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## 2D Spill Analysis for Proposed Development

**1942 Woodview Avenue**  
City of Pickering

October 2021

Prepared By:

**Valdor Engineering Inc.**

Prepared For:

**10861808 CANADA CORP.**

File: **21150**



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## 1.0 INTRODUCTION

Valdor Engineering was retained by 10861808 CANADA CORP. to complete a two-dimensional (2D) spill analysis for the proposed expansion of an existing building located at 1942 Woodview Avenue in Pickering within the Petticoat Creek watershed. The subject property currently resides within an identified spill zone based on the Toronto and Region Conservation Authority's (TRCA) current approved floodplain mapping. Due to the limitations of the existing steady-state HEC-RAS modelling utilized in the current approved floodplain mapping, the detailed characteristics and extent of the identified spill areas over Finch Avenue located to the north of the subject site are not fully understood nor have they been thoroughly assessed. New hydraulic modelling tools such as MIKE FLOOD allow for the improved characterization of the flooding conditions and how this affects land use planning within existing areas of development that currently reside within the floodplain or within identified spill zones. This type of modelling also allows for the establishment of appropriate flood proofing standards for discrete developments areas, allows for the detailed assessment of flood risk conditions for the purposes of emergency management and enables the identification of flood mechanisms and possible flood mitigation solutions. As such, the owner has been requested by the TRCA to provide a spill analysis using MIKE FLOOD for the Regional storm to confirm that the subject property is not significantly impacted by flooding.

### 1.1 Study Area

The subject site is located at 1942 Woodview Avenue in the City of Pickering within an identified spill area during the Regulatory Storm (Hurricane Hazel). The location of the subject site including the identified spill areas based on the current approved HEC-RAS hydraulic model are illustrated in **Figure 1.1**. The subject property is located on the west side of Woodview Avenue between Finch Avenue East and Pine Grove Avenue. A copy of the current approved TRCA floodplain map sheets for the area is provided in **Attachment 'A'**.

### 1.2 Pre-consultation with City of Pickering and TRCA

A Pre-Consultation Meeting regarding the proposed development at 1942 Woodview Avenue was held with the City of Pickering on 09 March 2021. Based on the meeting minutes and comments received following the Pre-Consultation Meeting with the City, it was identified by the TRCA that a spill investigation was required to demonstrate any potential impacts of the identified spill for the Regional storm at the location of the subject site and proposed development. Based on subsequent correspondence with the TRCA, the TRCA indicated they were planning to complete a spill analysis for this area as part of an overall characterization of spills within the Petticoat Creek Watershed but that the results were not yet available. To avoid any potential delay in the overall development review and approvals process, it was decided to proceed with the independent spill analysis as originally planned and as approved by the Client.

### 1.3 Purpose of Report

The purpose of this report is to characterize the extent of the identified spill for the Regional Storm that overtops Finch Avenue west of Woodview Avenue and to confirm that the subject site is not significantly impacted by the spill. This is required by the TRCA to confirm whether development restrictions may apply.

### 1.4 Project Scope and Approach

The scope and the key steps of this report are as follows:

- Review available background information and documents.
- Prepare a 2D MIKE FLOOD hydraulic model to define and characterize the Regional storm flow that spills over Finch Avenue west of Woodview Avenue and to the north of the subject site.

## 1.5 Previously Completed Available Studies and Information

A review of the following studies obtained from the TRCA was completed in preparing this report:

- Greenland Consulting Engineers, *Petticoat Creek Watershed Hydrology Update, Final Report*, October 2006.
- TRCA, *Floodplain Mapping Program, Map Sheet Nos. 3 and 4, Petticoat Creek*, 22 September 2006.



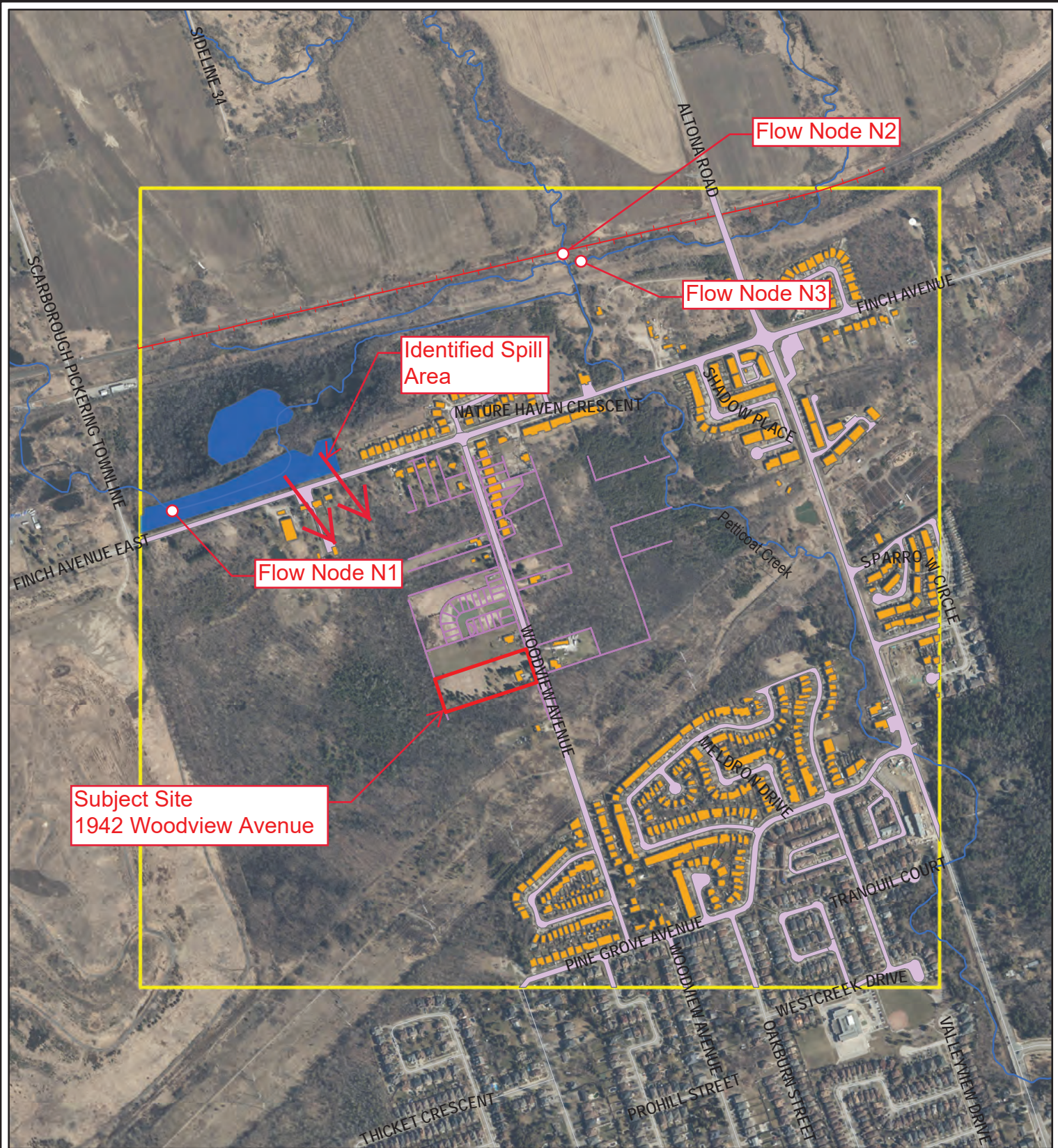


Figure 1.1

LOCATION MAP

2D SPILL ANALYSIS

1942 Woodview Avenue  
City of Pickering

LEGEND

- Subject Site
- MIKE 21 2D Model Extent
- River Network
- WaterBody
- Buildings
- Road Paved
- Parcel Boundary
- Rail Road





## 2.0 MIKE FLOOD MODEL DEVELOPMENT

A MIKE FLOOD model was prepared to complete the spill analysis using the following approach and in compliance with standard TRCA requirements:

- A model domain specific to the study area was defined as shown in **Figure 1.1**.
- LiDAR data was obtained from First Base Solutions and used to prepare the 2D bathymetry for the MIKE 21 Model. The digital elevation model prepared from the 2019 LiDAR is provided in **Figure 2.1**. The building footprints were used to modify the bathymetry. A land value of 145.0 m was used as the non-flooded area. The MIKE 21 2D bathymetry is provided in **Figure 2.2**.
- The model bathymetry was defined using a Single Grid that represents hydraulic controls for the overland flow, such as roadways and major system flow routes and for the channel flow, such as river and water areas.
- A GIS land use/land cover layer was prepared based on the high resolution orthophoto (2018). MIKE 21 2D Roughness data was prepared based on GIS land use/ land cover layer using TRCA standard roughness values. In the MIKE 21 model, the roughness for the entire model domain (*i.e.* both the overland flow and channel flow area) was defined as Manning number, M (which is 1/n). The MIKE 21 2D roughness map is provided in **Figure 2.3**.
- The wetting, flooding, and drying parameters were defined to better represent overland flooding in an urban setting as follows as per TRCA standard practices:
  - Flooding value - 0.02 m; and,
  - Drying value - 0.01 m.
- The downstream boundary condition was defined using an artificially created ponding area and a constant water level. The artificial ponding area was located in the south-east corner of the bathymetry. A constant water level of 127.0 m was used for the ponded area. The ground elevation in the river area at this downstream boundary location is generally below 119.0 m. The elevations at the subject site are generally above 132.0 m, which means an elevation difference between the subject site and the downstream south-east boundary location is more than 13.0 m. This large difference in ground elevation ensures there is virtually no possibility of downstream boundary influence on the model results for the subject site.
- The upstream north and west 2D boundaries were used as closed boundaries. The Regional inflow inputs were directly applied on the MIKE 21 2D bathymetry as isolated sources using the Source and Sink options of the MIKE 21 editor.

The flow inputs for the MIKE 21 model were obtained from the current approved hydrology report (*Petticoat Creek Watershed Hydrology Update, Final Report*, October 2006). Excerpts are provided in **Attachment ‘A’** for reference. The peak flows used are provided in **Table 2.1** and the flow node locations are provided in **Figure 1.1**.

**Table 2.1: MIKE 21 FLOW NODES AND STEADY PEAK FLOWS**

Mike Flood Flow Node	Location	Type	Flow (m <sup>3</sup> /s)
N1	Downstream of Scarborough Pickering Townline and just north of Finch Avenue East near intersection (Q <sub>p</sub> from TRCA FN#113 applied at N1)	Total Peak Flow	18.75
N2	Immediately downstream of the railroad and upstream of the confluence with other tributaries west of Altona Road (Q <sub>p</sub> from TRCA FN#110 applied at N2)	Total Peak Flow	62.40
N3	Downstream of Altona Road and just upstream of the confluence with the main branch of Petticoat Creek (Q <sub>p</sub> from TRCA FN#127 applied at N3)	Total Peak Flow	74.34

Steady peak flow inputs were used in running the MIKE 21 model as a conservative measure and in keeping with conventional TRCA policy for 2D modelling. The MIKE 21 model was run with a time step of 0.05 seconds and for a total run time of 7.0 hours. The run time was selected as a conservative measure to ensure that the full extent of any spills downstream of Finch Avenue and in the vicinity of the subject property would be identified.

## 2.1 Critical Spill Analysis

In preparing the MIKE FLOOD model to simulate the impact of any spills from Petticoat Creek at the location of the subject site, a few flow scenarios were investigated to ensure a conservative approach and results. The investigations included a critical analysis for the spill across Finch Avenue west of Woodview Avenue and a critical analysis for the spill between Woodview Avenue and Altona Road.

### 2.1.1 Critical Analysis re: Spill Across Finch Avenue West of Woodview Avenue

During the development of the hydraulic model, a high point of land was noted separating the existing basin and wetland north of Finch Avenue and east of Scarborough Pickering Townline. Given the location of this high point of land near the west limit of the model surface extent and the uncertainty regarding the Regional spill characteristics across Scarborough Pickering Townline at this location, two scenarios were investigated to determine whether locating the flow node to the north of the high point of land (Scenario 1) or south of the high point of land (Scenario 2) resulted in different flow characteristics regarding the spill across Finch Avenue west of Woodview Avenue and downstream at the location of the subject site. To assess these two scenarios, water surface elevations (WSELs) were measured adjacent the subject site. The WSELs adjacent the site for Scenario 1 and Scenario 2 varied between 132.760 m and 133.314 m and 132.760 m and 133.315 m, respectively. As such, it was determined that the flow node locations associated with Scenario 2 were appropriate for the spill analysis. The hydraulic results and location of flow nodes and WSEL comparison points (CPs) for Scenario 1 and Scenario 2 are provided in **Figure B.1** and **Figure B.2**, respectively in **Attachment ‘B’**. The comparison of WSELs for the two scenarios is provided in **Table B.1** in **Attachment ‘B’**.

### 2.1.2 Critical Analysis re: Spill Between Woodview Avenue and Altona Road

Upon inspection of the LiDAR surface, it was observed that the surface elevations at watercourse crossings reflect the elevation of the road deck (*i.e.* no modification of the LiDAR surface was made at watercourse crossings). Rather than code in the details associated with the hydraulic structures for Finch Avenue west of Altona Road and two other structures upstream of the Finch Avenue culvert at the abandoned road crossing and the railroad tracks, a conservative approach was employed whereby the crossings were left as defined by the LiDAR and without culverts. Regarding the spill across Finch Avenue west of Woodview Avenue, the exclusion of these three watercourse crossings (*i.e.* assuming the road deck elevation without a culvert) was conservative in the sense that, if anything, this would result in more spill across Finch Avenue west of Woodview Avenue and potentially more flow and greater spill extent in the vicinity of the subject site.

Regarding the spill identified between Woodview Avenue and Altona Road, however, this approach was not conservative (*i.e.* the attenuation of flow upstream of Finch Avenue west of Altona Road may reduce the extent of spill from Altona Road west to Woodview Road (should the potential for a westerly spill path exist). To address this issue and to ensure a conservative approach, a scenario was run whereby the location of the two incremental flow nodes (N2 and N3) at the confluence of watercourse tributaries immediately south of the railroad tracks were moved to immediately south of Finch Avenue west of Altona Road. By relocating the incremental flow nodes to south of Finch Avenue, any attenuating effects of the watercourse crossings was eliminated and thus ensuring a conservative simulation of flow conditions downstream of Finch Avenue regarding any potential flow west of Altona Road to Woodview Avenue. To assess this scenario, water surface elevations (WSELs) were measured adjacent the subject site. The WSELs adjacent

the site for Scenario 3 varied between 132.758 m and 133.308 m. As noted earlier, the WSELs for Scenario 2 varied between 132.760 m and 133.315 m. As such, it was confirmed that even under the conservative flow conditions associated with Scenario 3, the spill between Woodview Avenue and Altona Road occurs ultimately from west to east and there is not ultimate spill from east to west. The hydraulic results and location of flow nodes and WSEL comparison points for Scenario 3 and Scenario 2 are provided in **Figure B.3** and **Figure B.2**, respectively, in **Attachment ‘B’**. The comparison of WSELs for the two scenarios is provided in **Table B.1** in **Attachment ‘B’**.

Based on the critical spill investigations noted above, Scenario 2 was selected as the most appropriate and conservative approach to use for the spill analysis for the subject site located at 1942 Woodview Avenue.

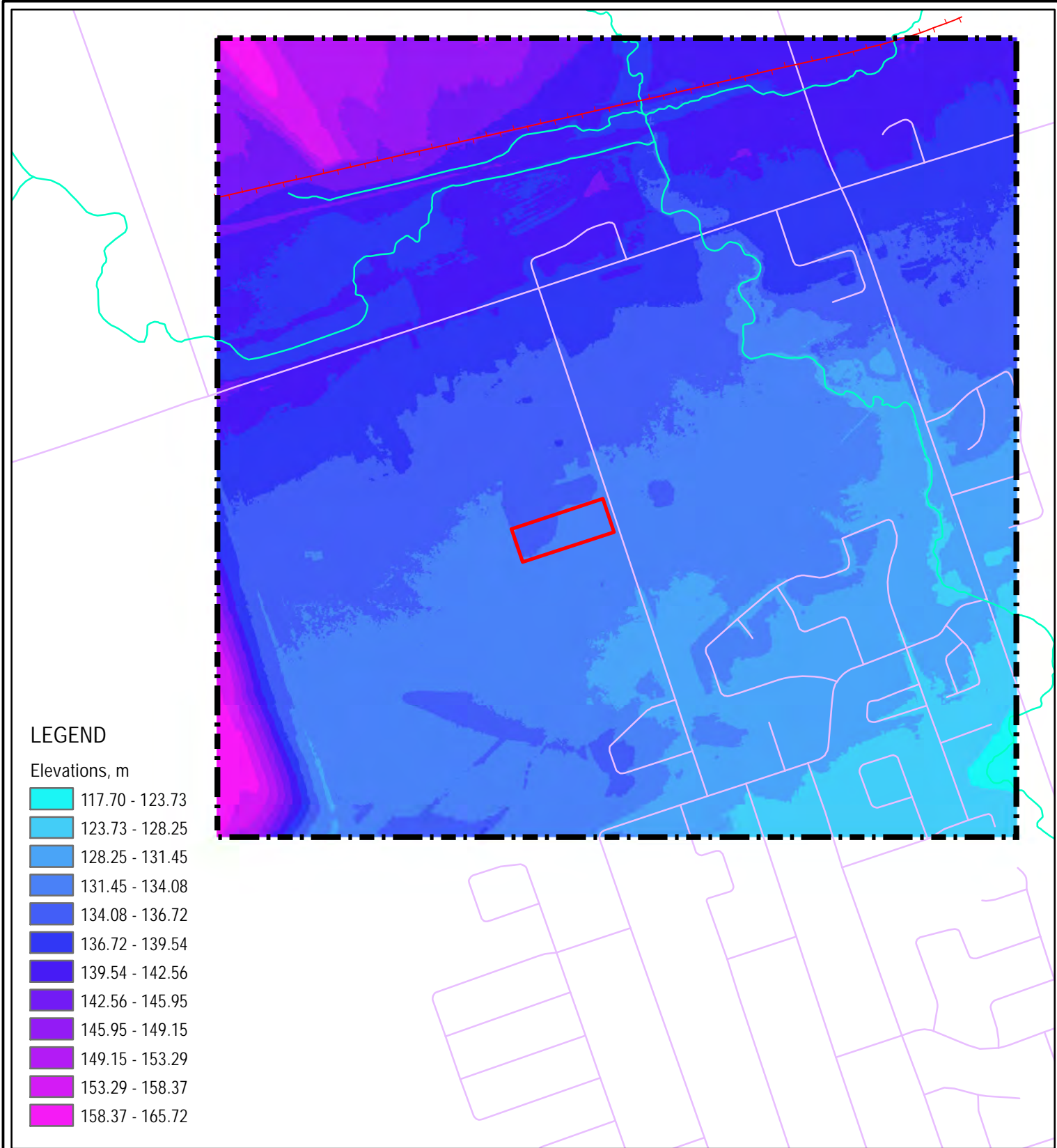


Figure 2.1

DIGITAL ELEVATION MODEL

**LEGEND**

- LiDAR DEM Extent
- River Network
- Subject Site
- Rail Road
- Road



2D SPILL ANALYSIS  
 1942 Woodview Avenue  
 City of Pickering



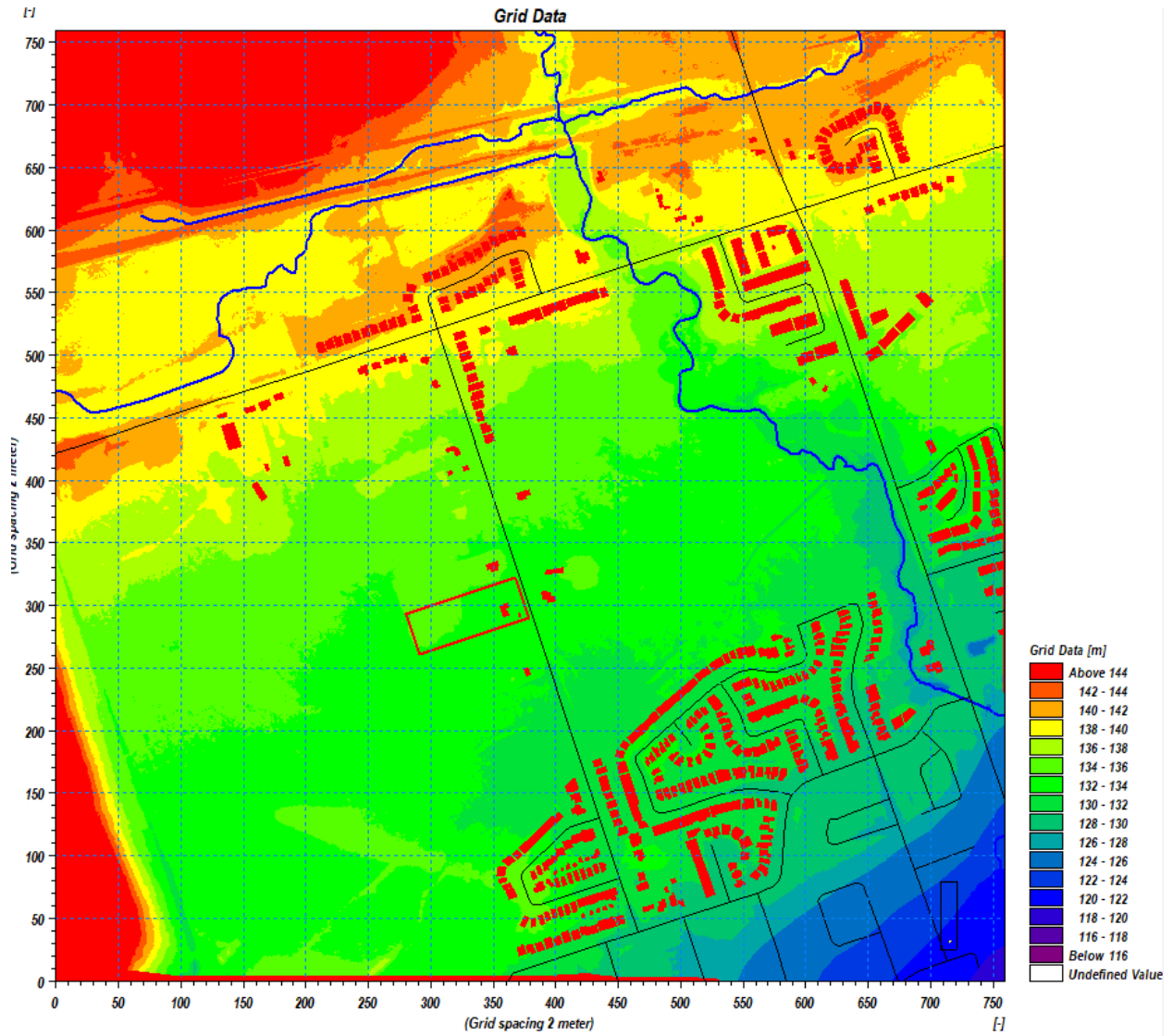


Figure 2.2: MIKE 21 2D Bathymetry

2D SPILL ANALYSIS  
 1942 Woodview Avenue  
 City of Pickering

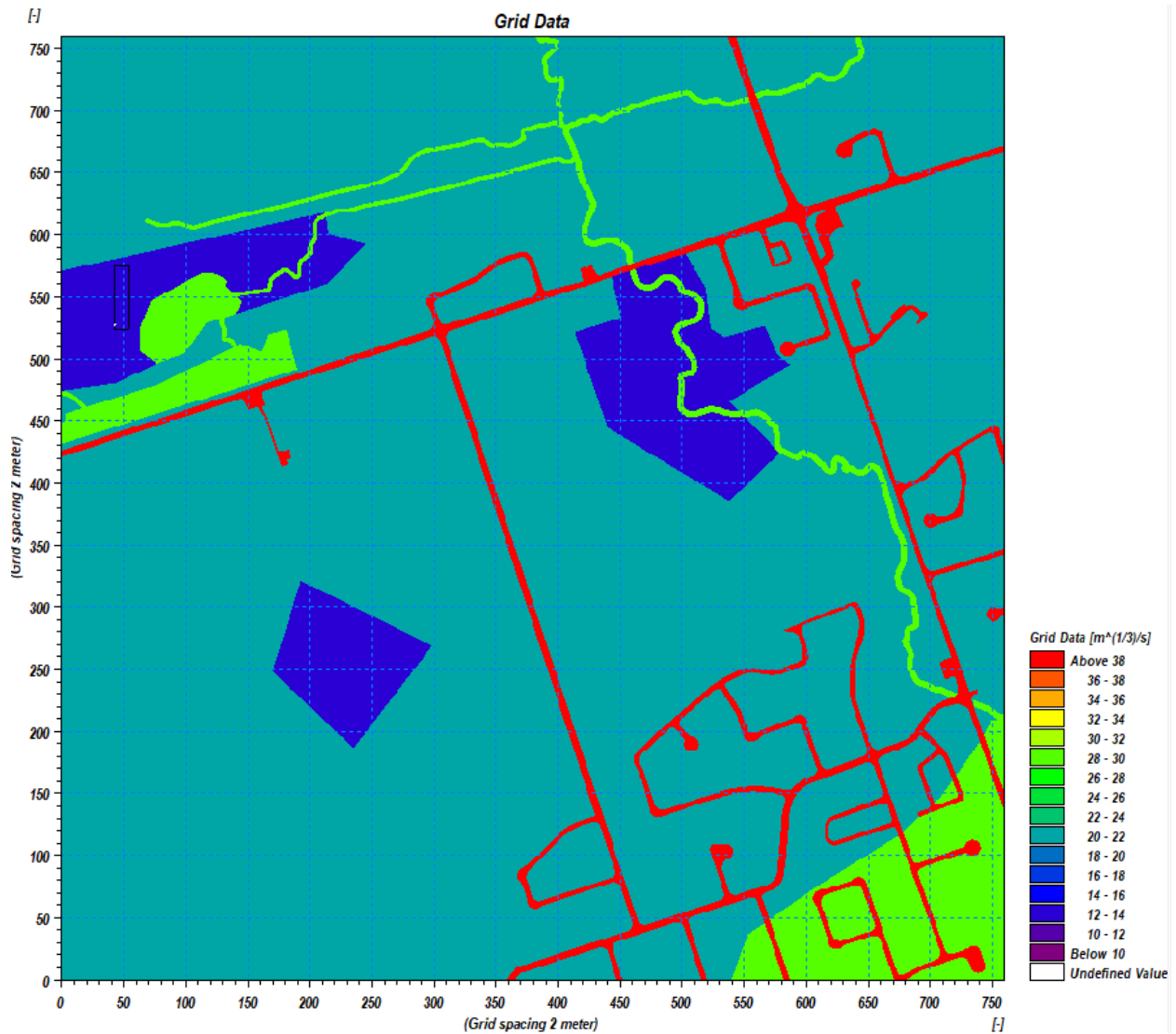


Figure 2.3: MIKE 21 2D Roughness

2D SPILL ANALYSIS  
 1942 Woodview Avenue  
 City of Pickering

Landuse /Landcover	Manning Number, M (i.e. 1/n)
Paved Impervious	40
Highly Vegetated Area	12.50
Pervious Area	20
River and Water Area	28.57



### 3.0 RESULTS OF THE SPILL ANALYSIS

The results of the MIKE FLOOD model were analyzed to determine whether the subject site lies within the current identified spill area. The flood flow direction mapping and flood depth mapping for the spill area near the subject site is provided in **Figure 3.1** and **Figure 3.2**, respectively. In addition, flood velocity mapping is provided in **Figure 3.3**. Based on the results of the MIKE FLOOD modelling, the Regional storm flow from Petticoat Creek spills over Finch Avenue to the west of Woodview Avenue and travels overland to the south in the vicinity of the subject site where it then connects with Woodview Avenue and continues to pass to the south. There is also a secondary spill that travels east from the primary spill path to Woodview Avenue north of the subject property. At this location a portion of this secondary spill continues south on Woodview Avenue and another portion spills east of Woodview Avenue and ultimately connects with Petticoat Creek near Altona Road. As illustrated on **Figure 3.2**, the subject property is virtually unaffected by the existing Regional spill route. There are only very minor encroachments of spill within the subject property limits associated with the primary spill path to the west and south of the site and the secondary spill path along Woodview Avenue to the east of the site. The depth of flooding within the very minor spill encroachment along the west and south property boundary varies between 0.00 m and 0.60 m and the velocity lies between 0.00 m/s and 0.90 m/s. The depth of flooding within the very minor spill encroachment along the east property boundary lies between 0.00 m and 0.30 m and the velocity varies between 0.00 m/s and 0.30 m/s. As such, we do not foresee any issues with floodproofing the site and there will be no significant impacts regarding any fill required within the site for floodproofing. There may also be a 10 m buffer along the west and south limits of the proposed development where fill will not be permitted. The minor flood encroachment along the east limit of the site is very shallow (*i.e.* < 0.30 m).

#### 3.1 Safe Ingress and Egress

As per the depth and velocity results, the maximum depth of flooding along Woodview Avenue north to Finch Avenue is 0.16 m and the maximum depth of flooding along Finch Avenue west of Woodview Avenue is 0.25 m as noted on **Figure 3.1**. As such, there is a safe route for site ingress and egress that meets the criteria for low risk flooding as per MNR flood risk criteria (*i.e.* < 0.30 m).



[m]

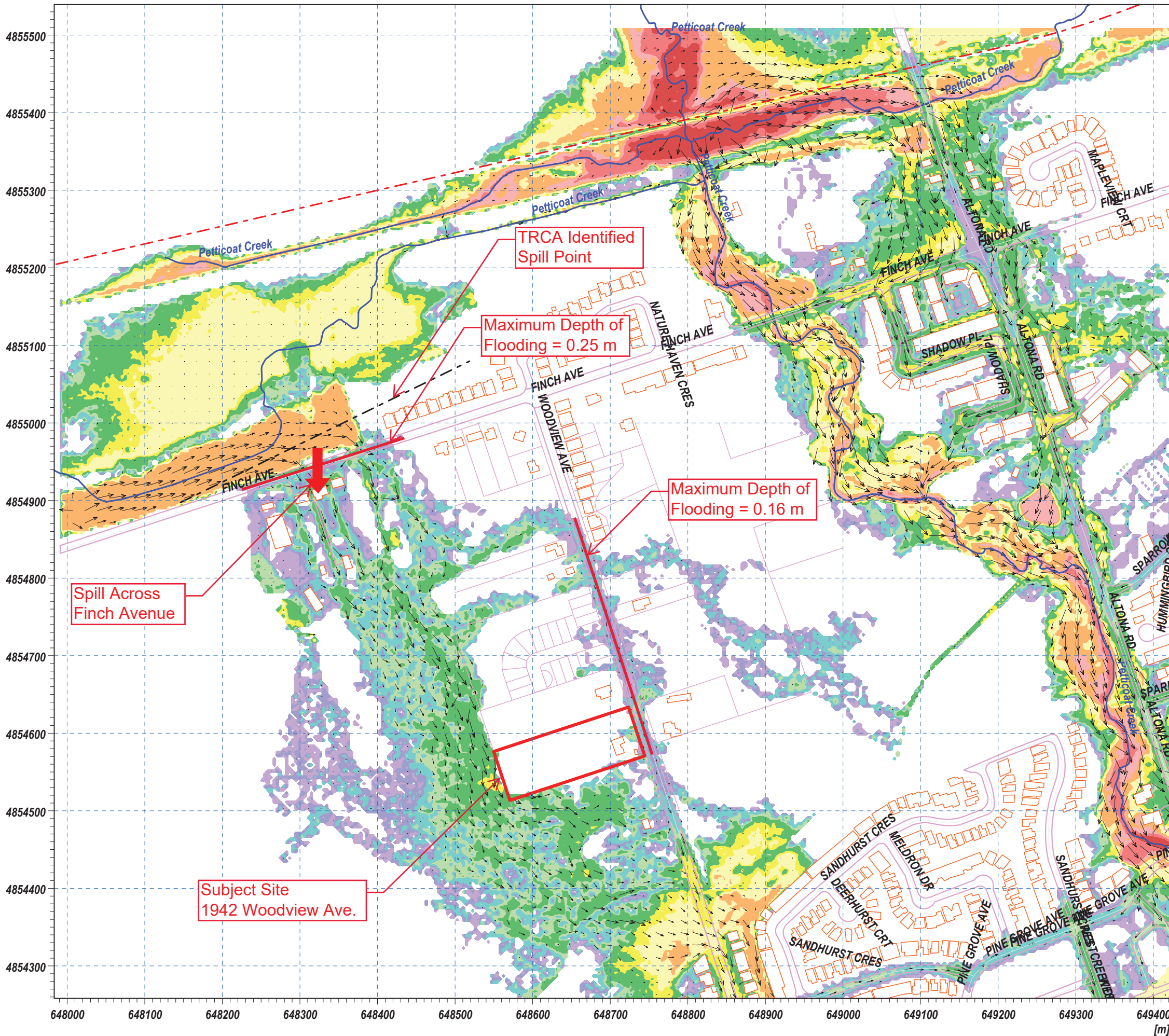


Figure 3.1  
 REGIONAL FLOOD FLOW DIRECTION MAP  
 1942 Woodview Avenue  
 City of Pickering

Total water depth [m]

Dark Red	Above 3.600
Red	2.400 - 3.600
Orange-Red	1.800 - 2.400
Orange	1.200 - 1.800
Yellow	0.800 - 1.200
Light Green	0.600 - 0.800
Green	0.300 - 0.600
Light Blue-Green	0.200 - 0.300
Teal	0.100 - 0.200
Blue	0.050 - 0.100
Light Blue	0.000 - 0.050
White	Below 0.000
White	Undefined Value

[m]

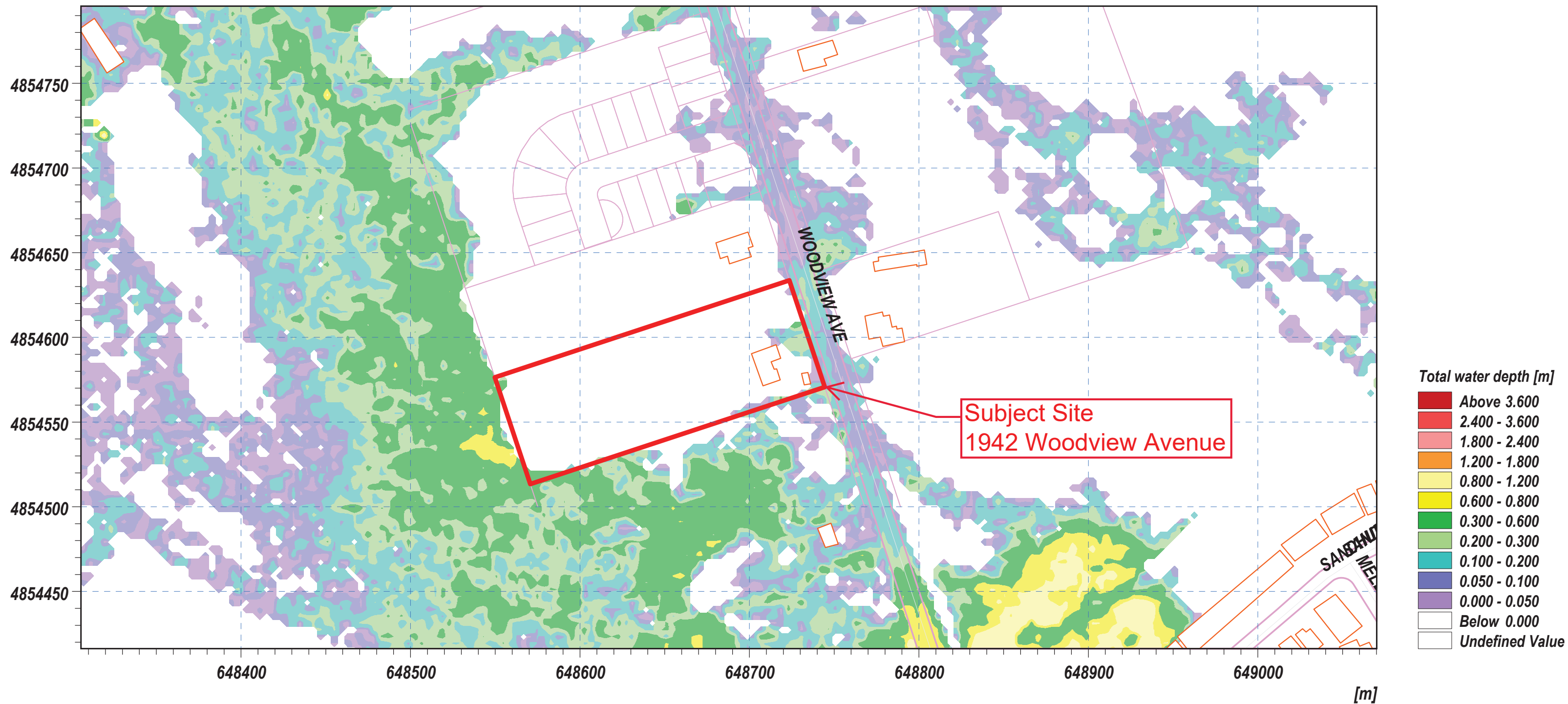


Figure 3.2  
REGIONAL FLOOD DEPTH MAP  
1942 Woodview Avenue  
City of Pickering



[m]

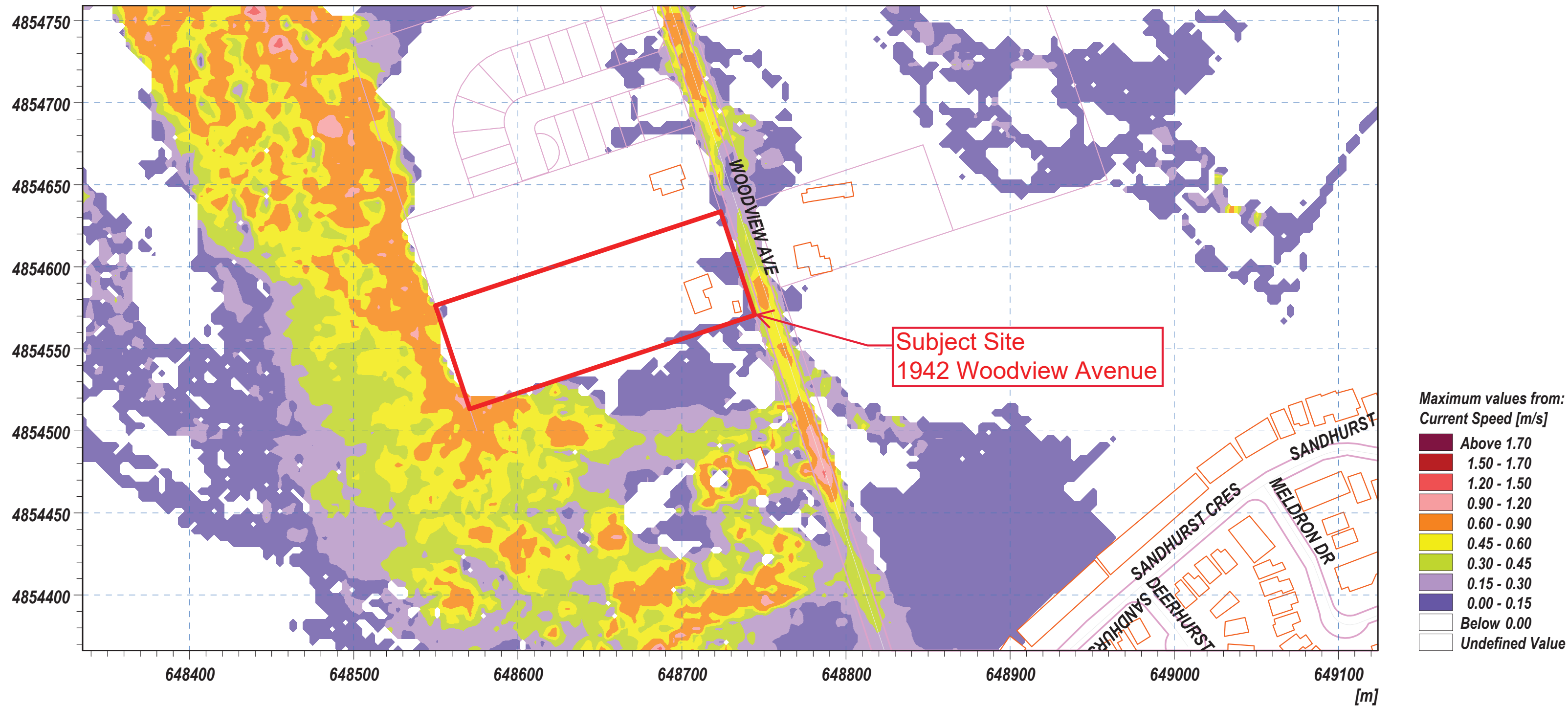


Figure 3.3  
REGIONAL FLOOD VELOCITY MAP  
1942 Woodview Avenue  
City of Pickering

#### **4.0 SUMMARY AND CONCLUSIONS**

On behalf of our Client, 10861808 CANADA CORP., Valdor Engineering has completed the *2D Spill Analysis for Proposed Development – 1942 Woodview Avenue* report. The key findings and results of the study are summarized as follows:

1. The results of the MIKE FLOOD model indicate that a spill occurs during the Regional storm from Petticoat Creek and across Finch Avenue west of Woodview Avenue. The primary spill travels south and passes to the west and south of the subject property. A secondary spill was also identified that travels east from the primary spill to Woodview Avenue north of the subject property. At this location a portion of this secondary spill continues south on Woodview and another portion spills to the east of Woodview Avenue and ultimately connects with Petticoat Creek near Altona Road.
2. It was demonstrated that the property located at 1942 Woodview Avenue in the City of Pickering is not significantly impacted by the identified spill from Petticoat Creek across Finch Avenue west of Woodview Avenue and to the south for the Hurricane Hazel storm.
3. The results of the MIKE FLOOD hydraulic model demonstrate that safe ingress and egress for the subject site is achieved north from the site along Woodview Avenue and west along Finch Avenue for the Regional storm.

## 5.0 RECOMMENDATIONS

The following summarizes the report recommendations:

1. Given that the property located at 1942 Woodview Avenue in the City of Pickering is not significantly impacted by the identified spill across Finch Avenue west of Woodview Avenue, the development criteria regarding construction within the floodplain should not apply other than confirmation that the proposed development is floodproofed regarding the minor encroachment of spill within the property boundary and that safe ingress and egress can be achieved for the Regional storm.

## 6.0 REFERENCES

- Greenland Consulting Engineers, *Petticoat Creek Watershed Hydrology Update, Final Report*, October 2006.
- TRCA, *Floodplain Mapping Program, Map Sheet Nos. 3 and 4, Petticoat Creek*, 22 September 2006.

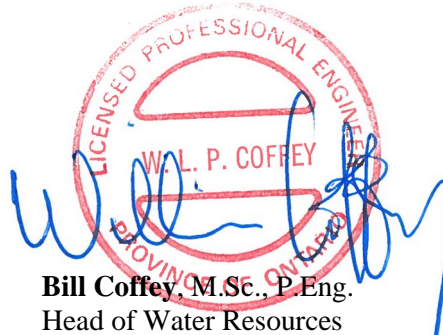
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Respectfully Submitted,

**VALDOR ENGINEERING INC.**



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Water Resources Analyst



**Bill Coffey, M.Sc., P.Eng.**  
Head of Water Resources

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This report was prepared by Valdor Engineering Inc. for the account of 10861808 CANADA CORP.. The comments, recommendations and material in this report reflect Valdor Engineering Inc.'s best judgment in light of the information available to it at the time of preparation. Any use of which a third party makes of this report, or any reliance on, or decisions made based on it, are the responsibility of such third parties. Valdor Engineering Inc. accepts no responsibility whatsoever for any damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

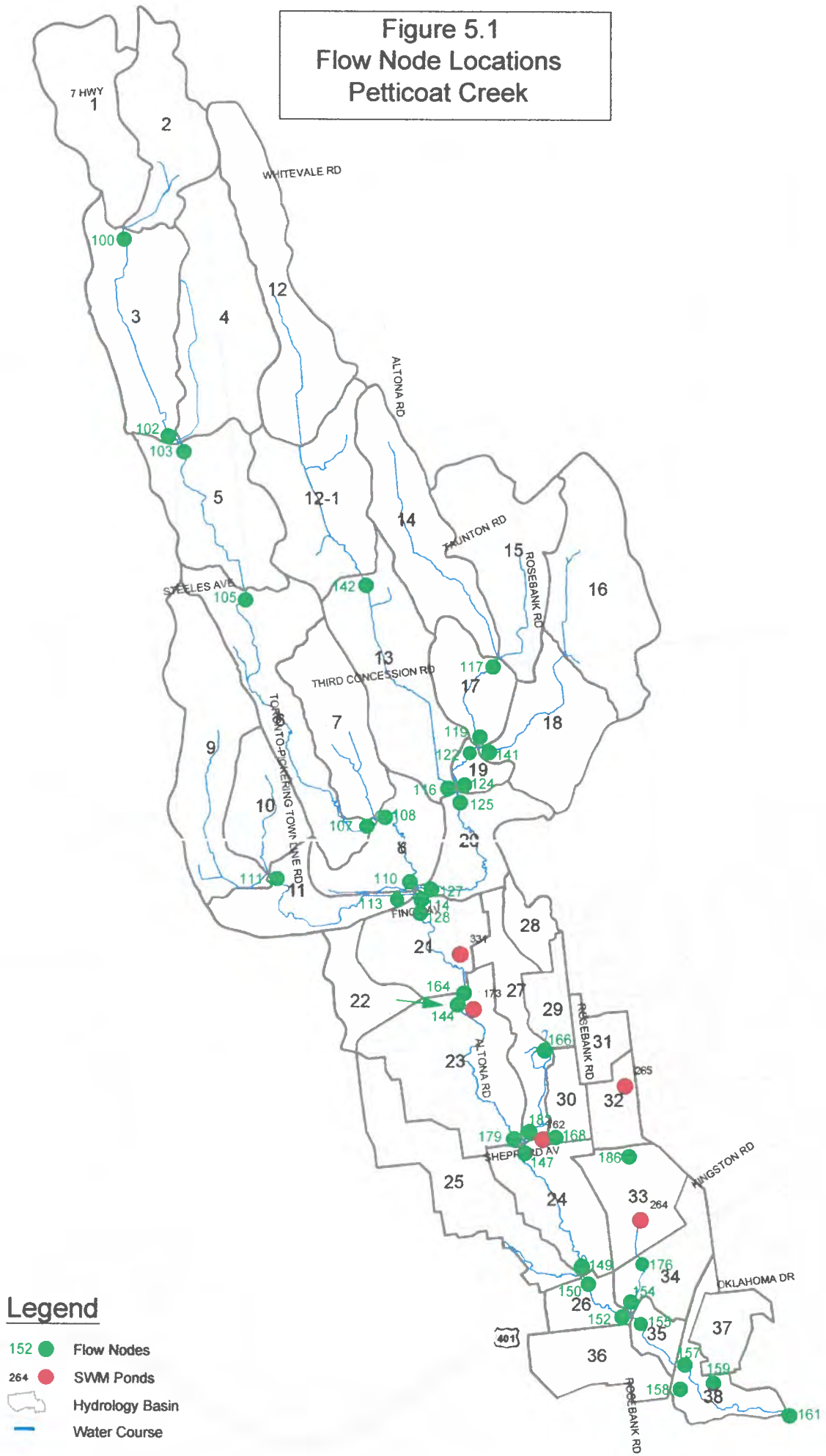
# ATTACHMENT 'A'

## Selected Background Information

### 2D Spill Analysis for Proposed Development 1942 Woodview Avenue, City of Pickering

- Excerpts from the *Petticoat Creek Watershed Hydrology Update, Final Report* (Greenland, October 2006)
- Floodplain Map Sheet Nos. 3 and 4, Petticoat Creek (TRCA, 22 September 2006)

**Figure 5.1**  
**Flow Node Locations**  
**Petticoat Creek**



**Legend**

- 152 ● Flow Nodes
- 264 ● SWM Ponds
- Hydrology Basin
- Water Course



**Summary of Peak Flows (m<sup>3</sup>/s)  
Petticoat Creek**

NHVD Number	Area (ha)	Conditions	Return Period						Hurricane
			2 year	5 Year	10 Year	25 Year	50 Year	100 Year	Hazel
105	492.5	Previous Modelling	n/a	3.40	4.80	6.90	8.70	10.80	34.10
		Existing (2004)	2.71	4.47	5.84	7.71	9.21	10.82	43.63
		Future (Committed)	2.71	4.47	5.84	7.71	9.21	10.82	43.63
		Future (Ultimate)	8.94	12.52	15.27	19.74	22.72	25.86	57.11
107	601.4	Existing (2004)	3.12	5.17	6.77	8.97	10.74	12.64	52.22
		Future (Committed)	3.12	5.17	6.77	8.97	10.74	12.64	52.22
		Future (Ultimate)	9.80	13.78	16.87	21.94	25.19	28.68	68.48
108	672.0	Existing (2004)	3.41	5.65	7.41	9.82	11.76	13.85	58.12
		Future (Committed)	3.41	5.65	7.41	9.82	11.76	13.85	58.12
		Future (Ultimate)	11.27	15.78	19.37	25.05	28.79	32.73	76.69
110	730.6	Previous Modelling	n/a	4.90	6.80	9.80	12.50	15.40	48.70
		Existing (2004)	3.68	6.10	8.00	10.61	12.71	14.97	62.40
		Future (Committed)	3.68	6.10	8.00	10.61	12.71	14.97	62.40
		Future (Ultimate)	12.17	17.04	20.98	27.09	31.18	35.42	81.34
111	163.8	Existing (2004)	0.79	1.34	1.77	2.37	2.86	3.38	14.96
		Future (Committed)	0.79	1.34	1.77	2.37	2.86	3.38	14.96
		Future (Ultimate)	3.72	5.15	6.25	7.64	9.01	10.17	21.10
113	217.7	Existing (2004)	0.95	1.60	2.11	2.81	3.38	3.98	18.75
		Future (Committed)	0.95	1.60	2.11	2.81	3.38	3.98	18.75
		Future (Ultimate)	4.00	5.46	6.60	8.17	9.57	10.83	24.32
114	848.3	Existing (2004)	4.57	7.64	10.04	13.34	16.01	18.86	80.61
		Future (Committed)	4.57	7.64	10.04	13.34	16.01	18.86	80.61
		Future (Ultimate)	16.12	22.43	27.51	35.17	40.64	46.12	104.97
116	328.3	Existing (2004)	1.60	2.68	3.52	4.68	5.62	6.60	27.68
		Future (Committed)	1.60	2.68	3.52	4.68	5.62	6.60	27.68
		Future (Ultimate)	6.12	8.53	10.30	13.37	15.39	17.48	36.46
117	196.4	Existing (2004)	1.16	1.96	2.58	3.44	4.13	4.85	19.19
		Future (Committed)	1.16	1.96	2.58	3.44	4.13	4.85	19.19
		Future (Ultimate)	4.56	6.34	7.63	9.81	11.22	12.68	25.76
119	241.3	Existing (2004)	1.40	2.35	3.09	4.12	4.94	5.81	23.36
		Future (Committed)	1.40	2.35	3.09	4.12	4.94	5.81	23.36
		Future (Ultimate)	5.27	7.30	8.88	11.36	13.01	14.72	30.61
122	435.6	Existing (2004)	2.56	4.32	5.71	7.57	9.08	10.68	42.19
		Future (Committed)	2.56	4.32	5.71	7.57	9.08	10.68	42.19
		Future (Ultimate)	9.58	13.33	16.28	20.77	23.79	26.92	55.36
124	448.5	Existing (2004)	2.61	4.40	5.82	7.71	9.24	10.87	43.26
		Future (Committed)	2.61	4.40	5.82	7.71	9.24	10.87	43.26
		Future (Ultimate)	9.70	13.52	16.50	21.03	24.40	27.28	56.97
125	776.8	Existing (2004)	4.16	7.00	9.23	12.25	14.69	17.28	69.72
		Future (Committed)	4.16	7.00	9.23	12.25	14.69	17.28	69.72
		Future (Ultimate)	15.74	21.94	26.66	34.24	39.32	44.58	91.90

Notes:  
Existing (2004), Future (Committed), and Future (Ultimate) peak flows based on 12-hr AES design storms (critical duration and distribution).

"Previous Modelling" Flows have been provided by the TRCA based on an uncalibrated INTERHYMO model.

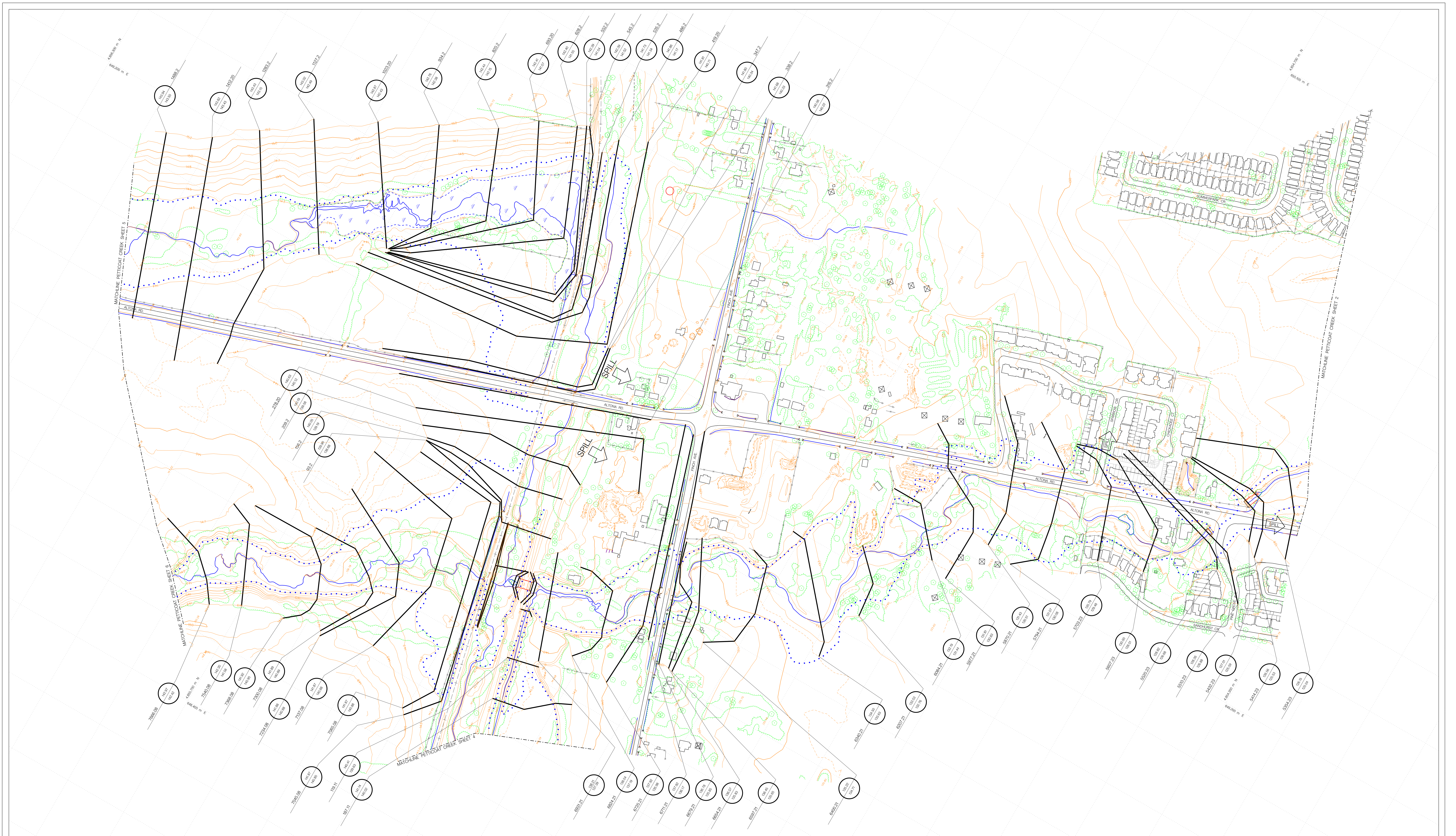
**Summary of Peak Flows (m<sup>3</sup>/s)  
Petticoat Creek**

NHYD Number	Area (ha)	Conditions	Return Period						Hurricane
			2 year	5 Year	10 Year	25 Year	50 Year	100 Year	Hazel
127	826.6	Existing (2004)	4.37	7.30	9.59	12.70	15.25	17.95	74.34
		Future (Committed)	4.37	7.30	9.59	12.70	15.25	17.95	74.34
		Future (Ultimate)	15.29	21.32	26.07	33.55	38.63	43.93	96.06
128	1774.9	Previous Modelling	n/a	9.90	13.90	20.00	25.40	31.30	101.50
		Existing (2004)	8.83	14.79	19.45	25.84	30.99	36.49	153.71
		Future (Committed)	8.83	14.79	19.45	25.84	30.99	36.49	153.71
		Future (Ultimate)	31.27	43.57	53.36	68.39	78.81	89.56	199.90
141	194.3	Existing (2004)	1.16	1.97	2.62	3.45	4.14	4.87	18.86
		Future (Committed)	1.16	1.97	2.62	3.45	4.14	4.87	18.86
		Future (Ultimate)	4.31	6.03	7.40	9.41	10.78	12.20	24.85
142	215.4	Existing (2004)	1.06	1.76	2.31	3.06	3.67	4.31	18.26
		Future (Committed)	1.06	1.76	2.31	3.06	3.67	4.31	18.26
		Future (Ultimate)	4.30	5.99	7.22	9.36	10.74	12.19	25.36
144	1873.9	Existing (2004)	8.92	15.01	19.73	26.25	31.52	37.16	157.59
		Future (Committed)	8.95	15.00	19.73	26.25	31.52	37.16	155.96
		Future (Ultimate)	30.67	42.90	52.37	67.10	77.45	88.12	203.94
147	2040.0	Previous Modelling	n/a	11.90	16.50	23.70	30.00	36.90	125.00
		Existing (2004)	9.50	15.85	20.76	27.58	33.08	38.89	165.54
		Future (Committed)	9.55	15.85	20.80	27.63	33.15	38.96	164.28
		Future (Ultimate)	31.76	44.58	54.51	69.93	80.83	92.04	219.20
149	2163.6	Previous Modelling	n/a	12.50	17.40	25.00	31.60	38.80	132.80
		Existing (2004)	10.05	16.60	21.68	28.67	34.33	40.32	170.03
		Future (Committed)	10.10	16.61	21.71	28.74	34.42	40.40	168.97
		Future (Ultimate)	32.54	46.11	56.56	72.32	83.50	95.25	228.25
150	2253.8	Previous Modelling	n/a	12.90	17.80	25.60	32.40	39.80	136.70
		Existing (2004)	10.45	17.14	22.33	29.47	35.22	41.32	173.91
		Future (Committed)	10.50	17.16	22.36	29.53	35.30	41.40	173.55
		Future (Ultimate)	33.35	47.37	58.09	74.23	85.77	97.82	236.75
152	2276.9	Previous Modelling	n/a	13.50	18.70	26.80	33.90	41.70	144.50
		Existing (2004)	10.56	17.29	22.49	29.66	35.45	41.58	172.80
		Future (Committed)	10.61	17.30	22.51	29.72	35.52	41.66	172.69
		Future (Ultimate)	33.50	47.61	58.31	74.55	86.08	98.07	236.29
154	146.4	Existing (2004)	3.93	5.28	6.23	7.58	8.55	9.48	19.15
		Future (Committed)	3.93	5.28	6.23	7.58	8.55	9.48	19.15
		Future (Ultimate)	3.93	5.28	6.23	7.58	8.55	9.48	19.15
155	2423.3	Previous Modelling	n/a	13.20	18.30	26.20	33.20	40.70	140.60
		Existing (2004)	11.44	18.45	23.84	31.26	37.25	43.59	181.31
		Future (Committed)	11.49	18.46	23.86	31.32	37.33	43.67	182.36
		Future (Ultimate)	35.44	50.45	61.94	79.11	91.26	104.28	250.72
157	2486.4	Existing (2004)	11.73	18.84	24.29	31.82	37.90	44.32	182.34
		Future (Committed)	11.49	18.55	23.95	31.44	37.47	43.84	183.46
		Future (Ultimate)	35.56	50.65	62.10	79.37	91.64	104.50	252.14

Notes:  
Existing (2004), Future (Committed), and Future (Ultimate) peak flows based on 12-hr AES design storms (critical duration and distribution).

"Previous Modelling" Flows have been provided by the TRCA based on an uncalibrated INTERHYMO model.





NO.	DESCRIPTION	BY	DATE
1	All cross-sections not previously included on map sheet now included from the original model	RAG	2013-09-24
2	Topographic data removed and replaced with proposed ground elevations. Revised cross sections from 5702.25-5912.25 and related flood line. See CRN 5542.03 - 594a and Assoc. Flood plan map.	MJ	2017-01-25

LEGEND	
Cross-Section Label	Cross-Section Leader Line
Regional Flood Elevation (m)	14.060
Cross-Section Number	172.00
100 Year Existing Flood Elevation (m)	172.00
REGULATORY FLOOD ELEVATION IS THE HIGHER OF THE TWO ELEVATIONS DISPLAYED	

LEGEND	
Contour Index	Trailer
Contour Intermediate	Bridge
Contour Auxiliary	Wooded Area
Contour Depression	Tree
Contour Text	Hedge
Spot Height	Fence
Road	Water Feature
Parking Lot	Culvert Symbol
Race Track	Culvert to Scale
Wall	Dam
Retaining Wall	Pool
Rail Line	Building
Runway	Pit
Silo, Smoke, Tank	Pile
Marsh Symbol	Regulatory Flood Line
Marsh Boundary	
Township Fabric	
Hydro Tower	

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DATE ISSUED: JUNE 17 2005

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PLEASE NOTE: THE VERTICAL DATUM IS MEAN SEA LEVEL AS ESTABLISHED BY THE GEODETIC SURVEY OF CANADA, CGVD 1928-1978 Ontario Adjusted Version. The horizontal datum is North American Datum, 1983, U.T.M. 6° projection Zone 17, Central Meridian 81° W. Grid Interval 100 metres.

PLEASE NOTE: THE PROFESSIONAL ENGINEERS' STAMP VERIFIES THE FLOOD LINE AND ASSOCIATED DATA UNLESS OTHERWISE NOTED.

## FLOOD PLAN MAPPING PROGRAM

FLOODLINE APPROVED DATE: 2006-09-22

**TORONTO AND REGION Conservation**  
for The Living City

5 Shoreham Drive Downsview Ontario M3N 1S4 (416) 661-6600

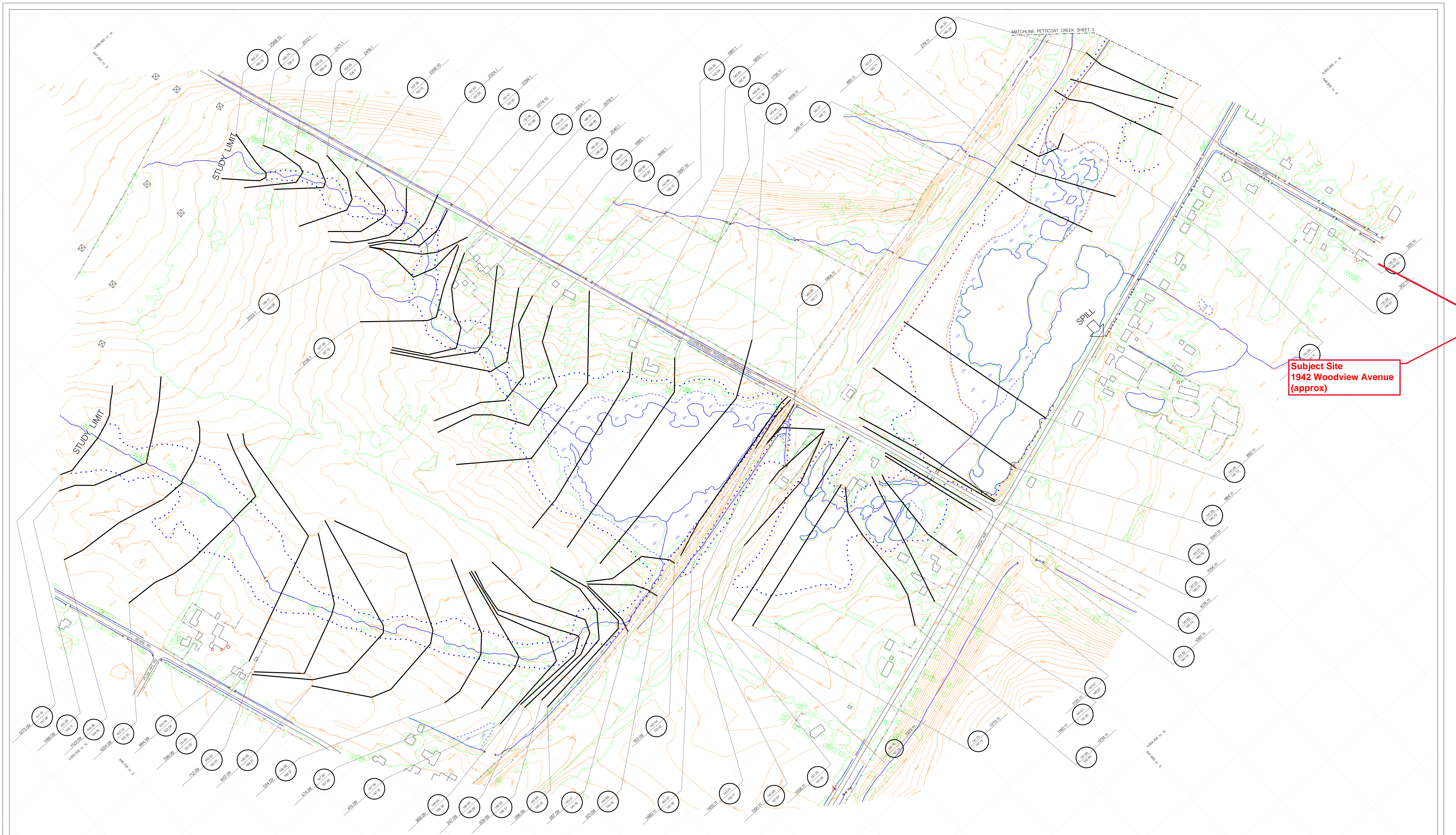
Scale 1:2000

CONTOUR INTERVAL 1.0 METRES

PETTICOAT CREEK

SHEET No. 3





Subject Site  
1942 Woodview Avenue  
(approx)

NO.	DESCRIPTION	BY	DATE
1	All cross-sections not previously indicated on map sheet now included from the original model	RAG	2013-09-24

LEGEND	
Contour Index	Trail
Contour Intermediate	Bridge
Contour Auxiliary	Wooded Area
Contour Depression	Tree
Contour Text	Hedge
Spot Height	Fence
Road	Water Feature
Parking Lot	Culvert Symbol
Race Track	Dam
Retaining Wall	Pool
Rail Line	Building
Runway	Pit
Silo, Smoke, Tank	Pile
Marsh Symbol	Regulatory Flood Line
Marsh Boundary	
Township Fabric	
Hydro Tower	

This map was compiled photogrammetrically from 1/10000 aerial photography flown in 2002.

The vertical datum is mean sea level as established by the Geodetic Survey of Canada CGVD 92/8-1978 Ontario Adjusted Version.

The horizontal datum is North American Datum 1983, U.T.M. 6° projection Zone 17, Central meridian 81° W, Grid Interval 100 metres.

PLEASE NOTE: FLOODLINE ELEVATIONS ARE SUBJECT TO CHANGE DUE TO REVISED INFORMATION.

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PLEASE NOTE: THE ORIGINAL LAND SURVEY STAMP VIEWS ONLY THE TOPOGRAPHY AND PLANNING DATA NOT THE REGULATORY DATA UNLESS OTHERWISE NOTED.

PLEASE NOTE: THIS PROFESSIONAL ENGINEERS STAMP VIEWS ONLY THE TOPOGRAPHY AND PLANNING DATA NOT THE REGULATORY DATA UNLESS OTHERWISE NOTED.

## FLOOD PLAN MAPPING PROGRAM

FLOODLINE APPROVED DATE: 2006-09-22

**TORONTO AND REGION Conservation**  
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5 Shoreham Drive Downsview Ontario M3N 1S4 (416) 661-6600

Scale 1:2000

CONTOUR INTERVAL 1.0 METRES:

PETTICOAT CREEK

SHEET No. 4



# ATTACHMENT 'B'

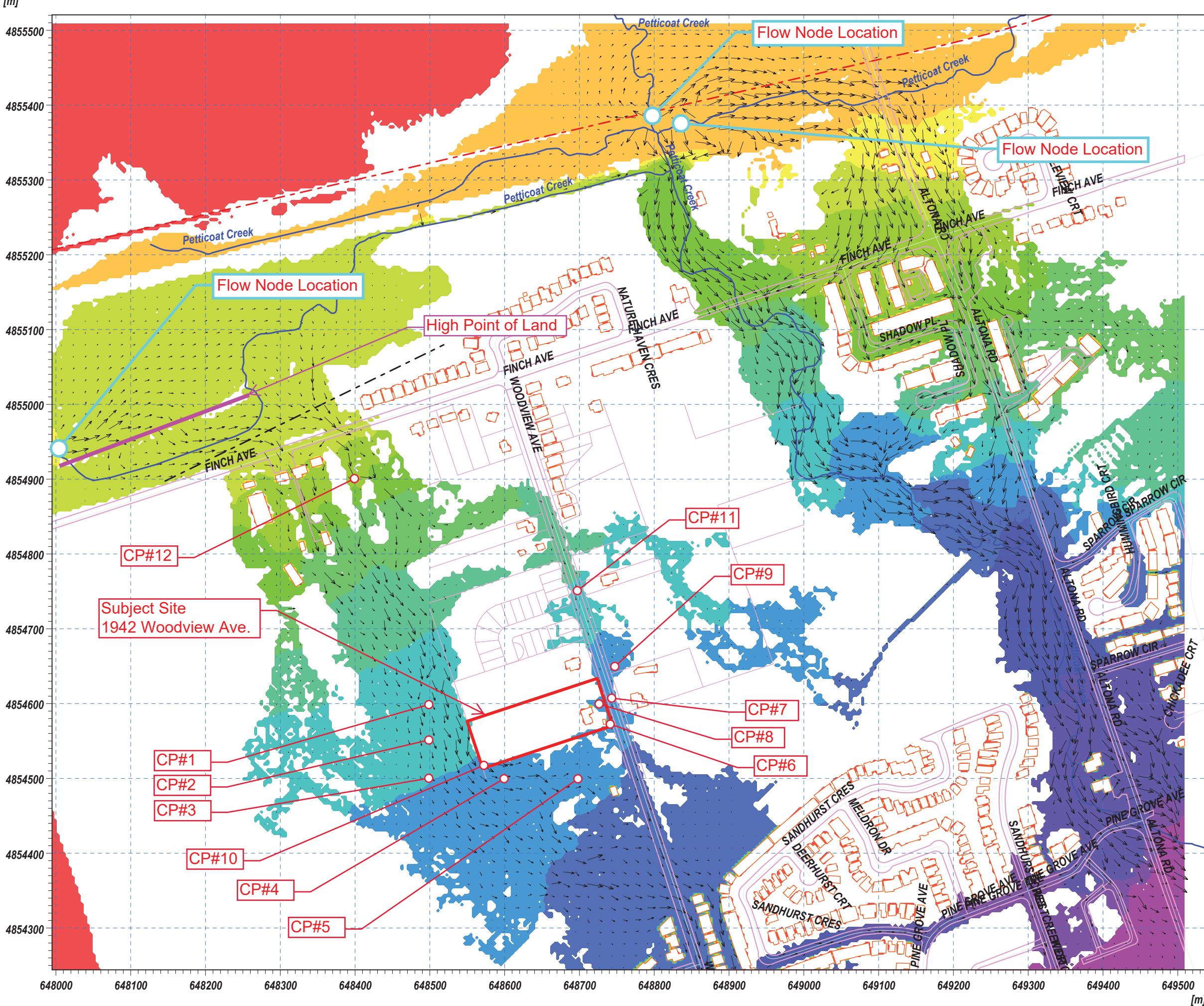
## Critical Spill Analysis

### 2D Spill Analysis for Proposed Development 1942 Woodview Avenue, City of Pickering

- **Table B.1:** Critical Spill Analysis Results
- **Figure B.1:** Critical Spill Analysis – Scenario 1
- **Figure B.2:** Critical Spill Analysis – Scenario 2
- **Figure B.3:** Critical Spill Analysis – Scenario 3



Figure B.1  
 CRITICAL SPILL ANALYSIS - SCENARIO 1  
 REGIONAL FLOOD FLOW DIRECTION MAP  
 1942 Woodview Avenue  
 City of Pickering



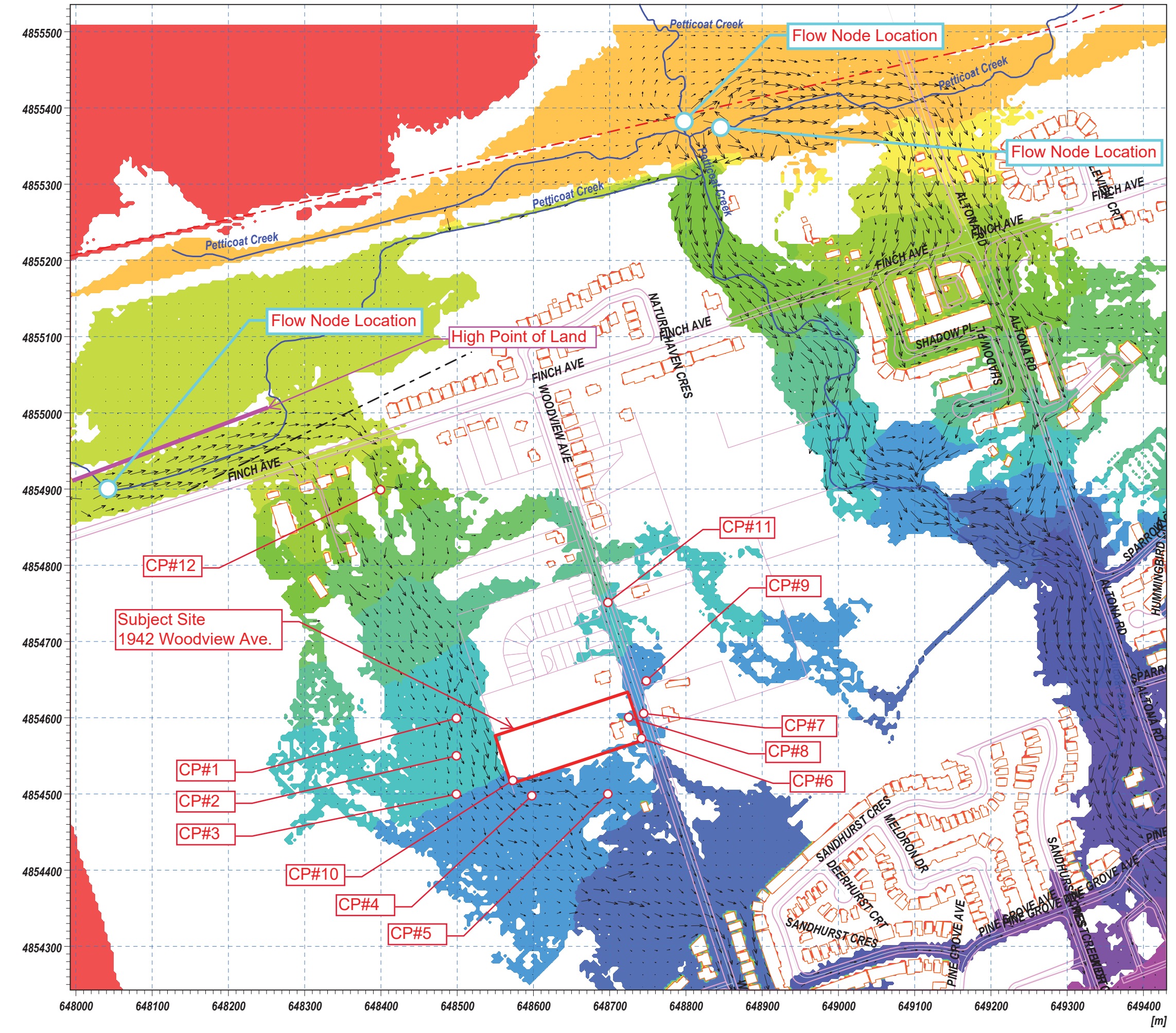
Surface elevation [m]

Red	Above 143.867
Orange	142.733 - 143.867
Yellow	141.600 - 142.733
Light Green	140.467 - 141.600
Green	139.333 - 140.467
Light Blue	138.200 - 139.333
Medium Green	137.067 - 138.200
Dark Green	135.933 - 137.067
Teal	134.800 - 135.933
Light Blue	133.667 - 134.800
Blue	132.533 - 133.667
Dark Blue	131.400 - 132.533
Very Dark Blue	130.267 - 131.400
Dark Purple	129.133 - 130.267
Light Purple	128.000 - 129.133
White	Below 128.000
White	Undefined Value



[m]

Figure B.2  
CRITICAL SPILL ANALYSIS - SCENARIO 2  
REGIONAL FLOOD FLOW DIRECTION MAP  
1942 Woodview Avenue  
City of Pickering



Surface elevation [m]

- Above 143.867
- 142.733 - 143.867
- 141.600 - 142.733
- 140.467 - 141.600
- 139.333 - 140.467
- 138.200 - 139.333
- 137.067 - 138.200
- 135.933 - 137.067
- 134.800 - 135.933
- 133.667 - 134.800
- 132.533 - 133.667
- 131.400 - 132.533
- 130.267 - 131.400
- 129.133 - 130.267
- 128.000 - 129.133
- Below 128.000
- Undefined Value



Figure B.3  
 CRITICAL SPILL ANALYSIS - SCENARIO 3  
 REGIONAL FLOOD FLOW DIRECTION MAP  
 1942 Woodview Avenue  
 City of Pickering

