

Table of Contents

3.	TRANSPORTATION NEEDS AND OPPORTUNITIES.....	3-1
3.1	Role and Function of Highway 17	3-1
3.2	Needs and Opportunity Statement.....	3-1
4.	EXISTING ENVIRONMENTAL CONDITIONS.....	4-1
4.1	Overview of Study Area Environmental Conditions	4-1
4.2	Natural Environment	4-1
4.2.1	Physiography and Geology.....	4-1
4.2.2	Hydrogeology.....	4-1
4.2.3	Surface Drainage	4-3
4.2.4	Fish and Fish Habitat	4-3
4.2.5	Fish Species at Risk and Provincially Rare Fish Species	4-3
4.2.6	Terrestrial and Wetland Habitat	4-3
4.2.7	Plant Species at Risk and Provincially Rare Plant Species.....	4-4
4.2.8	Wildlife and Avian	4-4
4.2.9	Wildlife Species at Risk and Provincially Rare Wildlife Species.....	4-4
4.2.10	Designated Areas	4-6
4.3	Socio-Economic Environment.....	4-6
4.3.1	Regional Setting and Economy	4-6
4.3.2	Residential	4-6
4.3.3	Commercial / Business	4-6
4.3.4	Provincial Parks	4-8
4.3.5	Community/ Recreational/ Tourist Facilities	4-8
4.3.6	Property Waste and Contamination.....	4-8
4.3.7	Highway Noise	4-9
4.3.8	Air Quality	4-10
4.3.9	Agriculture	4-11
4.4	Cultural Environment.....	4-11
4.4.1	Built Heritage and Cultural Landscapes	4-11
4.4.2	Archaeology	4-14
4.5	Transportation and Utilities	4-15
4.5.1	Transportation Environment	4-15
4.5.2	Utilities	4-16

List of Exhibits

Exhibit 3.1:	Highway 17 and the Provincial Highway Network	3-1
Exhibit 3.2:	Overview of Highway Collision Severity	3-2
Exhibit 3.3:	Breakdown by Collision Category in the 2004 through 2010 Period.....	3-2
Exhibit 3.4:	Highway 17 Traffic Projections, from Highway 531 to Highway 630	3-2
Exhibit 4.1:	Natural Environment Existing Conditions and Constraints	4-2
Exhibit 4.2:	Thermal Designation of Watercourses within the Highway 17 study area	4-3
Exhibit 4.3:	Study Area Business / Tourist Operations.....	4-6
Exhibit 4.4:	Socio-Economic Environment Existing Conditions and Constraints	4-7
Exhibit 4.5:	Identified Areas of Interest (AOIs).....	4-9
Exhibit 4.6:	Existing Highway 17 Noise Levels	4-9
Exhibit 4.7:	Existing Highway 17 Noise Sensitive Receptors	4-10
Exhibit 4.8:	Summary of Applicable Air Quality Guidelines and Standards	4-10
Exhibit 4.9:	Monitoring Station Data	4-11
Exhibit 4.10:	Ambient Air Quality Concentrations	4-11
Exhibit 4.11:	Cultural Environment Existing Conditions and Constraints.....	4-12
Exhibit 4.12:	Study Area Built Heritage Sites and Cultural Landscapes.....	4-13
Exhibit 4.13:	Registered Archaeological Sites within 1 km of the study area	4-15
Exhibit 4.14:	Utilities Along and Adjacent to Highway 17	4-16

3. Transportation Needs and Opportunities

This section provides an overview of the role and function of Highway 17 as part of the provincial highway system and presents the existing and future anticipated transportation needs and opportunities.

3.1 Role and Function of Highway 17

The provincial highway system is critical to Ontario's economy and quality of life and for northern Ontario (which covers an area of 800,000 square kilometres), the 11,000 km of provincial highway are literally economic life lines given the vast distances that separate communities, providing access to natural resources and major market areas.

Renewal and expansion of highway infrastructure was an integral component of the 2004 *Ontario Government's Northern Prosperity Plan*. As noted in this Plan, and in the *Northern Ontario Highways Strategy*, maintaining and enhancing transportation corridors like Highway 17 promotes safe and reliable movement of goods and people which is a key element of supporting northern communities and businesses.

The *Growth Plan for Northern Ontario*, released in 2011 by the Ministry of Infrastructure, built upon the principles of the *Northern Prosperity Plan* and was premised by the *Places to Grow Act* (2005). The Growth Plan outlines the government priorities for Northern Ontario over the next 25 years. The *Northern Ontario Multimodal Transportation Strategy* is a key deliverable of the Plan. MTO in partnership with the Ministry of Northern Development and Mines is developing a strategy to identify the long term strategic directions for transportation infrastructure and services in Northern Ontario.

The primary function of Highway 17 in Northern Ontario is to connect rural communities, urban areas, First Nation communities and recreational areas. Local residents and business owners rely on the system for convenient and safe access within and around their communities. Further, the highway supports the tourism and recreational industry which is a key component of the local economy. Providing a reliable, safe and convenient transportation system is essential in attracting visitors to the area and seasonal residents. In addition, as part of the Northern Highway System together with Highways 11 and 69, Highway 17 is a vital highway link between Northern Ontario and Western Canada, and between Southeastern Ontario and Eastern Canada. **Exhibit 3.1** shows the study area in relation to other major transportation facilities in the area, with highways with four lanes or more in the vicinity of Highway 17 presented in red.

The need for improvements to the major highways in Northern Ontario is driven by both the policy direction and the anticipated future demand. It is reasonable to expect that the overall transportation demand on Highway 17, despite moderate historical growth, will intensify significantly as a result of the *Growth Plan for Northern Ontario*, justifying the need for additional capacity within the corridor. In addition, an improved corridor will itself be a significant economic stimulant for development.

As part of the province's long term planning vision, Highway 17 is to be converted to a fully access controlled facility adequate for meeting the anticipated future transportation demand and maintaining its interprovincial and international role and function. MTO has already initiated a planning process for

Highway 17 between Ottawa and Sault Ste. Marie and several planning projects are underway for selected sections of the existing highway, including the subject section.

Exhibit 3.1: Highway 17 and the Provincial Highway Network



3.2 Needs and Opportunity Statement

Within the study area, Highway 17 is currently primarily a two lane highway, with auxiliary lanes (passing lanes, truck climbing lanes, slip-around lanes and turning lanes) at key locations. There are two major intersections on Highway 17 within the study limits at Highway 630 and Boundary Road and several sideroad connections.

Highway 17 has been characterized as having several issues that require the attention of MTO. These issues/ concerns are defined in general terms as including the need to:

- improve highway safety; and
- provide the additional highway traffic capacity that will be required for the 20-year planning horizon to 2035.

Further details are provided below.

A widened/ improved/ realigned Highway 17 within the study area will improve road safety by:

- providing increased opportunities for safe passing;
- physically separating opposing lanes of traffic;
- providing horizontal and vertical alignments that meet current design standards;
- eliminating turning movements along the highway by providing grade-separated interchanges with ramps at key crossing roadways, and eliminating all other direct access to the highway (i.e. other crossing roads and private entrances); and
- reducing congestion.

The benefits of a widened/ improved/ realigned Highway 17 within the study area are expected to be:

- a transportation system with improved reliability, safety and convenience that will support the tourism and recreation industry by continuing to attract visitors and seasonal residents, thereby boosting the local economy; and
- enhanced economic growth both in the study area and northern Ontario in general.

Highway Collision Overview

As shown in **Exhibit 3.2**, there have been a total of 199 collisions (71 of which were single-motor-vehicle collisions with animals) within the study corridor between 2004 and 2010 (7 years). The locations of the collisions involving animals were generally dispersed over the entire study corridor but the following two segments have been identified as those with a cluster of collisions involving animals:

1. Highway 17 in the vicinity of Boundary Road (8 animal collisions recorded); and
2. Highway 17 east of Rutherglen (7 animal collisions recorded).

Exhibit 3.2: Overview of Highway Collision Severity

Number and Severity of Highway Collisions in the 2004 through 2010 Period				
Year	Fatal	Injury	Property Damage Only (PDO)	Grand Total
2004		4	21	25
2005		2	23	25
2006	1	3	30	34
2007		7	30	37
2008	1	7	20	28
2009		5	24	29
2010		8	13	21
Grand Total	2	36	161	199*

**71 of the 199 collisions were single vehicle collisions with animals*

The current Accident Rate for Highway 17 within the study limits is 0.8 which is a little higher than the Provincial Accident Rate of 0.7. Accident Rate is defined as the number of reportable accidents occurring

annually on a particular highway section for every million vehicle kilometres (MVKM) travelled on that section during the same period. "Reportable Accidents" are those causing any death, injury or property damage exceeding a certain established amount. Categorization of each collision is detailed in **Exhibit 3.3**.

Exhibit 3.3: Breakdown by Collision Category in the 2004 through 2010 Period

Severity	Initial Impact Type	Lighting Condition	Environment Condition	Road Surface Condition
Fatal: 2 Injury: 36 PDO: 161	Single Vehicle: 168 Approach: 3 (2 fatal) Rear End: 16 Sideswipe: 9 Angle: 1 Turning: 2	Dawn: 6 Daylight: 102 Dusk: 13 Dark: 78	Clear: 130 Rain: 12 Snow: 38 Other: 19	Dry: 101 Wet: 34 Slippery: 64

Highway Traffic Projections

The desired operating range for a two-lane highway is 1,200 vehicles per hour (two-way) or less. The traffic projections on Highway 17 for the 2008 through 2035 time period are shown in **Exhibit 3.4**. The details presented in **Exhibit 3.4** indicate that by 2035, the peak hour volume on Highway 17 is projected to exceed 1,200 vehicles per hour (two-way) and additional capacity is required to accommodate the increasing traffic volumes.

Exhibit 3.4: Highway 17 Traffic Projections, from Highway 531 to Highway 630

Traffic Projections	Time Period (Year)				
	2008	2012	2015	2025	2035
Average Annual Daily Traffic (AADT)	4,900	5,075	5,700	7,000	8,200
Summer Average Daily Traffic (SADT)	6,050	6,363	7,100	8,700	10,200
Peak Hourly Volume (PHV)*	735	760	860	1,050	1,240

*Growth rate = 0.9% (2008 to 2012), *DHV = Commuter Tourist Recreation 9.8%, Trucks 14.6%, PHV**=15% of AADT*

4. Existing Environmental Conditions

4.1 Overview of Study Area Environmental Conditions

To support the development of the recommended alternative, existing conditions and constraints in the study area were inventoried (primarily from secondary sources augmented by field reconnaissance) so as to identify significant areas within the study limits and in order to determine a highway corridor within which alternative methods of carrying out the undertaking (alternative widening/ realignment designs) could be generated.

Key environmental conditions and constraints within the study area include:

- three provincial parks: Samuel de Champlain, Mattawa River (waterways class), and Amable du Fond River (waterway class and living legacy site);
- Pimisi Roadside Picnic Area;
- OVR/ CPR rail line, Trans Canada pipeline and Union Gas spur pipeline;
- hamlet of Rutherglen and its associated residential development, two churches and a cemetery;
- highway oriented businesses along existing Highway 17 (gas station, restaurant, outfitter);
- the Columbia Forest Products plant;
- private entrances onto existing Highway 17;
- tourist-related facilities/ businesses (cabins, campgrounds, marinas, recreational areas);
- other rural residential and commercial development, including farm structures;
- aggregate sites and designated aggregate removal areas;
- waste management sites;
- Mattawa River, Amable du Fond River, the lakes and watercourses draining into them, and associated fish habitat and spawning areas;
- significant wildlife habitat (fish spawning areas, ungulate wintering yards and significant bird nesting sites) and wildlife movement;
- Provincially Significant Wetlands;
- environmental protection area (Rutherglen Moraine Shoreline and Kame ANSI); and
- recreational trails (snowmobiles, canoes, hiking trails, etc).

A discussion of the key features in the study area is provided in the following subsections. Further details can be found in the Specialist Reports provided in **Appendices B to G**.

4.2 Natural Environment

4.2.1 Physiography and Geology

The study area is located within the Algonquin Highlands and the Highway 11 Strip physiographic regions (Chapman and Putnam, 1984). The Algonquin Highlands region is generally characterized by a thin drift of stony till overlying Precambrian bedrock knob and ridges. The Highway 11 Strip contains glaciolacustrine sands, silts and clays that are present in low-lying bedrock areas and were deposited by streams entering former glacial Lake Algonquin. A distinct east-west trending glaciofluvial spillway is found along the

Mattawa River and along the Highway 17 corridor between the towns of Bonfield and Mattawa. These deposits consist of well sorted sands and gravels and are utilized locally as a source of aggregate.

A north-south trending kame moraine feature (locally referred to as the Rutherglen Kame Moraine) is found in the central-eastern portion of the study area. This feature represents the shoreline of former glacial Lake Nipissing and is often associated with significant environmental areas such as Provincial ANSIs. In the south and southwestern portion of the study area, near Bonfield, stratified deposits of silt and clay are present, which were derived from calm deeper water areas of former glacial Lake Nipissing.

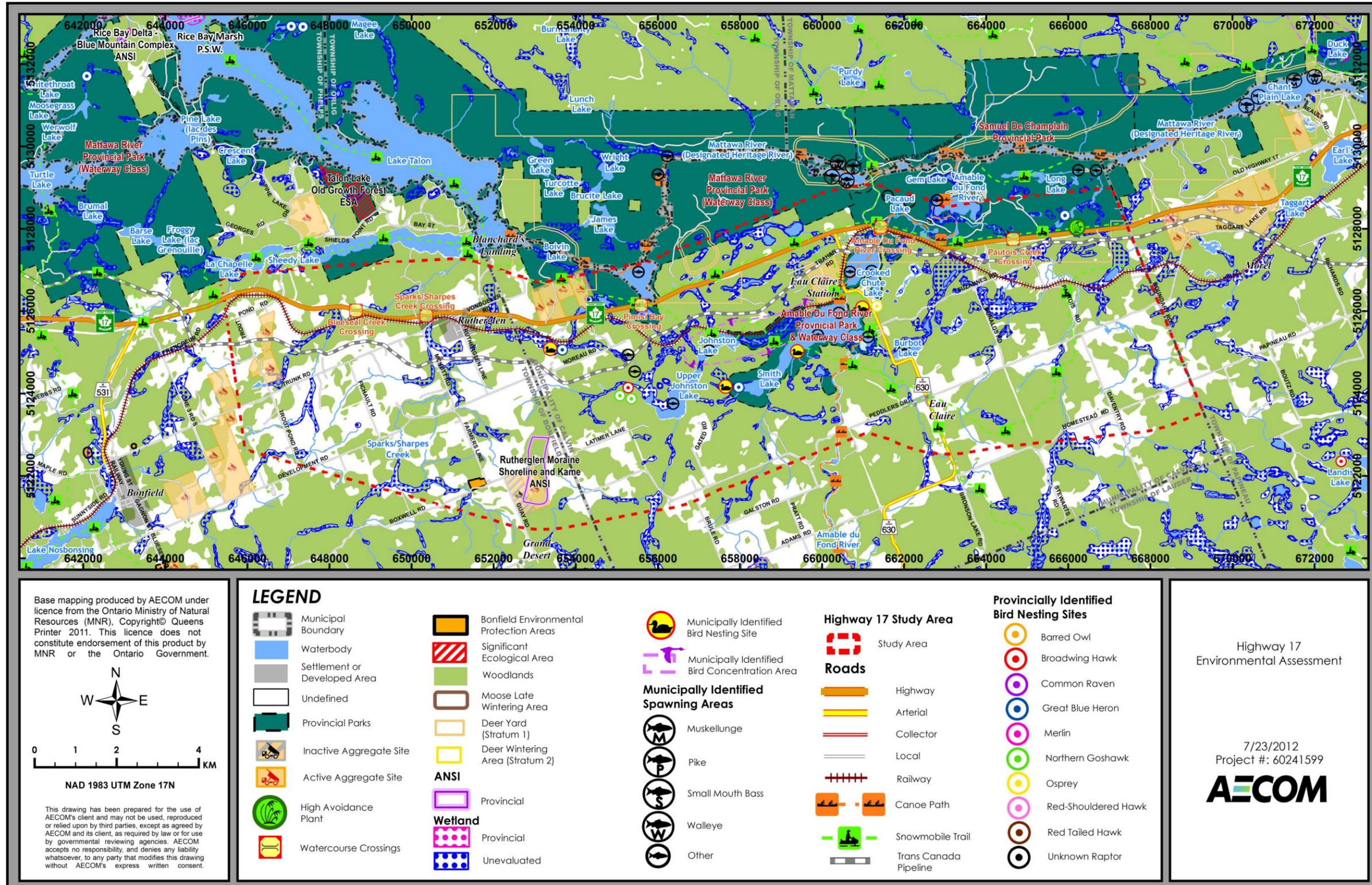
The study area is located within the geological Central Gneiss Belt of Ontario on the southern portion of the Canadian Shield. The bedrock geology of the study area is dominated by metamorphosed granitic gneisses, with occasional small outcrops of carbonate metasediments such as marble (Lumbers, 1966).

4.2.2 Hydrogeology

A search of the MOE water well database shows that there are approximately 171 groundwater wells within the study area. Private groundwater users within the study area typically obtain potable water from wells completed in bedrock aquifers, however, where outwash and kame deposits are present these units are utilized as a groundwater resource. Wells range in depth from less than 10 m to 100 m below ground surface (mbgs). Wells screened in overburden aquifers are generally shallower (less than 10 m in depth) than wells completed in bedrock aquifers. Groundwater levels in the study area range from 0 mbgs to greater than 20 mbgs. It is expected that in low lying areas and near watercourses, the groundwater table will be at or near surface (i.e., < 1 mbgs).

Due to the abundance of high permeability outwash and kame deposits in the study area, groundwater recharge dominates over runoff and infiltration rates are high where sands and gravels are present at surface and conversely are low where clay, till or bedrock deposits are present at surface. The Rutherglen Kame Moraine acts as a locally important recharge area that supports various flora and fauna in the Rutherglen Moraine Shoreline and Kame ANSI.

Exhibit 4.1: Natural Environment Existing Conditions and Constraints



4.2.3 Surface Drainage

Existing Highway 17 has five major watercourse crossings: Bluseal Creek (a tributary of Sparks Creek), Sparks (Sharpes) Creek, Pimisi Bay, Amable du Fond River, and Pautois Creek, all of which are tributaries of the Mattawa River to the north of the study area. All of these watercourses have a number of tributaries, and the sub-watersheds of some of them, including small lakes within the study area.

Bluseal Creek drains the westernmost portion of the study area, with Sparks (Sharpes) Creek draining the area immediately west of the Rutherglen Moraine. The east-central portion of the study area is drained by the Amable du Fond River and its tributaries. The main branch of the river flows through Upper Johnston Lake, Crooked Shoot Lake, and Smith Lake. The Amable du Fond River ultimately drains into the Mattawa River at a point within Samuel de Champlain Provincial Park. The easternmost portion of the study area is drained by Pautois Creek which also flows north and empties into Moore Lake within Samuel de Champlain Provincial Park. The creek and its main tributaries, including Little Pautois Creek and Bronson Creek, are known to have extensive wetlands associated within them.

4.2.4 Fish and Fish Habitat

Existing Highway 17 has five major watercourse crossings: Bluseal Creek, Sparks (Sharpes) Creek, Pimisi Bay, Amable du Fond River, and Pautois Creek. The fish community in the study area can be described according to thermal preference of the fish community found within a waterbody. Thermal designations for the watercourses within the study area are provided in **Exhibit 4.2**. The three major community types are defined below (Wright and Imhof, 2001):

- Coldwater – Fish community comprised primarily of fish species intolerant of water temperatures that exceed 22°C in the summer and are usually found only in groundwater rich areas.
- Coolwater/ Transitional Water – Fish communities comprised of species that can tolerate more variable water temperatures and conditions. This will include species that are coolwater tolerant and some species of salmonids that can tolerate maximum summer water temperatures up to 24°C for brief periods of time. These communities are often found where occasional groundwater discharges occur.
- Warmwater – Fish communities comprised of species that are highly tolerant of wide temperature and flow fluctuations, and can withstand water temperatures in excess of 26°C for prolonged periods of time.

Areas of known fish spawning were confirmed through correspondence with MNR and field investigations and include areas of Upper Johnston Lake, Smith Lake, Pimisi Bay, Burbot Lake, Pacaud Lake, Moore Lake, and Crooked Chute Lake as well as Bluseal Creek, Sparks (Sharpes) Creek, Pautois Creek and the Amable du Fond and Mattawa Rivers.

Exhibit 4.2: Thermal Designation of Watercourses within the Highway 17 study area

Waterbody Name	Sub-Watershed	Thermal Regime	In-Water Work Restriction
Bluseal Creek	Sharpes Creek	Coldwater	No in-water work between September 15 and April 1
Sparkes (Sharpes) Creek	Sharpes Creek	Coldwater	No in-water work between September 15 and April 1
Mattawa River and Pimisi Bay – location available to all (numerous) fish species within Mattawa River	Mattawa River	Warmwater	No in-water work between April 1 and July 15
Amable du Fond River	Amable du Fond River	Warmwater	No in-water work between April 1 and July 15
Pautois Creek	Pautois Creek	Coldwater	No in-water work between September 15 and April 1

4.2.5 Fish Species at Risk and Provincially Rare Fish Species

Three aquatic species at risk have been recorded in the greater area containing the Highway 17 study area: Lake sturgeon (*Acipenser fulvescens*), northern brook lamprey (*Ichthyomyzon fossor*), and Aurora trout (*Salvelinus fontinalis timagamiensis*). Of these three, occurrences of northern brook lamprey have been recorded within the Highway 17 study area. The northern brook lamprey is a non-parasitic lamprey species that is found in clear streams of varying sizes. Northern brook lamprey has been classified as Special Concern under the Species at Risk Act.

4.2.6 Terrestrial and Wetland Habitat

The Highway 17 study area is contained in the Great Lakes - St. Lawrence Forest Region; typified by a mixed hardwood forest community. It also exhibits examples of the transition into the Boreal Forest Region to the north; characterized by cooler micro-climates populated with black spruce, poplar and birch.

Although there are no Provincially Significant Wetlands known within the Highway 17 study area, there are 7 large unevaluated wetland systems associated with study area lakes and streams, and over 40 smaller unevaluated wetlands. The designation of wetlands as either locally or provincially significant is completed through standardized assessment developed by the Ontario Ministry of Natural Resources, known as the Ontario Wetland Evaluation System, which takes into consideration their biological, social, hydrological and special features.

It is noted that a number of wetland areas have not been evaluated according to the Ontario Wetland Evaluation System, e.g. the Bluseal Creek wetland area. It is believed that this wetland, and potentially others within the study area would be identified as a Provincially Significant Wetland if a formal evaluation were conducted (MNR, 2012).

4.2.7 Plant Species at Risk and Provincially Rare Plant Species

Two plant species considered rare in Ontario are known to exist in the Highway 17 study area: water awlwort (*Subularia aquatica*) and American waterwort (*Elatine americana*) (NHIC, 2012). Both species are ranked S3 indicating they are Vulnerable in Ontario due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making them vulnerable to extirpation. These wetland species are often found in association, in clayey to sandy soils in shallow waters of rivers and lakes.

4.2.8 Wildlife and Avian

Expansion of the existing Highway 17 corridor has the potential to affect core habitat (large blocks of wildlife habitat), interior and deep interior forest habitat, as well as specialized or sensitive wildlife habitat (SSWH) areas. A number of area-sensitive bird species and rare bird species were observed within the study area as a part of Breeding Bird Atlas Surveys (BSC, 2005). There are over 126 breeding bird species recorded in the various vegetation units throughout the study area, including 5 bird species at risk.

A variety of specialized habitat for wildlife exists within the Highway 17 study area. Such habitat includes, but is not limited to, grasslands, forest interior, amphibian woodland breeding ponds, turtle nesting habitat, specialized raptor nesting habitat, moose-specific areas (including mineral licks). The Significant Wildlife Habitat Technical Guide (OMNR, 2000) reports specialized habitats include:

- Areas that support wildlife species that have highly specific habitat requirements
- Areas with exceptionally high species diversity or community diversity
- Areas that provide habitat that greatly enhances a species' survival

The Guide classes specialized habitats as areas where: "The ecological function of specialized habitats is to enhance and, in some cases, ensure the survival of the associated wildlife species that depend on them. Protection and maintenance of these areas will contribute to higher biodiversity within the area. Loss or degradation of these areas and features could seriously stress and even eliminate the wildlife populations that intrinsically depend upon them." A number of areas of specialized habitat are present within the study area including:

- Waterfowl Concentration Areas
- Specialized Raptor Nesting Habitat
- Amphibian and Reptile Habitat
- Animal Movement Corridors
- Large Mammal Habitat

Waterfowl Concentration Areas

Municipal Official Plans have provided locations of Waterfowl Concentration Areas, municipal nesting sites, and fish spawning records. For information on fish spawning locations, please refer to **Section 4.2.4**. One known Waterfowl Concentration Area exists surrounding Johnston Lake, south of Eau Clair Station and west of Amable du Fond River Provincial Park.

Specialized Raptor Nesting Habitat

Provincially identified nesting sites for great blue heron, broadwing hawk, and northern goshawk are located within the study area. These species require specialized nesting habitat for their long-term survival. Locations of nesting sites are shown on **Exhibit 4.1**.

Amphibian and Reptile Habitat

Wooded areas and open meadows with associated water bodies are numerous within the Highway 17 study area and likely provide suitable habitat for several species of reptile and amphibian. A review of the Ontario Herpetofaunal Summary Atlas produced records of eight amphibian frog species within the study area including, American Toad, Spring Peeper, Gray Treefrog, Wood Frog, Green Frog, Northern Leopard Frog, Mink Frog and Bullfrog. Amphibian breeding habitat likely exists within study area wetlands, and associated vegetation communities. Furthermore, three salamander species, Red spotted newt, Jefferson-Blue Spotted Salamander Complex, and Northern Redback Salamander have occurrences within the study area.

Animal Movement Corridors

As described in the SWHTG (OMNR, 2000), *animal movement corridors* are 'elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another.' A wide variety of animal movement corridors exist within the Highway 17 study area. Areas possibly being used as corridors include riparian zones and shorelines, stream valleys, woodlands, and anthropogenic features such as hydro and Trans-Canada pipeline corridors, abandoned road and rail allowances and fencerows. Streams and areas connecting two wetlands may also be animal movement corridors.

Large Mammals

Moose, deer and black bear represent the largest mammals inhabiting the area. Habitat for these animals is in reasonable supply. The MNR values mapping indicates Stratum 1 Deer Wintering Yard from Pimisi Bay eastward with concentrated wintering yards located in the Bolvin Lake, Bouillon Lake and northwest of the Highway 630 / Highway 17 junction.

4.2.9 Wildlife Species at Risk and Provincially Rare Wildlife Species

A preliminary search using secondary sources was conducted to identify any possible Species at Risk recorded within the Highway 17 study area. Species that have been identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and/or by the Committee on the Status of Species at Risk in Ontario (COSSARO) as either Endangered or Threatened were cross-referenced with historical records. A discussion of select individual species and their habitat is provided below:

The Bobolink (*Dolichonyx oryzivorus*) species has been identified as Threatened by COSEWIC and is listed on Schedule 1 of the Federal Species at Risk Act (the SARA) and as Threatened under the Provincial Endangered Species Act (2009). This species was recorded as a part of the Ontario Breeding Bird Atlas. A ground nesting bird, the preferred habitat for this species includes open meadows and

hayfields (MNR, 2011). Suitable habitat for this species exists throughout the study area, and particularly wherever agricultural practices exist.

Barn Swallow (*Hirundo rustica*) species has been identified as Threatened by COSEWIC and is listed on Schedule 1 of the Federal Species at Risk Act and as Threatened under the Provincial Endangered Species Act. Also recorded during the Ontario Breeding Bird Atlas (2005), this species utilizes manmade structures for nesting, and feeds on flying insects over open fields. Suitable habitat for this species may exist wherever suitable nesting structures exist adjacent to open fields (e.g. agricultural lands, wetlands, large forest openings and road right-of-ways).

Eastern Meadowlark (*Sturnella magna*) species has been identified as Threatened by COSEWIC and is listed on Schedule 1 of the Federal Species at Risk Act and as Threatened under the Provincial Endangered Species Act. Recorded within the study area during the Ontario Breeding Bird Atlas (2005), this grassland species utilizes pastures and open meadows as nesting habitat. Suitable habitat for this species may exist in the western part of the study area, or wherever agricultural practices exist.

The Loggerhead shrike (*Lanius ludovicianus*) has been classified as Threatened under the Provincial Endangered Species Act. A grassland species, the Loggerhead shrike requires pasture or other grasslands with spiny, multi-branched shrubs (or barbed wire fencing) on which to impale their prey (MNR, 2009).

The Chimney Swift (*Chaetura pelagica*) has been classified as Endangered by COSEWIC and is listed on Schedule 1 of the Federal Species at Risk Act and as Threatened under the Provincial Endangered Species Act. Chimney swifts are found close to open water where they forage on flying insects. Chimneys and other manmade structures provide suitable nesting habitat, therefore this bird can now be found closer to urban settlements than in the past (MNR, 2009).

The Whip-poor-will (*Caprimulgus vociferus*) has been classified as Threatened by COSEWIC and is listed on Schedule 1 of the Federal Species at Risk Act and as Threatened under the Provincial Endangered Species Act. Nesting directly on the forest floor, the whip-poor-will requires large tracts of forest containing open spaces (MNR, 2009). Much of the Highway 17 study area is wooded, and therefore there are several areas where suitable whip-poor-will habitat could be located.

The Blanding's Turtle (*Emydoidea blandingii*) species has been identified as Threatened by COSEWIC and is listed on Schedule 1 of the SARA, as well as provincially under the Endangered Species Act (2009). Historical records of this species were identified as a part of the NHIC screening. A long-lived species, the Blanding's turtle uses the shallow areas of large wetlands and lakes with plenty of aquatic vegetation (MNR, 2011). Nesting habitat could include roadway shoulders. Several wetlands are located within the study area, as well as larger bodies of water and slow moving streams, that could provide suitable habitat for Blanding's turtle.

The Milksnake (*Lampropeltis triangulum*) was also identified during the NHIC screening. This species is listed as a species of Special Concern federally under the Species at Risk Act, and also provincially under the Endangered Species Act. Milksnakes are typically found in a wide variety of habitats including fields, swamps and open woodlots (COSEWIC, 2002). Suitable habitat exists throughout the Highway 17 study area.

The Bald Eagle (*Haliaeetus leucocephalus*) was also identified during the NHIC screening. This species is listed as a species of Special Concern federally under the Species at Risk Act, and also provincially under the Endangered Species Act. Bald Eagles nest in a variety of habitats and forest types, almost always near a major lake or river where they do most of their hunting. Suitable habitat exists throughout the Highway 17 study area.

The Canada Warbler (*Cardellina canadensis*) is a small, brightly-coloured songbird which was also identified during the NHIC screening. This species is listed as a species of Threatened federally under the Species at Risk Act, and Special Concern provincially under the Endangered Species Act. The Canada Warbler breeds in a range of deciduous and coniferous trees, usually wet forest areas with well-developed, dense shrub layers. Suitable habitat exists throughout the Highway 17 study area.

The Common Nighthawk (*Chordeiles minor*) was also identified during the NHIC screening. This species is listed as a species of Threatened federally under the Species at Risk Act, and Special Concern provincially under the Endangered Species Act. Traditional habitat for this species consists of open areas with little to no ground vegetation such as logged or burned-over areas, forest clearings, rock barrens, peat bogs and lakeshores. This species tends to occupy natural sites but can also nest in cultivated fields, orchards, urban parks, mine tailings and along gravel roads and railways. As such suitable habitat exists throughout the study area.

The Olive-sided Flycatcher (*Contopus cooperi*) was also identified during the NHIC screening. This species is listed as a species of Threatened federally under the Species at Risk Act, and Special Concern provincially under the Endangered Species Act. Habitat for this species is most often found along natural forest edges and openings in vegetated areas consisting of coniferous or mixed forest adjacent to rivers or wetlands and as such, suitable habitat exists throughout the study area.

The Snapping Turtle (*Chelydra serpentina*) species has been identified as Special Concern by COSEWIC as well as provincially under the Endangered Species Act (2009). Historical records of this species were identified as a part of the NHIC screening. Snapping Turtles spend most of their lives in water preferring shallow waters where they can hide under soft mud and leaves with only their noses exposed (MNR, 2011). Nesting habitat is usually gravelly or sandy areas along stream but can include roadway shoulders dams and aggregate pits. Several wetlands and areas of aggregate extraction are located within the study area, as well as larger bodies of water and slow moving streams, all of which could provide suitable habitat for this species.

It should be noted that the study area was also extensively surveyed for occurrences of species at risk. No additional species were identified through this exercise however, it is possible that additional species will be identified through future phases of work for the project particularly given that although there is no known occurrence, the Eastern Hog-Nosed Snake (*Heterodon platirhinos*), identified as Threatened under SARA and the Monarch Butterfly (*Danaus plexippus*), Special Concern under SARA, are also presumed to occur within the study area (MNR, 2012).

4.2.10 Designated Areas

Rutherglen Moraine Shoreline Area of Natural and Scientific Interest (ANSI) is located on private land and is approximately 72 ha in size (shown on **Exhibit 4.1**). According to the MNR, this feature represents an important area of a north-south trending end moraine that extends for 12 km from the edge of the Algonquin Highlands to the Mattawa River. The moraine was formed while submerged in post-Algonquin Lake Payette and is an area that is particularly unique as it remained submerged through Lake Sheguiandah.

4.3 Socio-Economic Environment

Existing conditions and constraints of the socio-economic environment are shown on **Exhibit 4.4**.

4.3.1 Regional Setting and Economy

The study area is situated in the Townships of Bonfield, Calvin and Papineau-Cameron located in the District of Nipissing. The study area is predominantly rural, with the Hamlet of Rutherglen being the most populated area (less than 500 residents), but also includes the communities of Eau Claire and Eau Claire Station. The combined population of the Township of Papineau-Cameron, the Municipality of Calvin and the Township of Bonfield is less than 4,000 people (source: Stats Canada, 2011 Census data). The most significant industries in the area are forestry, farming and tourism. While the highway runs adjacent to the Canadian Pacific Railway line there are no stations in the study area.

The District of Nipissing is a census division located between Quebec and Timiskaming to the north, Renfrew County, Parry Sound, Haliburton on the southeast, Parry Sound on the southwest, and Sudbury on the northwest. It has a population of 84,736 and a land area of 17,104 km² (Statistics Canada 2011). The District of Nipissing is comprised of one city, three towns, seven townships and two unorganized areas. The district is primarily a census division and does not have an upper tier administration, therefore the government services are provided by the towns and townships or provincial government.

The Township of Bonfield consists of a vast rural area and encompasses the communities of Bonfield, Rutherglen, Blanchard's Landing and Great Desert. The population of this township is 2,016 people and it occupies an area of 208.43km² (Canada Census, 2011). There are some small farming operations, but the primary economic activities are forestry, logging, tourism and a growing number of cottage industries. In 1986 the Township of Bonfield celebrated its 100th anniversary. It was inducted into the Canadian Railway Hall of Fame on October 8th, 2002 as the historic location where the first spike was driven in the CPR Trans-Continental Railway.

The Municipality of Calvin is located along the Mattawa River and Trans Canada Highway 17. According to the Canada 2011 Census, there are approximately 568 people living in this township that occupies an area of 140.69km². This is a farming community with a long history of logging. Notable landmarks of the area include the Samuel de Champlain Provincial Park, the Canadian Ecology Centre, the Eau Claire Gorge, and access to Algonquin Provincial Park.

The Township of Papineau-Cameron is located on the southern side of the Mattawa and Ottawa Rivers. There is development along Highway 17 which traverses through this area, but most of this township is rural. The Township has a mix of industrial, commercial, and residential with the main employers being Tembec Forest Products, GinCor Ltd, and tourist related facilities. There is an equestrian club whose members own many of the farms in the area. According to the Canada 2011 Census there are 978 people living here and the township occupies an area of 566.74 km².

4.3.2 Residential

The study area is sparsely populated with single residential homes along Highway 17 and connecting roads. An estimated total of 275 properties are found in this study area (based on secondary sources), of which 70 (25%) are farm properties. The most densely populated area is the hamlet of Rutherglen, in the Township of Bonfield. Within the town there are approximately 40 homes, of which 5 (12%) are farms. Rutherglen is bisected by Highway 17 and features two churches and a general store (Gagne's Red and White).

4.3.3 Commercial / Business

Exhibit 4.3 identifies business operations located within the study area, as determined from secondary source data. The table shows the services each business provides, its North American Industry Classification System (NAICS) group and the primary type of clientele served (e.g. customers primarily passing through the area (drive-by customer) or customers who have made a trip intentionally to visit this location (destination customer)).

Many of these businesses are "destination locations" such as campgrounds or cottages while others depend on drive-by customers such as gas stations and restaurants. Tourism is a key element in the economic profile of the area.

Exhibit 4.3: Study Area Business / Tourist Operations

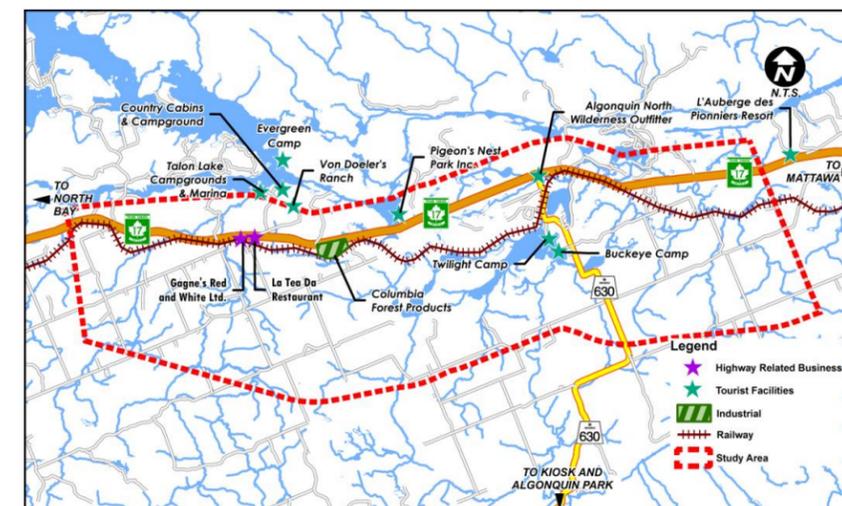
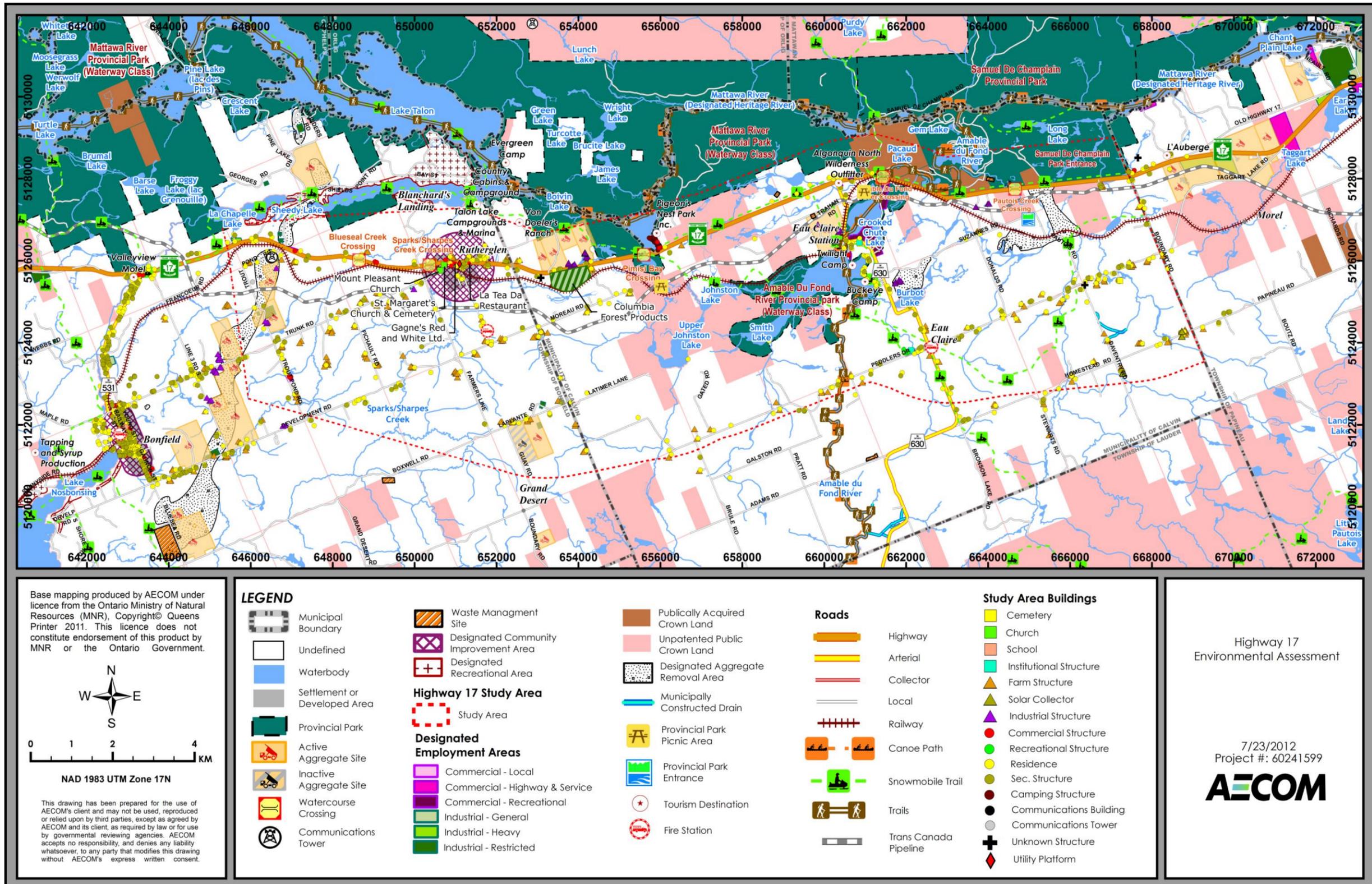


Exhibit 4.4: Socio-Economic Environment Existing Conditions and Constraints



4.3.4 Provincial Parks

The study area includes three provincial parks: Mattawa River Provincial Park, Samuel de Champlain Provincial Park and Amable du Fond River Provincial Park.

The Mattawa River runs parallel to Highway 17 and in 1970 a 33km section of the river was designated as the Mattawa Provincial Park. The park also includes a 122m ribbon of land either side of the river. The river features several stretches of rapids, an 8m waterfall and 14 portages. The park is a popular location for canoeing, white water rafting, boating, fishing and swimming. The park encompasses several lakes including Talon Lake and Turtle Lake which has docking facilities for boats. There are also a number of picnic and camping sites within the park as well as designated hiking trails and snowmobile routes. There are at least four access roads to the park from Highway 17. Visitor statistics are not available for waterway class Provincial Parks. The river is home to the Mattawa River Canoe Race which runs the full length of the river from Olmstead Beach to Mattawa – approximately 64km and takes place annually in July. (Source: Parks Ontario). Highway 17 crosses through the edge of the park at Pimisi Bay.

The Mattawa River also runs through the Samuel de Champlain Provincial Park, a popular location for hiking, boating, fishing, swimming and canoeing and includes camping and picnic areas. The park is 25.5 square km and is classed as a Natural Environment Park. The park features the Voyageur Heritage Centre which provides information on the role of the Mattawa River in the fur trade. The park is also home to the Canadian Ecology Centre, an outdoor education centre providing education on sustainable forestry. In 2010 there were 50,185 visitors to the park (Source: Parks Ontario statistics 2010). Highway 17 runs along the southern side of the park and is the principal access route to the park.

The Amable du Fond River flows from Pipe Lake and joins the Mattawa River in the Samuel de Champlain Provincial Park. The park provides an access point to Algonquin Provincial Park for canoeists and is an established ecological link between Samuel de Champlain and Algonquin Provincial Parks. The park is located south of Highway 17 and also contains Crooked Chute and Smith Lakes. It can be accessed both from Highway 17 and via Samuel du Champlain Provincial Park and is a popular location for canoeing, camping and hiking. Visitor statistics are not available for waterway class Provincial Parks. There are also a number of holiday cottages within the park. The Canadian Pacific Railway line runs along the North West perimeter of the park.

Amable du Fond River provides a recreational link between Samuel de Champlain Provincial Park and Algonquin Provincial Park. Retaining natural features also provides a natural corridor for animal movement north-south through the study area.

4.3.5 Community/ Recreational/ Tourist Facilities

Community features include: places of worship and cemeteries, community centres, institutional facilities (e.g., fire stations), educational or health care facilities and outdoor recreational facilities/ areas.

There are two churches found in the study area: St Margaret's of Scotland Anglican Church and the Mount Pleasant United Church, both located in Rutherglen. The churches are within 200m of each other and are located on the south side of Highway 17. St Margaret's Church also has a cemetery. There are no schools

located within the study area limits. In Eau Claire there is a public skating rink, sports park and baseball diamond located on Peddlers Drive.

The fire halls that service the study area are located in Bonfield, in Rutherglen, and on Highway 630 at its intersection with Peddlers Drive. Ambulance service is provided from North Bay and Mattawa. The local OPP detachment is located in North Bay.

There is a designated canoe route that runs through the Mattawa River Provincial Park and into the Samuel de Champlain Provincial Park, and also passes through the study area. There is a further canoe trail running south from Samuel de Champlain Provincial Park into Amable du Fond Provincial Park, passing under Highway 17, linking the two parks (shown in **Exhibit 4.4**).

There are a number of snowmobile trails in the areas surrounding and within the study area. These trails follow the aforementioned canoe trails in the Provincial Parks as well as passing through other rural lands outside of the Parks. One snowmobile trail runs directly alongside Highway 17. There are also hiking trails within all three Provincial Parks in the study area. One runs east-west along the Mattawa River and a second runs north-south, linking Samuel de Champlain Provincial Park with Amable du Fond Provincial Park.

The study area features a number of tourism-related operations such as outfitters, ranches and campsites that offer fishing and boating trips, canoeing, camping, fishing, horse riding, swimming, hiking and snowsports. All of these facilities can be accessed from Highway 17 either directly or via municipal road connections.

4.3.6 Property Waste and Contamination

A contaminant overview study (COS) was undertaken in order to identify properties or lands within the study area which may pose potential environmental concerns (i.e. soil and groundwater contamination). The COS is a preliminary assessment conducted at the screening level and based on historical aerial photographs and a variety of published inventories and documents including:

- Ontario Ministry of the Environment (MOE), "Waste Disposal Site Inventory", June 1991
- MOE, "Inventory of Coal Gasification Plant Waste Sites in Ontario", April 1987, reprinted Feb. 1989
- MOE, "PCB Site Inventory System 2000", July 2000
- MOE, "Hazardous Waste Information Network (HWIN)", June 2009
- MOE Brownfields Environmental Site Registry

Areas of Interest (AOIs) that were determined to present the highest potential for environmental concern to the roadway (and respective right-of-ways) were identified on a preliminary basis through an assessment of historical and/ or current property information available at the time of reporting. These AOI's are detailed in **Exhibit 4.5** and the key criteria used to assess environmental records to select the properties with the highest potential environmental concern are as follows: evidence of confirmed impacts, spill history, operational history (i.e. type and length of historical land use), and current operations. Any AOI's or properties identified as impacted by the recommended highway widening/ alignment alternative and that have potential for contamination will require further assessment to investigate and/ or delineate areas of potential contamination prior to any construction. In addition, during the course of the study, a property

owner advised the study team of the potential for contamination east of Trout Pond Road and north of the TransCanada Pipeline corridor as a result of a historic train derailment and incomplete clean-up.

Exhibit 4.5: Identified Areas of Interest (AOIs)

Location ID	Address	Location	Associated Company	Details*
1	Concession 5, Lot 30, Municipality of Bonfield.	Municipality of Bonfield	Not listed	• Rural Municipal Domestic Waste Landfill, closed for <20 years (as of 1991)
2	Concession 9, Part 21 (N ½), Municipality of Calvin	North of Hwy 17, west of Hwy 630	Not listed	• Rural Municipal Domestic Waste Landfill, closed for <20 years (as of 1991), with municipal waste received prior to 1980
3	Concession 8, Part 7-8, Municipality of Calvin	North of Hwy 17, near Moore Lake	Not listed	• Rural Municipal Domestic Waste Landfill, closed for <20 years (as of 1991)
4	Lot 34 & 35, Concession 9 Calvin Township, Nipissing District	East of Mt. Pleasant Road (600 m), North of Moreau Road (750 m)	Columbia Forest Products Ltd.	<ul style="list-style-type: none"> • Certificates of Approval for glue exhaust and wood waste fuel water-tube boiler • Hazardous waste generator number active during the following period; 1989, 1992-1996, 1999-2008, and 2010 onwards. • One 9,092 L gasoline UST and one 13,638 L diesel UST, with year of installation unknown • National Pollutant Release Inventory records from 2002-2009
5	Boundary Road, Township of Papineau	East side of the Township of Papineau/Municipality of Calvin Townline, to the south of Concession 12/13 Road, adjacent to a wetland	Mattawa Junkyard	• Active junkyard in the 1980's
6	Eau Clair Station	Approximately 450m north of Highway 17 and adjacent to a pond, in Eau Clair Station	Eau Clair Station Dump	• Active dump in the 1970's/80's
7	Champlain Provincial Park	Within the Samuel de Champlain Provincial Park, approximately 575 m north of Highway 17, and 75 m west of the road, near the gravel pits at this location	Champlain Dump	• Active dump in the 1980's/90's
8	1402 A Highway 17 E, Rutherglen	South of Hwy 17, within Rutherglen	ESSO	<ul style="list-style-type: none"> • Two single wall gasoline USTs installed in 1990 and one double wall gasoline UST installed in 2008. Total capacity of 75,000L • One single wall diesel UST (25,000 L) installed in 1990
9	625 Hwy 630, Municipality of Calvin	North of Peddler's Road and South of Suzanne's Road, on Hwy 630	Hydro One Networks	• Hydro transformer leak, unknown quantity of oil leaked to land and water
10	Not Applicable	Eau Clair Station	Canadian Pacific (CP) Rail	• Railway tracks run adjacent to Highway 17, northeast of Eau Clair Station and north of Crooked Chute Lake. Railway tracks may be associated with environmental impacts and should be treated as a concern.
11	Part Lot 17, Concession 5, Calvin Township	Unknown	Municipality of Calvin	• TSSA Expired Facilities identified at this location, indicating potential concern for subsurface impacts.
12	1442 Lots 33 & 34, Concession 8 East, Highway 17, Rutherglen	North of Highway 17, off Talon Lake Road	Sprucewood Gas Bar	• TSSA Expired Facilities identified at this location, indicating potential concern for subsurface impacts.

Location ID	Address	Location	Associated Company	Details*
13	Part Lots 23 and 24, Concession 10, Bonfield Township	Unknown	G W's Truck Stop	• TSSA Expired Facilities identified at this location, indicating potential concern for subsurface impacts.

* Note: All tank records indicate single wall steel tanks unless otherwise indicated

4.3.7 Highway Noise

All receptors in the study area were assessed as Class 3 receptors (rural). According to the Ministry of Transportation (MTO) Environmental Guide for Noise and NPC-233, ambient noise levels for this class of receptors are likely to be 45 dB(A). Due to traffic noise from Highway 17, receptors located close to Highway 17 are likely to be exposed to higher noise levels.

Using STAMSON, predictions have been made at specified distances from Highway 17 for the existing traffic volumes, speeds and alignment. Traffic volumes were taken from the Ministry of Transportation Provincial Highways Traffic Volumes On Demand service (6,500 per day for 2008), with a 1.5% annual growth rate to estimate for 2012. While these values are only indicative, they do provide a basis for determining existing ambient noise levels within the study area. Exhibit 4.6 summarizes the distance ranges from Highway 17 for various noise levels.

Exhibit 4.6: Existing Highway 17 Noise Levels

Noise level range (L _{eq,24hr})	Distance from Highway 17
45 dB(A) ¹	360 metres or greater
45 to 50 dB(A)	360 to 180 metres
50 to 55 dB(A)	180 to 90 metres
55 to 60 dB(A)	90 to 45 metres
60 to 65 dB(A)	45 to 22 metres
Greater than 65 dB(A)	Less than 22 metres

Note ¹: MTO Environmental Guide for Noise and NPC-233 provide an ambient background level of 45 dB(A) for Class 3 areas (rural). This level has been applied in this assessment for receptors not likely to experience significant levels of road traffic noise.

Categories of noise sensitive areas (NSAs) defined by the MTO Environmental Guide for Noise and found within this study area include:

- private homes such as single family residences; and
- campgrounds that provide overnight accommodation.

Categories of noise sensitive receptors identified by the MTO noise guide but not found within this study area include townhouses; multiple unit buildings; hospitals and nursing homes for the aged; hotels/motels where there are OLAs for visitors; educational facilities and daycare centres, where there are OLAs for students.

NSAs within the study area are primarily sparsely distributed private homes along Highway 17 and Highway 630, the hamlet of Rutherglen, and a significant number of other homes also sparsely distributed in the study area, but located away from major provincial roads.

Using the indicative distances provided, noise sensitive receptors have been assessed on the basis of which distance band they fall into. While these levels are not exact, **Exhibit 4.7** provides an indication of the existing noise environment for the study area.

Exhibit 4.7: Existing Highway 17 Noise Sensitive Receptors

Distance from Highway 17	Indicative existing noise level (L _{eq,24hr})	Number of NSAs (Locations identified in Noise Report in Appendix D)
360 metres or greater	45 dB(A) ¹	537 (82%)
360 to 180 metres	45 to 50 dB(A)	19 (3%)
180 to 90 metres	50 to 55 dB(A)	41 (6%)
90 to 45 metres	55 to 60 dB(A)	41 (6%)
45 to 22 metres	60 to 65 dB(A)	12 (2%)
Less than 22 metres	Greater than 65 dB(A)	4 (1%)
Total NSAs		654

Note ¹: MTO *Environmental Guide for Noise* and NPC-233 provide an ambient background level of 45 dB(A) for Class 3 areas (rural). This level has been applied in this assessment for receptors not likely to experience significant levels of road traffic noise.

4.3.8 Air Quality

Baseline (existing) ambient air quality for the Study Area can be approximated using publicly available historical data from ambient air quality monitoring stations which are operated by the Ministry of Environment (MOE) and Environment Canada and which monitor transportation and Volatile Organic Compound (VOC) emissions which are used to determine the ambient air quality. Transportation emissions include nitrogen oxides (NOx), carbon monoxide (CO) and particulate matter (PM), while VOC emissions include acetaldehyde, acrolein, benzene, 1,3-butadiene, and formaldehyde. Particulate Matter (PM) in the air and Total Suspended Particulate Matter (TSP) levels are also used to assess ambient air quality levels and are included in the assessment because of the potential health effects associated with inhalation of PMs.

Particulate matter (PM) consists of airborne particles (solid or liquid form) and are characterized according to size - mainly because of the different health effects associated with particles of different diameters. Some particles are emitted directly into the atmosphere. Other particles result from gases that are transformed into particles through physical and chemical processes in the atmosphere. Background values for TSP and PM10 were not readily available in background data and were therefore calculated using MOE approved ratios (PM2.5/ PM10 = 0.54 and PM2.5/ TSP = 0.3).

Contaminants of interest identified in air quality analysis for the Study Area are based on a number of guidelines, criteria and industry standards and include:

- Ontario Regulation 419/05 Air Pollution – Local Air Quality Regulation, Schedule 3
- MOE Ambient Air Quality Criteria (AAQC)
- Proposed Canada Wide Standards (CCME)
- World Health Organization Guideline

Ambient Air Quality Criteria (AAQCs) are used for assessing general air quality and the potential for causing an adverse effect. They are set at levels below which adverse health and/or environmental effects are not expected.

The Canadian Council of Ministers of the Environment (CCME) has developed Canada-wide Standards for a variety of contaminants. These standards are developed jointly by various provincial jurisdictions based on scientific and risk-based approach. Standards are presented to the Ministers along with a timetable for implementation and monitoring and public reporting programs. Ministers are responsible for implementing the standards within their own jurisdictions and promoting consistency across the country. Applicable standards include the Canada Wide Standard for PM2.5 (particulate matter particles smaller than 2.5 µm in diameter), which was established for the year 2010. This standard is based on the 98th percentile ambient measurement (24-hour), annually averaged over three years.

A summary of various standards and criteria is provided in **Exhibit 4.8** below. Where multiple sources of standards are available, the most stringent values are shown. The MOE interim 24-hour reference level for PM10 was added for comparison.

Exhibit 4.8: Summary of Applicable Air Quality Guidelines and Standards

Contaminant	Source	Averaging Time (hr)	Value (µg/m ³)
NOx	Reg. 419/05 Schedule 3	1	400
	Reg. 419/05 Schedule 3	24	200
NO ₂	World Health Organization (W.H.O)	1	200
CO	AAQC	1	36,200
	AAQC	8	15,700
	Reg. 419/05 Schedule 3	24	275
PM - TSP	Reg. 419/05 Schedule 3	24	120
	AAQC	Annual	60
PM ₁₀	MOE Interim Reference Level	24	50
PM _{2.5}	Canada Wide Standard (CCME)	24	30
Acetaldehyde	Reg. 419/05 Schedule 3	24	500
Acrolein	Reg. 419/05 Schedule 3	24	0.4
Benzene	AAQC	24	2.3
	AAQC	Annual	0.45
1,3-Butadiene	AAQC	24	10
	AAQC	Annual	2
Formaldehyde	Reg. 419/05 Schedule 3	24	65

As noted, a general estimate of the baseline ambient air quality can be made using publicly available historical air quality data from ambient air quality monitoring stations within Ontario. These stations and the pollutant data they provided are detailed below in **Exhibit 4.9** and include:

- North Bay Monitoring Station - hourly, daily and annual ambient concentrations of air quality pollutants (PM_{2.5}, and NO_x)
- Carbon monoxide (CO) and sulphur dioxide (SO₂) data were obtained from the
- Ottawa Downtown monitoring station – daily average for the years 2008-2010 of carbon monoxide (CO)
 - For each contaminant, the 90th percentile daily measurements value were used as the daily background value. The daily average from 2008-2010 was selected to be the annual background contaminant value.

Ambient air monitoring for VOCs is less common and the available monitoring stations were not close to the study area as compared to stations monitoring NO_x, SO₂ and PM. Environment Canada's National Air Pollution Surveillance Program (NAPS) Egbert monitoring station and Windsor West monitoring station were therefore chosen for ambient background levels, based on daily averages for the years 2008 to 2010 for:

- Benzene
- 1,3-Butadiene
- Formaldehyde
- Acetaldehyde
- Acrolein

Exhibit 4.9: Monitoring Station Data

	North Bay Information	Ottawa Downtown Information	Egbert Information	Windsor Information
Station Name:	North Bay	Ottawa Downtown	Egbert	Windsor
NAPS Number	62001	60104	64401	60211
Address:	Chippewa St. W., Dept. National Defense.	Rideau St./ Wurttemberg St.	Egbert	College and South
Latitude:	46.323	45.434	44.23	42.29
Longitude:	-79.449	-75.676	-79.78	-83.07
Station Type:	Urban	Urban	Rural	Urban
Height of Air Intake:	4 m	4 m	-	-
Elevation ASL:	219 m	68 m	253 m	184 m
Pollutants Measured:	O ₃ , PM _{2.5} , NO ₂ , NO _x	CO	Benzene, 1,3- Butadiene, Formaldehyde, Acetaldehyde	Acrolein

Exhibit 4.10 shows the ambient concentration values determined for the study area based on the data retrieved from monitoring stations. Generally, the data shown below indicates that for all contaminants of concern, existing data and concentration levels are all well below the established air quality standards or guidelines (**Exhibit 4.8**).

Exhibit 4.10: Ambient Air Quality Concentrations

Contaminants	Station Name	NAPS ID	90th Percentile of Hourly Concentrations (ppb)					Concentration (µg/m ³)
			2008	2009	2010	Average	Maximum	Average
NO_x	North Bay	62001	26.0	28.0	23.0	25.7	28.0	52.8
NO	North Bay	62001	8.00	8.00	6.00	7.33	8.00	37.7
NO₂	North Bay	62001	18.0	20.0	17.0	18.3	20.0	9.8
TSP	North Bay	62001	33.3	30.0	30	31.1	33.3	31.1
PM₁₀	North Bay	62001	18.5	16.7	16.7	17.3	18.5	17.3
PM_{2.5}	North Bay	62001	10.0	9.00	9.00	9.33	10.0	9.33
CO	Ottawa Downtown	60104	0.42	0.39	0.40	0.40	0.42	505
SO₂	Sudbury	60104	3.00	2.00	2.00	2.33	3.00	6.68
Concentration in µg/m³								
Benzene	Egbert	64401	0.46	0.52	0.51	0.50	0.52	
1,3-Butadiene	Egbert	64401	0.01	0.01	0.01	0.01	0.01	
Formaldehyde	Egbert	64401	1.96	1.02	1.27	1.42	1.96	
Acetaldehyde	Egbert	64401	4.83	2.53	5.24	4.20	5.24	
Acrolein	Windsor	65101	0.07	0.07	0.07	0.07	0.07	

4.3.9 Agriculture

While none of the existing lands within the study area are currently zoned agricultural, there are pockets of active farming within the study area involving primarily field crops and dairy operations. The area of agricultural land use and infrastructure associated with agricultural operations are primarily located in the western portion of the study area, west of Rutherglen.

4.4 Cultural Environment

4.4.1 Built Heritage and Cultural Landscapes

Built heritage sites and cultural landscapes within the study area include the following:

- cemeteries;
- churches with potential heritage resource attributes;
- former public buildings with potential heritage resource attributes;
- former commercial buildings with potential heritage resource attributes;
- residential properties with potential heritage resource attributes;
- farm properties with potential heritage resource attributes; and
- other cultural landscapes.

The inventory of built heritage and cultural landscapes was the subject of more detailed field inventory at this stage of the study. These features are identified on **Exhibit 4.11** below, and additional details of each site are provided in **Exhibit 4.12**.

Exhibit 4.11: Cultural Environment Existing Conditions and Constraints

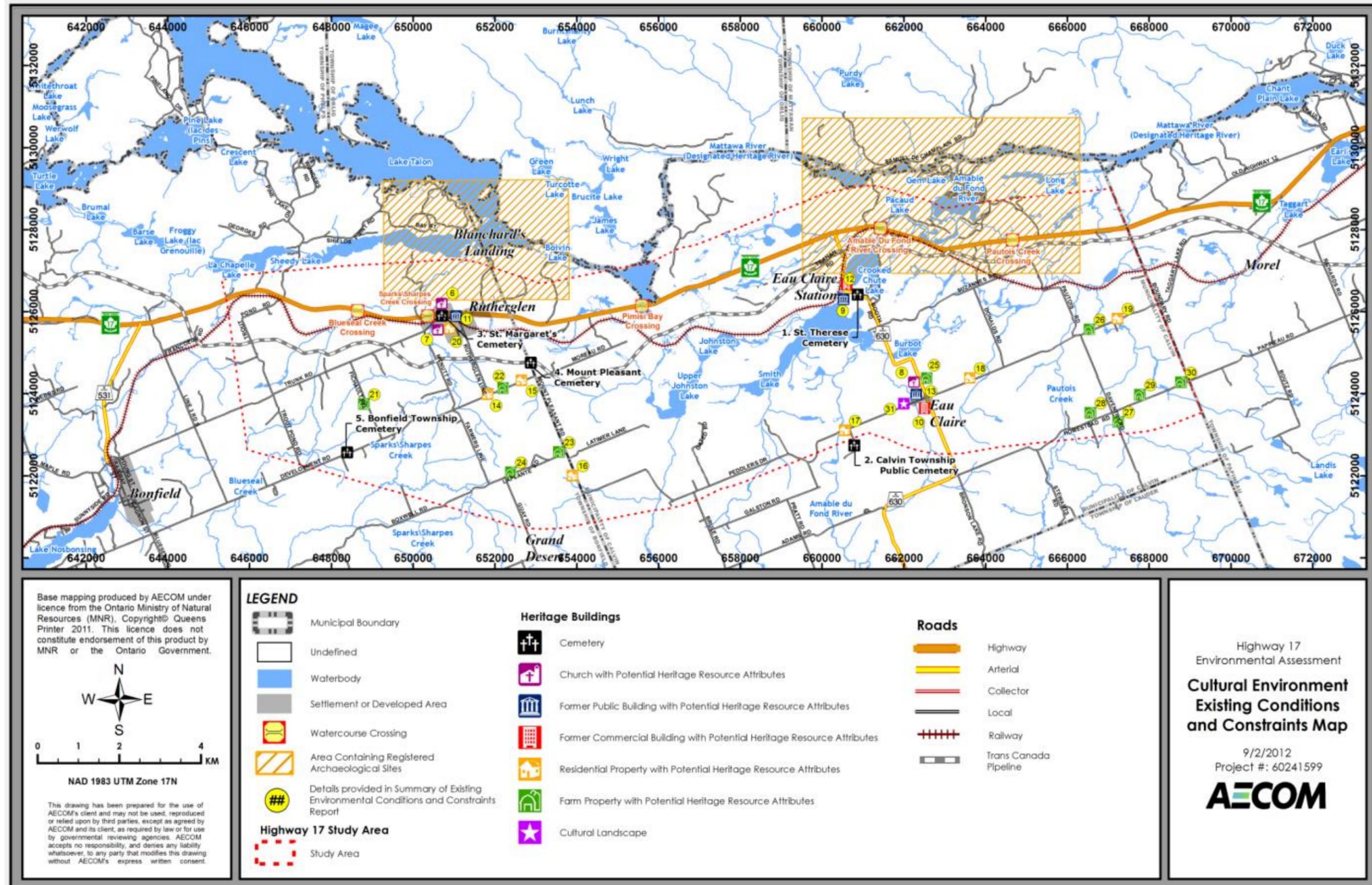


Exhibit 4.12: Study Area Built Heritage Sites and Cultural Landscapes

Map Number	Name & Location	Estimated Date	Comments, Cultural Heritage Attributes
Cemeteries			
1.	St. Therese Cemetery, 377 Highway 630 North, Eau Claire	19 th Century	<ul style="list-style-type: none"> Cemetery for village that has been in existence since late 19th century
2.	Calvin Township Public Cemetery, 60 Peaceful Lane, Eau Claire	19 th Century	<ul style="list-style-type: none"> Cemetery for village that has been in existence since late 19th century
3.	St Margaret of Scotland Cemetery, 1376 Highway 17, Rutherglen	Circa 1883	<ul style="list-style-type: none"> Very early cemetery for the area. Has long-standing association with the community.
4.	Mount Pleasant Cemetery, Mount Pleasant Road, Township of Bonfield	Established 1884, with earlier grave markers	<ul style="list-style-type: none"> Very early cemetery for the area.
5.	Bonfield Cemetery, Development Road, Township of Bonfield	Unknown	<ul style="list-style-type: none"> Abandoned Early cemetery for the area.
Churches with Potential Heritage Resource Attributes			
6.	St Margaret of Scotland Anglican Church, Rutherglen	Established 1883	<ul style="list-style-type: none"> Good example of a Gothic Revival period church. Has long-standing association with the community. Contributes to the character of the area. A significant local landmark
7.	Mount Pleasant United Church, Rutherglen	Established 1930	<ul style="list-style-type: none"> Good example of a Gothic Revival period church. Has long-standing association with the community. Contributes to the character of the area. A significant local landmark.
8.	Eau Claire Missionary Church, Eau Clair	Established 1955	<ul style="list-style-type: none"> Has long-standing association with the community. A significant local landmark.
Former Public Buildings with Potential Heritage Resource Attributes			
9.	Former SS #4B School, Highway 630, Eau Claire)	Circa 1929	<ul style="list-style-type: none"> School was built in 1929 and in operation until 1946. A late example of a log structure, albeit heavily renovated and modified.
10.	Former SS #4 School (Peddlers Drive, Eau Claire)	Circa 1947	<ul style="list-style-type: none"> Was built as a two-room school in 1947 to accommodate a growing number of students. Now converted into a residential duplex.
11.	Possible former Rutherglen Train	Circa 1882 (arrival of railway)	<ul style="list-style-type: none"> House appears to have been associated with a rail stop. Contributes to heritage character of the area.

Exhibit 4.12: Study Area Built Heritage Sites and Cultural Landscapes

Map Number	Name & Location	Estimated Date	Comments, Cultural Heritage Attributes
	Station, Park Street, Rutherglen		
Former Commercial Buildings with Potential Heritage Resource Attributes			
12.	Former Ryan's Store and Post Office, Highway 630, Municipality of Calvin	Circa 1865 - 1902	<ul style="list-style-type: none"> A fair example of an early mercantile structure. Built by W. Mackey and given to A. Ryan in 1902. Once of the first general stores in the area. Now a residential property.
13.	Former Simon Stein's Cheese Factory and former local post office, vernacular – gothic revival, Peddlers Drive.	Circa 1865 - 1900	<ul style="list-style-type: none"> An early structure in the area Was Simon Stein's cheese factory, a prominent landmark during the First World War. Became the local post office from 1930 to 1950 when Mr. Stein became the postmaster. Now a residential property
Residential Properties with Potential Heritage Resource Attributes			
14.	Front Gables Box Bungalow, Rutherglen Line	Circa 1920 - 1950	<ul style="list-style-type: none"> A good example of a box bungalow house.
15.	Vernacular Residence, Development Road	Circa 1860 - 1900	<ul style="list-style-type: none"> An older residence in the area. Contributes to the heritage character of the area.
16.	Gothic Revival Residence, Mount Pleasant Road	Circa 1865 - 1900	<ul style="list-style-type: none"> An older residence in the area. Contributes to the heritage character of the area.
17.	Colonial Dutch Revival Residence, Peddlers Drive	Circa 1900 - 1945	<ul style="list-style-type: none"> A fair example of a colonial Dutch revival period house.
18.	Log House – Gothic Revival, Peddlers Drive	Circa 1865 - 1900	<ul style="list-style-type: none"> An excellent example of the Gothic revival style, done in log construction. Contributes to the heritage character of the area.
19.	Vernacular – Gothic Revival Residence, Peddlers Drive	Circa 1865 - 1900	<ul style="list-style-type: none"> A fairly old structure for the area. Contributes to the heritage character of the area.
20.	Vernacular Residence, Talon Crescent, Eau Claire	Circa 1880 - 1920	<ul style="list-style-type: none"> Abandoned. May be associated with construction of the railway.
Farm Properties with Potential Heritage Resource Attributes			
21.	Vernacular – Gothic Revival House and Gambrel-Roofed Barn	House Circa 1865 – 1900 Barn Circa 1880 -	<ul style="list-style-type: none"> Both structures fairly old for the area. Structures serve as touchstones to the agricultural past of the area.

Exhibit 4.12: Study Area Built Heritage Sites and Cultural Landscapes

Map Number	Name & Location	Estimated Date	Comments, Cultural Heritage Attributes
	Barn, Fichault Road	1920	<ul style="list-style-type: none"> Contribute to the heritage character of the area.
22.	Gothic Revival House and Gambrel-Roofed Barn, Development Road	House Circa 1865 – 1900 Barn Circa 1860 – 1880 (?)	<ul style="list-style-type: none"> Good local example of Gothic revival house and gambrel-roofed barn. Structures serve as touchstones to the agricultural past of the area. Contribute to the heritage character of the area.
23.	Gothic Revival House and Gambrel-Roofed Barn, LaPlante Road	House Circa 1865 – 1900 Barn Circa 1880 - 1920	<ul style="list-style-type: none"> Both structures fairly old for the area. Structures serve as touchstones to the agricultural past of the area. Contribute to the heritage character of the area.
24.	Gothic Revival House and Gambrel-Roofed Barn, LaPlante Road	House Circa 1865 – 1900 Barn Circa 1880 - 1920	<ul style="list-style-type: none"> Both structures fairly old for the area. Structures serve as touchstones to the agricultural past of the area. Contribute to the heritage character of the area.
25.	Log House and Gambrel Roofed Barn; Gable-Roofed Barns, Highway 630 North	House Circa 1865 – 1900 Barn Circa 1860 - 1880	<ul style="list-style-type: none"> Both structures fairly early for the area. Structures serve as touchstones to the agricultural past of the area. Contribute to the heritage character of the area.
26.	Log House and Gambrel Roofed Barn, Peddlers Drive	House Circa 1865 – 1900 Barn Circa 1860 - 1880	<ul style="list-style-type: none"> A good example of the Gothic revival style, done in log construction. Contributes to the heritage character of the area.
27.	Vernacular – Gothic Revival House and Gambrel-Roofed Barn, Daventry Road	House Circa 1865 – 1900 Barn Circa 1880 - 1920	<ul style="list-style-type: none"> Both structures fairly early for the area. Structures serve as touchstones to the agricultural past of the area. Contribute to the heritage character of the area.
28.	Craftsman Box Bungalow and Gambrel-Roofed Barn, Homestead Road	House Circa 1900 - 1945 Barn Circa 1880 - 1920	<ul style="list-style-type: none"> Craftsman period structures are fairly uncommon for the area. Barn may be quite early. Structures serve as touchstones to the agricultural past of the area. Contribute to the heritage character of the area.
29.	Arts and Crafts House and Gambrel-Roofed Barn, Homestead Road	House Circa 1900 - 1945 Barn Circa 1880 - 1920	<ul style="list-style-type: none"> Fairly early structures for the area. Arts and Crafts period houses are uncommon here. Structures serve as touchstones to the agricultural past of the area. Contribute to the heritage character of the area.
30.	Two Gambrel-Roofed Barns, Homestead Road	1 st Barn dated 1887 on sign 2 nd Barn Circa 1880 - 1920	<ul style="list-style-type: none"> Both structures fairly early for the area. Structures serve as touchstones to the agricultural past of the area. Contribute to the heritage character of the area.

Exhibit 4.12: Study Area Built Heritage Sites and Cultural Landscapes

Map Number	Name & Location	Estimated Date	Comments, Cultural Heritage Attributes
Other Cultural Landscapes			
31.	Former School House Site, Now Calvin Community Centre	Unknown	<ul style="list-style-type: none"> Associated with the Calvin community. Plaque has been removed from the cairn in front of the building.
32.	OVR / CPR Rail	Reached Calvin Township by 1881. Reached Eau Claire by 1894	<ul style="list-style-type: none"> Railway was instrumental in promoting settlement and commerce in the area.
33.	Highway 17	First constructed in 1930s	<ul style="list-style-type: none"> Instrumental in encouraging further settlement in the area and allowing local resources to be taken to wider markets.
34.	Eau Claire Gorge former log slide site	Log slide was used in 1870's to early 20 th century	<ul style="list-style-type: none"> Log slide was used to bypass the gorge. It was dismantled in late 1930s, but cut out area is still visible on the landscape.
35.	Eau Claire	Village in existence since late 19 th century	<ul style="list-style-type: none"> Associated with events that made significant contributions to the broad patterns of history. Was once a stop on the railway line (station now gone), and the site of a number of schools, churches, homesteads, stores.
36.	Rutherglen	First settled in late 1880's. One of earliest settlements in the area.	<ul style="list-style-type: none"> Associated with events that made significant contributions to the broad patterns of history.

4.4.2 Archaeology

A Stage 1 overview and background study was conducted in accordance with the Ministry of Tourism, Culture and Sport (MTCS) standards in order to gather information about known and potential cultural heritage resources within the study area. The report is provided in **Appendix F**.

The study area falls within Northern Ontario, within the southernmost portion of the Canadian Shield. There has been limited archaeological research in this part of Ontario; however, through archaeological evidence it is known that both the Nipissing District in general and the Mattawa River environs specifically witnessed significant First Peoples land use and settlement from the period immediately following glaciation to more recent times. The archaeological record typically reflects patterns that are typical for both southern and northern Ontario patterns, as one might expect of an area that is somewhat intermediary between these two zones.

Some of the earlier periods of First Peoples settlement in the immediate area are more poorly known, largely due to lack of archaeological study and development-driven archaeological assessments but also due to the fact that some of the more typical landscape features on which sites of these periods are found (e.g., glacial shorelines) are absent, not yet well-documented, or now destroyed by aggregate extraction and other ground altering activities. More recent periods are slightly better known. Perhaps the best

archaeologically known period of native settlement in this part of Northern Ontario is the fur trade period. That this is the case stems from the fact that the interest of archaeologists has often focused on historic portage routes – the Voyageur Route, for example – and more accessible river- and lake-side locations.

According to the MTCS database, there are 13 registered archaeological sites within one kilometre of the study area (within the areas identified on **Exhibit 4.11** and as listed in **Exhibit 4.13**. Ten of the sites were identified during archaeological activities within Samuel de Champlain Provincial Park conducted by David Slattery; none of these have been assigned a precise cultural or temporal affiliation and are given various functional designations (camp, village, lithic, scatter, portage, pit, mining station). The three others were registered by Provincial archaeologists during a 1974 survey along the Mattawa River. One of these is a long-use fishing station, another is a Middle Woodland camp and a third has no assigned cultural or temporal affiliation. The latter three sites are well outside of the current study area. Of the registered sites in Samuel de Champlain Provincial Park seven fall within or along the northern edge of the study area, with the remainder falling outside of the study area. All of the registered sites identified to date are adjacent to watercourses or water bodies. None of the sites have seen full-scale excavation.

The low number of registered archaeological sites in the vicinity of the study area is not necessarily a reflection of the amount of past settlement. The study area has not witnessed a significant amount of disturbance associated with development and therefore has been the subject of limited amounts of formal archaeological survey. That there are numerous potential unregistered sites in the study area is suggested by reports of local residents finding artifacts on their properties or on lands within the study area. The local museum at Mattawa also reports having been given artifacts reportedly found along the river and all undisturbed areas within the study area should therefore be considered as having high archaeological potential.

Exhibit 4.13: Registered Archaeological Sites within 1 km of the study area

Borden Number	Name	Type	Cultural/Temporal Affiliation	Researcher
CbGr-3	La Grandemere	camp, fishing station	"Prehistoric and Historic"	Wright and Wright (1974)
CbGr-4	Gilligan's Island	camp	Middle Woodland	Wright and Wright (1974)
CbGs-10	Marshall	unknown	Unknown	Wright and Wright (1974)
CbGs-15	Samuel de Champlain P.P.2	lithic scatter/portage	Undetermined precontract First Peoples	Slattery (2003)
CbGs-16	Samuel de Champlain P.P.3	camp/village	Undetermined precontract First Peoples	Slattery (2003)
CbGs-20	Samuel de Champlain P.P.7	camp/village	Undetermined precontract First Peoples	Slattery (2003)
CbGs-21	Samuel de Champlain P.P.8	scatter	Undetermined precontract First Peoples	Slattery (2003)

CbGs-22	Samuel de Champlain 9	scatter/camp/village	Undetermined precontract First Peoples	Slattery (2003)	
CbGs-23	Long Lake Bluff	scatter	Undetermined precontract First Peoples	Slattery (2005)	
CbGs-24	Samuel de Champlain P.P. Main R	pit	Undetermined precontract First Peoples	Slattery (2005)	
CbGs-25	Gap # 3	camp	Undetermined precontract First Peoples	Slattery (2005)	
CbGs-26	Gap # 4		camp	Undetermined precontract First Peoples	Slattery (2005)
CbGs-27	Samuel de Champlain P.P. Staff H		mining station	Undetermined precontract First Peoples	Slattery (2005)

Note: The precise location of the above sites is confidential in order to minimize potential for looting.

4.5 Transportation and Utilities

4.5.1 Transportation Environment

The transportation network in the study area is identified on **Exhibit 4.4**. Key components of the network include: provincial highways; municipal roads and local connections; and Ottawa Valley/ Canadian Pacific Railway Line.

Highway 17 traverses northern Ontario, providing a strategic link in the Trans-Canada Highway. Besides providing for basic travel needs for residents as well as visitors to the area, the section of Highway 17 that is the subject of this study provides a transportation corridor for long haul trucks from eastern Canada to northern Ontario and western Canada. Highway 630 connects to Highway 17 just east of Eau Claire Station and runs southerly for a distance of 28 km from Highway 17 through the hamlets of Eau Clair and Kiosk to its southerly terminus in the northerly Algonquin Park.

The municipal road network within the study area provides local access from Highway 17 and Highway 630. For the most part, it is not comprised of interconnected roads that provide alternate access through the study area. As a result, the development and assessment of controlled access highway planning alternatives along sections of existing Highway 17 will require consideration of alternatives that maintain this access through direct municipal road connections to Highway 17 at interchanges, or through alternate means such as service roads and new connections between existing municipal roads. It is important to note that some of the municipal roads extending northerly from Highway 17 provide the only access to properties and businesses outside the northerly boundary of the study area. In addition to local road connections, there are approximately 130 private entrances onto/ from Highway 17 within the study area. The generation of controlled access highway planning alternatives along existing sections of Highway

17 required consideration of alternatives for private entrances through alternate means such as service roads and new connections between existing municipal roads.

The Ottawa Valley/ Canadian Pacific Rail line runs through the study area parallel and to the south of Highway 17. Given its close proximity to Highway 17 at a number of locations (e.g. near the west study limit boundary and west of Rutherglen) this rail line is a significant constraint to be considered in the development of highway planning alternatives. There are no stations or stops within the study area.

Railway tracks adjacent to Hwy 17, east of Eau Clair Station (Google Earth Pro)



4.5.2 Utilities

Utility locations and infrastructure within the study area are listed in **Exhibit 4.14**. Major utilities in the study area include hydro lines and telephone lines which are present along much of the existing Highway 17 right-of-way and a number of local utilities along many of the municipal roads within the study area. In addition, a Trans-Canada pipeline runs through the study area parallel to and south of Highway 17. The only location where the pipeline is close enough to existing Highway 17 to constrain highway widening and/or realignment alternatives is between the crossings of Amable du Fond River and Pautois Creek.

A Union Gas line also runs along a portion of the Highway 17 right-of-way, and a Union Gas spur line runs north from the Trans-Canada corridor to a distribution facility at its terminus just south of Highway 17 and west of the entrance to Samuel de Champlain Provincial Park.

Exhibit 4.14: Utilities Along and Adjacent to Highway 17

Utility	Location	Infrastructure Description
<i>Hydro One</i>	West limit of project (Township of Bonfield) to Station 14+000 (Municipality of Calvin)	Aerial pole line along the north side of Highway 17
	Station 17+350 to 19+250 (Municipality of Calvin)	Aerial pole line along the north side of Highway 17
	Station 23+500 (Municipality of Calvin) to Station 11+400 (Township of Papineau-Cameron)	Aerial pole line along the north side of Highway 17

Exhibit 4.14: Utilities Along and Adjacent to Highway 17

Utility	Location	Infrastructure Description
<i>Bell Canada</i>	West limit of project to Station 18+200 (Township of Bonfield)	Underground line along the south side of Highway 17
	Station 18+200 to Station 19+620 (Township of Bonfield)	Aerial pole line along the south side of Highway 17
	Station 19+620 to Station 20+050 (Township of Bonfield)	Aerial pole line and underground line along the south side of Highway 17
	Station 20+050 to Station 20+365 (Township of Bonfield)	Underground line along the north side of Highway 17
	Station 20+365 to Station 21+290 (Township of Bonfield)	Aerial pole line along the north side of Highway 17
	Station 21+290 to Station 21+550 (Township of Bonfield)	Underground line along the north side of Highway 17
	Station 21+550 to Station 21+670 (Township of Bonfield)	Aerial pole line along the south side of Highway 17
	Station 23+000 to Station 23+425 (Township of Bonfield)	Underground line along the north side of Highway 17
	Station 24+300 to Station 25+050 (Township of Bonfield)	Underground line along the south side of Highway 17
	Station 25+050 to Station 25+325 (Township of Bonfield)	Aerial pole line along the south side of Highway 17
	Station 25+325 (Township of Bonfield) to Station 11+800 (Municipality of Calvin)	Underground line along the south side of Highway 17
	Station 11+800 to Station 12+500 (Municipality of Calvin)	Aerial pole line along the south side of Highway 17
	Station 12+500 to Station 12+825 (Municipality of Calvin)	Underground line along the south side of Highway 17
	Station 12+825 to Station 13+950 (Municipality of Calvin)	Aerial pole line along the south side of Highway 17
	Station 17+385 to Station 18+250 (Municipality of Calvin)	Aerial pole line along the north side of Highway 17
	Station 18+250 to Station 18+350 (Municipality of Calvin)	Underground line along the south side of Highway 17
Station 18+350 to Station 21+750 (Municipality of Calvin)	Aerial pole line along the south side of Highway 17	
Station 24+235 (Municipality of Calvin) to Station 11+300 (Township of Papineau-Cameron)	Aerial pole line along the south side of Highway 17	

Exhibit 4.14: Utilities Along and Adjacent to Highway 17

Utility	Location	Infrastructure Description
	Cameron)	
	Station 11+300 to Station 11+400 (Township of Papineau-Cameron)	Aerial pole line along the north side of Highway 17
Union Gas	Station 23+600 (Township of Bonfield) to Station 11+500 (Municipality of Calvin)	Buried gas line along south side of Highway 17
	Station 23+054	Union Gas distribution facility
TransCanada Pipelines	Throughout the project limit	TransCanada pipeline corridor is located to the south and runs approximately parallel to Highway 17