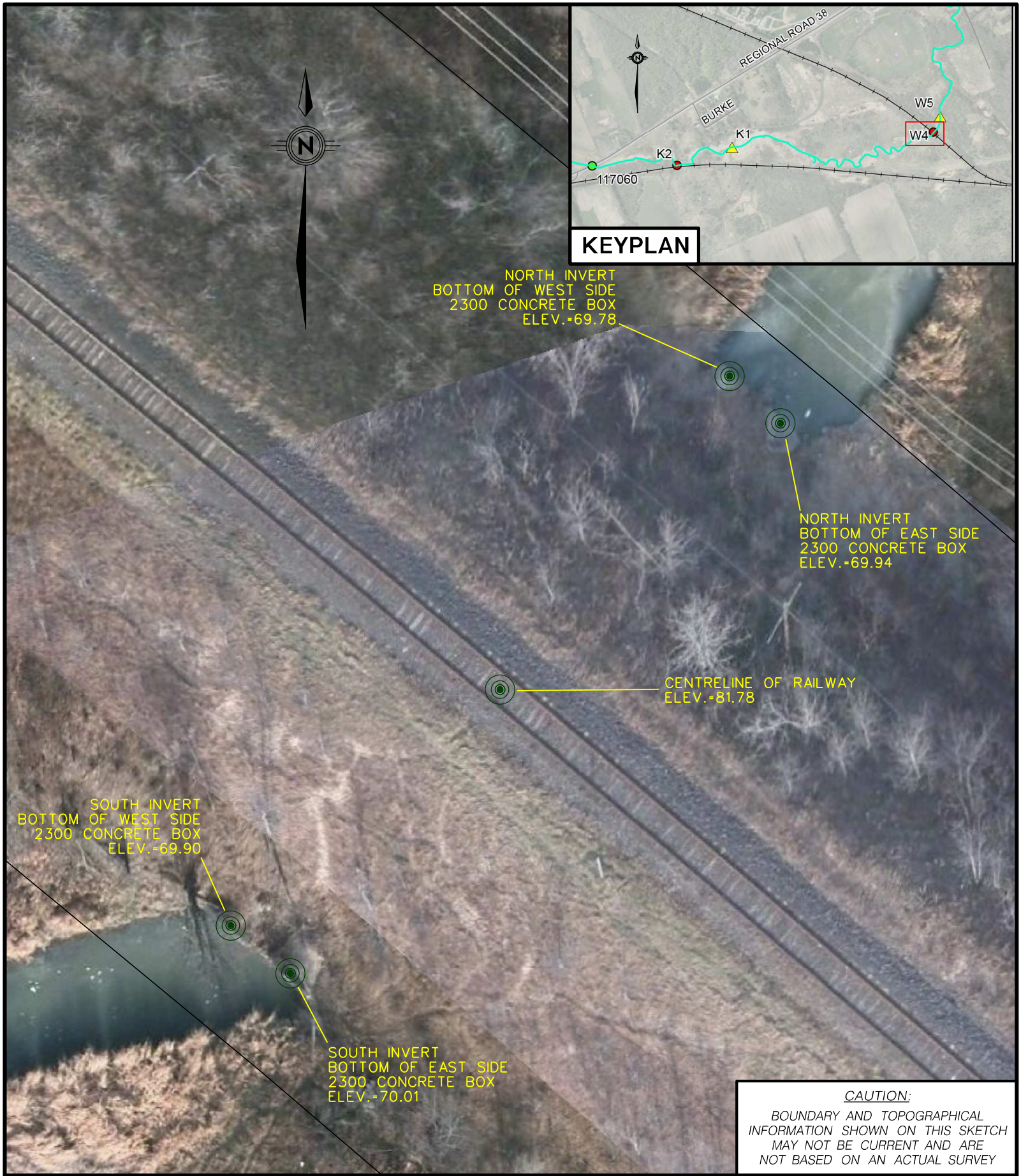
CAUTION:

BOUNDARY AND TOPOGRAPHICAL INFORMATION SHOWN ON THIS SKETCH MAY NOT BE CURRENT AND ARE NOT BASED ON AN ACTUAL SURVEY

Watt's Creek & Kizzel Drain - SN.K5

OWNER BEST THERATRONICS LTD.	CAD BY : M.P. GALLAGHER CHECKED BY : A. PETRANOVIC
SCALE 1:250 (METRIC)	DATE : OCT. 2012
	MS No. 16651_SNK5.DGN

Ottawa
INFRASTRUCTURE SERVICES DEPARTMENT
SURVEYS & MAPPING UNIT



CAUTION:

BOUNDARY AND TOPOGRAPHICAL INFORMATION SHOWN ON THIS SKETCH MAY NOT BE CURRENT AND ARE NOT BASED ON AN ACTUAL SURVEY

Watt's Creek & Kizzel Drain SN.W4

OWNER

OTTAWA CENTRAL RAILWAY INC.

CAD BY : M.P. GALLAGHER

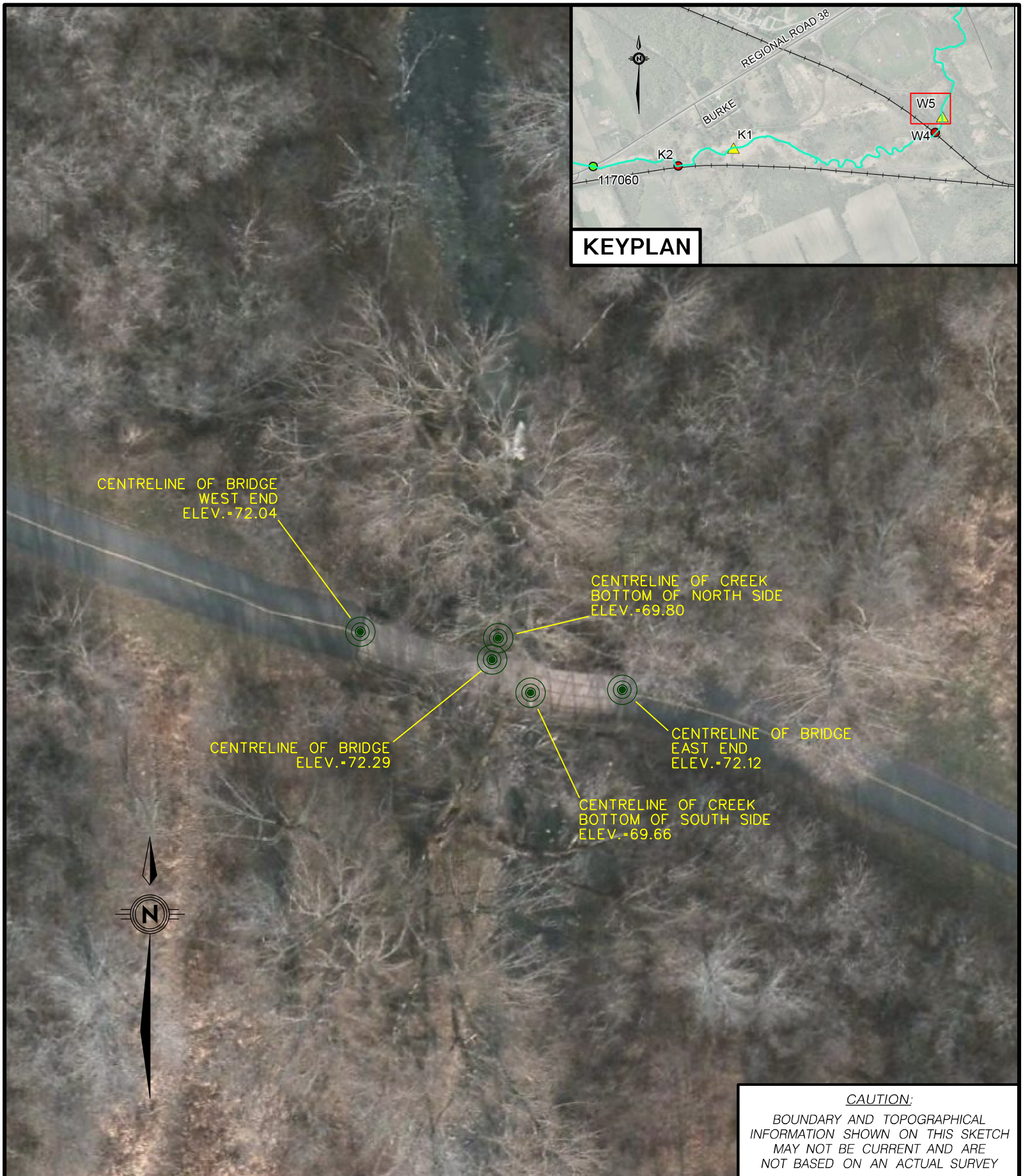
CHECKED BY : A. PETRANOVIC

SCALE : 1:250 (METRIC) | DATE : OCT. 2012 | MS No. 16651-SN-W4.DGN

Ottawa

INFRASTRUCTURE SERVICES DEPARTMENT

SURVEYS & MAPPING UNIT



CAUTION:

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Watt's Creek & Kizzel Drain SN.W5

OWNER
NATIONAL CAPITAL COMMISSION

CAD BY : M.P. GALLAGHER

CHECKED BY : A. PETRANOVIC

SCALE : 1:250 (METRIC) | DATE : OCT. 2012 | MS No. 16651-SN-W5.DGN

Ottawa
INFRASTRUCTURE SERVICES DEPARTMENT
SURVEYS & MAPPING UNIT

1) DA 1

Comments: Not found. Inlet likely buried.

2) DA 2

a) **Inlet ID**: Det_2B

Inlet Type: Standard catch basin

X/Y Coordinates: 350566.24 / 5020253.032

Lead Size: 200 mm (Invert: 98.24 m)
CB Frame: 99.52 m

Receiving Sewer: 675 mm (from GIS Infrastructure data base)

Comments: The extent of surface ponding is limited (according to the golf course superintendant). Detailed drawings of the detention area and inlet structure are not available.

DWG Reference: DWG13311-Ponds 1_2. DWGS: Plan 1 and Plan 2.

NOTE: Underlined information was measured by survey on April 10, 2012

3) DA 3:

Inlet ID: Det_3

Inlet Type: Honey comb inlet

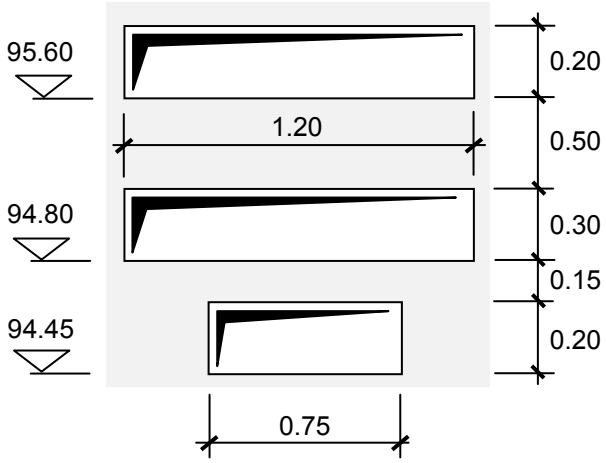
Lead Size: Unknown. Inlet structure submerged.
Receiving Sewer: Storm sewer conveys flows from the pond's outlet structure to a channel which conveys flows to detention area 4.

Comments: During large storm events, maximum water levels in the pond are achieved (according to the golf course superintendant). Excess flows from the pond drain overland to the receiving channel (see figure on the right).

DWG Reference: None available

4) DA 4:

Inlet ID: Det_4



Inlet Type: Large grate

X/Y Coordinates: 351153.991 / 5020407.172

Lead Size: 750 mm x 200 mm (el. 94.45 m); 1200 mm x 300 mm (el. 94.80 m); 1200 mm x 200 mm (el. 95.60 m).

Receiving Sewer: 1050 mm (from GIS infrastructure data base)

Comments: Maximum water level in detention area is achieved during large storm events (according to the golf course superintendant). Excess flows from the detention area drains overland to the inlet structure.

DWG Reference: DWG13023_Ponds 4_5_5a_6. DWGS: Plan 1, Plan 2, Plan 6, p&p13.pdf, details6.pdf.

NOTE: Underlined information was measured by survey on April 10, 2012

5) DA 5A:

Inlet ID: Det_5A

Inlet Type: Large grate

X/Y Coordinates: 351413.922 / 5019912.697

Lead Size: 630 mm x 350 mm (Invert: 99.59 m)

Receiving Sewer: 600 mm (from GIS infrastructure data base)

Comments: Manhole structure contains one opening which restricts the inflow to 450 L/s (see p&p10.pdf). The Inlet structure's outlet sewer is 450 mm in diameter.

DWG Reference: DWG13023_Ponds 4_5_5a_6. DWGS: Plan 1, Plan 2, Plan 3, Plan 6, p&p10.pdf, details5.pdf.

NOTE: Underlined information was measured by survey on April 10, 2012

6) DA 5:

Inlet ID: Det_5A

Inlet Type: Honey comb ditch inlet

X/Y Coordinates: 351375.782 / 5020184.113

Lead Size: 300 mm (Invert: 95.67 m)

Receiving Sewer: 525 mm (from GIS infrastructure data base)

Comments: Detailed drawing of the inlet structure indicates that a steel plate cover with a 400mm x 150 mm opening should have been installed at this location.

DWG Reference: DWG13023_Ponds 4_5_5a_6. DWGS: Plan 1, Plan 2, Plan 6, p&p11.pdf, details4.pdf.

NOTE: Underlined information was measured by survey on April 10, 2012

7) DA 6A:

Inlet ID: Det_6

Inlet Type: Honey comb ditch inlet

X/Y Coordinates: 351314.481 / 5020464.599

Lead Size: 250 mm (Invert: 94.15 m)

Receiving Sewer: 1050 mm (from GIS infrastructure data base)

Comments: Significant ponding occurs during large rainfall events (according to the golf course superintendant).

DWG Reference: DWG13023_Ponds 4_5_5a_6. DWGS: Plan 1, Plan 2, Plan 6, p&p11.pdf, details4.pdf.

NOTE: Underlined information was measured by survey on April 10, 2012

8) DA 6B:

Inlet ID: Det_6

Inlet Type: Honey comb ditch inlet

X/Y Coordinates: 351532.424 / 5020139.209

Lead Size: 200 mm (Invert: 97.12 m)

Receiving Sewer: 750 mm (from GIS infrastructure data base)

DWG Reference: None available

NOTE: Underlined information was measured by survey on April 10, 2012

9) DA 7:

Inlet ID: Det_7

Inlet Type: Ditch inlet

X/Y Coordinates: 351010.856 / 5020937.493

Lead Size: 300 mm (Invert: 92.04 m)

Receiving Sewer: 600 mm (from GIS infrastructure data base)

DWG Reference: None available

Comments: No history of surface ponding at this location (according to the golf course superintendant).

NOTE: Underlined information was measured by survey on April 10, 2012

10) DA 8:

Inlet ID: Det_8

Inlet Type: Honey comb ditch inlet

X/Y Coordinates: 350838.78 / 5020862.737

Lead Size: 250 mm (Invert: 91.84 m)

Receiving Sewer: 2550 mm (from GIS infrastructure data base)

Comments: Creek inlets into an outlet structure (see below). The outlet structure conveys flows to the 2550 mm storm sewer on Weslock Way via a 250 mm storm sewer.

The outlet structure is equipped with a honey comb inlet. Historical maximum water levels observed in detention area 8 are well below the honey comb inlet elevation (according to the golf course superintendant).

Potential spill: 350858.533 / 5020856.925 (Elevation: 95.84)

DWG Reference: DWG13180_Ponds 8_9_10_11. DWGS: Plan 1, Plan 5, Plan 6, Plan 10, Plan 15.pdf, details4.pdf.

NOTE: Underlined information was measured by survey on April 10, 2012

11) DA 9:

Inlet ID: Det_9

Inlet Type: Unknown. Inlet covered by mud and vegetation.

X/Y Coordinates: 350680.69 / 5021044.95

Lead Size: 300 mm (Invert: 92.82 m)

Receiving Sewer: 2700 mm (from GIS infrastructure data base)

Comments: Drawings indicate that a precast concrete ditch inlet structure with a 300 mm lead size service this detention area.

DWG Reference: DWG13180_Ponds 8_9_10_11. DWGS: Plan 1, Plan 6, Plan 11, Plan 15, P&P 1, Details2.

NOTE: Underlined information was measured by survey on April 10, 2012

12) DA 10A:

Inlet Id: Det_10

Inlet Type: Fishbone (square frame, herring bone openings)

X/Y Coordinates: 350086.363 / 5021117.785

Lead Size: 150 mm (Invert: 98.15 m)

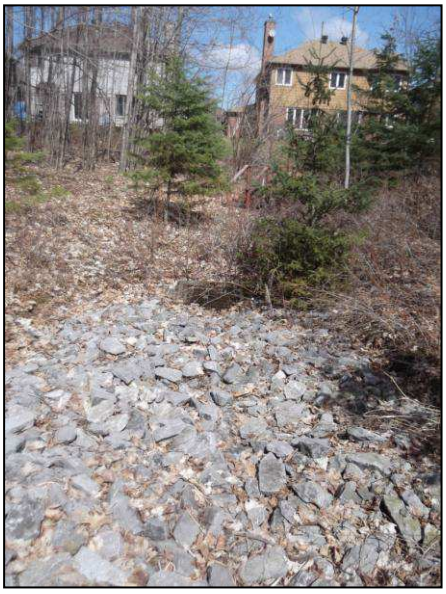
Comments: Receives flows from a splash park

DWG Reference: DWG13180_Ponds 8_9_10_11. DWGS: P&P 4, details2.

NOTE: Underlined information was measured by survey on April 10, 2012

13) DA 10B:

Inlet Id: Det_10



Inlet Type: Honey comb ditch inlet

X/Y Coordinates: 350229.775 / 5021059.455

Lead Size: 300 mm (Invert: 98.24 m)

DWG Reference: DWG13180_Ponds 8_9_10_11. DWGS: P&P 4, details2.

NOTE: Underlined information was measured by survey on April 10, 2012

14) DA 11:

Inlet ID: Det_11

Inlet Type: honey comb ditch inlet

X/Y Coordinates: 350711.768 / 5021279.614

Lead Size: 200 mm (Invert: 93.70 m)

Receiving Sewer: 2700 mm (from GIS infrastructure data base)

Comments: Storage area is significant (refer to figure above)

DWG Reference: DWG13180_Ponds 8_9_10_11. DWGS: Plan 1, Plan 11, Plan 15.

NOTE: Underlined information was measured by survey on April 10, 2012

TABLE B-1
CITY OF OTTAWA
SHIRLEY'S BROOK & WATT'S CREEK - PHASE 2 STORMWATER MANAGEMENT STUDY
CITY OF OTTAWA STREAM GAUGE LOCATION CK5-01 ON SHIRLEY'S BROOK
Version: 1
Project No.: 60264539
Date: 2/6/2015
Design: GAF/SN/CL

AECOM Survey Measurements

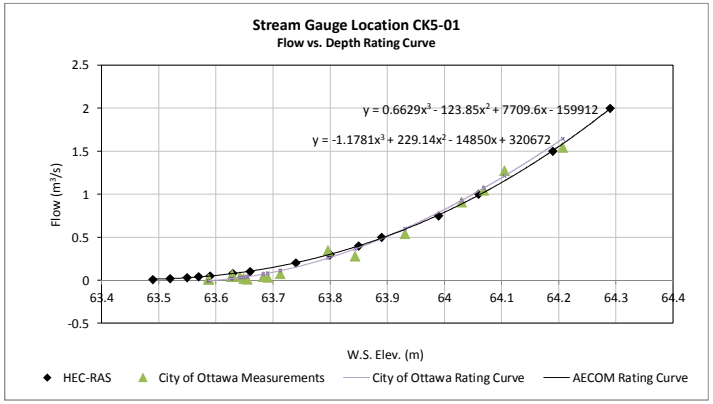
	Upstream
Crest Gauge Inv. Rod Reading =	3.33 [1]
W/C Inv. Rod Reading =	3.33 [1]
Crest Gauge Above W/C Invert =	0.008 [1]
HEC-RAS/Surveyed W/C Invert =	63.35 [1]
Crest Gauge Invert =	63.3550

Notes: *1. AECOM survey data*
2. City of Ottawa survey data
3. Flow estimates calculated using flow vs. depth rating curve developed using HEC-RAS.
4. n/a = flow depth below crest gauge elevation.
5. Blue text calculated using curve fit 3 rd order polynomial $y = ax^3 + bx^2 + cx + d$

Flow vs. Depth Curve Fitting

Parameter	HEC-RAS
a	0.66
b	-123.85
c	7709.58
d	-159911.76

HEC-RAS Rating Curve		City of Ottawa Measurements [2]		AECOM Fitted Rating Curve	City of Ottawa Rating Curve
Upstream Face		Upstream Face		Upstream Face	Upstream Face
Flow (m^3/s)	W.S. Elev (m)	Flow (m^3/s)	W.S. Elev (m)	Flow (m^3/s)	Flow (m^3/s)
0.01	63.49	0.01	63.59	0.05	-0.01
0.02	63.52	0.01	63.59	0.05	0.00
0.03	63.55	0.01	63.66	0.10	0.04
0.04	63.57	0.02	63.65	0.10	0.04
0.05	63.59	0.04	63.69	0.14	0.08
0.08	63.63	0.04	63.68	0.13	0.07
0.10	63.66	0.04	63.63	0.08	0.02
0.20	63.74	0.04	63.64	0.09	0.03
0.30	63.8	0.06	63.63	0.08	0.02
0.40	63.85	0.08	63.71	0.17	0.11
0.50	63.89	0.28	63.84	0.39	0.36
0.75	63.99	0.35	63.80	0.29	0.26
1.00	64.06	0.54	63.93	0.59	0.60
1.50	64.19	0.91	64.03	0.89	0.93
2.00	64.29	1.05	64.07	1.02	1.07
		1.28	64.11	1.16	1.21
		1.55	64.21	1.59	1.65



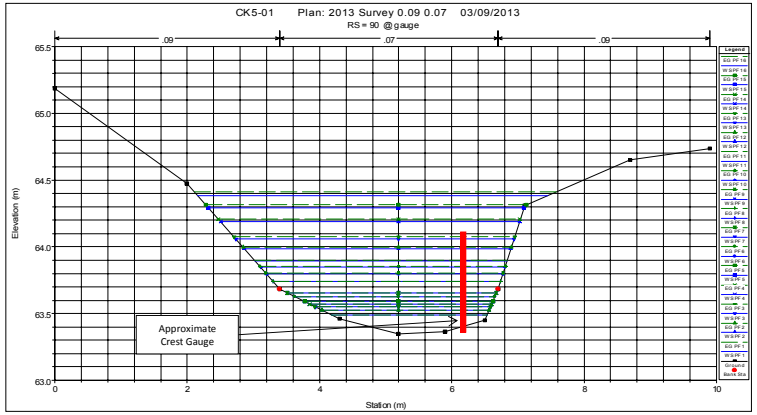


TABLE B-2
CITY OF OTTAWA
SHIRLEY'S BROOK & WATT'S CREEK - PHASE 2 STORMWATER MANAGEMENT STUDY
CITY OF OTTAWA STREAM GAUGE LOCATION CK6-002 ON WATT'S CREEK

Version: 1
Project No.: 60264539
Date: 2/6/2015
Design: GAF/SN/CL

AECOM Survey Measurements

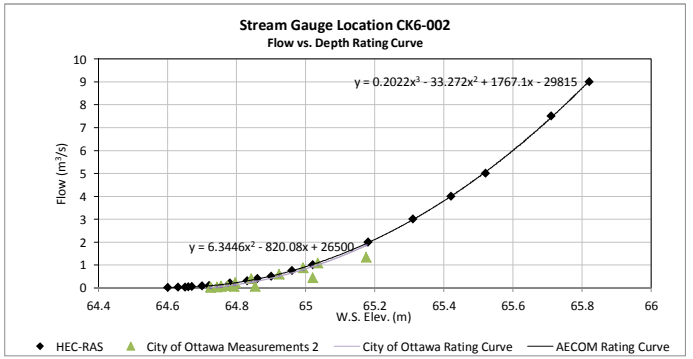
	Upstream
Crest Gauge Inv. Rod Reading =	3.29 [1]
W/C Inv. Rod Reading =	3.35 [1]
Crest Gauge Above W/C Invert =	0.060 [1]
HEC-RAS/Surveyed W/C Invert =	64.42 [2]
Crest Gauge Invert =	64.4810

Notes: 1. AECOM survey data
2. City of Ottawa survey data
3. Flow estimates calculated using flow vs. depth rating curve developed using HEC-RAS.
4. n/a = flow depth below crest gauge elevation.
5. Blue text calculated using curve fit 3rd order polynomial $y = ax^3 + bx^2 + cx + d$

Flow vs. Depth Curve Fitting

Parameter	HEC-RAS
a	0.20
b	-33.27
c	1767.07
d	-29815.13

HEC-RAS Rating Curve		City of Ottawa Measurements [2]		AECOM Fitted Rating Curve	City of Ottawa Rating Curve
Upstream Face		Upstream Face		Upstream Face	Upstream Face
Flow (m^3/s)	W.S. Elev (m)	Flow (m^3/s)	W.S. Elev (m)	Flow (m^3/s)	Flow (m^3/s)
0.01	64.6	0.24	64.80	0.23	0.14
0.02	64.63	0.10	64.77	0.18	0.09
0.03	64.65	0.45	65.02	1.02	0.93
0.04	64.66	0.07	64.79	0.22	0.13
0.05	64.67	0.02	64.72	0.10	0.02
0.08	64.7	0.06	64.75	0.14	0.06
0.10	64.72	0.08	64.76	0.14	0.06
0.20	64.78	0.03	64.73	0.10	0.02
0.30	64.83	1.34	65.18	1.94	1.85
0.40	64.86	0.07	64.85	0.37	0.28
0.50	64.9	0.03	64.74	0.13	0.04
0.75	64.96	1.09	65.04	1.10	1.01
1.00	65.02	0.87	64.99	0.89	0.80
2.00	65.18	0.59	64.92	0.60	0.51
3.00	65.31	0.40	64.84	0.34	0.25
4.00	65.42				
5.00	65.52				
7.50	65.71				
9.00	65.82				



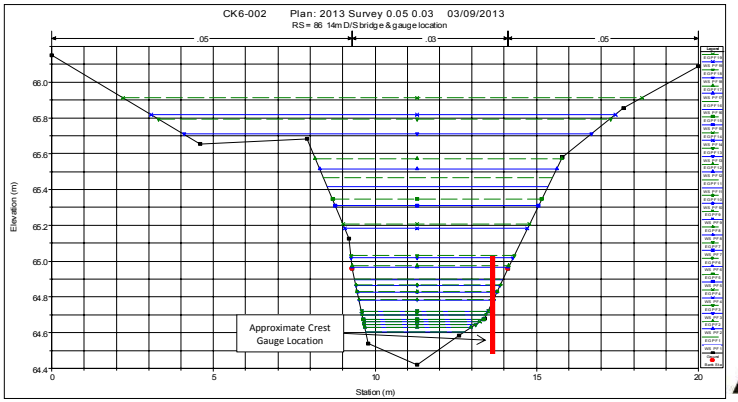


TABLE B-3
CITY OF OTTAWA
SHIRLEY'S BROOK & WATT'S CREEK - PHASE 2 STORMWATER MANAGEMENT STUDY
CREST GAUGE MONITORING LOCATION KD-1 KIZELL DRAIN AT HERZBERG ROAD

Version: 1
Project No.: 60264539
Date: 2/6/2015
Design: GAF/SN/CL

AECOM Survey Measurements

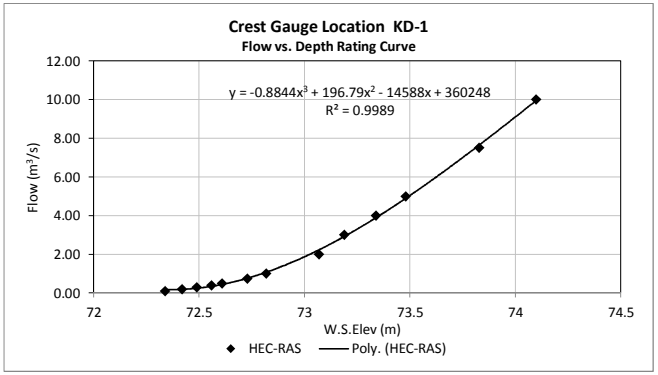
	Upstream 2012	Upstream 2013
Crest Gauge Inv. Rod Reading =	4.02	3.13 [1]
W/C Inv. Rod Reading =	4.18	3.51 [1]
Crest Gauge Above W/C Invert =	0.160	0.380 [1]
HEC-RAS/Surveyed W/C Invert =	72.10	72.10 [2]
Crest Gauge Invert =		72.48

Flow vs. Depth Curve Fitting

Parameter	HEC-RAS
a	-0.88
b	196.79
c	-14587.59
d	360247.53

Notes: 1. AECOM survey data
2. Based on LiDAR, design information and City survey data.
3. Flow estimates calculated using flow vs. depth rating curve developed using HEC-RAS.
4. n/a = flow depth below crest gauge elevation.
5. Blue text calculated using curve fit 3rd order polynomial $y = ax^3 + bx^2 + cx + d$
6. Orange highlighted measurement used in comparison with SWMHYMO output from observed event.

				HEC-RAS	
	Upstream Face			Upstream Face	
Reading Date	Depth Reading (m)	Elevation (m)	Approx. Flow (m^3/s) [3]	Flow (m^3/s)	W.S. Elev (m)
May 30, 2012	0.06	72.32	0.18	0.10	72.34
June 5, 2012	0.22	72.48	0.23	0.20	72.42
June 13, 2012	0.13	72.39	0.17	0.30	72.49
June 27, 2012	0.07	72.33	0.18	0.40	72.56
July 24, 2012	0.07	72.33	0.18	0.50	72.61
August 8, 2012	0.05	72.31	0.19	0.75	72.73
August 16, 2012	0.04	72.30	0.19	1.00	72.82
September 5, 2012	0.03	72.29	0.20	2.00	73.07
September 17, 2012	0.59	72.85	1.19	3.00	73.19
September 26, 2012	0.04	72.30	0.19	4.00	73.34
October 16, 2012	0.06	72.32	0.18	5.00	73.48
November 2, 2012	0.03	72.29	0.20	7.50	73.83
November 22, 2012	0.03	72.29	0.20	10.00	74.1
July 19, 2013	0.28	72.76	0.86		
August 8, 2013	0.39	72.87	1.27		
September 2, 2013	0.25	72.73	0.76		
October 19, 2013	0.25	72.73	0.76		



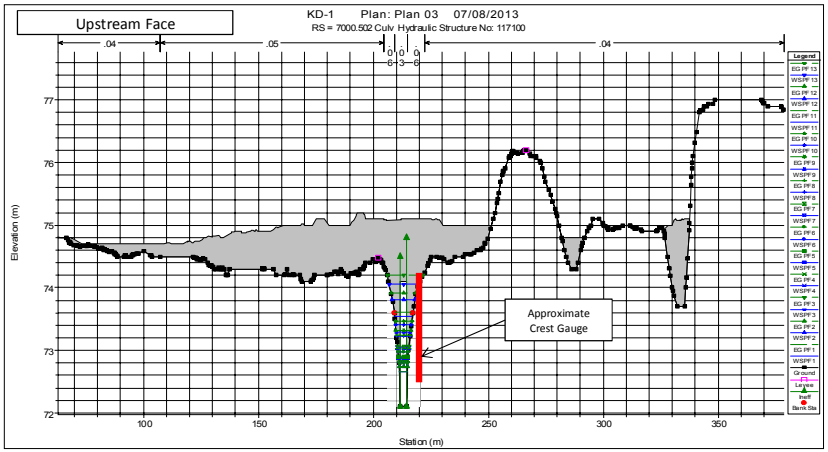


TABLE B-4
CITY OF OTTAWA
SHIRLEY'S BROOK & WATT'S CREEK - PHASE 2 STORMWATER MANAGEMENT STUDY
CREST GAUGE MONITORING LOCATION KD-2 KIZELL DRAIN AT MARCH / STATION ROAD

Version: 1
Project No.: 60264539
Date: 2/6/2015
Design: GAF/SN/CL

AECOM Survey Measurements

	Upstream 2012	Upstream 2013
Crest Gauge Inv. Rod Reading =	4.010	3.368 [1]
W/C Inv. Rod Reading =	4.185	3.583 [1]
Crest Gauge Above W/C Invert =	0.175	0.215 [1]
HEC-RAS/Surveyed W/C Invert =	78.13	78.13 [2]
Crest Gauge Invert =		78.35

Flow vs. Depth Curve Fitting

Parameter	Upstream	MTO Chart 2.32
a	0.07	0.11
b	-17.12	-27.79
c	1375.45	2259.75
d	-36865.26	-61267.75

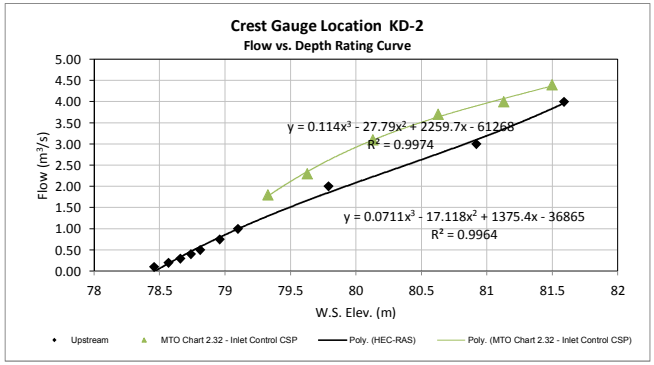
CHECK

MTO Chart 2.32 - Inlet Control for Circular CSP (Inlet Type = 3)

Depth (m)	Elev (m)	HW/D	Q (m^3/s)	Depth Reading	Flow (m^3/s)
1.2	79.33	1.00	1.8	79.1	1.25
1.5	79.63	1.25	2.3	79.79	2.61
2	80.13	1.67	3.1	80.92	3.90
2.5	80.63	2.08	3.7	81.59	4.45
3	81.13	2.50	4.0		
3.37	81.50	2.81	4.4		

Notes: 1. AECOM survey data
2. Based on LiDAR, design information and City survey data.
3. Flow estimates calculated using flow vs. depth rating curve developed using HEC-RAS.
4. n/a = flow depth below crest gauge elevation.
5. Blue text calculated using curve fit 3rd order polynomial $y = ax^3 + bx^2 + cx + d$
6. Orange highlighted measurement used in comparison with SWMHYMO output from observed event.
7. Red highlighted flow estimates suspect.

	Upstream of Culvert			HEC-RAS Rating Curve Upstream Face	
Reading Data	Depth Reading (m)	Elevation (m)	Approx. Flow ($m3/s$) [3]	Flow (m^3/s)	W.S. Elev (m)
May 30, 2012	0.18	78.48	0.03	0.10	78.46
June 5, 2012	0.36	78.67	0.34	0.20	78.57
June 13, 2012	0.32	78.63	0.28	0.30	78.66
June 27, 2012	0.11	78.42	> 0.1	0.40	78.74
July 24, 2012	0.07	78.38	> 0.1	0.50	78.81
August 8, 2012	0.08	78.39	> 0.1	0.75	78.96
August 16, 2012	0.07	78.38	> 0.1	1.00	79.1
September 5, 2012	0.05	78.36	> 0.1	2.00	79.79
September 17, 2012	0.52	78.83	0.60	3.00	80.92
September 26, 2012	0.05	78.36	> 0.1	4.00	81.59
October 16, 2012	0.02	78.33	> 0.1		
November 2, 2012	0.22	78.53	0.11		
November 22, 2012	0.15	78.46	0.10		
July 17, 2013	0.13	78.48	0.02		
August 8, 2013	0.58	78.93	0.75		
August 30, 2013	0.37	78.72	0.42		
October 19, 2013	0.45	78.80	0.55		



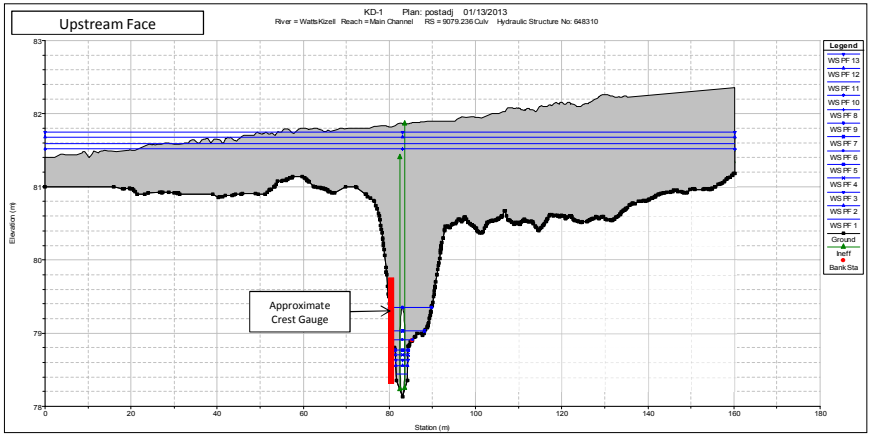


TABLE B-5
CITY OF OTTAWA
SHIRLEY'S BROOK & WATT'S CREEK - PHASE 2 STORMWATER MANAGEMENT STUDY
CREST GAUGE MONITORING LOCATION WC-1 WATT'S CREEK UPSTREAM OF CONFLEUNCE WITH KIZELL DRAIN (NCC LANDS)

Version: 1
Project No.: 60264539
Date: 2/6/2015
Design: GAF/SN/CL

AECOM Survey Measurements

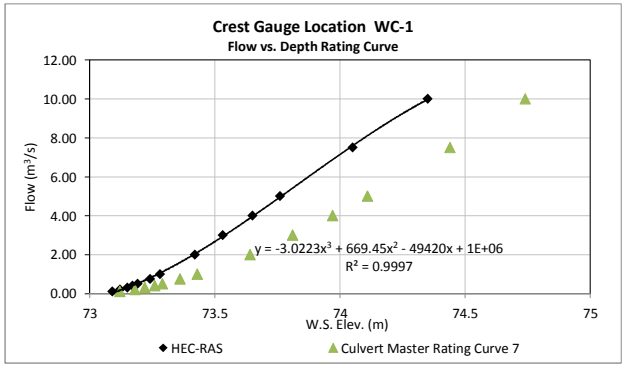
Upstream	2012	2013
Crest Gauge Inv. Rod Reading =	3.08	3.18 [1]
W/C Inv. Rod Reading =	3.34	3.35 [1]
Crest Gauge Above W/C Invert =	0.260	0.178 [1]
HEC-RAS/Surveyed W/C Invert =	73.10	73.04 [2]
Crest Gauge Invert =		73.22

Flow vs. Depth Curve Fitting

Parameter	HEC-RAS
a	-3.02
b	669.45
c	-49420.13
d	1215872.87

Notes:
1. AECOM survey data
2. Based on LiDAR, design information and field measurements.
3. Flow estimates calculated using flow vs. depth rating curve developed using HEC-RAS.
4. n/a = flow depth below crest gauge elevation.
5. Blue text calculated using curve fit 3rd order polynomial $y = ax^3 + bx^2 + cx + d$
6. Orange highlighted measurement used in comparison with SWMHYMO output from observed event.
7. Culvert master rating curve assumes a arch culvert with dimension 3100 x 1960mm.

	Upstream Face			HEC-RAS Upstream Face		Culvert Master Rating Curve [7] Upstream Face	
Reading Date	Depth Reading (m)	Elevation (m)	Approx. Flow (m3/s) [3]	Flow (m^3/s)	W.S. Elev (m)	Flow (m^3/s)	W.S. Elev (m)
May 30, 2012	0.32	73.68	4.18	0.10	73.09	0.10	73.12
June 5, 2012	0.11	73.47	2.43	0.20	73.12	0.20	73.18
June 13, 2012	0.02	73.38	1.74	0.30	73.15	0.30	73.22
June 27, 2012	0.10	73.46	2.35	0.40	73.17	0.40	73.26
July 24, 2012	0.05	73.41	1.96	0.50	73.19	0.50	73.29
August 8, 2012	0.15	73.51	2.76	0.75	73.24	0.75	73.36
August 16, 2012	0.04	73.40	1.89	1.00	73.28	1.00	73.43
September 5, 2012	0.05	73.41	1.96	2.00	73.42	2.00	73.64
September 17, 2012	0.67	74.03	7.42	3.00	73.53	3.00	73.81
September 26, 2012	0.15	73.51	2.76	4.00	73.65	4.00	73.97
October 16, 2012	0.13	73.49	2.59	5.00	73.76	5.00	74.11
November 2, 2012	0.15	73.51	2.76	7.50	74.05	7.50	74.44
November 22, 2012	0.17	73.53	2.92	10.00	74.35	10.00	74.74
July 17, 2013	0.13	73.35	1.53				
August 8, 2013	0.58	73.80	5.33				
August 30, 2013	0.37	73.59	3.44				
October 19, 2013	0.45	73.67	4.15				



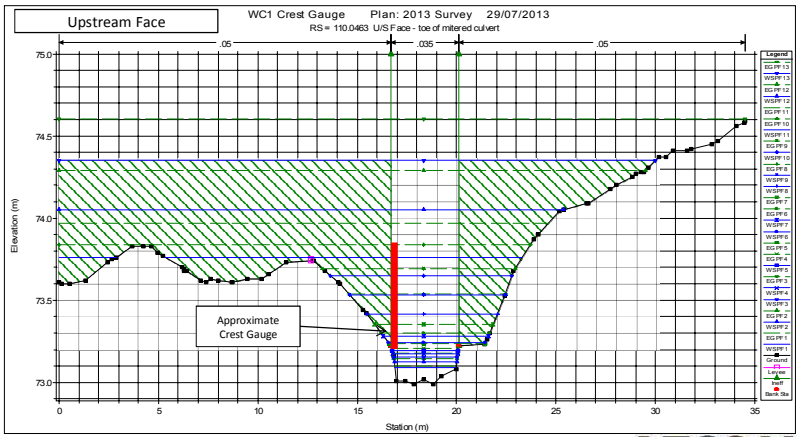


TABLE B-6
CITY OF OTTAWA
SHIRLEY'S BROOK & WATT'S CREEK - PHASE 2 STORMWATER MANAGEMENT STUDY
CREST GAUGE MONITORING LOCATION SB-1 SHIRLEY'S BROOK NORTH BRANCH AT MAXWELL BRIDGE ROAD

Version: 1
Project No.: 60264539
Date: 2/6/2015
Design: GAF/SN/CL

AECOM Survey Measurements

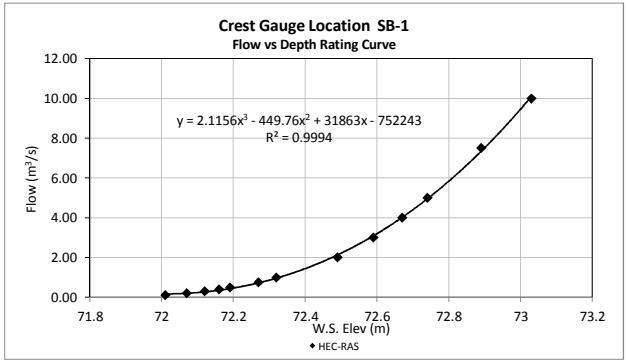
	Upstream	
	2012	**2013**
Crest Gauge Inv. Rod Reading =	3.74	4.30 [1]
W/C Inv. Rod Reading =	4.08	4.425 [1]
Crest Gauge Above W/C Invert =	0.339	**0.130** [1]
HEC-RAS/Surveyed W/C Invert =	71.90	71.88 [2]
Crest Gauge Invert =		72.01

Flow vs. Depth Curve Fitting [7]

Parameter	HEC-RAS
a	2.12
b	-449.76
c	31863.03
d	-752243.48

Notes: *1. AECOM survey data*
2. Based on LiDAR, design information and field measurements.
3. Flow estimates calculated using flow vs. depth rating curve developed using HEC-RAS.
4. n/a = flow depth below crest gauge elevation.
5. Blue text calculated using curve fit 3rd order polynomial $y = ax^3 + bx^2 + cx + d$
6. Orange highlighted measurement used in comparison with SWMHYMO output from observed event.
7. Linear equation was used for elevation lower than the local minimum of the 3rd degree polynomial rating curve.

	Upstream Face			HEC-RAS Upstream Face	
Reading Date	**Depth Reading (m)**	**Elevation (m)**	**Approx. Flow (m3/s)** [3]	**Flow (m^3/s)**	**W.S. Elev (m)**
May 30, 2012	n/a			0.10	72.01
June 5, 2012	0.02	72.26	**0.68**	0.20	72.07
June 13, 2012	n/a			0.30	72.12
June 27, 2012	n/a			0.40	72.16
July 24, 2012	n/a			0.50	72.19
August 8, 2012	n/a			0.75	72.27
August 16, 2012	n/a			1.00	72.32
September 5, 2012	n/a			2.00	72.49
September 17, 2012	0.30	72.54	**2.57**	3.00	72.59
September 26, 2012	0.05	72.29	**0.81**	4.00	72.67
October 16, 2012	0.05	72.29	**0.81**	5.00	72.74
November 2, 2012	0.02	72.26	**0.68**	7.50	72.89
November 22, 2012	0.03	72.27	**0.72**	10.00	73.03
July 19, 2013	0.26	72.27	**0.73**		
August 8, 2013	0.35	72.36	**1.20**		
August 26, 2013	0.12	72.13	**0.30**		
October 20, 2013	0.15	72.16	**0.36**		



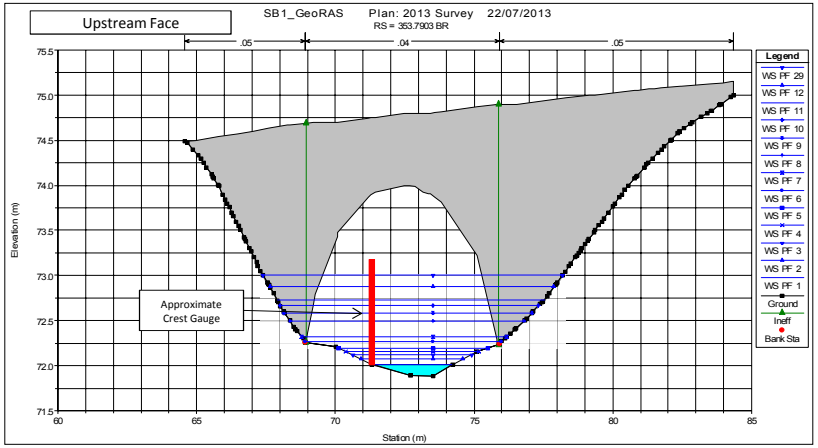


TABLE B-7
CITY OF OTTAWA
SHIRLEY'S BROOK & WATT'S CREEK - PHASE 2 STORMWATER MANAGEMENT STUDY
CREST GAUGE MONITORING LOCATION SB-2 SHIRLEY'S BROOK AT KLONDIKE ROAD

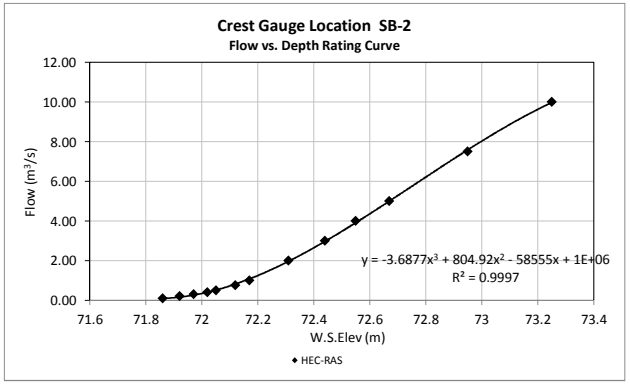
Version: 1
Project No.: 60264539
Date: 2/6/2015
Design: GAF/SN/CL

AECOM Survey Measurements	Upstream	
	2012	2013
Crest Gauge Inv. Rod Reading =	3.66	3.34 [1]
W/C Inv. Rod Reading =	3.92	3.63 [1]
Crest Gauge Above W/C Invert =	0.260	0.294 [1]
HEC-RAS/Surveyed W/C Invert =	71.54	71.54 [2]
Crest Gauge Invert =		71.83

Flow vs. Depth Curve Fitting	
Parameter	HEC-RAS
a	-3.69
b	804.92
c	-58554.63
d	1419644.14

Notes: *1. AECOM survey data*
2. Based on LiDAR, design information and City survey data.
3. Flow estimates calculated using flow vs. depth rating curve developed using HEC-RAS.
4. n/a = flow depth below crest gauge elevation.
5. Blue text calculated using curve fit 3rd order polynomial $y = ax^3 + bx^2 + cx + d$
6. Orange highlighted measurement used in comparison with SWMHYMO output from observed event.

	Upstream Face			HEC-RAS Upstream Face	
Reading Date	Depth Reading (m)	Elevation (m)	Approx. Flow (m3/s) [3]	Flow (m^3/s)	W.S. Elev (m)
May 30, 2012	0.06	71.86	0.10	0.10	71.86
June 5, 2012	0.22	72.02	0.41	0.20	71.92
June 13, 2012	0.13	71.93	0.18	0.30	71.97
June 27, 2012	0.07	71.87	0.11	0.40	72.02
July 24, 2012	0.07	71.87	0.11	0.50	72.05
August 8, 2012	0.05	71.85	0.10	0.75	72.12
August 16, 2012	0.04	71.84	0.10	1.00	72.17
September 5, 2012	0.03	71.83	0.10	2.00	72.31
September 17, 2012	0.59	72.39	2.57	3.00	72.44
September 26, 2012	0.04	71.84	0.10	4.00	72.55
October 16, 2012	0.06	71.86	0.10	5.00	72.67
November 2, 2012	0.03	71.83	0.10	7.50	72.95
November 22, 2012	0.03	71.83	0.10	10.00	73.25
July 19, 2013	0.24	72.07	0.61		
July 29, 2013	0.45	72.28	1.79		
August 26, 2013	0.16	71.99	0.33		
October 19, 2013	0.28	72.11	0.79		



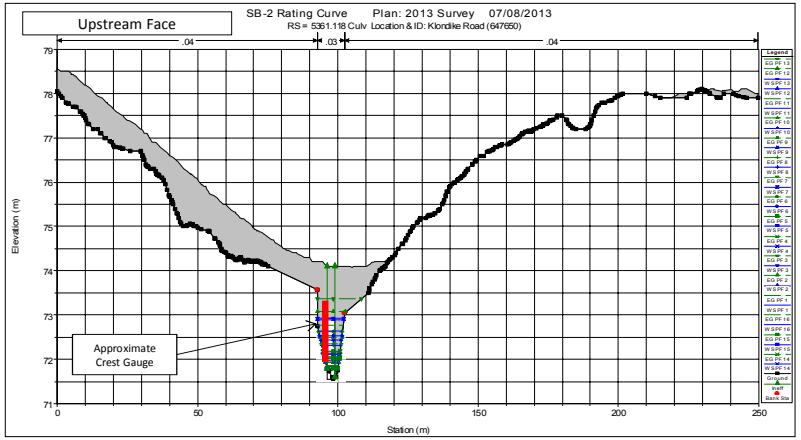


TABLE B-8
CITY OF OTTAWA
SHIRLEY'S BROOK & WATT'S CREEK - PHASE 2 STORMWATER MANAGEMENT STUDY
CREST GAUGE MONITORING LOCATION SB-3 SHIRLEY'S BROOK AT MARCH ROAD

Version: 1
Project No.: 60264539
Date: 2/6/2015
Design: GAF/SN/CL

AECOM Survey Measurements

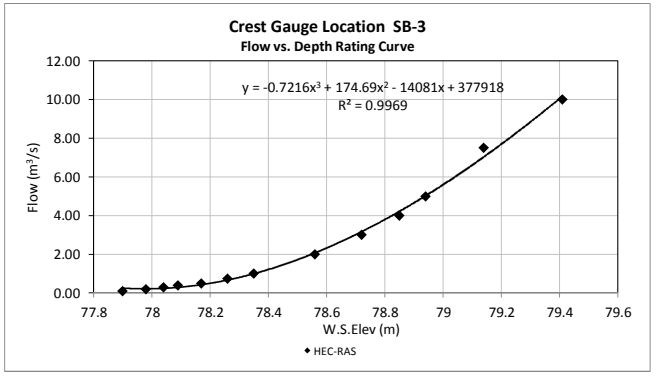
Upstream	2012	2013
Crest Gauge Inv. Rod Reading =	4.24	2.65 [1]
W/C Inv. Rod Reading =	4.56	2.96 [1]
Crest Gauge Above W/C Invert =	0.320	0.311 [1]
HEC-RAS/Surveyed W/C Invert =	77.51	77.51 [2]
Crest Gauge Invert =		77.82

Flow vs. Depth Curve Fitting

Parameter	HEC-RAS
a	-0.72
b	174.69
c	-14080.66
d	377918.49

Notes: *1. AECOM survey data*
2. Based on LiDAR, design information and City survey data.
3. Flow estimates calculated using flow vs. depth rating curve developed using HEC-RAS.
4. n/a = flow depth below crest gauge elevation.
5. Blue text calculated using curve fit 3rd order polynomial $y = ax^3 + bx^2 + cx + d$
6. Orange highlighted measurement used in comparison with SWMHYMO output from observed event.

	Upstream Face			HEC-RAS Upstream Face	
Reading Date	Depth Reading (m)	Elevation (m)	Approx. Flow ($m3/s$) [3]	Flow (m^3/s)	W.S. Elev (m)
May 30, 2012	0.06	77.89	0.26	0.10	77.9
June 5, 2012	0.22	78.05	0.25	0.20	77.98
June 13, 2012	0.13	77.96	0.22	0.30	78.04
June 27, 2012	0.07	77.90	0.25	0.40	78.09
July 24, 2012	0.07	77.90	0.25	0.50	78.17
August 8, 2012	0.05	77.88	0.27	0.75	78.26
August 16, 2012	0.04	77.87	0.28	1.00	78.35
September 5, 2012	0.03	77.86	0.30	2.00	78.56
September 17, 2012	0.59	78.42	1.30	3.00	78.72
September 26, 2012	0.04	77.87	0.28	4.00	78.85
October 16, 2012	0.06	77.89	0.26	5.00	78.94
November 2, 2012	0.03	77.86	0.30	7.50	79.14
November 22, 2012	0.03	77.86	0.30	10.00	79.41
July 19, 2013	0.27	78.09	0.29		
August 8, 2013	0.57	78.39	1.17		
September 2, 2013	0.31	78.13	0.35		
October 19, 2013	0.25	78.07	0.27		



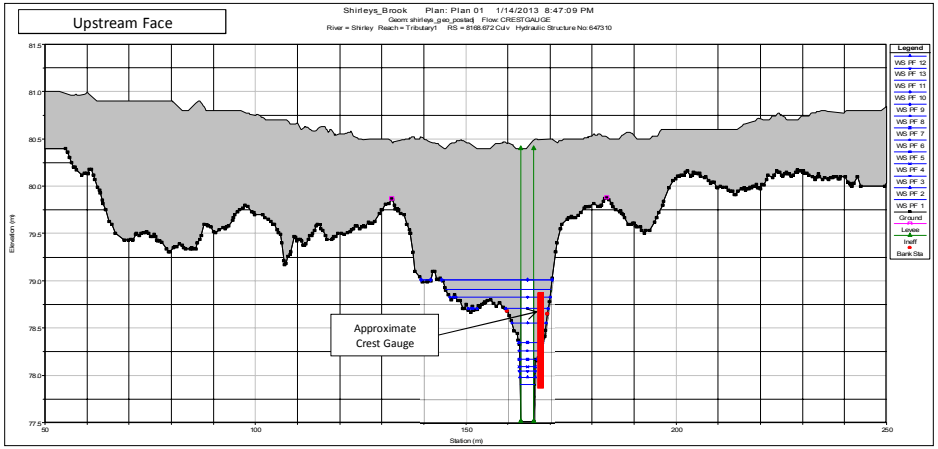


Figure B-1 - Supplemental 2013 Rainfall Data

Fire Hall and Glen Cairn

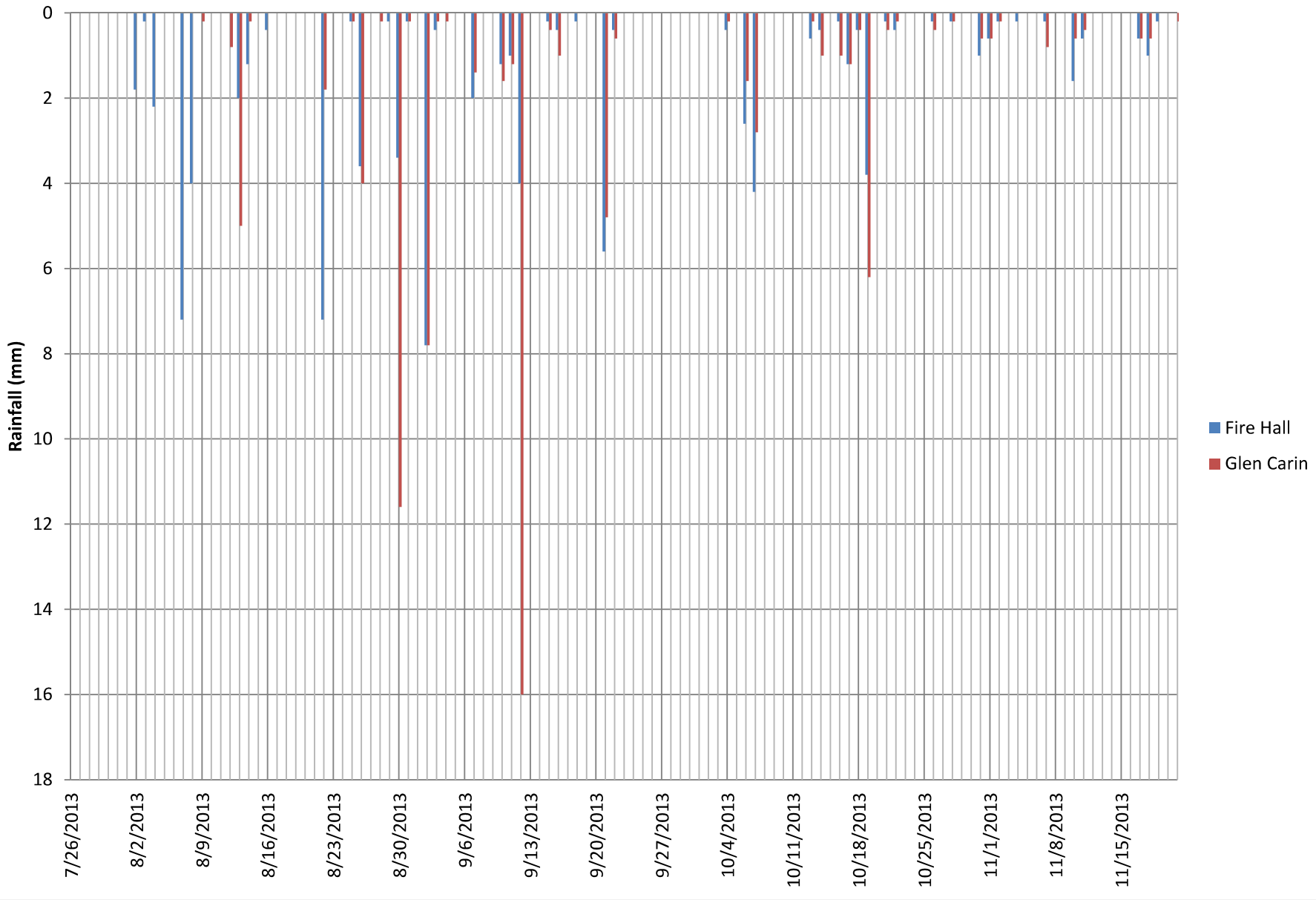


Figure B-2 - Supplemental 2013 Depth Logger Data

Kizell Drain at Hertzberg Road KD-1

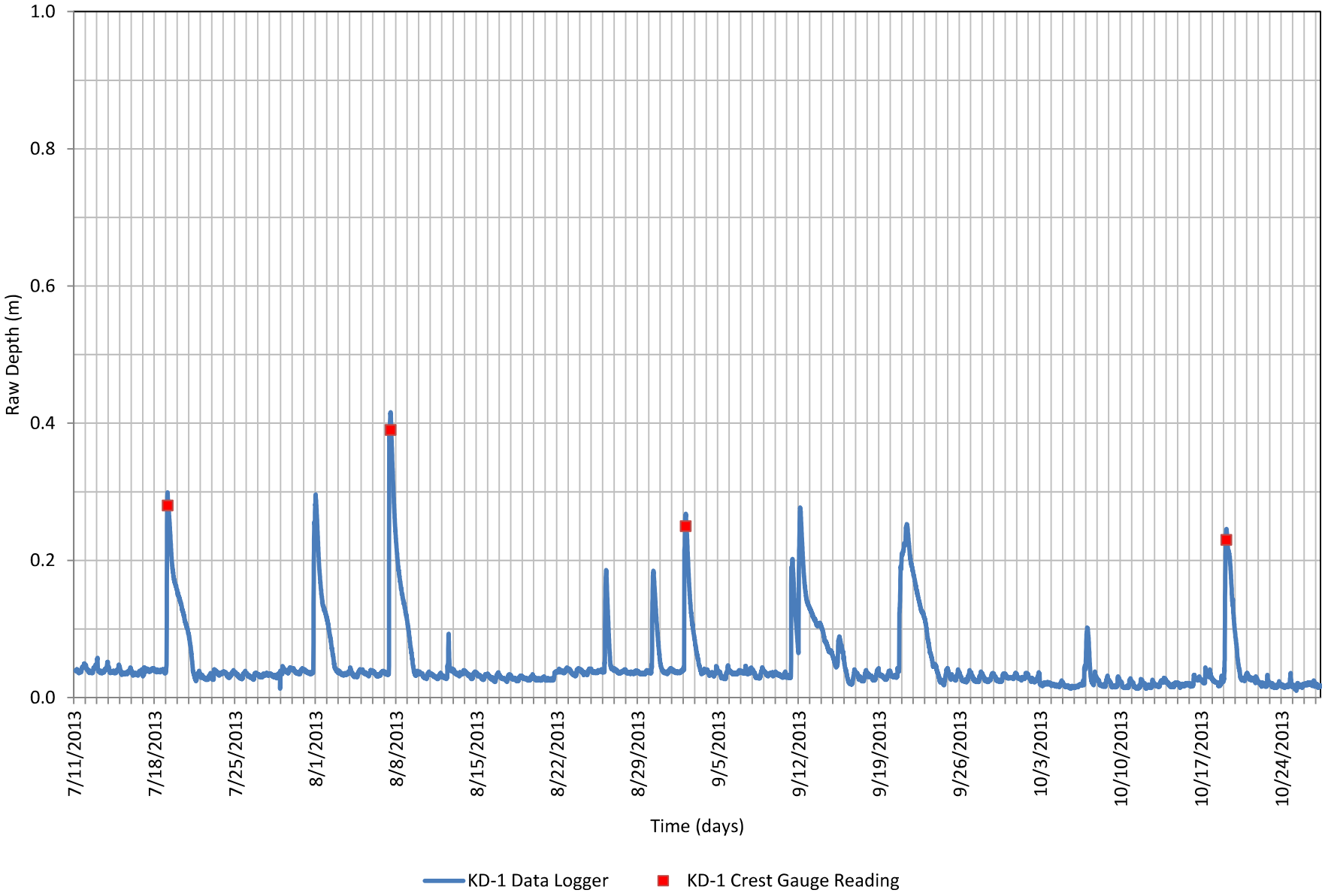


Figure B-3 - Supplemental 2013 Depth Logger Data

Watts Creek Upstream of Kizell Drain WC-1

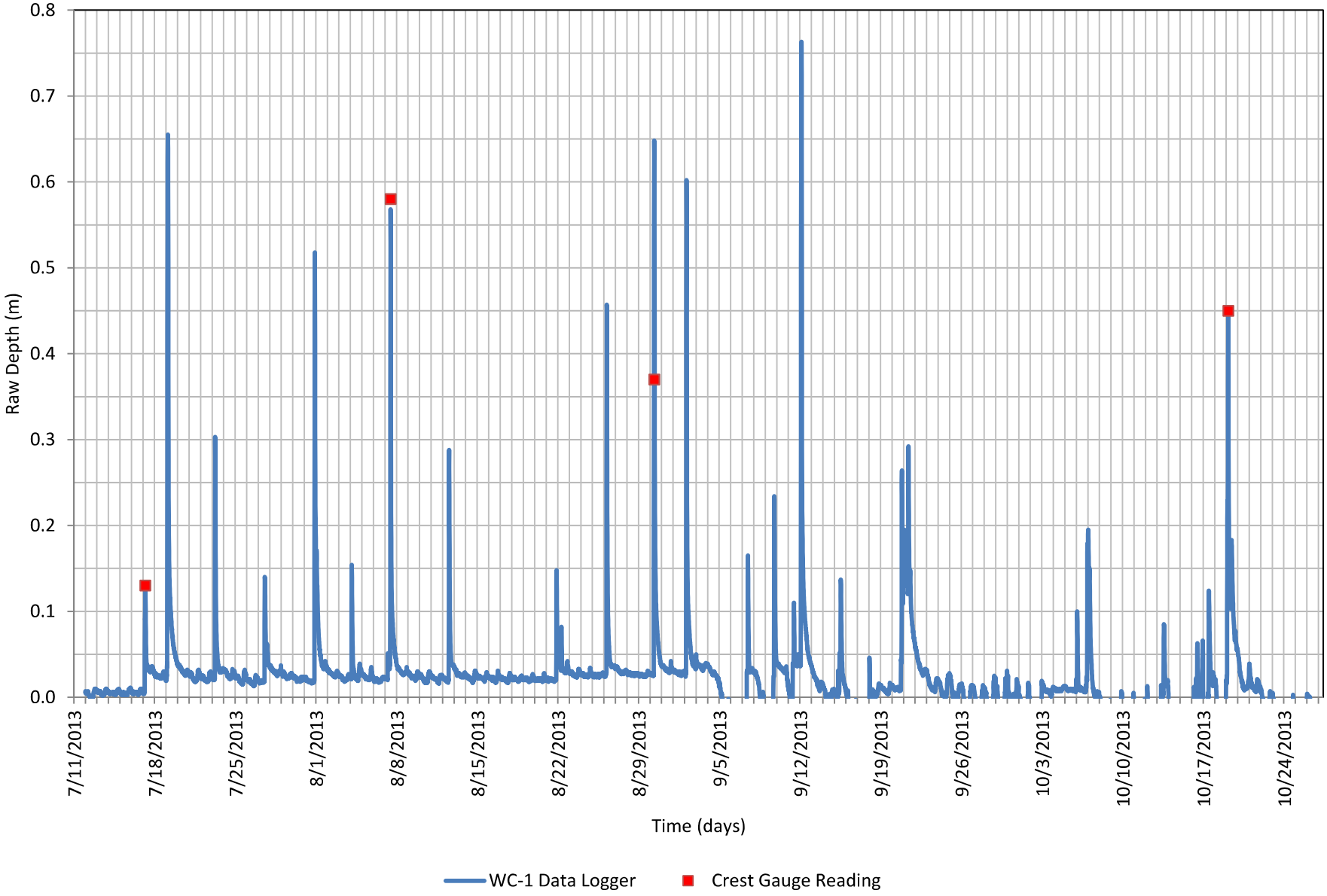


Figure B-4 - Supplemental 2013 Depth Logger Data

Shirley's Brook at Maxwell Bridge Road SB-1

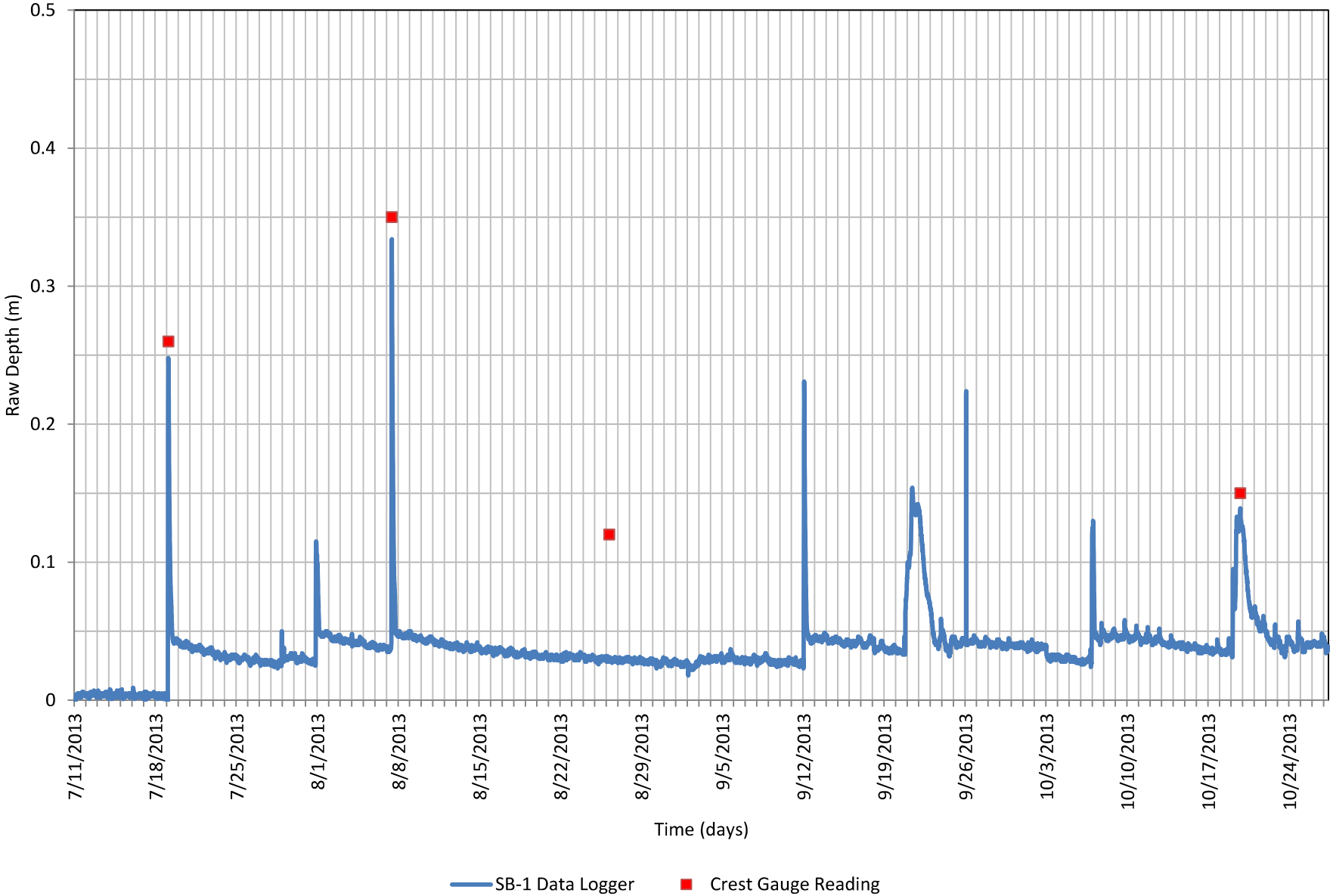


Figure B-5 - Supplemental 2013 Depth Logger Data

Shirley's Brook at Klondike Road SB-2

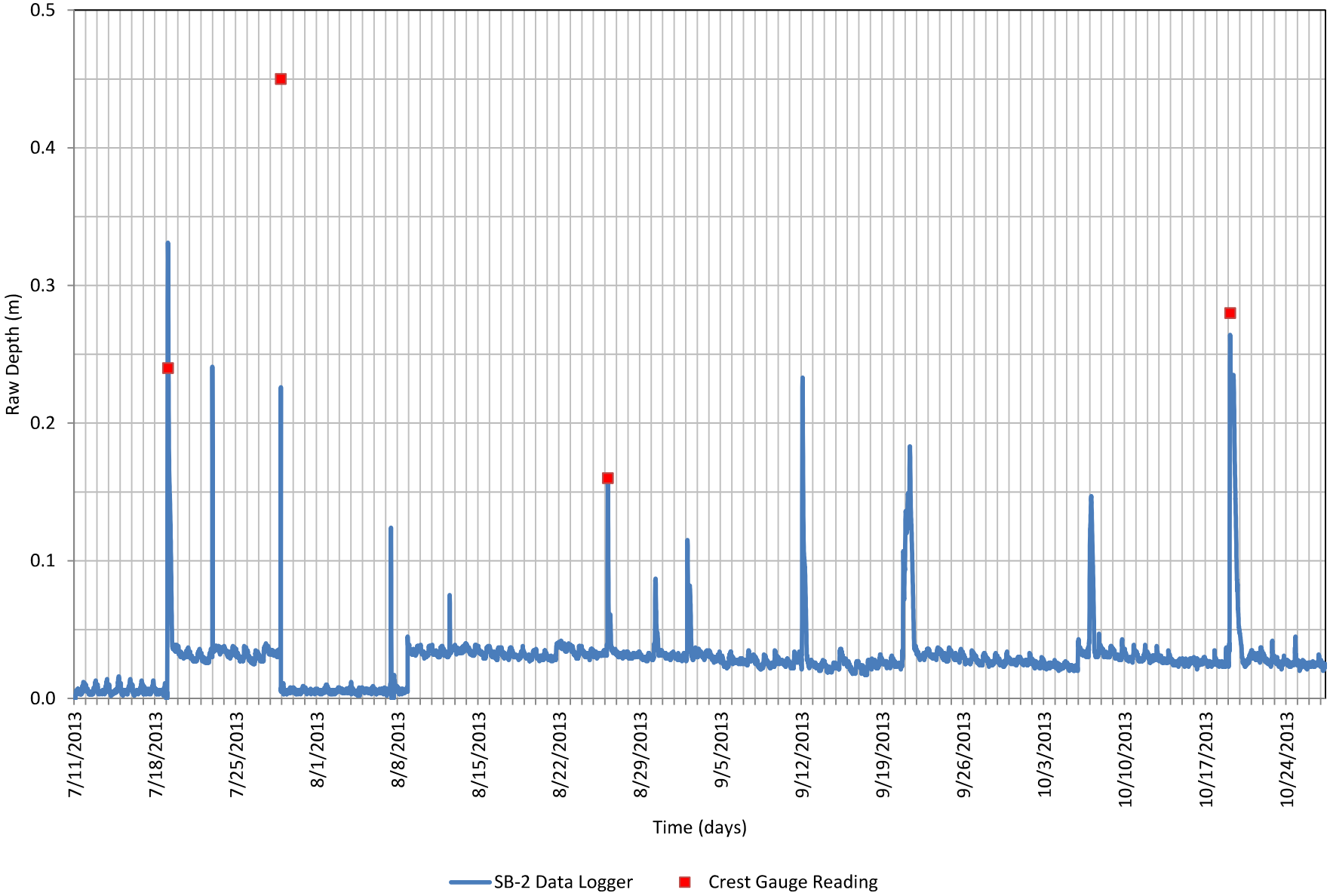


Figure B-6 - Supplemental 2013 Depth Logger Data

Shirley's Brook at March Road SB-3