APPENDIX

A NATURAL ENVIRONMENT SCREENING

MEMO

TO:	Denny Boskovski, Town of East Gwillimbury
FROM:	Dan Reeves, Project Ecologist & Jaclyn Rodo, Ecologist
SUBJECT:	Town of East Gwillimbury Water and Wastewater Master Plan Update Natural Environment Screening
DATE:	June 27, 2018

WSP Canada Inc. (WSP) is pleased to provide the following memorandum to summarize the natural environment conditions within the Town of East Gwillimbury (the Town) to support preparation of the Water and Wastewater Master Plan Update. This memorandum focuses on a 'Study Area', including the Town and 120 m limit from the Town boundary and has been designed to provide a summary of constraints and opportunities at a broad scale.

The assessment included herein focused on the review and documentation of Natural Heritage Features (NHF), as described within the Provincial Policy Statement (PPS) and further refined by regional policies.

The goal of this assessment was to:

- Review available background information for the Study Area and 120 m surrounding area; and,
- Identify opportunities and constraints with respect to the natural environment to be considered as part of the Master Plan update.

ENVIRONMENTAL POLICY CONTEXT

PROVINCIAL POLICY STATEMENT

The PPS (Ontario Ministry of Municipal Affairs and Housing (OMMAH), 2014) is a planning document that provides a framework for, and governs development within the Province of Ontario. To preserve various ecological resources deemed significant in the Province, development lands must be assessed for the presence of NHFs prior to construction. Generally, NHFs within 120 m limit of influence of development lands must be assessed. These NHFs (listed below) are both defined and afforded protections under the PPS. Linkages between NHFs, surface water and groundwater features are also recognized and afforded similar protections under the policy. Section 2.1.2 of the PPS also requires that the diversity and connectivity of all NHFs and

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the long-term ecological function of natural heritage systems be maintained, restored or improved where possible.

The Town occurs within Ecoregion 6E. Under the PPS (OMMAH, 2014), development or site alteration is prohibited within significant wetlands in Ecoregions 5E, 6E and 7E and in significant coastal wetlands, but may be allowed adjacent to these features provided the adjacent lands have been evaluated and it has been demonstrated that there will be no negative impacts to these features or their ecological functions. Development may be permitted in or adjacent to significant wetlands north of Ecoregions 5E, 6E and 7E, significant woodlands and significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River), significant wildlife habitat, and significant areas of natural and scientific interest (ANSI), provided there will be no negative impacts to these features or their ecological function due to the proposed undertaking. In addition, development and site alteration is not permitted in fish habitat unless in accordance with provincial and federal legislation.

Natural Heritage Features as defined by the PPS (OMMAH, 2014) include:

- Natural Heritage Systems;
- Fish Habitat;
- Habitats of Endangered and Threatened Species;
- Significant Areas of Natural and Scientific Interest (ANSI);
- Significant Wetlands;
- Significant Coastal Wetlands;
- Significant Wildlife Habitat;
- Significant Woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River); and,
- Significant Valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River).

The Study Area occurs within Ecoregion 6E, therefore Significant Woodlands and Significant Valleylands have been considered in this assessment.

SITE DESCRIPTION

Review of satellite imagery (Google Earth, 2017), Ministry of Natural Resources and Forestry (MNRF; 2014) natural heritage areas mapping, and topographic mapping (MNRF, 2016) indicates the Town is dominated largely by rural, agricultural properties, woodlands, and settlement areas. A variety of watercourses and wetland features also occur throughout the Study Area. The southeastern quadrant of the Study Area occurs within the Oak Ridges Moraine (ORM) planning area, and is dominated by both Natural Core and Countryside areas, with some areas of Natural Linkage, and a single settlement area associated with the Hamlet of Holt. The Greenbelt occurs in the southwest quadrant of the Study Area and the Town's Urban Planning Area occurs within the remaining area (Figure 1).

LOCAL POLICIES

In addition to the PPS, four (4) primary policies regulate development within the Study Area, and include: the regional policies of the ORM, Greenbelt Plan (GP), Lake Simcoe Protection Plan (LSPP), and the Town's Official Plan.

Oak Ridges Moraine

The Oak Ridges Moraine Conservation Plan (ORMCP; Government of Ontario, 2017a) regulates development within the ORM planning area through identification and development controls related to NHF, as summarized below, hydrological features, and through application of land use designations (Figures 2-1 through 2-4). Hydrological features include: permanent and intermittent streams; wetlands; kettle lakes and catchment area; seepage areas and springs; and, aquifers and recharge areas. As it relates to infrastructure development areas, the ORMCP indicates that development should be directed away from Natural Core and Natural Linkage areas. Development of infrastructure may be permitted within Key NHFs, hydrological features and both Natural Core and Natural Linkage areas, where a Natural Heritage Evaluation (NHE) confirms no net impact.

Greenbelt

The GP (Government of Ontario, 2017b) regulates development with the GP area (Figure 1). The planning area is broken down into Protected Countryside, which includes the Natural Heritage System (NHS) and Towns, the ORM, Niagara Escarpment Plan Area and Urban River Valleys. With respect to the Study Area, the GP applies to lands outside of the ORM and Urban Planning Area of the Town (Figure 1). The NHS of the Protected Countryside Area is comprised of Key NHF's and hydrological features, similar to the ORM, in addition to connection areas including areas 240 m or less between Key NHFs. Development of infrastructure may be permitted within Key NHFs and hydrological features where it has been demonstrated there will be no net impact.

Town's Official Plan: Urban Planning Area

The Town's Urban Planning Area includes Secondary Plan Areas identified within Schedule B of the Town's OP (2014). The Urban Planning Area for each of the Secondary Plan Areas is comprised of both Core and Supporting Feature Areas. Core areas are comprised of significant features, including NHF's as described below, and form the critical component of the Town's NHS. Development is generally not permitted within a Core Area feature. Supporting Area features are also important areas and include woodlands, wildlife habitat, and linkages. Development within Supporting Area features is permitted when a development-specific study reviews potential impacts and concludes an overall net benefit. Figures 2-1 through 2-4 identify the location of both the Core and Supporting Areas.

Lake Simcoe Protection Plan

The Town's OP (2014) indicates that areas not regulated by the ORM, Greenbelt Plan or a Secondary Plan Area (i.e. Urban Planning Area), are subject to regulations of the LSPP (Government of Ontario, 2009) (Figure 1). The plan doesn't permit development or site alteration with key NHF's and associated Vegetation Protection Zones (VPZ); however, infrastructure development may be permitted under the Environmental Assessment process and where there is no reasonable alternative.

NATURAL HERITAGE FEATURES

The following sub-sections provide a summary of NHF's that occur throughout the Study Area, in addition to development constraint and opportunity considerations. The four (4) planning areas, including the ORM, GP, LSPP and the Town's Secondary Plan Urban Planning Area recognize

the presence of NHF's as defined by the PPS, and require a similar Vegetation Protection Zone (VPZ), or vegetated protection buffer, from each of these features.

FISH HABITAT

Fish habitat, as defined by the Fisheries Act, c. F-14, includes the spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes. The Act also includes a broader definition of fish as shellfish, crustaceans, and marine mammals at all stages of their life cycles.

Fish habitat occur throughout the Study Area, and generally includes warm water habitat within the northwestern half, closest to Lake Simcoe, and cool and coldwater habitat within the southeastern half of the Study Area (Lake Simcoe Region Conservation Authority; LSRCA, 2015). Both coldwater species, Sculpin and Trout, have been confirmed within the Study Area, and are specifically noted within the Black River.

The Department of Fisheries and Oceans (DFO) Critical Habitat mapping depicts a section of Sharon Creek, west of Sharon, as habitat for Redside Dace (*Clinostomus elongatus*). Redside Dace is protected as Endangered under both the province's Endangered Species Act (ESA) and the federal Species at Risk Act (SARA) (DFO, 2017).

The Ministry of Natural Resources and Forestry (MNRF) recommends a 30 m VPZ from fish habitat, measured from the high-water mark. The 30 m offset may be reduced upon completion of an impact assessment. For the purpose of this evaluation, a 30 m offset is identified on Figures 3-1 through 3-4. Additionally, Redside Dace habitat includes 30 m of riparian habitat from the meander belt. The meander belt limit is to be defined as the furthest stream channel width, as determined through a technical study.

HABITAT OF ENDANGERED OR THREATENED SPECIES

The PPS (OMMAH, 2014) defines the significant habitat of Endangered or Threatened species as the habitat, as approved by the MNRF, that is necessary for the maintenance, survival and/or the recovery of a naturally occurring or reintroduced population of Endangered or Threatened species, and where those areas of occurrences are occupied or habitually occupied by the species during all or any part(s) of their life cycle. The MNRF is mandated to ensure accurate database information for the identification, listing and conduct of ongoing assessments for significant endangered species and their related habitats.

A survey of the MNRF Natural Heritage Information Centre (NHIC) database, Ontario Breeding Bird Atlas (OBBA; Bird Studies Canada et al., 2006), Ontario Reptile and Amphibian Atlas (ORAA; Ontario Nature, 2017), and the Ontario Butterfly Atlas (OBA; Macnaughton et al., 2017) were consulted to determine if there were any Threatened or Endangered species known to be present within or surrounding the Study Area. Several 1 km^2 square areas were searched within the NHIC database, in addition to the 10 km^2 within the OBBA and ORA databases.

DFO Critical Habitat mapping was reviewed for the area, specifically *Ontario South West, Map 5 of 34* (DFO, 2017). The map identifies a section of a tributary to the East Holland River, Sharon Creek, as habitat for Redside Dace (*Clinostomus elongatus*).

Review of the OBA revealed no records for the Study Area.

In addition to the species identified during the background review, it is noted that four (4) bat species should also be considered. Due to the recent listing and protection of these species under the Endangered Species Act, there have been limited efforts to track sightings of these species which has resulted in a lack of occurrence information. A summary of Threatened and Endangered species identified during the review, including the four (4) bat species, is identified in the table below.

Table 1: Threatened and Endangered Species within and surrounding the Study Area.

SPECIES	ESA*	SARA*	HABITAT DESCRIPTION
BIRDS			
Whip-poor-will *(Caprimulgus vociferus)*	THR	THR	This species avoids exposed, open areas or closed-canopy forests, and prefers rock or sand barrens with scattered trees, savannahs, and open conifer plantations.
Chimney Swift *(Chaetura pelagica)*	THR	THR	The species feeds in flocks around waterbodies due to the large amount of insects present. Nesting occurs in large, hollow trees or in the chimneys of houses in urban and rural areas.
Bank Swallow *(Riparia riparia)*	THR	THR	Bank Swallows nest in burrows in natural and man-made settings, wherever there are silt or sand deposits. Nests are often along riverbanks and in aggregate pits.
Barn Swallow *(Hirundo rustica)*	THR	No Status	Barn Swallows often live in close association with humans, building their cup-shaped mud nests almost exclusively on human-made structures such as open barns, under bridges and in culverts. This species forages over a wide area.
Bobolink *(Dolichonyx oryzivorus)*	THR	THR	This species builds its nests on the ground in dense grasses, such as those found in hay fields, tallgrass prairies and open meadows.
Eastern Meadowlark *(Sturnella magna)*	THR	THR	This species prefers native grasslands, pastures and savannahs though will use a variety of other grassland habitats such as hayfields, weedy meadows, etc.
Least Bittern *(Ixobrychus exilis)*	THR	THR	This species breeds in stable marshes with emergent vegetation, such as cattails, and areas with open water. They are typically found in large, quiet marshes.

Cerulean Warbler *(Setophaga cerulean)*	THR	SC	The species typically inhabit large, undisturbed, deciduous forest interiors.
Golden-winged Warbler *(Vermivora chrysoptera)*	THR	THR	This species is known to inhabit large rivers or lakes with a depth from 5 to 10 m. Generally associated with clay, sand and gravel substrates
REPTILES			
Blanding's Turtle *(Emydoidea blandingii)*	THR	THR	This species inhabits lakes, slow-moving streams and wetlands, preferring shallow wetland areas with abundant aquatic vegetation.
Jefferson Salamander* (undetermined) *(Ambystoma jeffersonianum)*	END	END	This species is typically found in deciduous and mixed deciduous forests with temporary pools fed by spring water.
MAMMALS			
Eastern Small-footed Bat *(Myotis leibii)*	END	NAR	This species occurs in southern Ontario, primarily between Georgian Bay to Lake Erie, and east of Pembroke. In the spring this species roosts in a variety of habitats including rocks, buildings, hollow trees, caves and mines. In the winter these bats hibernate in abandoned mines and caves.
Little Brown *Myotis* *(Myotis lucifuga)*	END	END	This species occurs throughout southern and northern Ontario. This species also roosts in large human made structures such as attics and abandoned barns. This species roosts primarily in old growth or mature forests, under loose bark and in tree cavities. Maternity colonies are typically located close to water, near foraging grounds. During the winter, these bats hibernate in humid mines and caves.

Northern *Myotis* (*Myotis septentrionalis)*	END	END	This species occurs within forested areas of southern Ontario to the north shore of Lake Superior. They prefer boreal forests and primarily roost under loose bark and in tree cavities. In the winter these bats hibernate in abandoned mines and caves and commonly share the same hibernation sites as Little Brown Bat.
Tri-colored Bat *(Pipstrellus subflavus)*	END	END	This species occurs within southern Ontario, and is most commonly located along the north shores of Lake Ontario and Lake Erie. This species typically roosts in foliage or in hollow trees or buildings. This species typically forages over open aquatic or terrestrial habitats. They hibernate in caves, mines or rock crevices during the winter.
FISH			
Redside Dace *(Clinostomus elongatus)*	END	END	This species inhabits coldwater, slow moving streams between 1m and 10m in width. It prefers overhanging vegetation, with pool and riffle habitat with substrates comprised of boulders, rocks, gravel or sand.
ESA – Provincial Endangered Species Act SARA – Federal Species at Risk Act Status: THR – Threatened, END – Endangered, NAR – Not at Risk			

Threatened and Endangered species have been confirmed within the Study Area; however, no specific mapping or areas have been identified. In general, naturalized habitats, including woodlands, meadows, wetlands and riparian areas, in addition to altered habitats, such as chimneys, barns, bridges, culverts, and active agricultural lands, have potential to support habitat of Threatened and Endangered species.

AREAS OF NATURAL AND SCIENTIFIC INTEREST

Significant ANSI's are defined as areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education. The NHIC mapping depicts two (2) ANSI features, the Holland River Marsh Life Science ANSI and the Holland Landing Prairie ANSI, in the northwest quadrant of the Study Area (Figure 3-1). The respective planning documents generally require a minimum 30 m VPZ from all NHF's, including ANSI's.

SIGNIFICANT WETLANDS

Wetlands are defined in the PPS (OMMAH, 2014) as lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface. There are four major wetland types which are classified as: swamps, marshes, bogs, and fens. A significant wetland is defined as an area identified as provincially significant by the MNRF using evaluation procedures established by the province, as amended from time to time (OMMAH, 2014). Accordingly, it is the responsibility of the MNRF to both identify and classify wetlands as significant in Ontario.

Three (3) types of wetlands occur within the Study Area, and include Provincially Significant, Locally Significant and unevaluated wetlands (Figures 3-1 through 3-4). Generally, a minimum 30 m VPZ is required from the edge of a wetland.

SIGNIFICANT WILDLIFE HABITAT

Wildlife habitat is defined as areas where plants, animals, and other organisms live and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory or non-migratory species (OMMAH, 2014).

Wildlife habitat is referred to as significant if it is ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System (OMMAH, 2014).

Guidelines and criteria for the identification of significant wildlife are detailed in the Significant Wildlife Habitat: Technical Guide (MNR, 2000), and the Significant Wildlife Habitat Criterion Schedule for Ecoregion 6E (MNRF, 2015). Significant Wildlife Habitat (SWH) is described under four main categories:

- Seasonal concentrations of animals,
- Rare vegetation communities or specialized habitats for wildlife,
- Animal movement corridors, and
- Habitats of Species of Conservation Concern.

Information pertaining to the presence of SWH is generally limited and is included as part of the field investigations. As it relates to the Study Area, it is anticipated that Environmental Protection Areas (EPA; Figures 2-1 through 2-4) and Significant features, as described in the PPS (see above), may also hold a SWH designation. Available spatial mapping for *Deer Winter Area (Stratum 2)*, a type of SWH, is scattered throughout the Study Area (Figures 3-1 through 3-4).

As it relates to habitats of Species of Conservation Concern and similar to the background search completed for Threated and Endangered species (discussed above), the NHIC, OBBA (Bird Studies Canada et al., 2006), ORAA (Ontario Nature, 2017), OBA and the DFO critical mapping (DFO, 2017) was reviewed for known occurrences within the Study Area. Review of the OBA and DFO critical habitat mapping revealed no records for the Study Area.

A summary of species of Special Concern is identified in the table below.

Table 2: Species of Special Concern within and surrounding the Study Area.

SPECIES	ESA	SARA	HABITAT DESCRIPTION
BIRDS			
Black Tern *(Chlidonias niger)*	SC	NAR	The species requires large, shallow, quiet marshes where their floating nests are not subject to disturbance from humans or boat traffic.
Red-headed Woodpecker *(Melanerpes erythrocephalus)*	SC	THR	The species lives in open woodlands and woodland edges, especially in oak savannah and riparian forest, where dead trees are used nesting and perching.
Eastern Wood Pewee *(Contopus virens)*	SC	SC	This species prefers disturbed areas and edges of mixed and deciduous forests with a distinct mid-canopy layer and minimal understory.
Wood Thrush *(Hylocichla mustelina)*	SC	THR	This species prefers large mature, moist deciduous and mixed forests, with developed undergrowth. They are typically associated with forests with a Sugar Maple or American Beech dominated canopy layer.
Canada Warbler *(Wilsonia Canadensis)*	SC	THR	The species is found in a variety of forest types, but is most abundant in wet, mixed deciduous-coniferous forest with a well-developed shrub layer. Also found in riparian shrub forest.
Bald Eagle *(Haliaeetus leucocephalus)*	SC	NAR	This species typically nests in the crotch of Pine and Poplar trees, in a variety of habitats occurring within a mile of water.
Eastern Wood Pewee *(Contopus virens)*	SC	SC	This species prefers disturbed areas and edges of mixed and deciduous forests with a distinct mid-canopy layer and minimal understory.

Canada Warbler *(Wilsonia canadensis)*	SC	THR	The species is found in a variety of forest types, but is most abundant in wet, mixed deciduous-coniferous forest with a well-developed shrub layer. Also found in riparian shrub forest.
Grasshopper Sparrow *(Ammodramus savannarum)*	SC	SC	This species lives in open grassland, hayfields, pastures, alvars and prairies.
Short-eared Owl *(Asio flammeus)*	SC	SC	This species prefers prairie, savannah, and maintained farmland.
Common Nighthawk *(Chordeiles minor)*	SC	THR	The species nests in areas with little to no ground vegetation, such as logged or burned-over areas, forest clearing, rock barrens, etc.
REPTILES			
Snapping Turtle *(Chelydra serpentina)*	SC	SC	This species prefers large bodies to water to small ponds containing dense vegetation.
Western Chorus Frog *(Pseudacris triseriata)*	NAR	THR	This species can be found in moist cultivated, meadow or forested lands. Tadpoles develop within intermittent wet pockets.
ESA – Provincial Endangered Species Act SARA – Federal Species at Risk Act Status: SC – Special Concern, NAR – Not at Risk			

In addition to Species of Special Concern, one (1) species with a subnational rank S2, namely, Little White Tiger Beetle (*Cicindela lepida*), and three (3) species with a subnational rank of S3, including, Schweinitz's Sedge (*Carex schweinitzii*), Weak Bluegrass (*Poa saltuensis ssp. Languida*) and Green-striped Darner (*Aeshna verticalis*) were identified within the Study Area.

As it relates to the ORM planning area, additional features, including Kettle Lakes; Sand barrens, savannahs and tallgrass prairies; and seepage areas are also protected.

Special Concern species have been confirmed within the Study Area; however, no specific mapping or areas have been identified. In general, naturalized habitats, including woodlands, meadows, wetlands and riparian areas, have potential to support habitat of Special Concern species.

A minimum 30 m VPZ is generally applied to most SWH areas. Additional buffer and no-disturbance zones may later be recommended should a highly sensitive species occurence or feature be discovered.

WOODLANDS

Significant woodlands are defined as treed areas that provide environmental and economic benefits such as erosion prevention, water retention, and provision of habitat, recreation and the sustainable harvest of woodland products (OMMAH, 2014). Woodlands include treed areas, woodlots or forested areas and vary in their level of significance. Woodland significance is typically determined by evaluating key criteria which relate to woodland size, ecological function, uncommon woodland species, and economic and social value.

Woodlands are protected throughout the Town under either the ORM, GPA or Town`s NHS policies and are referred to as woodlands, forest, Significant Woodlands, Regional Forest, and Key NHF woodlands. The Town`s Official Plan (2014) schedule D-2 depicts woodlands within the ORM, and outside of this area depicts Environmental Protection areas and Core Areas which contain NHF, including woodlands. York Region mapping identifies both woodlands and two (2) separate areas of Regional Forest within the Study Area. Where woodlands haven`t been assessed for significance with respect to the applicable policies, a comprehensive assessment may be required. Woodlands deemed to be significant generally have a greater development setback than those that are not. For the purpose of this assessment and without completing detailed field studies to evaluate for significance, a minimum 30 m VPZ or vegetated buffer, should be applied from woodland edge. Figures 3-1 through 3-4 depict woodlands and the minimum VPZ.

SIGNIFICANT VALLEYLANDS

The PPS (OMMAH, 2014) refers to significant valleylands as “a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year”. The local planning authority is responsible for identifying and evaluating significant valleylands.

Significant Valleylands are not identified within the Town’s Official Plan (2014); however, if present, are expected to occur within areas current zoned as Environmental Protection by the Town or within Core areas of the GP or ORM. A minimum 30 m VPZ is required from Significant Valleylands, and for the purpose of this assessment, is expected these areas will be captured as part of Environmental Protection and Core areas within the NHS.

CONSIDERATIONS AND RECOMMENDATIONS

Development constraints, with respect to NHF’s and hydrological features are depicted on the attached figures. The four (4) planning areas (i.e. ORM, GP, LSPP, Town’s OP), generally provide direction for maintenance of a minimum 30 m VPZ from all NHF’s and hydrological features. These plans also outline a provision for infrastructure development, which indicates that development is permitted in NHF’s, hydrological features and associated VPZs, only when there is no reasonable alternative.

Development within 120 m of a water feature or wetland may require authorization by the Lake Simcoe Region Conservation Authority (LSRCA), and development within any NHF may require authorization from the MNRF.

It is expected that future upgrades to the water and wastewater systems throughout the Study Area will include below-grade features, including watermain and sewers, and above-grade development, such as pumping stations. Below-grade features are generally characterized as a temporary disturbance to the natural environment given the above-grade areas can be returned to pre-disturbance conditions after installation is complete, whereas above-grade features, including structures, are considered a permanent loss to the above-grade area.

The following interim recommendations have been provided to support identification of design and route alternatives to both protect the form and function of the natural environment.

Recommendations include:

- A minimum 30 m VPZ is recommended from woodlands, wetlands and NHF's identified in the PPS;
- A minimum 30 m VPZ is recommended from hydrological features;
- Where possible, above-grade development should be directed to areas outside of NHF's, hydrological areas, ORM Natural Core and Natural Linkage landuses, and the Town's Core and Supporting Area features and below-grade development limited in these areas;
- Where possible, infrastructure routes should occur within existing disturbed areas, such as within road right-of-way's;
- Construction installation methods should consider use of trenchless technology to limit disturbance to surface features, particularly watercourse crossings; and,
- A detailed-design level study should consider concerns or constraints identified by the Lake Simcoe Region Conservation Authority and the Aurora District Ministry of Natural Resources and Forestry, in addition to seasonally appropriate field assessments. This study should provide site-specific recommendations with respect to appropriate VPZ and development setbacks.

CLOSURE

This report was produced by WSP Canada Inc. The assessment represents the conditions at the subject property only at the time of the assessment, and is based on the information referenced and contained in the report. The conclusions presented herein respecting current conditions represent the best judgment of the assessors based on current environmental standards. WSP Canada Inc. attests that to the best of our knowledge, the information presented in this report is accurate. The information in this report should be evaluated, interpreted, and implemented only in the context of the assignment. The use of this report or any of its parts for other projects without written permission of the Client and WSP Canada Inc. is solely at the user's own risk. This report must be reviewed and approved by the relevant regulating agencies prior to being relied on for planning and/or construction purposes.

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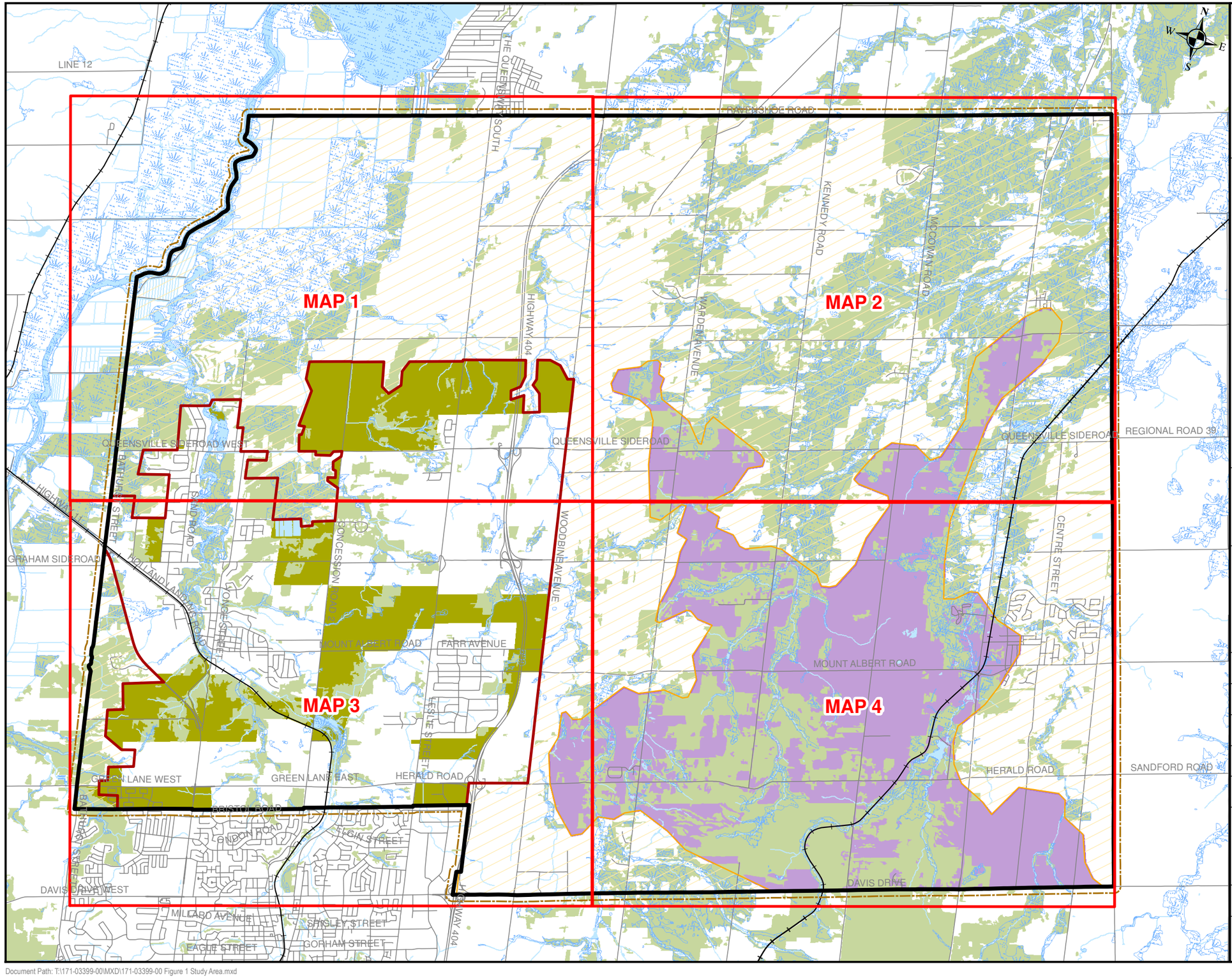

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LEGEND

- Town of East Gwillimbury Boundary
- Map Index
- Study Area
- Lake Simcoe Protection Plan Area
- Town of East Gwillmbury Uran Planning Area
- Greenbelt
- Oak Ridges Moraine
- Railway
- Wetland
- Waterbodies
- Woodland

300 150 0 300 Metres

Data Source: Ministry of Natural Resources, Ontario Base Mapping, October 2016.

CLIENT:
TOWN OF EAST GWILLIMBURY

PROJECT:
WATER AND WASTE WATER
MASTER PLAN

PROJECT NO:	DATE:
171-03399-00	APRIL 2018

DESIGNED BY: -

DRAWN BY: T.P.

CHECKED BY: -

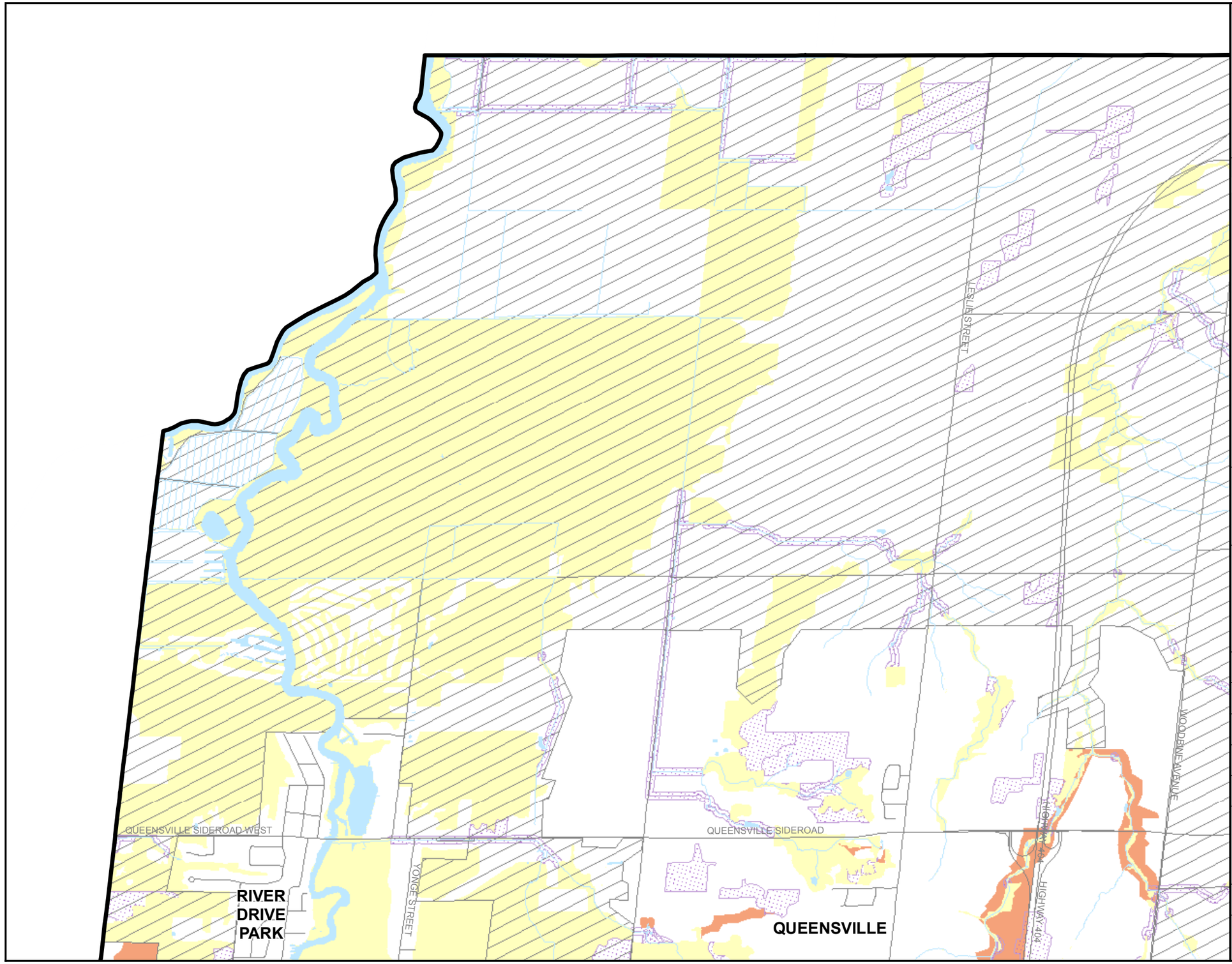
FIGURE NO:	SCALE:
1	1:70,000

TITLE:
KEY MAP

DISCIPLINE:
ENVIRONMENT

ISSUE:	REV.:
-	-

Document Path: T:\171-03399-00\MXD\171-03399-00 Figure 1 Study Area.mxd



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LEGEND

- Town of East Gwillimbury Boundary
- Roads

Planning Areas

Oak Ridges Moraine

- Natural Core Area
- Countryside Area
- Natural Linkage Area
- Settlement Area
- Rural Settlement

Greenbelt

- Greenbelt Natural Heritage System

Town of East Gwillimbury Natural Heritage System

- Core Area
- EPA
- Supporting Areas

N W E S

300 150 0 300 Metres

Data Source: Ministry of Natural Resources, Ontario Base Mapping, October 2016.

CLIENT:

TOWN OF EAST GWILLIMBURY

PROJECT:

WATER AND WASTE WATER
MASTER PLAN

PROJECT NO:	DATE:
171-03399-00	APRIL 2018

DESIGNED BY: -

DRAWN BY: T.P.

CHECKED BY: -

FIGURE NO:	SCALE:
2-1	1:30,000

TITLE:

PLANNING AREAS
MAP 1

DISCIPLINE:

ENVIRONMENT

ISSUE:	REV.:
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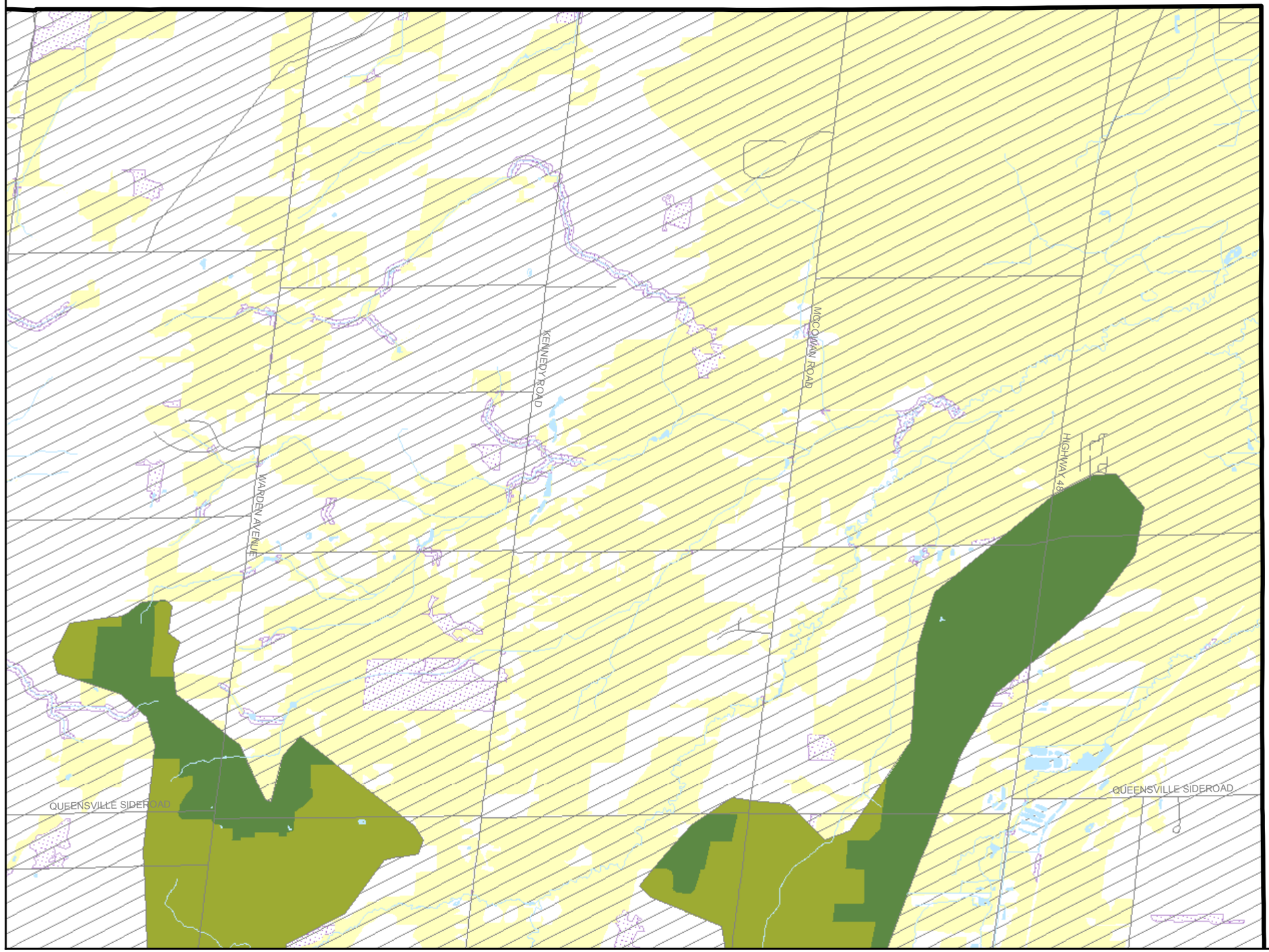

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LEGEND

- Town of East Gwillimbury Boundary
- Roads

Planning Areas

Oak Ridges Moraine

- Natural Core Area
- Countryside Area
- Natural Linkage Area
- Settlement Area
- Rural Settlement

Greenbelt

- Greenbelt Natural Heritage System

Town of East Gwillimbury Natural Heritage System

- Core Area
- EPA
- Supporting Areas

300 150 0 300 Metres

N W E S

Data Source: Ministry of Natural Resources, Ontario Base Mapping, October 2016.

CLIENT:
TOWN OF EAST GWILLIMBURY

PROJECT:
WATER AND WASTE WATER
MASTER PLAN

PROJECT NO:	DATE:
171-03399-00	APRIL 2018

DESIGNED BY: -

DRAWN BY: T.P.

CHECKED BY: -

FIGURE NO:	SCALE:
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TITLE:
PLANNING AREAS
MAP 2

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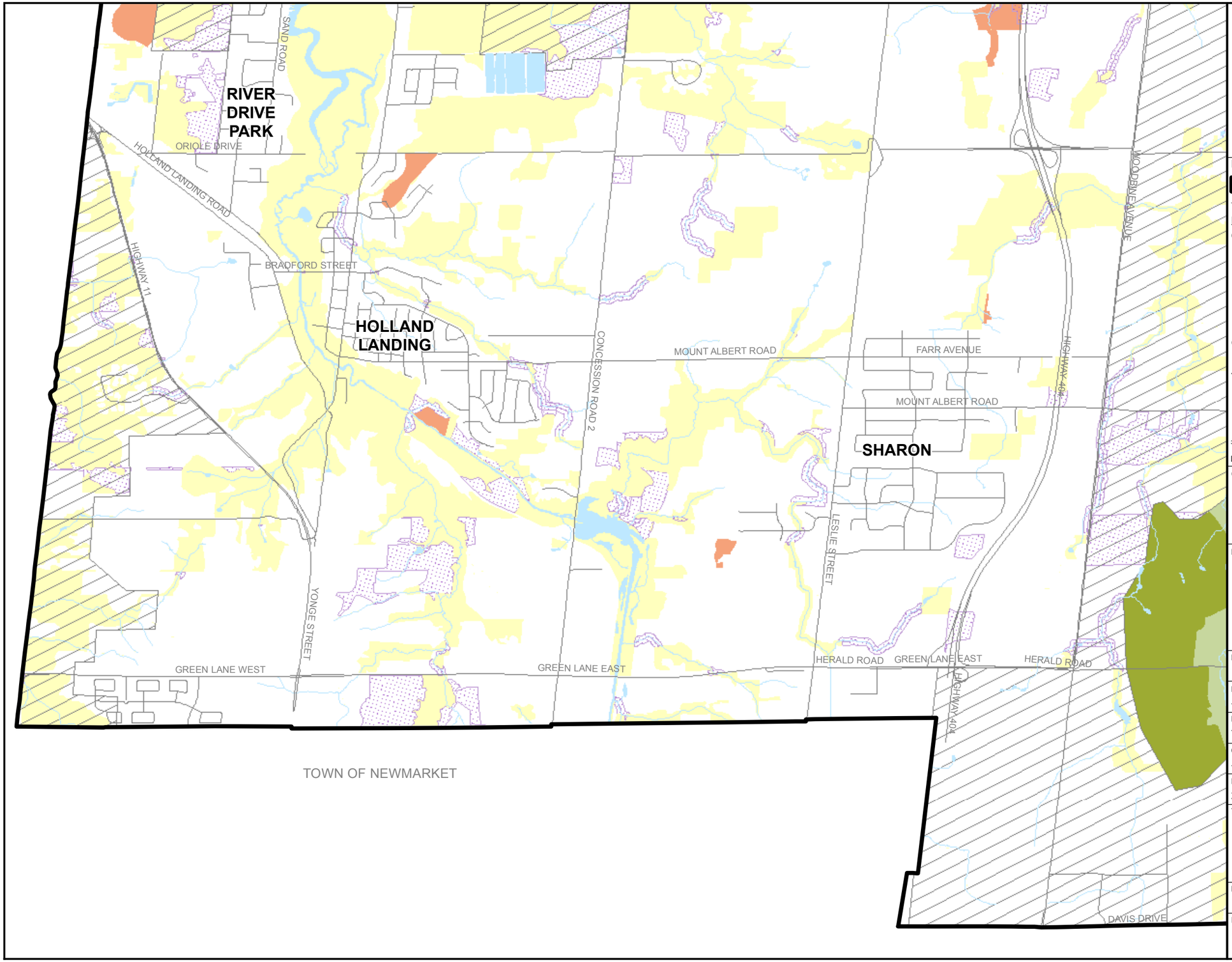

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PLANNING AREAS
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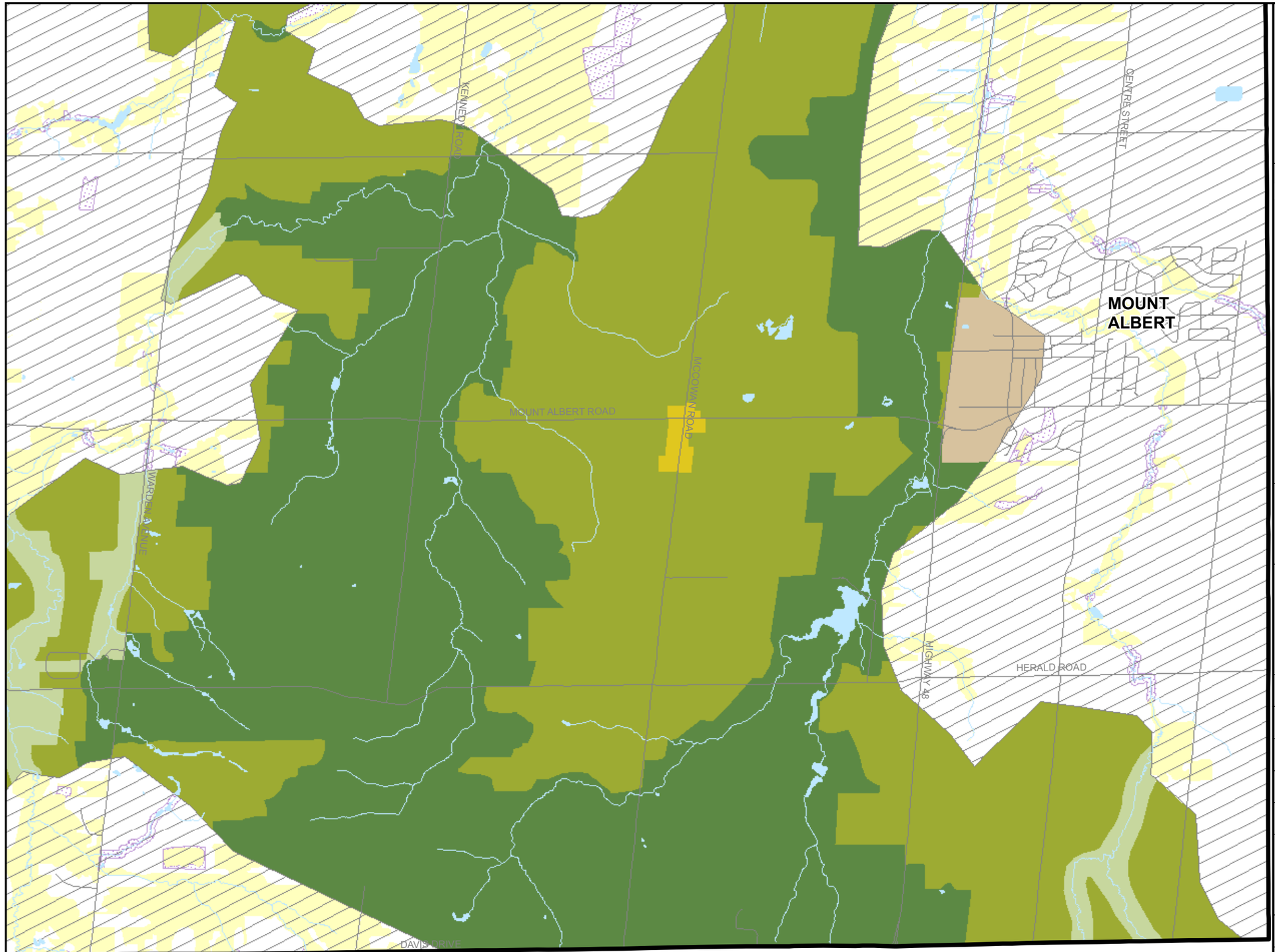

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PLANNING AREAS
MAP 4

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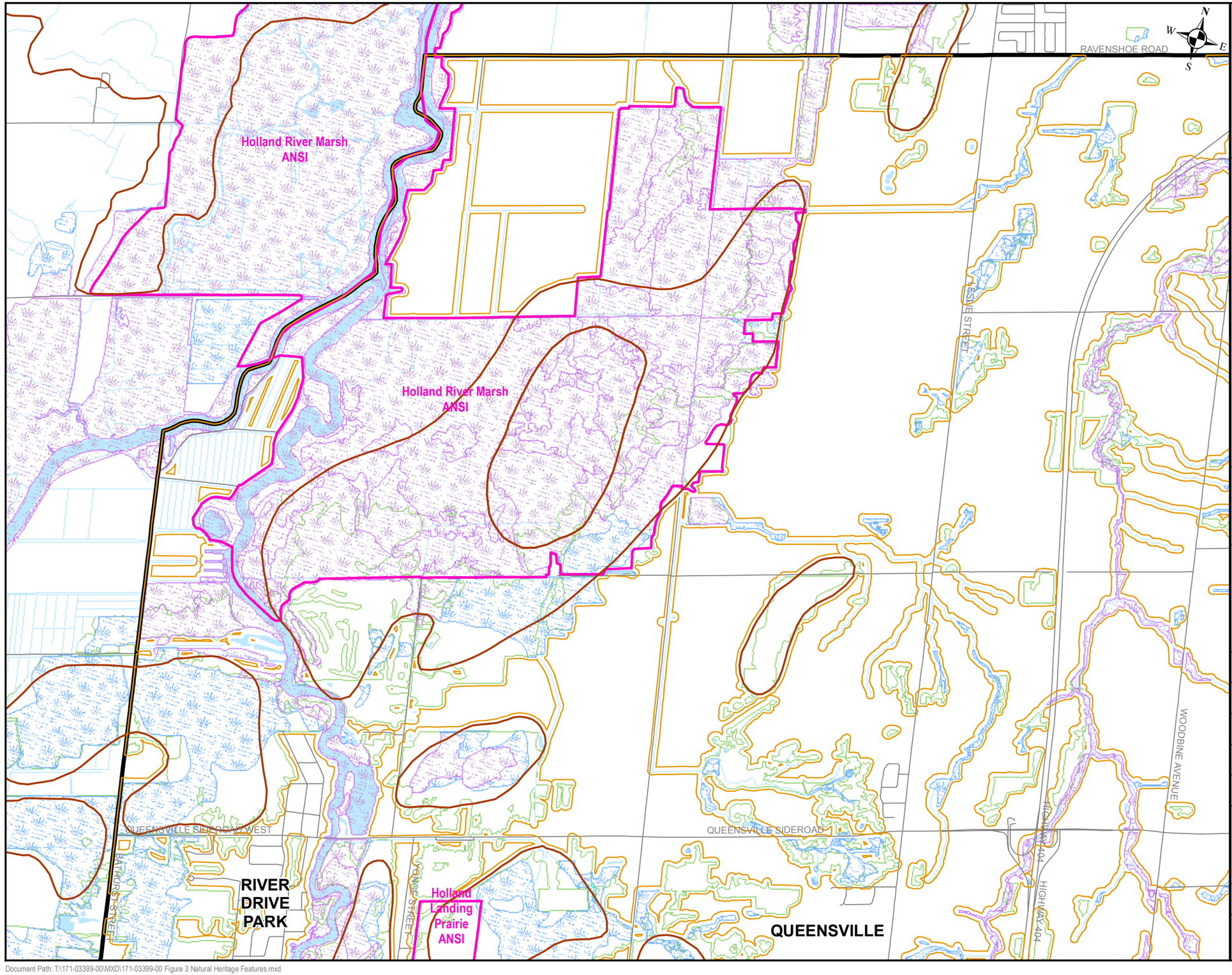

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LEGEND

Natural Heritage Features

Fish Habitat
- Waterbodies
- Watercourse

Endangered or Threatened Species
- Redside Dace

Area of Natural and Scientific Interest (ANSI)
- Life Science

Wetland
- Unevaluated Wetland
- Evaluated Wetland
- Provincially Significant Wetland

Significant Wildlife Habitat
- Deer Wintering Area (Stratum 2)
- Active Osprey Nest

Woodlands
- Woodland
- Regional Forest

Setbacks
- 300 m from Osprey Nest
- 30 m Vegetation Protection Zone

300 150 0 300 Metres

Data Source: Ministry of Natural Resources, Ontario Base Mapping, October 2016.

CLIENT:

TOWN OF EAST GWILLIMBURY

PROJECT:

WATER AND WASTE WATER
MASTER PLAN

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DESIGNED BY: -

DRAWN BY: T.P.

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NATURAL HERITAGE FEATURES
MAP 1

DISCIPLINE:

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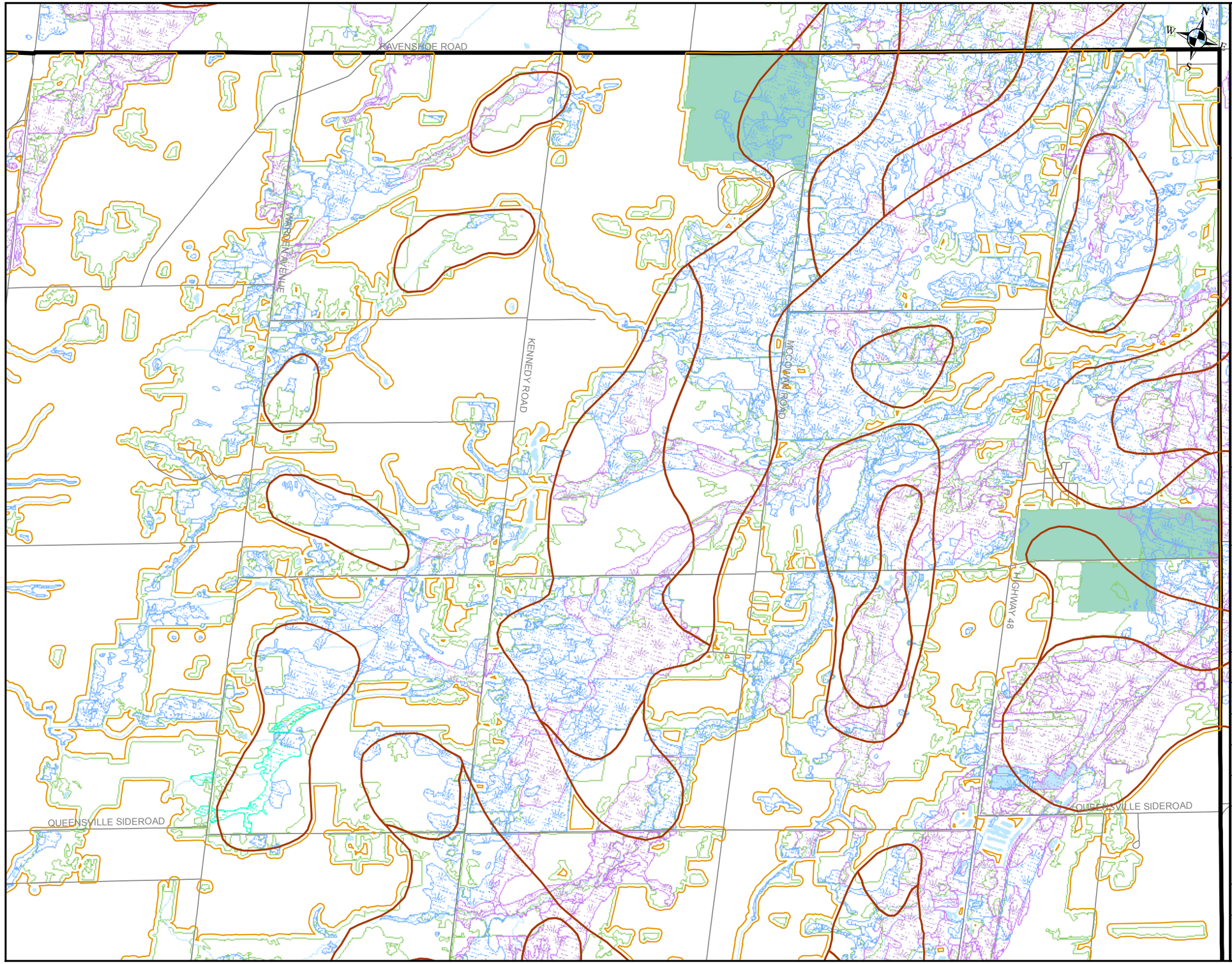

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WATER AND WASTE WATER MASTER PLAN

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DRAWN BY: T.P.

CHECKED BY: -

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TITLE:

NATURAL HERITAGE FEATURES MAP 2

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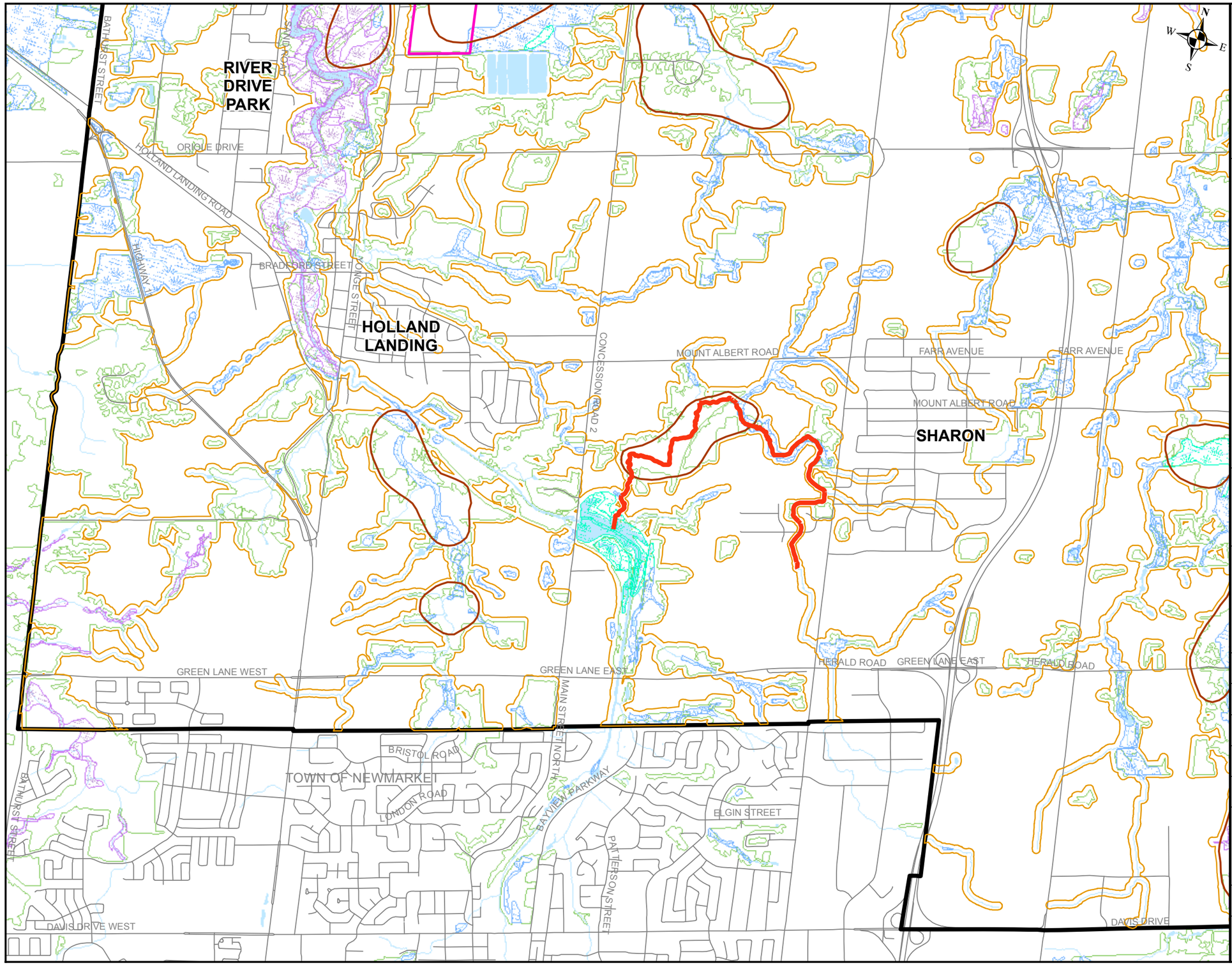

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DRAWN BY: T.P.

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NATURAL HERITAGE FEATURES MAP 3

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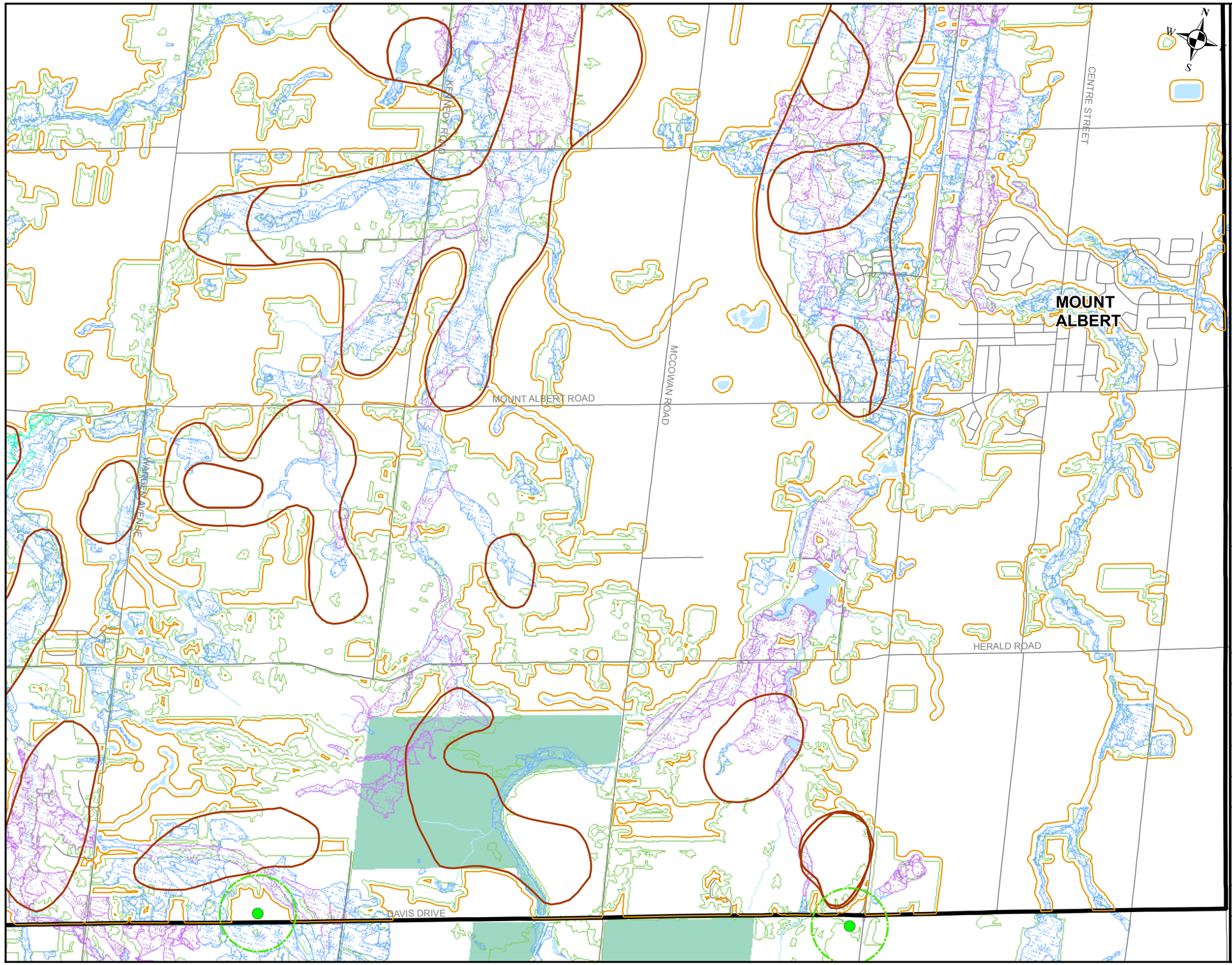

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APPENDIX

B ARCHAELOGY AND HERITAGE REVIEW

East Gwillimbury Water and Wastewater Master Plan

Archaeology and Heritage Review

THE CORPORATION OF THE TOWN OF EAST GWILLIMBURY

ORIGINAL REPORT

PROJECT NO.: 171-03399-00
DATE: JULY 2018

WSP
4 HUGHSON STREET SOUTH, SUITE 300
HAMILTON, ON, L8N 3Z1

WSP.COM

July 27th, 2018

East Gwillimbury WWW Master Plan

Archaeology and Heritage Review

Prepared for:

The Corporation of the Town of East Gwillimbury
19000 Leslie Street
Sharon, ON
Canada, L0G 1V0

4 Hughson Street South, Suite 300
Hamilton, ON, L8N 3Z1

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EXECUTIVE SUMMARY

WSP was retained by the Corporation of the Town of East Gwillimbury to produce a summary of the work completed and recommendations provided, as well as a gap analysis noting what is still required for archaeological assessments and cultural heritage assessments to aid in the planning for the Water and Wastewater Master Plan Update.

Two existing Archaeological Management Plans encompass the Town of East Gwillimbury, however an updated and more comprehensive Archaeological Management Plan based on currently available data may be considered. Given that Stage 1 Archaeological Assessments are required even with an up to date Archaeological Management Plan in place, for time and cost effectiveness a Stage 1 Archaeological Assessment is recommended for the proposed project area. Additionally, the municipal heritage inventory appears to require some minor updates based on the reports provided. Once updated, this inventory should be incorporated in the Stage 1 Archaeological Assessment potential modelling. The updated potential modelling could then be utilized to plan preferred and alternate infrastructure routes that have minimal impact on areas of archaeological potential, registered archaeological sites requiring further work, and listed and designated heritage properties.

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1 Introduction

1.1 Objectives

This report presents a summary and review of the background archaeological and heritage assessment reports for the Town of East Gwillimbury, as well as considerations and recommendations regarding next steps for the planning process to aid in the Water and Wastewater Master Plan Update.

2 Archaeological Component

2.1 Relevant Completed Studies: Archaeological Services Inc. (ASI). (1988). Master Plan of Archaeological Resources for the Town of East Gwillimbury, Ontario

The Archaeological Master Plan (AMP) for East Gwillimbury was completed in 1988 by Archaeological Services Inc (ASI). While useful, it was created before the *Standards and Guidelines for Consultant Archaeologists* (MTCS, 2011) came in to effect and would not be considered an adequate or compliant management plan by current standards. The Town of East Gwillimbury may wish to consider an updated management plan which clearly addresses the *Standards and Guidelines for Consultant Archaeologists* and incorporates any sites that have been identified in the thirty-year interim.

The 1988 AMP makes recommendations specifically regarding the re-investigation of four sites: BaGu-1, BaGu-5, BaGu-15, and BbGu-9. These sites and their current available data obtained from the Ontario Archaeological Sites Database (OASD) maintained by the Ministry of Tourism Culture and Sport (MTCS) are summarized in Table 1 below.

Table 1: Sites recommended for re-investigation by 1988 AMP

Borden #	Site Name	Time Period	Affinity	Site Type/Function	Researcher	Further CHVI (Cultural Heritage Value or Interest)	Easting (NAD83 17T)	Northing (NAD83 17T)
BaGu-1	Harvey Graham	Post-Contact, Woodland	Aboriginal, Iroquoian	Other-camp/campsite, burial	Dibb, G. 1978. "An Archaeological Survey of the East Holland River and Its Environs"	Unclear, 1988 AMP suggests reinvestigation. Aerial imaging shows impacts to site area, given potential for burials, warrants re-investigation.	620511.7541	4885122.7732
BaGu-5	Thompson	Post-Contact	Euro-Canadian	Other-camp/campsite	Ronald Williamson (1989-130B)	No further work recommended in 1978. Site physically revisited in 1989 and "found to be totally disturbed", no artifacts found, photographs taken.	621611.7718	4883622.7769
BaGu-15	Wilson	Post-Contact	Euro-Canadian	Other-building, homestead, house	Ronald Williamson (1984-83 & 1985-53)	Long-term investigation/protection	624612.36	4884321.36

Borden #	Site Name	Time Period	Affinity	Site Type/Function	Researcher	Further CHVI (Cultural Heritage Value or Interest)	Easting (NAD83 17T)	Northing (NAD83 17T)
BbGu-9	Deavitt	-	-	-	7Yk10 (Licensee ID#) "1979 An Archaeological Survey of the East Holland River and Its Environs Gordon Dibb MCC Head Office and Trent University"	Unclear, 1988 AMP suggests long-term investigation/protection. Judging by aerial imaging, site has not been developed, is situated in agricultural field, likely remains intact to date and warrants reinvestigation/protection should work be planned near the registered site location.	624012.18	4894321.32

2.1.1 *BaGu-1*

The status of this site is unclear from the OASD; however, examination of current aerial imagery places the site on a residential property, under structures and pavement (Figure 1). While the site has been impacted and portions may be disturbed, given the interpretation that it may be a burial site, it is recommended that this area would require further archaeological investigation. The potential for burials indicates significant Cultural Heritage Value or Interest (CHVI), with a high likelihood of Indigenous Engagement being required. This site likely still has CHVI and requires re-investigation or avoidance.

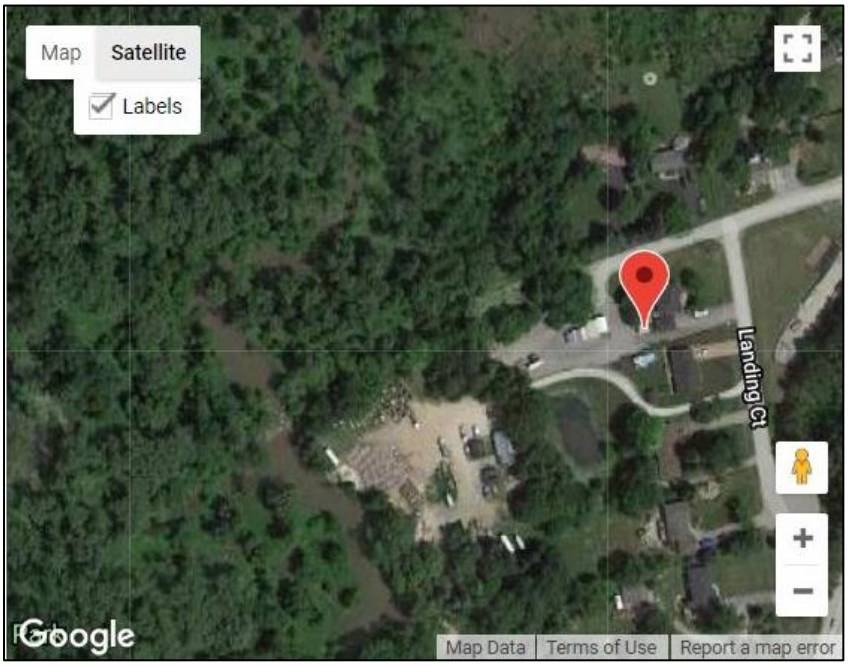


Figure 1: Location of BaGu-1 from OASD.

2.1.2 *BaGu-5*

This site has been investigated by ASI first in 1978, and re-investigated and photo documented in 1989. The most recent 1989 visit recommended that the site has been intensively and extensively disturbed, no artifacts were noted, and that it is free of any further archaeological concern (Figure 2).

Figure 2: Location of BaGu-5 from OASD.

2.1.3 *BaGu-15*

ASI conducted investigations in 1984 and 1985 which resulted in a recommendation that this site holds CHVI, and warrants long-term investigation and protection. Examination of current aerial imagery suggests the site remains protected, as it remains in an undeveloped wooded/fallow area (Figure 3). This site still has CHVI and should be avoided, or re-investigated if avoidance is not possible.

Figure 3: Location of BaGu-15 from OASD.

2.1.4 *BbGu-9*

Very little information about this site is available through the OASD. The 1988 AMP suggests that it possesses CHVI and should be investigated. Given that no site update forms are associated with this site, and current aerial imagery suggests it is located in the rear of an agricultural property that has not been developed, the site likely remains intact (Figure 4). This site still has CHVI and should be avoided or re-investigated if avoidance is not possible.

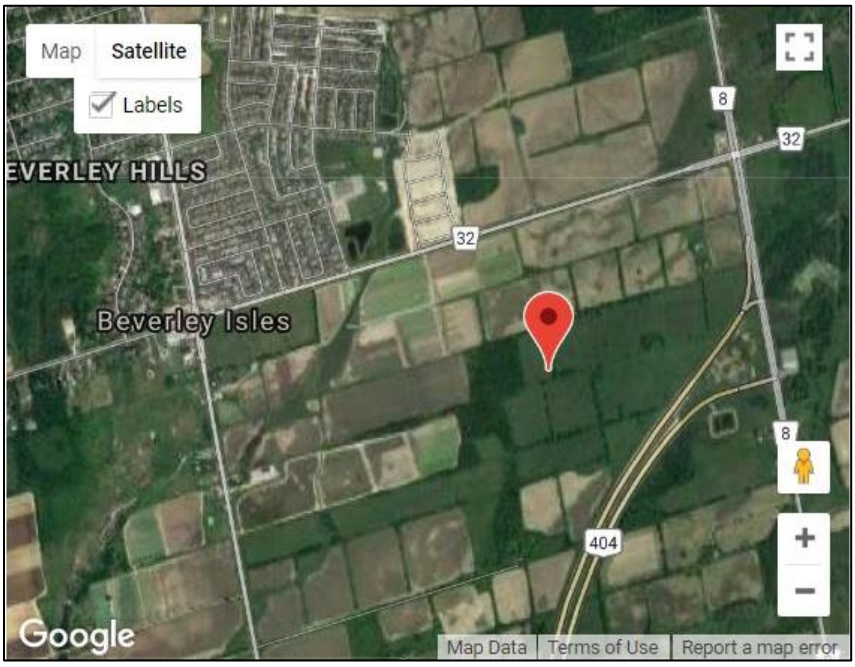


Figure 4: Location of BbGu-9 from OASD.

2.2 Relevant Completed Studies: Archaeological Services Inc. (ASI). (2014). Planning for the Conservation of Archaeological Resources in York Region.

In 2014, ASI completed an Archaeological Management Plan for York Region, which includes East Gwillumbury (Figure 5). The archaeological potential layer in this AMP inconsistently address the 2011 *Standards and Guidelines for Consultant Archaeologists*, as some Features Indicating Archaeological Potential are buffered by 100m or 250m rather than the required 300m, as per Standard 1.3.1 and Standard 1.4.1c.

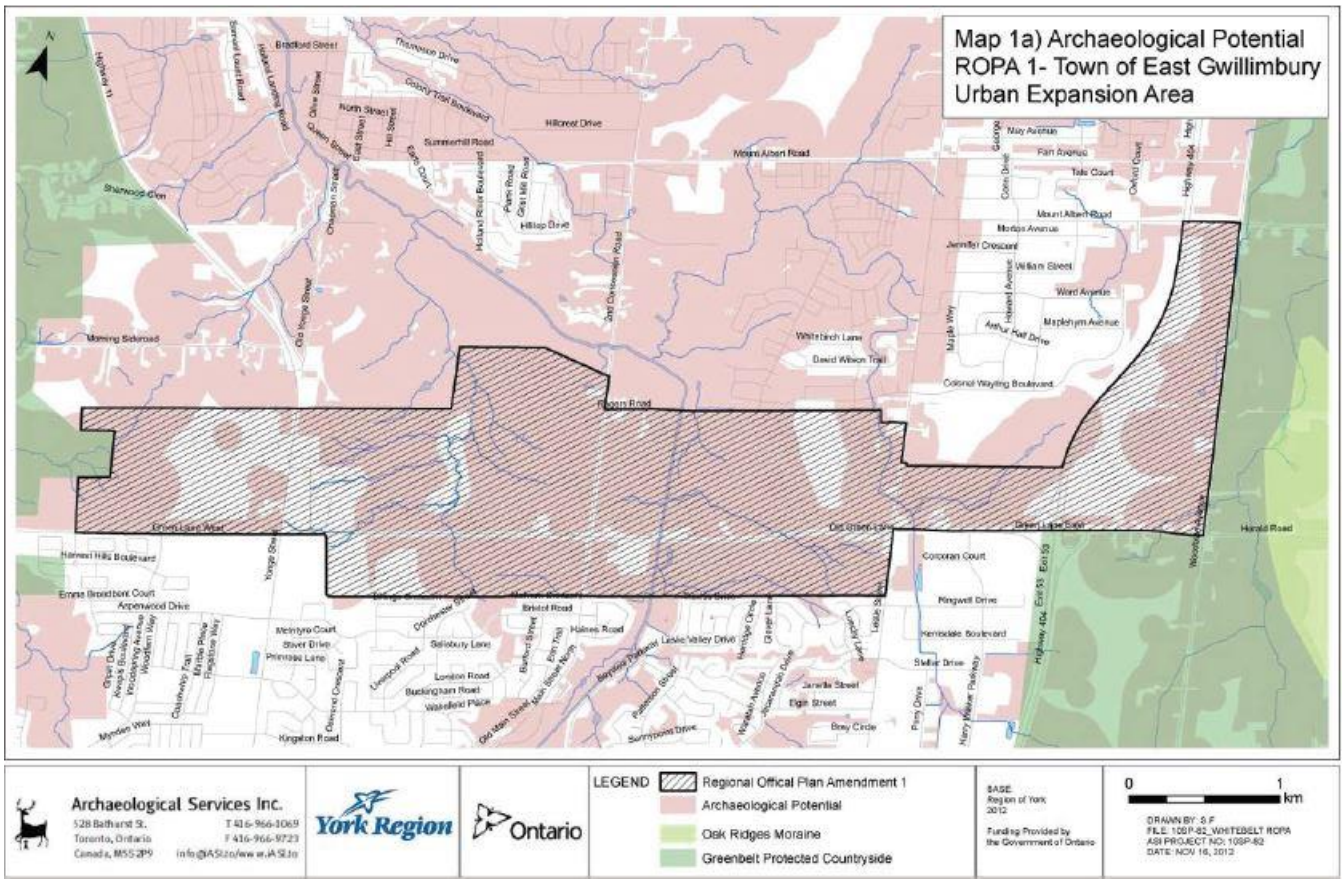


Figure 5: Regional Official Plan Amendment 1 – East Gwillimbury Urban Expansion Area (ASI, 2014)

Selected Features Indicating Archaeological Potential are presented in Table 2 to highlight the discrepancy between the ASI AMP and what is required by the MTCS. This is not an exhaustive list. For a full list of Features Indicating Archaeological Potential, please see Appendix A.

Table 2: ASI 2014 AMP comparison against MTCS Standards and Guidelines for Consultant Archaeologists.

Features Indicating Archaeological Potential	Standards and Guidelines for Consultant Archaeologists (MTCS, 2011)	Archaeological Management Plan (ASI, 2014)
Previously identified archaeological site	300 metres	100 metres
Water Sources	300 metres	250 metres
Areas of Euro-Canadian Settlement	300 metres	100 metres
Historic Transportation Route	100 metres	100 metres

This archaeological management plan did incorporate the 1453 registered archaeological sites in York Region at the time (2012-2013), however the document notes that updates would be required as more sites are discovered, new heritage designations are made, and as the criteria for determining archaeological potential evolves. In an attempt to account for ossuaries, ASI recommends that all village sites in York Region be buffered by 1km and all waterways be buffered by 300m, with the areas of overlap representing Heightened Ossuary Potential. This is an important consideration as not only will it potentially mean that any construction within those areas will have to be carefully monitored by a licensed archaeologist, but also that time and cost considerations may need to account for Indigenous Engagement with First Nations communities both in the planning and construction phases.

The ASI 2014 AMP was unable to account for all heritage resources, as the Town of East Gwillimbury had not provided data for all features designated under the *Ontario Heritage Act*. These would need to be included in the Archaeological Management Plan as the *Standards and Guidelines for Consultant Archaeologists* (MTCS, 2011) states that "property listed on a municipal register or designated under the *Ontario Heritage Act* or that is a federal, provincial or municipal historic landmark or site" (pg. 18) indicate archaeological potential.

2.3 Current Registered Archaeological Sites and Listed/Designated Heritage Properties

The "pIn_HeritageProperties" shapefile provided by the Town of East Gwillimbury for this review displays 484 listed or designated heritage properties. Each of these properties has protections under the *Ontario Heritage Act.* Additionally, none of these properties could be exempt from archaeological survey, and each property represents an area of archaeological potential.

A preliminary exploration of the Ontario Archaeological Sites Database maintained by the MTCS indicates at least 109 archaeological sites are present within the town boundary (Appendix B). Many of these sites include development review status information (whether the site requires further work or has been fully mitigated), however the database is incomplete in many instances. The reports documenting these sites will need to be reviewed in order to confirm the status of these archaeological sites. Information available through the MTCS also indicates at least 157 reports documenting archaeological work in the Town of East Gwillimbury. While incorporating these new sites it would be crucial not only to note any sites in the OASD that have been identified as villages, but any reports documenting a site which by all indications (artifacts and settlement pattern) would be considered a village. This village identification will aid in applying the ossuary potential modelling.

2.4 Considerations and Summary

A number of sources related to the archaeological potential areas of East Gwillimbury were considered during this review, the results of which are summarized in Table 3. The Town's register of heritage properties listed or designated under the *Ontario Heritage Act* was also considered.

Table 3 Summary of results by source

Year	Report	Number of Sites Identified	Comments
1988	(ASI). (1988). *Report on Phase 1 of the Master Plan of Archaeological*	4	Only sites recommended

Year	Report	Number of Sites Identified	Comments
	Resources for the Town of East Gwillimbury, Ontario		for re-investigation were included
2014	. (ASI). (2014). *Planning for the Conservation of Archaeological Resources in York Region*. Toronto. York Region.	1453	Includes all of York Region
2018	Ontario Archaeological Sites Database	109	Up to date as of July 2018
2018	Heritage Register	400 and something?	Up to date as of ?

In summary, it is recommended that a broad scope Stage 1 Archaeological Assessment for the project area is the most time and cost effective solution. Once complete, the Stage 1 Archaeological Assessment potential modelling could be utilized to plan preferred and alternate infrastructure routes that have minimal impact on listed or designated heritage properties, known archaeological sites, and areas of archaeological potential. By using the Stage 1 Archaeological Assessment to inform the preferred and alternate routes to utilize areas of low archaeological potential, costs and delays associated with mitigating archaeological resources can potentially be reduced. This scoped Stage 1 Archaeological Assessment would also narrow down which of the 484 heritage properties may be impacted by the plan, which of the157 archaeological reports need to be reviewed, and whether any previously identified archaeological sites are within the study area. The Stage 1 would take into consideration the results of the previous AMPs completed for the area, and would provide recommendations specific to the study area.

3 Heritage Component

3.1.1 *Heritage Report Summaries*

The following table (Table 4) presents a summary of the 33 Heritage reports provided by the Town of East Gwillimbury, organized by the title of the file provided, the address confirmed with the GIS layer received, and the results and recommendations of each report. The final column recommends what sort of action is required based on review of the report, provided GIS data, and aerial imagery.

Table 4 Heritage Report Summary

Title of file provided	Address	Results/ Recommendations	Follow-up/Site Inspection
06 08 2017 - Cultural Heritage Impact Assessment.pdf	18651 Warden Avenue	Property meets criteria for designation, if has been designated should only apply to the original 1840's front portion of dwelling.	Aerial Imagery shows structure has been removed, site inspection to confirm.
939 Queensville Rd - Advisor Report 08.13.pdf	939 Queensville Sideroad	Application for heritage permit to demolish.	None (does not appear on GIS layer)
1004 Queensville Rd - Advisor Report 08.13.pdf	1004 Queensville Radd	Demolition recommended.	None (does not appear on GIS layer)
2016 01 07 - Final Cultural Heritage Assessment - 21634 leslie street.pdf	21624 Leslie Street	Consent for demolition, no further documentation required.	None (does not appear on GIS layer)
2016 11 17 - Heritage Report Review 18202 Woodbine Avenue Rev 5 (1).compressed.pdf	18202 Woodbine Avenue	Documentation and removal of interior features prior to demolition.	Site inspection to see if demolished, still appears on aerials. Documentation report required prior to demolition.
2017 08 23 - HIA_18969 2nd Concession.pdf	18969 2nd Concession Road	Demolition recommended, fully documented (no further documentation required).	Site inspection to see if demolished, still appears on aerials.
2017 12 01 - 2016 Farr Ave final CHA.pdf	2016 Farr Avenue	Demolition, but retention and protection of stone foundation, if property developed avoid foundation and also commemoration plaque.	Avoid impacts to structure foundations.
2116 Davis Dr - Advisor Report 08.13.pdf	2116 Davis Drive	Application for heritage permit to demolish.	Site inspection to see if demolished, still appears on aerials.
2156 Queensville Sdrd - Advisor Report 08.13.pdf	2156 Queensville Sideroad	House was occupied, heritage assessment recommended when vacant. Application for demolition.	Requires heritage assessment once no longer occupied by tenants.
5751 Mt. Albert Rd - Advisor Report 08.13.pdf	5751 Mount Albert Road	Demolition recommended.	None (does not appear on GIS layer)
17743 McCowan Rd - Advisor Report 08.13.pdf	17743 McCowan Road	Recommends thorough Heritage Assessment Report before demolition, as vertical plank home sandwiched between two later additions.	None (does not appear on GIS layer/aerial imagery).
18326 Leslie St, East Gwillimbury, final CHA report.pdf	18326 Leslie Street	Does not meet requirements, demolition recommended with salvage of select materials, no further documentation required.	None (does not appear on GIS layer/aerial imagery).
18797 Centre St - Advisor Report 08.13.pdf	18797 Centre Street	Notes fire damage to upper level, demo permit included.	Follow up on status of demolition (still appears on aerial imagery).

Title of file provided	Address	Results/ Recommendations	Follow-up/Site Inspection
			Listed Property but does not appear on GIS layer.
18922 Leslie Street Heritage Assessment - Morgan Oct 2009 compressed.pdf	18922 Leslie Street	Full retention in situ of Temple Farm House, parallel Maples, archaeological remains of David Wilson House. No impacts recommended.	Avoid impacts.
19040 Leslie St, East Gwillimbury, final CHA.pdf	19040 Leslie Street	Retention and conservation for front part of Judah Doan House (pg. 43, figure 7.1), and all of silo in situ.	Avoid impacts.
19222 Woodbine Ave - Cultural Heritage Assessment.pdf (also covers 19222 Woodbine Ave - Advisor Report 08.13.pdf)	19222 Woodbine Avenue	Recommends demolition, report considered as full documentation.	Follow up on status of demolition (still appears on aerial imagery). Listed Property but does not appear on GIS layer.
19836 Woodbine Ave - Advisor Report 08.13.pdf	19836 Woodbine Avenue	House has been demolished by owner using fire/dozer, charred remains in situ August 2013.	Demolition permit required to remove house remains. Difficult as house already demolished illegally.
20089 Leslie St - Advisor Report 08.13.pdf	20157 Leslie Street	Demolition permit included, has been boarded up and was not further assessed (is listed).	Appears to be demolished from aerials, if confirmed can be removed from list/GIS layer.
20124 Leslie St - Advisor Report 08.13.pdf	20124 Leslie Street	Demolition permit included, has been boarded up and was not further assessed (is listed).	None (does not appear on GIS layer/aerial imagery).
20854 Leslie St - Advisor Report 08.13.pdf	20854 Leslie Street	Demolished without a permit or permission.	Requires demolition permit and documentation report.
21032 Woodbine Ave - Advisor Report 08.13 (2) .pdf	21032 Woodbine Avenue	Structurally house in good shape, but had been used for illegal cannabis production.	Listed property but may require demolition due to illegal activity (unclear whether still fit for residential/commercial use).
21320 Leslie St - Advisor Report 08 (1) .pdf	21320 Leslie Street	On list, boarded up and planned to be demolished.	Planned to be demolished, but no demolition permit included, and still extant on aerials, would need final Cultural Heritage Assessment (CHA) for demolition.
22532 Woodbine Ave - Advisor Report 08.13.pdf	22532 Woodbine Avenue	House, barn, and outbuildings demolished by MTO May, 2013.	None (does not appear on GIS layer/aerial imagery).
Archaeological Services Inc FINAL Report 1701 Queensville Sideroad.pdf (also covers Cultural Heritage Evaluation Report.pdf, Historical Society EG - Report.pdf)	1701 Queensville Sideroad	Recommended relocating structure in close proximity or within Queensville community.	Follow up on where structure was moved to, new property gets designation and 1701 Queensville Sideroad can be removed from designation.
Eves Report January 2007 and Revised July 2009.pdf	574 Green Lane East	In remarkable condition, recommended for designation	Recommended for designation (only listed now)
FINAL REPORT, 22376 Catering Road, Gwillimbury.pdf	22376 Catering Road	Listed building, recommends if it stays on list or moves toward designation that only original portion of farmhouse has value.	Town's decision regarding removing from Listing, only original portion has value.
Heritage Advisor Report.pdf	4 Farr Avenue	Listed, plaqued, not designated, building extant (August 2011).	Report says it has been plaqued, but GIS data doesn't indicate this, update to reflect plaqued status.
HIA Leslie Street, 18967, Sharon, East Gwillimbury, March 2017.docx	18967 Leslie Street	Abbreviated Heritage Impact Assessment (HIA), exterior of building significant and should not be altered.	Avoid impacts to structure.
John S. Millard House, Stephen Howard Sr. Property Heritage Report 2009.pdf	18474 Yonge St.	Recommended for designation, structure to remain unaltered.	Avoid Impacts, recommended for designation.

Title of file provided	Address	Results/ Recommendations	Follow-up/Site Inspection
Upper Canoe Landing Report.pdf	Approximately Lot 111 Con 1 WYS, and Lot 111 Con 1 EYS	No recommendations, vaguely identifies vicinity of Upper Canoe Landing (Cultural Heritage Landscape?), though appears surrounding area has been fairly subdivided/altered.	Not listed, plaqued, or designated. May warrant consideration as a Cultural Heritage Landscape (CHL) . Also has significant ties to archaeological site BaGu-1.

3.2 Considerations and Summary

As discussed above, listed and designated heritage properties are features that indicate archaeological potential. Once the Town's Heritage Inventory has been fully updated (inconsistencies with provided material noted in Table 2), this will need to be incorporated into the archaeological potential layer of the Stage 1 Archaeological Assessment. Special attention should be paid to the Upper Canoe Landing Report, as it identifies an area that may be considered an important Cultural Heritage Landscape due to both its pre-contact and Euro-Canadian ties. This area is also associated with a significant archaeological site; BaGu-1, identified in the 1988 Archaeological Master Plan.

4 Recommendations

Both the 1988 and 2014 AMPs prepared by ASI do not accurately reflect all of the currently available archaeological and heritage data. Once the Town's heritage inventory has been brought up to date, this heritage data would need to be incorporated and modelled as archaeological potential. Unfortunately, neither the 1988 and 2014 AMPs were able to incorporate the heritage register data. Additionally, the 2014 AMP does not adequately address the 300m potential buffering specified by the MTCS for select features of potential.

Another important component of the criteria for determining archaeological potential is the input from various communities, specifically regarding:

- Property that local histories or informants have identified with possible archaeological sites, historic events, activities, or occupations
- Resource areas, including:
  - Food or medicinal plants (e.g. migratory routes, spawning areas, prairie).
  - Scarce raw materials (e.g. quartz, copper, ochre, or outcrops of chert).
  - Early Euro-Canadian industry (e.g. fur trade, logging, prospecting, mining).

In order to obtain this information, community engagement will be necessary not only with local historical societies and heritage groups, but also with Indigenous communities.

Archaeological Management Plans require frequent updating and maintenance, and do not negate the need for Archaeological Assessment, as per the *Standards and Guidelines for Consultant Archaeologists,* Standard 1.4.2. It is instead recommended that the project area be subject to Stage 1 Archaeological Assessment, which would be the most time and cost effective solution to identify areas where listed or designated heritage properties are located, where previously registered archaeological sites that still hold CHVI are located, and any areas of archaeological potential are located within the study area, in order to inform the planning of infrastructure routes.

5 REFERENCES

Archaeological Services Inc. (ASI). (1988). *Report on Phase 1 of the Master Plan of Archaeological Resources for the Town of East Gwillimbury, Ontario*.

Archaeological Services Inc. (ASI). (2014). *Planning for the Conservation of Archaeological Resources in York Region*. Toronto. York Region.

Minstry of Tourism, Culture and Sport. (2011). *Standards and Guidelines for Consultant Archaeologists.* Toronto: Ministry of Tourism and Culture, Queens Printer.

A FEATURES INDICATING ARCHAEOLOGICAL POTENTIAL

Features Indicating Archaeological Potential

The following are features or characteristics that indicate archaeological potential:

- Previously identified archaeological sites.
- Water sources:
  - Primary water sources (lakes, rivers, streams, creeks).
  - Secondary water sources (intermittent streams and creeks, springs, marshes, swamps).
  - Features indicating past water sources (e.g. glacial lake shorelines, relic river or stream channels, shorelines of drained lakes or marshes, cobble beaches).
  - Accessible or inaccessible shoreline (e.g. high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh).
- Elevated topography (e.g. eskers, drumlins, large knolls, plateaux).
- Pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground.
- Distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases.
- Resource areas, including:
  - Food or medicinal plants (e.g. migratory routes, spawning areas, prairie).
  - Scarce raw materials (e.g. quartz, copper, ochre, or outcrops of chert).
  - Early Euro-Canadian industry (e.g. fur trade, logging, prospecting, mining).
- Areas of early Euro-Canadian settlement. These include places of early military or pioneer settlement (e.g. pioneer homesteads, isolated cabins, farmstead complexes), early wharf or dock complexes, pioneer churches and early cemeteries.
- Early historical transportation routes (e.g. trails, passes, roads, railways, portage routes).
- Property listed on a municipal register or designated under the Ontario Heritage Act or that is federal, provincial or municipal historic landmark or site.
- Property that local histories or informants have identified with possible archaeological sites, historic events, activities, or occupations

Source

Ontario Ministry of Tourism, Culture and Sport
2011 Standards and Guidelines for Consultant Archaeologists

B ARCHAEOLOGICAL SITES IN EAST GWILLIMBURY

Borden Number	Site Name	Lower Tier	Current Development Review Status
BaGt-1	Victoria	East Gwillimbury	
BaGt-15	Loon	East Gwillimbury	
BaGt-16	Hawk	East Gwillimbury	
BaGt-40	Mount Albert	Lower Tier Not Applicable	
BaGt-41	BaGt-41	Lower Tier Not Applicable	
BaGu-1	Harvey Graham	East Gwillimbury	
BaGu-107	Green Lane	East Gwillimbury	
BaGu-110	Lake Family Dump	East Gwillimbury	
BaGu-111	Graham	East Gwillimbury	
BaGu-112	Abraham Doan	East Gwillimbury	
BaGu-113	Abraham Leopard	East Gwillimbury	
BaGu-114	Willson Family Dump 1	East Gwillimbury	
BaGu-115	Willson Family Dump II	East Gwillimbury	
BaGu-116	Calvin Washburn	East Gwillimbury	
BaGu-117	-	East Gwillimbury	
BaGu-12	Fort Gwillimbury	East Gwillimbury	
BaGu-125		East Gwillimbury	
BaGu-126	The Salter Site	Lower Tier Not Applicable	
BaGu-127		East Gwillimbury	
BaGu-129		East Gwillimbury	No Further CHVI
BaGu-130		East Gwillimbury	No Further CHVI
BaGu-131		East Gwillimbury	No Further CHVI
BaGu-132		East Gwillimbury	
BaGu-133		East Gwillimbury	
BaGu-14	James	East Gwillimbury	
BaGu-141	HLQS H1	East Gwillimbury	
BaGu-142	Lount Site	East Gwillimbury	Further CHVI
BaGu-143	Willis Site	East Gwillimbury	Further CHVI

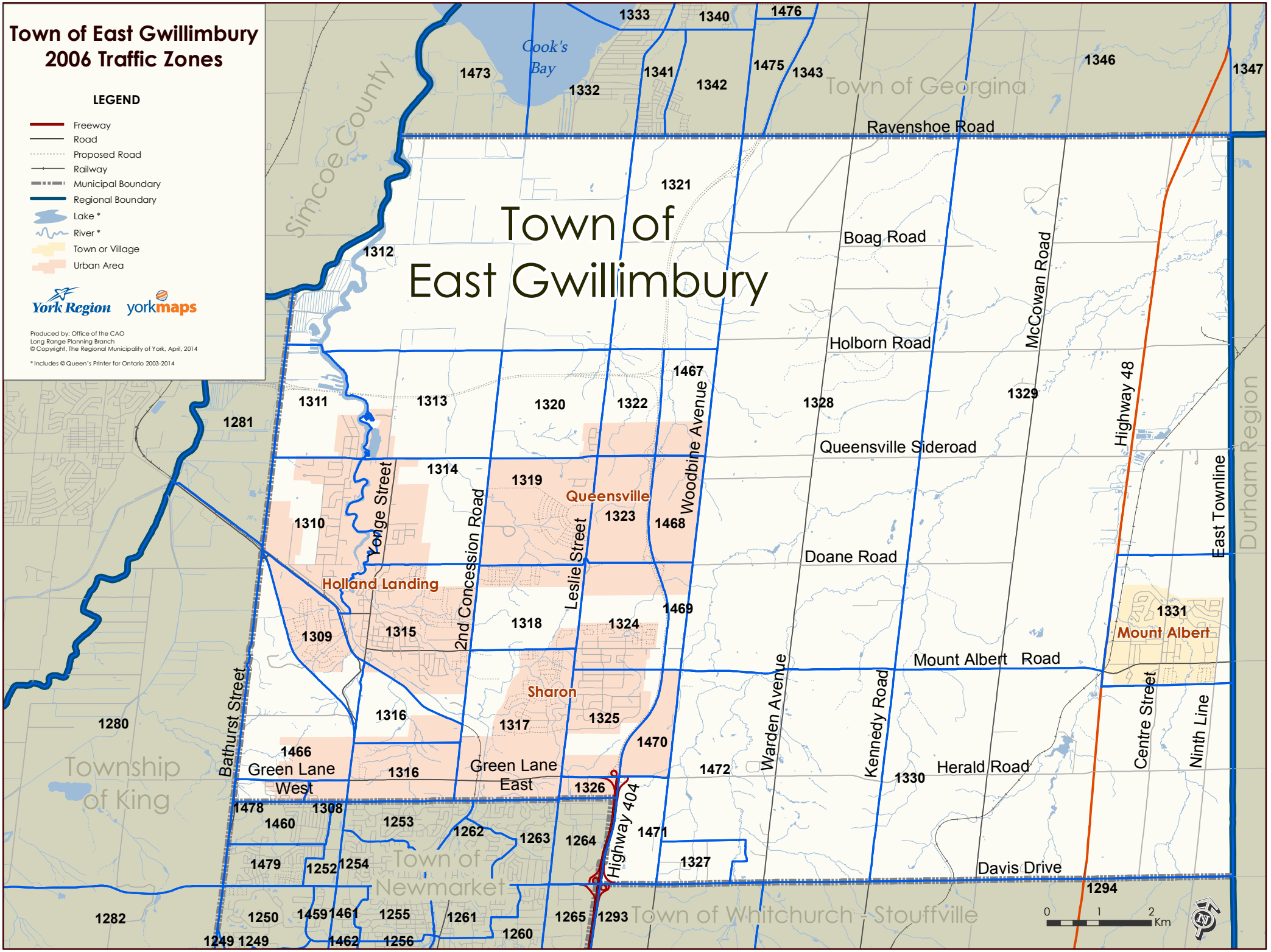
Borden Number	Site Name	Lower Tier	Current Development Review Status
BaGu-144	Queensville 3	East Gwillimbury	Further CHVI
BaGu-145	Queensville Site 2	Lower Tier Not Applicable	No Further CHVI
BaGu-147		East Gwillimbury	
BaGu-148	Graham I	East Gwillimbury	
BaGu-149	Graham II	East Gwillimbury	
BaGu-15	Willson	East Gwillimbury	
BaGu-150	Highway 404 New ROW	East Gwillimbury	
BaGu-151	Sharon Temple	Lower Tier Not Applicable	
BaGu-152	Lount	East Gwillimbury	
BaGu-153	Willis	East Gwillimbury	
BaGu-156	BaGu-156-H1	East Gwillimbury	
BaGu-157	BaGu-157 - H2	East Gwillimbury	
BaGu-158	West	Lower Tier Not Applicable	
BaGu-16	Jackson	East Gwillimbury	
BaGu-165	Lepard	East Gwillimbury	
BaGu-170	Hughes Site	Lower Tier Not Applicable	
BaGu-177	Queensville-Doane	East Gwillimbury	No Further CHVI
BaGu-178	Ronan	Lower Tier Not Applicable	
BaGu-183	Yonge Green Lane Site 2	East Gwillimbury	Further CHVI
BaGu-184	Yonge Green Lane Site 1	East Gwillimbury	Further CHVI
BaGu-189	Milne Site	East Gwillimbury	No Further CHVI
BaGu-19	Newmarket 1	East Gwillimbury	
BaGu-193	Location 1	East Gwillimbury	Further CHVI
BaGu-195	Sharon Corners H1 Site	East Gwillimbury	Further CHVI
BaGu-20	Druid	East Gwillimbury	
BaGu-21	Walnut Farm	East Gwillimbury	
BaGu-22	Solstice	East Gwillimbury	
BaGu-23	Martin	East Gwillimbury	

Borden Number	Site Name	Lower Tier	Current Development Review Status
BaGu-24	Cassandra	East Gwillimbury	
BaGu-25	Sparrow	East Gwillimbury	
BaGu-26	Spring Valley	East Gwillimbury	
BaGu-27	Falcon	East Gwillimbury	
BaGu-28	Gander	East Gwillimbury	
BaGu-29	Pheasant	East Gwillimbury	
BaGu-3	Orpel	East Gwillimbury	
BaGu-30	Nanabush	East Gwillimbury	
BaGu-31	Deuce	East Gwillimbury	
BaGu-32	Merganser	East Gwillimbury	
BaGu-33	McLeod	East Gwillimbury	
BaGu-4	Swezie	East Gwillimbury	
BaGu-42	Kelly	East Gwillimbury	
BaGu-43	Radar	East Gwillimbury	
BaGu-44	Swasey	East Gwillimbury	
BaGu-45	Blue Heron	East Gwillimbury	
BaGu-46	Lepard Site	Lower Tier Not Applicable	No Further CHVI
BaGu-47	Gleason	East Gwillimbury	
BaGu-48	Rogers	East Gwillimbury	
BaGu-49	Thophilus Wakefield	East Gwillimbury	
BaGu-5	Thompson	East Gwillimbury	
BaGu-50	Merlin	East Gwillimbury	
BaGu-51	Oriole	East Gwillimbury	
BaGu-52	Toucan	East Gwillimbury	
BaGu-53	Eves Site	East Gwillimbury	Further CHVI
BaGu-54	Innkeeper	East Gwillimbury	
BaGu-55	Arbuthnott	East Gwillimbury	
BaGu-56	Howard	East Gwillimbury	

Borden Number	Site Name	Lower Tier	Current Development Review Status
BaGu-57	Temple Farm	East Gwillimbury	
BaGu-6	Drive-In	East Gwillimbury	
BaGu-66		East Gwillimbury	
BaGu-77	Gibson	East Gwillimbury	
BaGu-84	Wasley	East Gwillimbury	
BaGv-42	East Holland River	East Gwillimbury	
BbGu-1	Fenton	East Gwillimbury	
BbGu-10	Boyington	East Gwillimbury	
BbGu-11	Perry	East Gwillimbury	
BbGu-14	Kargess	East Gwillimbury	
BbGu-15	Burgess	East Gwillimbury	
BbGu-16	Dudley	East Gwillimbury	
BbGu-17	Cryderman	East Gwillimbury	
BbGu-2	American	East Gwillimbury	
BbGu-22	McClellan Locality 1	East Gwillimbury	
BbGu-23	McClellan Locality 2	East Gwillimbury	
BbGu-24	Walter Rose	East Gwillimbury	
BbGu-25	Badali	East Gwillimbury	
BbGu-3	Lewis	East Gwillimbury	
BbGu-57	Penny Lane I	East Gwillimbury	
BbGu-58	Penny Lane II	East Gwillimbury	
BbGu-62		East Gwillimbury	No Further CHVI
BbGu-63	Maskinonge	East Gwillimbury	No Further CHVI
BbGu-84		East Gwillimbury	Further CHVI
BbGu-9	Deavitt	East Gwillimbury	

APPENDIX

C POPULATION FORECAST MAPS



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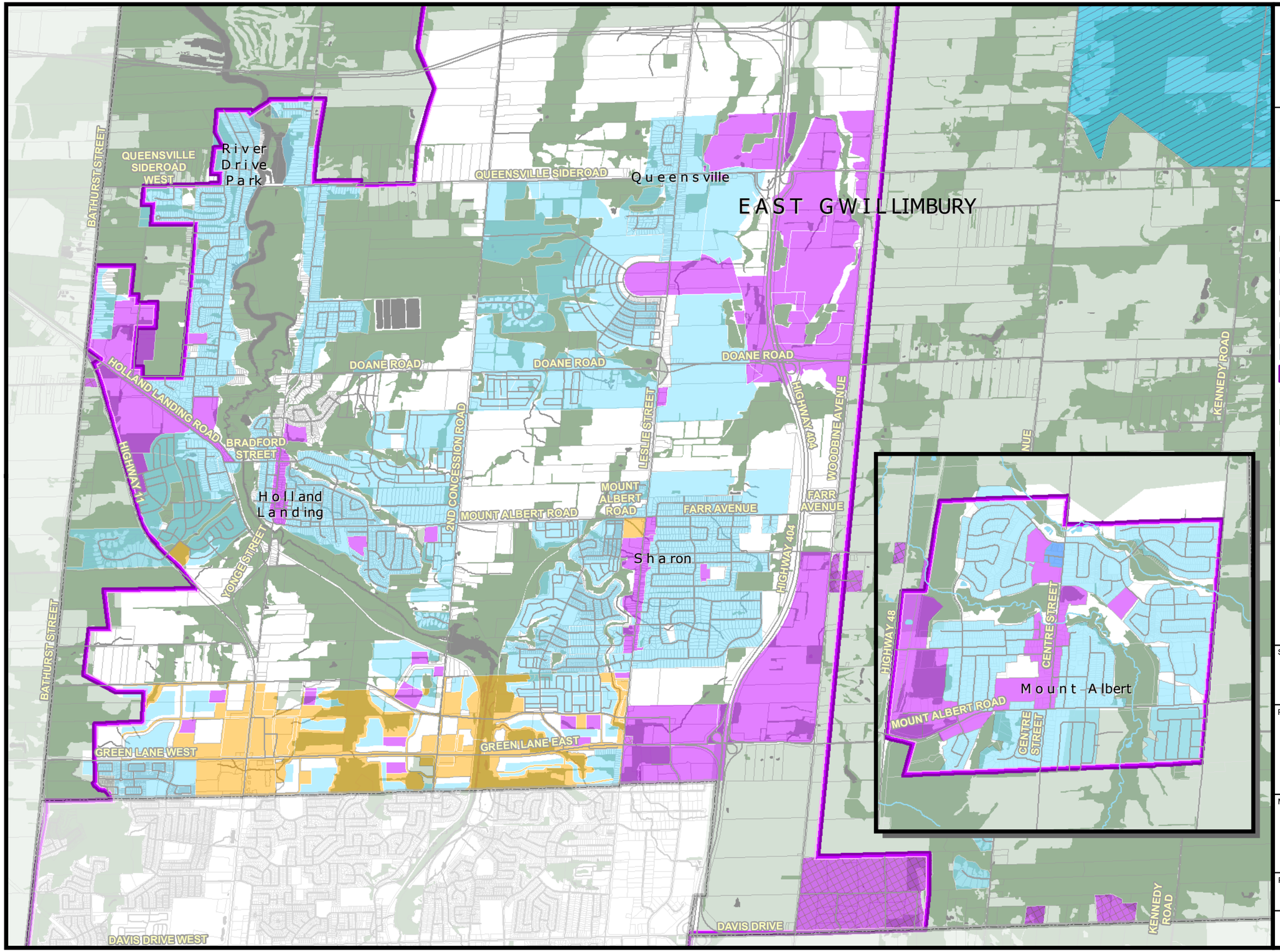

100 COMMERCE VALLEY DRIVE WEST
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CANADA, L3T 0A1
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Town of East Gwillimbury
19000 LESLIE STREET
SHARON, ONTARIO,
CANADA, L0G 1V0
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LEGEND

- Mixed
- ICI
- ICI (Rural)
- Low Residential (Rural)
- Low Residential
- Medium Residential
- Service Area
- Property Boundaries
- Natural Heritage Features
- Greenbelt

SCALE:
0 250 500 1,000 m
1:25,000

N W E S

PROJECT:
Water and Wastewater Master Plan Update

Town of East Gwillimbury

MAP:
FRAGMENTATION OF REGIONAL TRAFFIC ZONES INTO SMALLER POPULATION BLOCKS WITH CORRESPONDING WATER USERS (ICI OR RESIDENTIAL)

PROJECT NO.:	DATE:		
171-03399-00			
DRAWN BY:	CHECKED BY:	REPORT:	MAP NO.:
RCO	MA	-	X-X

100 COMMERCE VALLEY DRIVE WEST
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Town of East Gwillimbury
19000 LESLIE STREET
SHARON, ONTARIO,
CANADA, L0G 1V0
WWW.EASTGWILLIMBURY.CA

LEGEND

- Mixed
- ICI
- ICI (Rural)
- Low Residential (Rural)
- Low Residential
- Medium Residential
- Residential Development (2021-2026)
- ICI Development (2021-2026)
- Residential Development (2016-2021)
- ICI Development (2016-2021)
- ROADS

SCALE:
0 250 500 1,000 m
1:39,985
N W E S

PROJECT:
Water and Wastewater Master Plan Update

Town of East Gwillimbury

MAP:
Land Development (2021-2026)

PROJECT NO.:	DATE:		
171-03399-00	February 2018		
DRAWN BY:	CHECKED BY:	REPORT:	FIGURE NO.:
HC	KL	XX	X-X

File Location:S:\MA\17\171-03399-00 East Gwillimbury Master Plan\3.0 Technical\3.4 GIS\3.5.1 Internal Maps\Map_2021_Land_Development.mxd

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CANADA, L3T 0A1
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Town of East Gwillimbury
19000 LESLIE STREET
SHARON, ONTARIO,
CANADA, L0G 1V0
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LEGEND

- Mixed
- ICI
- ICI (Rural)
- Low Residential (Rural)
- Low Residential
- Medium Residential
- Residential Development (2041-Ultimate)
- ICI Development (2041-Ultimate)
- Residential Development (2016-2041)
- ICI Development (2016-2041)
- ROADS

SCALE:
0 250 500 1,000 m
1:39,985
N W E S

PROJECT:
Water and Wastewater Master Plan Update

Town of East Gwillimbury

MAP:
Land Development (2041-Ultimate)

PROJECT NO.:	DATE:		
171-03399-00	February 2018		
DRAWN BY:	CHECKED BY:	REPORT:	FIGURE NO.:
HC	KL	XX	X-X

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APPENDIX

D MODELLING

WATER AND WASTEWATER MASTER PLAN TOWN OF EAST GWILLIMBURY

EAST GWILLIMBURY WATER SYSTEM GAP ANALYSIS AND STATUS QUO REPORT

TOWN OF EAST GWILLIMBURY

DRAFT

PROJECT NO.: 171-03399-00
DATE: DECEMBER 2017

WSP
100 COMMERCE VALLEY DRIVE WEST
THORNHILL, ON, CANADA L3T 0A1

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TABLES

FIGURES

1 INTRODUCTION

The Town of East Gwillimbury (EG) retained WSP to undertake a Water and Wastewater Master Plan. The purpose of the Master Plan project is to establish servicing strategies for water and wastewater infrastructure in the Town to support growth to 2041. The Master Plan will identify potential projects to address the servicing needs for planned growth within the Town, as well as some notable sub-elements such as: establishing water and wastewater design criteria, coordinate with the public, stakeholders and the development community to ensure stakeholder by-in of the plan, determine interim servicing options as well as develop a phasing plan for future infrastructure.

This modeling Gap Technical Memorandum (TM) will summarize the state of the existing hydraulic model received by WSP, as well as outline updates that will be administered to the model by the WSP modeling team. This TM will also summarize the recommendations regarding any necessary updates required in the existing model and next steps to begin the modeling.

2 STUDY AREA

The East Gwillimbury Water System is located north of the Town of Newmarket and the Town of Whitchurch-Stoufville, and south of Keswick and Cook's Bay of Lake Simcoe. The Town is part of the Region of York's greater water servicing network. It services three (3) areas: Holland Landing, Queensville and Sharon (System 1), Green Lane Area (System 2), and Mount Albert (System 3). The systems are supplied via a network of watermains which bring water up from Lake Ontario. The Town is also supplied by the numerous wells which make up the main sources in the distribution system.

3 OVERVIEW OF EXISTING SYSTEM

WSP, formerly Genivar, completed the Town of East Gwillimbury Water and Wastewater Master Plan in 2009. The purpose of the Study was to develop infrastructure recommendations to service the Town to an ultimate buildout growth scenario, and to identify system responsibility between the Region of York and the Town. Population projections were used to develop water and wastewater rates for use in modeling existing and future scenarios. It should be noted that the study area considered for the purposes of the 2009 Master Plan included the entire Town of East Gwillimbury (the communities of Sharon, Queensville, Holland Landing, Mount Albert, as well as rural areas), excluding non-developable areas such as lands within the Oak Ridges Moraine and the Provincial Greenbelt areas.

3.1 EXISTING CONDITIONS

System 'existing' conditions during the 2009 Master Plan were as follows:

Table 3-1 Water Systems – Existing Conditions per 2009 Water and Wastewater Master Plan

SYSTEM	REGION	TOWN
Entire East Gwillimbury	Rural areas do not have water servicing	
	Three separate pressure districts	

		Town in process of obtaining responsibility for watermains located in the Yonge/Green Lane area; previously owned by the Town of Newmarket
Queensville	Wells at Holland Landing combines with flow from trunk main (from Queensville Wells) Two transmission mains and one trunk main conveying flow to Holland Landing, Queensville, Sharon, and Town of Newmarket	Distribution Network
Mount Albert	Wells Storage	Distribution Network
Holland Landing		Distribution Network Elevated Storage
Sharon		Distribution Network Elevated Storage
Local System: Yonge/Green Lane		Now property of EG (was NM)
Local System: Leslie/Green Lane		Supplied by NM system

4 DESIGN CRITERIA

The following design criteria were used to assess the remaining capacity of the existing systems and to forecast future requirements for the water systems. Design criteria recommended in the *MOECC Guidelines* and *Town of East Gwillimbury Engineering Standards and Design Criteria 2012* were used. The criteria described below was used as a high-level method to determine the existing state of the existing model. The design criteria that will be used further into the Master Plan for analysis will be presented in a later technical memorandum.

4.1 UNIT WATER DEMAND CRITERIA

The water demand criteria shown in Table 4-1 are from the unit rates recommended in *Town of East Gwillimbury Engineering Standards and Design Criteria 2012*.

The *MOECC Guidelines* recommend determining demands for institutional, commercial and industrial (ICI) users on a case by case basis. However, the following criteria for ICI demands were used for the purposes of this evaluation and are consistent with the *Town of East Gwillimbury Engineering Standards and Design Criteria 2012*.

Table 4-1 Water System Design Criteria

CRITERIA	VALUE	REFERENCE
Average Day Residential Demand	350 L/cap/day	Town's Engineering Standards and Design Criteria - 2012
Average Day Institutional Demand	35,000 L/ha/d	Town's Engineering Standards and Design Criteria - 2012
Average Day Commercial Demand	28,000 L/ha/d	Town's Engineering Standards and Design Criteria - 2012
Average Industrial Demand	18,000 L/ha/d	Town's Engineering Standards and Design Criteria - 2012
Domestic Demand Maximum Day Factor	2.0	Highest historical value
Domestic Demand Peak Hour Factor	2.75	Highest historical value

Residential average day demands are obtained by multiplying the residential unit rate by the service population. Similarly, average ICI demands are obtained by multiplying the corresponding unit rates to the areas of development, assuming 100% of the area would be developed and assuming 100% lot coverage on these properties.

Maximum day and peak hour demands are obtained by multiplying the average day demand by the corresponding peaking factor.

For purposes of the existing model evaluation, and in line with Town standards and practices, a residential fire flow of 80 L/s (4,800 L/min) and ICI fire flow of 200 L/s (12,000 L/min) were used.

4.1.1 DISTRIBUTION CAPACITY

The watermains within the existing model have to be sized to carry the greater of the maximum day plus fire flow or peak hour demand. The MOECC Guidelines recommend that the range of acceptable pressures under normal conditions (average to peak hour flows) is 275 kPa (40 psi) to 690 kPa (100 psi), while during fire flow conditions pressures may drop to 140 kPa (20 psi) (Ministry of Environment and Climate Change, 2008). The maximum allowable water velocity in the distribution system is 3 m/s (Ministry of Environment and Climate Change, 2008).

5 HYDRAULIC MODELING

An all-pipe model of the system including pipes, storage tanks, and system water sources was developed by the Town using Bentley Systems' WaterGEMS hydraulic modeling software. This model has not been updated or modified in any significant way since receipt. The description below outlines the current status of the model, at the time of receipt.

The water model allows for simulations that can predict system responses to events under a wide range of conditions. Using simulations, problems can be anticipated in proposed or existing systems, and solutions can be evaluated before time, money, and materials are invested in a real-world project. Simulations can either be steady-state or extended-period.

Steady-state simulations represent a snapshot in time and are used to determine the operating behaviour of a system under static conditions. This type of analysis can be useful in determining the short-term effect of fire flows

or average demand conditions on the system. Extended period simulations (EPS) are used to evaluate system performance over time. As it is not within the scope of this Master Plan to run extended period simulations, modelling and analysis will not include this scenario. Fire flow simulations were carried out throughout the system to determine whether the system could deliver fire flows under the Maximum Day demands.

This type of analysis allows modeling the filling and emptying of storage facilities, regulating valves opening and closing, and pressures and flow rates changing throughout the system in response to varying demand conditions and automatic control strategies.

The simulations that currently exist within the model (steady-state analysis of the Average Day, Maximum Day and Maximum Day + Fire conditions) were carried out to determine the existing state of the model.

5.1 WATERGEMS – STATUS OF EXISTING WATER MODEL

5.1.1 WATER DEMANDS

The existing WaterGEMs model is setup with a base Average Day Scenario. From this scenario, four child scenarios exist: a Minimum Hour Scenario, a Maximum Day Scenario (with seven child scenario which simulate fires at various nodes), a Peak Hour Scenario and a "Size" scenario of no specified year. All scenarios were created with the same set of alternatives, with the exception of the demand alternative which is unique to each scenario. Table 5-1 summarizes the total demand loaded in each scenario.

Table 5-1 Total Demands Loaded in each Scenario of the Existing WaterGEMs Model

Scenarios	Avg Day (1.0)	Peak Hr (2.75)	Max Day (2.0)	Max Day, Fire at J-4	Max Day, Fire at J-13	Max Day, Fire at J-78	Max Day, Fire at J-91	Max Day, Fire at J-96	Max Day, Fire at J-107	Max Day, Fire at J-137	Min Hr (0.7)	Sizes
Total Demand (m^3/day)	74,705	259,266	180,168	197,448	197,448	197,448	187,080	187,080	187,080	187,080	43,066	0

As indicated in Section 4, the Maximum Day and Peak Hour scenario are peaked according to the Town's design peaking factors of 2.0 and 2.75, respectively. The Minimum Hour scenario was peaked with a factor of 0.7, decreasing the base Average Day demand.

All junctions in the model have been loaded with a demand. Based on the magnitude of the demands at each junction, WSP assumes that these demands represent a large number of service connections. WSP does not know how the model was loaded with demands.

It is important to note that four junctions in the existing model were loaded with a negative demand. These demands are summarized in Table 5-2 while Figure 5-1 demonstrates the location of these junctions. Junctions with a negative demand are of some significance as they act as supply points (adding water to the system) rather than acting as a demand (removing water from the system).

Table 5-2 Junctions with Negative Demands

Junctions	J-155	J-156	J-157	J-158
Demand (m^3/day)	-13,090	-13,090	-2,290	-2,290

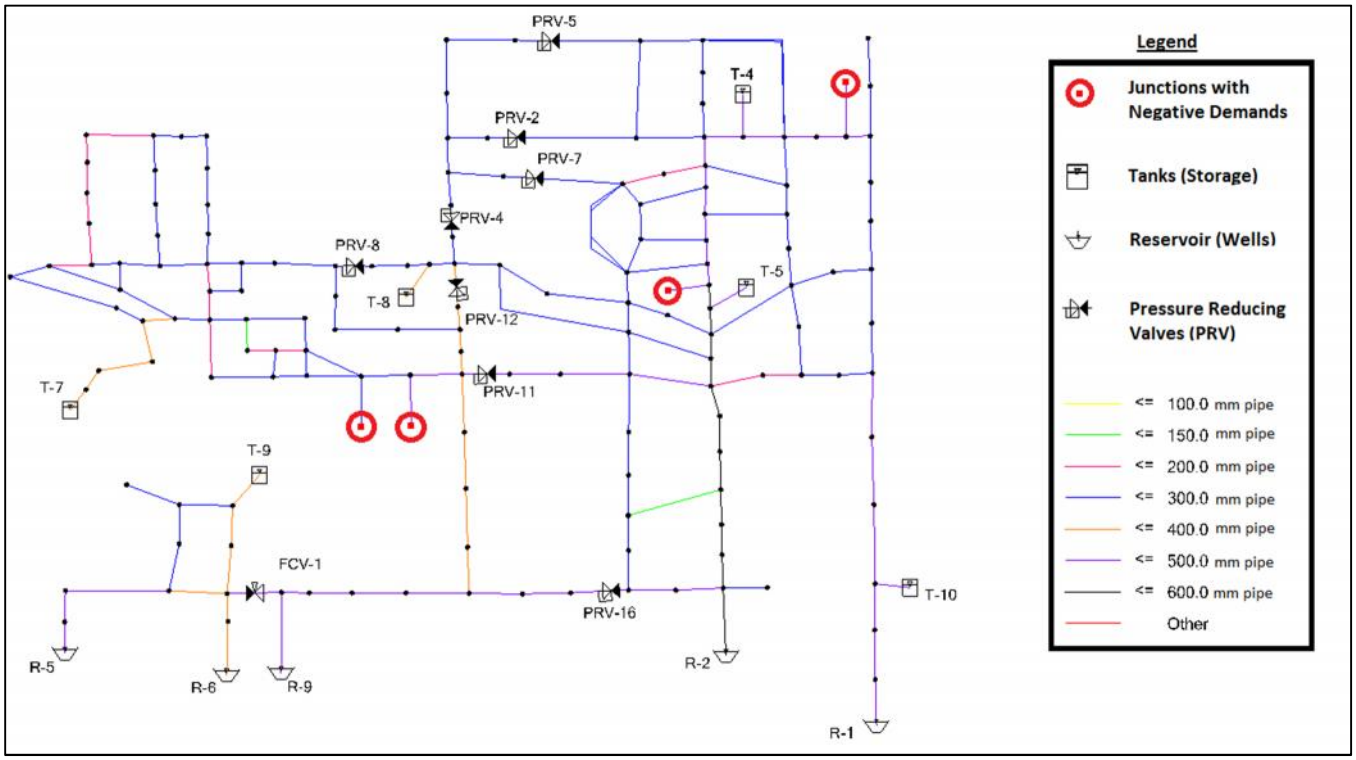

Figure 5-1 Existing System Layout in WaterGEMs Model

5.1.2 HYDRAULIC INFRASTRUCTURE – TANKS AND RESERVOIRS

The existing model has been built with both tanks and reservoirs. The model currently has five tanks and six reservoirs. The parameters for all of the tanks and reservoirs are shown in tables Table 5-3 and Table 5-4 while their locations can be seen in Figure 5-1.

The existing model will be updated to include the current levels of operation in the tanks and reservoirs, as provided by the Region of York.

Table 5-3 Modeling Parameters of All Tanks in the Existing WaterGEMs Model

Tanks - Parameters					
Label	**Zone**	**Elevation (Base) (m)**	**Elevation (Minimum) (m)**	**Elevation (Initial) (m)**	**Elevation (Maximum) (m)**
T-4	East	313.00	313.00	322.00	323.10
T-5	East	313.00	313.00	322.00	323.10
T-7	Central	280.55	280.55	289.55	290.55
T-8	East	313.00	313.00	322.00	323.10
T-9	West	294.00	324.00	337.80	338.90
T-10	East	313.00	313.00	322.00	323.10

Table 5-4 Modeling Parameters of All Reservoirs in the Existing WaterGEMs Model

Reservoir - Parameters				
Label	**Elevation (m)**	**Zone**	**Flow (Out net) (m^3/day)**	**Hydraulic Grade (m)**
R-1	322	Zone	2,290	322.00
R-2	322	Zone	18,662	322.00
R-5	338.9	Zone	7,133	338.90
R-6	338.9	Zone	7,443	338.90
R-9	307.4	Zone	13,239	307.40

The reservoirs in the existing WaterGEMs model act as supplies. In the case of East Gwillimbury these supplies are wells. They are currently set as fixed head reservoirs which supply an "infinite" amount of water to the system. All of the reservoirs in the model are setup with an elevation which is equal to the hydraulic grade line; both of these range between 39 to 80 m above the elevation of the first downstream junction.

The tanks in the existing WaterGEMs model act as storage. In the model, as WSP received it, all tanks are set to approximately 90% full. The minimum elevations of the tanks in the "east" zone are all lower than the maximum elevation of that zone, while the minimum elevations of the tanks in the "west" and "central" zones are higher than the maximum elevation in each respective zone.

5.1.3 HYDRAULIC INFRASTRUCTURE – PRESSURE REDUCING VALVES AND ZONES

The existing WaterGEMs model currently has three zones – East, West and Central. Each zone is bounded by Pressure Reducing Valves (PRV) in order to regulate pressures within the zone. Each zone is shown in Figure 5-2.

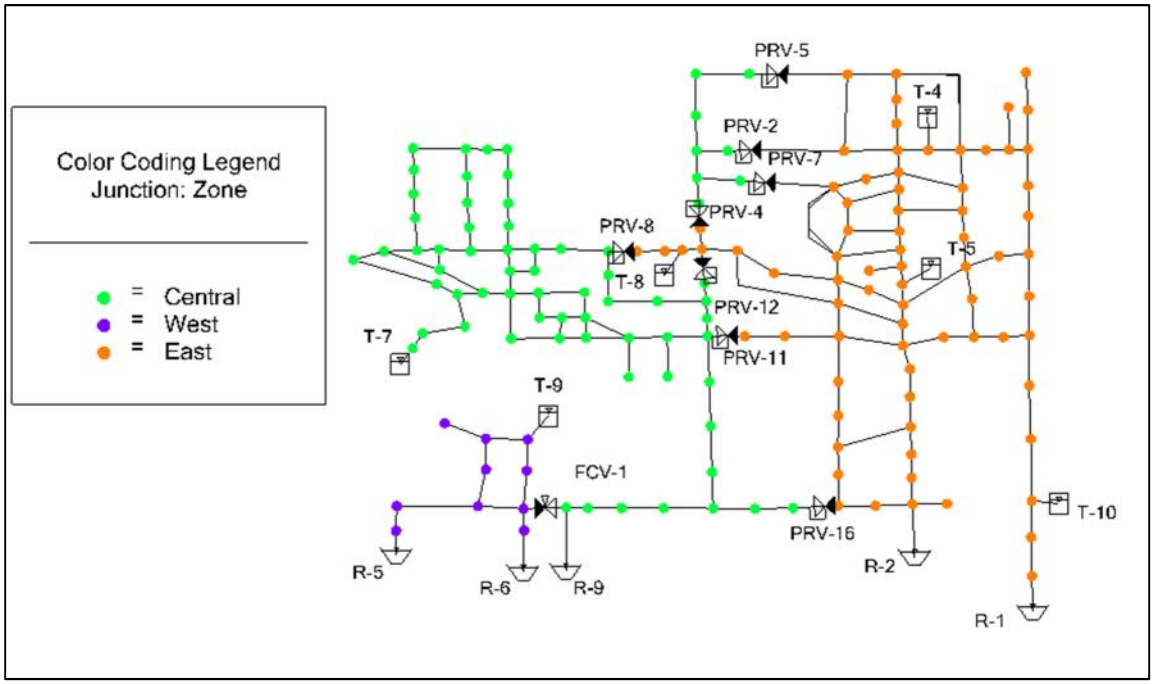

Figure 5-2 All zones in the existing WaterGEMs model.

Table 5-5 summarizes the PRV settings in the model as well as the upstream and downstream pressures. Table 5-6 demonstrates the maximum and minimum elevations in each zone. For the location of all PRVs please see Figure 5-2.

Table 5-5 PRV Settings for All PRVs in the existing WaterGEMs model

PRV Settings							
Label	**Elevation (m)**	**Diameter (Valve) (mm)**	**Hydraulic Grade Setting (Initial) (m)**	**Pressure Setting (Initial) (kPa)**	**Hydraulic Grade (From) (m)**	**Hydraulic Grade (To) (m)**	**Flow (m^3/day)**
PRV-2	240.00	400	290.00	0	321.05	290.02	1,789
PRV-4	260.00	400	290.00	0	321.78	290.01	963
PRV-5	225.00	300	290.00	0	321.09	290.02	1,768
PRV-7	242.00	300	290.00	0	321.79	290.02	925
PRV-8	253.00	300	289.30	0	321.98	291.93	0
PRV-11	260.00	450	290.35	0	321.51	297.41	0
PRV-12	266.00	400	291.00	0	321.87	296.97	0
PRV-16	247.00	500	305.50	0	321.09	305.52	8,596

Table 5-6 Elevation Range in Each Zone of the Watermain Network

Zones	East	West	Central
Maximum Elevation (m)	323.1	289	265

Minimum Elevation (m)	248	260	218

5.1.4 HYDRAULIC INFRASTRUCTURE – PIPES

The existing WaterGEMs model currently has a total of 105,300 m of pipe in the model – as in the network (based on this model) has this total length of pipe in it. All pipes have a user defined length, meaning that the length of each pipe was manually set. Pipe diameters range between 150 mm and 600 mm while pipe materials include both Concrete (Steel Forms) and PVC pipes.

5.2 MODEL OUTPUTS

With the model currently setup as described above, WSP ran all scenarios to verify that all scenarios ran without error and to verify that the outputs of each model run.

5.2.1 AVERAGE DAY SCENARIO

During the Average Day Scenarios, pressures throughout all junctions range between -10 and 772 kPa while the Hydraulic Grade Line (HGL) ranges between 288 and 338 m. Two junctions experience negative pressures while two additional junctions experience pressure below the minimum pressure criteria of 275 kPa set by the MOECC: of which all four (4) junctions have negative demands. Flow velocity throughout all pipes in this scenarios range between 0 and 2.65 m/s: corresponding to flow rates of 0 to 18,662 m^3/day.

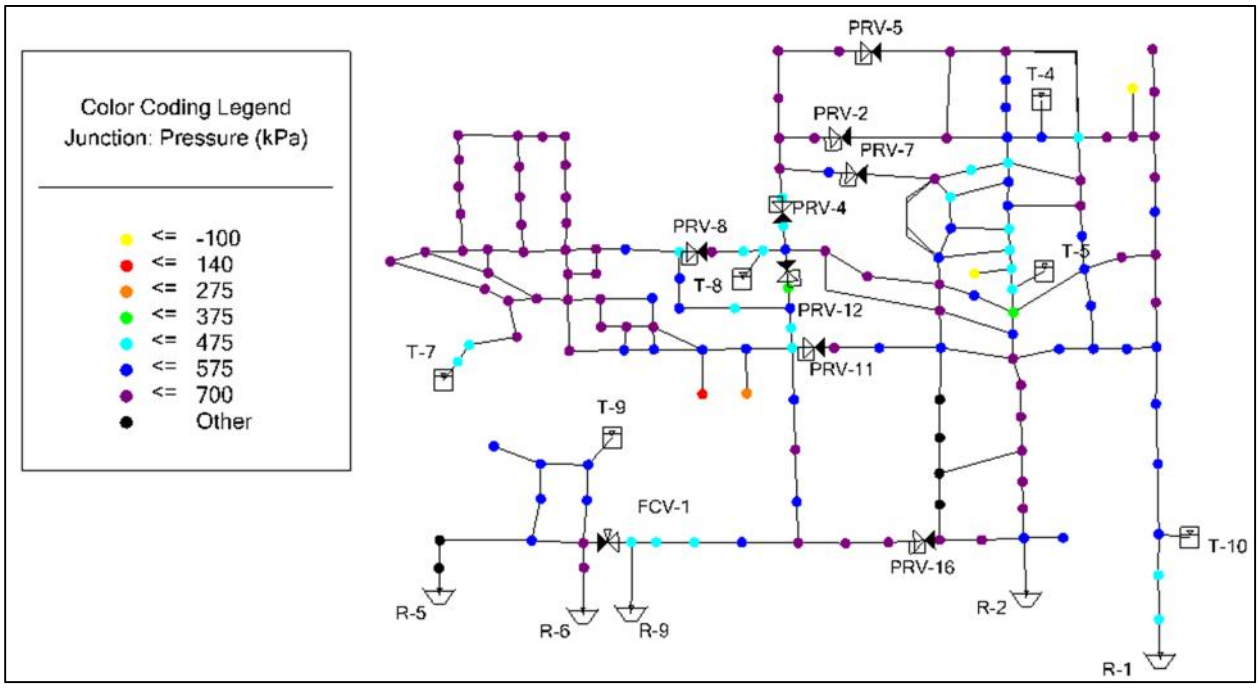

Figure 5-3 Pressures at each Junction in the Existing WaterGEMs Model during the Average Day Scenario

5.2.2 MAXIMUM DAY SCENARIO

During the Maximum Day Scenarios, pressures throughout all junctions range between -13 and 771 kPa while the Hydraulic Grade Line (HGL) ranges between 278 and 339 m. Two junctions experience negative pressures while two additional junctions experience pressure below to minimum pressure criteria of 275 kPa set by the MOECC. All four junctions have negative demands. Flow velocities throughout all pipes in this scenarios range between 0 and 1.78 m/s, corresponding to flow rates of 0 to 37,446 m^3/day.

5.2.3 MAXIMUM DAY + FIRE FLOW SCENARIOS

The existing model currently has seven fire flow scenarios, each of which is meant to simulate a fire at a specific node. The "Steady State/EPS Solver Calculation Options" is unique for each fire flow scenario, however these calculation options are all setup with the "Hydraulic Only" option. Furthermore, all fire flow scenarios have the "Base-Fire Flow" alternative. For these reasons the fire flow scenarios don't run fire flow simulations and no fire flow outputs are available.

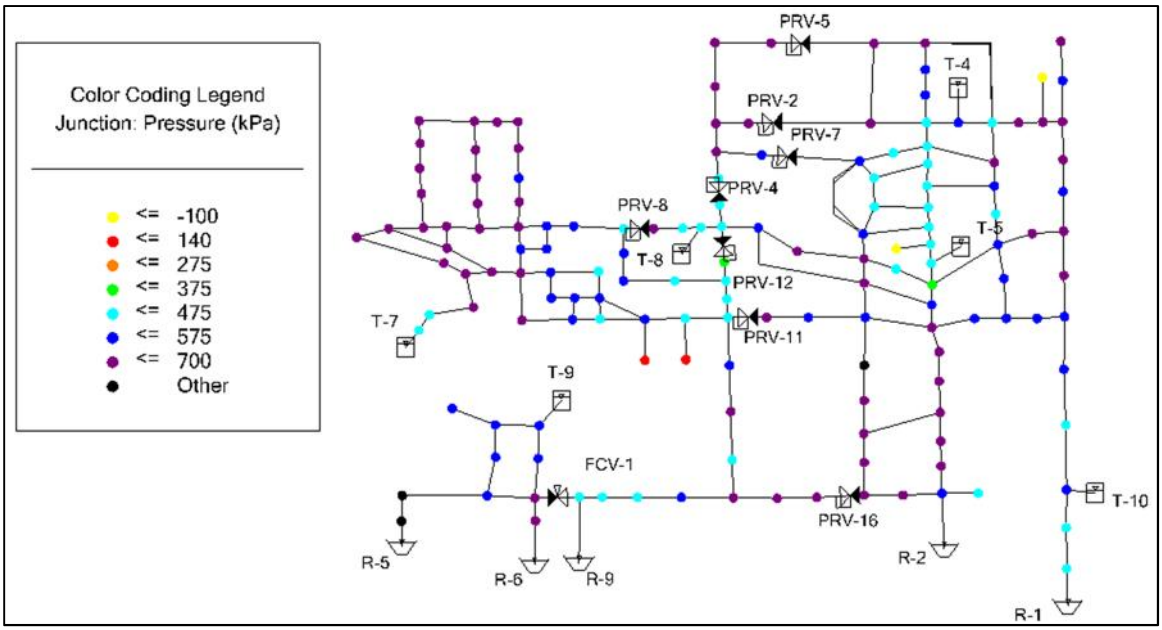

Figure 5-4 Pressures at each Junction in the Existing WaterGEMs Model during the Maximum Day Scenario

5.2.4 PEAK HOUR SCENARIO

During the Peak Hour scenarios, pressures throughout all junctions range between -21 and 770 kPa while the Hydraulic Grade Line (HGL) ranges between 268 and 339 m. Two junctions experience negative pressures while two additional junctions experience pressure below to minimum pressure criteria of 275 kPa set by the MOECC All four junctions have negative demands. Flow velocities throughout all pipes in this scenarios range between 0 and 2.65 m/s, corresponding to flow rates of 0 to 50,697 m^3/day.

Modeling of the Peak Hour Scenario is not included within the scope of this Master Plan.

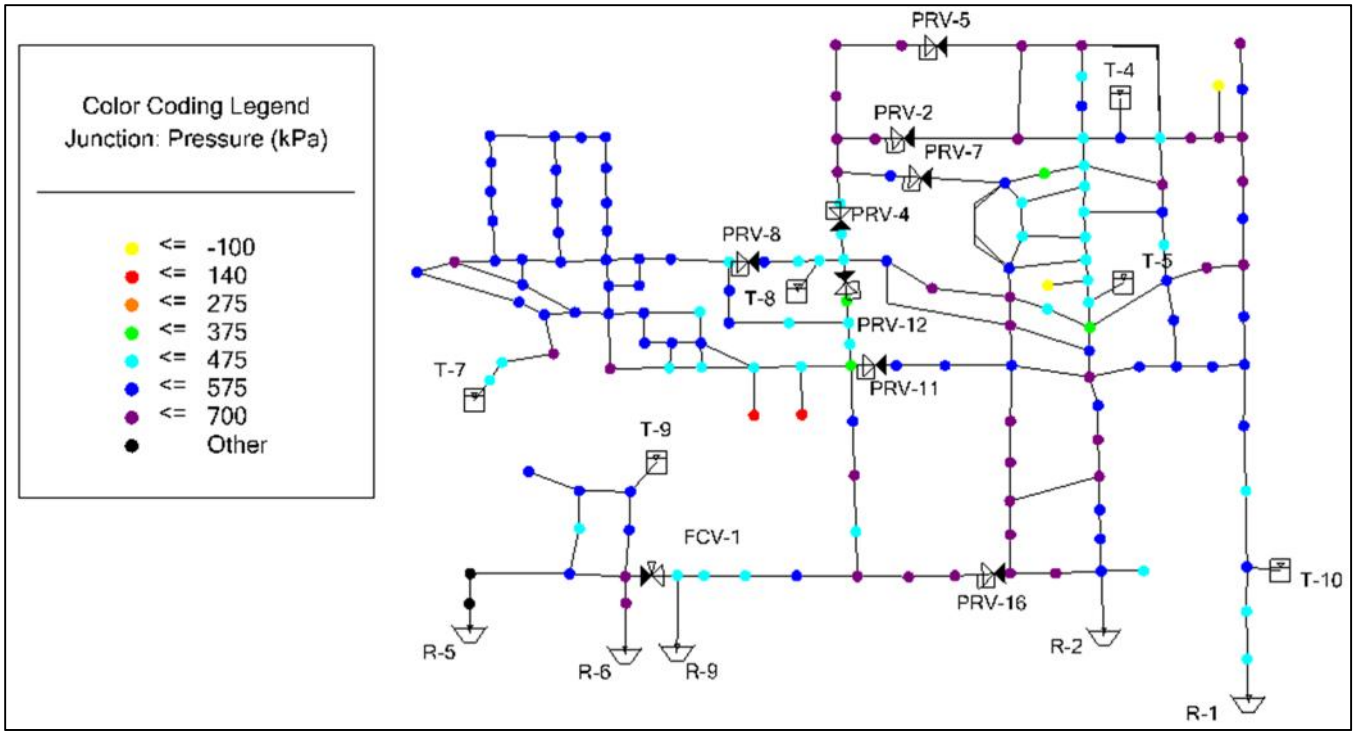

Figure 5-5 Pressures at each Junction in the Existing WaterGEMs Model during the Peak Hour Scenario

5.2.5 MINIMUM HOUR SCENARIO

During the Peak Hour scenarios, pressures throughout all junctions range between -10 and 776 kPa while the Hydraulic Grade Line (HGL) ranges between 289 and 339 m. Two junctions experience negative pressures while two additional junctions experience pressure below to minimum pressure criteria of 275 kPa set by the MOECC. All four junctions have negative demands. Flow velocities throughout all pipes in this scenarios range between 0 and 1.25 m/s, corresponding to flow rates of 0 to 13,090 m^3/day.

Modeling of the Minimum Hour scenario is not included within the scope of this Master Plan. Modeling of the Minimum Day scenario is included within the scope of the Master Plan, but was not included in the existing model. Minimum Hour is the smallest demand of Average Day, while Minimum Day is represented by reducing all of Average Day by a certain peaking factor (0.7 is commonly used).

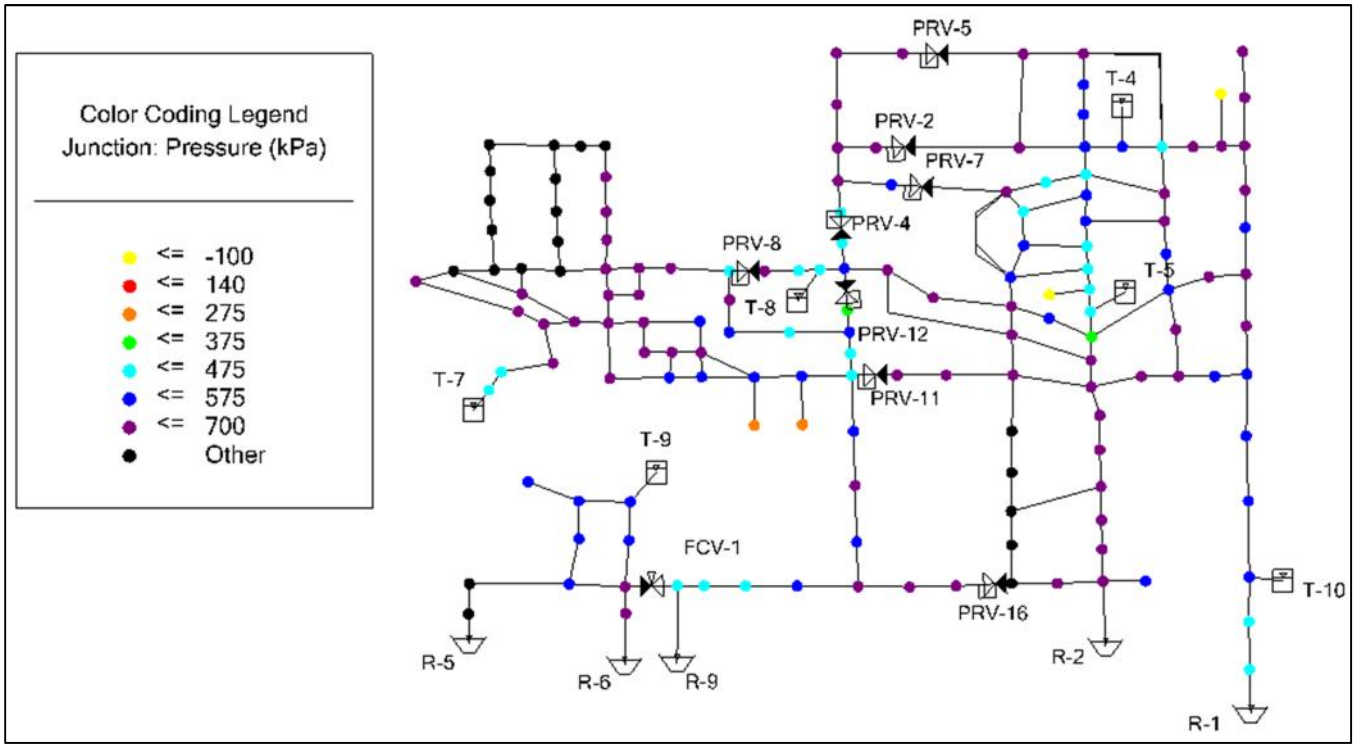

Figure 5-6 Pressures at each Junction in the Existing WaterGEMs Model during the Minimum Hour Scenario

5.3 WATER MODEL DEVELOPMENT

Based on WSP's review of the existing WaterGEMs model, significant improvements to the hydraulic model can be made and are strongly recommended.

At the most basic level, the watermain layout shown in all of the figures herein do not resemble the street layout found in East Gwillimbury at a local level or at a Concession level. Furthermore, the coordinates of the junction in the existing WaterGEMs do not match the real world coordinates of East Gwillimbury.

Similarly, the locations of the reservoirs and tanks (wells and storage) do not match the layout of the infrastructure in the real world or their relative location to each other. The model does not contain any pumps or pump curves.

With regards to the water supply, this model has many more supplies than the East Gwillimbury watermain network. The model currently has five "dummy" reservoirs able to provide an infinite supply in addition to the four negative demand junctions which act as supply points at the "real" wells. In comparison, the Town of East Gwillimbury has three different systems (Queensville-Holland Landing-Sharon, Green Lane Area, and Mount Albert) which should be modelled separately.

WSP is to receive GIS shape file of the watermains in the East Gwillimbury in January 2018. This data needs to be accurately geocoded and match the street layout of the Town. From this, WSP would be able to build a new WaterGEMS model from GIS. This would require WSP to receive reservoir and tank locations, pump locations, pump curves and contour lines. From this WSP would be able to build an accurate water model which can be loaded with demands derived from 2016 Statistics Canada and population projections (ECR004). Building a new model of East Gwillimbury would falls outside the original scope of this analysis. A change order will be provided to build the above described model.

6 CONCLUSIONS AND RECOMMENDATIONS

An assessment of the East Gwillimbury Water System was completed to evaluate and present the current state of the hydraulic model. The evaluation of the model has allowed for WSP to determine the necessary steps to improve the model to be used in the Master Plan. The assessment involved a review of flow data from the water facilities and an evaluation of the capacity of the system by means of the WaterGEMS model.

The conclusions and recommendations of the assessment are summarized in Table 6-1 below.

Table 6-1 Conclusions and Recommendations

	CONCLUSIONS	RECOMMENDATIONS
1.	The WaterGEMS model received by WSP from the Town contains a greater number of water supply points than the existing East Gwillimbury watermain network actually has. The current piping layout in this model does not reflect the East Gwillimbury street layout, at a local or concession level while the coordinates of the model do not represent the real world coordinates of the Town.	Redevelopment the Town's water model in real world coordinates. This would be completed using the updated GIS data as provided by the Town by January 15th, 2018.
2.	Based on the model runs, pressure in the model range from -21 to 776 kPa across all model scenarios. This range includes pressures above and below the requirements set by the MOECC and the Town. Negative pressures in the model are of a significant concern	Negative pressure may be due to the "dummy" reservoirs currently in the model. WSP to acquire the correct operating levels of the tanks and reservoirs from the Region of York.
3.	In its current state, the WaterGEMS model provided by the Town is not setup to run fire flow simulation. The calculation option in all fire flow scenarios are set as steady state solver rather than fire flow solver. For this reason this memo does not provide fire flow results.	Redevelopment the Town's water model to include a fire flow simulation. Development of a fire flow simulation was not included as part of the base scope. This would be completed using the updated GIS data as provided by the Town by January 15th, 2018.

WSP recommends that an all pipe model be constructed using the Town's updated GIS database. This all pipe model can be digitized in WaterGEMS and loaded with demands from existing water records as well as future population projection. This new model would be built to reflect the system and all of its storage infrastructure, pump stations (including pump curves), reservoir levels, and accurate boundary conditions.

As per Section 2.4.2 of the Town's RFP (P-2016-31), the base scope of the project included updating the model, assuming it was received in a working and accurate initial state. Building a new model in order to then perform the Master Plan tasks falls outside this RFP scope and is a significantly more involving exercise. A WSP change order to construct this model will be submitted.

7 BIBLIOGRAPHY

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MEMO

TO: Town of East Gwillimbury

FROM: Jean-Luc Daviau and Hari Sridhar, WSP Canada Inc.

SUBJECT: **Hydraulic Model Comparison and Recommendation**

PROJECT: 171-03399-00

DATE: **December 21, 2017**

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1 BACKGROUND AND SCOPE

The Town of East Gwillimbury's (Town) Water and Wastewater Master Plan Update is to evaluate the entire water and wastewater distribution system and identify the strengths, short and long-term weaknesses, and identify and evaluate the improvements required to maintain a reliable, sustainable, fair, and equitable water distribution system.

This Tech Memo is aimed at evaluating two robust hydraulic modeling software platforms: InfoWater (from Innovyze) and WaterGEMS (from Bentley Systems). The document also reviews two additional sewer models for applicability to the Town: InfoWorks (from Innovyze) and PC-SWMM (from CHI).

2 WATER MODEL OVERVIEW

This section compares the water and sewer models from two major vendors: Innovyze (InfoWater and InfoSewer/SWMM) and Bentley Systems (WaterCAD/GEMS and SewerCAD/GEMS).

2.1 INFOWATER:

InfoWater is a GIS integrated water distribution modeling and management software application. Built on ArcGIS™ using .NET and Esri ArcObjects component technologies, InfoWater integrates water supply distribution network modeling and optimization functionality with ArcGIS. It utilizes the geodatabase architecture to deliver geospatial analysis, infrastructure management and planning.

InfoWater offers direct ArcGIS integration enabling engineers and GIS professionals to work simultaneously on the same integrated platform. It allows one to command GIS analysis and hydraulic modeling in a single environment using a single dataset. One can now create, edit, modify, run, map, analyze, design and optimize your water network models and instantly review, query and display simulation results from within ArcGIS.

InfoWater by itself and the various available add-ons provide wide range of modeling capabilities which include Pressure Zone Management, Leak Detection Modeling, Sustainability Analysis, Water Quality Calibration, Demand Allocation, Hydraulic Calibration and Sensor Location management among other valuable capabilities.

Figure 2-1 shows a general snapshot of the user interface of InfoWater.

100 Commerce Valley Drive West
Thornhill, ON, Canada L3T 0A1
Tel.: +1 905 882-1100 ; Fax: +1 905 882-0055
www.wsp.com

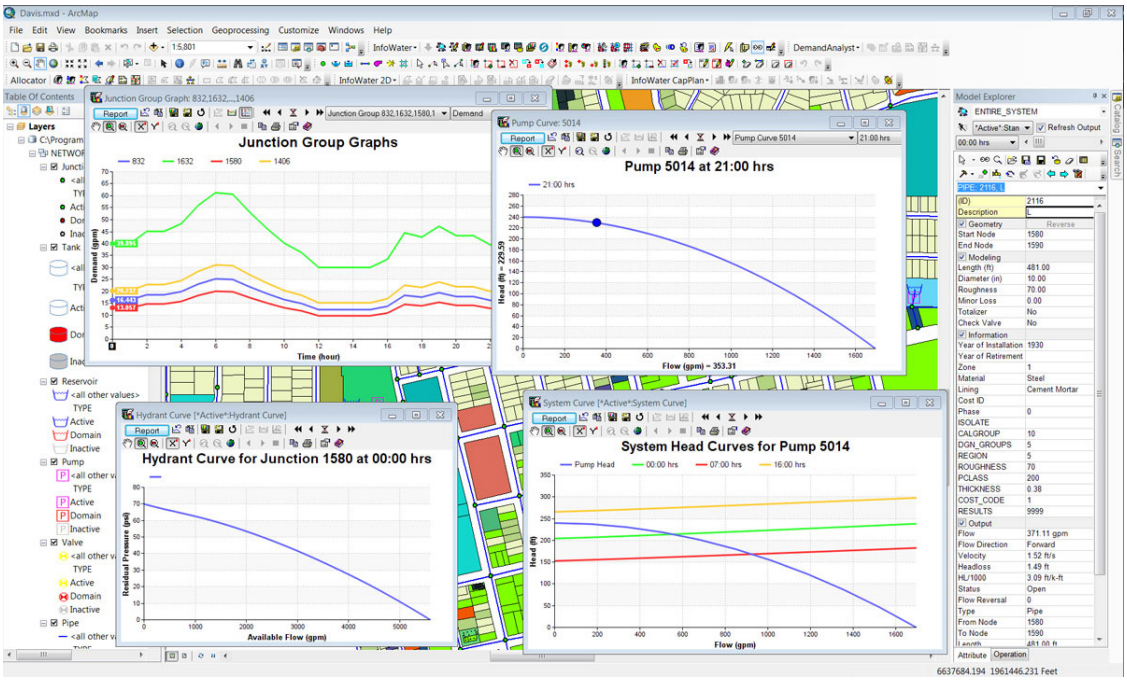

Figure 2-1 A screenshot of a typical InfoWater Model Results (Source: http://www.innovyze.com/)

2.2 WATERGEMS

WaterGEMS, similar to InfoWater in terms of functionality, provides easy-to-use decision-support tool for water distribution networks. The software helps improve your knowledge of how infrastructure behaves as a system, how it reacts to operational strategies, and how it should grow as population and demands increase.

From fire flow and water quality simulations, to criticality and energy cost analysis, WaterGEMS has many options one would need in a flexible multi-platform environment.

WaterGEMS provides numerous software tools for efficient planning for system reliability, optimizing operations for system efficiency and asset management tools for system sustainability.

As a utility grows in terms of population and area, it is essential to model the growth in order to adequately serve the customers and meet the required norms. A hydraulic modeling software effectively assists in doing so. WaterGEMS also possesses tools to model pumps accurately, optimize pumping strategies, and plan shutdowns and routine operations.

Figure 2-2 shows a general snapshot of the user interface in WaterGEMS.

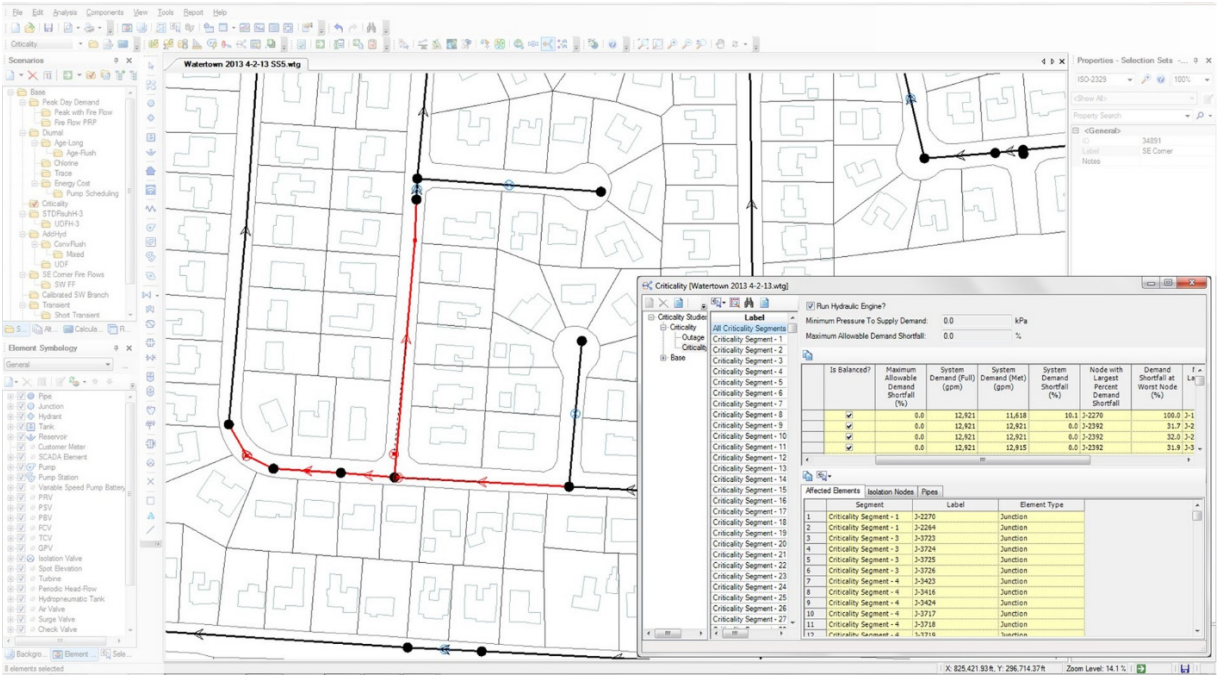

Figure 2-2 A screenshot of Network Analysis and Valve Criticality Assessment (WaterGEMS) (Source: www.bentley.com)

3 HYDRAULIC MODEL PLATFORM COMPARISON

InfoWater and WaterGEMs were compared based on their modeling capabilities. The modules and features common and unique to the two softwares are briefly explained in the following sections.

A side-by-side comparison of the modules in each software is presented in Table 3-1 and Table 3-2.

Table 3-1 Similar Modules across Platforms

INFOWATER	WATERGEMS
Pressure Zone Manager (PZM)	Zone Manager
Valve Criticality Modeling (VCM)	Criticality Manager
Hydraulic Calibrator	Darwin Calibrator
Demand Allocator	Demand Allocator
Skeletonizer	Skelebrator
Scheduler	Darwin Scheduler
Designer	Darwin Designer

Table 3-2 Modules Unique to Platform

INFOWATER	WATERGEMS
Leakage Detection Manager (LDM)	Data Inheritence (Between Scenarios)
BackTrack eXtension (BTX)	SCADAConnect
Sensor Location Manager (SLM)	Water Leakage Calibration
Sustainability Modeling	Pressure Depended Demand (PDD)
NetView	Google Earth (can be exported for free)
Protector	WaterCAD for AutoCAD V8i Edition works within AutoCAD or MicroStation (CAD)
Water Quality Calibrator	WaterGEMS V8i Edition works Stand-alone

The Region of York's hydraulic model is in InfoWater for water and InfoWorks CS for wastewater.

Due to the strong GIS background of the Town, a software based in GIS would allow for employees to easily pick up this software. Both WaterGEMS/SewerGEMS and InfoWater/InfoSewer operate within ArcGIS, with fundamental access to underlying pipe and junction data governed by GIS policies.

Two evaluation tables, one based numerically and one based descriptively, have been developed to compare the two modelling software. These are provided in **Appendix A.**

The difference in scores is not sufficient to make the decision because the quantitative table in Appendix A only scores WaterGEMS 5% higher than InfoWater. Instead, the Town's specific needs and experience above must drive the decision.

3.1 MODULES COMMON TO INFOWATER AND WATERGEMS

Modules common across the platforms are described below:

1. **Pressure Zone Manager (PZM)**

   PZM is a state-of-the-art geocentric solution for analyzing, simplifying, and summarizing pertinent hydraulic information for each pressure zone in a water distribution system model.

   - InfoWater: *InfoWater PZM*
   - WaterGEMS: *WaterGEMS Zone Manager*

2. **Valve Criticality Manager/Modeller**

   Valve criticality assessment is required to identify which valves most crucially affect the scale of impact of any potential water distribution system failures**. InfoWater VCM and WaterGEMS Criticality Analysis** were designed to enable water utilities to efficiently carry out a detailed assessment of the resulting hydraulic impact of valve operations on customer service levels. This information greatly improves system knowledge allowing water utilities to optimize future expenditure for maintaining the serviceability of key infrastructure assets.

3. **Calibrator**

   InfoWater Calibrator and Darwin Calibrator (WaterGEMS) fully automate and greatly simplify the process of hydraulic calibration, making modeling calibration a remarkably easy and enjoyable task. **Calibrators** consider various combination of field pressures, tank levels, and flow measurements, quickly assessing pipe status and friction coefficients, pump and valve status, and demand distributions to provide an extremely well calibrated model and best reflect what is actually occurring in the system.

4. **Allocator**

   The allocator (in both InfoWater and WaterGEMS) fully automates junction node demand geographical allocation to ensure the development and simulation of credible hydraulic models.

5. **Skeletonizer**

   The **Skeletonizer** (or **Skelebrator** in WaterGEMS) fully automates GIS and CAD datasets segmentation (data scrubbing, reduction, skeletonization and trimming), and automatically re-allocates node demands to construct credible hydraulic network models, ensuring network model integrity and its hydraulic equivalency

6. **Scheduler**

   Scheduler is designed to assist water distribution system operators and training new operators in selecting cost-effective pumping and valve policies to reduce operational costs, provide more reliable and safer operations and consistently deliver the required quality water. Using the genetic algorithms, **the Scheduler** identifies the optimal operational policy that will best meet the target system hydraulic and water quality performance criteria at maximum cost savings.

7. **Designer**

   A useful master planning and decision support tool, **Designer** lets one identify the best combination of pipe system improvements — rehabilitation (cleaning and lining), replacement, strengthening, and expansion options as well as the construction of new pumping and storage facilities — to meet desired hydraulic and water quality performance criteria at minimal cost, considering any modeling condition time frame (e.g. maximum day), multiple design scenarios (e.g., find the single optimum solution that provides the standard of service under peak day for normal operation + average day under a failure scenario), multiple fire flow scenarios, and complete extended period simulation (EPS) designs (e.g. 24-hour operational design).

3.2 MODULES UNIQUE TO INFOWATER AND WATERGEMS

3.2.1 InfoWater

1. **Leakage Detection Manager (LDM)**

   InfoWater LDM is a powerful and practical tool to identify leaks in the distribution system. It uses step-test network modeling method that narrows down leaks to specific sections of the system. This technique involves bracketing an area with excessive leakage into a tight zone (step-test area) with a flow meter installed on the input main to each zone. However, to accurately identify and locate leaks extensive field verification and correlation is required regardless of the accuracy of the model.

2. **BackTrack eXtension (BTX)**

   InfoWater BTX is a geocentric solution for determining contaminant injection locations following the successful detection of a water contamination event. This contamination threat identification tool can assist water utilities in appropriately planning for and responding to contamination threats and incidents and minimizing potential impacts to consumers.

3. **Sensor Location Manager (SLM)**

   InfoWater SLM (Sensor Location Manager) is assists one in identifying the most effective sensor locations for monitoring water quality compliance and water supply protection. **InfoWater SLM** provides a fully automated approach to generate solutions for the location and placement of monitoring stations according to different objectives and multiple scenarios, and evaluate and compare their trade-offs.

4. **Sustainability Modeling**

   The InfoWater Sustainability module gives water utilities invaluable energy efficiency management capabilities for reducing both power costs and carbon footprints.

5. **NetView**

   NetVIEW for **InfoWater** is a geospatial information viewing, distribution, and management software that facilitates rapid deployment and analysis of GIS data and modeling results in Google Earth. **NetVIEW** delivers the ability combine mapping, GIS and modeling data with Google Earth in an integrated environment via an easy-to-use interface.

3.2.2 WaterGEMS

1. **Data Inheritance (Between Scenarios)**

   Scenario Management let one set up an unlimited number of "What If?" situations for the model, and then modify, compute, review and compare your system under those conditions. WaterGEMS offers unique data inheritance between alternatives so that inherited data is always up-to-date in all scenarios.

2. **SCADAConnect**

   SCADAConnect allows the interaction with any SCADA system that supports open database connectivity (ODBC) interface or OLE DB interface.

3. **Water Leakage Calibration**

   This function is important to accurately predict the amount of leakage based on field data.

4. **Pressure Dependent Demand (PDD)**

   Pressure Dependent Demands (PDD) allows one to perform hydraulic simulation by treating the nodal demand as a variable of nodal pressure. Analyzing the effects of pressure on demand is very important in systems which do not provide 24 hour supply. Using PDD one can perform hydraulic simulation for:

   - Pressure dependent demand at a node or a set of nodes
   - Combination of PDD and volume based demand
   - Calculate the actual supplied demand at a PDD node and demand shortfall
   - Present the calculated PDD and the associated results in a table and graph.

5. **Google Earth (can be exported for free)**

   WaterGEMS results and input data can easily be exported to Google Earth for free.

4 PC-SWMM SEWER MODEL OPTION

The sewer models offered by major vendors include InfoSewer/SWMM or InfoWorks by Innovyze (or SewerCAD/GEMS by Bentley) and all of these either use or can import-export to the SWMM sewer model engine originally developed by the EPA. The EPA-SWMM software can also be downloaded free from their website, making it the most universally used and supported storm/sanitary sewer model.

The Town has the option of using a Canadian-developed and supported interface from Computational Hydraulics International (CHI), based near Guelph University in Ontario. The CHI version is called PC-SWMM and it has a world-class calibration engine as well as an efficient user interface. It costs a fraction of the other models discussed and the annual maintenance is below $1,000 – this makes it practical for the Town to buy and own an internal license for the odd model run/check.

CHI also hosts a yearly user conference and training course that are local and well-attended.

5 MODEL RECOMMENDATIONS

InfoWater and WaterGEMS are extremely useful softwares for hydraulic modeling of water systems. Both tools have come a long way in terms of functionality and are constantly improving making hydraulic modeling more productive. WSP's staff is equally proficient in multiple software tools and carry out hydraulic modeling for utilities and developers in both InfoWater and WaterGEMS.

For these reasons WSP recommends InfoWater be used for the Town's hydraulic water model.

InfoSewer/SWMM and SewerGEMS are extremely useful softwares for hydraulic modeling of storm, sanitary or combined sewer water systems; however, they are costly to acquire and maintain each year. Unless Town staff were to use the models on a near-continuous basis, it would be difficult to attain and maintain the required proficiency to deliver enough value to match the expenditure.

WSP understands this level of effort is not planned in the next several years, if ever. Instead, the Town may rely on a trusted partner to receive and evaluate developer submissions. These may be provided as MOECC-format spreadsheets or computer models, all of which can export to SWMM.

For these reasons WSP recommends PC-SWMM be used for the Town's hydraulic sewer model.

WSP also recommends the Town publish digital submission standards for engineering calculations or models, akin to CAD submission standards. WSP can assist in reviewing or drafting such standards.

APPENDIX

A EVALUATION TABLES

Town of East Gwillimbury Water and Wastewater Master Plan
Model Software Evaluation Table

The following evaluation table scores the modelling softwares Innovysze and Bentley Systems on a scale of 1.0 to 5.0, with 5.0 being the highest.

		Criteria	Innovyze		Bentley Systems		Comments: I = Innovyze B = Bentley Systems
			InfoSewer /SWMM	InfoWater	SewerGEMS	WaterGEMS	
TECH. SUPPORT	User Environment	Licensing & Access	4.5	4.5	5.0	5.0	I optional tools that may confuse or delay, B home use
		Rights Management	3.0	3.0	3.0	3.0	I & B rely on ArcGIS, support GoogleEarth ,web
		Collaboration & Concurrent Use	4.0	4.0	4.5	4.5	I & B rely on ArcGIS but B also has sub-models
		Public Information	4.0	4.0	4.0	4.0	
	Tech. Support	Hours & Locations	4.5	4.7	5.0	5.0	I mostly California, B mostly same time-zone + global 24/7 staff
		Methods Available	4.0	4.0	4.5	4.5	I mostly by e-mail or phone, B has WebEX live chats, recorded seminars
		Turn-around Time	4.0	4.5	5.0	5.0	I & B about 1 to 3 days (if complex) B's Haestad division has good support
		Customer Satisfaction	4.5	4.5	4.5	4.5	I & B strong based on WSP used, collegues' comments & web
	Deployment	Install & Lincense Mgt.	4.5	4.5	5.0	5.0	I options can complicate deployment, B easy
		Re-Install &/or Move License	3.5	3.5	4.0	4.0	I had spotty track record for WASA, B easy
		Has Thin Editor &/or viewer version?	3.0	3.0	3.0	3.0	I needs GIS, B pre-sets simplify interface. All have viewers.
		Upgrade Frequency	3.5	4.0	3.5	4.0	I most often but B upgrades focus more on physics. All good.
		SUPPORT sub-total	**3.9**	**4.0**	**4.3**	**4.3**	**Advantage: Bentley for TECH. SUPPORT**
DATA MANAGEMENT	Data Transfers	Requires file transfer?	4.0	4.0	4.0	5.0	I & B rely on ArcGIS level, B supports ProjectWise
		Persistent field mapping (for updates)?	4.0	4.0	4.2	4.2	I GIS gateway, B Model Builder. B fast
		Full infrastructure ID used?	4.0	4.0	4.2	4.2	I simplify IDs, B uses full ID
		Allows re-name? Model layer?	4.5	4.5	4.7	4.7	I & B run in GIS, B stand-alone also supports background layers and renames
	Audits & Security	Changes can be audited	4.0	4.0	4.0	4.0	I & B backups flexible, B has fast undo/redo
		Flags for reliablity of data?	3.5	3.5	3.5	3.5	I & B allow custom fields
		Security of transfer & storage	3.5	3.5	4.0	4.0	I needs many tables, B needs 3 files
		Backup frequency & integrity	4.5	4.5	4.8	4.8	I databases add size, B needs 3 files: quick backups
	Data Scaling	Server-side support?	4.0	4.0	3.5	4.0	I & B run on workstations but licenses on servers
		Database options?	4.0	4.0	4.0	4.0	I uses dBase, B uses Access, ODBC or Oracle & has "WaterObjects"
		Sub-model or dataset support?	3.0	3.0	4.0	4.0	I needs facility set database for each element, B has sub-models
		Used by large cities & agencies?	5.0	5.0	4.0	4.0	I widely used in USA, B used world-wide
		DATA MANAGEMENT sub-total	**4.0**	**4.0**	**4.1**	**4.2**	**No clear Advantage for DATA MANAGEMENT**
GIS & CAD SUPPORT	GIS & CAD Support	ArcGIS Support	5.0	5.0	4.5	5.0	I & B fully integrated "partner" products
		Other GIS and Spatial Data	3.0	3.0	4.0	4.0	M only runs in ArcGIS, B also runs in MicroStration GIS & imports more images
		AutoCAD or MicroStation Support	3.5	3.5	4.5	4.5	I & B can display CAD, B fully supports both
		GIS & CAD Standard-Compliant	4.0	4.0	4.0	4.0	I & B compliant & drive USA standards
	SCADA & Database	SCADA Support	4.0	4.0	4.0	4.0	I & B include SCADA
		SCADA live links	5.0	5.0	5.0	5.0	B's "SCADA Connect" adds programming capabilities
		Database support	4.0	4.0	4.5	4.5	I does not support Oracle, B supports most platforms
		Text, spreadsheets, etc.	4.5	4.5	4.5	4.5	B has more file format support
	Interoperability	Works with native GIS and CAD	4.0	4.0	5.0	5.0	Only B can open and work in native GIS & CAD. I copies GIS to model data
		Additional licenses required?	3.0	3.0	4.5	5.0	I needs GIS to run, B also runs in 2 CAD & 2 GIS, needs GIS to import
		Modeller needs CAD or GIS skills?	3.5	3.5	4.5	4.5	I only runs inside GIS (no CAD), B can run stand-alone
		Live linkages to data stores?	4.0	4.0	4.0	4.0	I & B support hyperlinks, I relies on ArcGIS, B adds ProjectWise support
		GIS & CAD SUPPORT sub-total	**4.0**	**4.0**	**4.4**	**4.5**	**Advantage: Bentley for GIS & CAD or Stand-alone**
TECHNICAL BASIS	Technical Accuracy	Hydraulic Analysis	5.0	5.0	5.0	5.0	I & B provide accurate solutions. B's APEX matches variable-speed behaviour
		Water Quality Analysis	4.0	4.0	4.0	4.0	I & B good
		Special Tools and Analyses	5.0	5.0	3.0	3.0	I has many auto-mapping tools for operations, many good model-based modules
		Optimization Analysis	4.0	4.0	4.0	4.0	I & B good
	Problem-Solving Tools	Fire Flows	4.0	4.0	4.0	4.0	I & B good
		Water Quality & Security	4.5	4.5	4.5	4.5	I & B all quality tools good, have water security tools
		Flushing and Leak Detection	5.0	5.0	5.0	5.0	I & B flushing excellent, I maps operations, B leakage is pressure-dependant
		Sewer Model Solvers	4.0		4.5		B sewer model solvers best. B provides 2 engines
	Alternatives	Scenario & Alternative Mgr.	4.0	4.0	5.0	5.0	I copy and manage 'datasets', B field-level control: faster, less memory
		Integrity of Comparisons over time	4.0	4.0	5.0	5.0	I does not update corressponding items if parent changes, B does
		Large number of alternatives	4.0	4.0	4.5	4.5	I effectively limits the number due to slow switching, large disk space needed
		Growth or re-development	4.5	4.5	5.0	5.0	I copies all pipes (whole database) even if very few changes. B does a sub-model
		TECHNICAL BASIS sub-total	**4.3**	**4.4**	**4.5**	**4.5**	**No clear Advantage for TECHNICAL BASIS**
& COSTING sub-total	Costing Impacts	Capital cost of alternatives	5.0	5.0	4.0	4.0	I's CAPEX is most current tool, B track capital costs
		Energy cost of alternatives	5.0	5.0	4.5	4.5	I & B have extensive tracking and reporting
		Operating costs	4.5	4.5	4.5	4.5	B offers Bentley Water
		Cost optimization	4.0	4.0	4.0	4.0	I & B good
	Efficiency	Efficiency for model staff	4.0	4.0	5.0	5.0	I needs many clicks, GIS know-how, B fastest 'by far'
		Efficiency for GIS staff	5.0	5.0	5.0	5.0	I & B run inside familiar ArcGIS
		Efficiency to respond to questions	5.0	5.0	5.0	5.0	I profiles slow, B query manager is best
		Efficiency of interface & tools	4.0	4.0	5.0	5.0	I buttons & bars fill 2/3 screen, many clicks, B fly-outs: 80% data & few clicks

Town of East Gwillimbury Water and Wastewater Master Plan
Model Software Evaluation Table

ENERGY &	Field Data	Works with field data formats?	4.5	4.5	5.0	5.0	I supports many formats, B has most formats
		Produces maps usable in field?	5.0	5.0	4.5	4.5	I automates operations maps, I & B run inside ArcGIS
		Model can display sources of data?	3.5	3.5	3.5	3.5	I & B support custom fields for data origin
		Model handles isolation valves	4.0	4.0	4.5	4.5	I & B have criticality reports, B valves do not require node
		ENERGY & COSTING sub-total	**4.5**	**4.5**	**4.5**	**4.5**	**No clear Advantage for ENERGY AND COSTING**
WORKFLOW EFFICIENCY	Workflow Efficiency	Can adapt for workflow?	4.0	4.0	5.0	5.0	I interface 'busy', B is 'clean-screen': fly-out & custom property sets
		Custom parameter libraries?	4.5	4.5	5.0	5.0	I do not stock library, B pre-filled & custom libraries, B check ranges
		Complexity for 'minor updates'	4.0	4.0	5.0	5.0	I minor model update adds file size & slowest, B fastest
		Complexity for 'new assumptions'	4.0	4.0	4.0	4.0	I relies on optimisation, B scenario make it easy
	Reporting Tools	Graphs	4.0	4.0	4.0	4.0	I & B can graph everything, I graphs the slowest to build, B can select/run right-click
		Tables: Sort / Filter / Units	4.0	4.0	4.5	4.5	I & B sory & filter, B easiest and has FlexUnits, global edit capabilities
		Custom Reports	4.0	4.0	4.2	4.2	I & B good with tables & database report, MS Access, has WaterObjects
		Publish to PDF, web…	4.0	4.0	4.0	4.0	I & B publish to web & Google Earth. B offers web server for utilities
	Links to System	Links to MIS or Data Management	5.0	5.0	5.0	5.0	I & B use databases. B WaterObjects allows full-function customizing
		Links to SCADA	4.0	4.0	4.0	4.0	I & B link to SCADA. B SCADA Connect & WaterObjects allows full customizing
		Open data model?	4.0	4.0	4.2	4.2	I proprietary format, many databases. B open. B has WaterObjects.
		Support for devices: digitisers, PDA	4.5	4.5	4.5	4.5	I & B rely on ArcGIS
		WORKFLOW EFFICIENCY sub-total	**4.2**	**4.2**	**4.5**	**4.5**	**Advantage: Bentley for WORKFLOW EFFICIENY**
TOTAL COST	Cost of Software	License Costs	4.0	4.0	5.0	5.0	I offers unlimited pipes & features
		Staff Training Costs	4.5	4.5	4.5	4.5	I requires extensive training, B needs less & effective trainers
		Editors and Tools' Costs	5.0	5.0	4.0	4.0	I has the most tools
		Conversion Costs from other Models	4.0	4.0	4.2	4.2	I needs upgrade to Info, B can still use -CAD in -GEMS
	Cost of Staffing	Number of staff and efficiency	4.5	4.5	4.7	4.7	I needs GIS-modellers, B modellers only
		Understudy and support roles	4.5	4.5	4.5	4.5	I easy for GIS support, B intuitive for model building
		Common platform benefits	5.0	5.0	5.0	5.0	I & B run in ArcGIS, I object models vary, B object models unified
		Database &/or GIS qualifications required	4.5	4.5	4.7	4.7	I runs best if query, GIS-aware, B easiest
	Cost of Decisions	Opportunity cost	4.0	4.0	5.0	5.0	I requires ArcGIS proficiency as pre-requisite, B easy to learn & use
		Responsivness to customers	4.0	4.0	4.0	4.0	I & B good
		Cost of mistakes or sub-optimal work	4.5	4.5	4.5	4.5	Speed in preparing and comparing multiple scenarios, maps for field use
		Buy-in and staff commitment	5.0	5.0	5.0	5.0	
		TOTAL COST sub-total	**4.5**	**4.5**	**4.6**	**4.6**	**No clear Advantage for TOTAL COST**
		EVALUATION TOTAL:	**29.3**	**29.4**	**30.8**	**31.0**	Advantage of 5% before purchase costs are factored-in: very close.

Characteristics	WaterGEMS/CAD (Bentley)	Infowater Suite (Innovyze)
Hydraulic Modeling General Features	**Advanced Features**	**Advanced Features**
Platform	Standalone or within CAD or within GIS	Works inside ArcGIS
Hydraulic Modeling Engine	EPANET with stability updates	EPANET with subsequent improvements by Dr. Paul Boulos, author of the mathematics and hydraulics in the original EPANET.
Computing Engine Capability	Varies from 25-links to 10,000- links or unlimited	Varies from 1,000-links to 10,000-links or unlimited (InfoWater Exec Suite or Suite)
Primary Programming Language	Microsoft .NET and ArcObjects Geospatial Component Mc	ArcObjects Geospatial Component Model only
Data Storage Architecture	MS Access relational database with customisable WaterObjects	iW Database
Unidirectional and Systematic Flushing	WaterGEMS Flushing Extension	InfoWater UDF Note: sold in separate module
Hydraulic Model Builder	Elevation and topology tools are available both in ArcGIS and in the model. Software has: • Elevation extractor • Network tracer • Main break isolation • Automated network zoning • Digitization • Undo/Redo command (unlimited) • Model validation	Elevation and topology tools are available both in ArcGIS and in the model.
ESRI	Full integration with all current versions of ESRI. Bentley Systems has a technology partnership with ESRI. The following article is a white paper from ESRI's website about the GIS interoperability between Bentley and ESRI: http://www.esri.com/software/standards/bentley_esri_wp.pdf	Full integration with all current versions of ESRI. (100% inside ArcGIS)
Network Simplification	Skelebrator	Skeletonizer

Characteristics	WaterGEMS/CAD (Bentley)	Infowater Suite (Innovyze)
Google Street View	WaterGEMS results and input data can easily be exported to Google Earth for free.	Launch Google Street View for any node location to instantly see what is in the field
Map and Data Visualization	Inherited in the modeling software with formatting choices	Inherited in the modeling software with formatting choices
Graphical Editing	Select elements by polygon, element or attribute, split pipes, element morphing, reconnect pipes, reverse pipes, *unlimited* undo-redo.	Later versions have (some) the capabilities but easier within WaterGEMS
Demand Allocation and Management	Load Builder • Allocation - Billing meter aggregation - Nearest pipe - Nearest node • Distribution - Equal flow distribution - Proportional distribution by area - Proportional distribution by population - Unit line • Projection - Load estimation by population - Projection by land use	Demand Allocator • Polygon intersection method • Polygon extraction method • Meter summation method • Closest junction method • Closest pipe method • Meter-junction allocation method • Meter-pipe allocation method
Pressure Dependent Demands and Water Leakage Modeling	Darwin Calibrator Module – model calibration	InfoWater LDM - Leak Detection Manager Note: available in InfoWater Exec Suite Module
Network License	SELECT subscribers - Free network license	-
Pump Scheduling and Optimization	Darwin Scheduler – pump scheduling.	Available – Pump Scheduling Optimization

Characteristics	WaterGEMS/CAD (Bentley)	Infowater Suite (Innovyze)
SCADA Integration	SCADAConnect	IWLive • Resets the boundary conditions based on data read. E.g. pump on/off/speed, tank levels, valve settings, system demands. Thus, model actually run based on these new SCADA delivered settings. Alarms can be set.
Scenario Management	Easy and quick – Models can easily be replicated using Parent Child Scenario tool, allowing differences to be stored.	Available – True Visual Scenario Management. Facilities can be designated as "Active" and "Inactive" – removed from the model view.
Extensions and Add-on Modules for Analysis	Module for Analysis: • Scenario Energy Cost • Energy Management	Module for Analysis: • Scheduler • Valve Criticality Modeling
Pipeline Design	Darwin Designer – optimized design.	InfoWater Suite Designer or PipePlan – design pipelines
Transient Analysis and Protection	Hammer Note: sold in separate module	InfoSurge Note: sold in separate module
Water Quality Analysis and Calibration	Water Quality Batch Run	Available – automatically determine wall decay coefficients based on input field measured data.
System Security/Vulnerability Assessment	-	Protector • Quickly verify minimum no. of isolation valves for any contamination or pipe break issue • Multi-source tracing • Delineating critical network pipes based on user-defined hydraulic criteria • Developing customer notification lists
Pressure Zone Hydraulic Information and Management	Pressure Zone Studies	InfoWater PZM – Pressure Zone Manager Note: available in InfoWater Exec Suite Module

Characteristics	WaterGEMS/CAD (Bentley)	Infowater Suite (Innovyze)
Real-time Modeling	-	DemandAnalyst – generate baseline water demands and diurnal pattern from smart metering
Master Planning and Pipe Renewal Management	Pipe Renewal Planner – pipe assessment.	CapPlan – system rehabilitation/renewal solution.

APPENDIX

E DESIGN CRITERIA

TOWN OF EAST GWILLIMBURY WATER AND WASTEWATER MASTER PLAN

DESIGN CRITERIA FOR WATER AND WASTEWATER TECHNICAL MEMORANDUM

TOWN OF EAST GWILLIMBURY

PROJECT NO.: 171-03399-00
DATE: MAY 2018

WSP
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TABLES

1 INTRODUCTION

The Town of East Gwillimbury retained WSP to undertake a Water and Wastewater Master Plan Update (henceforth referred to as the Master Plan Update). The purpose of the Master Plan Update project is to establish servicing strategies for water and wastewater infrastructure for the core urban areas and surrounding communities in the Town for the next 35 years (from 2016 to 2041), as part of the five-year review of the Town's Official Plan. The Master Plan will identify potential projects to address the servicing needs for planned growth within the Town. The Master Plan is being conducted in accordance with the requirements set out in the Municipal Class Environmental Assessment (Class EA) document (October 2000 as amended in 2007, 2011, and 2015).

This Technical Memorandum documents the water and wastewater unit rates and design criteria that will be used to assess the existing systems and the planning of the future system requirements.

2 WATER SYSTEMS

The sections below present the results of an analysis of historical water production data conducted to determine unit water demand criteria. As part of the scope of the Master Plan Update, WSP conducted a review of the design criteria derived from the historical water production data as well as the criteria used by the Town, York Region and those recommended in the Ministry of Environment and Climate Change (MOECC) guidelines (MOECC, 2008).

Based on the results of the analysis and comparison with the Town's, York Region's, and the MOECC's recommended design criteria, recommendations are provided on the design criteria to be used in the Town's current Master Plan Update for future demand projections. The design criteria adopted will be used to load the Town's hydraulic water model and to ultimately determine the sizing of the recommended water and wastewater infrastructure projects. The rates will be multiplied by the future population projections to determine the water demand in a given year.

2.1 EXISTING WATER SYSTEM

Figure 2-1 below shows the existing water infrastructure and network within the Town of East Gwillimbury. The following section briefly describes the water network in the three communities: Queensville-Holland Landing-Sharon, Green Lane Area, and Mount Albert.

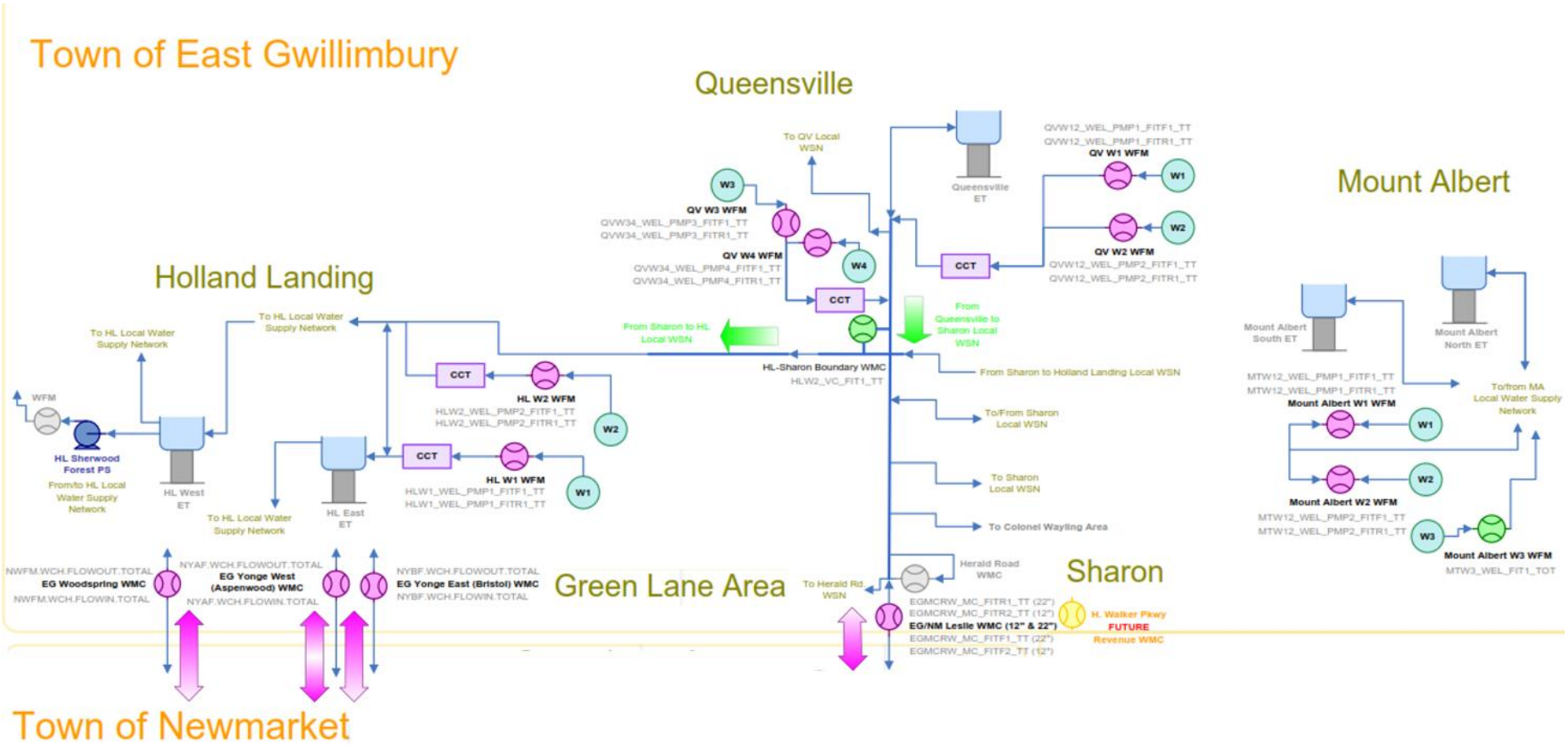

Figure 2-1 Existing Water Network (From York Region Water System Flow Schematic)

The community of Queensville-Holland Landing-Sharon receives water from groundwater wells located in the Queensville and Holland Landing areas. Water is distributed throughout the communities through multiple transmission watermains. Three elevated storage facilities exist in Queensville-Holland Landing-Sharon to provide emergency, peak, and fire flows to the systems. The Queensville-Holland Landing-Sharon system also supplies via a 300 mm (12") and 500 mm (20") diameter watermains to the Town of Newmarket.

The Green Lane Area currently receives water from the Town of Newmarket's water distribution system. Water meters exist on the watermains from Newmarket to the Green Lane Area to determine the water usage in the Green Lane Area.

The existing Mount Albert water system is served by groundwater wells. Two elevated storage facilities exist in Mount Albert to provide emergency, peak, and fire flows to the systems.

All wells and water storage facilities within the Town of East Gwillimbury are operated by York Region while the distribution system is operated by the Town.

2.2 HISTORICAL WATER CONSUMPTION ANALYSIS

As the Queensville, Holland Landing and Sharons areas are fed by a single water network, their demand is serviced by the sum total of water production from Queensville Wells 1, 2, 3 and 4, Holland landing Wells 1 and 2 and the net flow through the 12" and 20" Leslie watermains connecting East Gwillimbury to Newmarket. Demands include all residential and Industrial, Institutional, and Commercial (ICI) users within the system.

The water demand for the Green Lane Area was calculated as the net flow into East Gwillimbury from Newmarket as monitored by three flowmeters as shown in Figure 2-1: EG Woodspring, EG Yonge West (Aspenwood) and EG Yonge East (Bristol). Similar to Queensville-Holland Landing-Sharon, the supply data provided did not differentiate between the residential flow and Institutional, Commercial, and Industrial (ICI) flows.

The water demand for the Mount Albert community was estimated as the net production from Mount Albert Wells 1, 2 and 3. The Mount Albert community consists mainly of residential development.

Some irregularities were noted in the flow meter readings obtained where the maximum day flows were several orders of magnitude larger than the average day flows. WSP accounted for these outliers by looking at the top five maximum day flows in all three areas and comparing them to the average day flow. If the maximum day flow was in the same order of magnitude to the corresponding average day flow, the largest maximum day flow was used. If not, the second largest maximum day flow was used, and so on until a value of less than 4 times greater than the average day flow was found.

York Region provided population projections from 2011 to 2041 at five year intervals (45% Intensification Scenario). To determine the yearly populations from 2011 to 2017, the population projection data provided by York Region was interpolated between 2011 and 2016, and extrapolated to 2017.

Table 2-1 presents historical average day and maximum day production data for the period of 2012 to 2017 as provided by York Region for East Gwillimbury.

Table 2-1 Historical Average Unit Rates: Water Demand

COMMUNITY		2012	2013	2014	2015	2016	2017
Queensville-Holland Landing-Sharon	**Average Day Water Demand (m^3/day)**	12391	6555	7379	3971	3110	3541
	Population	13,438	13,579	13,720	13,861	14,002	14,143
	Average Day (L/Cap/Day)	As there is no way to determine the amount of water to Queensville-Holland Landing-Sharon area versus the amount of water to the Town of Newmarket, per capita rates could not be calculated.				222	250
	Max Day (L/Cap/Day)					518	521

COMMUNITY		2012	2013	2014	2015	2016	2017
Green Lane Area	**Average Day Water Demand (m^3/day)**	2310	1887	1808	1176	868	701
	Population	1,635	1,792	1,948	2,105	2,262	2,419
	Average Day (L/Cap/Day)	1413	1053	928	558	384	290
	Max Day (L/Cap/Day)	3164	3050	2642	1270	1095	893
Mount Albert	**Average Day Water Demand (m^3/day)**	989	991	965	1045	1152	1038
	Population	4,677	4,867	5,056	5,245	5,434	5,623
	Average Day (L/Cap/Day)	211	204	191	199	212	185
	Max Day (L/Cap/Day)	469	567	427	463	471	516

Data for the Queensville and Holland Landing wells were provided for 2012 to 2017. The blended per capita numbers calculated for 2012 – 2015 were unusually large compared to 2016 and 2017 and did not seem practical. Upon further investigation, York Region informed WSP that the flow meter in the Leslie watermain connecting East Gwillimbury to Newmarket was only installed in mid-2015. Prior to the meter being installed on Leslie Street allowing a separation of demand for Queensville, Holland Landing and Sharon from the Newmarket East Pressure district was not possible. For the time period before 2016, a realistic per capita demand for this area of East Gwillimbury could hence not be calculated. Water demand data for the years 2016 and 2017 only are hence presented in the table below.

In the Green Lane Area, the per capita water demand is high when compared to that in the surrounding areas. It appears that employment demand in this area constitutes much of the consumption, yielding a higher blended per capita demand.

It is noted that in the Green Lane Area, the water demand has been declining since 2012. Prior to 2014, the Town indicated that they had seen water quality issues in the system that required significant operational flushing. The Town's Operations staff indicated that since January 2015 there has been a noticeable improvement in the chlorine residuals compared to prior years. Operations staff indicated that the flushing volume in 2015 was nearly 30% of the total volume flushed in 2014. As seen in Table 2-2, this operational flushing could explain the large decrease in water use from 2014 to 2015.

Water demand rates in Mount Albert have been much more consistent.

Water meter billing data for the entire Town of East Gwillimbury was provided by the Town. As the billing accounts have not been geocoded, the location of the meters could not be determined through GIS. As such, only the total water demand from all of East Gwillimbury (including Queensville-Holland Landing-Sharon, Green Lane Area, and Mount Albert) could be calculated.

It should be noted that production data does not correspond exactly to consumption data (obtained from water meters), as production data also includes unbilled and unaccounted for water. Unbilled water includes water that is used to prevent water connections (municipal side) from freezing in the winter, and is considered authorized. Unaccounted for water includes water that is lost through leakage in the distribution system, operational flushing, and inaccuracies in water meters readings. Although this Master Plan doesn't include an analysis of the unbilled water in the system, future Master Plans for the Town may benefit from this analysis to determine the amount and where the water loss is in the system.

The historical maximum day to average day peaking factors are summarized in Table 2-2.

Table 2-2 Historical Maximum Day to Average Day Peaking Factors: Water

	MAXIMUM DAY PEAKING FACTORS					
COMMUNITY	2012	2013	2014	2015	2016	2017
Queensville-Holland Landing-Sharon	2.0	2.1	1.8	2.3	2.3	2.1
Green Lane Area	2.2	2.9	2.8	2.3	2.9	3.1
Mount Albert	2.2	2.8	2.2	2.3	2.2	2.8

2.3 TOWN OF EAST GWILLIMBURY STANDARD WATER DESIGN CRITERIA

The Town's Engineering Standards and Design Criteria manual indicates residential water demand shall be calculated on the basis of an average day consumption rate of 350 L/cap/d (Town of East Gwillimbury, 2012). This is higher than the values based on historical data (

Table 2-1). This is to be expected as a municipality's design criteria used for designing infrastructure will always be more conservative than what is used to model the system.

The Design Manual also indicates that industrial, commercial, and institutional (ICI) water demands be used, as shown in Table 2-3 below.

Table 2-3 Water Demand Rates for ICI (Town of East Gwillimbury, 2012)

DEVELOPMENT TYPE	WATER DEMAND RATE (L/HA/D)
Industrial	35,000
Commercial	28,000
Institutional	18,000

In addition, the Design Manual states the minimum fire flow requirement for residential areas to be 4,800 L/min (80 L/s) and employment areas to be 12,000 L/min (200 L/s) (Town of East Gwillimbury, 2012). Fire flow + maximum day rates will be used in the system water modelling to check the pressures in the pipes under those conditions.

2.4 YORK REGION WATER DESIGN CRITERIA

York Region's 2016 Water and Wastewater Master Plan lists the water demand rates used for infrastructure design for systems serving more than 25,000 residents or employees. Table 2-4 below shows the specified design rates for 25,000 or more residents or employees from 2016 to 2041. For systems less than 25,000 residents or employees, average demand and maximum day peaking factor are to be based on data for the preceding five years.

Table 2-4 Water Design Rates from York Region Water and Wastewater Master Plan (York Region, 2016)

YEAR	2016	2021	2026	2031	2036	2041
Residential (L/cap/day)	233	218	211	201	195	189
Employment (L/cap/day)	182	164	160	155	149	144

It can be noted in Table 2-4 that York Region has recommended their design rates be decreased over time. This is due to York Region adopting a very aggressive water conservation strategy.

As noted, York Region's Master Plan does not provide per capita values for systems servicing populations less than 25,000. However, the values for the Town of East Gwillimbury (
Table 2-1) based on the historical data are within the same order of magnitude as the values provided in the York Region Master Plan for populations over 25,000.

Maximum day demand was obtained by multiplying a factor that varies from 1.8 for the York Water System to a maximum of 2.7 for stand-alone water systems to the numbers above table (York Region, 2016).

York Region's Design Standards (2017) indicate that fire demands should be determined using the method described by the Fire Underwriters Survey. In addition, a commercial or industrial fire should have a fire flow of at least 17,000 L/min (283 L/s) for a duration of 3.5 hours. Small commercial, medium and high density residential developments must have a fire flow of at least 10,000 L/min (167 L/s) for a duration of 2 hours (York Region, 2017).

2.5 MOECC WATER DESIGN CRITERIA

The MOECC Guidelines for Drinking Water Systems (MOECC, 2008) list values ranging from 270 to 450 L/cap/day as typical for domestic (residential) demand projections. However, MOECC Guidelines recommend using water records wherever possible to determine per capita consumption values.

The MOECC Guidelines also recommend using existing data to determine maximum day and peak hour factors for system design; however, it also provides peaking factors that can be used in the absence of reliable data. These peaking factors are based on the service population of the water system. Based on the provided York Region population projections from 2011 to 2041, the corresponding peaking factors for the Town are shown in Table 2-5 based on the 2016 population.

Table 2-5 MOECC Guidelines Peaking Factors (MOECC, 2008)

COMMUNITY	2016 POPULATION*	MAX DAY FACTOR
Queensville-Holland Landing-Sharon	14,002	1.90
Green Lane Area	2,262	2.25
Mount Albert	5,434	2.00

**From York Regions Population projections*

For commercial and institutional users, in the absence of historical data, the MOECC recommends using an average demand value of 28 m^3/ha/d. For industrial users, the MOECC lists average flow values ranging from 35 (light industry) to 55 m^3/ha/d (heavy industry). It can be noted that these are the same ICI numbers as those specified in the Town's Design Manual.

MOECC Guidelines do not specify peaking factors for commercial and institutional users, recommending rather that a fixture-unit approach be used for every commercial and institutional building. Values of two to four times the average rate are cited for industrial users.

The MOECC recommends following the Fire Underwriters Survey for fire flow requirements. Historically, small municipalities in Ontario have used the criteria in Table 2-6 below.

Table 2-6 MOECC Guidelines Fire Flows (MOECC, 2008)

COMMUNITY	2016 POPULATION*	FIRE FLOW (L/S)	DURATION (HOURS)
Queensville-Holland Landing-Sharon	14,002	220	3
Green Lane Area	2,262	295	2
Mount Albert	5,434	144	2

**From York Regions Population projections*

2.6 FIRE UNDERWRITERS SURVEY

The Fire Underwriters Survey provides a formula for estimating the required fire flow for a building or a group of buildings.

$$F = 220C\sqrt{A}$$ (Fire Underwriters, 1999)

Where F is the required fire flow in litres per minute
C is the coefficient related to the type of construction:
- 1.5 for wood frame construction
- 1.0 for ordinary construction (brick or other masonry walls)
- 0.8 for non-combustible construction
- 0.6 for fire-resistive construction

A is the total floor area in square meters in the building being considered

Fire flow shall not exceed 45,000 L/min nor be less than 2,000 L/min.

2.7 RECOMMENDED WATER DEMAND CRITERIA

The below recommended water rates have been superseded by the Water Balance Technical Memorandum. The recommended rates from this technical memorandum have been kept for record purposes.

The following section describes the recommended water demand criteria to be used going forward with the Master Plan Update and how they were determined. The projected water consumption rates along with maximum day factors have been determined based on the maximum in the historical data from 2016 to 2017 for Queensville-Holland Landing-Sharon and 2012 to 2017 for Mount Albert. The recommended rate for Green Lane is York Region's recommended residential rate (233 L/cap/day). This recommendation is based off the inability to differentiate between residential and the large ICI use in the area, thus limiting the use of historical data to recommend a residential rate. The recommendations are presented in Table 2-7.

There is no firm consensus on how climate change may influence water consumption rates. However, climate change can be expected to produce extremes in weather from heavy rainfall to dry or drought-like conditions. These conditions would impact the need for irrigation (lawn watering) which can amount to about one-third of the unit consumption rate in the summer. The Town of East Gwillimbury has an Outdoor Water Use Bylaw with restrictions in effect from May 15th to the end of September. The bylaw permits lawn watering on alternate days of the month and sets fines for non-compliance. The Town should continue to enforce and monitor this program.

As there is no historical data available for ICI users, it is recommended to continue to use the ICI peak unit rates in the Town's design guidelines.

- Institutional: 18 m^3/ha/d
- Commercial: 28 m^3/ha/d

— Industrial: 35 m^3/ha/d (assumed to be light industrial)

2.7.1 SUMMARY

Unit consumption water rates and peaking factors have been determined for each water system based on historical records. The recommended water consumption unit rates are in summarized in Table 2-7 below. Note the recommended unit rates will be held constant through to 2041.

The below recommended water rates have been superseded by the Water Balance Technical Memorandum. The recommended rates from this technical memorandum have been kept for record purposes.

Table 2-7 Recommended Domestic Water Consumption Unit Rates (L/cap/day)

SERVICE AREA	RECOMMENDED UNIT RATE TO 2041 (L/CAP/DAY)	RECOMMENDED MAXIMUM DAY FACTOR
Queensville-Holland Landing-Sharon	250	2.3
Green Lane Area	233	3.1
Mount Albert	212	2.8

It is recommended to continue to use the ICI peak unit rates in the Town's design guidelines.

— Institutional: 18 m^3/ha/d
— Commercial: 28 m^3/ha/d
— Industrial: 35 m^3/ha/d (assumed to be light industrial)

The recommended to use the Fire Underwriters Survey method to determine the required fire flows in the Town.

3 WASTEWATER SYSTEMS

The sections below present the results of an analysis of historical wastewater flow data conducted to determine unit wastewater demand criteria. As part of the scope of the Master Plan Update, WSP conducted a review of the design criteria derived from the historical data as well as the criteria used by the Town, York Region and those recommended in the Ministry of Environment and Climate Change (MOECC) guidelines (MOECC, 2008).

Based on the results of the analysis and comparison with the Town's, York Region's, and the MOECC's recommended design criteria, recommendations are provided on the design criteria to be used in the Town's current Master Plan Update for future flow projections. The design criteria adopted will be used to update the Town's wastewater spreadsheets. The rates will be multiplied by the future population projections to determine the wastewater flow in a given year.

3.1 EXISTING WASTEWATER SYSTEM

Figure 3-1 below shows the existing wastewater infrastructure network within the Town of East Gwillimbury. The following section briefly describes the wastewater network in the three communities: Queensville-Holland Landing-Sharon, Green Lane Area, and Mount Albert.

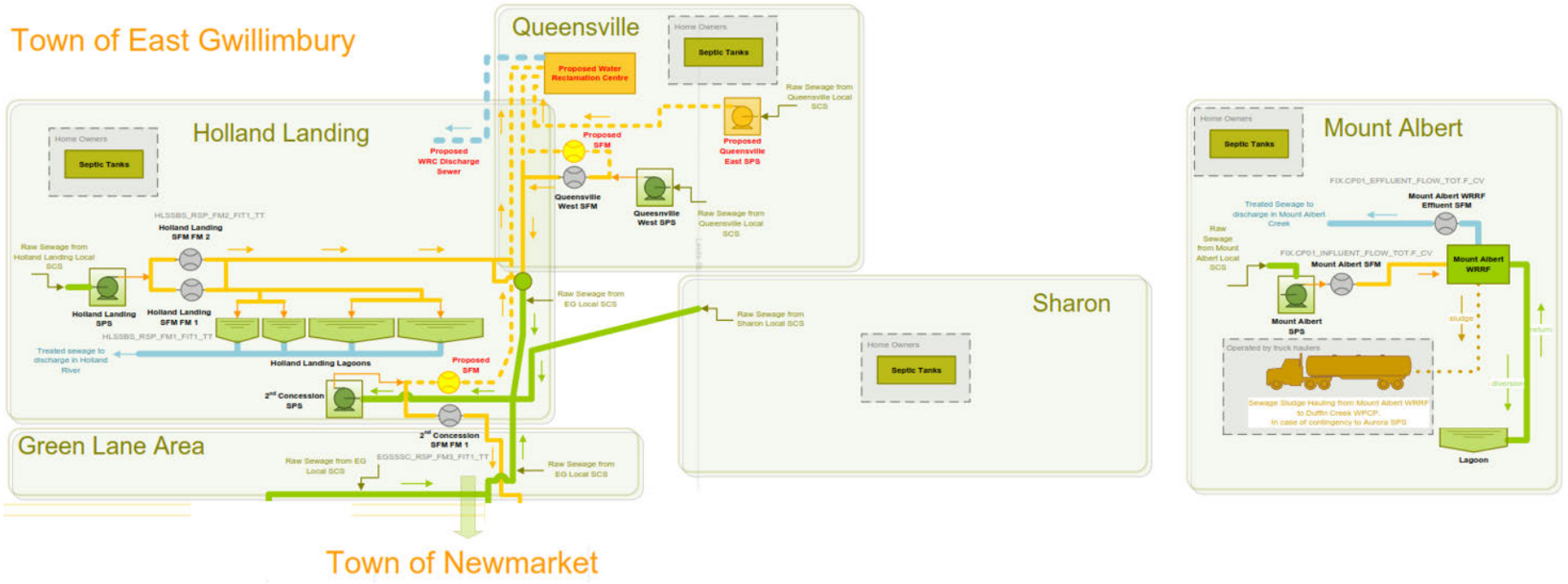

Figure 3-1 Existing Wastewater System

The communities of Queensville-Holland Landing-Sharon are currently serviced by three pumping stations all owned and operated by York Region: Holland Landing Pumping Station, Queensville West Pumping Station, and 2nd Concession Pumping Station.

The Holland Landing Pumping Station primarily services the community of Holland Landing and some surrounding areas, pumping sewage to the existing Holland Landing lagoons as well as to a trunk sewer headed to 2nd Concession Pumping Station.

The Queensville West Pumping Station conveys sewage to the gravity sewer starting at the high point on 2nd Concession Road which flows to the 2nd Concession Pumping Station.

2nd Concession Pumping Station collects flows from the Holland Landing and Queensville West Sewage Pumping Stations, as well as the Sharon area and a portion along Green Lane. The 2nd Concession Pumping Station then pumps via a forcemain south to the Town of Newmarket to be treated. pumping to Newmarket is temporary, as the final servicing plan is for the pump stations to direct flow north to a proposed water reclamation centre in Queensville to be treated.

Due to topographic constraints, there is provision for a future sewage pumping station to service the north East Gwillimbury area. This future pumping station would pump north towards the proposed water reclamation centre.

The Mount Albert area is serviced through a separate system by the Mount Albert Pumping Station which pumps to local sewage lagoons, owned by York Region, to be treated. The remainder of the population in Mount Albert are serviced by septic systems.

3.2 HISTORICAL WASTEWATER GENERATION ANALYSIS

Historical wastewater flow data was obtained for 2013 to 2017 from York Region for Holland Landing Pumping Station and Mount Albert Pumping Station. 2nd Concession Pumping Station came online in 2017 so no historical data is available for this station. Although the total wastewater flows from the Holland Landing area can be determined through the Holland Landing Pumping Station data, there is no way to determine the population that is being serviced. Thus, the per capita rates cannot be calculated for Holland Landing. The only area for which wastewater flows could be calculated was Mount Albert. The data received was reviewed to determine the residential unit rates and the maximum day factors. Table 3-1 summarizes these findings for Mount Albert.

Table 3-1 Historical Unit Generation Rates: Wastewater

		HISTORICAL AVERAGE UNIT GENERATION RATES				
COMMUNITY		**2013**	**2014**	**2015**	**2016**	**2017**
Mount Albert	**Average Day Demand (L)**	1311	1260	1069	1111	1277
	Population	4867	5056	5245	5434	5623
	Average Day (L/cap/day)	269	249	204	204	227

Historical maximum day peaking factors for Mount Albert are summarized in Table 3-2. Historical instantaneous peak flows were not available, and so historical peaking factors were not reviewed.

Table 3-2 Wastewater Generation Factors

	HISTORICAL MAXIMUM DAY PEAKING FACTORS				
COMMUNITY	**2013**	**2014**	**2015**	**2016**	**2017**
Mount Albert	1.86	1.95	1.42	1.40	1.40

3.3 TOWN OF EAST GWILLIMBURY UNIT WASTEWATER GENERATION CRITERIA

The Town's Design Manual specifies residential, industrial, commercial, and institutional average daily flows to be used in calculating the design flows for sewer sizing. These can be seen in Table 3-3 below.

Table 3-3 Wastewater Design Flows (Town of East Gwillimbury, 2012)

DEVELOPMENT TYPE	WATER DEMAND RATE (L/HA/D)
Industrial	35,000
Commercial	28,000
Institutional	18,000

The Town's Design Manual also states an infiltration allowance (extraneous flow) of 0.286 L/ha/sec (24,710.40 L/ha/day) should be used in determining the design flows.

The historical average wastewater unit rates for Mount Albert are noted to be significantly lower than the 350 L/cap/day stated in the Town's Design Manual.

The Town's Design Manual also defines how to calculate peaking factors to be used when designing infrastructure for residential and industrial developments.

For residential development the peaking factor shall be calculated based on the Harmon Formula as follows:

$$M_d = 1 + \frac{14}{4+P^{0.5}}$$ (Town of East Gwillimbury, 2012)

Where, P = Population, in thousands
M_d (Maximum) = 4.0
M_d (Minimum) = 2.0

For industrial development the peaking factor shall be calculated as:

$$M_i = 6.6604 \times A^{-0.1992}$$ (Town of East Gwillimbury, 2012)

Where, M_i = industrial peaking factor
A = gross lot area (ha)

Table 3-4 below shows the calculated Harmon peaking factors for the three service areas for residential developments.

Table 3-4 Harmon Peaking Factor per Service Area

SERVICE AREA	POPULATION	HARMON PEAKING FACTOR
Queensville-Holland Landing-Sharon	14,002	1.1

Green Lane Area	2,262	1.3
Mount Albert	5,434	1.2

3.4 YORK REGION WASTEWATER GENERATION CRITERIA

York Region sizes their wastewater system to convey wet weather flow from a 25-year storm event. The design flows for their wastewater system in their most recent Master Plan was calculated as (York Region, 2016):

- Dry Weather Flows (Existing): Use dry weather flows as per calibrated model
- Dry Weather Flows (Future): Wastewater generation rates for dry weather conditions are based on adding a groundwater base infiltration allowance of 90 litres per capita per day to the water design rates show in Table 2-4
- Wet Weather Flows (Existing): Generate flows through modelling by using a calibrated hydraulic model. Inflow and Infiltration flow rates for existing service areas are based on measured flow data and normalized to a 25-year design storm.
- Wet Weather Flows (Future): The wet weather flow rates for future service areas are derived by adding the domestic flow based on water design rates in Table 2-4 to the Region's inflow and infiltration flow hydrograph with a peak flow of 0.26 litres per second per hectare.

York Region's inflow and infiltration rate of 0.26 L/sec/ha from their Master Plan is slightly lower than that stated in the Town's Design Manual at 0.286 L/sec/ha.

3.5 MOECC UNIT WASTEWATER GENERATION CRITERIA

For residential servicing, the *MOECC Guidelines* recommend estimating the average and peak residential wastewater flows, as well as peak extraneous flows using historical data when available. The Guidelines recommend calculating peak residential wastewater flow using either the Harmon or Babbitt formula to determine the peaking factor, with a minimum of 2.0. In the absence of historical data, the Guidelines indicate that average daily domestic flows of 225 to 450 L/cap/day are typical for residential areas (MOECC, 2008).

For ICI users, in the absence of reliable data, the Guidelines list common rates for different users such as shopping centres, hospitals, and schools. It is suggested that peaking factors are used, similar to the water demand, for a certain establishment. A minimum average allowance of 28 m^3/ha/d is recommended for commercial and tourist areas. No recommendations are made for industrial areas since water use varies by industry and process.

The unit wastewater generation rates used historically in the Town of East Gwillimbury for the design and assessment of treatment facilities and collection systems are generally within the range of values indicated in the *MOECC Guidelines*.

3.6 RECOMMENDED WASTEWATER GENERATION CRITERIA

The below recommended wastewater rates have been superseded by Section 3.7. The recommended rates from this section have been kept for record purposes.

The average residential unit rates for Mount Albert was based on the average of historical data. As historical data was not available for Queensville-Holland Landing-Sharon and Green Lane Area, the Town's standard of 350 L/cap/day is recommended to be used. It is assumed that new developments will be leak-tight and use more advanced technologies compared to existing areas. Therefore, the York Region's extraneous flow value of 0.26 L/ha/sec is deemed suitable for future use.

Unit consumption wastewater rates and peaking factors have been determined for each wastewater system based on historical records. The recommended rates for use in the Master Plan are summarized in Table 3-5.

Table 3-5 Recommended Domestic Wastewater Generation Unit Rates (L/cap/day)

SERVICE AREA	RECOMMENDED RESIDENTIAL UNIT RATE TO 2041 (L/CAP/DAY)
Queensville-Holland Landing-Sharon	350
Green Lane Area	350
Mount Albert	250

For the Master Plan it is recommended to use the ICI peak unit rates indicated in the Town's Engineering Design Manual as a conservative estimate:

- Institutional: 18 m^3/ha/d
- Commercial: 28 m^3/ha/d
- Industrial: 35 m^3/ha/d (assumed to be light industrial)

The minimum and maximum velocities in the watermains will be based on the recommended values by the MOECC and the Town's Engineering Design Manual at 0.6 m/s and 3.0 m/s respectively.

3.7 RECOMMENDED WASTEWATER GENERATION CRITERIA – REVISION 1

A conference call with WSP and the Town to discuss the wastewater unit rates was help May 9th, 2018. The Town indicated that the recommended 350 L/cap/day for Queensville-Holland Landing-Sharon and Green Lane Area may be high. Although the recommended 250 L/cap/day for Mount Albert is closer to the expected wastewater unit rate, the Town indicated that a factor of safety should be applied to ensure pipes are not undersized in the future. As such, WSP suggested using a unit rate of **290 L/cap/day** for all communities within East Gwillimbury. This value is based on the historical wastewater per capita rates seen in Mount Albert (ranging from 204 L/cap/day to 269 L/cap/day) while also considering future population growth within the Town. We believe this wastewater unit rate of 290 L/cap/day to be reasonable for all communities within East Gwillimbury.

The ICI peak unit rates indicated in the Town's Engineering Design Manual were agreed to be a reasonable and conservative at:

- Institutional: 18 m^3/ha/d
- Commercial: 28 m^3/ha/d
- Industrial: 35 m^3/ha/d (assumed to be light industrial)

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MEMO

TO: Denny Boskovski; Town of East Gwillimbury

FROM: Hari Sridhar, Jean-Luc Daviau, Mazahir Alidina; WSP

SUBJECT: **East Gwillimbury Water Balance & Recommendations for Unit Rates**

DATE: **April 19, 2018**

1. WATER BALANCE

WSP conducted a Water Balance to compare the monthly Billed Authorized Consumption – Metered (BACM) with the "Water Supplied" volumes. Non-Revenue Water (NRW) were calculated by subtracting the total BACM from the total Water Supplied.

Water Balance and Modeling comments:

1. The total Water Supplied in 2015 and 2016 were calculated by compiling the System Input Volume (SIV) and Water Exported (WE). SIV includes all the water "produced" within East Gwillimbury and WE includes flows from East Gwillimbury to Newmarket.
2. The boundary flowmeter between East Gwillimbury and Newmarket was not online till mid 2015 because of which the total volume exported could not be calculated. The total Water Supplied in first half of 2015 was calculated to be almost equal to the SIV. Hence much cannot be commented on the results of the 2015 Water Balance. The higher noted NRW for 2015 can be attributed to the fact that water flows to Newmarket are not accounted for in the WE.
3. Water Balance and NRW trends for 2016 are fairly accurate and are representative of the expected NRW trends. However in 2016 the supplied volumes trend upwards towards the end of the year compared to the BACM, resulting in higher NRW for November and December.
4. The BACM volumes were calculated after meter lag-correction* to deduce monthly volumes. BACM for both years follow a consistent trend and hence the variation in NRW is synchronized with the variation in the total water supplied.

   A summary of the 2015 and 2016 data are presented in the tables and graphs below:

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1) 2015 Water Balance:

Table 1: 2015 NRW Volumes and %

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
EG Water Supply (m3)	272122	160554	170084	167547	226678	248756	234388	299137	178587	140486	115743	129613	**2343695**
BACM (m3)	91773	84173	97234	97006	109439	110559	114902	109264	95917	96366	87441	89053	**1183128**
NRW (m3)	180349	76381	72851	70541	117239	138197	119485	189873	82670	44120	28301	40560	**1160567**
NRW%	**66.3%**	**47.6%**	**42.8%**	**42.1%**	**51.7%**	**55.6%**	**51.0%**	**63.5%**	**46.3%**	**31.4%**	**24.5%**	**31.3%**	**49.5%**

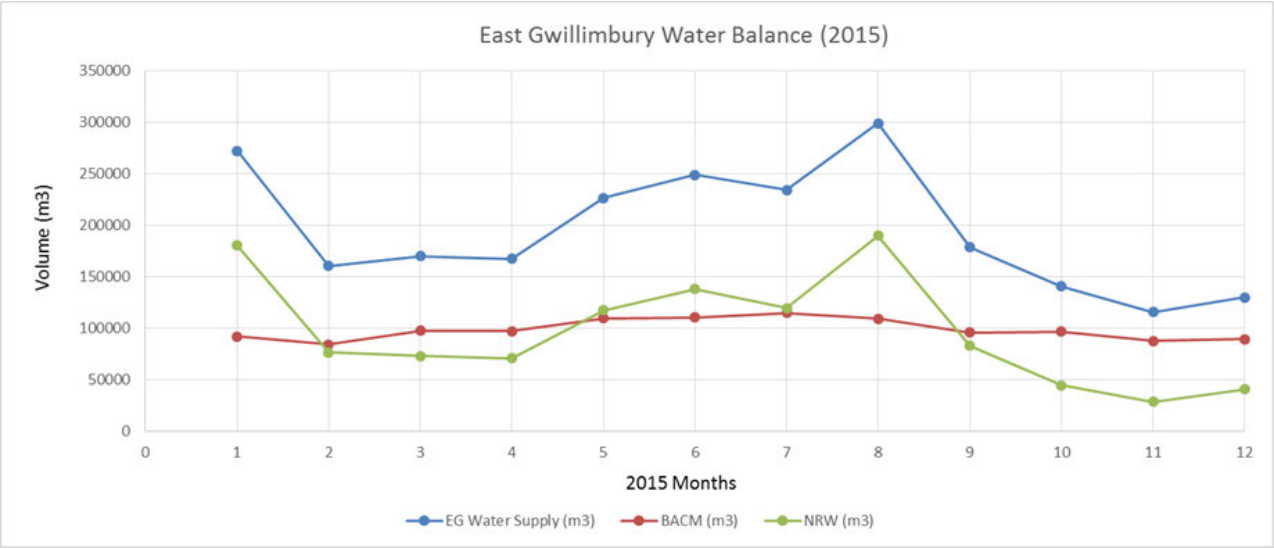

Figure 1: 2015 NRW Trends

2) 2016 Water Balance:

Table 2: 2016 NRW Volumes and %

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
EG Water Supply (m3)	122361.7	127081.7	127205.9	119033.2	167806.4	213020.9	202439.5	196753.2	157357.4	143602.4	151127.9	158286.2	**1886076**
BACM (m3)	88847.67	81210.86	94631.89	97101.74	124706.8	134744.3	140879.8	127291.6	107346.2	92937.56	79890.85	80579.47	**1250169**
NRW (m3)	33514.03	45870.84	32574.01	21931.46	43099.57	78276.58	61559.65	69461.6	50011.19	50664.84	71237.05	77706.73	**635907.6**
NRW%	**27.4%**	**36.1%**	**25.6%**	**18.4%**	**25.7%**	**36.7%**	**30.4%**	**35.3%**	**31.8%**	**35.3%**	**47.1%**	**49.1%**	**33.7%**

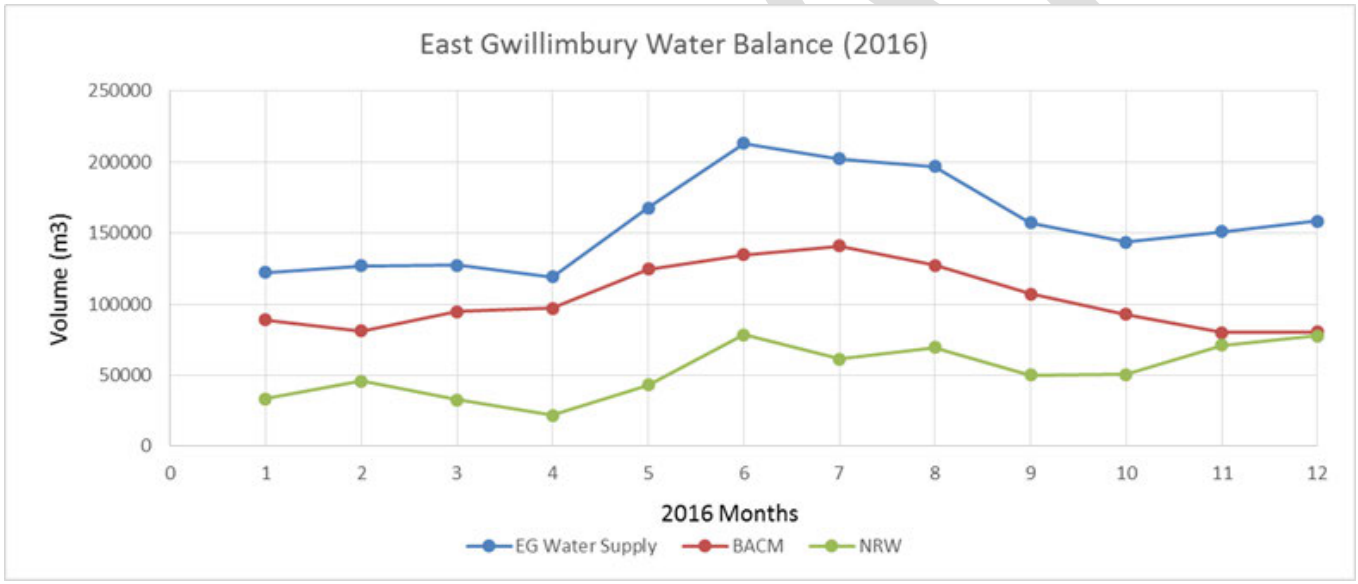

Figure 2: 2016 NRW Trends

5. To accurately load demands at nodes it is essential to consider the BACM and NRW volumes. Water Supply values should hence be considered for loading demands. WSP has calculated water supply values based on East Gwillimbury boundaries. York Region has also provided calculations for water supply values based on larger pressure districts (including areas in Newmarket).
6. If the Town prefers to use BACM volumes to derive the billing rates then WSP recommends further detailed investigation into BACM and NRW components (Extra to Base Scope).
7. Also the BACM volumes being quarterly, ADD and peaking factors cannot be determined based on the billing data alone. Detailed studies must be carried out to benchmark and trend the consumption of different types of units throughout the year.

***Meter Lag (& Lead) Correction:**

The AWWA's Manual of Water Supply Practices M36 *Water Audits and Loss Control Programs* identifies that "corrections must be made to metered use data when the source-meter reading dates and the customer-meter reading dates do not coincide with the beginning and ending dates of the water audit period." It should be noted that the lag adjustments were only applied on the billed authorized consumption.

WSP used one of the most accurate algorithms to calculate as accurately as possible, the monthly consumption volumes. Billed consumption in East Gwillimbury for 2015 and 2016, includes some metered usage from the previous year, corrections made to previous bills; consumption based on estimated readings, and also excludes usage that will be billed in the year under consideration (ex: the consumption in the last quarter of 2015 that would be billed in 1st quarter 2016). Hence WSP analysed metering and billing data from last quarter 2014 through first quarter 2017 to account for all the monthly consumption in 2015 and 2016. Daily usage is calculated assuming equal use on each of the days between the read dates.

The meter-lag analysis was used to validate the volume of Billed, Authorized Consumption – Metered included in the water balance which also helps illustrate how the Town's monthly and quarterly billed consumption trends against the volume of water supplied. Though the billing periods were quarterly the consumption volume was lag adjusted by assuming equal usage between meter-reads and totalizing it over a month. Hence it is essential to know that the tables and figures don't show exact volume of water consumed over the month or day. The consumption volumes are only as accurate as the granularity of the data provided.

2. UNIT RATES CALCULATION AND COMPARISON WITH YORK REGION DATA

WSP met with York Region staff to discuss the approach that York Region took to calculate unit rates for East Gwillimbury. While overall fairly similar, there were some differences in approach as outlined below:

1. York Region considered Holland Landing as its own separate community using the flowmeter separating Holland landing from Queensville to isolate the flows for this community.
2. Queensville (QV) and Sharon (SH) were considered as part of the larger Newmarket East Pressure District. Average day demands (ADD) were calculated individually for the QV and SH communities, but the Maximum Day Demand Peaking Factor (MDD PF) reported is the single PF calculated for the whole pressure district.
3. Green Lane Servicing Area was considered as part of the larger Newmarket West Pressure District. Average day flows were calculated individually for the GLSA, but the MDD PF reported is the single PF calculated for the whole pressure district.
4. Populations were based on census data and increased based on a standard density based on approved building permits.
5. Storage was considered in calculations of ADD & MDD PF.

Overall numbers as calculated using York Region and WSP methods are summarized in Table 3 below:

Table 3. York Region and WSP Flow Calculations

		HOLLAND LANDING-QUEENSVILLE-SHARON			GREEN LANE SERVICE AREA		MT. ALBERT	
		WSP QV-SH-HL	York Region QV-SH	York Region HL	WSP	York Region	WSP	York Region
Average Day Demand (ADD)	2012			213	1413		211	
	2013			196	1053	983	204	221
	2014			197	928	986	191	214
	2015			195	558	634	199	203
	2016	222	316	211	384	459	212	219
	2017	250	220	175	290	370	185	195
Maximum Day Demand Peaking Factor (PF)	2012	2.0		2.22	2.2		2.2	
	2013	2.1	1.70	1.80	2.9	1.54	2.8	1.78
	2014	1.8	1.49	1.86	2.8	2.18	2.2	1.85
	2015	2.3	1.76	2.11	2.3	1.53	2.3	1.87
	2016	2.3	1.53	2.29	2.9	1.62	2.2	1.98
	2017	2.1	1.72	2.04	3.1	1.72	2.8	2.09

Populations	2012	13438		7484	1635		4677	
	2013	13579		7504	1792	1731	4867	4497
	2014	13720		7510	1948	1834	5056	4515
	2015	13861		7510	2105	1893	5245	5150
	2016	14002	4770	7570	2262	1890	5434	5280
	2017	14143	9490	8300	2419	1890	5623	5390

Other than the way the boundaries for the different communities were considered, the major difference between the methods used by York Region and WSP was that York Region considered the effect of storage in the calculation. We hence re-ran calculations to evaluate the resulting unit rate for the closed community of Mt. Albert taking into account the daily changes in elevated tank storage volume. The results are presented below:

Table 4. Effect of Storage on the Mt. Albert Community

		WSP ORIGINAL CALCS. (NO STORAGE)		WSP NEW CALCS. (INCL. STORAGE)		YORK REGION CALCS. (INCL. STORAGE)	
		ADD	MDD PF	ADD	MDD PF	ADD	MDD PF
Average Day Demand (ADD)	2012	211	2.2				
	2013	204	2.8	204	2.0	221	1.78
	2014	191	2.2	191	2.4	214	1.85
	2015	199	2.3	199	1.9	203	1.87
	2016	212	2.2	211	2.1	219	1.98
	2017	185	2.8	187	2.1	195	2.09

DISCUSSION:

1. While the overall numbers are different (Table 3), the ***supply trends*** for the different communities as seen in Table 3 are similar whether the York Region or WSP approaches are taken.
2. Even when storage was considered (Table 4), the overall numbers provided by York Region are different from those calculated by WSP due to the following two reasons:
    a. Different population numbers were considered. The population projections approach (based on intensification targets) adopted by WSP is consistent with the direction provided by the Town of East Gwillimbury Planning department as well as the Transportation Master Plan and so will remain different from York Regions population numbers.
    b. The method approached for dealing with data inconsistencies as well as the method for selecting the maximum day demand differed between the two calculations. WSP's approach for trimming the average to compensate for outliers as well as considering the 2nd or 3rd Max approach was outlined in the Tech Memo.

3. When the effect of storage was considered, it was noted that the ADD did not change much between WSP's original calculations and the new calculations (only slight changes noted for 2016 & 2017). The amount of water going into the tower and draining form it average to close to zero over the year, meaning no effect is expected in the ADD. This was the reason storage was not included by WSP in the initial calculation.
4. The MDD however seems to be affected slightly by storage. The original approach seems to be more conservative however.

3. UNIT RATES DISCUSSION

RESIDENTIAL UNIT RATES:

WSP recommended unit rates and maximum day peaking factors for the different communities based on the flow calculations in the Water & Wastewater Design Criteria – Tech Memo submitted to the City in January, 2018, and summarized in Table 5 below.

Table 5. Recommended Unit Rates

SERVICE AREA	RECOMMENDED UNIT RATE TO 2041 (L/CAP/DAY)	RECOMMENDED MAXIMUM DAY FACTOR
Queensville-Holland Landing-Sharon	250	2.3
Green Lane Area	233	3.1
Mount Albert	212	2.8

These unit rates along with the residential population of the respective communities were used to calculate a combined weighted average unit rate for the Town, and a rate of **238.7 L/cap/day** was obtained. This combined rate for the Town of East Gwillimbury, is not too far off from the 2016 water rate presented in York Region's 2016 Master Plan of **233 L/cap/day.**

ICI UNIT RATES

In the Water & Wastewater Design Criteria – Tech Memo submitted to the City in January, 2018, WSP recommended that the ICI unit rates be determined using the area method as provided in the Town of East Gwillimbury Design Guidelines as follows:

- Institutional: 18 m^3/ha/d
- Commercial: 28 m^3/ha/d
- Industrial: 35 m^3/ha/d (assumed to be light industrial)

Upon receipt of the Town's GIS data for ICI areas however, it was found that the Institutional, Commercial and Industrial land use areas overlapped partially or completely on many instances and could not be accurately distinguished. Also, the land use area covers the entire section designated for ICI. Building areas would be required to estimate the employment based on the area method. Using the entire land use area to estimate the demand using the area method would overestimate the ICI demand greatly.

WSP calculated the ICI unit rate from the MOECC recommended unit rate of 28 m^3/ha/day. With the Town's existing population this yielded a unit rate of **1643 L/cap/day**. Compared to York Region's 2016 ICI unit rate (**182 L/cap/day**) the Town's rates derived from the area method is more than nine (9) times the amount. It could be assumed that the building area is about a ninth of the total land use area. However, due to lack of data validating such an assumption and uncertainty in the calculated ICI land use areas, use of the York Region employment based ICI unit rate is preferred.

RECOMMENDATIONS:

WSP is making the following recommendation based on the residential and ICI unit rates calculated and compared with that of York Region:

1. The weighted average unit rate of **238.7 L/cap/day**, calculated for residential customers is recommended to be used across the Town for demand loading. This rate has a variation of less than 2.5% from the residential unit rate value for York Region.
2. York Region's unit rate of **182 L/cap/day** is recommended to be used to load demand onto the nodes representing ICI connections throughout the Town. This will also allow direct application of the employment forecasted populations as recommended by the Town of East Gwillimbury Planning Department and consistent with the Transportation Master Plan.
3. A standard Maximum Day peaking factor of **2.3** be adopted for all communities within East Gwillimbury. Based on York Region's method of calculating MDD from the entire pressure district & considering storage, a lower MDD is expected than what was presented in our original Tech Memo. We are hence recommending that a standard peaking factor of 2.3 be applied to all communities for demand loading which is conservative enough yet overall representative of the data.

Osaka, Erin

From: Sridhar, Hari
Sent: Friday, May 11, 2018 10:49 AM
To: Dodwell, David; Hollett, Larry; Boskovski, Denny
Cc: Daviau, Jean-Luc; Osaka, Erin; Ruprai, Mani; Alidina, Mazahir
Subject: RE: EGMP - Decision Required on Water& Wastewater Design Criteria

Thanks a lot for the quick response, David and Larry. Exactly!

The effect of the total flushing on the unit rates is less than **1.5%.** As rightly mentioned and expected the flushing does not affect the unit rates. In fact being conservative by using slightly higher flows than actual is perfect as the model can be well calibrated. We will document the flushing calculations provided and report it as well as this supports our idea of being conservative with the unit rates.

With that, I believe we can go ahead with using the recommended unit rates for demand loading within the model.

Denny, can you please confirm so that we can proceed.

It is quite impressive that the Town tracks what would otherwise be unbilled authorized consumption such as flushing. Goes a long way in quantifying and reducing NRW!

Best,

Hari Sridhar
Designer, Hydraulic Group

T+ 1 905-882-1100 x 6323

100 Commerce Valley Drive West
Thornhill, ON
L3T 0A1 Canada

From: Dodwell, David [mailto:ddodwell@eastgwillimbury.ca]
Sent: Friday, May 11, 2018 7:47 AM
To: Sridhar, Hari <hari.sridhar@wsp.com>; Hollett, Larry <lhollett@eastgwillimbury.ca>
Cc: Daviau, Jean-Luc <Jean.Luc.Daviau@wsp.com>; Osaka, Erin <Erin.Osaka@wsp.com>; Boskovski, Denny <dboskovski@eastgwillimbury.ca>
Subject: RE: EGMP - Decision Required on Water& Wastewater Design Criteria

Hi Hari,

To summarize for 2016, our flushing volume for new development was 27,470 cubic meters and for 2015 it was rather minor if even noteworthy at all. It appears our flushing for new development had increased significantly about halfway through 2016 and into 2017, so I don't think this would have much impact on your unit rates as previously discussed.

If you need any additional information please feel free to contact me.

Thanks,

Dave Dodwell, *C.Tech, WQA*
Environmental Compliance Technologist
Town of East Gwillimbury
19000 Leslie Street, Sharon, Ontario L0G 1V0
905-478-4283 Ext.**1296 |** Fax: 905-478-8545
ddodwell@eastgwillimbury.ca
www.eastgwillimbury.ca

From: Sridhar, Hari [mailto:hari.sridhar@wsp.com]
Sent: May-10-18 4:05 PM
To: Hollett, Larry <lhollett@eastgwillimbury.ca>
Cc: Dodwell, David <ddodwell@eastgwillimbury.ca>; Daviau, Jean-Luc <Jean.Luc.Daviau@wsp.com>; Osaka, Erin <Erin.Osaka@wsp.com>; Boskovski, Denny <dboskovski@eastgwillimbury.ca>
Subject: RE: EGMP - Decision Required on Water& Wastewater Design Criteria

Hello Larry and team,

Thanks a lot for taking time to discuss with me today. Really appreciate it.

As discussed during the call we recommend using the unit rates outlined in the Tech Memo. WSP can make a quick comparison of the unit rates with the averaged flushing volume if the total flushing volume is readily available, but that wouldn't likely have an effect on the overall unit rates.

However, if you have the flushing volume ready we can make a quick comparison and get back to you. Please note that it is best practice to be conservative with the unit rates as that way the model wouldn't over-estimate the system pressure. This would help the town in proactively manage system pressure. Also, once the model is built we would calibrate it based on the field tests that were conducted last year - we expect the calibration to be conservative as well.

Please provide us the flushing volume if you have it.

Best,

Hari Sridhar
Designer, Hydraulic Group

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100 Commerce Valley Drive West
Thornhill, ON
L3T 0A1 Canada

From: Hollett, Larry [mailto:lhollett@eastgwillimbury.ca]
Sent: Thursday, May 10, 2018 3:04 PM
To: Sridhar, Hari <hari.sridhar@wsp.com>
Subject: RE: EGMP - Decision Required on Water& Wastewater Design Criteria

lbjgh@hotmail.com

Larry B. Hollett, C.E.T.
Director of Operations
Office # 905-478-4283, x3850
Community Infrastructure & Environmental Services

From: Sridhar, Hari [mailto:hari.sridhar@wsp.com]
Sent: Thursday, May 10, 2018 1:53 PM
To: Osaka, Erin <Erin.Osaka@wsp.com>; Hollett, Larry <lhollett@eastgwillimbury.ca>
Cc: Daviau, Jean-Luc <Jean.Luc.Daviau@wsp.com>; Kumar, Abhi <Abhi.Kumar@wsp.com>; Ruprai, Mani <Mani.Ruprai@wsp.com>; Boskovski, Denny <dboskovski@eastgwillimbury.ca>
Subject: RE: EGMP - Decision Required on Water& Wastewater Design Criteria

Hello Larry,

Good Afternoon! As discussed in the meeting with the Town yesterday I reached out to you via call to finalize the unit rates but it went straight to your voicemail. Please let me know what time works best for you.

I would prefer to skype you as I can share screen that way.

Can you please share your skype ID if possible?

Best,

Hari Sridhar
Designer, Hydraulic Group

T+ 1 905-882-1100 x 6323

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Thornhill, ON
L3T 0A1 Canada

From: Sridhar, Hari
Sent: Wednesday, May 09, 2018 2:38 PM
To: Osaka, Erin <Erin.Osaka@wsp.com>; Hollett, Larry <lhollett@eastgwillimbury.ca>
Cc: Daviau, Jean-Luc <Jean.Luc.Daviau@wsp.com>; Kumar, Abhi <Abhi.Kumar@wsp.com>; Ruprai, Mani <Mani.Ruprai@wsp.com>; Boskovski, Denny <dboskovski@eastgwillimbury.ca>
Subject: RE: EGMP - Decision Required on Water& Wastewater Design Criteria

Hello Larry,

Hope you are well. Please let me know if we can have a quick call today or tomorrow to finalize the water unit rates (as suggested in the Tech Memo and the email below).

Just to give you some background information; all the water balance components in the calculated unit rates. I will be able to explain further in a call.

Best,

Hari Sridhar
Designer, Hydraulic Group

T+ 1 905-882-1100 x 6323

100 Commerce Valley Drive West
Thornhill, ON
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From: Osaka, Erin
Sent: Thursday, May 03, 2018 3:06 PM
To: Hollett, Larry <lhollett@eastgwillimbury.ca>
Cc: Daviau, Jean-Luc <Jean.Luc.Daviau@wsp.com>; Kumar, Abhi <Abhi.Kumar@wsp.com>; Wrzala, Ray <rwrzala@eastgwillimbury.ca>; Ruprai, Mani <Mani.Ruprai@wsp.com>; Dodwell, David <ddodwell@eastgwillimbury.ca>; Neuman, Paul <pneuman@eastgwillimbury.ca>; Boskovski, Denny <dboskovski@eastgwillimbury.ca>; Sridhar, Hari <hari.sridhar@wsp.com>
Subject: FW: EGMP - Decision Required on Water& Wastewater Design Criteria

Hi Larry,

Please see below the e-mail we sent and the attached Water Balance memo regarding the **water** rate numbers. I have also attached the previous Design Criteria memo which has our recommended **wastewater** design rates (the Design Criteria memo also has recommended water rates, but they are superseded by the Water Balance memo recommendations.).

We are looking for direction from the Town as to whether we can go ahead with using our recommended rates as per the memos for the water and wastewater modelling. To summarize:

Water:

1. The weighted average unit rate of **238.7 L/cap/day**, calculated for residential customers is recommended to be used across the Town for demand loading. This rate has a variation of less than 2.5% from the residential unit rate value for York Region.
2. York Region's unit rate of **182 L/cap/day** is recommended to be used to load demand onto the nodes representing ICI connections throughout the Town. This will also allow direct application of the employment forecasted populations as recommended by the Town of East Gwillimbury Planning Department and consistent with the Transportation Master Plan.
3. A standard Maximum Day peaking factor of **2.3** be adopted for all communities within East Gwillimbury. Based on York Region's method of calculating MDD from the entire pressure district & considering storage, a lower MDD is expected than what was presented in our original Tech Memo. We are hence recommending that a standard peaking factor of 2.3 be applied to all communities for demand loading which is conservative enough yet overall representative of the data.

Wastewater

Extraneous flow value of 0.26 L/ha/sec.

SERVICE AREA	RECOMMENDED RESIDENTIAL UNIT RATE TO 2041 (L/CAP/DAY)
Queensville-Holland Landing-Sharon	350
Green Lane Area	350
Mount Albert	250

ICI peak unit rates:

- Institutional: 18 m^3/ha/d
- Commercial: 28 m^3/ha/d
- Industrial: 35 m^3/ha/d (assumed to be light industrial)

Please let me know if you have any questions!

Thanks

Erin Osaka

T+ 1 905-882-4211 Ext. 6811

From: Alidina, Mazahir
Sent: Thursday, April 19, 2018 6:20 PM
To: Boskovski, Denny <dboskovski@eastgwillimbury.ca>; Hollett, Larry <lhollett@eastgwillimbury.ca>; Molinari, Mike <mmolinari@eastgwillimbury.ca>; Neuman, Paul <pneuman@eastgwillimbury.ca>
Cc: Wrzala, Ray <rwrzala@eastgwillimbury.ca>; Daviau, Jean-Luc <Jean.Luc.Daviau@wsp.com>; Sridhar, Hari <hari.sridhar@wsp.com>; Ruprai, Mani <Mani.Ruprai@wsp.com>; Osaka, Erin <Erin.Osaka@wsp.com>
Subject: RE: EGMP - Decision Required on Water& Wastewater Design Criteria

Hi Denny,

Nice talking to you today. As discussed, we have done a thorough analysis of data that York Region provided to us and have summarized our findings in the attached updated Memo. The last section of the memo presents our recommendations for unit rates to be adopted.

As discussed, our modeling is currently on hold waiting for demands to be loaded. We hence need a decision by the Town by end of day tomorrow on which unit rates to adopt for modelling. Unfortunately this is critical path currently and every extra day is a day off our target for completion.

On the same note our wastewater model is coming together fairly quickly as well, do you have any comments on the wastewater rates we recommended in our Design Criteria tech memo?

Look forward to hearing from you.

Regards

Mazahir Alidina, PhD, P.Eng
T +1 905-882-4211 #6394

From: Boskovski, Denny [mailto:dboskovski@eastgwillimbury.ca]
Sent: Tuesday, April 17, 2018 9:41 AM
To: Hollett, Larry <lhollett@eastgwillimbury.ca>; Molinari, Mike <mmolinari@eastgwillimbury.ca>; Neuman, Paul <pneuman@eastgwillimbury.ca>; Alidina, Mazahir <Mazahir.Alidina@wsp.com>
Cc: Wrzala, Ray <rwrzala@eastgwillimbury.ca>; Daviau, Jean-Luc <Jean.Luc.Daviau@wsp.com>; Sridhar, Hari <hari.sridhar@wsp.com>; Ruprai, Mani <Mani.Ruprai@wsp.com>; Osaka, Erin <Erin.Osaka@wsp.com>
Subject: FW: EGMP - Decision Required on Water& Wastewater Design Criteria

Hi Larry, Paul and Mike, below and attached for your information and our consideration of Option 1 or 2 once WSP responds to my question.

Hi Mazahir,

Before we move forward on this discussion, please suggest/recommend WSP's Option Preference and reason(s) why.

Please copy all on your response.

Regards,

Denny S. Boskovski, C.E.T.
Asset Management and Capital Project Manager
Town of East Gwillimbury
19000 Leslie Street, Sharon, Ontario L0G 1V0
905-478-4283 Ext. 3818 **|** Fax: 905-478-8545
DBoskovski@eastgwillimbury.ca
www.eastgwillimbury.ca

http://www.eastgwillimbury.ca/" style='position:absolute;margin-left:0;margin-top:0;width:154.5pt;height:48.75pt;z-index:251658240;mso-wrap-distance-left:7.8pt;mso-wrap-distance-top:0;mso-wrap-distance-right:7.8pt;mso-wrap-distance-bottom:0;mso-position-horizontal:left;mso-position-horizontal-relative:text;mso-position-vertical-relative:line' o:allowoverlap="f" o:button="t">

From: Alidina, Mazahir [mailto:Mazahir.Alidina@wsp.com]
Sent: April-16-18 6:07 PM
To: Boskovski, Denny <dboskovski@eastgwillimbury.ca>; Wrzala, Ray <rwrzala@eastgwillimbury.ca>
Cc: Osaka, Erin <Erin.Osaka@wsp.com>; Ruprai, Mani <Mani.Ruprai@wsp.com>; Daviau, Jean-Luc <Jean.Luc.Daviau@wsp.com>; Sridhar, Hari <hari.sridhar@wsp.com>
Subject: EGMP - Decision Required on Water& Wastewater Design Criteria

Hi Denny,

The Town sent WSP their Geocoded water billing data. WSP looked through the data and has the following comments:

1. The billing information provided cannot simply be used to load the demands into the hydraulic model, for the following reasons:
    1) A calculation of the demand as summed from the water meters is not an indication of the Average Day Demand (ADD) of the system since infiltration, leakage, hydrant testing, flushing etc. are not captured by billing data. Furthermore, some properties may have residents but no billing record and some records may include back-billing that extends before the "year".
    2) Peaking factors used in modelling are Peak Hour Demand (PHD) to Maximum Day Demand (MDD) and MDD to ADD: only the latter can be calculated from weekly billing records and it cannot be accurately determined from directly averaging quarterly billing data spanning several months.
    3) A detailed analysis of the consumption data (Billed Authorised Metered Consumption) and a detailed IWA/AWWA Water Audit estimating the Authorised and Unauthorised consumption, apparent losses and real losses (physical losses) would be required to support model loading. This is not within the current scope and cannot be delivered within the current timeline.
2. The data provided however can be used to perform an AWWA Water Balance. At no additional cost, WSP carried out an NRW assessment through a Water Balance for the years 2015 and 2016, the results of which are presented in the attached DRAFT Memo. It is clear from the results of this analysis that the billed data is significantly less than the supply data and is hence not useful in calculation of average and max day demands.
3. The hydraulic model is being built by WSP with polygon to point loading. Upon completion of this ask, we can re-look into the point-to-point loading (which can be done using the consumption data). A cost estimate for this task (additional to base scope) can be provided if the Town wishes to pursue this option.

Our Modelling has reached a point whereby we need demand criteria rates agreed by the Town in order to load the Model. Work cannot proceed until such a decision is made. Since this is now on the critical path, and any delays directly impact the schedule, we request that some agreement is achieved with the Town on the way forward.

Currently two options are possible:

1. York Region provided WSP with their water demand calculations for East Gwillimbury. York Region's approach considers different pressure zones, with Queensville and Sharon considered together with Newmarket East, while Green Lane Area considered as part of Newmarket West. The overall demands in the entire pressure district are calculated and then applied to all areas.
2. Adopt WSP's approach to calculate the water demands where the East Gwillimbury Central Area and Green Lane Area are considered on their own, individually and separately from the rest of Newmarket. This is possible since there are flowmeters separating the different areas. (NB. York Region's approach differs in one aspect in that it also considered the effect of storage, which does not affect ADD but would have some effect on MDD. WSP can adjust our calculations to incorporate the impact of storage).

In terms of approach however, direction is required from the Town on which way to proceed. A decision on exact rates to be used is also required.

Feel free to give me a call to discuss.

Thanks

Mazahir Alidina, PhD, P.Eng
Water/Wastewater

T+ 1 905-882-4211 #6394

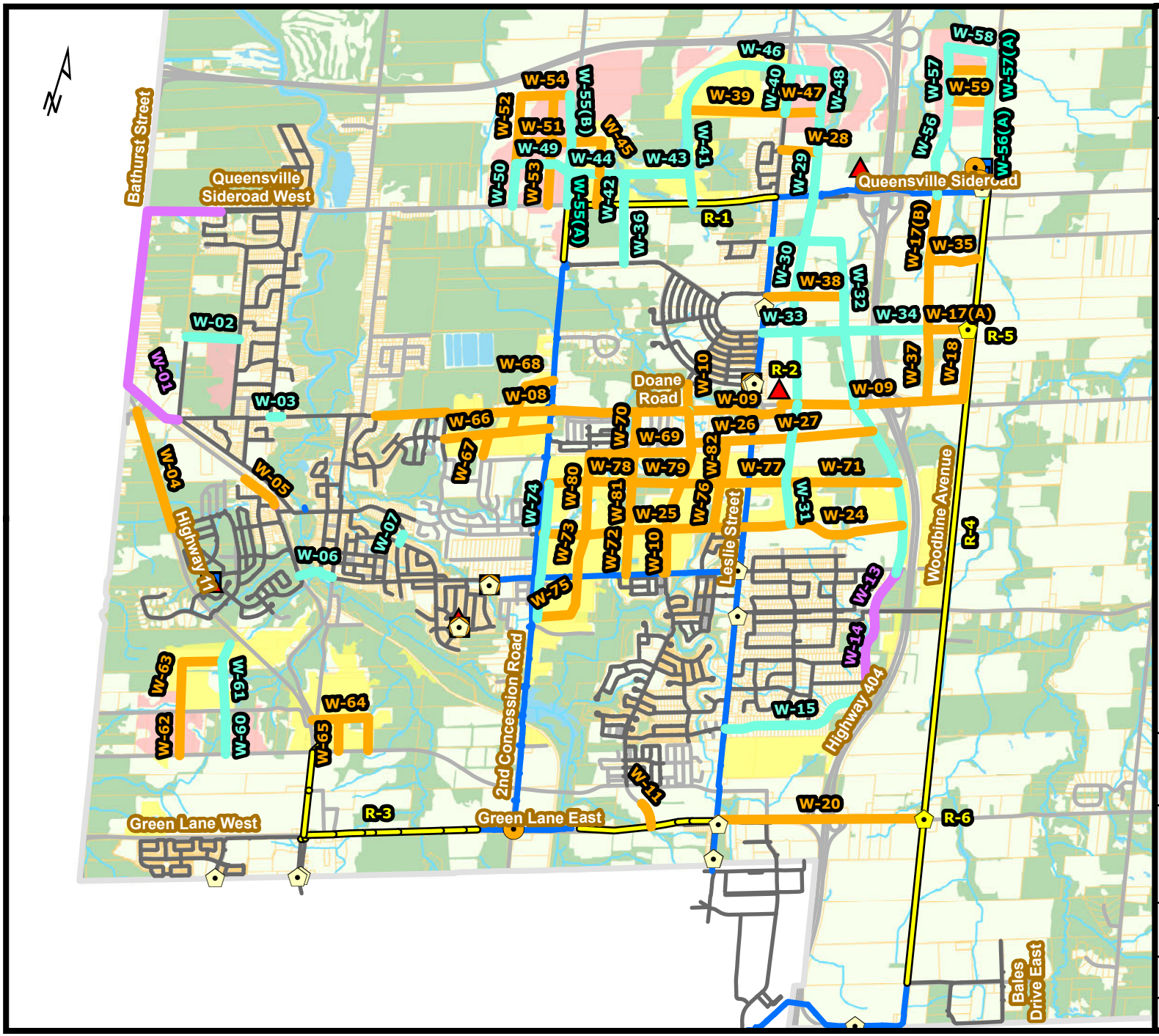
100 Commerce Valley Drive West
Thornhill, ON
L3T 0A1

wsp.com

-LAEmHhHzdJzBlTWfa4Hgs7pbKI

APPENDIX

F CAPITAL COST ESTIMATES



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Town of East Gwillimbury
19000 LESLIE STREET
SHARON, ONTARIO,
CANADA, L0G 1V0
WWW.EASTGWILLIMBURY.CA

LEGEND

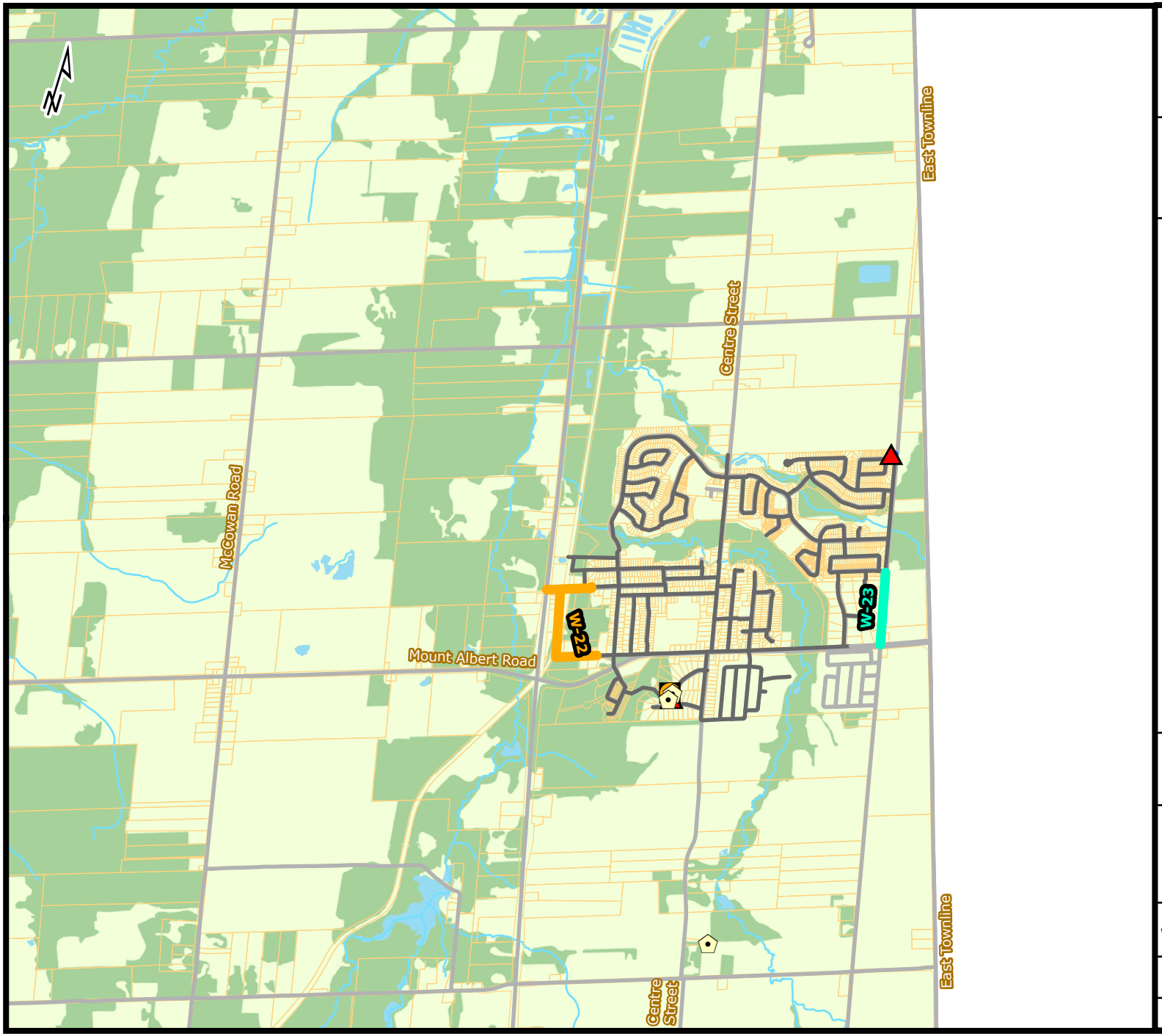
- Existing Region/Town Water Meter Chamber
- Existing Region/Town Well
- Existing Region/Town Water Storage
- Existing Town Water Pump Station
- Existing Town Water Main
- Existing Region Water Main
- Proposed DC Projects
- Proposed Developer Projects
- Proposed Town Projects
- Proposed Future Region Projects
- Rivers
- Waterbodies
- Natural Heritage Features
- Greenbelt
- 70% Whitebelt Lands
- 100% Whitebelt Lands

SCALE:
0 250 500 1,000 m
1:54,591

PROJECT:
Water and Wastewater Master Plan Update
Town of East Gwillimbury

MAP:
WATER RECOMMENDED SERVICING SOLUTION

PROJECT NO.:	DATE:		
171-03399-02			
DRAWN BY:	CHECKED BY:	REPORT:	MAP NO.:
RCO	MA	-	X-X



100 COMMERCE VALLEY DRIVE WEST
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19000 LESLIE STREET
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LEGEND

- Existing Region/Town Water Meter Chamber
- Existing Region/Town Well
- Existing Region/Town Water Storage
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- Rivers
- Waterbodies
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- Greenbelt
- 70% Whitebelt Lands
- 100% Whitebelt Lands

SCALE:
0 250 500 1,000 m
1:35,000

PROJECT:
Water and Wastewater Master Plan Update
Town of East Gwillimbury

MAP:
WATER RECOMMENDED SERVICING SOLUTION

PROJECT NO.:	DATE:		
171-03399-02			
DRAWN BY:	CHECKED BY:	REPORT:	MAP NO.:
RCO	MA	-	X-X

Town of East Gwillimbury
Water and Wastemater Master Plan

Water Project List

Project ID	Location	Category	Project Description	Project Rationale	Municipal Class EA Project Schedule	Jurisdiction	Timing	Funding Source	Implementation	Length (m)	Proposed Diameter (mm)	Pipe Type	Stream Crossing	Railway Crossing	Highway Crossing	Land Acquisition Cost	DC Estimate	Est. Project Cost	Highest $ Value	Final $ Value (Round Up)	Benefit to Existing Rationale	Benefit to Existing %	Benefit to Existing Cost	Developer Responsibilities	Total DC Eligible Cost
W-01	Holland Landing		400mm watermain on Bathurst Street and Queensville Sideroad: from Oriole Drive / Holland Landing Road to Queensville Sideroad West, and then east to Karissa Lane.	Two purposes of project: improve deficient fire flows on Karissa Lane, Amberglen Ct., and French Cres., and provide servicing to customers along Bathurst St. The watermain will connect to the existing network at Oriole Dr and Holland Landing Road. Tunnelling across the railway line will be required at 2 locations	A+	Town	2030-2034	Town	Town	3200	400	PVC		2(Y)				$5,861,393.01	$5,861,393	$5,900,000	This watermain will support water supply to the existing customers along Bathurst St and help address the fire flow deficiency in the existing residential areas along Karissa Lane, Amberglen Ct., and French Cres. Hence, it is 100% Benefit to Existing.	100%	$5,900,000	$0	$0
W-02	Holland Landing		300mm watermain from Sluse Road, approximately 800m north of Oriole Drive, to Park Avenue.	Improves the Insufficient fire flows in the subdivision North of Oriole Dr (southern portion) and provides secondary supply and additional looping to Park Ave. This will also help support the future growth in Whitebelt Land Zone#6.	A+	Town	2030-2034	Cost Shared	Town/Developer	600	300	PVC						$938,550.50	$938,551	$1,000,000	This watermain will help address the fire flow deficiency and maintain the service level in the existing residential areas., as well as support the future growth from Whitebelt Land intensification. The Benefit to Existing share has been calculated based on the high-level assessment of BTE customers/demands of 35%.	35%	$350,000	$0	$650,000
W-03	Holland Landing		Replace existing 200 mm watermain with 300 mm watermain along Oriole Drive from Sand Road to beyond Cotton Court.	Replaces the existing 200 mm with a 300 mm to avoid bottlenecks in flow. Provides better flows to Holland Landing West as well as better serviceability for future development along Holland Landing West	A+	Town	2030-2034	Cost Shared	Town/Developer	200	300	PVC						$312,850.17	$312,850	$400,000	This watermain will support water supply for future development along Holland Landing West as well as provide better flows to the existing developments. The Benefit to Existing share of 84% has been calculated as the unit cost difference between 200mm and 300mm main.	84%	$336,000	$0	$64,000
W-04	Employment Areas		300mm watermain on Highway 11: from Bathurst Street to Crimson King Way.	Provides servicing to the future Employment lands to be located between Highway 11 and Holland Landing Road, north of the existing development.	A+	Town	2030-2034	Developer	Developer	1450	300	PVC						$2,268,163.72	$2,268,164	$2,300,000		0%	$0	$2,300,000	$0
W-05	Employment Areas		300mm watermain on Holland Landing Road: extension to Employment Lands from north of Bradford St to 400m north.	As recommended in updated 2016 DC Study document provided by the Town. This provides an alternate feed to the Employment Lands and provides network looping	A+	Town	2025-2029	Developer	Developer	400	300	PVC						$625,700.34	$625,700	$700,000		0%	$0	$700,000	$0
W-06	Holland Landing		300mm watermain directly across ravine and rail line, from West St to Charlotte Abby Dr.	To provide network security to the community west of Holland Landing Rd. by providing an alternative water supply watermain. Proposed route is shortest route possible, however tunnelling under the ravine will be required. Land is assumed conservation land so no land acquisition costs are considered, however permitting will be required.	B	Town	2025-2029	DC	Town/Developer	300	300	PVC	Y	Y				$2,488,200.00	$2,488,200	$2,500,000		0%	$0	$0	$2,500,000
W-07	Holland Landing		Upsize existing 200 mm watermain linking Stonehill Boulevard to Colony Trail Boulevard to 300mm watermain.	Clears bottleneck along Stonehill Blvd, improves fire flows to Thompson Dr., reduces headloss downstream of the Holland Landing Pump station. Also provides better serviceability for future developments along Holland Landing Central and North	A+	Town	2030-2034	Cost Shared	Town/Developer	100	300	PVC						$156,425.08	$156,425	$200,000	This watermain will support water supply for future development along Holland Landing Center and North as well as provide better flows to the existing developments. The Benefit to Existing share of 84% has been calculated as the unit cost difference between 200mm and 300mm main.	84%	$168,000	$0	$32,000
W-08	Holland Landing		300mm watermain on Doane Road: from Anchor Court to 2nd Concession Road.	Expansion of the existing network to service future developments.	A+	Town	2025-2029	Developer	Developer	1800	300	PVC					$1,838,298	$2,815,651.51	$2,815,652	$2,900,000		0%	$0	$2,900,000	$0
W-09	Holland Landing		300mm watermain on Doane Road: from 2nd Concession Road to Woodbine Avenue.	Expansion of the existing network to service future developments.	A+	Town	2025-2029	Developer	Developer	4100	300	PVC			Y		$5,379,033	$7,086,403.35	$7,086,403	$7,100,000		0%	$0	$7,100,000	$0
W-10	Sharon		300mm watermain on new roadway: north-south collector from Mount Albert Road to Doane Road.	Expansion of the existing network to service future developments.	A+	Town	2025-2029	Developer	Developer	1800	300	PVC					$942,425	$2,815,651.51	$2,815,652	$2,900,000		0%	$0	$2,900,000	$0
W-11	Sharon		300mm watermain on new roadway: north-south collector from Green Lane to the south limit of Official Plan.	Loop the network and close the missing link in the future development	A+	Town	2025-2029	Developer	Developer	300	300	PVC					$307,395	$469,275.25	$469,275	$500,000		0%	$0	$500,000	$0
W-13	Sharon		Upsize 200mm watermain stub along Colonel Wayling Blvd from 200m South of Mount Albert Road to Farr Avenue to 300mm watermain.	Clears bottleneck along Colonel Wayling Blvd – South of Mount Albert Rd. by upsizing the existing 200 mm watermain stub to a 300 mm watermain. Also provides better serviceability for Sharon	A+	Town	2030-2034	Town	Town	400	300	PVC						$625,700.34	$625,700	$700,000	This watermain will clear bottleneck in the existing Sharon community. Hence, it is 100% Benefit to Existing.	100%	$700,000	$0	$0
W-14	Sharon		300mm watermain on Colonel Wayling Boulevard: loop south of Mount Albert Road (missing link).	Required to close the missing link in the watermain network. Across a natural heritage feature, so tunnelling will be required	A+	Town	2030-2034	Town	Town	300	300	PVC					$192,280	$469,275.25	$469,275	$500,000	This watermain is required for pipe connectivity in the existing Sharon community. Hence, it is 100% Benefit to Existing.	100%	$500,000	$0	$0
W-15	Sharon		Upsize 200mm watermain along Colonel Wayling Boulevard between Leslie St. to beyond Ward Avenue to 300mm watermain.	Better serviceability and fire flows within Sharon (existing and future). Improved connectivity to the area between Leslie St. and the 404.	A+	Town	2030-2034	Cost Shared	Town/Developer	1900	300	PVC						$2,972,076.59	$2,972,077	$3,000,000	This watermain will support water supply to the existing and future Sharon community. The Benefit to Existing share of 70% has been calculated as a combination of high-level assessment of the BTE customers/demands (30%) and the unit cost difference between 200mm and 300mm main (84%).	70%	$2,100,000	$0	$900,000
W-17(A)	Employment Areas		300mm watermain on new roadway: from Woodbine Avenue, approx. 700m north of Doane Rd, to approx. 500m west.	Expansion of the existing network to service future developments.	A+	Town	2025-2029	Developer	Developer	500	300	PVC						$782,125.42	$782,125	$800,000		0%	$0	$800,000	$0
W-17(B)	Employment Areas		300mm watermain on new roadway: between Woodbine Avenue and Highway 404, running from Queensville Sideroad to approx. 1.6 km south.	Expansion of the existing network to service future developments.		Town	2025-2029	Developer	Developer	1650	300	PVC						$2,581,013.88	$2,581,014	$2,600,000		0%	$0	$2,600,000	$0
W-18	Employment Areas		300mm watermain on Woodbine Avenue: from Doane Road to 300m North.	Expansion of the existing network to service future developments.	A+	Town	2040-2044	Developer	Developer	300	300	PVC						$469,275.25	$469,275	$500,000		0%	$0	$500,000	$0
W-20	Employment Areas		300mm watermain on Green Lane: from Leslie Street to Woodbine Avenue.	Expansion of the existing network to service future developments & link existing network to Bales Drive sub-division	A+	Town	2040-2044	Developer	Developer	2100	300	PVC					$2,644,284	$3,284,926.76	$3,284,927	$3,300,000		0%	$0	$3,300,000	$0
W-22	Mount Albert		300mm watermain on new roadway: from Princess Street to Albert Street for West Side Water Distribution System - Mount Albert (ICI).	Expansion of the existing network to service future developments.	A+	Town	2025-2029	Developer	Developer	1100	300	PVC		Y				$2,393,650.84	$2,393,651	$2,400,000		0%	$0	$2,400,000	$0
W-23	Mount Albert		300mm watermain on Ninth Line: from Donald Stewart Crescent to south of Mount Albert Road.	Expansion of the existing network to provide a secondary feed to the new development at the South west corner of Mount Albert Road and Ninth Line. The main feed will be directly from Mount Albert Road into the new subdivision. This provides true redundancy as the secondary feed is from a totally different watermain than the primary feed	A+	Town	2025-2029	Cost Shared	Town/Developer	800	300	PVC						$1,251,401	$1,251,401	$1,300,000	This watermain will provide water supply to the new development and provide redundancy (looping) to the existing community. The Benefit to Existing share has been calculated based on the high-level assessment of the BTE customers/demands of 10%.	10%	$130,000	$0	$1,170,000
R-1	Queensville		New Watermain linking Leslie St. and 2nd Concession Rd. along Queensville Sideroad	Provide Servicing to the Town	A+	Region	2030-2034	Region																
R-2	Queensville		New Elevated Tank located at Leslie and Doane + 0.2 km watermain (300 mm)	Provide storage for the Town and for pressure	B	Region	2040-2044	Region																
R-3	Queensville		New Elevated Tank located of Yonge Street, north of Green Lane + 1.1 km watermain (400 mm)	Provide storage for the Town and for pressure	B	Region	2040-2044	Region																
R-4	Employment Areas		New Watermain from Queensville Sideroad to Garfield Wright Blvd. distributing water to the Town	Water supply to the Town	A+	Region	2030-2034	Region																
R-5	Queensville		New Flowmeter chamber (Region-Town flow measurement) along Woodbine Ave. (400 m north of Doane Rd.)	Supply Metering	* A+	Region	2030-2034	Region																
R-6	Queensville		New Flowmeter chamber (Region-Town flow measurement) along Green Lane	Supply Metering	* A+	Region	2030-2034	Region																
R-7	Green Lane / Leslie Street		Install a new transmission main along Green Lane to service growth and allow connection of Newmarket and East Gwillimbury delivery systems. Install a new transmission main along Leslie Street to bring additional Lake Ontario supply as demand increases in the northeast parts of the system.	Water supply to the Town		Region	2030-2034	Region																

Town of East Gwillimbury
Water and Wastemater Master Plan

Water Project List

Project ID	Location	Category	Project Description	Project Rationale	Municipal Class EA Project Schedule	Jurisdiction	Timing	Funding Source	Implementation	Length (m)	Proposed Diameter (mm)	Pipe Type	Stream Crossing	Railway Crossing	Highway Crossing	Land Acquisition Cost	DC Estimate	Est. Project Cost	Highest $ Value	Final $ Value (Round Up)	Benefit to Existing Rationale	Benefit to Existing %	Benefit to Existing Cost	Developer Responsibilities	Total DC Eligible Cost
W-11-DMA	*		Implement District Metered Areas at 7 proposed locations	7 areas defined covering all the parts of the Town: Holland Landing, Sharon, Queensville, Green Lane Area & Mt. Albert	A+	Town	2025-2034	DC	Town/Developer									$546,000	$546,000	$600,000					
W-01A	Holland Landing		Watermain from Sluse Rd. to Queensville Sideroad West at Karissa Ln.	Alternative to W-01. Improve deficicent fire flows on Karissa Lane, Amberglenn Ct., and French Cr., Provides secondary supply and additional looping to Park Ave and Sand Rd. Also provides better serviceability for future development along Queensville Side Rd. Is the most direct connection from an existing network stub, howwver there is no additonal benefit of servicing any unserviced population	A+	Town	2030-2034	DC	Town/Developer	1600	300	PVC						$2,502,801.34	$2,502,801	$2,600,000					
W-06A	Holland Landing		Watermain linking Holland Vista St. to Mt. Albert Rd. (Via Yonge Street)	Alternative to W-06. The proposed route entirely traverses the ROW It is practical to connect from the south of the service area and Yonge St bridge can be used for attaching the watermain to in order to avoid tunnelling under the stream. A railway crossing will be unavoidable.	A+	Town	2025-2029	DC	Town/Developer	900	300	PVC	Y	Y				$7,464,600.00	$7,464,600	$7,500,000					
W-23A	Mount Albert		Watermain along Ninth Line to south of Mount Albert Road	Expansion of the existing network to provide a secondary feed to the new development at the South west corner of Mount Albert Road and Ninth Line. The main feed will be directly from Mount Albert Road into the new subdivision. This alternative provides a secondary feed but does not provide true redundancy as the source of the secondary feed is still from Mount Albert Road	A+	Developer	2025-2029	Developer	Developer	400	300	PVC						$625,700	$625,700	$700,000					

Notes:

1. Level D cost estimate. Costs for excavation, backfill, material, and etc. are not included and should be coordinated with road projects.
2. Costs do not include any costs associated with Studies required for the projects or any Management costs from the Town to administer the projects.
3. Costs based on unit costs and do not represent any site specific conditions.
4. Inflation not accounted for, all costs are in $2018 CAD.
5. Land Acquisition costs are high level estimates. Estimated to be $300,000 per 100 m.
6. W-17(A) and W-17(B) were split up from W-17 in the 2019 Master Plan Update per the 2041 TMP change.

Town of East Gwillimbury
Water and Wastemater Master Plan

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Project ID	Location	Category	Project Description	Project Rationale	Municipal Class EA Project Schedule	Jurisdiction	Timing	Funding Source	Implementation	Length (m)	Proposed Diameter (mm)	Pipe Type	Stream Crossing	Railway Crossing	Highway Crossing	Land Acquisition Cost	DC Estimate	Est. Project Cost	Highest $ Value	Final $ Value (Round Up)	Benefit to Existing %	Benefit to Existing Cost	Alternative Funding Source	Total DC Eligible Cost
W-24	Sharon		300mm watermain on new roadway: from Leslie Street to Colonel Wayling Boulevard extension north of Mount Albert Road.	Expansion of the existing network to service future developments; improve east-west connectivity between Leslie Street and Colonel Wayling Boulevard extension.	A+	Town	2025-2029	Developer	Developer	1600	300	PVC						$2,748,972	$2,748,972	$2,800,000	0%	$0	$2,800,000	$0
W-25	Sharon		300mm watermain on new roadway: from 2nd Concession Road to Leslie Street.	Expansion of the existing network to service future developments; improve east-west connectivity between 2nd Concession Road and Leslie Street.	A+	Town	2035-2039	Developer	Developer	2000	300	PVC						$3,478,540	$3,478,540	$3,500,000	0%	$0	$3,500,000	$0
W-26	Sharon		300mm watermain on new roadway: link Leslie Street to north-south Collector connecting Mount Albert Rd to Doane Rd.	Expansion of the existing network to service future developments.	A+	Town	2025-2029	Developer	Developer	400	300	PVC						$611,862	$611,862	$700,000	0%	$0	$700,000	$0
W-27	Sharon		300mm watermain on east-west collector: link Leslie Street to Colonel Wayling Blvd. extension, north of New Leaf Lane.	Expansion of the existing network to service future developments.	A+	Town	2030-2034	Developer	Developer	1500	300	PVC						$2,512,530	$2,512,530	$2,600,000	0%	$0	$2,600,000	$0
W-28	Queensville		300mm watermain on new roadway: from Leslie Street, approx. 450m north of Queensville Sideroad to approx. 360m east.	Expansion of the existing network to service future developments.	A+	Town	POST 2040	Developer	Developer	400	200	PVC						$520,731	$520,731	$600,000	0%	$0	$600,000	$0
W-29	Queensville		300mm watermain on new roadway: from Queensville Sideroad, approx. 360m east of Leslie Street, to approx. 450m north.	Expansion of the existing network to service future developments.	A+	Town	POST 2040	DC	Town/Developer	500	300	PVC						$769,301	$769,301	$800,000	0%	$0	$0	$800,000
W-30	Queensville		300mm watermain on new roadway: north-south collector from Queensville Sideroad, approx. 360m east of Leslie Street, to approx. 800m south of Doane Road.	Expansion of the existing network to service future developments. This also provides alternative feed between Queensville and Sharon areas.	A+	Town	2030-2034	DC	Town/Developer	2900	300	PVC						$4,941,610	$4,941,610	$5,000,000	0%	$0	$0	$5,000,000
W-31	Sharon		300mm watermain on new roadway: north-south collector approx. 400m east of Leslie Street, from approx. 800m south of Doane Road to approx. 350m north of May Avenue.	Expansion of the existing network to service future developments.	A+	Town	2035-2039	DC	Town/Developer	500	300	PVC						$721,241	$721,241	$800,000	0%	$0	$0	$800,000
W-32	Queensville		300mm watermain on new roadway: from Leslie Street, approx. 450m south of Queensville Sideroad, to approx. 700m east and then approx. 3.2km south to approx. 350m north of May Avenue.	Expansion of the existing network to service future developments. This also provides alternative feed between Queensville and Sharon areas.	A+	Town	2030-2034	DC	Town/Developer	3600	300	PVC						$6,211,796	$6,211,796	$6,300,000	0%	$0	$0	$6,300,000
W-33	Queensville		300mm watermain on new roadway: from Leaslie Street, approx. 700m north of Doane Road, to approx. 810m east.	Expansion of the existing network to service future developments.	A+	Town	2030-2034	DC	Town/Developer	900	300	PVC						$1,399,845	$1,399,845	$1,400,000	0%	$0	$0	$1,400,000
W-34	Queensville		300mm watermain on new roadway: east-west collector approx. 700m north of Doane Road, from approx. 810m east of Leslie Street to to approx. 400m west of Woodbine Avenue.	Expansion of the existing network to service future developments.	A+	Town	2035-2039	DC	Town/Developer	900	300	PVC		Y				$1,435,437	$1,435,437	$1,500,000	0%	$0	$0	$1,500,000
W-35	Employment Areas		300mm watermain on new roadway: from Woodbine Avenue, approx. 650m south of Queensville Sideroad, to approx. 480m west.	Expansion of the existing network to service future developments.	A+	Town	2035-2039	Developer	Developer	500	300	PVC						$825,084	$825,084	$900,000	0%	$0	$900,000	$0
W-36	Queensville		300mm watermain on new roadway: from Queensville Sideroad, approx. 550m east of 2nd Concession Road, to Evans Farm Blvd.	Expansion of the existing network to service future developments; provide better serviceability to the existing Queensville Area	A+	Town	2025-2029	DC	Town/Developer	600	300	PVC						$1,006,059	$1,006,059	$1,100,000	0%	$0	$0	$1,100,000
W-37	Employment Area		300mm watermain on new roadway: from Doane Road, approx. 360m west of Woodbine Avenue, to approx. 710m north.	Expansion of the existing network to service future developments.	A+	Town	2035-2039	Developer	Developer	800	300	PVC						$1,225,265	$1,225,265	$1,300,000	0%	$0	$1,300,000	$0
W-38	Queensville		300mm watermain on new roadway: from Leslie Street, approx. 960m south of Queensville Sideroad, to approx. 800m east.	Expansion of the existing network to service future developments.	A+	Town	2030-2034	Developer	Developer	800	300	PVC						$1,311,754	$1,311,754	$1,400,000	0%	$0	$1,400,000	$0
W-39	Queensville / Whitebelt - Zone 1	70%	200mm watermain on new roadway: from east limit of 70% Whitebelt Lands along Leslie Street, approx. 850m north of Queensville Sideroad to approx. 980m west	Expansion of the existing network to service future developments.	A+	Town	2045-2050	Developer	Developer	1000	200	PVC						$1,423,430	$1,423,430	$1,500,000	0%	$0	$1,500,000	$0
W-40	Queensville / Whitebelt - Zone 1	70%	250mm watermain on Leslie Street: from approx. 850m north of Queensville Sideroad, extending approx. 450m further north	Expansion of the existing network to service future developments.	A+	Town	2045-2050	DC	Town/Developer	500	250	PVC						$701,399	$701,399	$800,000	0%	$0	$0	$800,000

Town of East Gwillimbury
Water and Wastemater Master Plan

Water Project List

Project ID	Location	Category	Project Description	Project Rationale	Municipal Class EA Project Schedule	Jurisdiction	Timing	Funding Source	Implementation	Length (m)	Proposed Diameter (mm)	Pipe Type	Stream Crossing	Railway Crossing	Highway Crossing	Land Acquisition Cost	DC Estimate	Est. Project Cost	Highest $ Value	Final $ Value (Round Up)	Benefit to Existing %	Benefit to Existing Cost	Alternative Funding Source	Total DC Eligible Cost
W-41	Queensville / Whitebelt - Zone 1	70%	300mm watermain on new roadway: from Queensville Sideroad, approx. 820m west of Leslie Street to approx. 930m north	Expansion of the existing network to service future developments.	A+	Town	2040-2044	DC	Town/Developer	1000	300	PVC	Y					$1,607,731	$1,607,731	$1,700,000	0%	$0	$0	$1,700,000
W-42	Queensville / Whitebelt - Zone 1	70%	300mm watermain on new roadway: from Queensville Sideroad, approx. 550m east of 2nd Concession Road to approx. 300m north	Expansion of the existing network to service future developments.	A+	Town	2040-2044	DC	Town/Developer	300	300	PVC	y					$518,889	$518,889	$600,000	0%	$0	$0	$600,000
W-43	Queensville / Whitebelt - Zone 1	70%	300mm watermain on new roadway: approx. 300m north of Queensville Sideroad, from approx. 820m west of Leslie Street to approx. 890m further west	Expansion of the existing network to service future developments.	A+	Town	2040-2044	DC	Town/Developer	900	300	PVC						$1,539,078	$1,539,078	$1,600,000	0%	$0	$0	$1,600,000
W-44	Queensville / Whitebelt - Zone 1	70%	200mm watermain on new roadway: approx. 300m north of Queensville Sideroad, from approx. 300m east of 2nd Concession Road to the west limit of 70% Whitebelt Lands	Expansion of the existing network to service future developments.	A+	Town	2040-2044	DC	Town/Developer	300	200	PVC						$438,469	$438,469	$500,000	0%	$0	$0	$500,000
W-45	Queensville / Whitebelt - Zone 1	70%	300mm watermain on new roadway: from Queensville Sideroad, approx. 300m east of 2nd Concession Road to approx. 630m north and then west to 2nd Concession Road	Expansion of the existing network to service future developments.	A+	Town	2040-2044	Developer	Developer	1000	300	PVC	Y					$1,618,337	$1,618,337	$1,700,000	0%	$0	$1,700,000	$0
W-46	Queensville / Whitebelt - Zone 1	70%	300mm watermain on new roadway: from Leslie Street, approx. 1.3km north of Queensville Sideroad, to approx. 1.3km southwest	Expansion of the existing network to service future developments.	A+	Town	2045-2050	DC	Town/Developer	1300	300	PVC						$2,226,451	$2,226,451	$2,300,000	0%	$0	$0	$2,300,000
W-47	Queensville / Whitebelt - Zone 1	100%	200mm watermain on new roadway: from Leslie Street, approx. 850m north of Queensville Sideroad to approx. 350m east	Expansion of the existing network to service future developments.	A+	Town	POST 2051	Developer	Developer	400	200	PVC						$507,443	$507,443	$600,000	0%	$0	$600,000	$0
W-48	Queensville / Whitebelt - Zone 1	100%	300mm watermain on new roadway: approx. 350m west of Leslie Street, from approx. 440m north of Queensville Sideroad to approx. 800m further north and then west to Leslie Street	Expansion of the existing network to service future developments.	A+	Town	POST 2051	DC	Town/Developer	1200	300	PVC	Y					$1,925,600	$1,925,600	$2,000,000	0%	$0	$0	$2,000,000
W-49	Queensville / Whitebelt - Zone 1	100%	200mm watermain on new roadway: approx. 400m north of Queensville Sideroad, from the west limit of 70% Whitebelt Lands to approx. 480m west	Expansion of the existing network to service future developments.	A+	Town	POST 2051	DC	Town/Developer	600	200	PVC						$806,739	$806,739	$900,000	0%	$0	$0	$900,000
W-50	Queensville / Whitebelt - Zone 1	100%	300mm watermain on new roadway: approx. 540m west of 2nd Concession Road, from Queensville Sideroad to approx. 450m north	Expansion of the existing network to service future developments.	A+	Town	POST 2051	DC	Town/Developer	450	300	PVC						$731,312	$731,312	$800,000	0%	$0	$0	$800,000
W-51	Queensville / Whitebelt - Zone 1	100%	300mm watermain on new roadway: approx. 620m north of Queensville Sideroad, from the west limit of 70% Whitebelt Lands to approx. 530m west	Expansion of the existing network to service future developments.	A+	Town	POST 2051	Developer	Developer	600	300	PVC						$920,930	$920,930	$1,000,000	0%	$0	$1,000,000	$0
W-52	Queensville / Whitebelt - Zone 1	100%	300mm watermain on new roadway: approx. 540m west of 2nd Concession Road, from approx. 450m north of Queensville Sideroad to 700m further north	Expansion of the existing network to service future developments.	A+	Town	POST 2051	Developer	Developer	700	300	PVC						$1,157,043	$1,157,043	$1,200,000	0%	$0	$1,200,000	$0
W-53	Queensville / Whitebelt - Zone 1	100%	300mm watermain on new roadway: approx. 195m west of 2nd Concession Road, from Queensville Sideroad to approx. 1.1km north	Expansion of the existing network to service future developments.	A+	Town	POST 2051	Developer	Developer	1100	300	PVC						$1,883,772	$1,883,772	$1,900,000	0%	$0	$1,900,000	$0
W-54	Queensville / Whitebelt - Zone 1	100%	300mm watermain on new roadway: approx. 1.1km north of Queensville Sideroad, from approx. 550m west of 2nd Concession Road to 2nd Concession Road	Expansion of the existing network to service future developments.	A+	Town	POST 2051	Developer	Developer	500	200	PVC						$701,230	$701,230	$800,000	0%	$0	$800,000	$0
W-55(A)	Queensville / Whitebelt - Zone 1	100%	300mm watermain on 2nd Concession Road: from Queensville Road to approx. 620m north	Expansion of the existing network to service the future developments; better serviceability and fire flow ability	A+	Town	2040-2044	DC	Town/Developer	700	300	PVC						$1,077,096	$1,077,096	$1,100,000	0%	$0	$0	$1,100,000
W-55(B)	Queensville / Whitebelt - Zone 1	100%	300mm watermain on 2nd Concession Road: from approx. 620m north of Queensville Sideroad to approx. 500m further north	Expansion of the existing network to service the future developments; better serviceability and fire flow ability	A+	Town	POST 2051	DC	Town/Developer	500	300	PVC						$815,407	$815,407	$900,000	0%	$0	$0	$900,000
W-56	Queensville / Whitebelt - Zone 2	100%	300mm watermain on new roadway: approx. 420m west of Woodbine Ave, from Queensville Sideroad to the south limit of 70% Whitebelt Land	Expansion of the existing network to service future developments.	A+	Town	2045-2050	DC	Town/Developer	1000	300	PVC	Y					$1,667,951	$1,667,951	$1,700,000	0%	$0	$0	$1,700,000

Town of East Gwillimbury
Water and Wastemater Master Plan

Water Project List

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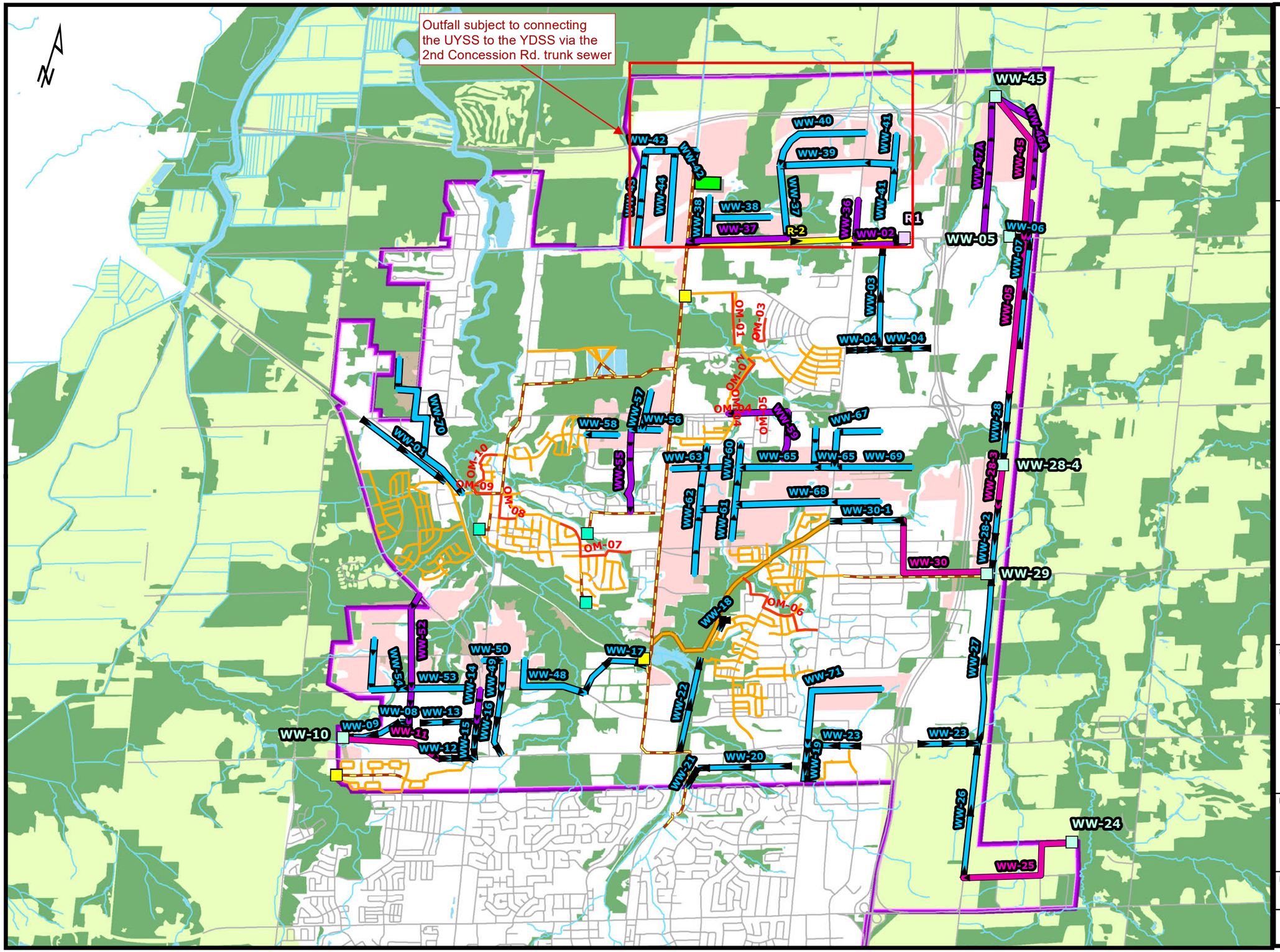
W-56(A)	Queensville / Whitebelt - Zone 2	100%	300mm watermain on Woodbine Avenue: from Queensville Sideroad to the south limit of 70% Whitebelt Land	Expansion of the existing network to service future developments.	A+	Town	2045-2050	DC	Town/Developer	1000	300	PVC						$1,596,223	$1,596,223	$1,600,000	0%	$0	$0	$1,600,000
W-57	Queensville / Whitebelt - Zone 2	100%	200mm watermain on new roadway: along the west limit of 70% Whitebelt Land	Expansion of the existing network to service future developments.	A+	Town	2045-2050	DC	Town/Developer	300	200	PVC						$414,555	$414,555	$500,000	0%	$0	$0	$500,000
W-57 (A)	Queensville / Whitebelt - Zone 2	100%	200mm watermain on Woodbine Ave: along the east limit of 70% Whitebelt Land and extend further north to the north limit of 100% of Whitebelt Land	Expansion of the existing network to service future developments.	A+	Town	2045-2050	DC	Town/Developer	500	200	PVC						$690,925	$690,925	$700,000	0%	$0	$0	$700,000
W-58	Queensville / Whitebelt - Zone 2	100%	200mm watermain on new roadway: approx. 410m west of Woodbine Avenue, from the north limit of 70% Whitebelt Lands to approx. 230m north and then east to Woodbine Avenue	Expansion of the existing network to service future developments.	A+	Town	POST 2051	DC	Town/Developer	700	200	PVC						$680,967	$680,967	$700,000	0%	$0	$0	$700,000
W-59	Queensville / Whitebelt - Zone 2	100%	200mm watermain on new roadway: along the north and south limit of 70% Whitebelt Land	Expansion of the existing network to service future developments.	A+	Town	POST 2051	Developer	Developer	900	200	PVC						$1,243,664	$1,243,664	$1,300,000	0%	$0	$1,300,000	$0
W-60	Green Ln W / Whitebelt - Zone 3	100%	300mm on new roadway: approx. 780m west of Yonge Street, from 820m north of Green Lane to Morning Sideroad	Expansion of the existing network to service future developments.	A+	Town	2035-2039	DC	Town/Developer	400	300	PVC	Y					$633,583	$633,583	$700,000	0%	$0	$0	$700,000
W-61	Green Ln W / Whitebelt - Zone 3	70%	300mm on new roadway: approx. 780m west of Yonge Street, from Morning Sideroad to Highway 11	Expansion of the existing network to service future developments.	A+	Town	2035-2039	DC	Town/Developer	800	300	PVC	Y					$1,285,815	$1,285,815	$1,300,000	0%	$0	$0	$1,300,000
W-62	Green Ln W / Whitebelt - Zone 3	100%	300mm on new roadway: approx. 1.25km west of Yonge Street, from Green Lane to Morning Sideroad	Expansion of the existing network to service future developments.	A+	Town	2035-2039	Developer	Developer	400	300	PVC						$663,055	$663,055	$700,000	0%	$0	$700,000	$0
W-63	Green Ln W / Whitebelt - Zone 3	70%	300mm on new roadway: approx. 1.25km west of Yonge Street, from Morning Sideroad to approx. 540m north and then approx. 400m east	Expansion of the existing network to service future developments.	A+	Town	2035-2039	Developer	Developer	1000	300	PVC						$1,629,232	$1,629,232	$1,700,000	0%	$0	$1,700,000	$0
W-64	Green Ln W / Whitebelt - Zone 3	70%	300mm watermain on new roadway: approx. 550m east of Yonge Street, from 820m north of Green Land to approx. 330m north and then approx. 550m west	Expansion of the existing network to service future developments.	A+	Town	2035-2039	Developer	Developer	900	300	PVC						$1,518,121	$1,518,121	$1,600,000	0%	$0	$1,600,000	$0
W-65	Green Ln W / Whitebelt - Zone 3	70%	300mm watermain on new roadway: approx. 260m east of Yonge Street, from 820m north of Green Lane to approx. 330m north	Expansion of the existing network to service future developments.	A+	Town	2035-2039	Developer	Developer	400	300	PVC						$551,132	$551,132	$600,000	0%	$0	$600,000	$0
W-66	Holland Landing / Whitebelt - Zone 4	70%	300mm watermain on new roadway: approx. 190m south of Doane Road, from 2nd Concession Road to Silk Twist Drive	Expansion of the existing network to service future developments.	A+	Town	2040-2044	Developer	Developer	1100	300	PVC						$1,803,865	$1,803,865	$1,900,000	0%	$0	$1,900,000	$0
W-67	Holland Landing / Whitebelt - Zone 4	70%	300mm watermain on new roadway: N-S collector approx. 600m west of 2nd Concession Road	Expansion of the existing network to service future developments.	A+	Town	2040-2044	Developer	Developer	300	300	PVC						$388,359	$388,359	$400,000	0%	$0	$400,000	$0
W-68	Holland Landing / Whitebelt - Zone 4	70%	300mm watermain on new roadway: from 2nd Concession Road, approx. 300m north of Doane Road, to approx. 290m west and then approx. 470m south	Expansion of the existing network to service future developments.	A+	Town	2040-2044	Developer	Developer	800	300	PVC						$1,305,799	$1,305,799	$1,400,000	0%	$0	$1,400,000	$0
W-69	Sharon / Whitebelt - Zone 5	70%	200mm watermain on new roadway: E-W collector approx. 400m south of Doane Road, from 420m east of 2nd Concession Rd to 1km east	Expansion of the existing network to service future developments.	A+	Town	2025-2029	Developer	Developer	1000	200	PVC						$1,463,230	$1,463,230	$1,500,000	0%	$0	$1,500,000	$0
W-70	Sharon / Whitebelt - Zone 5	70%	200mm watermain on new roadway: approx. 870m east of 2nd Concession Road, from Doane Road to approx. 400m south	Expansion of the existing network to service future developments.	A+	Town	2025-2029	Developer	Developer	500	200	PVC						$589,084	$589,084	$600,000	0%	$0	$600,000	$0
W-71	Sharon / Whitebelt - Zone 5	70%	300mm watermain on new roadway: E-W collector between Leslie Street and Highway 404, approx. 340m south of Doane Road	Expansion of the existing network to service future developments.	A+	Town	2030-2034	Developer	Developer	1100	300	PVC						$1,914,103	$1,914,103	$2,000,000	0%	$0	$2,000,000	$0

Town of East Gwillimbury
Water and Wastemater Master Plan

Water Project List

Project ID	Location	Category	Project Description	Project Rationale	Municipal Class EA Project Schedule	Jurisdiction	Timing	Funding Source	Implementation	Length (m)	Proposed Diameter (mm)	Pipe Type	Stream Crossing	Railway Crossing	Highway Crossing	Land Acquisition Cost	DC Estimate	Est. Project Cost	Highest $ Value	Final $ Value (Round Up)	Benefit to Existing %	Benefit to Existing Cost	Alternative Funding Source	Total DC Eligible Cost
W-72	Sharon / Whitebelt - Zone 5	70%	200mm watermain on new roadway: approx. 870m east of 2nd Concession Road, from Mount Albert Road to approx. 910m north	Expansion of the existing network to service future developments.	A+	Town	2035-2039	Developer	Developer	1000	200	PVC						$1,333,035	$1,333,035	$1,400,000	0%	$0	$1,400,000	$0
W-73	Sharon / Whitebelt - Zone 5	70%	200mm watermain on new roadway: approx. 450m east of 2nd Concession Road, from Mount Albert Road to approx. 950m north	Expansion of the existing network to service future developments.	A+	Town	2035-2039	Developer	Developer	1000	200	PVC	Y					$1,384,928	$1,384,928	$1,400,000	0%	$0	$1,400,000	$0
W-74	Sharon / Whitebelt - Zone 5	70%	300mm watermain on 2nd Concession Road: from approx. 910m north of Mount Albert Road and to approx. 410m south of Mount Albert Road	Expansion of the existing network to service future developments and provide better serviceability via additional looping.	A+	Town	2035-2039	DC	Town/Developer	1400	300	PVC						$2,285,766	$2,285,766	$2,300,000	0%	$0	$0	$2,300,000
W-75	Sharon / Whitebelt - Zone 5	70%	300mm watermain on new roadway: from Mount Albert Road to the south and then east to 2nd Concession Road	Expansion of the existing network to service future developments.	A+	Town	2035-2039	Developer	Developer	800	300	PVC						$1,303,828	$1,303,828	$1,400,000	0%	$0	$1,400,000	$0
W-76	Sharon / Whitebelt - Zone 5	70%	300mm watermain on new roadway: N-S collector approx. 300m west of Leslie Street, from 460m north of Mount Albert Road to 500m further north	Expansion of the existing network to service future developments.	A+	Town	2035-2039	Developer	Developer	500	300	PVC						$768,104	$768,104	$800,000	0%	$0	$800,000	$0
W-77	Sharon / Whitebelt - Zone 5	70%	300mm watermain on new roadway: E-W collector approx. 860m north of Mount Albert Road from 300m west of Leslie Street o 350m east of Leslie Street	Expansion of the existing network to service future developments.	A+	Town	2035-2039	Developer	Developer	700	300	PVC						$1,119,131	$1,119,131	$1,200,000	0%	$0	$1,200,000	$0
W-78	Sharon / Whitebelt - Zone 5	70%	300mm watermain on new roadway: from 2nd Concession Road, approx. 670m south of Doane Road, to approx. 860m east	Expansion of the existing network to service future developments.	A+	Town	2035-2039	Developer	Developer	900	300	PVC						$1,492,659	$1,492,659	$1,500,000	0%	$0	$1,500,000	$0
W-79	Sharon / Whitebelt - Zone 5	70%	300mm watermain on new roadway: E-W collector approx. 860m north of Mount Albert Road, from approx. 290m west of Leslie Street to approx. 870m further west	Expansion of the existing network to service future developments.	A+	Town	2040-2044	Developer	Developer	900	300	PVC						$1,516,898	$1,516,898	$1,600,000	0%	$0	$1,600,000	$0
W-80	Sharon / Whitebelt - Zone 5	70%	300mm watermain on new roadway: approx. 420m east of 2nd Concession Rd from the south limit of York Minster Boulevard to approx. 270m south	Expansion of the existing network to service future developments.	A+	Town	2040-2044	Developer	Developer	300	200	PVC						$385,024	$385,024	$400,000	0%	$0	$400,000	$0
W-81	Sharon / Whitebelt - Zone 5	70%	300mm watermain on new roadway: N-S collector approx. 870m east of 2nd Concession Road, from 400m south of Doane Road to 300m further south	Expansion of the existing network to service future developments.	A+	Town	2040-2044	Developer	Developer	300	200	PVC						$430,749	$430,749	$500,000	0%	$0	$500,000	$0
W-82	Sharon / Whitebelt - Zone 5	70%	300mm watermain on new roadway: N-S collector approx. 260m west of Leslie Street, from 300m south of Doane Road to 500m further south	Expansion of the existing network to service future developments.	A+	Town	2040-2044	Developer	Developer	500	300	PVC						$729,321	$729,321	$800,000	0%	$0	$800,000	$0

Notes:
1. Level D cost estimate. Costs for excavation, backfill, material, and etc. are not included and should be coordinated with road projects.
2. Costs do not include any costs associated with Studies required for the projects or any Management costs from the Town to administer the projects.
3. Costs based on unit costs and do not represent any site specific conditions.
4. Inflation not accounted for, all costs are in $2021 CAD.
5. Land Acquisition costs are high level estimates. Estimated to be $300,000 per 100 m.



100 COMMERCE VALLEY DRIVE WEST
THORNHILL, ONTARIO,
CANADA, L3T 0A1
WWW.WSPGROUP.COM

Town of East Gwillimbury
19000 LESLIE STREET
SHARON, ONTARIO,
CANADA, L0G 1V0
WWW.EASTGWILLIMBURY.CA

LEGEND

- Existing Town Wastewater Pumping Station
- Existing Region Wastewater Pumping Station
- Proposed Region Wastewater Pumping Station
- Proposed Town Wastewater Pumping Station
- Proposed Forcemain Projects (Region)
- Proposed Wastewater O&M Projects
- Proposed Gravity Sewers Projects (Developer)
- Proposed Gravity Sewers Projects (Town)
- Proposed Forcemain Projects (Town)
- Existing Sewer
- Sharon Trunk
- Existing Forcemain
- Proposed Water Reclamation Centre Site
- Service Area
- Natural Heritage Feature
- Greenbelt
- Whitebelt Lands

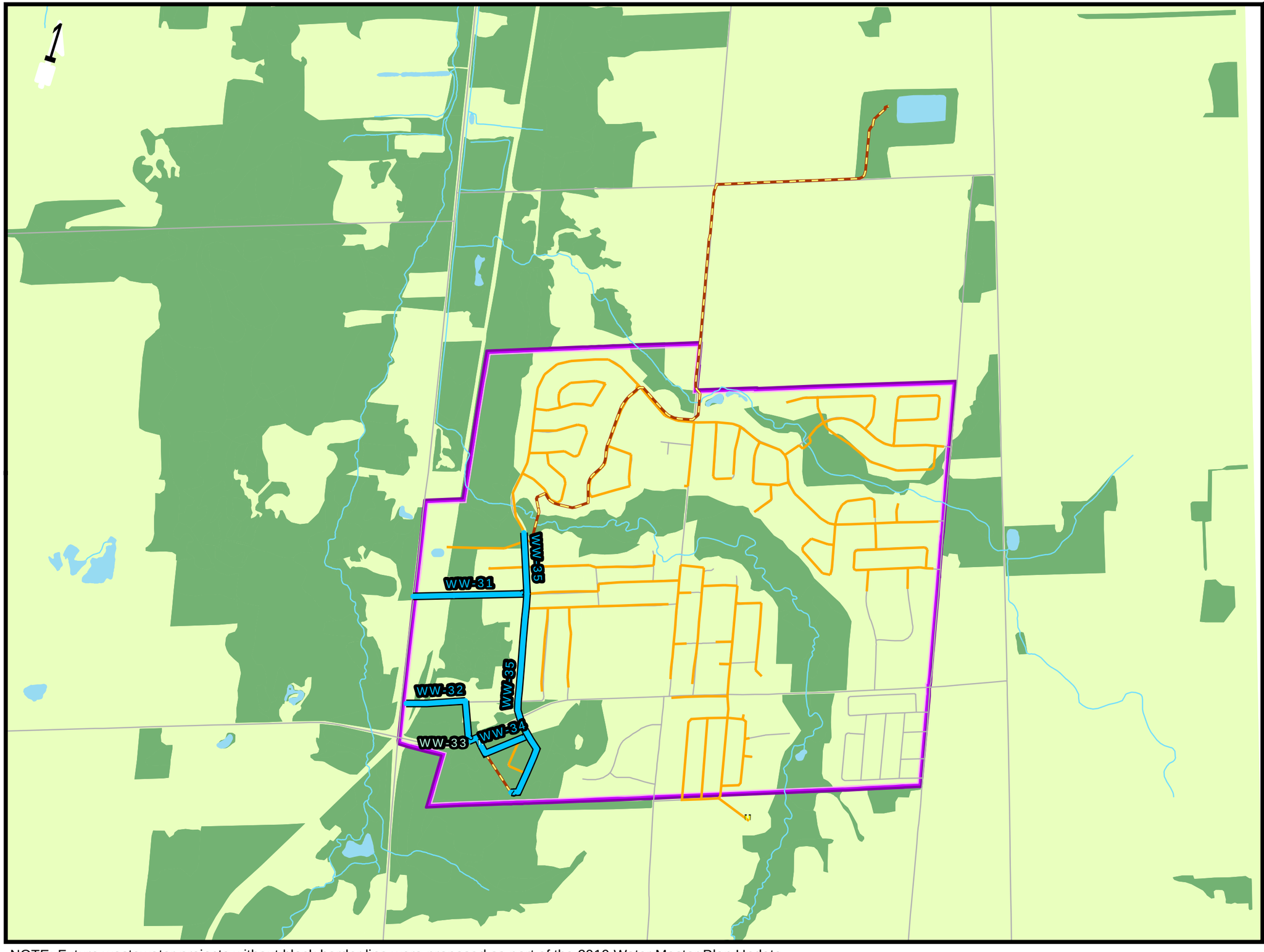
SCALE:
0 250 500 1,000 m
1:45,000

PROJECT:
Water and Wastewater Master Plan Update

Town of East Gwillimbury

MAP:
WASTEWATER RECOMMENDED PROJECTS (WITH CATCHMENTS)

PROJECT NO.:	DATE:		
171-03399-00			
DRAWN BY:	CHECKED BY:	REPORT:	MAP NO.:
RCO	MA	-	X-X



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LEGEND

- Existing Town Wastewater Pumping Station
- Existing Region Wastewater Pumping Station
- Proposed Region Wastewater Pumping Station
- Proposed Town Wastewater Pumping Station
- Proposed Forcemain Projects (Region)
- Proposed Wastewater O&M Projects
- Proposed WBL Gravity Sewers Projects (Developer)
- Proposed WBL Gravity Sewers Projects (Town)
- Proposed WBL Forcemain Projects
- Existing Sewer
- Sharon Trunk
- Existing Forcemain
- Proposed Water Reclamation Centre Site
- Service Area
- Natural Heritage Feature
- Greenbelt
- Whitebelt Lands

SCALE:
0 120 240 480 m
1:15,000

PROJECT:
Water and Wastewater Master Plan Update

Town of East Gwillimbury

MAP:
WASTEWATER RECOMMENDED PROJECTS (MOUNT ALBERT)

PROJECT NO.:	DATE:		
171-03399-00			
DRAWN BY:	CHECKED BY:	REPORT:	MAP NO.:
RCO	MA	-	X-X

NOTE: Future wastewater projects without black border line were proposed as part of the 2019 Water Master Plan Update

Town of East Gwillimbury Water and Wastemater Master Plan

Wastewater Project List

Project ID	Location	Project Description	Project Rationale	Jurisdiction	Timing	Funding Source	Implementation	PS Size (L/s)	Length (m)	Proposed Diameter (mm)	Pipe Type	Railway Crossing	Highway Crossing	Land Acquisition	Construction Costs - PS's	DC Estimate	Est. Project Cost	Highest $ Value	Final $ Value (Round Up)	Benefit to Existing %	Benefit to Existing Population	Alternative Funding Source	Total DC Eligible Cost
WW-01	Holland Landing	Holland Landing Rd Sewer Extension North to Employment Lands	Required for Servicing of future employment lands between Holland Landing Rd. and Highway 11. Previously recommended in the DC Study. Gravity sewer to flow southwards towards existing colelction system along Holland Landing Road	Town	2025-2029	Developer	Developer		950	450	PVC					$1,200,000	$ 1,503,936	$1,503,936	$1,600,000	0%	$0	$1,600,000	$0
WW-02	Queensville	Queensville Side Rd Trunk Sewer: Leslie St. to Region PS-5	Servicing of the existing development on Leslie Street, north of Queensville Sideroad. Gravity sewer to flow to the proposed Regional pumping station R1 on Queensville Sideroad	Town	2040-2044	DC	Town/Developer		1300	675	Concrete					$3,011,712	$ 2,397,921	$3,011,712	$3,100,000	0%	$0	$0	$3,100,000
WW-03	Queensville	Gravity sewer located east of Leslie St. flowing northwards to Regional PS R1 on Queensville Sideroad	Servicing of new developments east of Leslie St. and south of Queensville Sideroad.	Town	2025-2029	Developer	Developer		1700	525	PVC						$ 3,340,825	$3,340,825	$3,400,000	0%	$0	$3,400,000	$0
WW-04	Queensville	Gravity collection sewer feeding into the trunk sewer that conveys wastewater to Regional PS R1 on Queensville Sideroad	Servicing of new developments east of Leslie St. and north of Doane Rd.	Town	2025-2029	Developer	Developer		1000	250	PVC						$ 1,296,885	$1,296,885	$1,300,000	0%	$0	$1,300,000	$0
WW-05	Queensville	PS 4: North of Queensville Side Rd, west of Woodbine, including forcemain to Regional Pumping Station R1	Point of collection for sewers east of 404 and conveyance of wastewater across Highway 404 to the Regional Pumping station R1	Town	2040-2044	Developer	Developer	60	1500	400	PVC			$250,000	$7,000,000	$3,447,125	$ 7,250,000	$7,250,000	$7,300,000	0%	$0	$7,300,000	$0
WW-06	Queensville	Queensville Side Rd Trunk Sewer: Woodbine Ave to PS 4	Conveyance of flow from Woodbine sewers to PS 4	Town	2030-2034	Developer	Developer		250	675	Concrete					$647,882	$ 461,139	$647,882	$700,000	0%	$0	$700,000	$0
WW-07	Queensville	Gravity sewer northwards along Woodbine Ave to sewers runing along Queensville Sideroad towards PS 4, located east of the 404.	Servicing of the developments along Woodbine Ave. to Queensville Sideroad.	Town	2025-2029	Developer	Developer		1700	525	PVC						$ 3,340,825	$3,340,825	$3,400,000	0%	$0	$3,400,000	$0
WW-08	Green Lane	Feeder gravity sewer into trunk sewer which leads to PS 9	Servicing of the development north of Green Ln. and west of Yonge St.	Town	2025-2029	Developer	Developer		400	250	PVC						$ 518,754	$518,754	$600,000	0%	$0	$600,000	$0
WW-09	Green Lane	Gravity sewer westwards towards PS9 (located north of Green Lane and West of Yonge St.)	Servicing of the development north of Green Ln. and west of Yonge St.	Town	2025-2029	Developer	Developer		900	450	PVC						$ 1,424,782	$1,424,782	$1,500,000	0%	$0	$1,500,000	$0
WW-10	Green Lane	PS 9: North of Green Lane, West of Yonge St	Wastewater collection for the development north of Green Ln. and west of Yonge St.,	Town	2030-2034	Developer	Developer	50	PS	NA	NA			$250,000	$6,000,000	$1,454,750	$ 6,250,000	$6,250,000	$6,300,000	0%	$0	$6,300,000	$0
WW-11	Green Lane	Forcemain eastwards from Pumping station PS 9 and then southeast to Green ln.	Conveyance of wastewater from PS 9 servicing the development north of Green Ln. and west of Yonge St. towards Green Lane	Town	2025-2029	Developer	Developer		1500	300	PVC						$ 1,577,296	$1,577,296	$1,600,000	0%	$0	$1,600,000	$0
WW-12	Green Lane	Gravity trunk sewer eastwards along Green Ln. towards Yonge St.	Conveyance of flow from the forcemain along Green Lane	Town	2025-2029	Developer	Developer		500	500	PVC						$ 982,596	$982,596	$1,000,000	0%	$0	$1,000,000	$0
WW-13	Green Lane	Gravity collector sewer eastwards towards Yonge St. (located north of Green Ln.)	Servicing of the development north of Green Ln. and west of Yonge St.	Town	2025-2029	Developer	Developer		700	300	PVC						$ 998,854	$998,854	$1,000,000	0%	$0	$1,000,000	$0
WW-14	Green Lane	Gravity collector sewer southwards along Yonge St. to Green Ln.	Conveyance of flows southwards along Yonge Street towards begininning of WW-15	Town	2025-2029	Developer	Developer		500	350	PVC						$ 747,929	$747,929	$800,000	0%	$0	$800,000	$0
WW-15	Green Lane	Gravity collector sewer southwards along Yonge St.	Conveyance of flows southwards along Yonge Street towards Green Lane (from WW-13 and WW-14)	Town	2025-2029	Developer	Developer		400	250	PVC						$ 518,754	$518,754	$600,000	0%	$0	$600,000	$0
WW-16	Green Lane	N/S Trunk Sewer: East of Yonge St, North of Green Lane	Servicing of the development north of Green Ln. and east of Yonge St.	Town	2030-2034	Developer	Developer		850	375	PVC					$500,940	$ 1,271,479	$1,271,479	$1,300,000	0%	$0	$1,300,000	$0
WW-17	Green Lane	Cove Farm to Pick to 2nd Concession Pumping Station	Servicing of the development west of 2nd Concession Road	Town	2025-2029	Developer	Developer		1200	600	PVC	Y				$394,680	$1,857,969	$ 1,857,969	$1,900,000	0%	$0	$1,900,000	$0
WW-18	Green Lane	Pumping Station: South of Green Lane, East of 2nd Concession (Incl. Forcemain)		Town	2030-2034	Developer	Developer	225	NA	NA	NA			$400,000	$12,500,000	$2,365,550	$ 12,900,000	$12,900,000	$12,900,000	0%	$0	$12,900,000	$0
WW-19	Green Lane	Leslie Street Gravity Trunk Sewer: Green Lane to the Newmarket Boundary North to Green Lane	Redirecting of flows from Green Lanes Southwards to the Harry Walker Network	Town	2030-2034	Developer	Developer		550	250	PVC					$441,738	$ 713,287	$713,287	$800,000	0%	$0	$800,000	$0
WW-20	Green Lane	East-West Sewer south of Green Lane: Carratuck Lands to River	Servicing of new development South of Green Lane and west of Leslie	Town	2030-2034	Developer	Developer		1600	250	PVC					$641,355	$ 2,075,015	$2,075,015	$2,100,000	0%	$0	$2,100,000	$0
WW-21	Green Lane	North-South Sewer: Limit of Ladyfield to Newmarket PS	Servicing of new development South of Green Lane and west of Leslie	Town	2030-2034	Developer	Developer		500	250	PVC					$273,240	$ 648,442	$648,442	$700,000	0%	$0	$700,000	$0
WW-22	Green Lane	South Sharon Collector Trunk Sewer: Sharon West Limit South to Green Lane & East to Leslie St	Conveyance of flows from Leslie Street via Hydro Corridor to the Sharon Sewer	Town	2025-2029	Developer	Developer		2900	950	Concrete					$2,914,497	$ 7,790,136	$7,790,136	$7,800,000	0%	$0	$7,800,000	$0
WW-23	Green Lane	Green Lane Trunk Sewer: Woodbine Ave. to Leslie	Conveyance of flows from Woodbine Ave. sewer towards Leslie Street	Town	2025-2029	Developer	Developer		4100	950	Concrete					$15,000,000	$ 18,590,071	$18,590,071	$18,600,000	0%	$0	$18,600,000	$0
WW-24	Employment Areas	Pumping Station PS-1: Bales Drive	Collection of wastewater via local sewers in the Woodbine Ave./Davis Dr. area and pumping via forcemain to discharge location on Woodbine Ave.	Town	2040-2044	Cost Share	Town/Developer	60	NA	NA	NA			$250,000	$7,000,000	$13,598,750	$ 7,250,000	$13,598,750	$13,600,000	54%	$4,750,000	$0	$8,850,000
WW-25	Employment Areas	Forcemain from Bales Dr PS to Woodbine Ave	Conveyance of pumped flows from PS 1 to Woodbine Ave. gravity sewer at Garfield Wright Blvd.	Town	2040-2044	Cost Share	Town/Developer		1700	350	PVC					$2,941,884	$ 1,939,509	$2,941,884	$3,000,000	54%	$1,050,000	$0	$1,950,000
WW-26	Employment Areas	Woodbine Ave Trunk Sewer: Garfield Wright Blvd. to Green Lane	Conveyance of wastewater from Garfield Wright Blvd. towards Green Lane along Woodbine Ave.	Town	2040-2044	Developer	Developer		1700	600	PVC					$2,163,150	$ 5,289,611	$5,289,611	$5,300,000	0%	$0	$5,300,000	$0

Town of East Gwillimbury Water and Wastemater Master Plan

Wastewater Project List

Project ID	Location	Project Description	Project Rationale	Jurisdiction	Timing	Funding Source	Implementation	PS Size (L/s)	Length (m)	Proposed Diameter (mm)	Pipe Type	Railway Crossing	Highway Crossing	Land Acquisition	Construction Costs - PS's	DC Estimate	Est. Project Cost	Highest $ Value	Final $ Value (Round Up)	Benefit to Existing %	Benefit to Existing Population	Alternative Funding Source	Total DC Eligible Cost
WW-27	Employment Areas	Woodbine Ave Trunk Sewer: Green Lane to PS-2	Servicing of 404 employment lands along Woodbine Ave.(south of PS-2)	Town	2025-2029	Developer	Developer		3700	950	Concrete					$34,000,000	$ 16,776,405	$34,000,000	$34,000,000	0%	$0	$34,000,000	$0
WW-28	Employment Areas	Trunk Sewer: North of Doane Rd. to Woodbine PS	Servicing of 404 employment lands along Woodbine Ave.(north of PS-2)	Town	2040-2044	Developer	Developer		700	450	PVC						$ 1,108,163	$1,108,163	$1,200,000	0%	$0	$1,200,000	$0
WW-28-2	Employment Areas	Northeast Sharon Trunk Sewer: North of Doane Rd. to PS-2	Servicing of 404 employment lands along Woodbine Ave.(north of PS-2)	Town	2040-2044	Developer	Developer		600	250	PVC						$ 778,131	$778,131	$800,000	0%	$0	$800,000	$0
WW-28-3	Employment Areas	Forcemain from Woodbine PS	Servicing of 404 employment lands along Woodbine Ave.(north of PS-2)	Town	2040-2044	Developer	Developer		200	375	PVC						$ 251,647	$251,647	$300,000	0%	$0	$300,000	$0
WW-28-4	Employment Areas	Pumping Station: Woodbine Road (South of Doane)	Servicing of 404 employment lands along Woodbine Ave.(north of PS-2)	Town	2040-2044	Developer	Developer	200	NA	NA	NA			$250,000	$11,000,000	$9,127,300	$ 11,250,000	$11,250,000	$11,300,000	0%	$0	$11,300,000	$0
WW-29	Employment Areas	PS-2: Woodbine and Mount Albert Road	Collection of wastewater from 404 Employment Lands and pumping via forcemain to discharge location on Sharon Trunk	Town	2025-2029	Developer	Developer	300	NA	NA	NA			$250,000	$10,000,000	$9,127,300	$ 10,250,000	$10,250,000	$10,300,000	0%	$0	$10,300,000	$0
WW-30	Employment Areas	Forcemain from PS-2 to Sharon Trunk	Conveyance of pumped flows from PS 2 to Sharon Trunk	Town	2025-2029	Developer	Developer		1800	450	PVC		Y				$ 2,558,130	$2,558,130	$2,600,000	0%	$0	$2,600,000	$0
WW-30-1	Employment Areas	Gravity sewer from PS-2 forcemain to Sharon Trunk	Conveyance of pumped flows from PS 2 to Sharon Trunk	Town	2025-2029	Developer	Developer		1000	500	PVC						$ 1,627,951	$1,627,951	$1,700,000	0%	$0	$1,700,000	$0
WW-31	Mt. Albert	Gravity collection sewer to service the North Service Area and feeding into the Princess Street Sewer	Servicing of new Mount Albert West Employment lands	Town	2025-2029	Developer	Developer		250	250	PVC	Y					$ 324,221	$324,221	$400,000	0%	$0	$400,000	$0
WW-32	Mt. Albert	Gravity collection sewer to service the South Service Area and feeding into the new pumping station	Servicing of new Mount Albert West Employment lands	Town	2025-2029	Developer	Developer		600	250	PVC						$ 778,131	$778,131	$800,000	0%	$0	$800,000	$0
WW-33	Mt. Albert	Pumping station in Mount Albert West (ICI)	Collection of wastewater from Mount Albert West Employment Lands and pumping via forcemian to discharge location on Don Rose Blvd.	Town	2025-2029	Developer	Developer	140	NA	NA	NA			$300,000	$11,000,000	$2,209,533	$ 11,300,000	$11,300,000	$11,300,000	0%	$0	$11,300,000	$0
WW-34	Mt. Albert	Forcemain from new Mt Albert West Pumping Station to Don Rose Boulevard	Conveyance of pumped flows from Mount Albert West PS to Don Rose Boulevard	Town	2025-2029	Developer	Developer		200	600	PVC						$ 435,860	$435,860	$500,000	0%	$0	$500,000	$0
WW-35	Mt Albert	Upsizing of gravity sewer along King St	Accommodate flows coming from ICI lands in the Mount Albert area	Town	2025-2029	Developer	Developer		1500	450	PVC						$ 2,374,636	$2,374,636	$2,400,000	0%	$0	$2,400,000	$0
R-1	Queensville	New 140 L/s Pumping Station PS 4: Queensville Side Rd, West of Woodbine		Region	2030-2034	Region	Region	140															
R-2	Queensville	New Forcemain from Region Pumping Station PS 4 to 2nd Concesssion Rd.		Region	2030-2034	Region	Region		3000	600													
OM-01	Queensville	O&M: Flushing, and Limit I/I to 50% of design allowance to avoid surcharge of sewer Pipe IDs: SAN_SL_790 and SAN_SL_789, located north of Doane Rd. and east of 2nd Concession Rd.	Avoid surcharge of sewer or potential requirement to upsize sewer	Town	2025-2029	Town	Town																
OM-02	Queensville	O&M: Flushing, and Limit I/I to 50% of design allowance to avoid surcharge of sewer Pipe IDs: SAN_SL_1418, SAN_SL_1419, SAN_SL_1405, SAN_SL_783, located north of Doane Rd. and east of 2nd Concession Rd.	Avoid surcharge of sewer or potential requirement to upsize sewer	Town	2025-2029	Town	Town																
OM-03	Queensville	O&M: Flushing, and Limit I/I to 50% of design allowance to avoid surcharge of sewer Pipe IDs: SAN_SL_1722, SAN_SL_1739, SAN_SL_1731, SAN_SL_1665, SAN_SL_1740, SAN_SL_1641, located north of Doane Rd. and east of 2nd Concession Rd.	Avoid surcharge of sewer or potential requirement to upsize sewer	Town	2025-2029	Town	Town																
OM-04	Queensville	O&M: Flushing, and Limit I/I to 50% of design allowance to avoid surcharge of sewer Pipe IDs: SAN_SL_1411, SAN_SL_1412, SAN_SL_1404, located south of Doane Rd. and west of Leslie St.	Avoid surcharge of sewer or potential requirement to upsize sewer	Town	2025-2029	Town	Town																
OM-05	Queensville	O&M: Flushing, and Limit I/I to 50% of design allowance to avoid surcharge of sewer Pipe ID: SAN_SL_1796, located south of Doane Rd. and west of Leslie St.	Avoid surcharge of sewer or potential requirement to upsize sewer	Town	2025-2029	Town	Town																
OM-06	Queensville	O&M: Flushing, and Limit I/I to 50% of design allowance to avoid surcharge of sewer Pipe IDs: , SAN_SL_1200, SAN_SL_1201, SAN_SL_1202, SAN_SL_1303: located west of Leslie St. and south of Mt. Albert Rd.	Avoid surcharge of sewer or potential requirement to upsize sewer	Town	2025-2029	Town	Town																

Town of East Gwillimbury Water and Wastemater Master Plan

Wastewater Project List

Project ID	Location	Project Description	Project Rationale	Jurisdiction	Timing	Funding Source	Implementation	PS Size (L/s)	Length (m)	Proposed Diameter (mm)	Pipe Type	Railway Crossing	Highway Crossing	Land Acquisition	Construction Costs - PS's	DC Estimate	Est. Project Cost	Highest $ Value	Final $ Value (Round Up)	Benefit to Existing %	Benefit to Existing Population	Alternative Funding Source	Total DC Eligible Cost
OM-07	Holland Landing	O&M: Flushing, and Limit I/I to 50% of design allowance to avoid surcharge of sewer Pipe IDs: SAN_SL_38, located along Olive St. and Dutch Settler's Ct. to Thompson SPS	Avoid surcharge of sewer or potential requirement to upsize sewer	Town	2025-2029	Town	Town																
OM-08	Holland Landing	O&M: Flushing, and Limit I/I to 50% of design allowance to avoid surcharge of sewer Pipe IDs: SAN_SL_1366, SAN_SL_1364, SAN_SL_1364B, SAN_SL_1362, located along Colony Trail Blvd., Peggs Crescent and Mt. Albert Rd.	Avoid surcharge of sewer or potential requirement to upsize sewer	Town	2025-2029	Town	Town																
OM-09	Holland Landing	O&M: Flushing, and Limit I/I to 50% of design allowance to avoid surcharge of sewer Pipe IDs: SAN_SL_184, SAN_SL_183, SAN_SL_185, located along Kitching Dr. towards Yonge St. and the sewer north of Walker Rd. along Yonge St.	Avoid surcharge of sewer or potential requirement to upsize sewer	Town	2025-2029	Town	Town																
OM-10	Holland Landing	O&M: Flushing, and Limit I/I to 50% of design allowance to avoid surcharge of sewer Pipe IDs: , located along Bradford St. westwards from Yonge St. towards Thompson SPS	Avoid surcharge of sewer or potential requirement to upsize sewer	Town	2025-2029	Town	Town																

Notes:
1. Level D Estimates
2. Costs do not include any costs associated with Studies required for the projects or any Management costs from the Town to administer the projects
3. Costs based on unit costs and do not represent any site specific conditions
4. Inflation not accounted for, all costs are in $2018 CAD
5. Sewers/forcemains on existing undeveloped land are assumed to be constructed as part of a street ROW by developer. No land acquisition costs assumed
6. Land Acquisition Cost assumed to be as provided below
7. Pumping Station Construction costs can vary significantly depending on the nature of the soils, the type of superstructure, equipment, complexity etc. based on previous projects estimtes of $6M to $12.5M for pumping stations in the 50 - 225 L/s range

Land Acquisition Cost

Based on Project in Bradford/West Gwillimbury 4 Acres, cost $500,000 (Rural, Developer owned)

Assume cost of $250,000 Per Acre

Area required for a pumping station: 50 m x 50 m (0.7 Acres). Assume 1 Acre required

Town of East Gwillimbury Water and Wastewater Project List

Project ID	Location	Category	Project Description	Project Rationale	Jurisdiction	Timing	Funding Source	Implementation	PS Size (L/s)	Length (m)	Proposed Diameter (mm)	Pipe Type	Stream Crossing	Railway Crossing	Highway Crossing	Land Acquisition	Construction Costs - PS's	DC Estimate	Est. Project Cost	Highest $ Value	Final $ Value (Round Up)	Benefit to Existing Population %	Benefit to Existing Population	Alternative Funding Source	Total DC Eligible Cost
WW-36	Whitebelt Zone 1	70%	N/S gravity sewer connecting to the trunk sewer on Queensville Sideroad that conveys wastewater to the future Water Reclamation Plant	DC project to service the future developments within the Whitebelt Land located north of Queensville Sideroad	Town	2030-2034	DC	Town/Developer		500	250	PVC							$ 1,118,833	$1,118,833	$1,200,000	0%	$0	$0	$1,200,000
WW-37	Whitebelt Zone 1	70%	N/S collection sewer within the 70% Whitebelt Land north of Queensville Sideroad	Servicing of new developments within the 70% Whitebelt Land located north of Queensville Sideroad and east of Second Concession Rd.	Town	2040-2044	DC	Town/Developer		2100	375-450	PVC	Y						$ 3,939,654	$3,939,654	$4,000,000	0%	$0	$0	$4,000,000
	Whitebelt Zone 1	100%	Sewer to be upsized to service the 100% Whitebelt Land Development	Sewer to be upsized to service the 100% Whitebelt Land Development	Town	Post 2051	DC	Town/Developer		900	450-525	PVC	Y						$ 2,402,321	$2,402,321	$2,500,000	0%	$0	$0	$2,500,000
WW-38	Whitebelt Zone 1	70%	Gravity sewer within the 70% Whitebelt Land north of Queensville Sideroad and east of Second Concession Rd.	Servicing of new developments within the 70% Whitebelt Land located north of Queensville Sideroad and east of Second Concession Rd.	Town	2040-2044	Developer	Developer		1400	250	PVC	Y						$ 3,190,585	$3,190,585	$3,200,000	0%	$0	$3,200,000	$0
	Whitebelt Zone 1	100%	Sewer to be upsized to service the 100% Whitebelt Land Development	Servicing of new developments within the 100% Whitebelt Land	Town	Post 2051	Developer	Developer		400	300	PVC	Y						$ 807,144	$807,144	$900,000	0%	$0	$900,000	$0
WW-39	Whitebelt Zone 1	70%	W/E gravity sewer within the 70% Whitebelt Land north of Queensville Sideroad and east of Second Concession Rd.	Servicing of new developments within the 70% Whitebelt Land located north of Queensville Sideroad and east of Second Concession Rd.	Town	2045-2050	Developer	Developer		1100	250	PVC							$ 2,427,855	$2,427,855	$2,500,000	0%	$0	$2,500,000	$0
	Whitebelt Zone 1	100%	Sewer to be upsized to service the 100% Whitebelt Land Development	Servicing of new developments within the 100% Whitebelt Land	Town	Post 2051	Developer	Developer		1100	375	PVC							$ 2,697,617	$2,697,617	$2,700,000	0%	$0	$2,700,000	$0
WW-40	Whitebelt Zone 1	70%	Gravity sewer within the 70% Whitebelt Land north of Queensville Sideroad and east of Second Concession Rd.	Servicing of new developments within the 70% Whitebelt Land located north of Queensville Sideroad and east of Second Concession Rd.	Town	2045-2050	Developer	Developer		1400	250	PVC							$ 3,301,631	$3,301,631	$3,400,000	0%	$0	$3,400,000	$0
	Whitebelt Zone 1	100%	Sewer to be upsized to service the 100% Whitebelt Land Development	Servicing of new developments within the 100% Whitebelt Land	Town	Post 2051	Developer	Developer		400	300	PVC							$ 383,947	$383,947	$400,000	0%	$0	$400,000	$0
WW-41	Whitebelt Zone 1	100%	Gravity collection sewer within the 100% Whitebelt Land, connecting to the proposed sewer network in the 70% Whitebelt Land, north of Queensville Sideroad and east of Second Concession Rd.	Servicing of new developments within the 100% Whitebelt Land located north of Queensville Sideroad and east of Second Concession Rd.	Town	Post 2051	Developer	Developer		1100	250-375	PVC							$ 2,627,563	$2,627,563	$2,700,000	0%	$0	$2,700,000	$0
WW-42	Whitebelt Zone 1	100%	Gravity sewer within the 100% Whitebelt Land conveying wastewater to the future Water Reclamation Plant	Servicing of new developments within the 100% Whitebelt Land located north of Queensville Sideroad and west of Second Concession Rd.	Town	Post 2051	Developer	Developer		1000	250-375	PVC							$ 3,282,544	$3,282,544	$3,300,000	0%	$0	$3,300,000	$0
WW-43	Whitebelt Zone 1	100%	S/N gravity sewer within the 100% Whitebelt Land north of Queensville Sideroad and west of Second Concession Rd.	Servicing of new developments within the 100% Whitebelt Land located north of Queensville Sideroad and west of Second Concession Rd.	Town	Post 2051	Developer	Developer		1400	250	PVC							$ 3,085,676	$3,085,676	$3,100,000	0%	$0	$3,100,000	$0
WW-44	Whitebelt Zone 1	100%	S/N gravity sewer within the 100% Whitebelt Land north of Queensville Sideroad and west of Second Concession Rd.	Servicing of new developments within the 100% Whitebelt Land located north of Queensville Sideroad and west of Second Concession Rd.	Town	Post 2051	Developer	Developer		1400	250	PVC							$ 3,083,205	$3,083,205	$3,100,000	0%	$0	$3,100,000	$0
WW-45	Whitebelt Zone 2	N/A	Future PS north of Queensville Sideroad and west of Woodbine Ave.	Collection of wastewater from the Whitebelt Land and pumping via forcemain to the Woodbine trunk sewer.	Town	2045-2050	DC	Town/Developer	100	N/A	N/A	N/A					$250,000	$10,000,000	$10,250,000	$10,250,000	$10,300,000	0%	$0	$0	$10,300,000
WW-46A	Whitebelt Zone 2	100%	N/S gravity collection sewer on Woodbine Ave., north of Queensville Sideroad.	DC project to service the Whitebelt Land developments west of Woodbine Ave. and north of Queensville Sideroad.	Town	2045-2050	DC	Town/Developer		1900	250	PVC							$ 4,273,556	$4,273,556	$4,300,000	0%	$0	$0	$4,300,000
WW-47A	Whitebelt Zone 2	100%	N/S gravity collection sewer west of Woodbine Ave., north of Queensville Sideroad., connecting to WW-45	DC project to service the Whitebelt Land developments west of Woodbine Ave. and north of Queensville Sideroad.	Town	2045-2050	DC	Town/Developer		1800	250	PVC	Y						$ 4,005,062	$4,005,062	$4,100,000	0%	$0	$0	$4,100,000
WW-48	Whitebelt Zone 3	70%	Gravity sewer feeding to the trunk sewer on Second Concession Rd. that conveys wastewater to the Second Concession SPS	Servicing of new developments within the 70% Whitebelt Land located north of Green Ln. and east of Yonge St.	Town	2025-2029	Developer	Developer		600	250	PVC							$ 1,859,686	$1,859,686	$1,900,000	0%	$0	$1,900,000	$0
WW-49	Whitebelt Zone 3	70%	Gravity sewer within the 70% Whitebelt Land located north of Green Ln. and east of Yonge St.	Servicing of new developments within the 70% Whitebelt Land located north of Green Ln. and east of Yonge St.	Town	2025-2029	Developer	Developer		300	250	PVC							$ 488,358	$488,358	$500,000	0%	$0	$500,000	$0
WW-50	Whitebelt Zone 3	70%	Gravity sewer within the 70% Whitebelt Land located north of Green Ln. and east of Yonge St.	Servicing of new developments within the 70% Whitebelt Land located north of Green Ln. and east of Yonge St.	Town	2035-2039	Developer	Developer		500	250	PVC							$ 989,001	$989,001	$1,000,000	0%	$0	$1,000,000	$0
WW-51	Whitebelt Zone 3	70%	Gravity sewer extending north on Yonge St., north of Green Ln.	DC project to service the future developments within the Whitebelt Land located north of Green Ln.	Town	2025-2029	DC	Town/Developer		400	250	PVC							$ 913,375	$913,375	$1,000,000	0%	$0	$0	$1,000,000
WW-52	Whitebelt Zone 3	70%	N/S gravity sewer feeding into the trunk sewer that conveys wastewater to the future PS5.	Servicing of new developments within the Whitebelt Land located north of Green Ln. and east of Yonge St.	Town	2035-2039	DC	Town/Developer		1100	250-300	PVC	Y						$ 2,527,053	$2,527,053	$2,600,000	0%	$0	$0	$2,600,000
WW-53	Whitebelt Zone 3	100%	E/W gravity sewer within the 100% Whitebelt Land north of Green Ln. and west of Yonge St.	Servicing of new developments within the 100% Whitebelt Land located north of Green Ln. and west of Yonge St.	Town	2035-2039	Developer	Developer		900	250	PVC							$ 1,987,690	$1,987,690	$2,000,000	0%	$0	$2,000,000	$0
WW-54	Whitebelt Zone 3	100%	Gravity sewer within the Whitebelt Land north of Green Ln. and west of Yonge St.	Servicing of new developments within the Whitebelt Land located north of Green Ln. and west of Yonge St.	Town	2035-2039	Developer	Developer		1100	250	PVC							$ 2,352,922	$2,352,922	$2,400,000	0%	$0	$2,400,000	$0
WW-55	Whitebelt Zone 4	70%	Gravity sewer south of Doane Rd. and west of Second Concession Rd., connecting to the Holland Landing network	DC project to service the future developments in the 70% Whitebelt Land located west of Second Concession Rd.	Town	2025-2029	DC	Town/Developer		600	250	PVC							$ 1,217,724	$1,217,724	$1,300,000	0%	$0	$0	$1,300,000

Town of East Gwillimbury Water and Wastewater Project List

Project ID	Location	Category	Project Description	Project Rationale	Jurisdiction	Timing	Funding Source	Implementation	PS Size (L/s)	Length (m)	Proposed Diameter (mm)	Pipe Type	Stream Crossing	Railway Crossing	Highway Crossing	Land Acquisition	Construction Costs - PS's	DC Estimate	Est. Project Cost	Highest $ Value	Final $ Value (Round Up)	Benefit to Existing Population %	Benefit to Existing Population	Alternative Funding Source	Total DC Eligible Cost
WW-56	Whitebelt Zone 4	70%	Gravity sewer within the 70% Whitebelt Land located west of Second Concession Rd. and south of Doane Rd.	Servicing of new developments within the 70% Whitebelt Land located west of Second Concession Rd. and south of Doane Rd.	Town	2040-2044	Developer	Developer		500	250	PVC							$ 1,031,163	$1,031,163	$1,100,000	0%	$0	$1,100,000	$0
WW-57	Whitebelt Zone 4	70%	Gravity sewer within the 70% Whitebelt Land located west of Second Concession Rd. and south of Doane Rd.	Servicing of new developments within the 70% Whitebelt Land located west of Second Concession Rd. in Holland Landing	Town	2040-2044	Developer	Developer		600	250	PVC							$ 1,323,256	$1,323,256	$1,400,000	0%	$0	$1,400,000	$0
WW-58	Whitebelt Zone 4	70%	Gravity sewer within the 70% Whitebelt Land tieing into the Holland Landing network on Beckett Ave.	Servicing of new developments within the 70% Whitebelt Land located west of Second Concession Rd. in Holland Landing	Town	2040-2044	Developer	Developer		400	250	PVC							$ 916,332	$916,332	$1,000,000	0%	$0	$1,000,000	$0
WW-59	Whitebelt Zone 5	70%	Gravity sewer south of Doane Rd. and east of Second Concession Rd., tieing into the Queensville network on Doane Rd.	Servicing of new developments within the 70% Whitebelt Land located west of Leslie St. and south of Doane Rd.	Town	2025-2029	DC	Town/Developer		1100	250	PVC							$ 2,409,035	$2,409,035	$2,500,000	0%	$0	$0	$2,500,000
WW-60	Whitebelt Zone 5	70%	S/N gravity sewer within the 70% Whitebelt Land located east of Second Concession Rd. and south of Doane Rd., tieing into the Queensville Village network	Servicing of new developments within the 70% Whitebelt Land located east of Second Concession Rd. and south of Doane Rd.	Town	2025-2029	Developer	Developer		500	300	PVC							$ 1,109,156	$1,109,156	$1,200,000	0%	$0	$1,200,000	$0
WW-61	Whitebelt Zone 5	70%	S/N gravity sewer extension within the 70% Whitebelt Land located west of Second Concession Rd. and south of Doane Rd., connecting to Project WW-60	Servicing of new developments within the 70% Whitebelt Land located east of Second Concession Rd. between Doane Rd. and Mount Albert Rd.	Town	2035-2039	Developer	Developer		800	250	PVC							$ 1,715,562	$1,715,562	$1,800,000	0%	$0	$1,800,000	$0
WW-62	Whitebelt Zone 5	70%	S/N gravity collection sewer within the 70% Whitebelt Land located east of Second Concession Rd. and south of Doane Rd., tieing into the	Servicing of new developments within the 70% Whitebelt Land located east of Second Concession Rd. between Doane Rd. and Mount Albert Rd.	Town	2035-2039	Developer	Developer		1600	250	PVC	Y						$ 3,685,926	$3,685,926	$3,700,000	0%	$0	$3,700,000	$0
WW-63	Whitebelt Zone 5	70%	Gravity sewers within the 70% Whitebelt land, connecting to WW-62	Servicing of new developments within the 70% Whitebelt Land located east of Second Concession Rd. and south of Doane Rd.	Town	2035-2039	Developer	Developer		800	250	PVC							$ 1,738,073	$1,738,073	$1,800,000	0%	$0	$1,800,000	$0
WW-64	Whitebelt Zone 5	70%	Gravity sewer within the 70% Whitebelt land, connecting to WW-62	Servicing of new developments within the 70% Whitebelt Land located east of Second Concession Rd. and south of Doane Rd.	Town	2035-2039	Developer	Developer		400	250	PVC							$ 802,337	$802,337	$900,000	0%	$0	$900,000	$0
WW-65	Whitebelt Zone 5	70%	E/W gravity collection sewer within the 70% Whitebelt Land between Second Concession Rd. and	Servicing of new developments within the 70% Whitebelt Land located east of Second Concession Rd. and south of Doane Rd.	Town	2030-2034	Developer	Developer		1200	300	PVC							$ 2,874,334	$2,874,334	$2,900,000	0%	$0	$2,900,000	$0
WW-66	Whitebelt Zone 5	70%	Gravity sewer within the Whitebelt Land, connecting to WW-65	Servicing of new developments within the 70% Whitebelt Land located east of Second Concession Rd. and south of Doane Rd.	Town	2035-2039	Developer	Developer		700	250	PVC							$ 1,460,518	$1,460,518	$1,500,000	0%	$0	$1,500,000	$0
WW-67	Whitebelt Zone 5	70%	Gravity sewer within the Whitebelt Land, connecting to WW-65	Servicing of new developments within the 70% Whitebelt Land located east of Second Concession Rd. and south of Doane Rd.	Town	2030-2034	Developer	Developer		1000	250	PVC							$ 2,324,460	$2,324,460	$2,400,000	0%	$0	$2,400,000	$0
WW-68	Whitebelt Zone 5	70%	Gravity sewer within the Whitebelt Land, connecting to WW-61	Servicing of new developments within the 70% Whitebelt Land located east of Second Concession Rd. and south of Doane Rd.	Town	2035-2039	Developer	Developer		1800	250	PVC							$ 4,089,815	$4,089,815	$4,100,000	0%	$0	$4,100,000	$0
WW-69	Whitebelt Zone 5	70%	E/W Gravity sewer within the Whitebelt Land, connecting to WW-65	Servicing of new developments within the 70% Whitebelt Land located east of Second Concession Rd. and south of Doane Rd.	Town	2035-2039	Developer	Developer		1000	250	PVC							$ 2,157,480	$2,157,480	$2,200,000	0%	$0	$2,200,000	$0
WW-70	Whitebelt Zone 6	70%	Gravity sewer west of Park Ave., connecting to the N/S gravity collection sewer along Park Ave. at Sunrise St.	Servicing of new developments within the 70% Whitebelt Land located west of Park Ave.	Town	Post 2051	Developer	Developer		2300	250	PVC							$ 3,357,000	$3,357,000	$3,400,000	0%	$0	$3,400,000	$0
WW-71	Whitebelt Zone 5	70%	Gravity sewer east of Leslie and along Leslie, connecting to the E/W future gravity collection sewer WW-23 along Green Lane.	Servicing of new developments within the 70% Whitebelt Land located east of Leslie St.	Town	2030-2034	Developer	Developer		1600	250	PVC							$ 3,685,926	$3,685,926	$3,700,000	0%	$0	$3,700,000	$0

Notes:
1. Level D Estimates. Estimates shown above only consider the proposed sewer. Costs for excavation, backfill, pavement, material, and etc. are not included.
2. Costs do not include any costs associated with Studies required for the projects or any Management costs from the Town to administer the projects
3. Costs based on unit costs and do not represent any site specific conditions
4. Inflation not accounted for, all costs are in $2021 CAD
5. Sewers/forcemains on existing undeveloped land are assumed to be constructed as part of a street ROW by developer. No land acquisition costs assumed
6. Land Acquisition Cost for pump station projects assumed to be as provided below
7. Pumping Station Construction costs can vary significantly depending on the nature of the soils, the type of superstructure, equipment, complexity etc. based on previous projects estimtes of $6M to $12.5M for pumping stations in the 50 - 225 L/s range

Land Acquisition Cost

Based on Project in Bradford/West Gwillimbury 4 Acres, cost $500,000 (Rural, Developer owned)

Assume cost of $250,000 Per Acre

Area required for a pumping station: 50 m x 50 m (0.7 Acres). Assume 1 Acre required

APPENDIX

G CONSULTATION

East Gwillimbury

Notice of Study Commencement

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WATER AND WASTEWATER MASTER PLAN UPDATE

PROJECT DESCRIPTION

This notice of commencement is being issued to ensure administrative compliance and also to provide all stakeholders with a status of the work that is being undertaken. The Town of East Gwillimbury previously initiated a Water and Wastewater Master Plan (W/WWMP) Study in 2017 to provide a sustainable blueprint for the planned growth and servicing needs to the 2041 year and serve as an update to the 2010 W/WWMP by identifying long-term strategies for servicing current and future populations.

In 2019, the Town initiated an Official Plan Review, which included a land needs assessment to accommodate land use growth projections to the year 2051. The W/WWMP is being further updated to address the water and wastewater servicing needs to 2051 while accounting for a new study context including updated servicing policies and plans by York Region and the Province of Ontario.

The Study will meet the Town's Water and Wastewater Services mission:

The Town of East Gwillimbury is projected to experience significant population and employment growth over the next 30 years. As a result of this growth, a safe, efficient, and reliable supply of water and wastewater services to the Town will become increasingly important and challenging and the Town's water and wastewater systems will need to be expanded as necessary to accommodate this growth.

The W/WWMP will be prepared in accordance with the requirements of the Municipal Class Environmental Assessment (Class EA) process (October 2000, as amended in 2007, 2011, and 2015). The Town of East Gwillimbury is completing this Master Plan addressing Phase 1 – Problem or Opportunity, and Phase 2 – Alternative Solutions of the Municipal Engineers Association (MEA) Class EA process. The Study is conducted at a broad level of assessment in which site-specific Class EA's for all recommended Schedule 'B' projects are to be completed in the future, closer to the time of the projects' implementation.

CONSULTATION

Public consultation is vital to the success of this Master Plan. We encourage all residents to provide input throughout the Study. Various opportunities for public consultation are planned throughout the Master Plan Process. Public Information Centres (PICs) will take place to present the Study, proposed alternatives, and recommended solutions. The members of the public will also be able to interact directly with the project team. Advertisement of the PICs will be made in advance through newspaper ads, the Town website, social media and hardcopy or electronic mailings. Once the Study is complete, the Master Plan will be filed for public review.

Project updates and notices will be posted on the Town's website at **www.eastgwillimbury.ca/WWWMP** to inform the public of the progress of the W/WWMP. Residents and interested parties are encouraged to regularly visit the website to learn more about the Study. In addition to project updates and notices posted on the Town's website, residents and interested parties can contact a member of the project team to receive email updates/notices about the project.

QUESTIONS/MAILING LIST

If you have any questions or concerns, or would like to be added to the Study mailing list to receive updates and notices via email, please contact a member of the project team:

Denny S. Boskovski, C.E.T.
Asset Management and Capital Project Manager
Town of East Gwillimbury, 19000 Leslie St., Sharon, Ontario L0G 1V0
905-478-4283 ext. 3818 | Fax: 905-478-8545
dboskovski@eastgwillimbury.ca

Antoine Lahaie, P.Eng, PMP
Consultant Manager & Project Manager
WSP Canada Inc., 100 Commerce Valley Drive, Thornhill, ON L3T 0A1
289-982-4454
antoine.lahaie@wsp.com

Comments and information regarding this Municipal Class Environmental Assessment are being collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become a part of the public record. For further information please contact a member of the project team.
Notice re-issued on February 9, 2023.

NOTICE OF PUBLIC INFORMATION CENTRE #1

TOWN OF EAST GWILLIMBURY WATER AND WASTEWATER MASTER PLAN

The Town of East Gwillimbury has initiated a Water and Wastewater Master Plan Study to provide a sustainable blueprint for the planned growth of the Town to the ultimate planning horizon of 2041. The Master Plan will serve as an update to the 2009 Water and Wastewater Master Plan by building upon sustainable servicing policies and plans developed by York Region and the Province of Ontario.

The Town is committed to managing growth in a responsible manner, planning for the safe, efficient and reliable water and wastewater servicing, and ultimately achieving the Town's vision for a safe, accessible and liveable community. With these goals in mind, the Master Plan will provide a roadmap to guide infrastructure phasing to service long-term growth and define policies and programs required to meet the Town's projected water and wastewater servicing needs.

THE PROCESS

The Water and Wastewater Master Plan will be conducted in accordance with the requirements of the Municipal Class Environmental Assessment (Class EA) process (October 2000, as amended in 2007, 2011, and 2015). The Town of East Gwillimbury is completing this Master Plan addressing Phase 1 – Problem or Opportunity, and Phase II – Alternative Solutions of the Municipal Class EA process. Activities encompassed by Phase I and Phase II are:

- Phase I will assess existing conditions, context and challenges; and
- Phase II will develop water and wastewater servicing plans and identify triggers for different infrastructure needs, phasing of projects and an action plan.

PUBLIC INFORMATION CENTRE (PIC) #1

PIC #1 will introduce the study to you, provide information on the existing conditions and seek your input on identifying opportunities, challenges, and ideas for the future vision of water and wastewater servicing in the Town.

Date: **Thursday March 22nd, 2018**
Time: **5:30-7:30 PM: Drop-in Interactive Open House**
Location: **East Gwillimbury Sports Complex, Canada Hall**
1914B Mount Albert Road, Sharon, ON L0G 1V0

CONTACTS

If you require additional information or would like to be placed on the project contact list, please visit the Town's website at www.eastgwillimbury.ca/projects or contact one of the individuals below:

OR

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This Notice first issued March 8, 2018

Town of East Gwillimbury

Station 3

Water and Wastewater Master Plan Update

Town of East Gwillimbury

PROJECT OVERVIEW

The Town of East Gwillimbury has retained WSP to update their **Water and Wastewater Master Plan**, in order to ensure accommodation of the expected population of developments to increase to the year 2041. As a result of this growth, **safe**, **efficient**, and **reliable** supply of water and wastewater services to the Town will become increasingly important and challenging, and the Town's water and wastewater systems will need to be expanded as necessary to accommodate this growth. The Master Plan provides a **'roadmap'** of water and wastewater infrastructure requirements based on existing and future capacity deficiencies identified, as well as associated cost details and recommended implementation timing.

OBJECTIVES

- Complete a comprehensive review of background documentation, existing water and wastewater system and key relevant studies
- Calculate the future water and wastewater flows based on future expected populations provided by York Region
- Review and update the Town's current water and wastewater models based on existing infrastructure and population **(Boards 9 and 10)**
- Identify opportunities and constraints to improve the water and wastewater network based on existing and future populations.
- Develop alternative water and wastewater servicing solutions for future growth scenarios
- Evaluate the alternatives, using a set of criteria determined as part of the Master Plan, to arrive at preferred water and wastewater servicing solutions **(Board 7)**
- Prepare cost details and implementation timing for recommended servicing strategies.

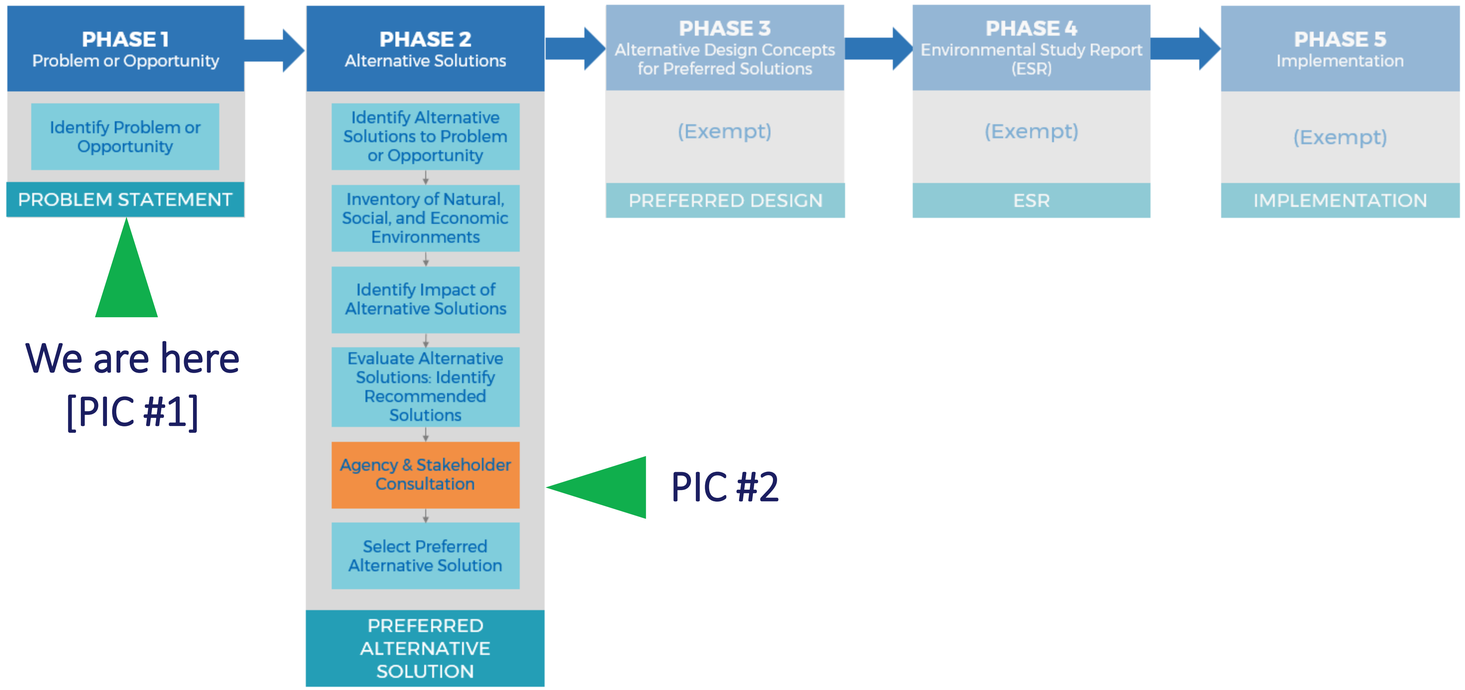
The Municipal Class Environmental Assessment (EA) under the Ontario Environmental Assessment Act was approved in 1990 as a way to streamline the planning of municipal infrastructure. The process was designed to protect the environment, receive stakeholder and resident feedback, and ensure a transparent evaluation and decision process. The Municipal Class EA Planning and Design process include a total of 5 phases. The required phases to be completed are based on the type of study that is being conducted.

At a minimum, a Master Plan must follow the first 2 phases. Phases 3 through 5 are usually completed as part of a separate process when the time comes to implement the projects.

MASTER PLANNING PROCESS

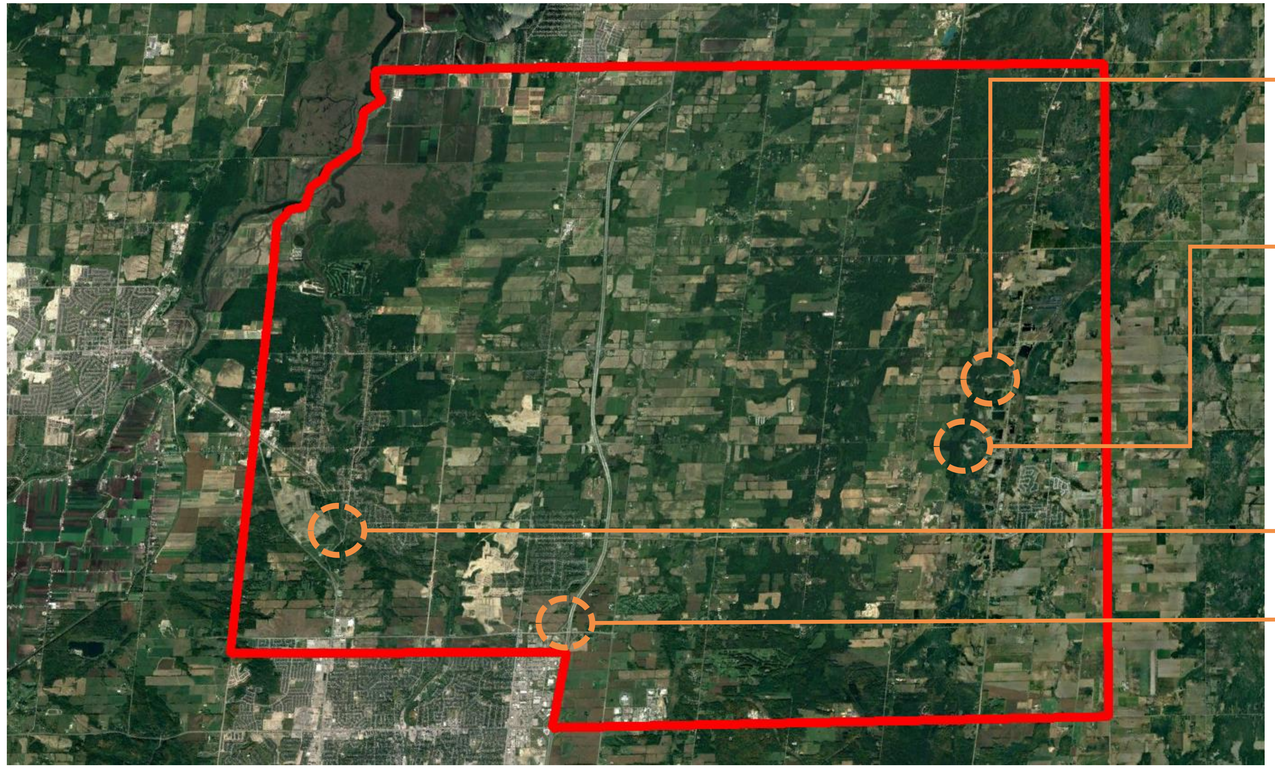
A Master Plan is a **long term** plan which integrates infrastructure requirements for existing and future land use. The study will provide the framework for planning and subsequent projects and/or development. At the end of the study, the key deliverables will be:

- The completed Master Plan Report documenting the process and analyses that were conducted;
- A list with high-level cost estimates of future infrastructure projects for the Town of East Gwillimbury; and
- A map indicating where these future infrastructure projects will be located.



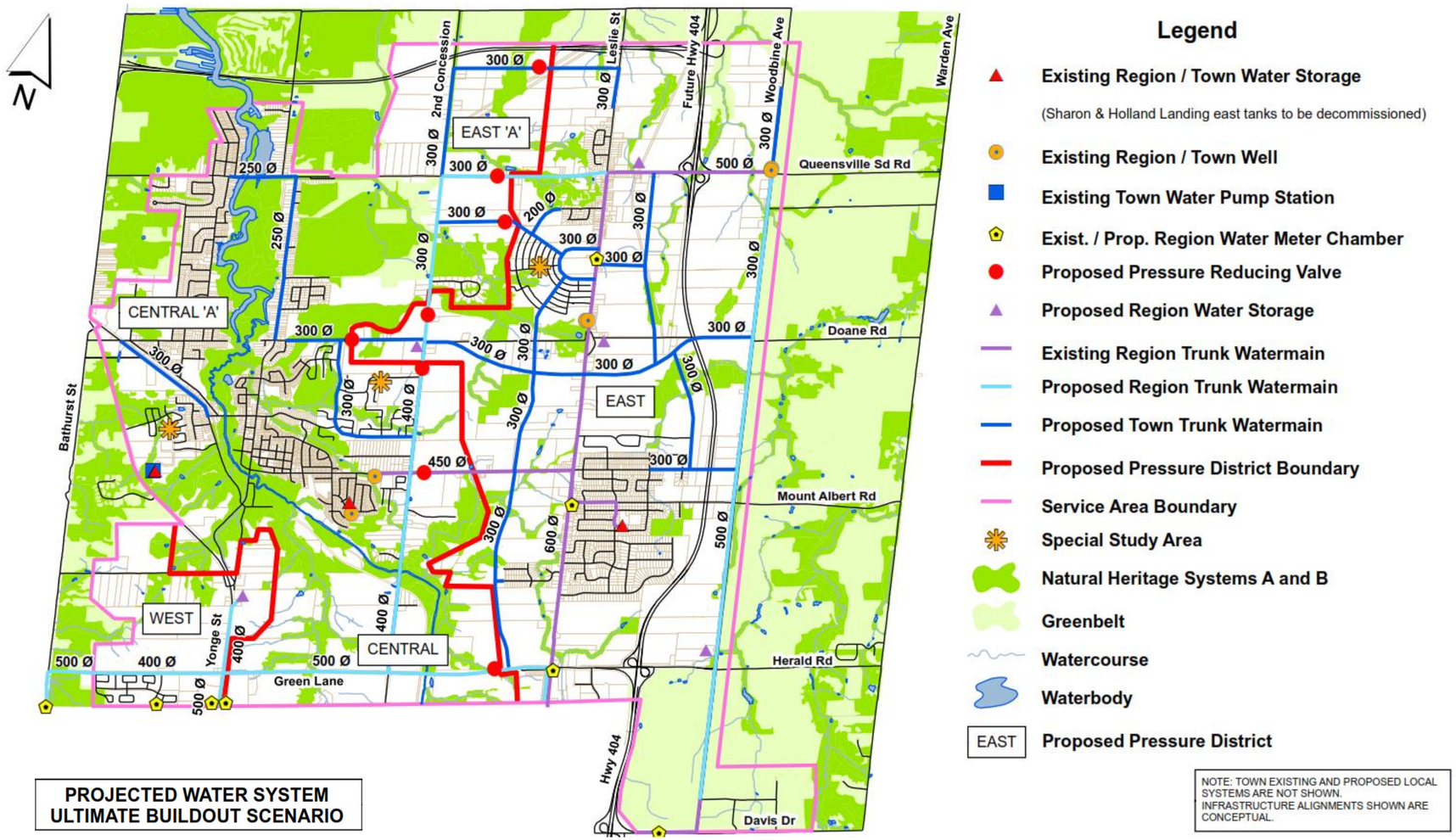
The following table and figure are illustrative examples of the final products the Town will receive when the study has been completed.

PROJECT NO.	ESTIMATED YEAR REQUIRED	PROJECT	DESCRIPTION	ESTIMATED COSTS	CLASS EA SCHEDULE	TRIGGER
W-01	2017 - 2022	Watermain upgrade along Street A	Capacity expansion	$100,000	Schedule 'B'	To accommodate a population of 10,000 in Community A
W-02	2036 - 2041	New collector watermain along Road B	Capacity expansion	$400,000	Schedule 'C'	To accommodate a population of 2,000 in Community B
WW-01	2017 - 2022	Avenue C Pumping Station upgrade	Capacity expansion	$200,000	Schedule 'B'	To accommodate a population of 15,000 Community C
WW-02	2031 - 2036	New trunk sewer along Boulevard D	Capacity expansion	$350,000	Schedule 'C'	To accommodate a population of 8,000 in Community D



The following figure has been taken from the previous **Town of East Gwillimbury Water and Wastewater Master Plan (2009)** as an illustrative example of what one of the final maps of the proposed upgrades to the East Gwillimbury water system could look like.

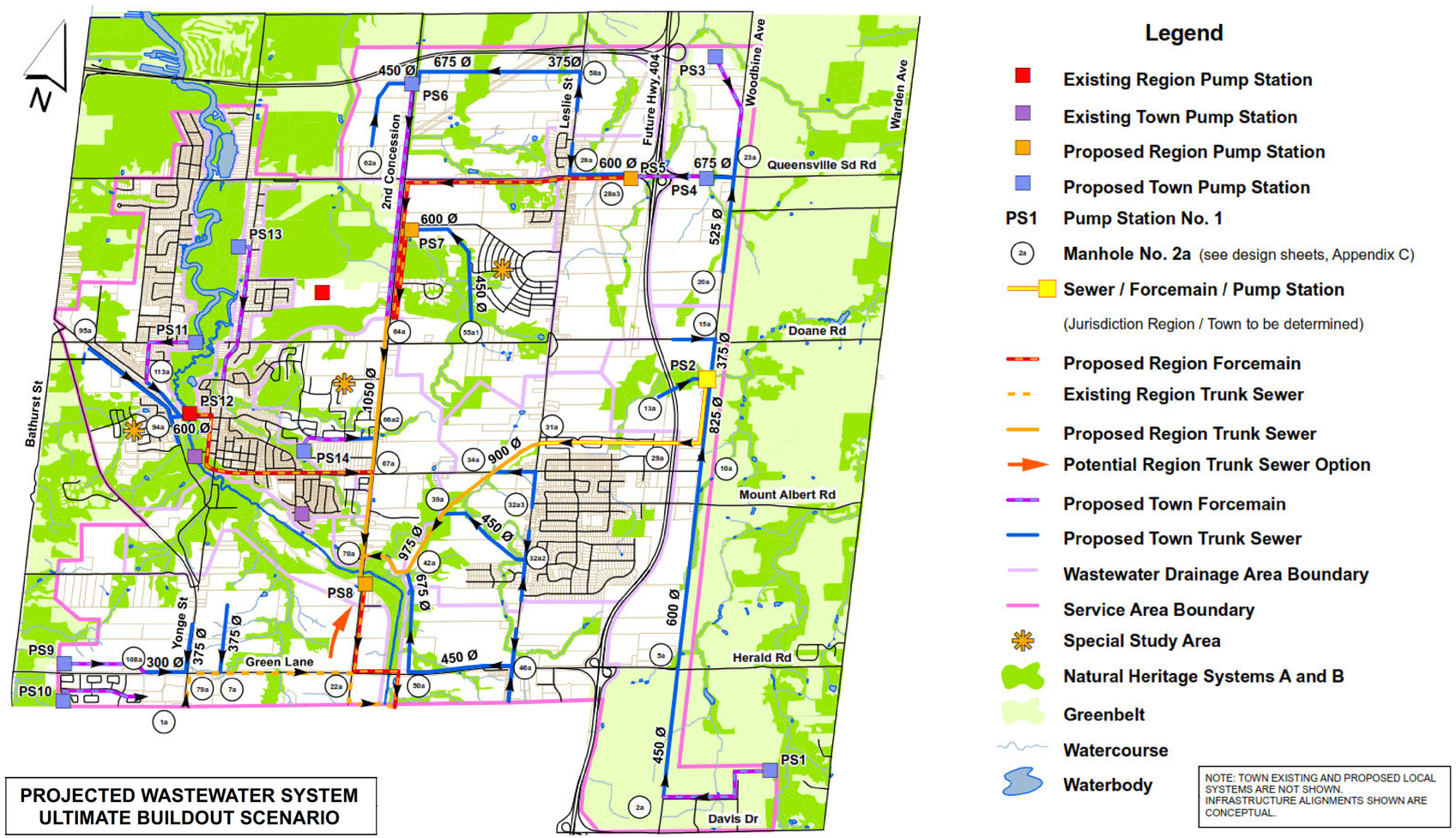
The map below shows the recommended water system for the ultimate buildout scenario (as recommended in 2009) based on projected population growth in the communities.



PROJECTED WATER SYSTEM ULTIMATE BUILDOUT SCENARIO

The following figure has been taken from the previous **Town of East Gwillimbury Water and Wastewater Master Plan (2009)** as an illustrative example of what one of the final maps of the proposed upgrades to the East Gwillimbury wastewater system could look like.

The map below shows the recommended wastewater system for the ultimate buildout scenario (as recommended in 2009) based on projected population growth in the communities.



General alternative solutions are listed below. Detailed alternative solutions will be generated on a case-by-case review of the Town's water and wastewater systems, and may include a combination of the alternatives listed below.
This will take place at a later time in the Master Planning process and will be presented at the second Public Consultation Session.

WATER

- Do nothing
- Repair or replace watermains
- Upgrade the existing water distribution network
- Expand system to accommodate growth

WASTEWATER

- Do nothing
- Repair or replace sewers
- Upgrade or construct new pumping stations
- Upgrade the existing wastewater conveyance network
- Expand system to accommodate growth

Alternative Solutions Based on the Following Criteria

METHODOLOGY

STEP 1 Determine Evaluation Criteria

STEP 2 Create an Evaluation System

STEP 3 Document Potential Impacts

STEP 4 Evaluate the Alternatives

STEP 5 Determine the Preferred Alternative

NATURAL ENVIRONMENT

- Proximity to environmentally sensitive and designated natural areas (e.g. Oak Ridges Moraine, Greenbelt)
- Impact on existing natural environment feature (e.g. Species at Risk)
- Impact on Areas of Natural and Scientific Interest (ANSI)
- Impact on watercourses and aquatic habitat

SOCIAL & CULTURAL

- Impact to water quality, built heritage areas and areas or archaeological importance
- Aesthetic impact on existing and proposed development
- Consistency with Land Use designations, approved Development Plans, and proposed Land Use changes
- Traffic impacts during construction

TECHNICAL

- Constructability, duration of construction and site access
- Ease of connection to existing infrastructure and ease of modifications required to existing infrastructure
- System reliability, redundancy and hydraulic performance
- Maintaining of enhancing security of supply

ECONOMIC

- Capital costs
- Operations and maintenance costs

EVALUATION COLOUR RATING SYSTEM

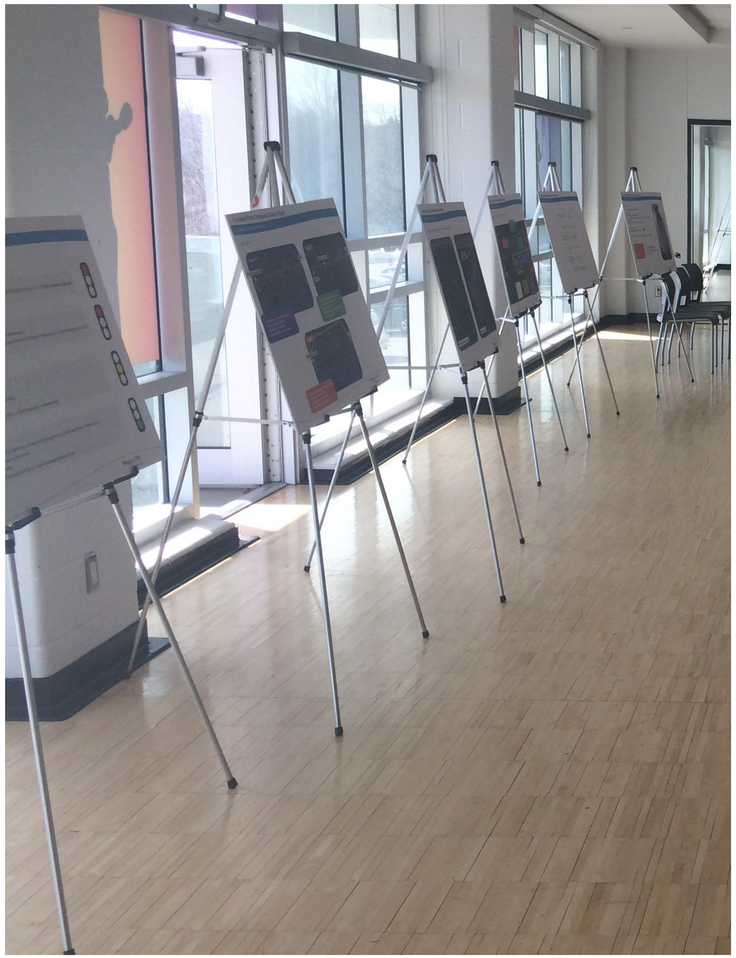
Most Preferred

Less Preferred

Least Preferred

A major component of the Master Planning process is consultation with the public, agencies, and First Nations communities that may be affected by the proposed infrastructure projects. Stakeholders include:

• First Nations Communities	• Federal/Provincial Authorities
• Environmental Agencies	• Residents
• Neighbouring Municipalities	• Employers/Employees
• Developers	



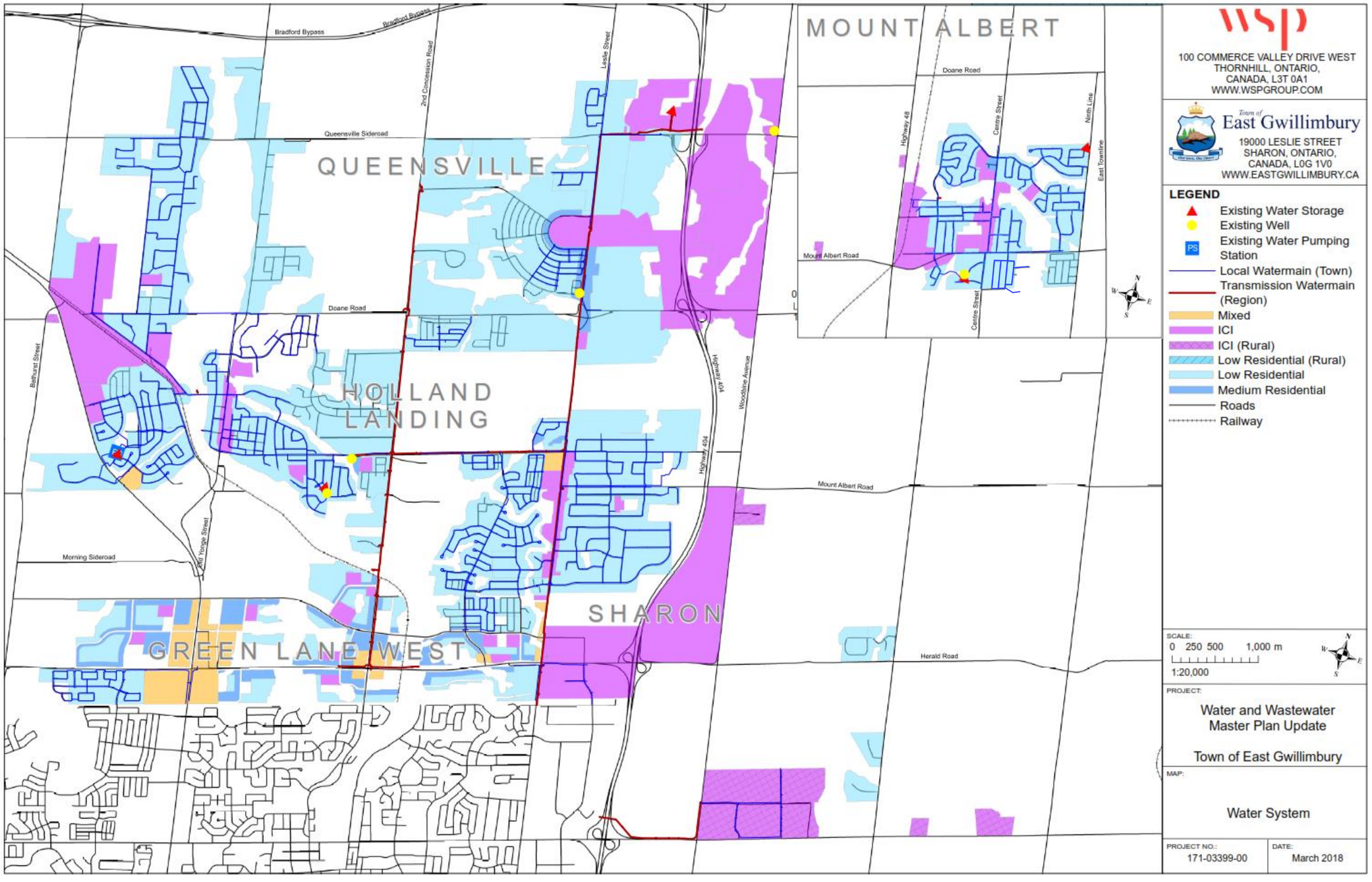
Although your input is valued and will be considered during **all** phases of the project, there are specified milestones where you can provide your feedback. Notices will be sent out two weeks in advance of the following milestones:

- PIC #1 **(We are here)**
- PIC #2 (Expected in Summer 2018, prior to selecting preferred alternative solution)
- 30-day Review Period after the filing of the final Master Plan document
- The Master Plan document will be available for review once filed in the Town offices and on the project website.

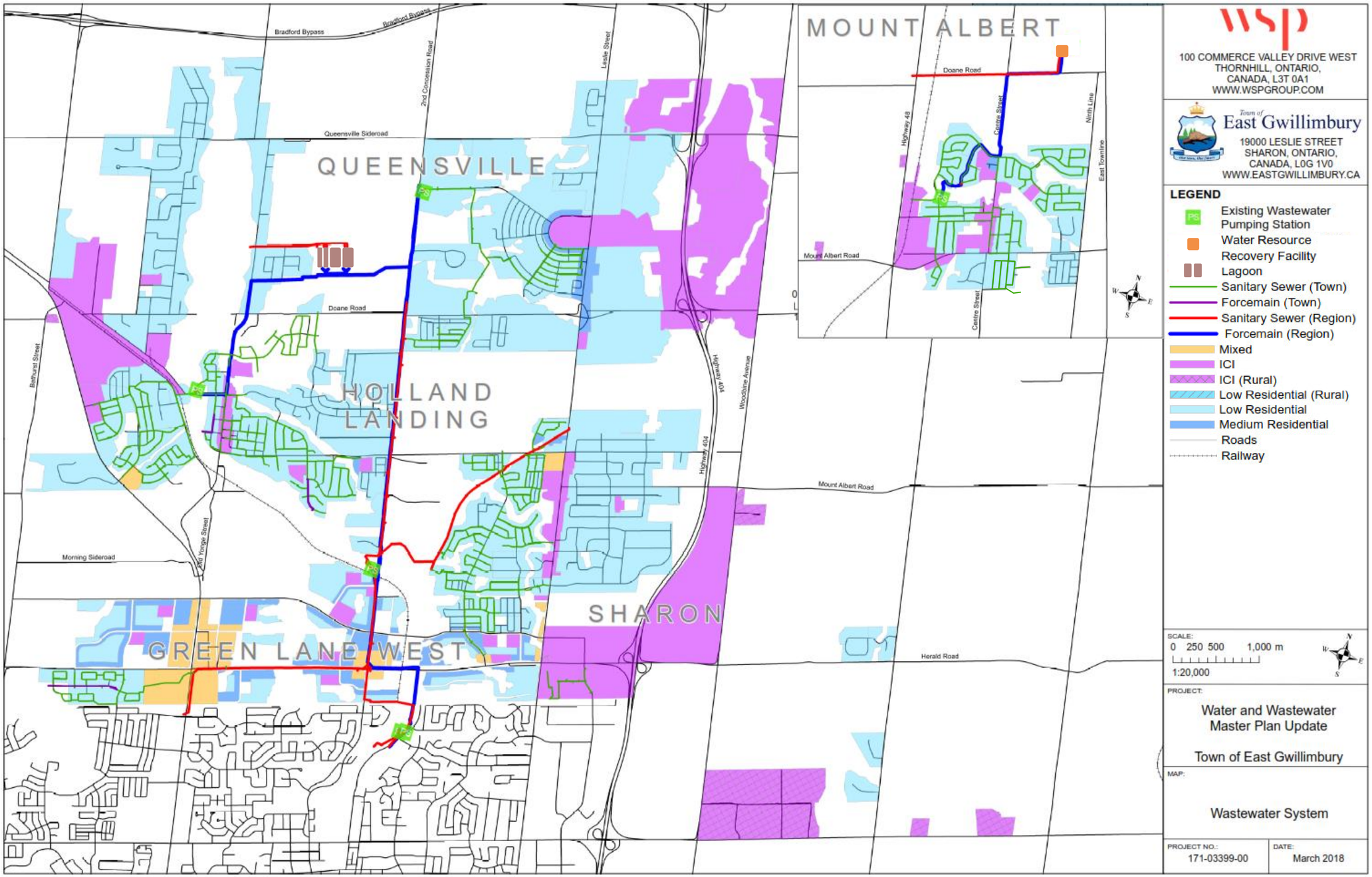
We encourage you to submit your feedback and join the project mailing list. Contact information for the Water and Wastewater Master Plan Update can be found on Board 11.

wsp | Town of East Gwillimbury

EXISTING WATER SYSTEM & LAND USE



EXISTING WASTEWATER SYSTEM & LAND USE



STAY INFORMED

Please sign-in to receive future meeting notices.

Stay informed by visiting our project webpage:
http://eastgwillimbury.ca/projects

If you would like to submit your comments directly to the Study Team, please contact:

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RWrzala@eastgwillimbury.ca

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Mani.Ruprai@wsp.com

Public Consultation Centre #1
Thursday, March 22nd, 2018 @ East Gwillimbury Sports Complex, Canada Hall

Identification of Alternatives
Identify problems or opportunities in the water and wastewater system. Develop alternatives to address.

Evaluation of Alternatives
Technical, natural, social, financial and archaeological assessment. Identification of preferred solution.

Public Information Centre #2
Summer 2018
Date and venue to be confirmed.

Master Plan Report
Documents findings of study. Incorporate comments received from the public and review agencies.

Notice of Study Completion
Late 2018/Early Spring 2019
Issue Notice of Study Completion

WSP | Town of East Gwillimbury

NOTICE OF PUBLIC INFORMATION CENTRE #2

TOWN OF EAST GWILLIMBURY TRANSPORTATION MASTER PLAN AND WATER/WASTEWATER MASTER PLAN

The Town of East Gwillimbury has initiated a Transportation Master Plan (TMP) Study and a Water & Wastewater Master Plan (W/WWMP) Study to provide a sustainable blueprint for the planned growth of the Town to 2041. The TMP and W/WWMP will serve as updates to the Town's 2010 Transportation Master Plan and to the Town's 2009 Water & Wastewater Master Plan respectively by building upon sustainable policies and plans developed by York Region and the Province of Ontario.

Public feedback will help structure these Master Plan updates and build a stronger understanding of the public's interest, identify opportunities, challenges, and ideas for the future vision of transportation and water & wastewater infrastructure in the Town. As such, we intend to host a joint Public Information Centre for both of these Master Plan updates.

THE PROCESS

This Study follows the master planning process described in the Municipal Engineers Association Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011 and 2015), including consultation with the public and stakeholders, consideration of all reasonable alternatives, a high level assessment of the effects on the environment at the network level, evaluation of alternatives highlighting advantages and disadvantages, and full documentation of the process providing a traceable rationale for conclusions reached. The Master Plan process will satisfy Phase I and II of the Municipal Class EA for recommended transportation infrastructure improvements:

- Phase I will assess existing conditions, context and challenges; and
- Phase II will develop network plans and identify triggers for different infrastructure needs, phasing of projects and an action plan.

PUBLIC INFORMATION CENTRE (PIC) # 2

Thank you for your input at PIC # 1 on March 22, 2018.

PIC #2 will introduce and develop network plans and identify triggers for different infrastructure needs, the phasing of projects, and an action plan. We require your input on the vision of transportation, and water/wastewater servicing in the Town

Date: **April 10, 2019**

Time: **5:00-8:00 PM: Drop-in Interactive Open House**

Location: **East Gwillimbury Civic Centre**

19000 Leslie Street, Sharon, ON L0G 1V0

CONTACTS

If you require additional information or would like to be placed on the project contact list, please visit the Town's website at www.eastgwillimbury.ca or contact one of the individuals below:

OR

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This Notice first issued March 27, 2019

Town of East Gwillimbury

WELCOME

Water and Wastewater Master Plan
Public Information Centre #2

April 10, 2019

PURPOSE OF THE PROJECT

The Town of East Gwillimbury is undertaking a Town-wide Water and Wastewater Master Plan. The Master Plan will identify long-term strategies for servicing the current and future populations, based on the projected growth for the Town to the year 2041.

Problem Statement: The Town of East Gwillimbury is projected to experience significant population and employment growth over the next 25 years. As a result of this growth, a **safe**, **efficient**, and **reliable** source of water and wastewater services will become increasingly important and challenging. The Town's water and wastewater systems will need to be expanded as necessary to accommodate this growth.

MASTER PLANNING PROCESS

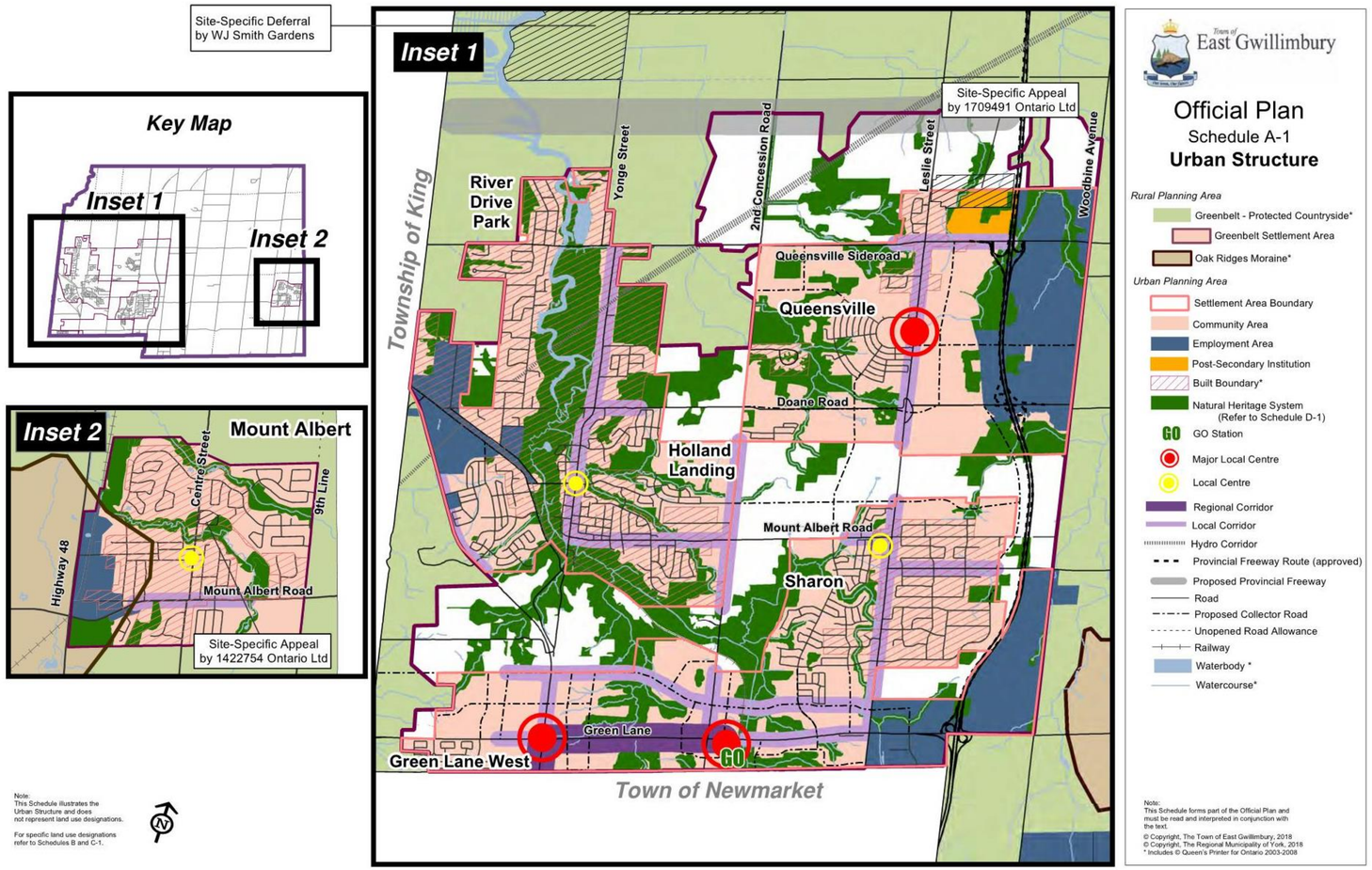
A Master Plan is a **long term** plan that provides a 'roadmap' of the water and wastewater infrastructure requirements based on the existing and future growth projections to the year 2041.

At the end of this study, the key deliverables will be:

1. The completed Master Plan Report documenting the preferred solution, process and analyses that were conducted.
2. A list of future infrastructure projects recommended for the Town to implement the Master Plan, with high-level cost estimates and timing.
3. A map indicating where these future infrastructure projects will be located.

- Complete a comprehensive review of background documentation, existing water and wastewater system and key relevant studies
- Identify opportunities and constraints to improve the water and wastewater network based on existing and future populations.
- Calculate the future water and wastewater flows, and update the Town's water and wastewater models
- Develop alternative servicing solutions for future growth
- **Evaluate the alternatives, using a set of criteria determined as part of the Master Plan, to arrive at a preferred servicing solution**
- Prepare cost estimates and timing for recommended future infrastructure projects to implement the Master Plan

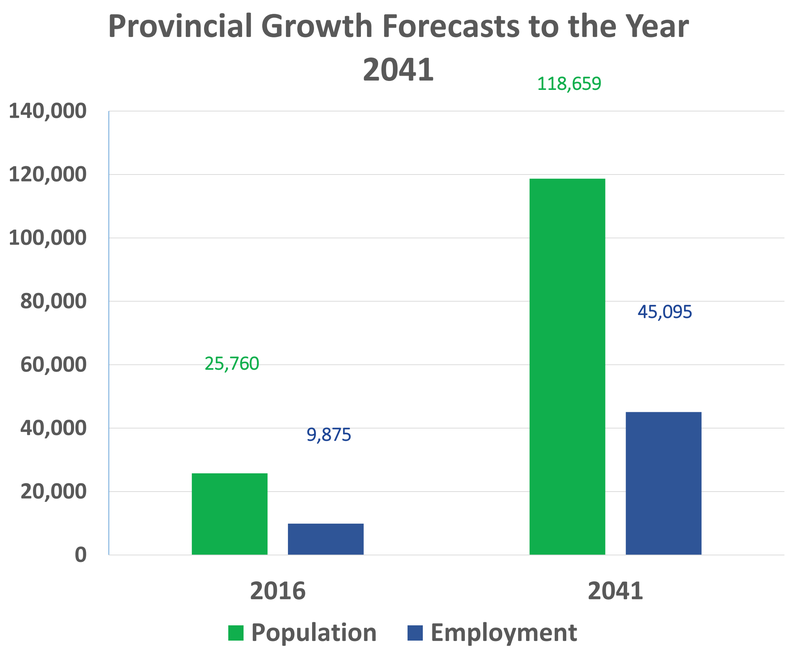
WHY ARE WE CONDUCTING THIS REVIEW?



PLANNED GROWTH

The Town is undertaking a review of the 2009 Water and Wastewater Master Plan to accommodate the Town's current and projected growth and to ensure that sufficient servicing can be provided to facilitate growth to 2041. Since the York Region water and sewer networks form a backbone to the East Gwillimbury networks, this Master Plan builds on York Region's Master Plan. The current Master Plan also reflects updates to provincial policy.

The *settlement areas* such as Green Lane West, Holland Landing, Sharon, Queensville and Mount Albert are intended to accommodate the Town's forecasted growth.



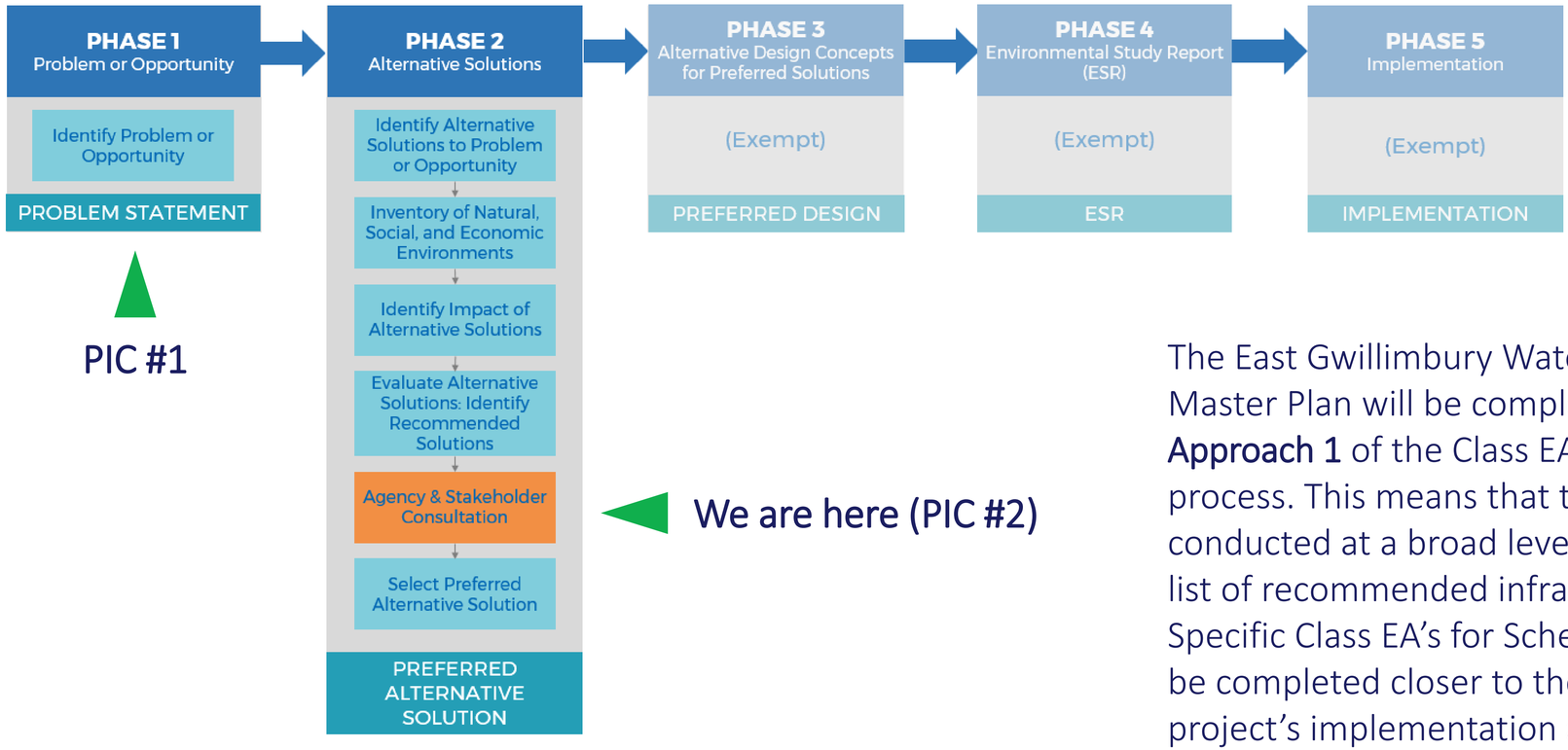
The Master Plan will be developed within the context of existing Provincial, Regional, and local policies

- Provincial Policy Statement, 2014
- Growth Plan for the Greater Golden Horseshoe, 2017 Update
- Oak Ridges Moraine Plan, 2002
- York Region Official Plan, 2010
- York Region Water and Wastewater Master Plan, 2016
- Lake Simcoe Protection Plan, 2009
- East Gwillimbury Official Plan, 2010
- East Gwillimbury Water and Wastewater Master Plan, 2009

WHAT IS A MUNICIPAL CLASS EA

The Municipal Class Environmental Assessment (EA) was approved in 1990 under the *Ontario Environmental Assessment Act* as a way to streamline the planning of municipal infrastructure while managing environmental impacts, receive stakeholder and resident feedback, and ensure a transparent evaluation and decision process.

The Municipal Class EA Planning and Design process can include up to a total of **5** phases. The required phases to be completed are based on the type of study that is being conducted. At a minimum, a Master Plan must follow the first **2** phases. Phases 3 through 5 are usually completed as part of a separate process when the time comes to implement the recommended infrastructure projects.



The East Gwillimbury Water and Wastewater Master Plan will be completed using **Approach 1** of the Class EA Master Planning process. This means that the study is conducted at a broad level and will result in a list of recommended infrastructure projects. Specific Class EA's for Schedule B projects will be completed closer to the time of the project's implementation and after the Master Plan is finalized.

SCREENING OF ALTERNATIVE SOLUTIONS

The alternative solutions have been screened based on the following :

- **Policy and Regulation Compatibility** – Does the alternative comply with the Provincial and Town policies related to growth management and land development?
- **Does the Solution Address the Problem Statement** - Alternatives that do not address the Problem Statement do not satisfy the Master Plan's core objective to support future growth to 2041. Future planning policies and opportunities to provide water and wastewater servicing for existing and future development would not be adhered to in selecting this alternative.

1. Do Nothing

This alternative represents a scenario where no improvements or expansions would be undertaken. This alternative does not comply with Provincial and Town policy related to growth. With the "Do Nothing" alternative, municipal water and wastewater infrastructure will be inadequate for future development.

Policy/regulation compatibility? **No.**

Address Problem Statement? **No.**

2. Water Efficiency / Conservation

The Town currently has a Water Conservation strategy that limits Outdoor Water Use (By-Law 2002-100). Implementation of further water conservation and reduction strategies to reduce water consumption may have marginal benefits. Water efficiency/conservation does not address future development requirements

Policy/regulation compatibility? **Yes (partial).**

Address Problem Statement? **No.**

3. Limit Growth

This alternative involves restricting population growth within the Town. Lower growth rates may ensure sufficient supply to accommodate future demand. However, in line with the Provincial Growth Plan, York Region has identified targets for intensification for municipalities. The Town will be unable to meet its targets by limiting growth.

Policy/regulation compatibility? **Yes (partial).**

Address Problem Statement? **No.**

4. Upgrade and Expand the Water and Wastewater System Network

The Town is responsible for the distribution of water and collection of wastewater for residents and businesses. This alternative improves the existing water distribution system to address pressure and fire flow issues and expands the system to service new developments. It also improves the wastewater collection system preventing surcharge and services new developments.

Policy/regulation compatibility? **Yes.**

Address Problem Statement? **Yes.**

EVALUATION CRITERIA

NATURAL ENVIRONMENT

- Proximity to environmentally sensitive and designated natural areas (e.g. Oak Ridges Moraine, Greenbelt)
- Impact on existing natural environment feature (e.g. Species at Risk)
- Impact on Areas of Natural and Scientific Interest (ANSI)
- Impact on watercourses and aquatic habitat

SOCIAL & CULTURAL

- Impact to water quality, built heritage areas and areas or archaeological importance
- Aesthetic impact on existing and proposed development
- Consistency with Land Use designations, approved Development Plans, and proposed Land Use changes
- Traffic impacts during construction

TECHNICAL

- Constructability, duration of construction and site access
- Ease of connection to existing infrastructure and ease of modifications required to existing infrastructure
- System reliability, redundancy and hydraulic performance
- Maintaining or enhancing security of supply
- Additional servicing opportunities

ECONOMIC

- Capital costs
- Operation costs
- Maintenance costs

EVALUATION COLOUR RATING SYSTEM

Most Preferred / Low Impact

Preferred / Low to Moderate Impact

Less Preferred / Moderate Impact

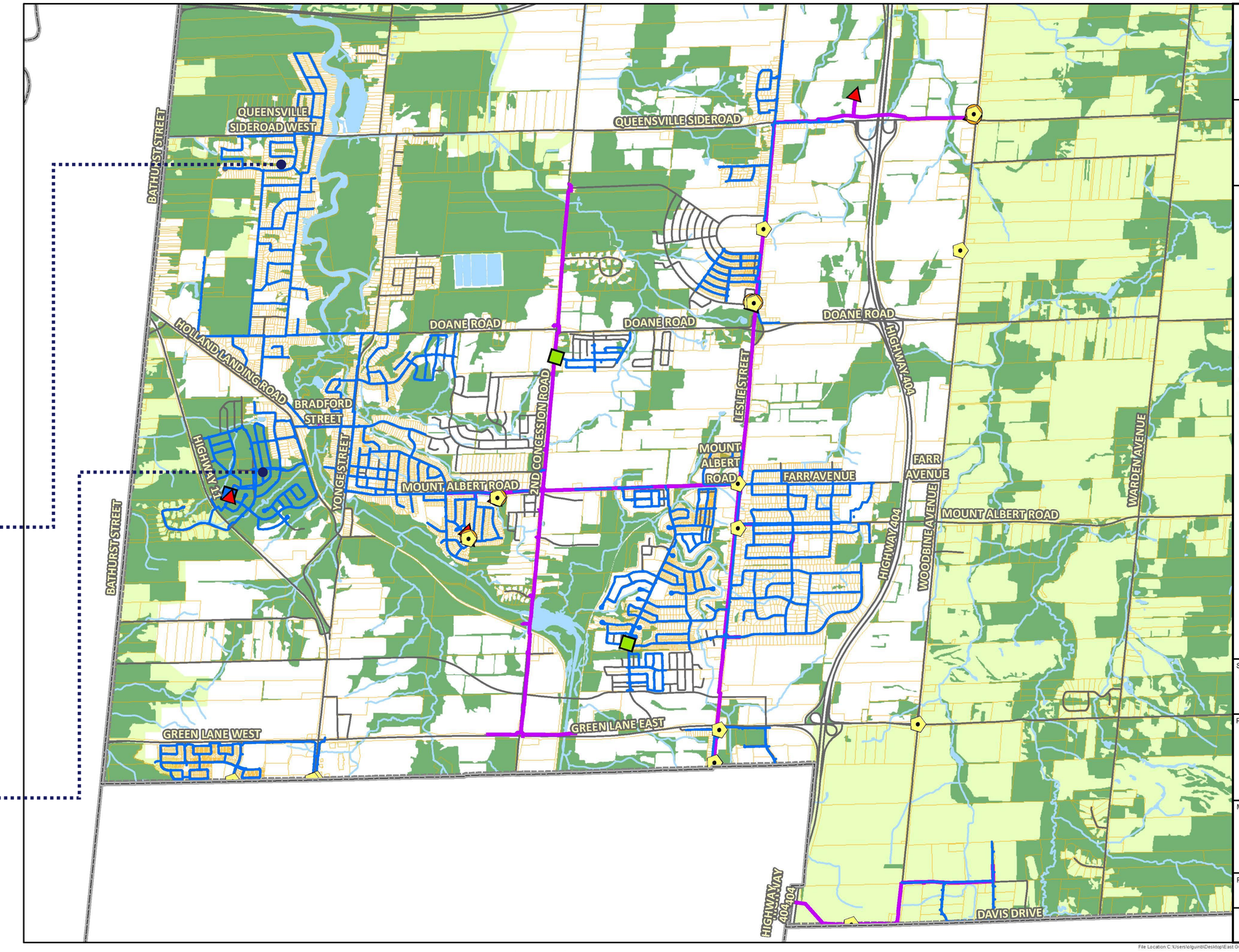
Least Preferred / High Impact

EXISTING WATER SYSTEM – CENTRAL GROWTH AREA

Water projects outlined in the Master Plan either address existing system deficiencies or are required due to growth. Within the Central Growth Area, three projects had alternative solutions which were assessed based on the criteria outlined on **Board 6.** Project alternatives are presented on **Board 9**.

Water Issue #1: Lower Fire Flows noted in the Queensville Sideroad/Sand Road Area

Water Issue #2: There is currently only one watermain connection between the new Holland Landing subdivision and the existing system on Bradford Street

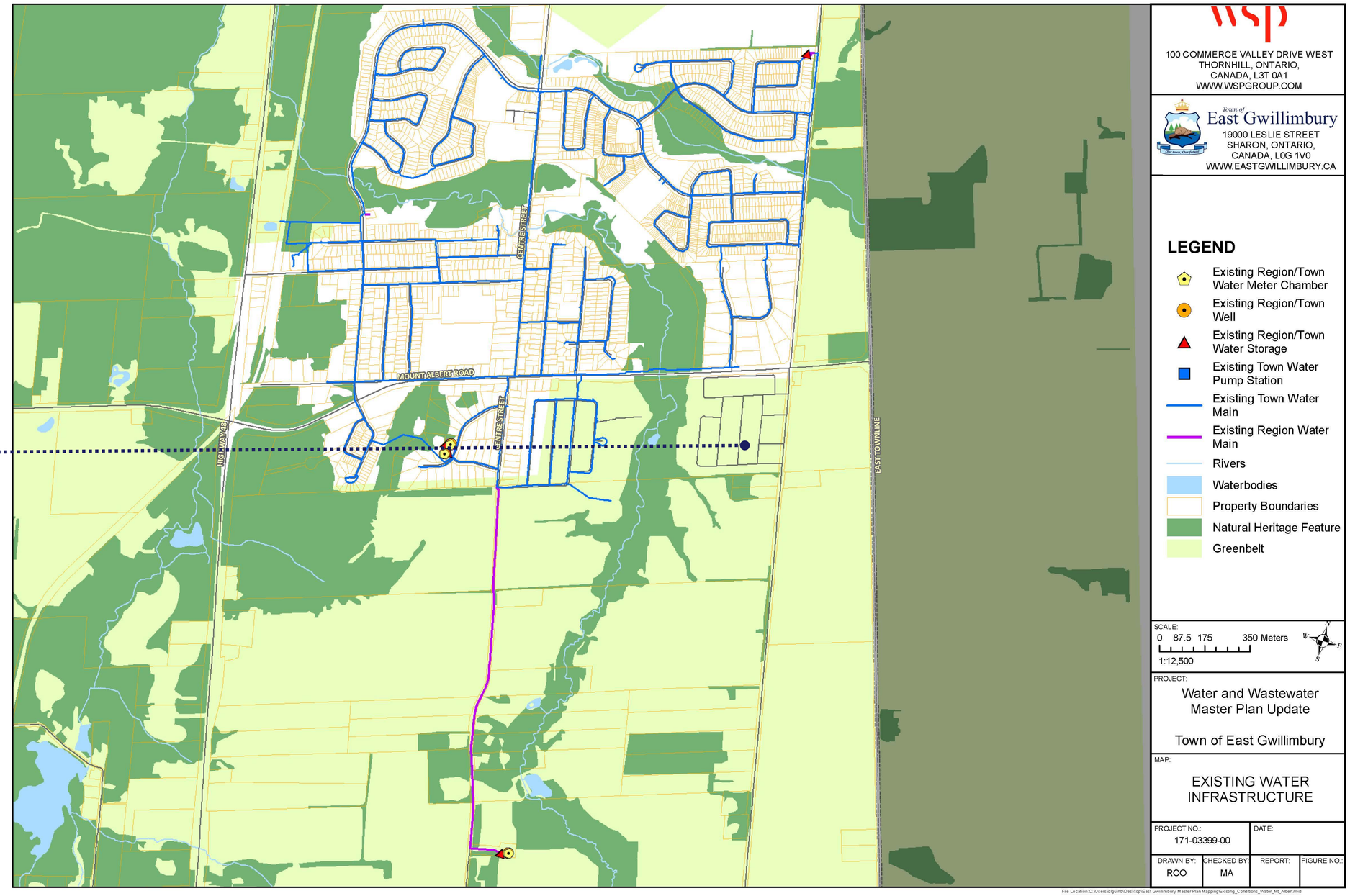


EXISTING WATER SYSTEM – MOUNT ALBERT

The only water projects required within Mount Albert were due to growth. One of the projects in Mount Albert had alternative solutions which were assessed based on the criteria outlined on **Board 6.** Project alternatives are presented on **Board 10**.

Water Issue #3: Servicing required for the new development south west of Mount Albert Road and Ninth Line

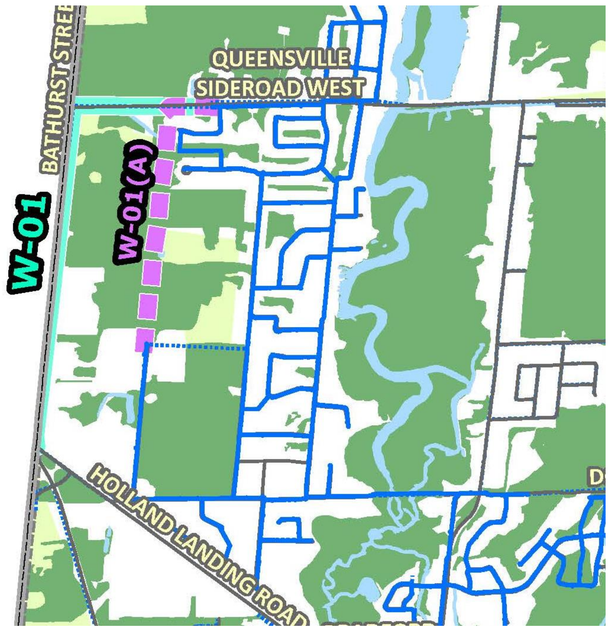
York Region is currently carrying out an Environmental Assessment (EA) to investigate Water Quality in this area.



Water Issue #1 – Queensville Low Fire Flows

The area near **Queensville** Sideroad and Sand Road was observed to have lower fire flows. An additional watermain loop is required to provide network looping and increase the fire flows.

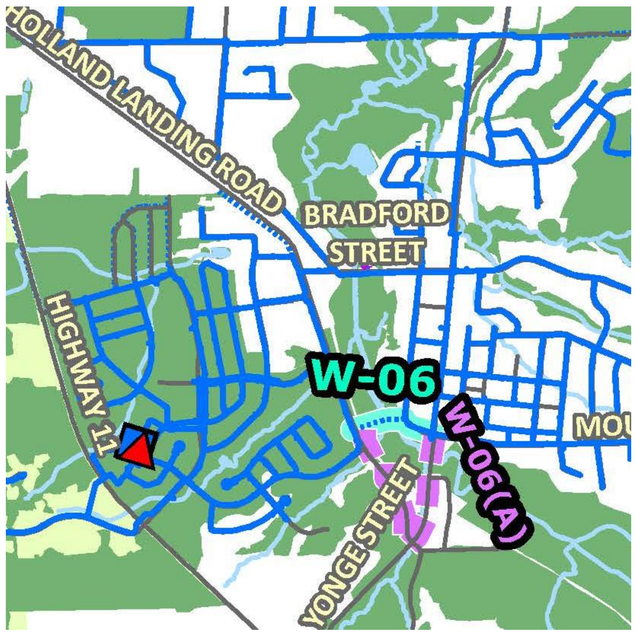
	Alternatives	Evaluation Criteria			
		Natural Env.	Social / Cultural	Technical	Economic
W-01	Install the watermain along the existing Bathurst Street Right-of-Way (ROW). This option will also provide servicing along Bathurst Street. **(Recommended)**				
W-01 (A)	Install the watermain directly from Sluse Road to Queensville Sideroad. This option traverses a currently undeveloped area.				



Water Issue #2 – Holland Landing Subdivision Service Connection

There is population growth planned for the area west of Holland Landing Road. The community currently only has one watermain connection to the rest of the network. This poses a network security risk and a secondary supply is required from Olive Street. A secondary supply will increase fire flows and enhance water quality. Both alternatives will require direct drilling underneath the stream and railway crossing.

	Alternatives	Evaluation Criteria			
		Natural Env.	Social / Cultural	Technical	Economic
W-06	Install the watermain directly from Olive Street to Holland Landing Road. This option requires a shorter length of watermain, and direct drilling will limit the environmental impact. **(Recommended):**				
W-06 (A)	Install the watermain to the south along the Yonge Street ROW and then north along the Holland Landing Road ROW. Direct drilling will be required due to the stream and railway crossings required.				



KEY

Most Preferred | Preferred | Less Preferred | Least Preferred

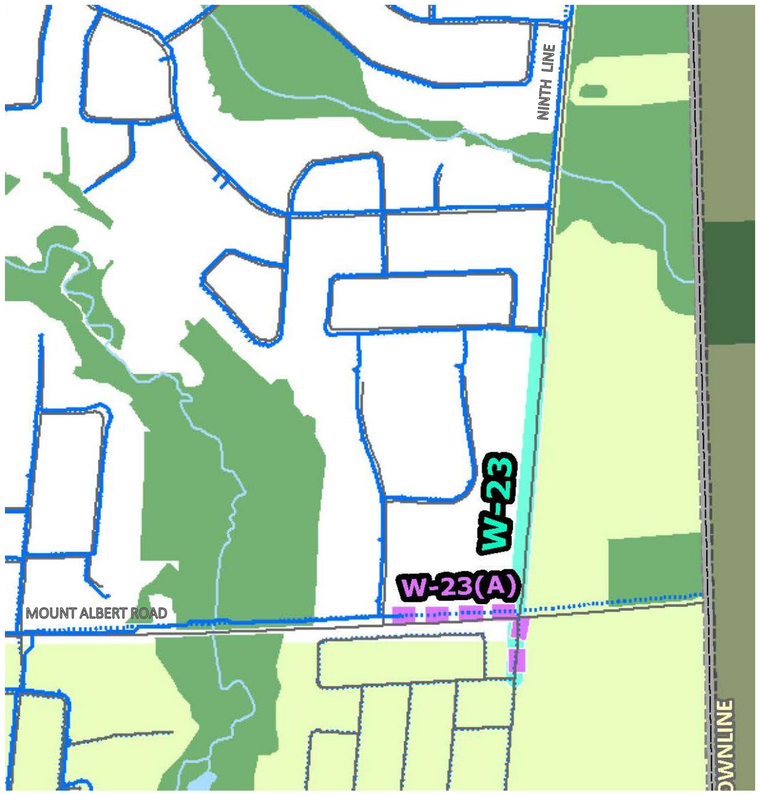
wsp

Town of East Gwillimbury

Water Issue #3 – Secondary Servicing for new Subdivision in Mount Albert

A new subdivision is planned for the south west corner of Mount Albert Road and Ninth Line. This subdivision will connect to the existing water network from the stub at Mount Albert Road and Samuel Harper Ct. A secondary servicing is required for network security and looping.

	Alternatives	Evaluation Criteria			
		Natural Env.	Social / Cultural	Technical	Economic
W-23	Extend the watermain on Ninth Line southwards from Donald Stewart Crescent to the new subdivision. **(Recommended)**				
W-23(A)	Extend the primary service watermain along Mount Albert Road and then south along Ninth Line to connect to the subdivision on Ninth Line.				



KEY

Most Preferred | Preferred | Less Preferred | Least Preferred

wsp | Town of East Gwillimbury

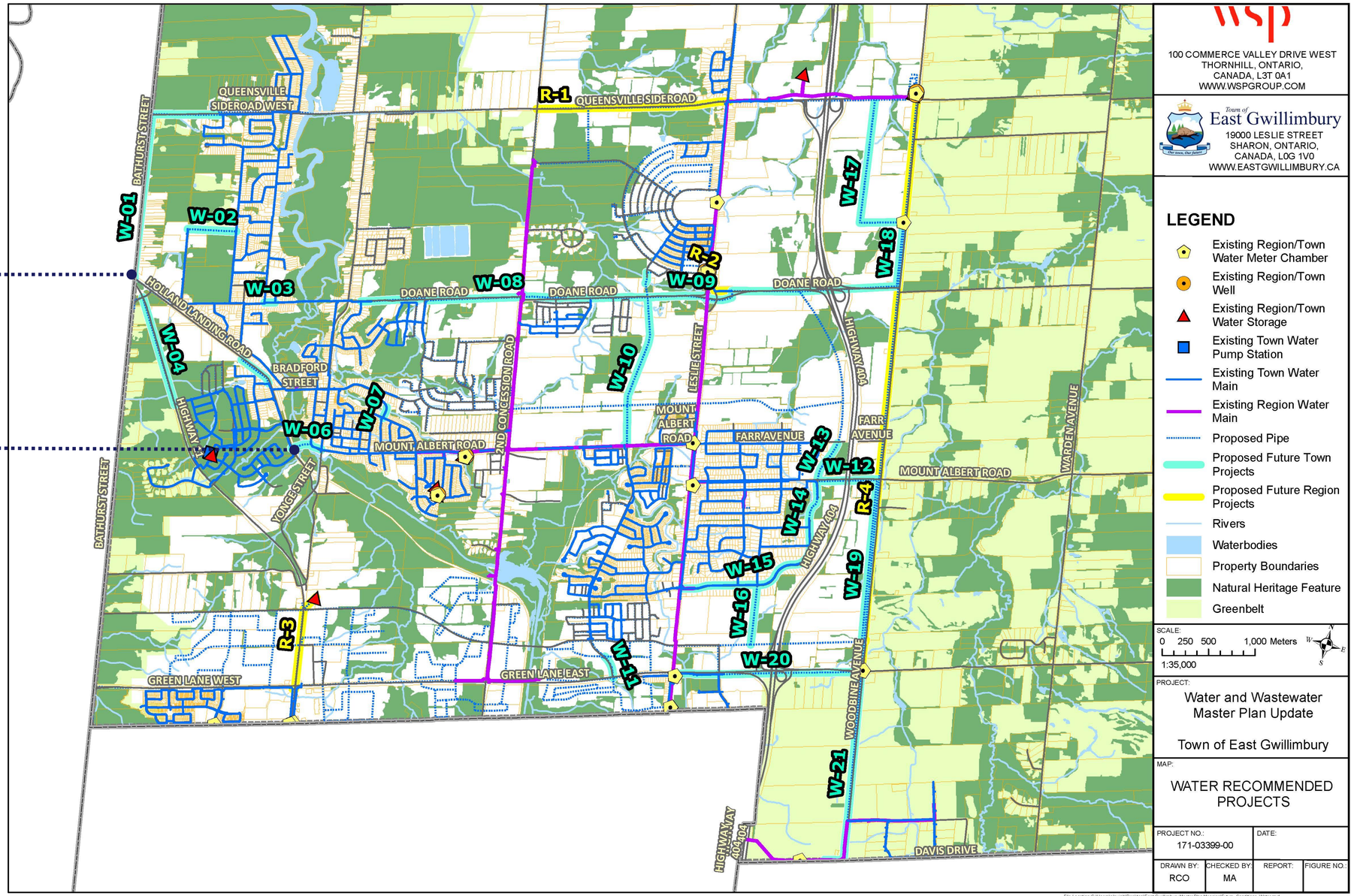
EAST GWILLIMBURY – CENTRAL GROWTH AREA

All projects recommended through this study constitute improvements to the system, and require the upgrade of existing watermains or the installation of new watermains. For the two projects where alternative options were explored **(Board 9)**, the preferred alternative for these two projects are labelled.

The projects can be implemented over time, when opportunities for implementation arise. Timing for implementation is recommended to coincide with the Town's other proposed projects for interrelated infrastructure such as roads, sewers and storm sewers.

Water Issue #1
Preferred Alternative

Water Issue #2
Preferred Alternative



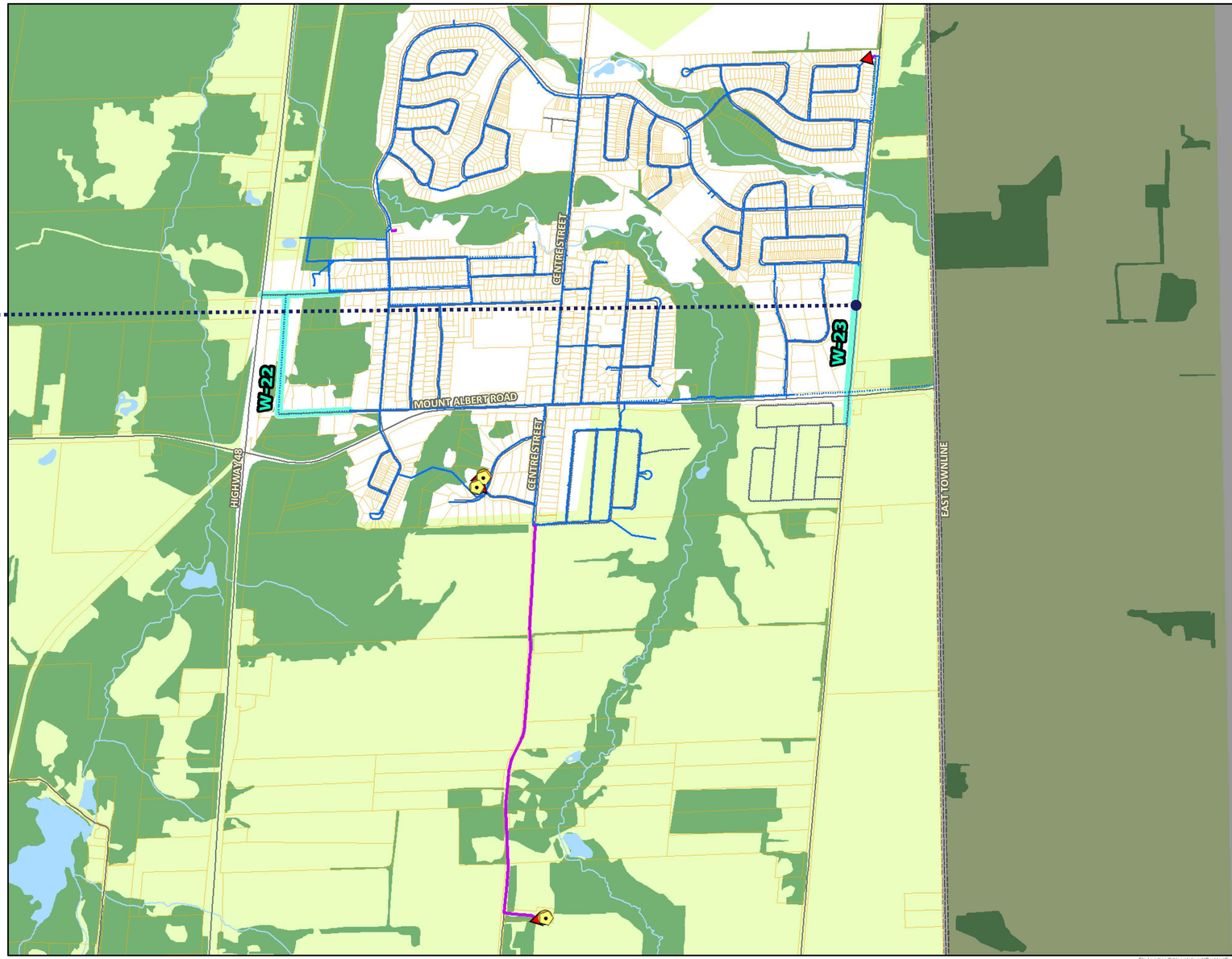
The recommended projects for the Town's water distribution system to meet servicing demands to the year 2041 are highlighted in light blue in the figure above.

EAST GWILLIMBURY – MOUNT ALBERT

Water Issue #3
Preferred
Alternative

Required water projects within Mount Albert are shown. For the one project where alternative options were explored **(Board 10)**, the preferred alternative is labelled on this map.

The projects can be implemented over time, when opportunities for implementation arise. Timing for implementation is recommended in to coincide with the Town's other proposed projects for interrelated infrastructure such as roads, sewers and storm sewers.



100 COMMERCE VALLEY DRIVE WEST
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WWW.WSPGROUP.COM

Town of East Gwillimbury
19000 LESLIE STREET
SHARON, ONTARIO,
CANADA, L0G 1V0
WWW.EASTGWILLIMBURY.CA

LEGEND

- Existing Region/Town Water Meter Chamber
- Existing Region/Town Well
- Existing Region/Town Water Storage
- Existing Town Water Pump Station
- Existing Town Water Main
- Existing Region Water Main
- Proposed Pipe
- Proposed Future Town Projects
- Proposed Future Region Projects
- Rivers
- Waterbodies
- Property Boundaries
- Natural Heritage Feature
- Greenbelt

SCALE: 0 87.5 175 350 Meters
1:12,500

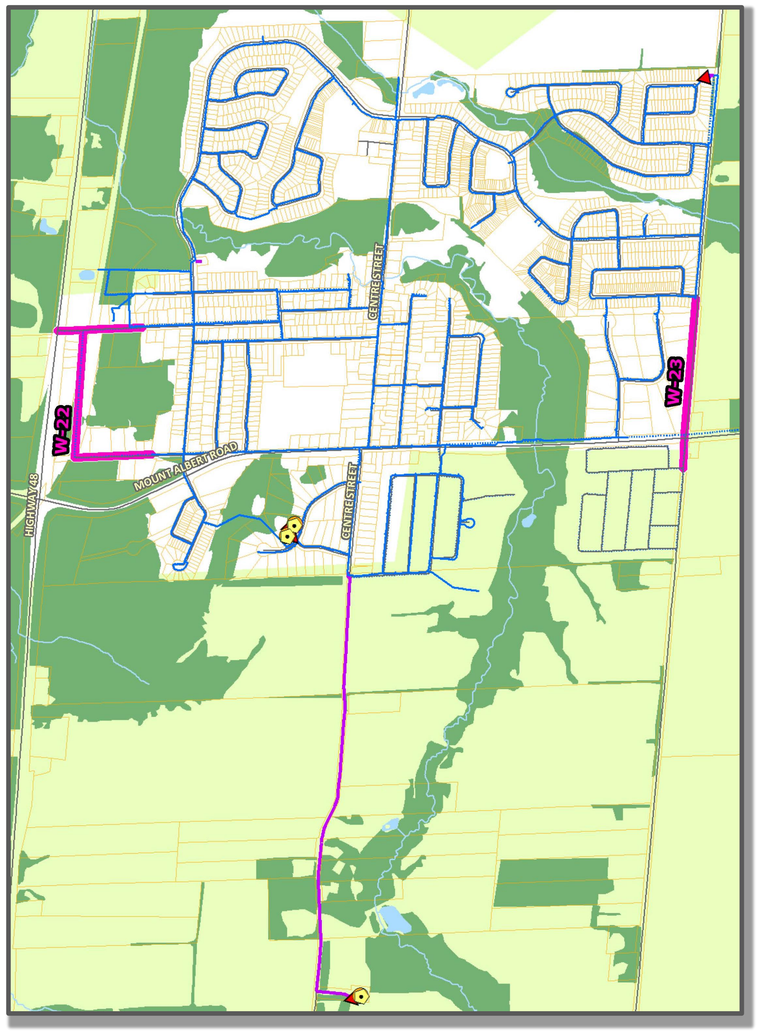
PROJECT:
Water and Wastewater Master Plan Update
Town of East Gwillimbury

MAP:
WATER RECOMMENDED PROJECTS

PROJECT NO.:	DATE:		
171-03399-00			
DRAWN BY:	CHECKED BY:	REPORT:	FIGURE NO.:
RCO	MA		

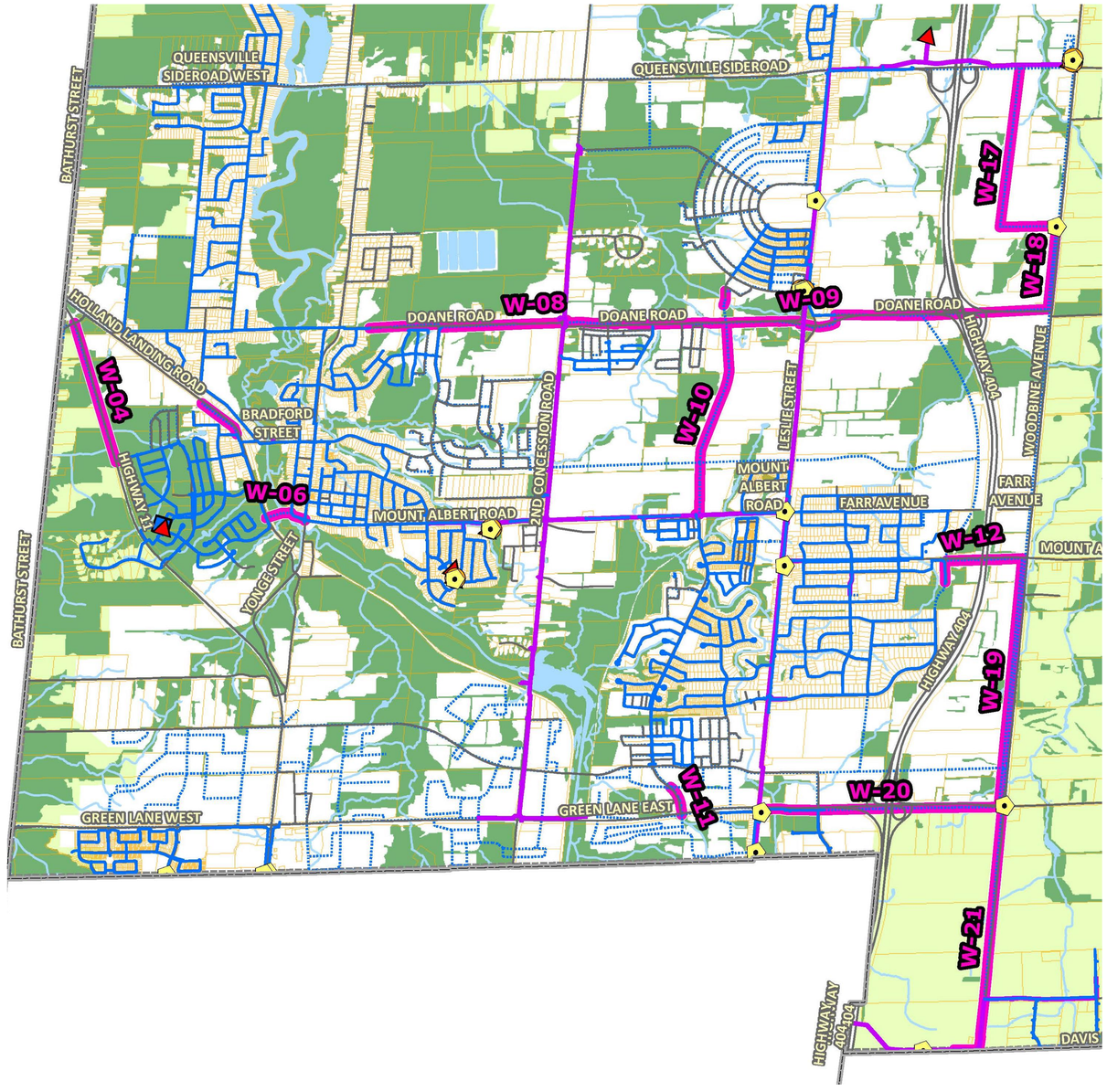
File Location:C:\Users\cliguori\Desktop\East Gwillimbury Master Plan Mapping\Future_Conditions_Water_Mt_Albert.mxd

UPGRADES DRIVEN BY GROWTH



MOUNT ALBERT

CENTRAL GROWTH AREA



The water projects highlighted in pink are system upgrade projects that are driven by future growth in residential and employment populations.

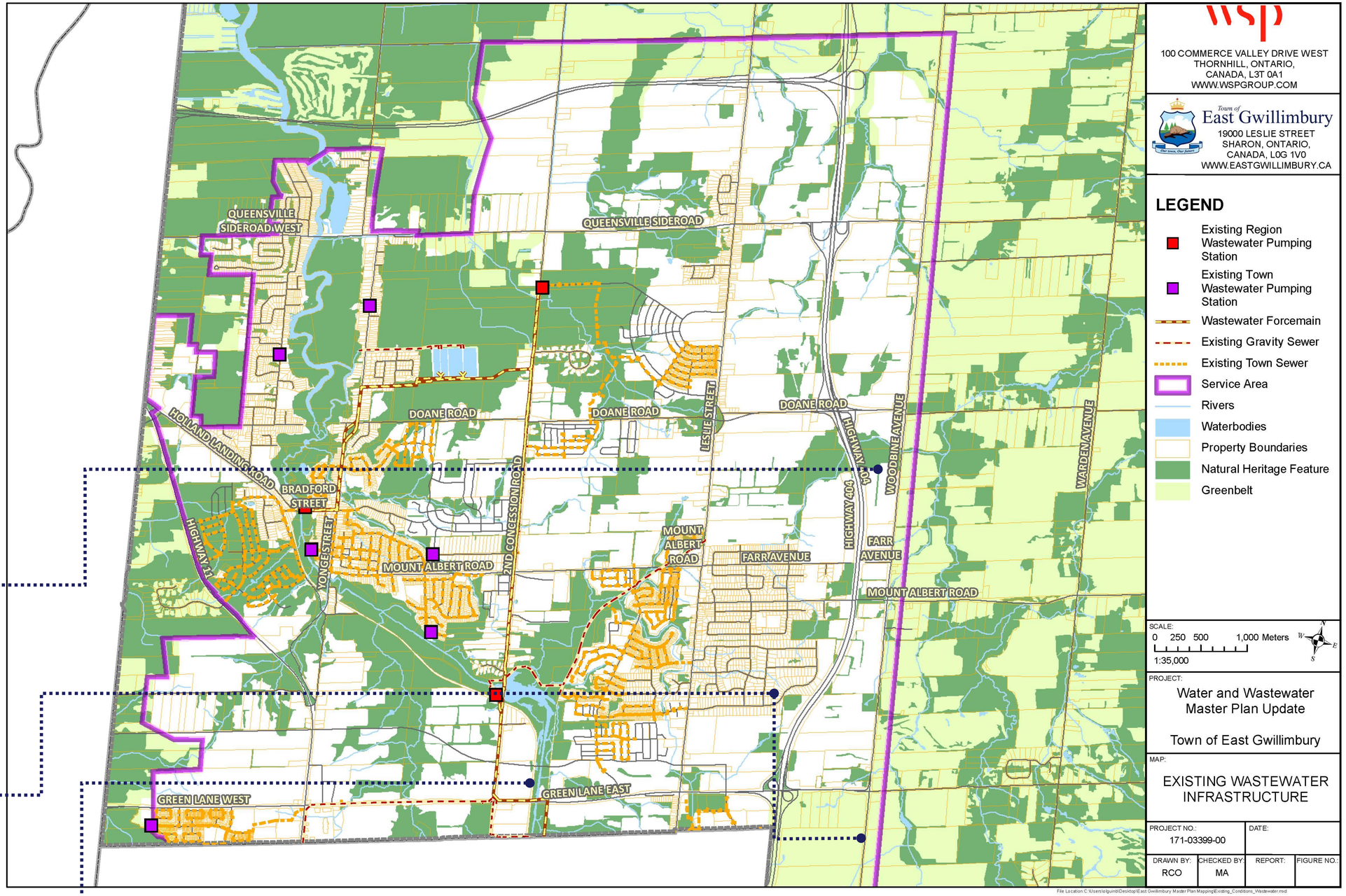
EXISTING WASTEWATER SYSTEM – CENTRAL GROWTH AREA

Wastewater projects outlined in the Master Plan either address existing system deficiencies or are required due to growth. Within the Central Growth Area, three projects had alternative solutions which were assessed based on the criteria outlined on **Board 6.** Project alternatives are presented on **Boards 16 and 17**.

WW Issue #1: A final discharge location is required for the wastewater from the new pumping station proposed on Woodbine Avenue which will be servicing the Employment Lands.

WW Issue #2: Determination of the length of the forcemain required before discharging wastewater from the new pumping station on Bales Drive into a gravity system.

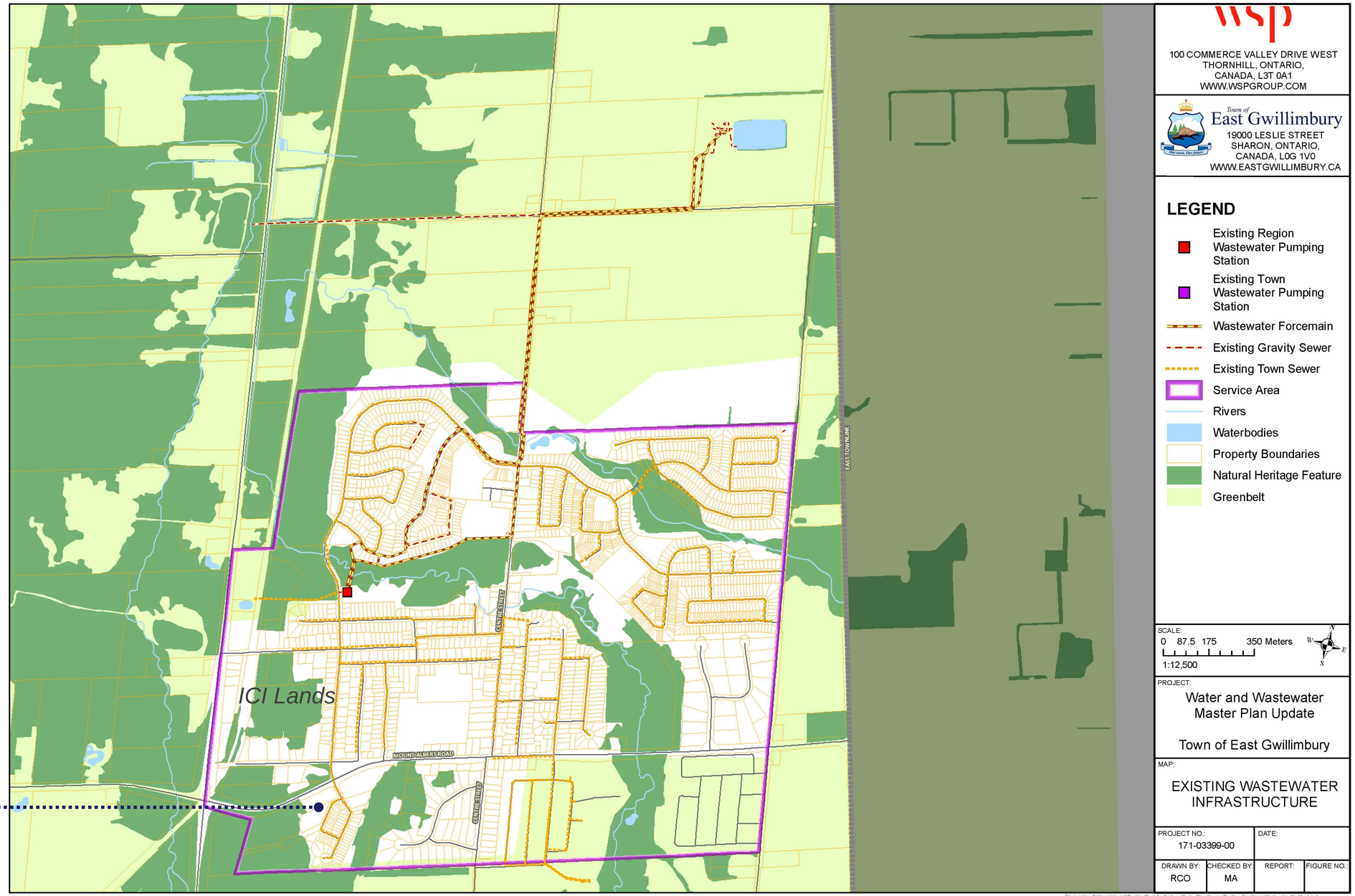
WW Issue #3: Final discharge location required for the gravity sewer along Green Lane servicing the Employment Lands



EXISTING WASTEWATER SYSTEM – MOUNT ALBERT

The only wastewater projects required within Mount Albert were due to growth. One of the projects in Mount Albert had alternative solutions which were assessed based on the criteria outlined on **Board 6.** Project alternatives are presented on **Board 17**.

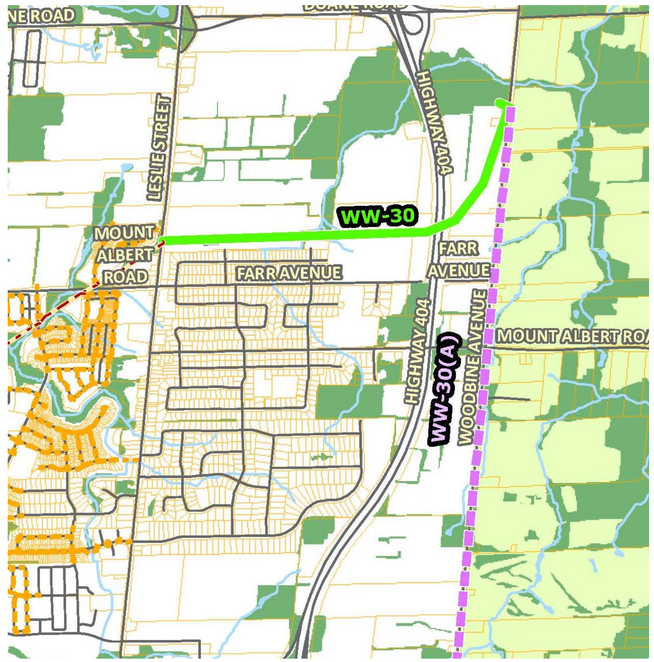
WW Issue #4: Wastewater discharge location required for the new pumping station servicing the Industrial Commercial and Institutional (ICI) lands in Mount Albert West



Wastewater Issue #1 – PS-2

A new station (PS-2) is being constructed on Woodbine Avenue to service the Employment Area east of Highway 404. A final discharge location is required for the pumping station.

	Alternatives	Evaluation Criteria: Natural Env.	Social / Cultural	Technical	Economic
W-30	Install a forcemain directly across Highway 404 and tie into the Sharon trunk sewer. This option requires a shorter forcemain. **(Recommended)**				
W-30 (A)	Install a forcemain south along Woodbine Avenue to Green Lane. This option requires a significantly longer forcemain.				



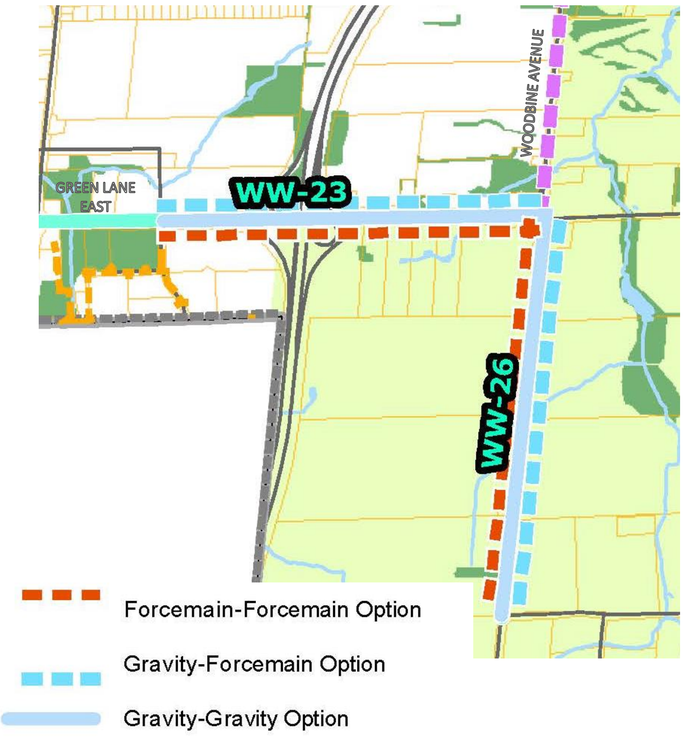
Wastewater Issue #2 – Bales Drive Pumping Station

A new pumping station (PS-1) is being constructed on Bales Drive to service the Employment Area east of Highway 404. The length of the forcemain from the pumping station before discharge into a gravity system needs to be determined.

	Alternatives	Evaluation Criteria: Natural Env.	Social / Cultural	Technical	Economic
W-26 (FM)/23 (FM)	Extend the forcemain from Garfield Wright Blvd all the way to the gravity sewer beyond the 404 on Green Lane. Forcemains have lower capital costs, but higher operational costs over time.				
W-26 (FM)/23 (GS)	Extend the forcemain from Garfield Wright Blvd to Woodbine/Green Lane, and a gravity sewer along Green lane to beyond the 404.				
W-26 (GS)/23 (GS)	Install gravity sewers from Garfield Wright Blvd to beyond the 404 on Green Lane. Gravity sewers are installed at a greater depth and have higher capital costs, but lower operational costs over time. **(Recommended)**				

KEY

Most Preferred | Preferred | Less Preferred | Least Preferred



wsp

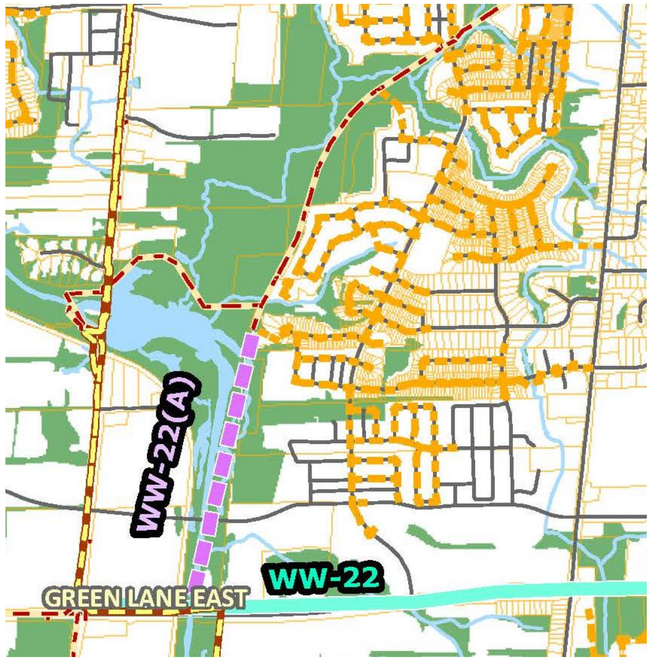
Town of East Gwillimbury

Wastewater Issue #3 – Servicing on Green Lane

A gravity sewer is required along Green Lane to service the Employment Area east of Highway 404. There are two options to determine the location of the proposed sewer.

	Alternatives	Evaluation Criteria			
		Natural Env.	Social / Cultural	Technical	Economic
WW-22	The gravity sewer will follow the existing ROW along Green Lane and terminate at 2nd Concession Road. This option requires a shorter sewer. **(Recommended*)**				
WW-22 (A):	The gravity sewer will run north from Green Lane along the hydro corridor to connect to the Sharon sewer.				

**Subject to Confirmation of Capacity Availability by York Region*



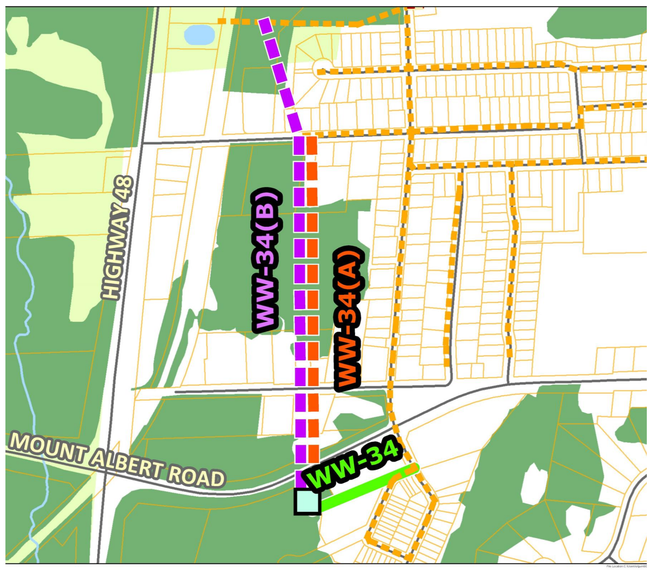
Wastewater Issue #4 – Servicing the new ICI Lands in Mount Albert

A new sewage pumping station is required to service the South Service area designated within the Mount Albert West ICI lands. There are three options for where this pumping station can discharge to.

	Alternatives	Evaluation Criteria			
		Natural Env.	Social / Cultural	Technical	Economic
W-34	The forcemain will discharge to the residential sewer system on Don Rose Boulevard which in turn discharges to the south end of King Street. **(Recommended)**:				
W-34 (A):	A longer forcemain will run northwards and discharge to the Princess Street sewer.				
W-34 (B):	A longer forcemain will run northwards and discharge into the IGA sewer.				

KEY

Most Preferred	Preferred	Less Preferred	Least Preferred



EAST GWILLIMBURY – CENTRAL GROWTH AREA

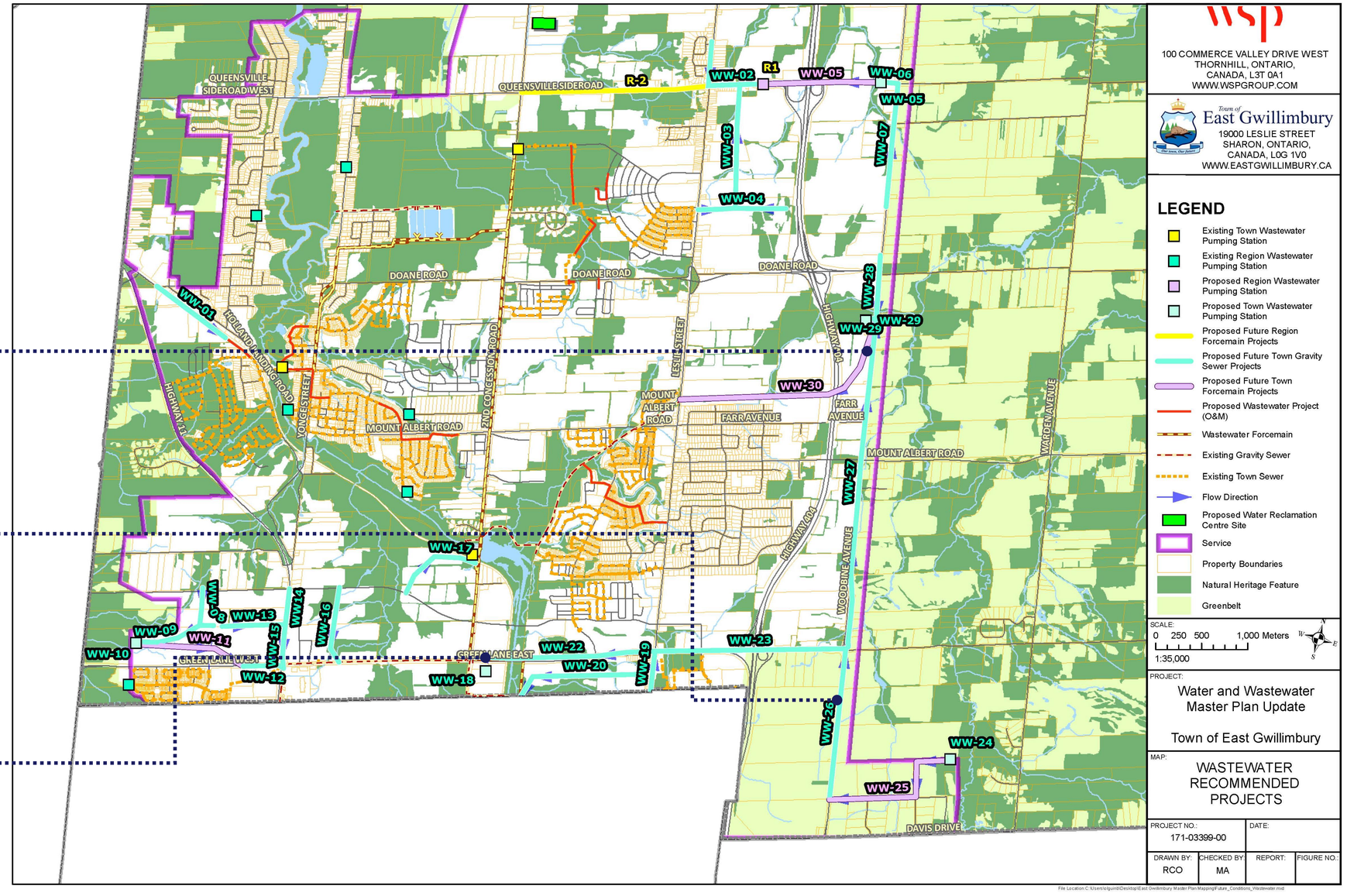
All projects recommended through this study constitute improvements to the system, and require the upgrade or expansion of the existing wastewater network For the three projects where alternative options were explored **(Boards 17 and 17)**, the preferred alternatives are labelled.

The projects can be implemented over time, when opportunities for implementation arise. Timing for implementation is recommended to coincide with the Town's other proposed projects for interrelated infrastructure such as roads, sewers and storm sewers.

WW Issue #1
Preferred Alternative

WW Issue #2
Preferred Alternative

WW Issue #3
Preferred Alternative

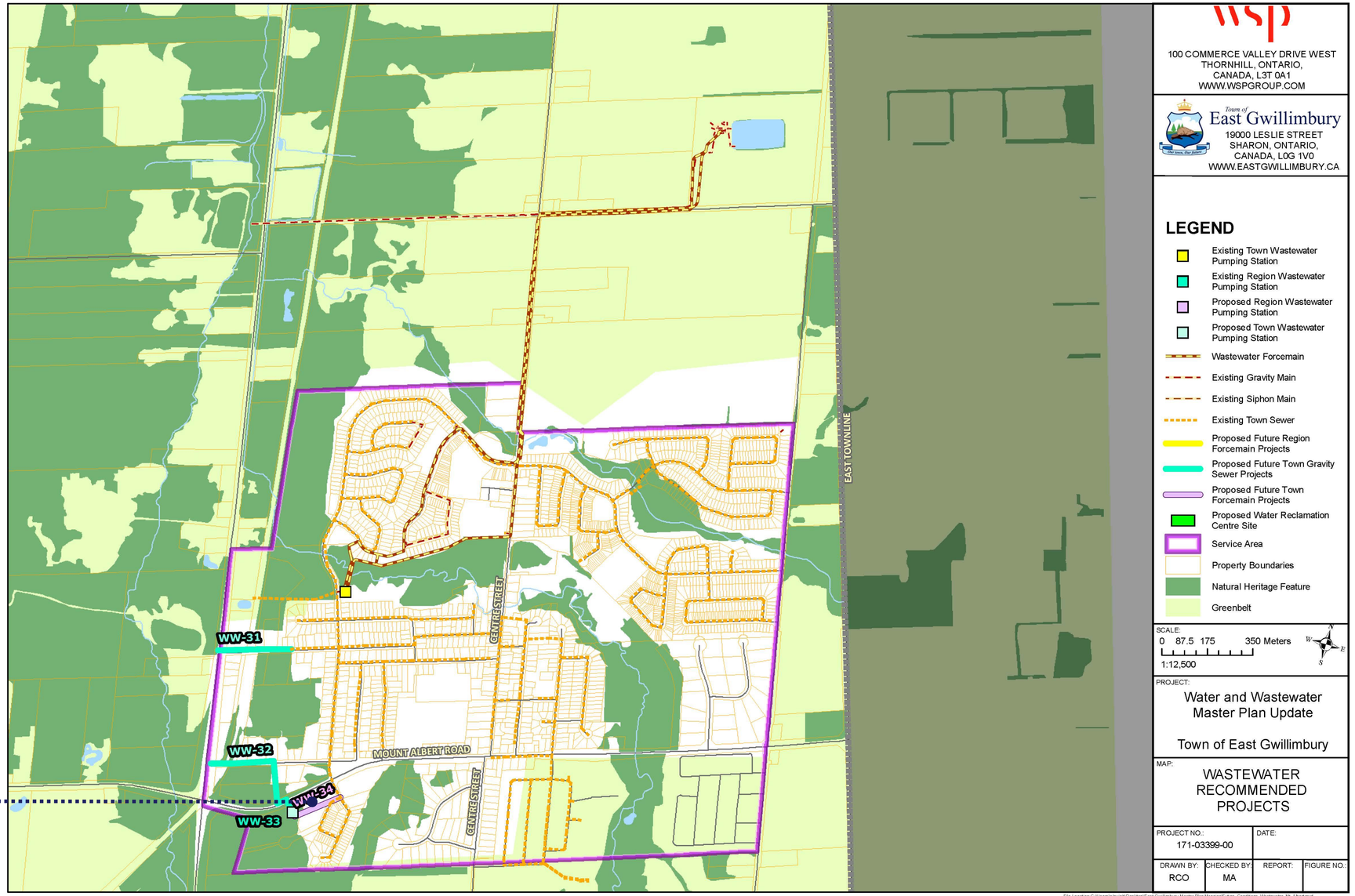


The recommended projects for the Town's wastewater distribution system to meet servicing demands to the year 2041 are highlighted in light blue in the figure above.

EAST GWILLIMBURY – MOUNT ALBERT

Required wastewater projects within Mount Albert are shown. For the one project where alternative options were explored **(Board 17)**, the preferred alternative is labelled on this map.

The projects can be implemented over time, when opportunities for implementation arise. Timing for implementation is recommended in to coincide with the Town's other proposed projects for interrelated infrastructure such as roads, sewers and storm sewers.

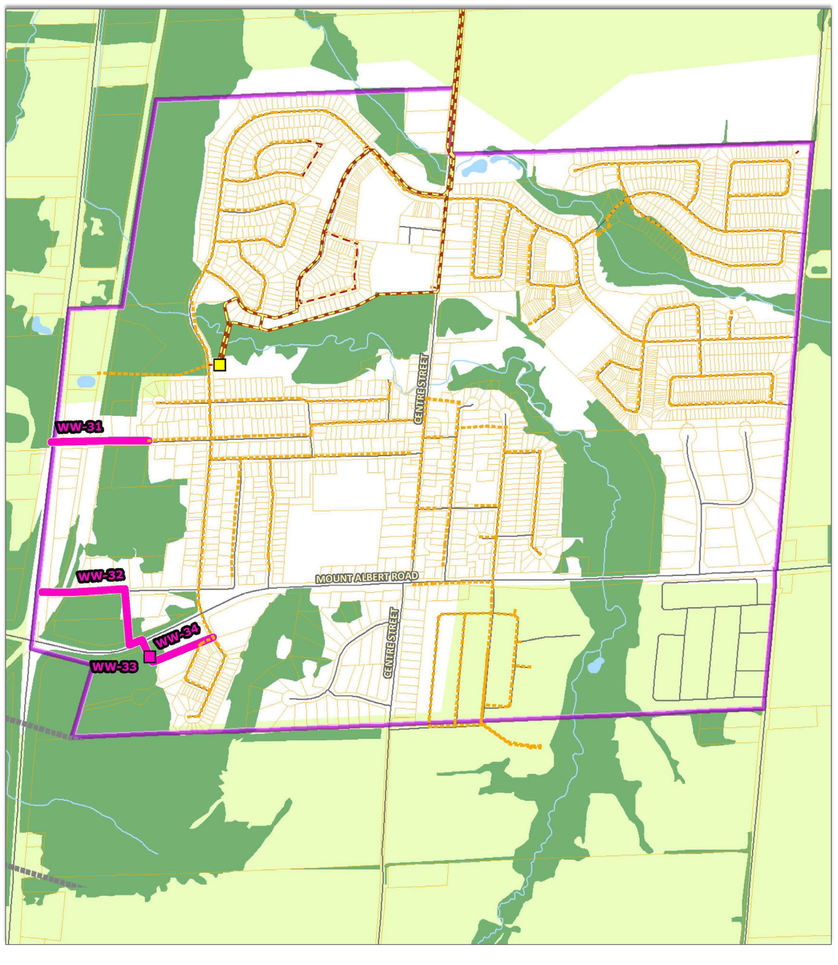


WW Issue #4
Preferred Alternative

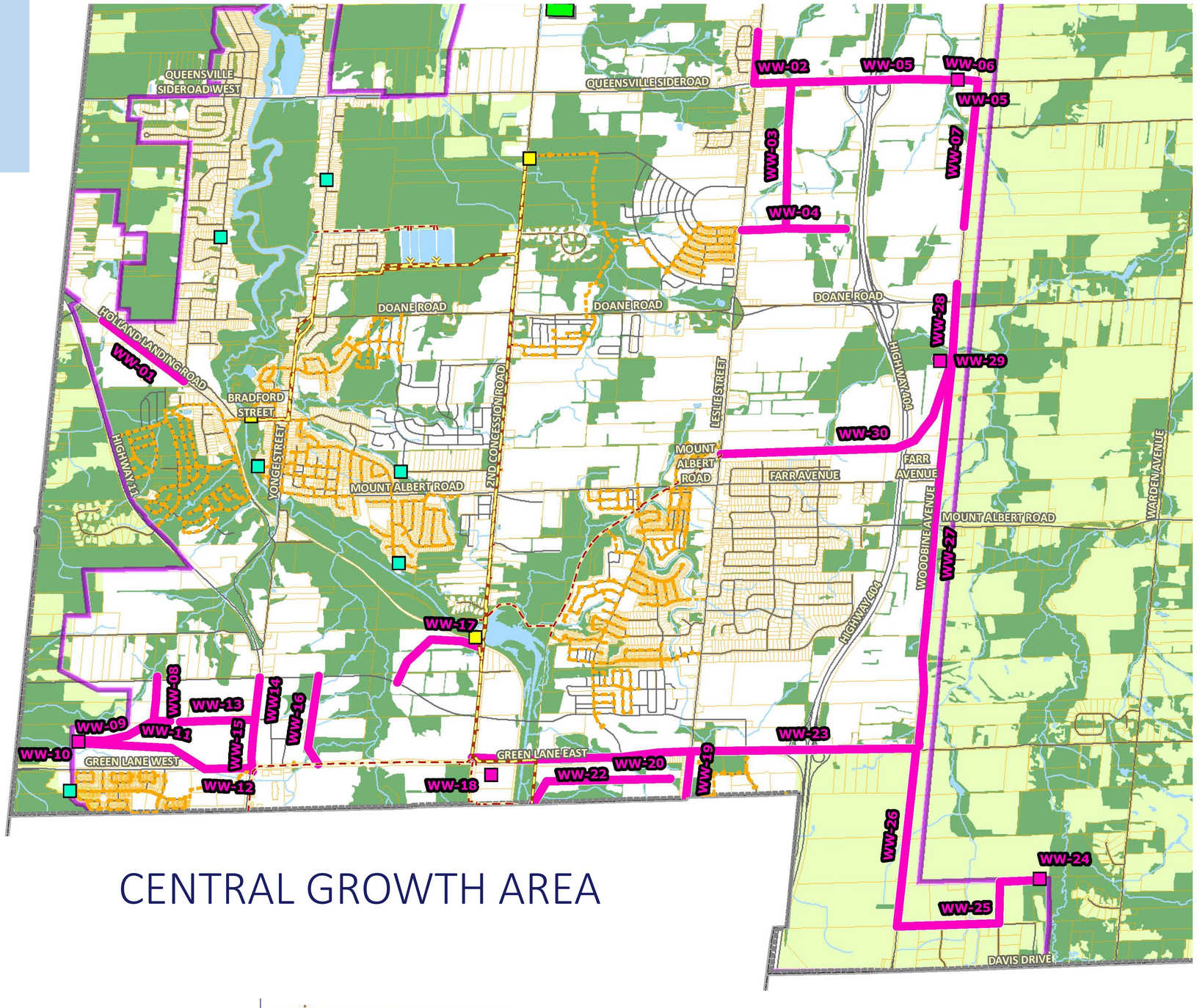
The recommended projects for the Mount Albert's wastewater distribution system to meet servicing demands to the year 2041 are highlighted in light blue in the figure.

The wastewater projects highlighted in pink are system upgrades that are driven by future population and employment growth forecasts.

MOUNT ALBERT



CENTRAL GROWTH AREA



STAY INFORMED

Comments received will be included in the Final Master Plan Report which is expected to be published in Q3/Q4 of 2019. For any further inquiries please refer to:

http://eastgwillimbury.ca/projects

If you would like to submit your comments directly to the Study Team, please contact:

Denny S. Boskovski, C.E.T.
Asset Management and Capital Project Manager
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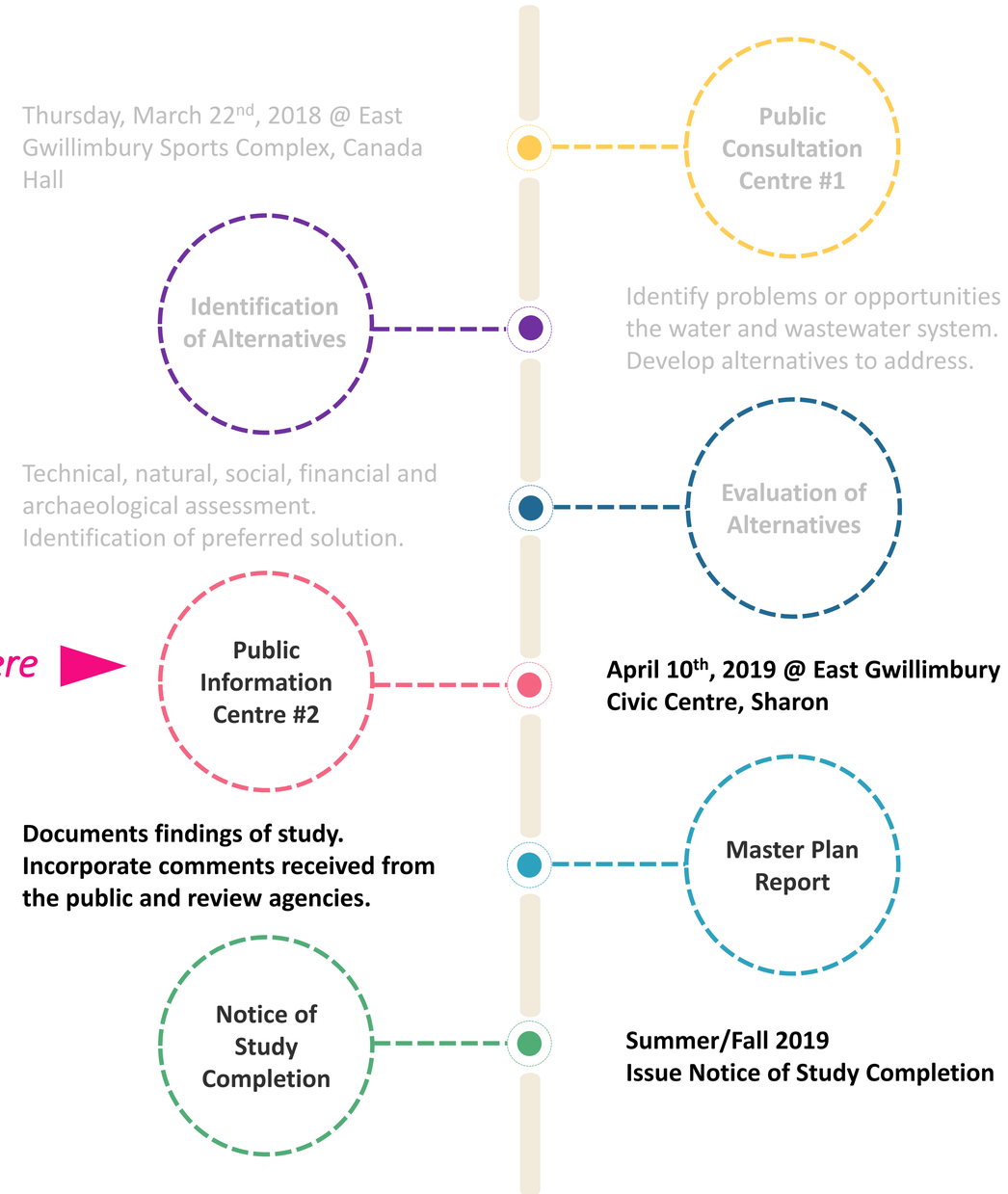
Tel: 289-982-4021/289-982-4393
Mani.Ruprai@wsp.com /
Mazahir.Alidina@wsp.com



wsp | Town of East Gwillimbury

East Gwillimbury

PUBLIC INFORMATION CENTRE #3

@TownofEastGwillimbury
@TownofEG
@TownofEastGwillimbury
www.eastgwillimbury.ca
905-478-4282
customerservice@eastgwillimbury.ca

Water and Wastewater Master Plan Update

April 26, 2023, at 5 p.m.

Council Chambers and Atrium at the Civic Centre (19000 Leslie Street, Sharon)

PROJECT DESCRIPTION

The Town of East Gwillimbury previously initiated a Water and Wastewater Master Plan (W/WWMP) Study in 2017 to provide a sustainable blueprint for the planned growth and servicing needs to the 2041 year and serve as an update to the 2010 W/WWMP by identifying long-term strategies for servicing current and future populations.

In 2019, the Town initiated an Official Plan Review, which included a land needs assessment to accommodate land use growth projections to the year 2051.

The W/WWMP is being further updated to address the water and wastewater servicing needs to 2051 while accounting for a new study context including updated servicing policies and plans by York Region and the Province of Ontario.

The Study will meet the Town's Water and Wastewater Services mission:

The Town is projected to experience significant population and employment growth over the next 30 years. As a result of this growth, a safe, efficient, and reliable supply of water and wastewater services to the Town will become increasingly important and challenging and the Town's water and wastewater systems will need to be expanded as necessary to accommodate this growth.

The W/WWMP will be prepared in accordance with the requirements of the Municipal Class Environmental Assessment (Class EA) process (October

2000, as amended in 2007, 2011, 2015 and 2023). The Town of East Gwillimbury is completing this Master Plan addressing Phase 1 – Problem or Opportunity, and Phase 2 – Alternative Solutions of the Municipal Engineers Association (MEA) Class EA process. The Study is conducted at a broad level of assessment in which site-specific Class EA's for all recommended Schedule 'B' projects are to be completed in the future, closer to the time of the projects' implementation.

CONSULTATION

Public consultation is vital to the success of this Master Plan. We encourage all residents to provide input throughout the Study.

Public Information Centre (PIC) #3 will inform you about this process, proposed alternatives, and recommended solutions. This is the final PIC, once the Study is complete, the Master Plan will be filed for public review.

Project updates and notices will be posted on the Town's website at **www.eastgwillimbury.ca/WWWMP** to inform the public of the progress of the W/WWMP. Residents and interested parties are encouraged to regularly visit the website to learn more about the Study.

Drop-in Interactive Open House
Date: Wednesday, April 26, 2023
Time: 5 to 8 p.m.
Location: East Gwillimbury Civic Centre
19000 Leslie Street, Sharon, ON L0G 1V0

QUESTIONS/MAILING LIST

If you have any questions or concerns, or would like to be added to the Study mailing list to receive updates and notices via email, please contact a member of the project team:

Denny S. Boskovski, C.E.T.
Asset Management and Capital Project Manager
Town of East Gwillimbury
19000 Leslie St., Sharon, Ontario L0G 1V0
905-478-4283 ext. 3818 | Fax: 905-478-8545
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Consultant Manager & Project Manager
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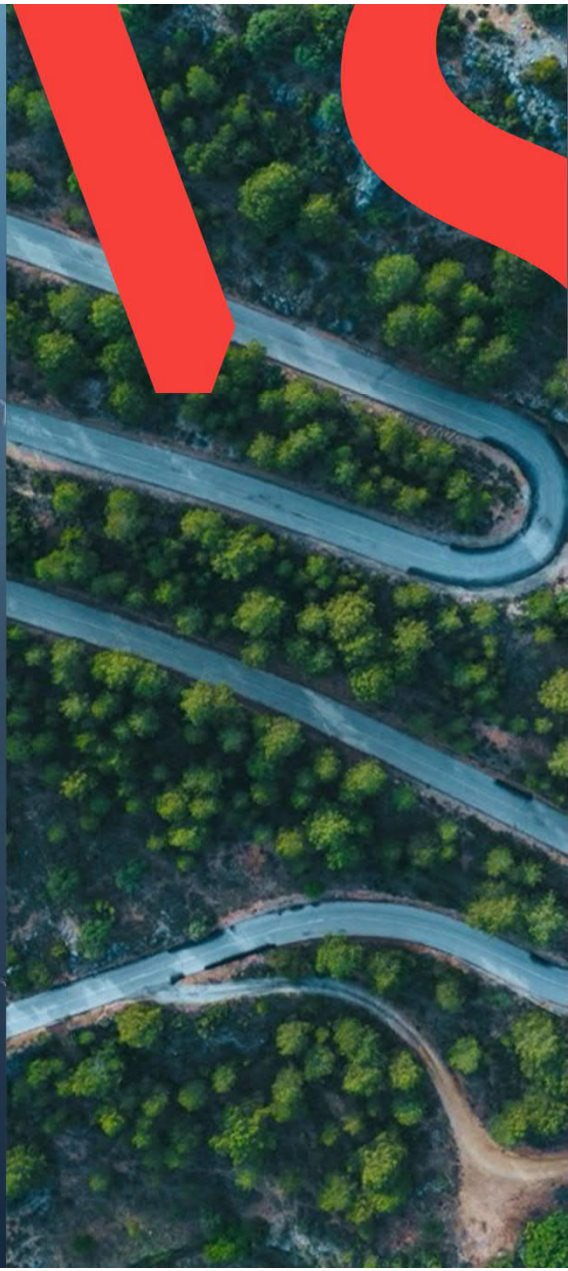
antoine.lahaie@wsp.com

East Gwillimbury Master Plan Update

Public Information Centre

2023/04/26

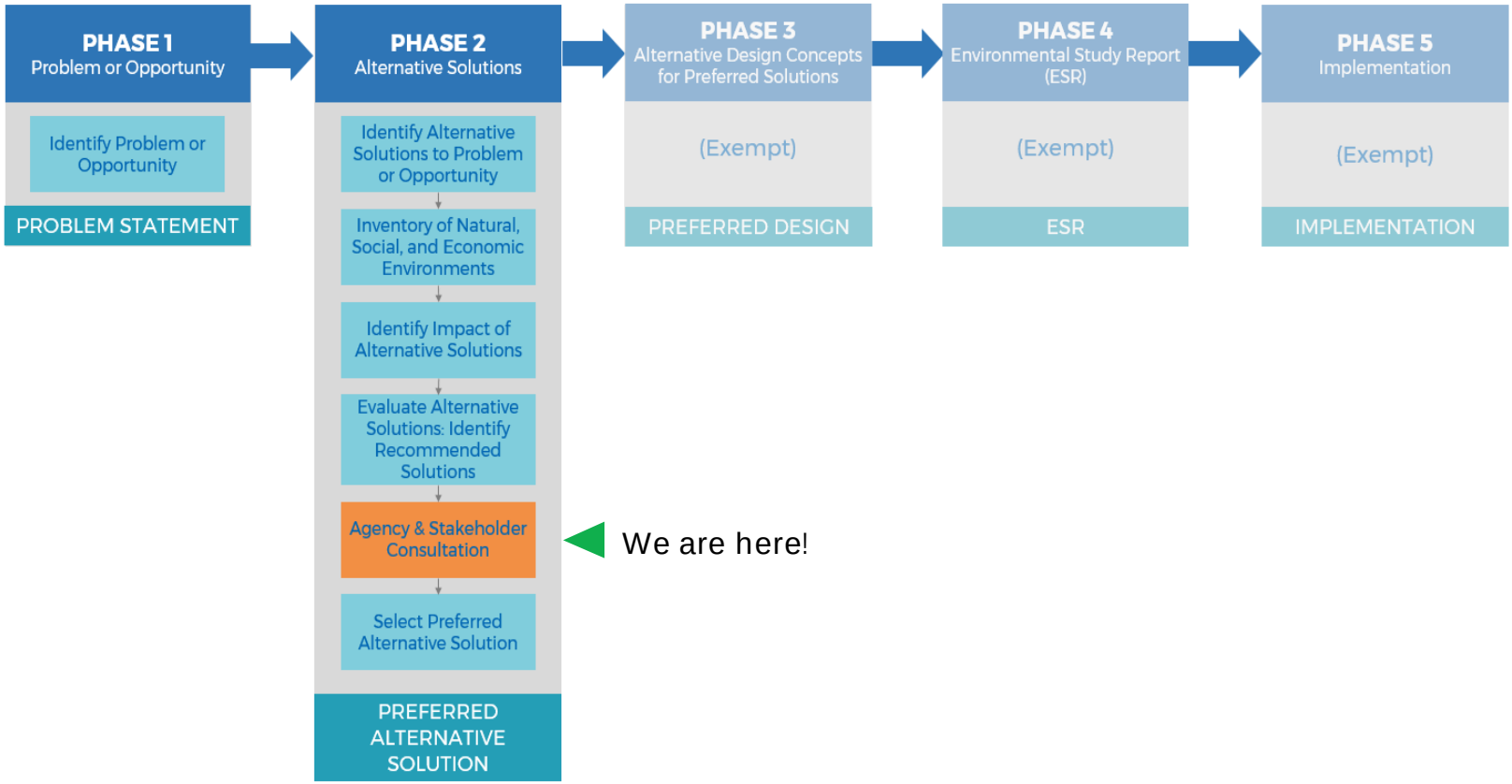


Problem Statement and Project Overview

- The Town of East Gwillimbury is projected to experience significant population and employment growth over the next 30 years. As a result of this growth, a safe, efficient, and reliable source of water and wastewater services will become increasingly important and challenging. The Town's water and wastewater system will need to be expanded as necessary to accommodate this growth.
- The 2022 Water and Wastewater Master Plan Update will:
  - Update from the draft 2041 water and wastewater recommendations (draft completed in 2019)
  - Provide a 'roadmap' of the water and wastewater infrastructure requirements based on the growth projections to the year 2051 and beyond
  - Accommodate the 70% and 100% Whitebelt Lands intensification
  - Develop a safe, efficient, and reliable source of water and wastewater services

Master Planning Process

- Approach # 1 of the Class EA Master Planning process was adopted for the completion of this Master Plan.



East Gwillimbury Master Plan Update Process

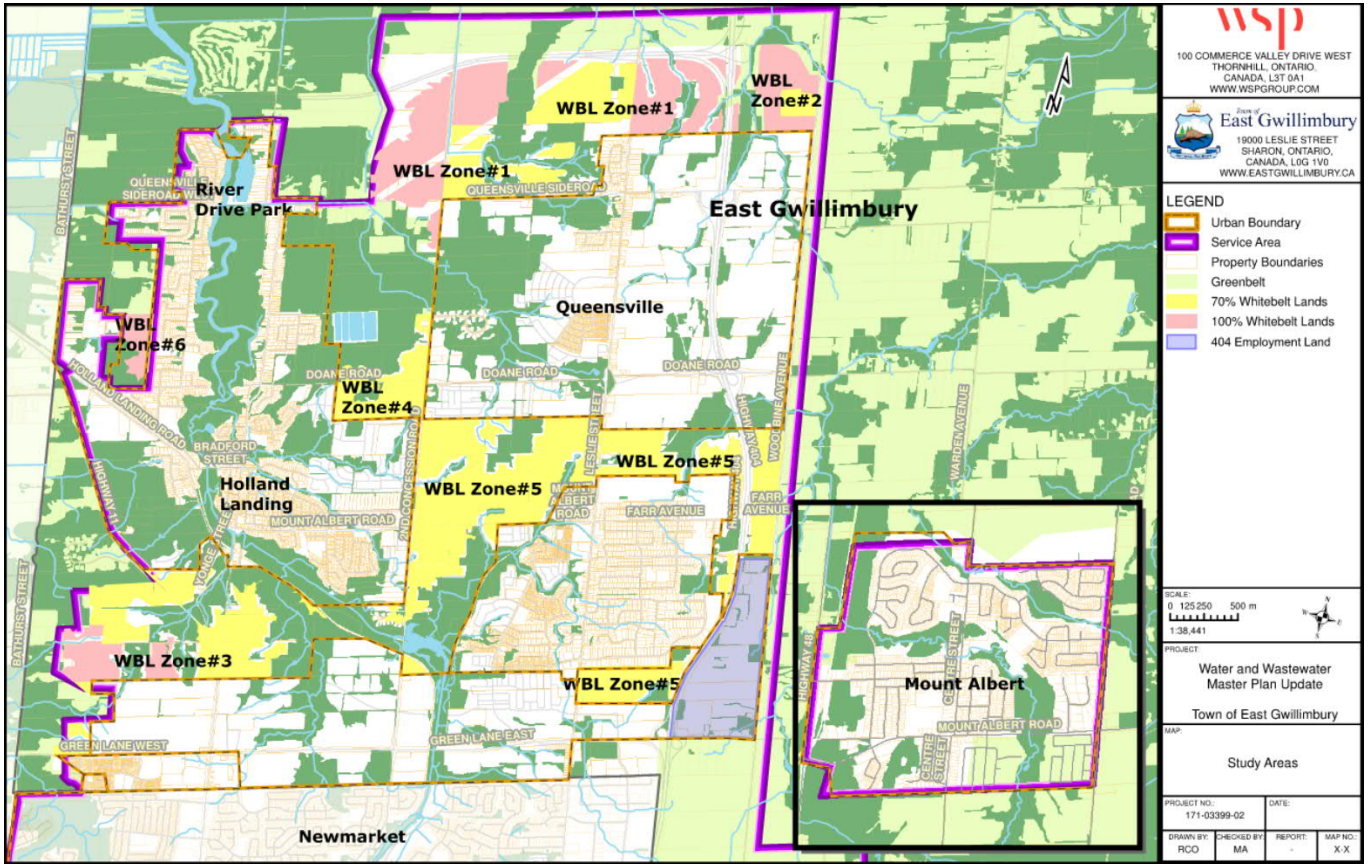
- Complete a comprehensive review of background documentation, existing water and wastewater system and key relevant studies
- Calculate the future water and wastewater flows, and update the Town's water and wastewater models
- Identify opportunities and constraints to improve the water and wastewater network based on existing and future populations
- Develop alternative servicing solutions for future growth; update 2019 draft EGMP recommendations and extend projects to 2051 to reflect the Official Plan amendments
- Evaluate the alternatives, using a set of criteria determined as part of the Master Plan, to arrive at a preferred service solution
- Prepare cost estimates and timing for recommended future infrastructure projects to implement the Master Plan
- Provide updated maps and list of projects for W & WW

Public Information Centre

- Provide Draft Report for 2022 EGMP Update (scheduled for Q2 2023)
- Finalise 2022 EGMP Update report (scheduled for Q2/Q3 2023)

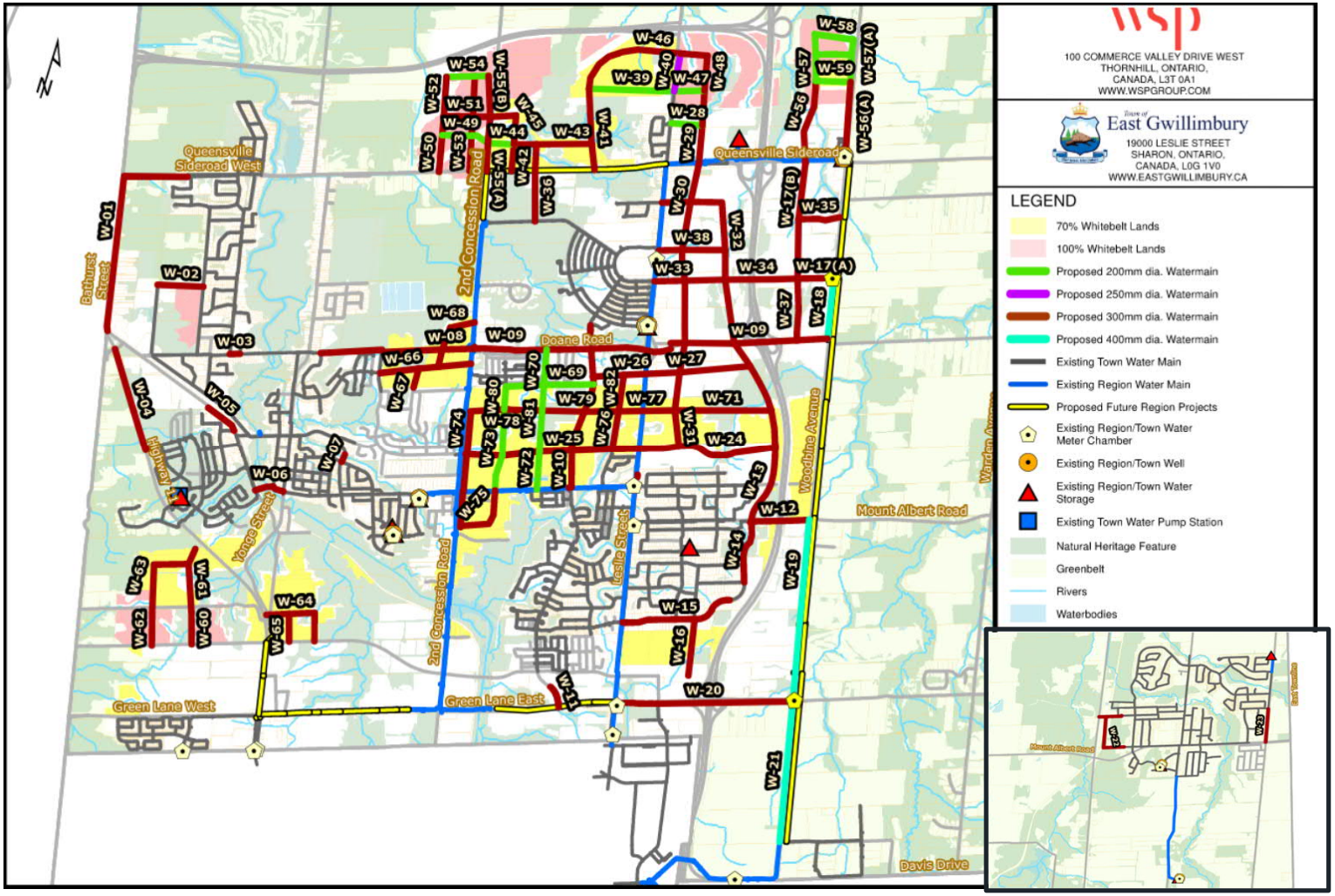
Whitebelt Lands Area

- WSP updated the 2019 Master Plan model by adding the 70% Whitebelt Land (in yellow) and 100% Whitebelt Land (in pink).
- Water and Wastewater Master Plan update was completed in coordination with the Transportation Master Plan.
- Proposed watermains sized based on the worst-case scenario simulation results
- Some piping infrastructure falls within the 100% WBL areas and was considered as part of 70% WBL projects due to the service needs for 70% WBL areas.



SOURCE	2051 SCENARIOS	POPULATION	EMPLOYMENT
Town of East Gwillimbury Official Plan	70% Whitebelt Lands	127,600	43,800
	100% Whitebelt Lands	140,730	63,068

Proposed 2051 Water Network



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Town of East Gwillimbury
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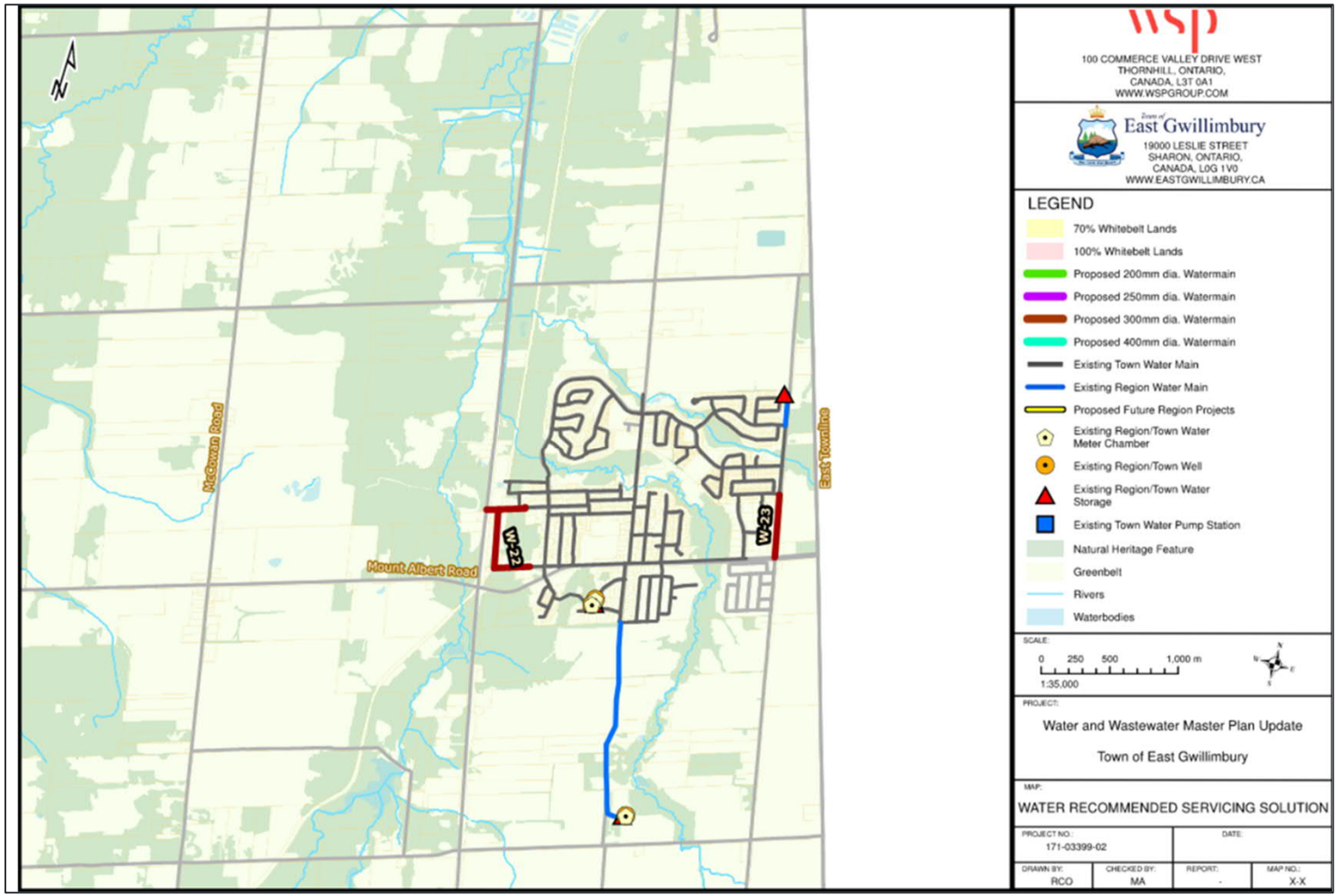
WWW.EASTGWILLIMBURY.CA

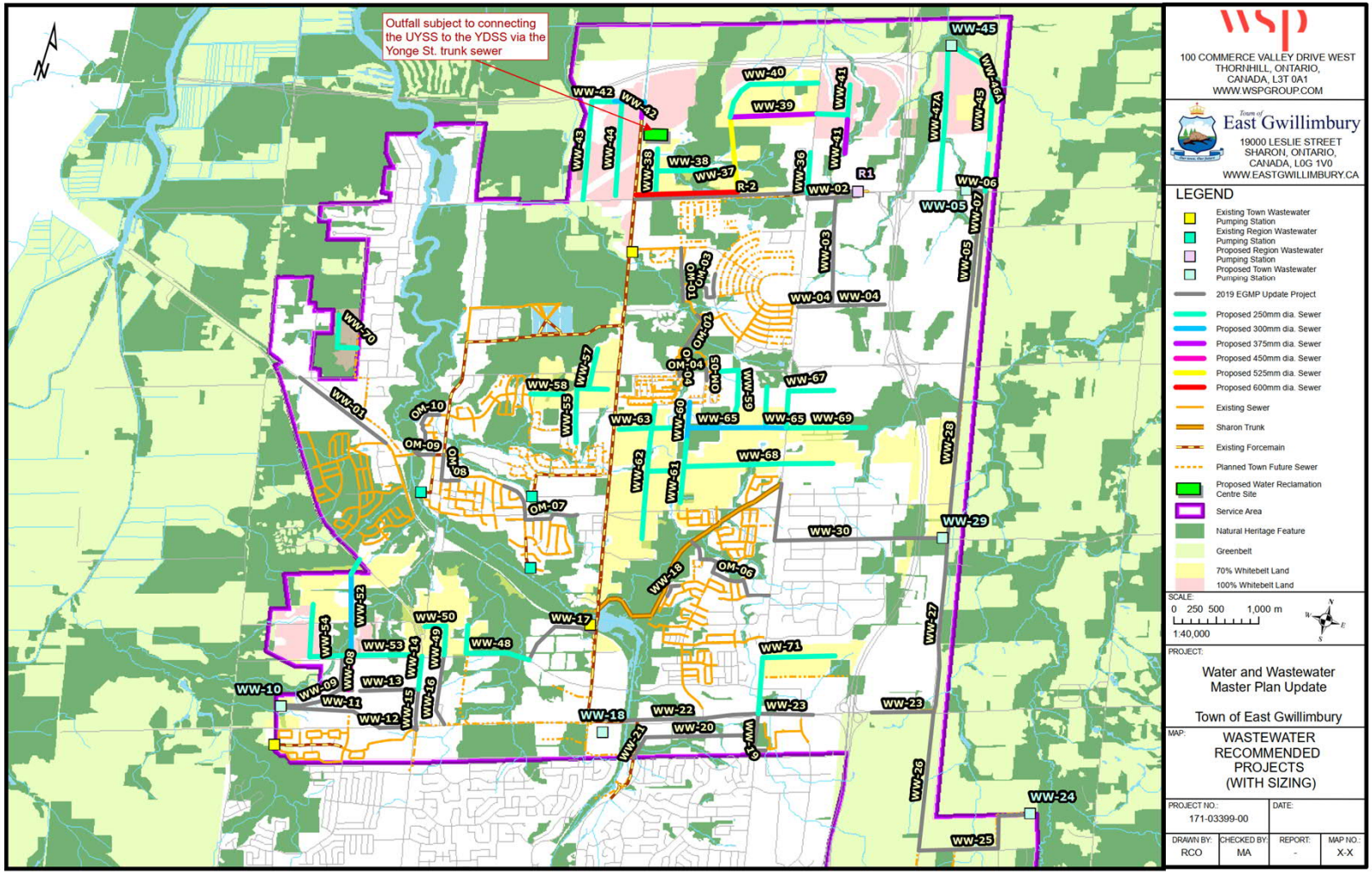
LEGEND

- 70% Whitebelt Lands
- 100% Whitebelt Lands
- Proposed 200mm dia. Watermain
- Proposed 250mm dia. Watermain
- Proposed 300mm dia. Watermain
- Proposed 400mm dia. Watermain
- Existing Town Water Main
- Existing Region Water Main
- Proposed Future Region Projects
- Existing Region/Town Water Meter Chamber
- Existing Region/Town Well
- Existing Region/Town Water Storage
- Existing Town Water Pump Station
- Natural Heritage Feature
- Greenbelt
- Rivers
- Waterbodies

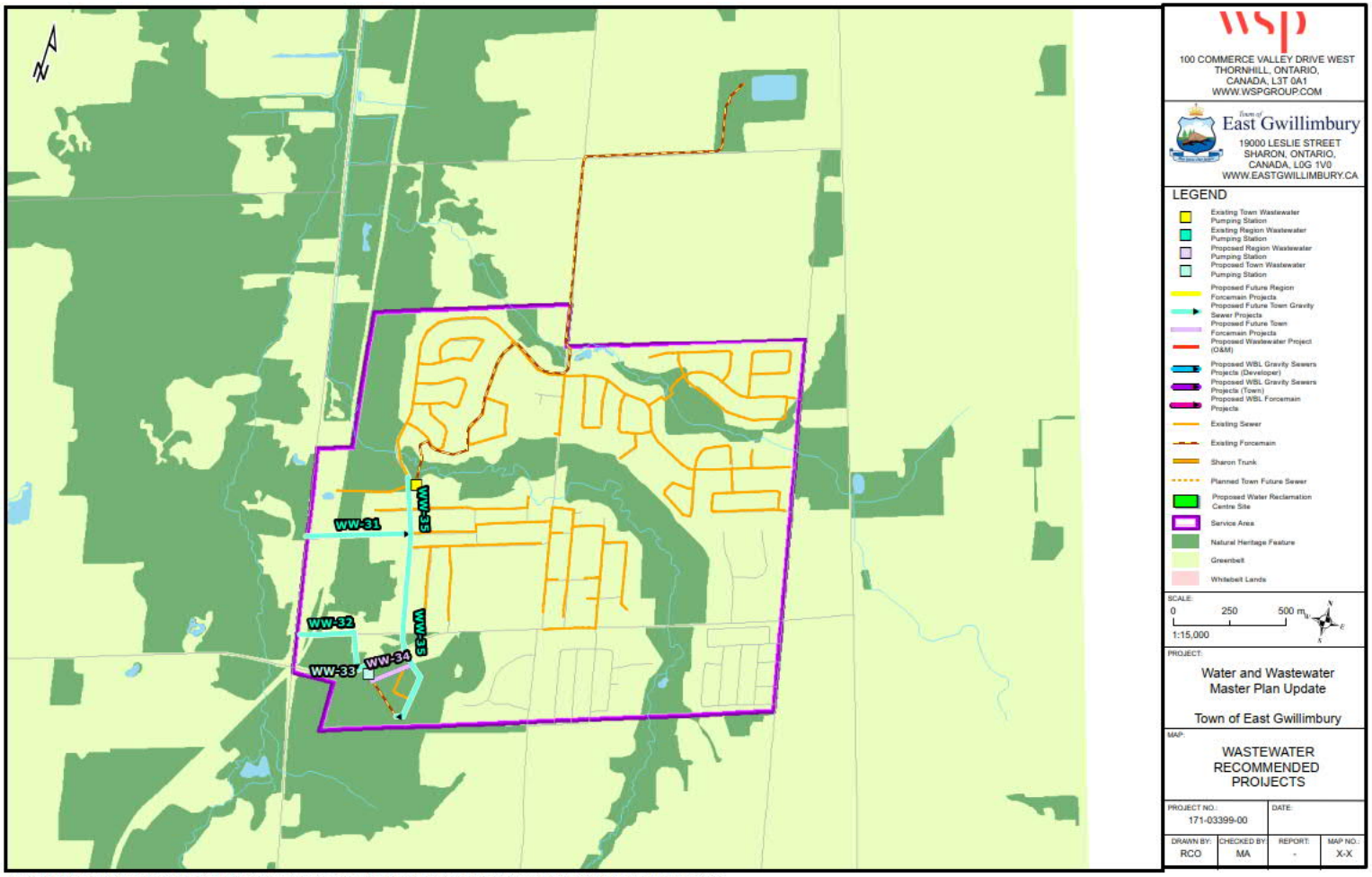
Proposed 2051 Water Network



Proposed 2051 Wastewater Network



Proposed 2051 Wastewater Network



NOTE: Future wastewater projects without black border line were proposed as part of the 2019 Water Master Plan Update

Keep Informed and Get Involved

Please share your thoughts about the East Gwillimbury Master Plan.

For More Information, visit us at: www.eastgwillimbury.ca/en/living-in-eg/town-projects

Contact Us at:

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Thank you

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