

**Pre-Station Construction
Groundwater and Surface
Water Baseline Conditions
Report, Hydro One -
Clarington Transformer Station,
Addendum**



Prepared for:
Hydro One Networks Inc.
483 Bay Street
South Tower, 4th Floor
Toronto, ON M5G 2P5

Prepared by:
Stantec Consulting Ltd.
300 – 675 Cochrane Drive
Markham, ON L3R 0B8

Project No.: 160900764

February 3, 2015

Sign-off Sheet

This document entitled Pre-Station Construction Groundwater and Surface Water Baseline Conditions Report, Hydro One - Clarington Transformer Station, Addendum was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Hydro One Networks Inc. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.



Prepared by _____
(signature)

Lesley Veale, M.Sc., P.Geo.
Hydrogeologist



Prepared by _____
(signature)

J. Brant Gill, H.B.Sc., P.Geo.
Senior Hydrogeologist



Reviewed by _____
(signature)

Craig Johnston, M.Sc., P.Geo.
Senior Hydrogeologist

**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

Table of Contents

ABBREVIATIONS	III
1.0 INTRODUCTION	1.1
2.0 MONITORING WELL WATER QUALITY SAMPLING	2.1
2.1 INFLUENCE OF WELL CASING AND SAMPLING EQUIPMENT	2.1
2.2 WELL PURGING AND GROUNDWATER SAMPLING	2.2
2.2.1 Well Purging and Sampling Methods	2.2
2.3 FILTERING OF SAMPLES FOR METALS ANALYSIS	2.5
2.4 INFLUENCE OF SEDIMENT.....	2.5
2.4.1 BTEX Parameters	2.6
2.4.2 Phthalates	2.6
2.4.3 PAH Parameters.....	2.8
2.4.4 Other SVOC.....	2.9
2.4.5 VOC.....	2.9
2.5 QA/QC PROTOCOL.....	2.10
3.0 REVIEW OF ANALYTICAL METHODS	3.1
4.0 PRIVATE WELL WATER QUALITY SAMPLING	4.1
4.1 SAMPLE COLLECTION.....	4.1
4.2 WATER QUALITY RESULTS	4.2
5.0 CONCLUSIONS AND RECOMMENDATIONS	5.1
6.0 REFERENCES	6.1

**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

LIST OF APPENDICES

Appendix A Figures
Appendix B Tables
Appendix C Laboratory Certificate of Analysis
Appendix D Laboratory Investigations

LIST OF FIGURES

Figure 1 Project Location
Figure 2 Site Groundwater Monitoring Locations

LIST OF TABLES

Table 1 Summary of Groundwater Analytical Results – Monitoring Wells
Table 2 Summary of Groundwater Analytical Results – Private Wells

**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

Abbreviations

AO	Aesthetic Objective
BGS	below ground surface
BTEX	benzene, toluene, ethylbenzene and xylene
Class EA	Class Environmental Assessment
DEHP	Bis(2-Ethylhexyl)phthalate
ESR	Environmental Study Report
E.coli.	Escherichia coli
GTA	Greater Toronto Area
HDPE	high-density polyethylene
Hydro One	Hydro One Networks Inc.
Maxxam	Maxxam Analytics Inc.
MAC	Maximum Acceptable Concentration
Monitoring Program	Groundwater and Surface Water Monitoring Program
MOECC	Ontario Ministry of Environment and Climate Change
MOH	Medical Officer of Health
ODWS	Ontario Drinking Water Standards
OG	Operational Guideline
O. Reg. 153	Ontario Regulation 153/04
PAH	Polycyclic Aromatic Hydrocarbons
PHC	Petroleum Hydrocarbons

**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

Project Area	lands owned by Hydro One in the vicinity of the Clarington TS
PVC	polyvinyl chloride
RDL	reportable detection limit
SCS	Site Condition Standard
Stantec	Stantec Consulting Ltd.
SVOCs	semi-volatile organic compounds
THM	Trihalomethanes
TS	Transformer Station
TSS	Total suspended solids
USEPA	United States Environmental Protection Agency
VOCs	volatile organic compounds

PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION, ADDENDUM

Introduction
February 3, 2015

1.0 INTRODUCTION

In 2014, Hydro One Networks Inc. (Hydro One) completed a Class Environmental Assessment for Minor Transmission Facilities (Class EA) to support the construction of the Clarington Transformer Station (TS). The Clarington TS is required to facilitate the delivery of power to the eastern portion of the Greater Toronto Area (GTA) as a result of the shutdown of the Pickering Nuclear Generating Station and to reinforce the regional reliability of power supply. The Clarington TS will be constructed on Hydro One owned property located in the Regional Municipality of Durham, in the Municipality of Clarington, bordering the east side of the City of Oshawa, northeast of Concession Road 7 and Townline Road North (Figure 1; Appendix A). For this report, the lands owned by Hydro One in the vicinity of the Clarington TS are referred to as the "Project Area". The final Environmental Study Report (ESR) was submitted to the Ministry of the Environment and Climate Change (MOECC) on January 16, 2014 (Hydro One, 2014).

Stantec Consulting Ltd. (Stantec) was retained by Hydro One to prepare a groundwater monitoring plan in accordance with MOECC requirements. Following a comprehensive review and consultation period, the final monitoring program was submitted to the MOECC on June 13, 2014. Approval of the Groundwater and Surface Water Monitoring Program (Monitoring Program) was received from the MOECC on June 24, 2014. In November 2014, Stantec prepared the Pre-Station Construction Groundwater and Surface Water Baseline Conditions Report, which documented the results of the Monitoring Program for the Clarington TS (Stantec, 2014).

The Baseline Conditions report indicated that additional investigations were planned by Hydro One in support of the Clarington TS. In November / December 2014, additional water quality sampling and analysis was completed as follows:

- Bacteriological sampling was completed at selected private wells that were missed during the initial monitoring event in August/September 2014 to provide two complete baseline monitoring rounds for all private wells;
- An evaluation of the potential for sampling equipment, well development, and/or sediment to have biased the analytical results for select phthalate and Polycyclic Aromatic Hydrocarbons (PAH) compounds in Project Area monitoring wells. Specifically, sampling was completed to evaluate the following:
 - The effect of sampling equipment and well construction materials on the detection of select phthalate compounds;
 - The effect of further well development on groundwater quality, particularly for wells that recovery slowly due to the low permeability of the aquitard materials;
 - The effect of sediment within samples on phthalate and PAH concentrations; and,
- The effect of different sampling and analytical methods on analytical results.



**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

Introduction
February 3, 2015

1.1 REPORT OUTLINE

The following Addendum Report to the Pre-Station Construction Groundwater and Surface Water Baseline Conditions Report presents the results of the additional investigations completed between November 2014 and December 2014 for the Clarington TS. This report is arranged into six (6) sections, including this introduction. Section 2 presents the results of the monitoring well water quality sampling. Section 3 presents the review of analytical methods. Section 4 presents the private well water quality sampling. Section 5 presents conclusions and recommendations, and Section 6 presents report references.

All Figures and Tables referenced throughout the report are presented in Appendices A and B, respectively. Appendices C and D include Laboratory Certificate of Analysis and Laboratory Investigations, respectively.

PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION, ADDENDUM

Monitoring Well Water Quality Sampling
February 3, 2015

2.0 MONITORING WELL WATER QUALITY SAMPLING

Additional water quality sampling was completed within Project Area monitoring wells in November and December 2014. The November/December 2014 water quality results are presented in Table 1, along with the historical data and compared to the Ontario Drinking Water Standards (ODWS) and Tables 6 and 8 of the Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, dated April 15, 2011 (MOE, 2011a) (henceforth the site condition standard (SCS)). The locations of the monitoring wells are shown on Figure 2.

2.1 INFLUENCE OF WELL CASING AND SAMPLING EQUIPMENT

The Baseline Conditions Report indicated low level phthalate detections including (Bis(2-Ethylhexyl)phthalate (DEHP) and Diethyl Phthalate) within the majority of Project Area monitoring wells, with the exception of MW6-14 where phthalate parameters were not detected above the reportable detection limit (RDL) in 2014 sampling results.

Phthalates are an additive to plastics to increase their flexibility, transparency, durability, and longevity. The only potential source for these phthalate compounds identified within the Project Area was the polyvinyl chloride (PVC) well casing, high-density polyethylene (HDPE) sampling tubing, bailer and/or logger cable commonly used to construct and monitor wells in environmental investigations and monitoring programs.

To evaluate if plastics of the well casing or monitoring equipment could be the source of the elevated phthalate compounds, water quality samples were collected without prior purging of the monitoring wells at MW1-13S/D, MW2-13S, and MW3-13S on November 20, 2014. The groundwater samples were collected from the sample tubing and well casing, which reflected a storage time within the well of approximately 50 days since the last sampling event.

It was hypothesized that if elevated phthalate concentrations were detected in comparison to historical water quality where the wells were purged of water prior to sample collection it would indicate leaching of phthalate compounds from the well casing, sampling tubing and/or logger cable as the likely source.

The four (4) wells noted above selected for sampling can be purged of a minimum of three (3) well volumes prior to sample collection, allowing a comparison of sampling methodologies and their potential effects on phthalate concentrations

For the sampling of MW1-13S/D, MW2-13S, and MW3-13S on November 20, 2014, the groundwater samples were collected directly from the HDPE tubing into the sample containers. All groundwater samples collected were packed into sample coolers, which were refrigerated using ice packs, and delivered to Maxxam Analytics Inc. (Maxxam) for laboratory analyses. Groundwater samples were analyzed for total suspended solids (TSS), turbidity, benzene, toluene, ethylbenzene, xylenes (BTEX), unfiltered semi-volatile organic compounds (SVOCs) and



PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION, ADDENDUM

Monitoring Well Water Quality Sampling
February 3, 2015

lab filtered SVOCs. Chain of custody forms were completed and included with the sample submissions. The results of the groundwater quality testing at the monitoring wells are presented in Table 1 with a copy of the Laboratory Certificates of Analysis provided in Appendix C.

The November 20, 2014 phthalate (DEHP, Diethyl Phthalate and Dimethyl Phthalate) results were similar to historical data suggesting that the well casing and equipment were not a factor controlling phthalate detections. All sample results were below the SCS criteria with the exception of monitoring well MW2-13S, which had a DEHP concentration of 12 µg/L, just above the SCS criteria of 10 µg/L. The sample at MW2-13S had a sediment concentration of 2,800 mg/L, which was an order of magnitude above the other three wells sampled during this event. The laboratory filtered sample from MW2-13S had a DEHP concentration of <1 µg/L indicating that the elevated DEHP concentration was related to the high sediment content of the sample.

As a precaution, Stantec removed the sample tubing from all wells and replaced any plastic coated datalogger cables with stainless steel cables in an effort to remove potential sources of phthalates.

2.2 WELL PURGING AND GROUNDWATER SAMPLING

The Baseline Conditions Reports indicated that groundwater sampling procedures for Project Area monitoring wells would be modified to evaluate potential impacts from sampling methods and to reduce entrained sediment within the samples. Additional purging and sampling was completed in November/December 2014 to evaluate the purging and sampling methods. The following section describes the groundwater sampling procedures.

2.2.1 Well Purging and Sampling Methods

Following sampling on November 20, 2014, Project Area monitoring wells MW1-13S/D, MW2-13S/D, MW3-13S/D, MW4-13S/D, MW5-14S/I, MW6-14 and MW7-14 were purged on November 20/21, 2014 to further develop the wells. Three (3) well volumes were purged at each location, with the exception of low yielding wells that were purged dry resulting in purging of 2.5 well volumes at MW3-13S, 2.0 well volumes at MW3-13D and 1.0 well volume at MW5-14I.

On November 26/27, 2014 and December 22/23, 2014, Stantec and a Hydro One technician completed additional water quality sampling of the Project Area monitoring wells. MW5-14I was not accessible during the sampling dates due to safety concerns related to drilling and development of the deep bedrock well at MW5-14D (2).

Stantec staff employed the use of low flow purging and sampling procedures for groundwater sampling activities on November 26/27, 2014 and December 22/23, 2014; a procedure which minimizes the drawdown of water in a well, and the mixing or disturbance of the standing water within the well, by removing water from a discrete depth within the well screen.

A Geopump™ bladder pump with HDPE tubing was used to pump the water from the middle of the well screen at a constant rate. New tubing was used at each well to eliminate the potential



PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION, ADDENDUM

Monitoring Well Water Quality Sampling
February 3, 2015

for cross contamination. The low flow procedure was based on the United States Environmental Protection Agency (USEPA) low flow/minimal drawdown well purging protocol (USEPA, 2010). The purging protocol consists of pumping water from the midpoint of the well screen at a steady rate of 100 mL to 500 mL/min. Under the protocol, water levels are to be measured frequently to monitor drawdown. During purging, field parameters are to be measured at five minute intervals until they have stabilized. Stabilization of the field parameters is defined by USEPA (2010) as follows:

- ± 0.1 units for pH;
- $\pm 3\%$ for conductivity;
- ± 10 mV for ORP; and
- $\pm 10\%$ for turbidity and dissolved oxygen (DO).

Puls and Barcelona (1996) states, "In lieu of measuring all five parameters, a minimum subset would include pH, conductivity, and turbidity or [dissolved oxygen]"; therefore, dissolved oxygen was used as the stabilization parameter in lieu of turbidity during monitoring well purging and sampling.

Groundwater samples were collected directly from the HDPE tubing into the appropriate pre-labeled laboratory-supplied sample containers. Where appropriate, the laboratory placed preservative into the sample containers prior to shipping them to Stantec. Two (2) groundwater samples for metals analysis were collected at each location; with one sample collected in an unpreserved sample bottle and filtered and preserved by Maxxam in the laboratory, and the second sample field filtered and collected in a sample bottle with preservative. All groundwater samples collected were packed into sample coolers, which were refrigerated using ice packs, and delivered to Maxxam for laboratory analyses. Groundwater samples were submitted for TSS, turbidity, BTEX parameters, unfiltered SVOCs, lab filtered SVOCs, field filtered metals and lab filtered metals. At monitoring wells MW3-13D and MW4-13D there was still insufficient sample volume for complete analysis due to the slow well recovery. Maxxam completed all analyses possible based on sample volume, with priority given to the SVOC analysis and metals analyses. Chain of custody forms were completed and included with the sample submissions.

Under Ontario Regulation 153/04 (O.Reg. 153), the standard sampling and analysis of SVOCs is on an unfiltered sample. SVOCs tend to be hydrophobic and will adsorb to both the sample bottle and any particulate material in the sample. As such, the default method of analysis is "whole sample" analysis in which the entire contents of the sample are extracted. MOE (2011b) acknowledges that the inclusion of particulate material will tend to produce a high bias result.

MOE (2011b) indicates that if particulate material is noted during sample collection, a separate sample can be collected for lab filtered benzo(a)pyrene analysis in accordance with O.Reg. 153. Samples for lab filtered analysis of benzo(a)pyrene were collected in November 2014 and December 2014 in accordance with O.Reg. 153. Analysis of the lab filtered samples for the remaining SVOCs was completed for discussion purposes.



**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

Monitoring Well Water Quality Sampling
February 3, 2015

The results of the groundwater quality testing at the monitoring wells are presented in Table 1 with a copy of the Laboratory Certificates of Analysis being provided in Appendix C.

The following sections present a summary of the specific sampling methods completed for each monitoring well.

Monitoring Wells MW1-13S/D, MW3-13S, MW4-13S, MW6-14, MW7-14

On November 26, 2014, Stantec installed new HDPE tubing and Waterra foot valves and completed additional purging of these wells. Stantec attempted to purge three (3) well volumes at each location prior to sample collection. At MW1-13S, only 2 well volumes were purged and at MW3-13S and MW6-14 only 1 well volume was purged due to slow groundwater recovery. Following purging, low flow sampling procedures were followed with the pumping rate decreased as required until stabilization criteria were met at all monitoring wells. At MW6-14, dissolved oxygen did not stabilize; however, the other parameters did and greater than three well volumes were purged prior to sample collection, in accordance with Stantec's standard operating procedures.

Monitoring Wells MW2-13S/D

Monitoring Wells MW2-13S/D were sampled on November 26, 2014. These wells were previously purged on November 20, 2014. These wells are low yielding wells and as a result, minimal additional purging was completed prior to sampling. Stantec employed modified low flow sampling procedures for groundwater sampling activities with the purge rate decreased below the recommended range to minimize drawdown.

An initial 3 L of water was removed using low flow sampling procedures from each well while monitoring field parameters. Stabilization criteria were met at MW2-3S prior to groundwater sample collection. At MW2-13D, dissolved oxygen did not stabilize and continued to fluctuate; however, the other parameters did stabilize.

Monitoring Wells MW3-13D, MW4-13D, MW5-14S

Stantec attempted groundwater sampling at Monitoring Wells MW3-13D and MW4-13D on November 26, 2014. These wells were previously purged on November 20, 2014 and there was inadequate recovery to allow sampling on November 26, 2014. MW5-14S was not accessible in November 2014 for sampling due to adjacent drilling activity and safety concerns.

On December 22, 2014, Stantec employed modified low flow sampling procedures for groundwater sampling activities at MW3-13D and MW5-14S. Due to the low well yield, no purging was completed prior to sampling and field parameters were not monitored.

At MW4-13D, sampling on December 22, 2014 was completed using a disposable bailer due to the limited available water. A replacement monitoring well was installed adjacent to MW4-13D in 2015 at a slightly deeper depth. Future monitoring should be completed at this location to facilitate representative groundwater sample collection.



PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION, ADDENDUM

Monitoring Well Water Quality Sampling
February 3, 2015

2.3 FILTERING OF SAMPLES FOR METALS ANALYSIS

The standard method for groundwater sample collection from a monitoring well requires the technician to field filter the sample and collect groundwater samples in a preserved bottle with analytical results presented as dissolved metals. For the groundwater samples collected from December 2013 to October 2014, Hydro One staff requested a modified approach to simplify the sampling procedure and reduce potential technician error. These groundwater samples were collected as unpreserved unfiltered samples. Upon sample delivery at Maxxam, the samples for metals analysis were immediately filtered and lab preserved.

The time delay in the filtering allowed the potential for metals to precipitate out of solution. Any precipitate, if present, would have been filtered out by the lab, biasing the sample toward lower concentrations of metals. Redox sensitive parameters, such as iron, are a specific concern for this potential bias.

The November / December 2014 samples included both field filtered and lab filtered metals analyses to evaluate this potential bias. Due to the limited sample volume at MW4-13D, it was not possible to field filter the metals sample from this well.

The results from November / December 2014 generally indicated similar metals concentrations within the field filtered and lab filtered samples. Results indicated iron concentrations below the RDL within both the field filtered and lab filtered samples from November / December 2014, with the exception of MW1-13D. The sample at MW1-13D from November 26, 2014 had an iron concentration of 0.25 mg/L within the field filtered sample compared to a concentration below the RDL of 0.1 mg/L within the lab filtered sample. Based on this comparison, it was concluded that the historical analyses at MW1-13D are likely biased low for iron. The historical lab filtered metals analysis for all remaining wells are considered representative of dissolved phase groundwater quality and the delayed filtering is not interpreted to have impacted results. All future sampling will be completed as field filtered and field preserved samples.

The Baseline Conditions Report compared groundwater quality from the Project Area monitoring wells with ODWS criteria. Results from November 2014 are consistent with the previous summary, with the exception of manganese. Results from MW6-14 and MW7-14 in November 26, 2014 exceeded the ODWS aesthetic objective (AO) of 50 µg/L, while previous results from October 2014 were below criteria. In November 2014, the manganese concentration at MW6-14 was 79 µg/L within the field filtered sample and 92 µg/L within the lab filtered sample. Similar concentrations were noted at MW7-14, with manganese concentration of 79 µg/L within the field filtered sample and 86 µg/L within the lab filtered sample.

2.4 INFLUENCE OF SEDIMENT

The Baseline Conditions report indicated the potential for sampling equipment and/or sediment to have biased the analytical results. The November 26/27, 2014 and December 2014 water

PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION, ADDENDUM

Monitoring Well Water Quality Sampling
February 3, 2015

quality sampling was completed in an effort to minimize collection of entrained sediment. Organic water quality results are discussed below.

2.4.1 BTEX Parameters

The Baseline Conditions Report presented groundwater quality data from May to October 2014. Results indicated low level BTEX detections in monitoring wells MW1-13D, MW2-13S/D, MW3-13D, MW4-13D, MW5-14S, MW6-14 and MW7-14; while, BTEX parameters were not detected above the RDL in the remaining well samples, including MW1-13S, MW3-13S, MW4-13S and MW5-14I.

A review of the historical 2014 BTEX results and current results from November / December 2014 indicates that BTEX concentrations decreased at all monitoring wells over the monitoring period. This decrease appears to have occurred over time, and is not solely a function of the recent low flow sampling methods.

Water quality results from November / December 2014 indicated that BTEX parameters were not detected above the RDL at monitoring wells MW1-13S/D, MW2-13S, MW3-13S/D, MW4-13S, MW5-14S, MW6-14 and MW7-14. At MW2-13D in the November 26, 2014 sample trace toluene and total xylene concentrations of 0.44 µg/L and 0.29 µg/L, respectively, were detected. These concentrations are just above the RDL, but well below the SCS criteria of 22 µg/L for toluene, and 72 µg/L for total xylene.

Due to the limited sample volume available at MW4-13D, BTEX parameters were not analyzed in December 2014. Previous results at MW4-13D from October 2014 indicated detections of ethylbenzene and xylenes, with all results below the SCS criteria.

The November / December results do not indicate any exceedance of the SCS criteria for BTEX parameters. The water quality results from November / December 2014 indicated that BTEX parameters were not detected above the RDL, with the exception of MW2-13D.

2.4.2 Phthalates

2.4.2.1 Low Flow Sampling

Sampling on November 26/27, 2014 and in December 2014 was completed using low flow sampling techniques to minimize sediment within the sample, with the exception of MW4-13D which was sampled using a bailer due to the limited water volume available within the well. A review of historical DEHP and Diethyl Phthalate concentrations with respect to TSS concentrations suggests a correlation between high phthalate concentrations and elevated TSS concentrations above approximately 500 mg/L.

Low flow sampling between November 26/27, 2014 and December 2014 resulted in TSS concentrations ranging from < 10 mg/L to 120 mg/L, except for MW5-14S which had a TSS concentration of 2,200 mg/L. These TSS concentrations were generally an order of magnitude lower than previous results, and significantly less than the maximum TSS concentration of 29,000 mg/L from previous sampling events.



PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION, ADDENDUM

Monitoring Well Water Quality Sampling
February 3, 2015

The November 26/27, 2014 results indicated that phthalates were not detected above the RDL within MW1-13S/D, MW4-13S, MW5-14S, MW6-14 and MW7-14; however, DEHP and Diethyl Phthalate were detected above the RDL at MW2-13S/D and DEHP was detected above the RDL at MW3-13S/D despite the low TSS concentrations. Notably, there were no exceedances of the SCS criteria for phthalate parameters within the November 26/27, 2014 or December 2014 samples.

2.4.2.2 Comparison of Filtered and Unfiltered Samples

For the November / December 2014 samples, Maxxam completed analysis of both filtered and unfiltered SVOCs. Laboratory QA/QC included adding a surrogate spike to the sample bottle prior to filtering to evaluate method recoveries. The results indicated a 3% to 17% recovery of the lab filtered surrogate spike for DEHP. Maxxam indicated that overall quality control for the SVOC analyses met acceptable criteria; however, the recovery of DEHP was not adequate for comparison of filtered versus unfiltered DEHP concentrations. An observed decrease in DEHP concentration within the lab filtered sample could be a function of sediment removal from the sample and/or a function of direct adsorption onto the laboratory filter.

Laboratory QA/QC results indicated 82% to 100% recovery of the lab filtered surrogate spike for Diethyl Phthalate. Maxxam indicated that this recovery met criteria and that any observed reduction in diethyl phthalate concentration within the lab filtered sample was likely a result of sediment removal and removal of the diethyl phthalate adsorbed to that sediment.

The November / December 2014 filtered and unfiltered Diethyl Phthalate samples indicated the following:

- On November 20, 2014 at MW1-13D, a concentration of 0.2 µg/L was reported for the unfiltered sample and < 0.1 µg/L for the filtered sample;
- On November 26, 2014 at MW2-13D, a concentration of 0.2 µg/L was reported for both the filtered and unfiltered samples;
- Results from MW2-13S on November 20, 2014 indicated a concentration of < 0.1 µg/L for the unfiltered sample and 0.3 µg/L for the filtered sample. On November 26, 2014, results indicated 0.3 µg/L within the unfiltered sample and 0.1 µg/L within the filtered sample; and,
- The remaining results were below the RDL within both the filtered and unfiltered samples.

Comparison of the filtered and unfiltered Diethyl Phthalate concentrations indicates variability in results, and that the presence of sediment is not the only controlling factor in Diethyl Phthalate detections.

2.4.2.3 Summary

The November and December 2014 testing and sampling did not provide a conclusive answer of controlling factors for phthalates detections. The November 26/27, 2014 and December 22/23, 2014 groundwater quality results indicated phthalate detections above the RDL at



**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

Monitoring Well Water Quality Sampling
February 3, 2015

MW2-13S/D, MW3-13S/D and MW4-13D. There were no exceedances of the SCS criteria for phthalates parameters within the November 26/27, 2014 or December 2014 samples at any location.

Stantec has removed the sample tubing from all wells and confirmed that all loggers are installed using stainless steel cable in an effort to remove potential sources of phthalates. Future monitoring should be completed using low flow sampling methods to minimize entrained sediment within the samples.

2.4.3 PAH Parameters

The Baseline Conditions Report indicated low level PAH detections in 2014 within MW1-13S/D, MW2-13S/D, MW3-13S/D, MW4-13S/D, MW5-14S and MW6-14. PAHs were not detected above the RDL in 2014 at MW5-14I or MW7-14.

In 2014, benzo(a)pyrene was detected on at least one (1) occasion within MW1-13D, MW2-13S, MW3-13S/D and MW4-13S/D with all detections exceeding ODWS maximum acceptable concentration (MAC) and the SCS criteria.

The Baseline Conditions Report indicated that detections of PAHs can be biased high due to the presence of sediment within the sample. A review of historical benzo(a)pyrene concentrations indicated higher benzo(a)pyrene concentrations correlating with elevated TSS concentrations above approximately 500 mg/L.

The November 26/27, 2014 and December 2014 water quality sampling was completed to further evaluate the influence of sediment on PAH concentrations.

2.4.3.1 Low Flow Sampling Results

The November 26/27, 2014 and December 2014 low flow sampling resulted in TSS concentrations ranging from < 10 mg/L to 120 mg/L, except for MW5-14S which had a TSS concentration of 2,200 mg/L. As discussed above, these TSS concentrations are generally an order of magnitude lower, and significantly less than the maximum TSS concentration of 29,000 mg/L from previous results.

The November and December 2014 results indicated that PAHs were not detected above the RDL within MW1-13S/D, MW2-13S, MW3-13D, MW4-13D, MW5-14S, MW6-14 and MW7-14; however, benzo(a)pyrene was detected at 0.02 µg/L within the unfiltered sample at MW2-13D which is above the SCS criteria of 0.01 µg/L and at the SCS criteria (0.01 µg/L) within the unfiltered sample at MW4-13S. At MW3-13S, benzo(a)pyrene was detected at 0.02 µg/L from the unfiltered sample from November 27, 2014 but was not detected above the RDL in the December unfiltered sample. No other PAH parameters were detected above the RDL in the November or December 2014 samples.

The water quality results for samples collected using low flow sampling resulted in lower TSS concentrations, and fewer detections and lower concentrations of PAHs. These results are



PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION, ADDENDUM

Monitoring Well Water Quality Sampling
February 3, 2015

consistent with the understanding that PAHs detections were associated with the sediment and not representative of dissolved groundwater concentrations.

2.4.3.2 Comparison of Filtered and Unfiltered Samples

For the November and December 2014 samples, Maxxam completed analysis on both filtered and unfiltered PAHs samples. Within the unfiltered samples, benzo(a)pyrene was the only PAH parameter detected above the RDL in the November and December 2014 samples. The filtered groundwater quality results from November and December 2014 did not exceed the RDL for any PAH parameter, including benzo(a)pyrene.

The laboratory QA/QC indicated that 98% to 99% of the surrogate spike for benzo(a)pyrene was retained on the lab filter, further indicating the preference for this compound to adsorb onto surfaces/particles.

2.4.3.3 Summary

The November and December 2014 water quality results collected using low flow procedures resulted in lower TSS concentrations, fewer PAH detections, and lower concentrations of PAH parameters than historical monitoring. Benzo(a)pyrene was the only PAH parameter detected above the RDL in the November and December 2014 samples. The lab filtered analysis, completed in accordance with O.Reg. 153, indicated that results did not exceed the RDL for benzo(a)pyrene.

The results are consistent with the understanding that PAHs tend to adsorb to soil particles, with the majority of benzo(a)pyrene adsorbed to particles. This tendency to adsorb to particles will limit movement of PAHs within groundwater.

Future monitoring will be completed using low flow sampling methods to minimize entrained sediment within the samples. Benzo(a)pyrene should continue to be analyzed for both unfiltered and lab filtered water quality samples in accordance with O.Reg.153.

2.4.4 Other SVOC

Groundwater quality monitoring within the Project Area monitoring wells included sample analyses of other SVOC compounds such as organochlorines and Biphenyl. As detailed in the Baseline Conditions Report, these parameters were generally not detected above the RDL; with the exception of Biphenyl which was detected in October 2014 at 0.3 µg/L at MW5-14S and 0.2 µg/L at MW6-14. These results did not exceed the SCS criteria of 0.5 µg/L.

Testing in November 2014 and December 2014 indicated that no other SVOCs (including biphenyl) were detected above the RDL in any of the samples.

2.4.5 VOC

The 2013 and 2014 groundwater quality results for Project Area monitoring wells generally indicated that volatile organic compounds (VOC) were not detected above the RDL; with the



**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

Monitoring Well Water Quality Sampling
February 3, 2015

exception of acetone within the initial October 2014 samples from MW5-14S, MW6-14 and MW7-14, and chloroform from the initial October 2014 sample from MW5-14I. Acetone concentrations ranged from 10 µg/L to 16 µg/L, which are well below the SCS criteria of 2700 µg/L. Follow-up sampling in November/December 2014 indicated that acetone concentrations were below the RDL at these locations.

In October 2014, the chloroform concentration at MW5-14I was 0.37 µg/L, which is below the SCS criteria of 2 µg/L. Additional sampling at MW5-14I has not been possible to date. Chloroform was not detected at any other Project Area monitoring well.

2.5 QA/QC PROTOCOL

November and December 2014 monitoring included sampling of field blanks and trip blanks to evaluate potential sources of error during sample collection. The following trip and field blanks were completed:

- Field Blanks for VOC and BTEX parameters on November 20 and 27, 2014;
- Field Blanks for SVOCs and lab filtered SVOCs on November 20, 26 and 27, 2014 and December 22, 2014;
- Field Blanks for SVOCs and metals on December 23, 2014;
- Trip Blank for VOCs and BTEX parameters on November 20, 2014; and
- Trip Blank for VOCs, SVOCs and BTEX parameters on November 27, 2014.

Results for all field and trip blanks were below the RDL, with the exception of Pentachlorophenol which was detected in the unfiltered SVOC field blank from December 22, 2014. Maxxam has confirmed that this detection is considered valid. Pentachlorophenol was not detected in any of the groundwater samples from December 22, 2014 and has not been historically detected within the Project Area monitoring wells, or nearby private wells. The source of the Pentachlorophenol in the field blank is not known. The analytical results for the field and trip blanks are included in Table 1.

Maxxam followed internal QA/QC protocols, which included internal replicates, process blanks, process recovery, and matrix spike analyses. A surrogate spike was added for the SVOC analysis to document recovery within lab filtered samples. Maxxam reported that the results for their internal QA/QC were within acceptable limits, and these results were considered acceptable for use in the report. The results of the lab replicates are not presented in Table 1, but included in the detailed laboratory certificates of analyses in Appendix C.

PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION, ADDENDUM

Review of Analytical Methods
February 3, 2015

3.0 REVIEW OF ANALYTICAL METHODS

The previous section discussed the results of the filtered and unfiltered SVOC parameters. Lab filtered benzo(a)pyrene analysis was completed in accordance with O.Reg. 153 and lab filtering for the remaining SVOC's was completed for discussion purposes.

Maxxam followed internal QA/QC protocols for the SVOC analysis, which included a surrogate spike for the SVOC analysis to document recovery within lab filtered samples. For some parameters, there was adequate surrogate recovery to allow comparison of filtered versus unfiltered results. These parameters included Diethyl Phthalate with 82% to 100% recovery of the lab filtered surrogate spike and phenanthrene with 51% to 58% recovery. These results meet Maxxam standards and any observed reduction in concentration within the lab filtered sample is considered a result of adsorption to the sediment.

However, for other SVOC parameters that have a strong tendency to adsorb onto any surface, there was inadequate surrogate recovery. The recovery of the lab filtered surrogate spike for DEHP, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b/j)fluoranthene, Benzo(g,h,i)perylene and Biphenyl had recoveries less than 40% of the lab filtered surrogate spike. Maxxam indicated that although the analysis itself met their overall quality control, there was inadequate recovery for comparison between filtered and unfiltered samples.

To further evaluate the SVOC concentrations within the solution versus bound to sediment, additional PAH analyses were completed by Maxxam on duplicate samples, using standard analytical methods for unfiltered PAHs, filtered PAHs in accordance with O.Reg.153 and analysis of a decanted sediment free sample.

On December 22, 2014, Stantec completed additional groundwater sampling at MW3-13S for further evaluation by Maxxam. This well was selected for the additional testing based on the relatively high well yield and historical detections of PAHs.

Stantec employed modified low flow sampling procedures followed by Waterra sampling for comparison of these groundwater sampling procedures. Initial samples were collected using a Geopump™ bladder pump with HDPE tubing to pump the water from the well screen at a constant rate. New tubing was used to reduce the potential for cross contamination. Additional samples were then collected using inertial lift Waterra™ sampling pump constructed of 16 mm diameter HDPE tubing connected to a Waterra™ Delrin foot valve. This was the same sampling method used in historical sampling completed in 2014. The samples from MW3-13S from December 2014 were submitted to Maxxam for PAH analysis only, as requested by the lab.

The Maxxam analytical methods and comparison of results are discussed in the Maxxam report dated January 9, 2015. A copy of the report is included in Appendix D. The results of the standard analysis for the unfiltered sample are also included In Table 1.



**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

Review of Analytical Methods
February 3, 2015

The December 2014 water quality results for the samples collected using low flow methods at MW3-13S indicated that PAH parameters were not detected above the RDL for any analysis method.

For the samples collected using Waterra sampling, the TSS concentration was approximately 1,500 mg/L and there were detections of several PAH parameters, including:

- Benzo(a)anthracene;
- Benzo(a)pyrene;
- Benzo(b/j)fluoranthene;
- Benzo(g,h,i)perylene;
- Chrysene;
- Fluoranthene;
- Phenanthrene; and
- Pyrene.

These detections are consistent with historical Waterra sampling results at MW3-13S. Maxxam completed additional analyses and QA/QC on these samples and concluded that the PAH detections within the water quality samples were associated with the sediment and particulate matter rather than as dissolved concentrations within the groundwater.

This additional analysis completed by Maxxam is consistent with the previous results which indicated that the PAH detections were associated with the particulate matter and not representative of dissolved groundwater concentrations. These findings indicate that PAHs are adsorbed to the sediment within the overburden and not mobile within the groundwater.

**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

Private Well Water Quality Sampling
February 3, 2015

4.0 PRIVATE WELL WATER QUALITY SAMPLING

The approved groundwater and surface water monitoring for the Clarington TS indicated that water quality samples from private wells would be collected twice prior to station construction for general chemistry, turbidity, metals, petroleum hydrocarbons (PHCs)(F1-F4), BTEX, and bacteriological analyses. The Baseline Monitoring Report detailed the results of the initial two (2) water quality samples collected from private wells.

During the first round of sampling in July/August 2014, not all wells were sampled for bacteriological analyses due to a miscommunication. The well owners affected by this omission were notified, and a follow-up round of sampling, including bacteriological analyses was completed in November 2014. The following section details the sampling methods and results from the November sampling event. The historical and current water quality data from private wells are presented on Table 2 with copies of the November 2014 Laboratory Certificates of Analysis included in Appendix C.

4.1 SAMPLE COLLECTION

During the July/August 2014 sampling, bacteriological analysis was mistakenly omitted at sixteen (16) locations. Additional sampling was completed in November 2014 at twelve (12) of these locations. The residents at the remaining four (4) locations either turned down the additional sampling, or could not be contacted despite repeated attempts to schedule sampling for their wells. Additional sampling was completed at one (1) of the private wells to compare sample location and raw/treated sample.

During sampling, Stantec attempted to collect water quality samples from a raw water tap, where available. However, this was not always feasible at some locations, and as a result, some private well samples could only be collected after a treatment system. Water type (raw / treated) and sample location are detailed on Table 2 along with water quality results.

Prior to sample collection, the sample location tap was disinfected with a dilute bleach solution and allowed to run for approximately 10 minutes. Water samples were collected directly into laboratory supplied containers. The samples were not filtered, and results represent total concentrations.

All groundwater samples collected were packed into sample coolers, which were refrigerated using ice packs, and delivered to Maxxam for laboratory analyses. The November 2014 groundwater samples from private wells were analyzed for microbiological analysis, general inorganic chemistry, total metals, petroleum hydrocarbons and BTEX compounds, PCBs, VOCs and SVOCs. For comparison, certain locations were also analyzed for lab filtered SVOCs. Chain of custody forms were completed and included with the samples.



**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

Private Well Water Quality Sampling
February 3, 2015

4.2 WATER QUALITY RESULTS

Water quality results are presented on Table 2 and compared to the ODWS which are the applicable criterion for drinking water in Ontario. For privacy reasons, sample identifications are not given and the samples are labelled based on aquifer unit, raw or treated, sample tap, as appropriate.

Following receipt of the water quality results and completing internal QA/QC procedures, Stantec notified individual well owners of any health related exceedances within their water sample results. A follow-up letter was provided to each well owner detailing the full water quality results. The sections below summarize key raw water quality characteristics only.

4.2.1.1 Bacteriological Water Quality

Water quality trends for shallow private wells that were installed to a maximum depth of 16 m below ground surface (BGS) had total coliform detections within 2 of the 3 wells (66%) sampled during the initial round of sampling, 10 of the 12 wells (83%) sampled during the October 2014 round and 3 of the 8 wells (38%) sampled during the November 2014 round. *Escherichia coli* (E.coli) results indicated no detections within the initial round of sampling, detections within 3 of the 12 wells (25%) sampled during the October 2014 round and 1 of the 8 wells (12%) sampled during the November 2014 round.

For wells installed within the Thorncliffe Formation, results indicated total coliform detections within 2 of the 4 wells (50%) sampling during the initial round of sampling, 1 of the 9 wells (11%) sampled during the October 2014 round, and no detections in the 4 wells sampled during the November 2014 round. E.coli was not detected in any sampled well in 2014.

The November 2014 water quality results were consistent with previous samples; indicating that bacteriological detections within some of the shallow dug wells, with no detections in the drilled wells installed within the Lower Thorncliffe Formation. As stated in the Baseline Conditions Report, the total coliform and E.coli detections within the shallows dug wells are interpreted to be related to local sources associated agricultural activities (manure storage and animal feedlots), septic systems, or potential surface influences and well construction.

All residents were notified by phone of the bacteriological results and directed to follow any recommendations from the Durham Region Health Unit regarding sampling, treatment of the well and routine well maintenance.

4.2.1.2 Inorganic Water Quality

The private well November 2014 inorganic water quality results did not exceed the ODWS-MAC for any tested parameter and results were generally consistent with historical concentrations.

Hardness was above the ODWS Operational Guideline (OG) in all raw water sampling, which is typical for groundwater quality from southern Ontario, and was below criteria the ODWS-OG for any samples collected after a water softener.



PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION, ADDENDUM

Private Well Water Quality Sampling
February 3, 2015

The following parameters were detected above the ODWS-AO, ODWS Medical Officer of Health (MOH) or ODWS-OG criteria within at least one (1) location in November 2014:

- Elevated sodium was noted in all samples collected after treatment by a water softener with concentrations ranging from 33 mg/L to 310 mg/L. All results exceeded the ODWS-MOH of 20 mg/L and two (2) samples exceeded the ODWS-AO of 200 mg/L. The samples collected following treatment by a water softener also indicated elevated chloride at one (1) location and elevated TDS at two (2) locations above the ODWS-AO;
- Sodium concentrations of 53 mg/L and 70 mg/L were detected within two (2) shallow wells exceeding the ODWS-MOH;
- TDS exceeded the ODWS AO within the raw water at one (1) shallow overburden well; and
- Iron was detected at 1.8 mg/L within one (1) sample from the Thorncliffe Formation, which exceeded the ODWS-AO of 0.3 mg/L. This concentration is consistent with historical results for this well, and typical of the other Thorncliffe wells, which indicated elevated iron within 66% (6 out of 9) of the private wells.

The November 2014 water quality results are generally consistent with historical monitoring within the private wells. No exceedances of the ODWS-MAC were reported.

4.2.1.3 Organic Water Quality

The November 2014 organic water quality data indicated detections of Trihalomethanes (THM) parameters (bromoform, bromodichloromethane, dibromochloromethane and /or chloroform) in seven (7) locations, with an exceedance of the ODWS-MAC of THMs at one (1) location. THMs are by-product of disinfection and are created by the reaction of chlorine with organic carbon. It is our understanding that prior to the November 2014 sampling, the well with the THM exceedance was recently disinfected by the resident in an effort to address bacteriological detections.

The ODWS MAC for THMs is based on an annual average concentration. Previous THM results for this location were below the RDL, indicating that the annual THM concentration within the well would not have exceeded the ODWS/MAC. THM concentration are expected to decrease at this well with increased pumping.

The November 2014 water quality results did not indicate any other exceedance of the ODWS MAC for any tested organic water quality parameter, with results similar to historical data.

**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

Conclusions and Recommendations
February 3, 2015

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results presented in the additional investigations for the Hydro One Transformer Station, the following conclusions are provided:

- Results for lab filtered versus field filtered metals were generally similar with the exception of MW1-13D, which indicated dissolved iron present within the groundwater. Future metals analyses for groundwater sampled from monitoring wells will be completed on field filtered samples.
- The 2014 water quality results indicated that BTEX concentrations decreased at all Project Area monitoring wells. Water quality results from November / December 2014 indicated that BTEX parameters were not detected above the RDL at the majority of tested monitoring wells; with the exception of MW2 13D, where toluene and xylene were detected just above the RDL, but well below the SCS criteria.
- Historical results indicate a correlation with high phthalate and benzo(a)pyrene concentrations, with elevated TSS concentrations above 500 mg/L. The November 26/27, 2014 and December 2014 results from sampling completed using low-flow methods indicated TSS concentrations generally an order of magnitude lower than previous results.
- The November 26/27, 2014 results indicated that phthalates were not detected above the RDL within the majority of tested wells; however, DEHP and Diethyl Phthalate were detected above the RDL at MW2-13S/D and DEHP was detected above the RDL at MW3-13S/D despite the low TSS concentrations. There were no exceedances of the SCS criteria for phthalate parameters within the November 26/27, 2014 or December 2014 samples.
- Monitoring of water present within the well casing prior to well development indicated that the well casing and equipment were not a main factor controlling phthalate detections. As a precaution, Stantec has removed the sample tubing from all wells and confirmed that all loggers are installed using stainless steel cable in an effort to remove potential sources of phthalates.
- The November and December 2014 results indicated that PAHs were not detected above the RDL within the majority of tested wells; however, benzo(a)pyrene was detected at MW2-13D (0.02 µg/L) and MW4-13S (0.01 µg/L). At MW3-13S, benzo(a)pyrene was detected on November 27, 2014 (0.02 µg/L) but was not detected above the RDL in the December sample. No other PAH parameters were detected above the RDL in the November or December 2014 samples. Results for filtered samples for benzo(a)pyrene, completed in accordance with O.Reg. 153, did not exceed the RDL.



**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

Conclusions and Recommendations
February 3, 2015

- The water quality results for samples collected using low flow sampling resulted in fewer detections and lower concentrations of PAHs. These results are consistent with the understanding that PAHs detections were associated with the sediment and not representative of dissolved groundwater concentrations. The additional analysis completed by Maxxam further confirmed this understanding that detections were associated with the particulate matter and not representative of dissolved concentrations. This tendency of PAHs to adsorb to particles will limit their movement within the groundwater system.
- Results for the remaining SVOC and VOC parameters were not detected above the RDL within any sample in November/December 2014.
- Private water quality monitoring was completed in November 2014, with results generally consistent with initial results collected in 2014. Elevated THMs were noted within one (1) private well associated with recent disinfection to address bacteriological detections. These THM concentrations are considered temporary and do not exceed the ODWS-MAC which is based on an annual average. Following receipt of the water quality results, Stantec notified individual well owners of any health related exceedances within their water sample. A follow-up letter was provided to each well owner detailing the full water quality results.

The following recommendations are provided:

- Future groundwater sampling should be completed using low flow sampling methods to minimize entrained sediment within the samples.
- Benzo(a)pyrene should continue to be analyzed for both unfiltered and lab filtered water quality samples in accordance with O.Reg.153.
- Water quality sampling of MW5-14S(2), MW5-14I, MW5-14D should be completed once the wells are fully developed to document groundwater quality. Sampling of the bedrock well at MW5-14D(2) may be completed as part of a separate research project, with appropriate agreements with Hydro One.
- A replacement monitoring well was installed adjacent to MW4-13D in 2015 at a slightly deeper depth. Future monitoring should be completed at this location to facilitate representative groundwater sample collection.

**PRE-STATION CONSTRUCTION GROUNDWATER AND SURFACE WATER BASELINE CONDITIONS
REPORT, HYDRO ONE - CLARINGTON TRANSFORMER STATION,
ADDENDUM**

References
February 3, 2015

6.0 REFERENCES

Hydro One, 2014. Class Environmental Assessment Environmental Study Report, Clarington Transformer Station, Report Number 590-CLEA-12-11. Hydro One Networks Inc., January 2014.

Ministry of the Environment (MOE), 2006. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines, June 2003, revised June 2006.

Ministry of Environment (MOE), 2011a. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Ontario Ministry of the Environment, April 15, 2011. PIBS #7382e01.

Ministry of the Environment (MOE), 2011b. Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Prepared by Laboratory Services Branch, MOE. Amended July 1, 2011.

Puls, R.W. and Barcelona, M.J., 1996. Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures. USEPA, April 1996.

Stantec Consulting Ltd., 2014. Pre-Station Construction Groundwater and Surface Water Baseline Conditions Report, Hydro One - Clarington Transformer Station. Prepared for Hydro One, November 2014.

USEPA, 2010. Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells, Version 3, January 19, 2010.