

### TECHNICAL MEMORANDUM

**DATE** July 8, 2025 **Project No.** CA0046793.6287

TO Andrew Evans, Director of Waste Management Services

The Regional Municipality of Durham

CC Poornitha Suresh, Nicia Williams, Lyndsay Waller, Lipika Saha

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#### DYEC SECONDARY PLAN SCREENING MODELLING ASSESSMENT

### 1.0 BACKGROUND

WSP Canada Inc (WSP) previously supported the Region of Durham (Region) with the preparation of an Air Quality Impact Assessment (AQIA) to support the Environmental Screening Report (ESR) for a proposed increase in annual tonnage throughput of the Durham York Energy Centre (DYEC). As part of this scope of work, the Town of Clarington identified that there are proposed plans for the Major Transit Station Area (MTSA) around a proposed Courtice GO station which allow for tall developments in the surrounding area that should be included in the assessment. At the time of the AQIA, no detail was available regarding the design and layout of these buildings and therefore, it was identified that they would be assessed at a later stage once further information is available regarding the specific locations, heights and end use (e.g. residential or commercial) of future developments.

In January 2025, WSP was retained by the Region to prepare an Emission Summary and Dispersion Modelling (ESDM) report for the proposed future operating scenario of 160,000 tonnes per annum which would include an assessment of a ground-level receptor grid and above grade receptors on existing and future (approved) tall residential buildings in the surrounding area for developments for which site plans are available, in accordance with Ministry of Environment, Conservation and Parks (MECP) guidelines including the ESDM Procedure Document Version 4.1, dated March 2018 (ESDM Procedure Document) and Air Dispersion Modelling Guideline for Ontario Version 3.0, dated February 2017 (ADMGO). It is understood that Site Plan Approval for the MTSA buildings has not been approved and therefore it does not meet the requirement of a receptor to be included in an ESDM report.

In acknowledgement of the commitments made as part of the ESR, the Region has identified that an assessment of the proposed MTSA be completed. It is understood that no site plans are available for the MTSA and the precise location of buildings, building heights and potential air intakes (including openable windows and balconies) has not been identified. Furthermore, it is unclear whether residential locations could be constructed in this location without impacting the ability of the existing operations at DYEC to maintain compliance with the existing ECA. As a result, a screening assessment has been completed to identify the change in potential impacts at these locations from the proposed increase in annual tonnage (from 140 ktpa to 160 ktpa). This will also allow the Region and Reworld to comment on the proposed future re-development of the MTSA and provide input to be

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The Regional Municipality of Durham

incorporated into future Site Plans, which may include restrictions on the location of the tall buildings and/or air intakes.

In addition to the above, WSP has identified four (4) Courtice secondary plans for locations near DYEC that have the potential to include tall developments that will be factored into the assessment at the same time. The screening assessment modelling includes the following secondary plans and the respective maximum potential height of the potential developments:

- Southeast Courtice (SEC), up to 12 storeys high,
- Southwest Courtice (SWC), up to 12 storeys high,
- Courtice Waterfront Energy Park, up to 15 storeys high,
- Major Transit Station Area, up to 40 storeys high.

Land use maps obtained from Clarington website for the above Courtice secondary plans are included in Appendix A.

### 2.0 EMISSION RATES

For this screening assessment, six contaminants of greatest concern were identified, based on the 2025 ESDM report: Dioxins and Furans, Hydrogen Chloride, Nitrogen Oxides, Sulphur Dioxide, PM<sub>2.5</sub> and Odour.

Emission rates were calculated for three different scenarios:

- 1. Current operating conditions (140 ktpa)
- 2. Proposed future operating conditions (160 ktpa)
- 3. Odour Upset Scenario (all combustion sources offline with waste on the tipping floor)

For the 140 ktpa operating scenario, emission rates of all contaminants, except for PM<sub>2.5</sub>, were taken from Scenario 1A as described in the AQIA.

For the 160 ktpa scenario, emission rates for all the contaminants of concern were based on Scenario A as described in the 2025 ESDM.

Maximum odour emissions are not dependent on the annual waste processed as they are based on an upset condition where all combustion equipment is off-line but waste is present on the tipping room floor and is vented through the stack. This is not a typical operational scenario but represents a potential upset condition. Emission rates for this scenario were based on the 2015 Odour testing report (Appendix D) of the 2025 ESDM from within the tipping room and it was conservatively assumed all emissions are vented through the stack with no combustion occurring. This is consistent with Scenario E described in the 2025 ESDM Report.

For the purpose of this assessment, only emissions from the main stack were considered as all other sources have much lower emission rates and release emissions from release points which are much lower in elevation. As a result, maximum concentrations from these ancillary sources are expected to occur at lower elevations, closer to the point of emission and are not expected to be impacted by the potential taller buildings introduced by the secondary plans.



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### 3.0 MODELLING

The following models and pre- and post-processors were used in the assessment:

- CALMET diagnostic meteorological model (v. 6.5.0, level 150223);
- CALPUFF dispersion model (v. 7.2.1, level 150618);
- CALPOST post processor (v. 7.1.0, Level 141010);
- BPIP building downwash pre-processor (v. 04274); and
- POSTUTIL post processor (v.7.0.0, Level 150207)

### 3.1 Model Domain

The Model domain used in this assessment only encompassed the receptor grid created based on the secondary plans.

## 3.2 Meteorology, Land Use and Terrain Data

Meteorological data is based on observation data from surface stations and large-scale mesoscale meteorological data from the Weather Research and Forecasting (WRF) model between 2014 – 2018, inclusive. The CALMET output files were submitted to MECP for review and approval prior to use in the modelling and are consistent with those used in the AQIA.

Terrain data was downloaded from the MECP's database of regional terrain data for modelling (MECP, 2017b) and processed using the CALPUFF pre-processor, TERREL.

# 3.3 Receptors

A series of receptor grids were generated that encompass the above secondary plans, based on the proposed land use maps (contained in Appendix A). Receptor grids were placed to represent the locations of potential developments within each secondary plan area at a resolution of 100m horizontally. Vertically, each receptor grid was repeated at height intervals of 3 m to represent potential air intakes at each storey. For each secondary plan, the receptor grid was repeated to the maximum storey height plus an additional story was added to represent a mechanical penthouse. For example, to represent a 12 storey building a receptor would be placed starting at 0m elevation to represent the base of the building, and then additional receptors were added at 3m increments up to 12 stories, plus an additional 3m for the mechanical penthouse. Therefore, receptors from 0m to 39m are included to represent a 12 storey building. It should be noted that receptor locations that were placed as part of this screening assessment do not represent actual developments since no official development plans have been submitted. Furthermore, the final building design may not include mechanical air intakes at all storeys, therefore this screening represents a conservative or 'worst case' assessment.

# 3.4 Building Downwash

The buildings used in this assessment to represent building downwash are the same as the buildings used in the 2025 ESDM Report and AQIA. Building wake effects were considered in this assessment using the U.S. EPA's Building Profile Input Program (BPIP-ISC). The inputs into this pre-processor include the coordinates and heights

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of the buildings and stacks. The output data from BPIP is used in the building wake effect calculations. No changes were made to the BPIP input or output file for this assessment.

### 3.5 Deposition

CALPUFF has the capability to account for wet and dry deposition of substances that would reduce ground level concentrations at POIs. However, the deposition algorithm has not been implemented for conservatism and to maintain consistency with the 2025 ESDM report and the AQIA for maximum POI predictions.

## 3.6 Dispersion Modelling Options

All modelling options used in this assessment are consistent with both the AQIA and 2025 ESDM report.

### 3.7 Source Parameters

The source parameters modelled are provided in Table 1, below:

**Table 1: Modelled Source Parameters for Main Stack** 

Scenario	Stack Height [m]	Stack Diameter [m]	Flow Rate [m³/s]	Exit Velocity [m/s]	Exhaust Temperature [K]
Current (140 ktpa)	87.6	1.7	52.31	23.02	405.4
Future (160 ktpa)	87.6	1.7	54.56	24.04	411.0
Odour upset conditions	87.6	1.7	23.61	10.40	293.2

### 4.0 MODELLING RESULTS

Modelling was completed for emissions from the main stack only, under each of the three operating scenarios using the receptor grids representing potential tall buildings in each of the four secondary plans. In Ontario, MECP guidance allows for the removal of meteorological anomalies to account for extreme, rare and transient conditions that may be present in the datasets and considered outliers. As such, for air quality assessments that require 24-hour average concentrations, the highest predicted 24-hr concentration in each year of meteorological data may be removed. Similarly, for assessments that use shorter 1-hour average concentrations, the eight highest predicted concentrations in each year may be removed, as per the MECP guidance listed in ADMGO. No predicted results are removed for assessment against annual averaging periods. Elimination of these anomalies is optional but both methodologies are considered acceptable for the demonstration of compliance with Ontario Regulation 419/05 standards.

Maximum predicted concentrations (with meteorological anomalies removed) at any of the four secondary plan locations are presented in Tables 2 through 4 below. The modelled POI concentrations were compared to the 2023 Schedule 3 standards listed in O.Reg. 419/05 and in the case of PM<sub>2.5</sub> and PM<sub>10</sub>, the Ontario Ambient Air Quality Criteria (AAQC).



Table 2: Maximum predicted concentrations at potential new receptors in 140 ktpa Scenario

Contaminant	Averaging Period	MECP POI Limit [μg/m³]	Maximum POI Concentration [µg/m³]	Percentage of MECP Limit
Dioxins, Furans and Dioxin-like PCBs	24-hour	0.1 pg TEQ/m3	0.0069 pg TEQ/m3	7%
Hydrogen Chloride	24-hour	20	1.04	5%
Hydrogen Chloride	24-hour	200	1.04	Below URT*
Nitrogen Oxides	24-hour	200	13.93	7%
Nitrogen Oxides	1-hour	400	96.14	24%
Sulphur Dioxide	1-hour	100	27.84	28%
Sulphur Dioxide	Annual	10	0.17	2%
Particulate matter (< 2.5 µm diameter)	24-hour	27	0.49	2%
Particulate matter (< 2.5 µm diameter)	Annual	8.8	0.06	1%

<sup>\*</sup>Upper Risk Threshold as set out in Schedule 6 of O.Reg 419/05

Table 3: Maximum predicted concentrations at potential new receptors in 160 ktpa Scenario

Contaminant	Averaging Period	MECP POI Limit [µg/m³]	Maximum POI Concentration [µg/m³]	Percentage of MECP Limit
Dioxins, Furans and Dioxin-like PCBs	24-hour	0.1 pg TEQ/m3	0.0066 pg TEQ/m3	7%
Hydrogen Chloride	24-hour	20	1.00	5%
Hydrogen Chloride	24-hour	200	1.00	Below URT*
Nitrogen Oxides	24-hour	200	13.39	7%



Contaminant	Averaging Period	MECP POI Limit [μg/m³]	Maximum POI Concentration [µg/m³]	Percentage of MECP Limit
Nitrogen Oxides	1-hour	400	95.39	24%
Sulphur Dioxide	1-hour	100	27.62	28%
Sulphur Dioxide	Annual	10	0.13	1%
Particulate matter (< 2.5 µm diameter)	24-hour	27	0.66	2%
Particulate matter (< 2.5 µm diameter)	Annual	8.8	0.09	1%

<sup>\*</sup>Upper Risk Threshold as set out in Schedule 6 of O.Reg 419/05

Table 4: Maximum predicted concentrations at potential new receptors under Odour Upset Scenario at 99.5%ile

Contaminant	Averaging Period	MECP POI Limit [OU/m³]	Maximum POI Concentration [OU/m³]	Percentage of MECP Guideline
Odour	10-minute	1	2.10	210%

Overall, the results of the modelling indicate that the maximum predicted concentrations of the assessed contaminants would be below the respective MECP limits under both the current and proposed future operating scenarios with no significant change in the predicted concentrations as a result of the proposed increase in annual waste processing. The maximum concentrations occur on buildings proposed on the MTSA within the Mixed Use Core area at heights over 110 m above grade. The Mixed Use Core area has the potential to include buildings up to 40 storeys high.

For the odour upset scenario, maximum predicted concentrations have the potential to exceed the odour guideline (greater than 0.5% of the time) at receptors located on the MTSA buildings within the Mixed Use Core area, at heights 84 m and above (Appendix A). Under this scenario "at receptor" mitigation could be required depending on building configuration and location. Mitigation could be in the form of restrictions on the locations of openable windows/ balconies or other options. This scenario represents an upset conditions scenario only, however, and is not part of routine operations. It would only occur if there is waste on the tipping floor and all combustion equipment is off-line.



### 5.0 CONCLUSIONS

This screening assessment was completed to assess the potential impact of future tall building locations identified in secondary plans in areas in close proximity to DYEC. The assessment considered the potential impacts of these potential future buildings on both the current operating scenario, proposed future operating scenario and a potential upset condition. Overall, the results of the assessment indicate that the potential developments would not impact the ability of DYEC to maintain compliance with O.Reg. 419/05 air quality limits, however, there may be the potential for odour impacts at the potential developments during upset conditions. Mitigation strategies to reduce potential odour impacts should be considered as part of the design phase of future developments. It should also be noted that since actual building plans are not available for any potential development, representative buildings were not added to the modelling domain in CALPUFF. Therefore, once actual building plans are available, it is recommended that this assessment be revised accordingly.

### 6.0 CLOSURE

The assessment was completed for the Region of Durham to assess potential impacts associated with air quality related to the potential tall building developments in close proximity to the DYEC. It is based on current air quality guidelines and the secondary plans available at the time this assessment was completed. The conclusions and recommendations presented in this report may change pending any new land use compatibility guidelines and/or air quality regulations introduced by the province.

We trust that the above technical memorandum meets your needs at this time. Should you have any questions please contact the undersigned.

WSP Canada Inc.

Katherine Armstrong, M.Sc.

K. Hrustvory

Associate Director, Air Quality

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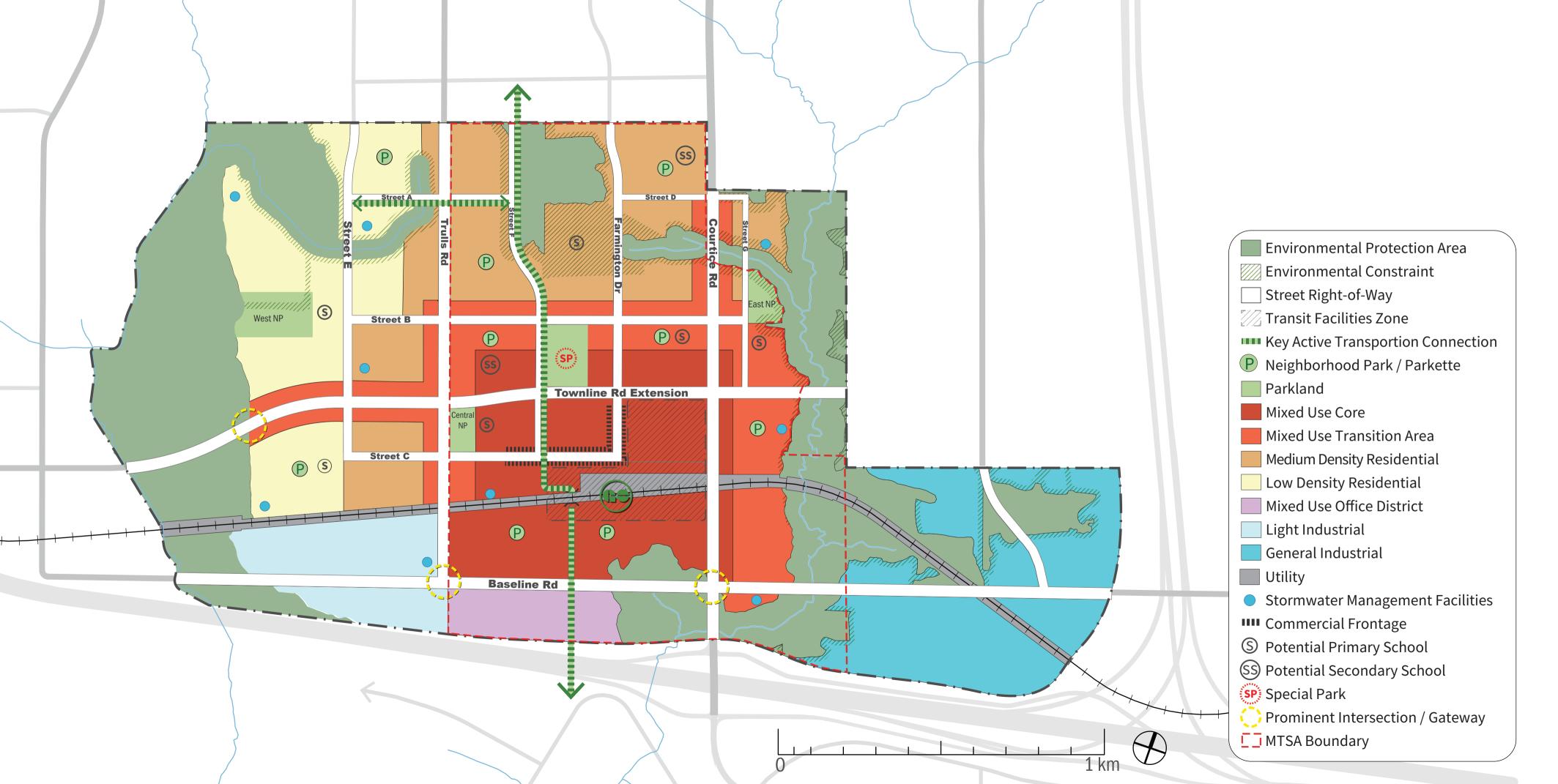
Senior Lead Environmental Engineer, Air Quality and GHGs

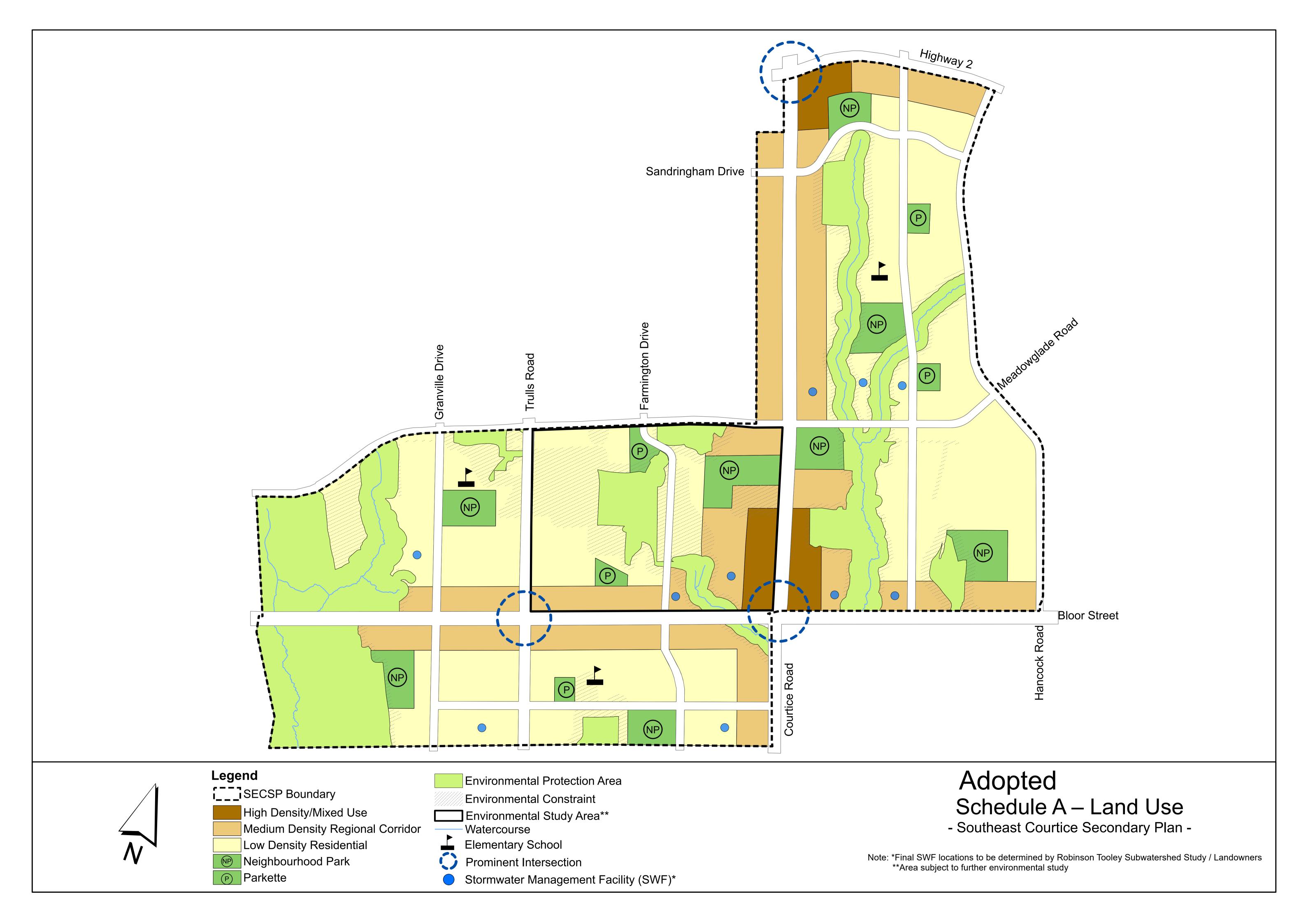
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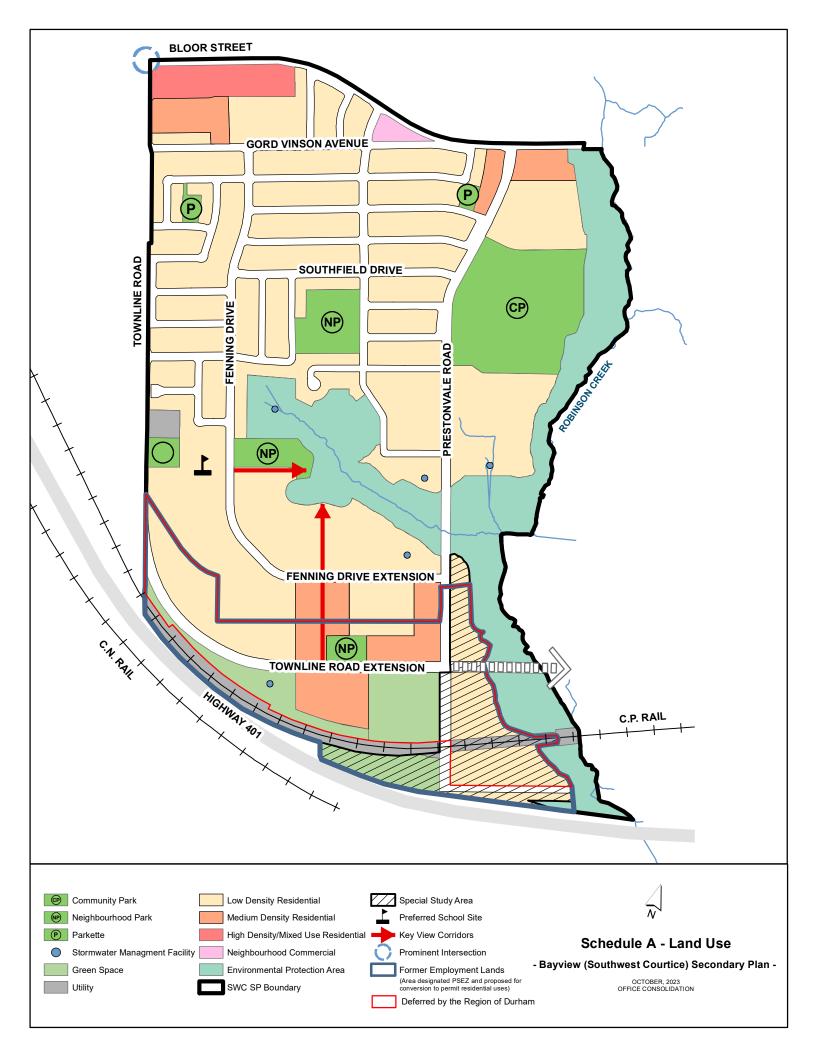
This memo was prepared exclusively for The Regional Municipality of Durham (Client) by WSP Canada Inc (WSP). The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in WSP's services and based on: (i) information available at the time of preparation; (ii) data supplied by outside sources; and (iii) the assumptions, conditions and qualifications set forth in this report. While it is believed that the information contained herein is reliable under the conditions and subject to the limitations set forth herein, this memo is based in part on information not within the control of WSP and WSP therefore cannot and does not guarantee its accuracy. WSP provides no warranty, guarantee or other assurances to the Client, express or implied, of any kind, nor assumes liability of any kind, whether in tort, contract or otherwise, relative to the observations, conclusions, and recommendations set out in this memo. This memo is intended to be used by The Regional Municipality of Durham. only, subject to the terms and conditions of its contract with WSP. Any use of, or reliance on, this report by any third party is at that party's sole risk.

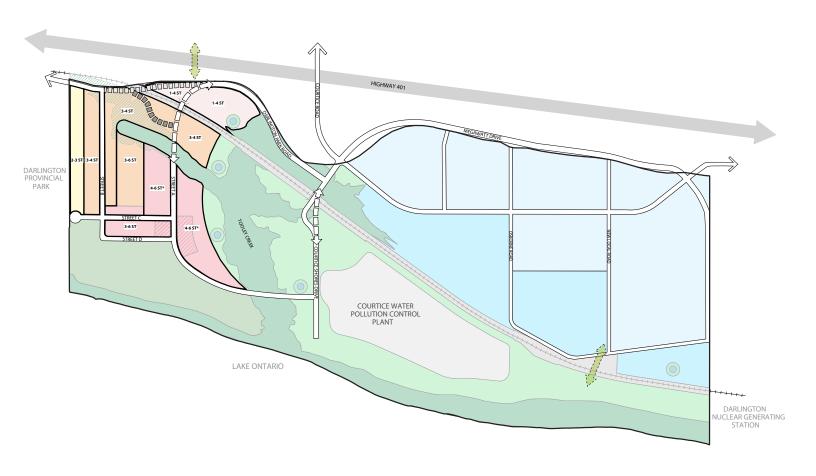
### **APPENDIX A**

Courtice Secondary Plans and Receptors









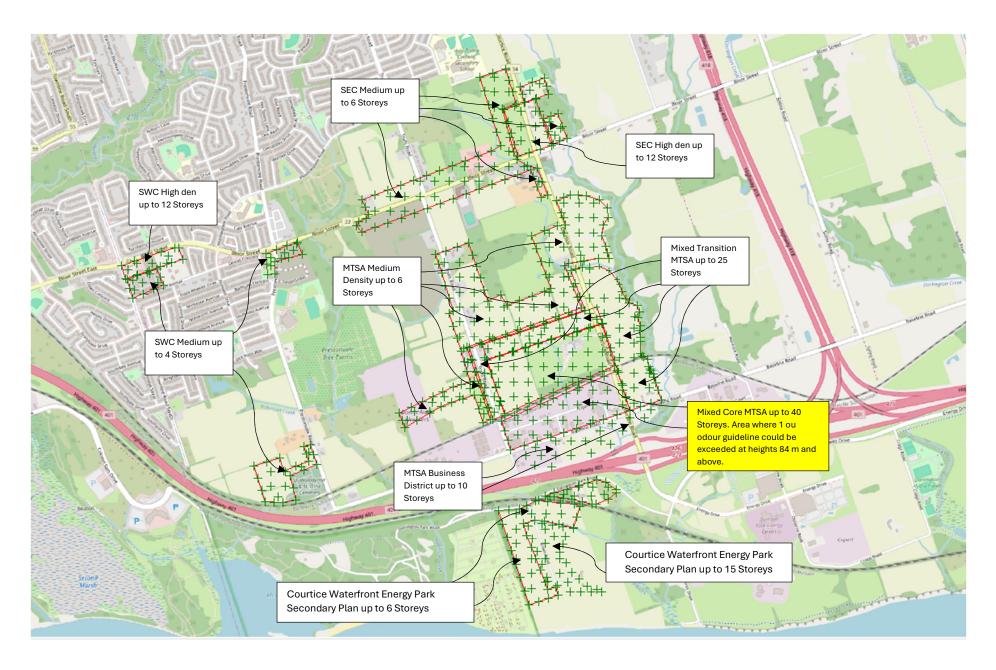
#### LEGEND:

- Low Density Residential
- Medium Density Residential
- Mixed Use Area
- Municipal Wide Park
- Storm Water Management Facilities
- Environmental Protection Area
- Waterfront Greenway
- Light Industrial
- General Industrial
- Gateway Commercial
- Utility

Courtice Waterfront and Energy Park Seconday Plan **Schedule B - Heights Plan** 

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<sup>\*</sup> Buildings up to 15 storeys may be permitted subject to Policy 5.5.8. Note: The minimum height of standalone commercial uses (excluding hotels) shall be 2 storeys.



**Courtice Secondary Plan Receptor Locations**