

October 2017

## HYDROLOGICAL REVIEW SUMMARY

The form is to be completed by the Professional that prepared the Hydrological Review.  
 Use of the form by the City of Toronto is not to be construed as verification of engineering/hydrological content.

Refer to the Terms of Reference, Hydrological Review:  
[http://www1.toronto.ca/static\\_files/CityPlanning/PDF/geotechnical.pdf](http://www1.toronto.ca/static_files/CityPlanning/PDF/geotechnical.pdf)

<b>For City Staff Use Only:</b>	
<b>Name of ECS Case Manager (Please print)</b>	
<b>Date Review Summary provided to to TW, EM&amp;P</b>	

**IF ANY OF THE REQUIREMENTS LISTED BELOW HAVE NOT BEEN INCLUDED IN THE HYDROLOGICAL REVIEW, THE REVIEW WILL BE CONSIDERED INCOMPLETE.  
 THE GREY SHADED BOXES WILL REQUIRE A CONSISTANCY CHECK BY THE ECS CASE MANAGER.**

**Summary of Key Information:**

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Site Address	721 Eastern Avenue, Toronto, Ontario	S 1.1, pg 1-1	
Postal Code	M4M 1E6		
Property Owner (on request for comments memo)	General Motors of Canada Company (GM Canada)	S 1.1, pg 1-1	
Proposed description of the project (if applicable) (point towers, number of podiums)	GM Mobility Campus (Site 1) 2 office blocks (Sites 2 & 3)	S 1.2, pg 1-1	
Land Use (ex. commercial, residential, mixed, institutional, industrial)	Currently Commercial	S 1.2, pg 1-1	
Number of below grade levels for the proposed structure	Only elevator Pit for Site 1; conceptual design has not been conducted for Sites 2 or 3; conservative assumption was made that both will have 3 level parking structures	10mbgs)	
HYDROLOGICAL REVIEW INFORMATION			
Date Hydrological Review was prepared:	Revised March 5, 2018	title page	
Who Performed the Hydrological Review (Consulting Firm)	CH2M HILL Canada Limited	title page and S1.1, pg 1-1	

## HYDROLOGICAL REVIEW SUMMARY

Name of Author of Hydrological Review	Jennifer Caron, P.Eng., and Jinlong Zang , P.Eng.,	S 7, pg 7-1	
<p>Check the directories on the website for Professional Geoscientists and/or Professional Engineers of Ontario been checked to ensure that the Hydrological Report has been prepared by a qualified person who is a licensed Professional Geoscientist as set out in the Professional Geoscientist Act of Ontario or a Professional Engineer?</p> <p>PEO:  <a href="http://peo.on.ca/index.php?ci_id=1798&amp;la_id=1">http://peo.on.ca/index.php?ci_id=1798&amp;la_id=1</a></p> <p>APGO:  <a href="https://www.apgo.net/search/registered-members">https://www.apgo.net/search/registered-members</a></p>	<p>#90496431                      #100111406</p>	<p>N/A</p>	
<p>Has the Hydrological Review been prepared in accordance with all the following:</p> <ul style="list-style-type: none"> <li>• Ontario Water Resources Act</li> <li>• Ontario Regulation 387/04</li> <li>• Toronto Municipal Code Chapter 681-Sewers</li> </ul>	<p>yes</p>	<p>S 4.2, pg 4-3</p>	

## HYDROLOGICAL REVIEW SUMMARY

		Page # & Section # of every occurrence in the Review	Review Includes this Information City Staff (Check)
<p>Total Volume (L/day) Short Term Discharge of groundwater (construction dewatering) <b>with safety factor included</b></p>	<p>What safety factor was used?  <u>1.5</u></p> <p>Calculated Range: 1100 to 173,900 L/day</p>	<p>S 4.2.2.2, pg 4-3 and Executive Summary pg ES-1</p>	
<p>Total Volume (L/day) Short Term Discharge of groundwater (construction dewatering) <b>without safety factor included</b></p>	<p>Calculated Range: 700 to 115,900 L/day</p>	<p>S 4.2.2.2, pg 4-3</p>	
<p>Total Volume (L/day) Long Term drainage of groundwater (from foundation drainage, weeping tiles, sub slab drainage) <b>with safety factor included</b></p> <p>If the development is part of a multiple tower complex, include total volume for each separate tower</p>	<p>What safety factor was used?  <u>1.5</u></p> <p>Site 1 -No subsurface structure other than above water table elevator pit. Therefore 0 L/day. Conceptual structure for initial assessment only</p> <p>Site 2 - three level (10 mbFF) parking structure</p> <p>Site 3 - three level(10 mbFF) parking structure</p>	<p>S 4.3.1, pg 4-5</p> <p>S 4.3.3, pg 4-5</p> <p>S 4.3.3, pg 4-5</p>	
<p>List the nearest surface water (river, creek, lake)</p>	<p>Lake Ontario (Portlands Turning Basin) ~500 m south Don River ~1.5km west</p>	<p>S 3.2, pg 3-1</p>	

## HYDROLOGICAL REVIEW SUMMARY

Lowest basement elevation	Parking structure estimated at 68.2 masl or 10 metres below proposed finished floor grade of 78.2 masl	Table 7	
Foundation elevation	H-piles to bedrock (expected to be <64masl)	S 4.1, pg 4-1 and Exec Summary, pg ES-2	
Ground elevation	Current Site Ground 76.67- 77.75 masl; Proposed Final Grade Site 1 and ROWs 76.8-78.2 masl; Proposed FF 78.2 (Site2/3)-78.4 (Site 1) masl	S 3.1, pg 3-1 S 4.3, pgs -4, 4-5	
<b>STUDY AREA MAP</b>		<b>Page # &amp; Section # of every occurrence in the Review</b>	<b>Review Includes this Information City Staff (Check)</b>
Study area map(s) have been included in the report.	Yes	Figure 1	
Study area map(s) been prepared according to the Hydrological Review Terms of Reference.	<input checked="" type="radio"/> Yes	Figure 1	N/A
The onsite well(s) referenced in the report have been installed at locations that represent the entire proximity of the site (it is required that the well(s) be installed at a minimum of 38mm diameter and 2 meters below the lowest elevation in the proposed building structure(s) if the site is larger than 30m X 30m.	<input checked="" type="radio"/> Yes  All wells shown on Figure 3 are 2 inch (50mm) diameter	Figure 3 S 2.1.3 pg 2-2 and Appendix A, logs	N/A

## HYDROLOGICAL REVIEW SUMMARY

WATER LEVEL AND WELLS		Page # & Section # of every occurrence in the Review	Review Includes this Information (City Staff Initial)
The groundwater level has been monitored using all wells located on site (within property boundary).	Yes, many on several occasions since Dec 2015.	Table 1, Section 2.3	
The static water level measurements have been monitored at all monitoring wells for a minimum of 3 months with samples taken every 2 weeks for a minimum of 6 samples.  The intent is for the qualified professional to use professional judgement to estimate the seasonally high groundwater level.	Six events with 5 of the events being over a 3 month period at select wells. Additional water levels will be collected in 2018 to further assess seasonal variations.	Table 1, Section 2.3 Hydrographs are also included in Appendix B	
All water levels in the wells have been measured with respect to masl.	Yes - OLS has surveyed in elevations of wells	S 2.12 pg 2-3	
A table of geology/soil stratigraphy for the property has been included.	Cross-sections, logs and a descriptions have been provided	Figures 4 to 7 S 3.4, pg 3-2	
GEOLOGY AND PHYSICAL HYDROLOGY		Page # & Section # of every occurrence in the Review	Review Includes this Information (City Staff Initial)
The review has made reference to the soil materials including thickness, composition and texture, and bedrock environments.	Yes	Figures 4 to 7 S 3.3, pg 3-1	
Key aquifers and the site's proximity to nearby surface water has been identified.	<input checked="" type="radio"/> Yes	S 3.2, pg 3-1 S 3.5, pg 3-3	N/A

## HYDROLOGICAL REVIEW SUMMARY

PUMP TEST/SLUG TEST/DRAWDOWN ANALYSIS		Page # & Section # of every occurrence in the Review	Review Includes this Information City Staff (Check)
A summary of the pumping test data and analysis is included in the review.	Yes	Table 2, S 3.5.2, pg 3-3	
The pump test been carried out for at least 24 hours if possible. If not, has a slug test been conducted?	Slug tests have been conducted at 2 locations in February 2016 and 12 locations in June/July 2017	Table 2, S 3.5.2, pg 3-3	
Have the monitoring well(s) have been monitored using digital devices? If yes how frequently?	data loggers were used for slug tests	Appendix B	
If a slug or pump test has been conducted has the static groundwater level been monitored at all monitoring well(s) multiple times to measure recovery? -prior to the slug or pumping test(s)? -post slug or pumping test(s)?	● Yes  Manual groundwater level measurements were made prior to the test and following the test to confirm recovery at each well	S 3.5.2, pg 3-3	N/A
The above noted slug or pump tests have been included in the report.	● Yes	Appendix B	
WATER QUALITY		Page # & Section # of every occurrence in the Review	Review Includes this Information City Staff (Check)
The report includes baseline water quality samples from a laboratory. The water quality must be analyzed for all parameters listed in Tables 1 and 2 of Chapter 681 Sewers of the	Yes	S 3.6, pg 3-5	

## HYDROLOGICAL REVIEW SUMMARY

<p>Toronto Municipal Code (found in Appendix A) and the samples must have to be taken unfiltered within 9 months of the date of submission.</p>	<p>unfiltered and within 9 months of original March 2017 submission</p>	<p>S 2.5, pgs 2-3, 2-4</p>	
<p>The water quality data templates in Appendix A have been completed for each sample taken for both sanitary/combined and storm sewer limits.</p>	<p>For sanitary discharge- See the sanitary/combined sewer parameter limit template</p> <p>For storm discharge- See the storm sewer parameter limit template</p>	<p>yes</p>	
<p>Qualified professional to list all sample parameters that have violated the Bylaw limits for each sample taken for the sanitary/combined Bylaw limits</p> <p><b>If there are any sample parameter Exceedances the groundwater can't be discharged as is.</b></p>	<p>none</p>	<p>S 3.6, pg 3-4 Table 5</p>	
<p>Qualified professional to list all sample parameters that have violated the Bylaw limits for each sample taken for the storm Bylaw limits.</p> <p><b>If there are any sample parameter exceedances the groundwater can't be discharged as is.</b></p>	<p>suspended solids manganese zinc</p>	<p>S 3.6, pg 3-4 Table 5</p>	

## HYDROLOGICAL REVIEW SUMMARY

<p>The water quality samples have been analyzed by a Canadian laboratory accredited and licensed by Standards Council of Canada and/or Canadian Association for Laboratory Accreditation.</p> <p>List of Canadian accredited laboratories:  <a href="https://www.scc.ca/en/search/palcan">https://www.scc.ca/en/search/palcan</a></p>	<input checked="" type="radio"/> <b>Yes</b>  Maxxam Analytical - accredited	S 2.5, pg 2-4	N/A
<p>A chain of custody record for the samples is included with the report.</p>	Yes	Appendix C	
<p>Has the chain of custody reference any filtered sample? If yes, the report has to be amended and re-submitted to include only non-filtered samples.</p>	unfiltered sample submitted	Appendix C	
<p>List any of the sample parameters that exceed the Bylaw limits with the reporting detection limit (RDL) included.</p>	chromium VI	Table 5	
<p>A true copy of the Certificate of Analysis report, is included with the report.</p>	Yes	Appendix C	
<b>EVALUATION OF IMPACT</b>		<b>Page # &amp; Section # of every occurrence in the Review</b>	<b>Review Includes this Information City Staff (Check)</b>
<p>Does the report recommend a back-up system or relief safety valve(s)?</p> <p>Does the associated Geotechnical report recommend a back-up system or relief safety valve(s)?</p>	<input type="radio"/> <b>Yes</b> <input checked="" type="radio"/> <b>No</b>  <input type="radio"/> <b>Yes</b> <input checked="" type="radio"/> <b>No</b>	na	
<p>The taking and discharging of groundwater on site has been analyzed to ensure that no</p>	<input checked="" type="radio"/> <b>Yes</b>	S 4.2, pg 4-2	N/A



## HYDROLOGICAL REVIEW SUMMARY

<p>negative impacts will occur to: the City sewage works in terms of quality and quantity (including existing infrastructure), the natural environment, and settlement issues.</p>		<p>see above</p>	
<p>Has it been determined that there will be a negative impact to the natural environment, City sewage works, or surrounding properties has the study identified the following: the extent of the negative impact, the detail of the precondition state of all the infrastructure, City sewage works, and natural environment within the effected zone and the proposed remediation and monitoring plan?</p>	<p style="text-align: center;"> <input type="radio"/> <b>Yes</b>  <b>If yes, identify impact:</b>   <input checked="" type="radio"/> <b>No</b> </p>	<p>S 4.4, pg 4-6</p>	<p>N/A</p>

### Summary of Additional Information and Key Items (if applicable):

Additional ESA investigation along the new proposed public ROW is planned for March 2018.

## HYDROLOGICAL REVIEW SUMMARY

### Appendix A:

**SANITARY/COMBINED**

**Sample Location: MW38-16**

Inorganics		Sample Result	Sample Result with upper RDL included	
<u>Parameter</u>	<u>mg/L</u>	<u>mg/L</u>	<u>mg/L</u>	<u>ug/L</u>
BOD	300	2.0	<2	300,000
Fluoride	10	0.75	<0.10	10,000
TKN	100	4.2	<0.2	100,000
pH	6.0 - 11.5	7.81	N/A	6.0 - 11.5
Phenolics 4AAP	1	<0.0010	<0.0010	1,000
TSS	350	25	<10	350,000
Total Cyanide	2	0.011	<0.0050	2,000
<b>Metals</b>				
Chromium Hexavalent	2	<0.50	<0.50	2,000
Mercury	0.01	<0.0001	<0.0001	10
Total Aluminum	50	0.2	<0.1	50,000
Total Antimony	5	0.02	<0.02	5,000
Total Arsenic	1	<0.01	<0.01	1,000
Total Cadmium	0.7	<0.002	<0.002	700
Total Chromium	4	<0.01	<0.01	4,000
Total Cobalt	5	0.004	<0.002	5,000
Total Copper	2	0.03	<0.01	2,000
Total Lead	1	<0.01	<0.01	1,000
Total Manganese	5	2.5	<0.001	5,000
Total Molybdenum	5	<0.005	<0.005	5,000
Total Nickel	2	0.014	<0.005	2,000
Total Phosphorus	10	<0.05	<0.05	10,000
Total Selenium	1	<0.02	<0.02	1,000
Total Silver	5	<0.01	<0.01	5,000
Total Tin	5	<0.02	<0.02	5,000
Total Titanium	5	0.009	<0.005	5,000
Total Zinc	2	0.049	<0.005	2,000
<b>Petroleum Hydrocarbons</b>				
Animal/Vegetable Oil & Grease	150	1.2	<0.50	150,000
Mineral/Synthetic Oil & Grease	15	<0.05	<0.05	15,000

## HYDROLOGICAL REVIEW SUMMARY

Volatile Organics		Sample Result	Sample Result with upper RDL included	
<u>Parameter</u>	<u>mg/L</u>	<u>ug/L</u>	<u>ug/L</u>	<u>ug/L</u>
Benzene	0.01	<0.10	<0.10	10
Chloroform	0.04	<0.10	<0.10	40
1,2-Dichlorobenzene	0.05	<0.20	<0.20	50
1,4-Dichlorobenzene	0.08	<0.20	<0.20	80
Cis-1,2-Dichloroethylene	4	<0.10	<0.10	4,000
Trans-1,3-Dichloropropylene	0.14	<0.20	<0.20	140
Ethyl Benzene	0.16	<0.20	<0.20	160
Methylene Chloride	2	<0.50	<0.50	2,000
1,1,2,2-Tetrachloroethane	1.4	<0.20	<0.20	1,400
Tetrachloroethylene	1	<0.10	<0.10	1,000
Toluene	0.016	<0.20	<0.20	16
Trichloroethylene	0.4	<0.10	<0.10	400
Total Xylenes	1.4	0.13	<0.10	1,400
<b>Semi-Volatile Organics</b>				
Di-n-butyl Phthalate	0.08	<2	<2	80
Bis (2-ethylhexyl) Phthalate	0.012	<2	<2	12
3,3'-Dichlorobenzidine	0.002	<0.8	<0.8	2
Pentachlorophenol	0.005	<1	<1	5
Total PAHs	0.005	<1	<1	5
<b>Misc Parameters</b>				
Nonylphenols	0.02	<0.025	<0.025	20
Nonylphenol Ethoxylates	0.2	<0.001	<0.001	200

Sample Collected: December 21, 2016  
 Temperature: 11.05 deg C (in ground)  
 0.2-2.7 deg C in lab

## HYDROLOGICAL REVIEW SUMMARY

**STORM**

**Sample Location:**

Inorganics		Sample Result	Sample Result with upper RDL included	
<b>Parameter</b>	<b>mg/L</b>	<b>mg/L</b>	<b>mg/L</b>	<b>ug/L</b>
pH	6.0 - 9.5	7.81	n/a	
BOD	15	2.0	<2.0	15,000
Phenolics 4AAP	0.008	<0.0010	<0.0010	8
TSS	15	25	<25	15,000
Total Cyanide	0.02	0.011	<0.050	20
<b>Metals</b>				
Total Arsenic	0.02	<0.01	<0.01	20
Total Cadmium	0.008	<0.002	<0.002	8
Total Chromium	0.08	<0.01	<0.01	80
Chromium Hexavalent	0.04	<0.50	<0.50	40
Total Copper	0.04	0.03	<0.01	40
Total Lead	0.12	<0.01	<0.01	120
Total Manganese	0.05	2.5	<0.001	50
Total Mercury	0.0004	<0.0001	<0.0001	0.4
Total Nickel	0.08	0.014	<0.005	80
Total Phosphorus	0.4	<0.05	<0.05	400
Total Selenium	0.02	<0.02	<0.02	20
Total Silver	0.12	<0.01	<0.01	120
Total Zinc	0.04	0.049	<0.005	40
<b>Microbiology</b>				
E.coli	200	na		200,000
<b>Volatile Organics</b>				
<b>Parameter</b>	<b>mg/L</b>	<b>ug/L</b>	<b>ug/L</b>	<b>ug/L</b>
Benzene	0.002	<0.10	<0.10	2
Chloroform	0.002	<0.10	<0.10	2
1,2-Dichlorobenzene	0.0056	<0.20	<0.20	6
1,4-Dichlorobenzene	0.0068	<0.20	<0.20	7
Cis-1,2-Dichloroethylene	0.0056	<0.10	<0.10	6
Trans-1,3-Dichloropropylene	0.0056	<0.20	<0.20	6
Ethyl Benzene	0.002	<0.20	<0.20	2
Methylene Chloride	0.0052	<0.50	<0.50	5
1,1,2,2-Tetrachloroethane	0.017	<0.20	<0.20	17
Tetrachloroethylene	0.0044	<0.10	<0.10	4
Toluene	0.002	<0.20	<0.20	2
Trichloroethylene	0.0076	<0.10	<0.10	8
Total Xylenes	0.0044	0.13	<0.10	4

## HYDROLOGICAL REVIEW SUMMARY

Semi-Volatile Organics		Sample Result	Sample Result with upper RDL included	
Di-n-butyl Phthalate	0.08	<2	<2	80
Bis (2-ethylhexyl) Phthalate	0.012	<2	<2	12
3,3'-Dichlorobenzidine	0.002	<0.8	<0.8	2
Pentachlorophenol	0.005	<1	<1	5
Total PAHs	0.005	<1	<1	5
Hexachlorocyclohexane	0.1	n/a (see Note 1)	n/a	100
<b>Misc Parameters</b>				
Nonylphenols	0.001	<0.001	<0.001	1
Nonylphenol Ethoxylates	0.01	<0.025	<0.025	10

Sample Collected: **December 21, 2016**  
 Temperature: **11.05 deg C (in ground)**  
**0.2-2.7 deg C in lab**

Note 1 - Pesticides/herbicides have been analyzed in groundwater samples from 6 wells and have all been non-detect

Consulting Firm that prepared Hydrological Report: CH2M HILL Canada Limited

Qualified Professional who completed the report summary: Jennifer L Caron, P.Eng.,  
 Print Name

Qualified Professional who completed the report summary:   
 Signature

  
 Date & Stamp

Also Reviewed By:  
 Jinlong Zang, M.Sc., P.Eng.

  
 J. L. ZANG  
 100111406  
 Mar 5, 2018  
 PROVINCE OF ONTARIO