3.0 Existing Environment

The following description includes the site specific environmental information identified within the areas of the proposed WTP area. The information has been gathered through a desktop review and field investigation surveys and includes the following sections:

- Atmospheric Environment;
- Geology;
- Hydrogeology and Hydrology;
- Aquatic Environment (Wetlands and Watercourses);
- Terrestrial Environment;
- Species at Risk and of Conservation Concern (including habitat);
- Archaeological and Heritage Resources; and,
- Socio-Economic and Land use.

3.1 Methodology

3.1.1 Desktop Review

The desktop review consisted of an analysis of the biophysical and socio-economic setting based on background information available within the proposed WTP study area (i.e., within 1 km of the project boundary). Information sources included digital mapping and online databases through provincial and federal government resources along with discussions with government representatives.

Prior to conducting field investigation studies, various federal and provincial databases were consulted to identify potential occurrences of rare and endangered flora and fauna, and unique or sensitive habitats that have been known to occur within a 1km radius of the project boundaries and identified as the "study area". The following lists were reviewed to define species and habitats of concern:

- Species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC);
- Species listed under the *Species at Risk Act* (SARA);
- Species listed under the *New Brunswick Species at Risk Act* (NBSARA);
- Species ranked or identified by New Brunswick Department of Natural Resources (NBDNR) species at risk biologist; and,
- Species listed by the Atlantic Canada Conservation Data Center (ACCDC) as extremely rare (S1), rare (S2) and uncommon (S3). Refer to **Appendix C** for the complete report.

Other available background information from the following websites and databases were also reviewed:

- Nature NB;
- Important Bird Areas (IBA), the Ramsar Convention on Wetlands and Federally recognized Migratory Bird Sanctuaries;
- Provincially identified deer wintering areas;
- Protected Wellfields and Watersheds; and,
- Protected Natural Areas.

Watercourses and wetland habitats were identified using the NBDNR watercourse mapping, the GeoNB wetland mapping database as well as high resolution aerial photography mapping.

3.1.2 Biophysical Field Surveys

Site Investigations were carried out between June and September 2014. The site investigation consisted of a topographical and environmental aspect survey that focused on identifying the existing environment and identifying potential environmental constraints, including watercourses, wetlands and sensitive habitats potentially affected by the project.

Characterization of the existing conditions included:

- Watercourses/wetlands within 30 m of the project boundary;
- Forest habitat and vegetation assessment;
- Migratory birds;
- Wildlife and wildlife habitat;
- Species at risk and of conservation concern; and,
- Land use.

Watercourses and wetland habitats to be field verified were initially identified using the provincial Depth to Water (DTW) mapping, derived from Light Detection and Ranging (LIDAR) surveys and the DNR wetland mapping database, as well as high resolution aerial photography mapping found within the project footprint. The aquatic study area covered by an area surrounding 30 m on either side of the project footprint and is defined in terms of extent of potential effects, extending up to 50 m downstream of the proposed project footprint.

3.2 Atmospheric Environment

Various data resources were consulted to conduct the desktop assessment for the atmospheric environment and are discussed further throughout this section. Field investigations were not

conducted as part of this assessment. For the purpose of this EIA, the atmospheric environment is characterized by the following:

- Air quality – the chemical and physical properties of the air in the atmosphere that includes particulate contaminates;
- Climate – the composite or prevailing weather conditions in an area averaged over several years which generally includes the temperature, precipitation, winds and air pressure; and,
- Sound levels (Noise quality) – any pressure variation (in air, water or other medium) that can be detected by the human ear. Noise is characterized as any unwanted sound.

The NBDELG and industry maintain and operate a number of ambient air monitoring stations within the province to measure ground-level concentrations of a variety of air contaminants.

The ambient air quality monitoring station that is in closest proximity to the project is located at the Fredericton Airport, approximately 5 km west of the project. An ozone monitoring station is located in Fredericton, approximately 18 km west of the project. Data from these locations were used to develop an understanding of the ambient air quality in the area.

3.2.1 Climate

The Canadian Climate Normals recorded from the Fredericton Airport climate station (Environment Canada, 2015), located approximately 5 km to the west of the proposed WTP, at 45°51'N and 66°28'W indicates an annual daily mean temperature of 5.6°C, with extremes ranging from -37.2°C to 37.2°C. A summary of the average temperature by month from the Fredericton Airport climate station is presented in **Table 3-1**.

TABLE 3-1: AVERAGE DAILY TEMPERATURES FREDERICTON AIRPORT CLIMATE STATION (ENVIRONMENT CANADA, 2015)

Month	Average Daily Temperature (°C)
January	-9.4
February	-7.9
March	-2.4
April	4.5
May	11.1
June	16.2
July	19.3
August	18.4
September	13.6
October	7.5
November	1.5
December	-5.7
Year	5.6

The warmest period of the year was typically from June to August, with July typically being the warmest month with an average daily temperature of 19.3°C. The coolest period annually was typically between December and February with coldest month being January at an average daily temperature of -9.4°C.

The monthly averages for rainfall, snow and total precipitation are presented in **Table 3-2** below. The historical precipitation data from the Fredericton Airport Station recorded an average of 1078 mm of precipitation per year with 859 mm falling as rain and 252 cm as snowfall. The extreme daily rainfall occurred on August 5, 1989 when 148.6 mm of rain fell. The extreme daily snowfall occurred on December 4, 1967 when 78.0 cm of snow fell.

TABLE 3-2: AVERAGE PRECIPITATION FREDERICTON AIRPORT CLIMATE STATION (ENVIRONMENT CANADA, 2015)

Month	Rainfall (mm)	Snowfall (cm)	Total Precipitation (mm)
January	38.0	69.9	95.3
February	31.4	47.5	73.1
March	46.7	49.4	93.2
April	68.3	18.6	85.9
May	94.5	1.4	96.2
June	82.4	0.0	82.4
July	88.3	0.0	88.3
August	85.6	0.0	85.6
September	87.5	0.0	87.5
October	88.2	0.8	89.1
November	92.9	14.3	106.3
December	55.3	50.5	94.9
Year	859.1	252.3	1077.7

Wind direction and speed data from the Fredericton Airport climate station are presented in **Table 3-3**. According to the Climate Normals, the average annual wind speed at the Fredericton Airport is 12.0 km/h from the west. The maximum wind speed generally occurs in April with an average speed of 14.2 km/h from the northwest. The minimum wind speed generally occurs in August with an average speed of 9.6 km/h from the south. The maximum hourly wind speed noted in the climate normal data from the Fredericton Airport climate station was 80 km/h, which was recorded on February 3, 1970. The maximum gust speed of 132 km/h was recorded on June 30, 1971. Generally the average monthly wind speeds tend to be high between March and May and lower between July and September. The prevailing winds are generally from the south in the summer and the west in the winter.

TABLE 3-3: AVERAGE WIND DATA FOR FREDERICTON AIRPORT CLIMATE STATION (ENVIRONMENT CANADA, 2015)

Month	Wind Speed (km/h)	Most Frequent Direction
January	12.2	W
February	12.7	NW
March	13.9	NW
April	14.2	NW
May	13.1	S
June	11.5	S
July	10.3	S
August	9.6	S
September	10.5	SW
October	11.6	SW
November	12.1	W
December	12.4	W
Year	12.0	W

3.2.2 Ambient Air Quality

The NBDELG and industry maintains and operates a number of ambient air monitoring stations within the province to measure ground-level concentrations of a variety of air contaminants. The closest monitoring station in relation to the project is located on Aberdeen Street in Fredericton, approximately 18 km west of the Project. The Fredericton monitoring station reports on carbon monoxide (CO), nitrogen dioxide (NO_2), fine particulate matter ($PM_{2.5}$), and ground level ozone (O_3).

3.2.2.1 Carbon Monoxide (CO)

Monitoring results for CO for the Fredericton station from 2009 to 2011 showed no exceedances of the 1-hour or 8-hour New Brunswick Air Quality Objectives (Clean Air Act, 1997) of 30 ppm and 13 ppm for CO (NBDELG, 2013; NBDELG, 2012; NBDELG, 2011). The maximum one hour values ranged from 0 to less than 3 ppm in 2011 (NBDELG, 2013).

3.2.2.2 Nitrogen Dioxide (NO_2)

Monitoring results for NO_2 for the Fredericton station from 2009 to 2011 showed no exceedances of the New Brunswick Air Quality Objectives (Clean Air Act, 1997) of 210 ppb for 1-hour, 105 ppb for 24-hour, and 120 µg/m^3 for 1-year averaging periods (NBDELG, 2013; NBDELG, 2012; NBDELG, 2011). The maximum one hour values ranged from 0 to 50 ppb in 2011 (NBDELG, 2013).

3.2.2.3 Fine Particulate Matter (PM2.5)

Particles less than 2.5 micrometers in diameter ($PM_{2.5}$) are referred to as "fine" particles and are believed to pose the greatest health risks. Because of their small size (approximately 1/30th the average width of a human hair), fine particles can lodge deeply into the lungs (USEPA, 2012). Monitoring results for $PM_{2.5}$ for the Fredericton station in 2011 (most recent available data) showed no hourly values exceeding the Canada-wide Standard (CCME, 2000) of 30 µg/m^3. Further, there have been no reported exceedances of the Canada-wide Standard since coming into effect in 2010 (NBDELG, 2013). A summary of the annual concentrations from 2007-2011 are presented in **Table 3-4**.

TABLE 3-4: ANNUAL AVERAGE $PM_{2.5}$ CONCENTRATION EMISSIONS RECORDED AT THE FREDERICTON STATION

Year	Annual Average $PM_{2.5}$ Concentration (µg/m^3)	98th Percentile Value (CWS) (µg/m^3)
2011	Not available	16
2010	4.0	15.0
2009	3.8	15.6
2008	4.0	14.8
2007	3.8	16.8

3.2.2.4 Ground Level Ozone (O_3)

Monitoring results for ground level O_3 for the Fredericton station in 2011 (NBDELG, 2013) showed no exceedances of the Canada Wide Standard (CCME, 2000) of 65 ppb for an 8-hour averaging time. Further, there have been no reported exceedances of the Canada-wide Standard since coming into effect in 2010 (NBDELG, 2013). In 2011, the maximum 1-hour values ranged from 2 ppb to 60 ppb, which are below the 1-hour O_3 level of 82 ppb (NBDELG, 2013) in other jurisdictions.

3.2.3 Emissions

The air contaminant releases from sources throughout New Brunswick can serve as a benchmark for the existing environment conditions. Emissions data is available for criteria air contaminants (CACs) which include:

- Particulate Matter:
  - Total Particulate Matter (TPM);
  - Particles less than 10 µmin diameter (PM_{10}); and,
  - Particles less than 2.5 µmin diameter ($PM_{2.5}$).

- Combustion Gases:
  - Sulfur Dioxide (SO_2);
  - Nitrogen Oxides (NOx); and,
  - Carbon Monoxide (CO).
- Volatile Organic Compounds (VOCs).

A summary of the CAC emissions in New Brunswick between 2009 and 2012 (the most recent available data) from Environment Canada is presented in **Table 3-5** below.

TABLE 3-5: ESTIMATED CAC EMISSIONS FROM NEW BRUNSWICK

Contaminant	2012 Emissions (Tonnes)[1]	2011 Emissions (Tonnes)[2]	2010 Emissions (Tonnes)[3]	2009 Emissions (Tonnes)[4]
Total Particulate Matter (TPM)	483,044	384,254	383,686	379,621
Particulate Matter less than 10 microns (PM_{10})	132,085	101,849	101,864	100,786
Particulate Matter less than 2.5 microns ($PM_{2.5}$)	31,714	24,791	24,790	24,742
Sulphur Oxides (SO_x)	34,291	28,057	33,263	54,003
Nitrogen Oxides (NO_x)	38,198	40,540	43,221	48,781
Carbon Monoxide (CO)	212,969	220,609	235,707	231,485
Volatile Organic Compounds (VOCs)	274,702	276,689	278,628	279,253

[1] Environment Canada 2012 Air Pollutant Emissions for New Brunswick (Environment Canada, 2014b)
[2] Environment Canada 2011 Air Pollutant Emissions for New Brunswick (Environment Canada, 2013b)
[3] Environment Canada 2010 Air Pollutant Emissions for New Brunswick (Environment Canada, 2012b)
[4] Environment Canada 2009 Air Pollutant Emissions for New Brunswick (Environment Canada, 2011a)

The Base reports to the National Pollutant release Inventory (NPRI). There are five additional major sources of emissions located within 25 km of the Project site including:

- Fredericton International Airport – airport operations located approximately 5 km to the west of the project;
- University of New Brunswick, Department of Facilities Management – university campus including central heating plant operations located approximately 17 km northwest of the project;
- City of Fredericton, Barker Street Treatment Facility – municipal sewer treatment plant located approximately 16 km northwest of the project;

- Marwood Ltd. - Wood product manufacturers located approximately 19 km to the southwest of the project; and,
- Springhill Construction Limited, Springhill Quarry – quarry activities located approximately 25 km west of the project.

3.2.4 Greenhouse Gas (GHG) Emissions

The Province of NB has no standards or guidelines for regulating the emissions of GHGs. In 2012, the national reported emissions of GHGs for Canada were 699 Mega-tonnes (Mt) of carbon dioxide equivalent (CO2e) (Environment Canada, 2014c) which is similar to the 2011 emissions (Environment Canada, 2014c). In New Brunswick the annual emissions for 2012 were approximately 16.4 Mt of CO2e per year representing 2.3 % of the national emissions (Environment Canada, 2014e).

GHG reporting is mandated by Environment Canada from sources that release 0.05 MT or more of CO2e per year. In 2012, 13 NB facilities reported emissions to Environment Canada for a total of 6.4 Mt of CO2e. The closest of these facilities to the Project is AV Nackawic, located approximately 60 km to the northwest, which produced 0.121 Mt of CO2e in 2012 and 0.116 Mt of CO2e in 2011 (Environment Canada, 2013c).

3.2.5 Ambient Sound Quality

Existing sound quality conditions in the vicinity of the project were not measured for this assessment. There are commercial land uses within 150 m of the project and residential areas within 500 m. It is likely that traffic on the access road is limited to vehicles accessing the recreation facilities and WTP. Given the setting of the project, existing sound pressure levels in vicinity of the project are expected to be typical of sound pressure levels in a suburban mixed development area near at city outskirts. Based on data collected by the US EPA (1971) of typical background community noise, existing sound pressure levels in the area are likely in the (L_{10} to L_{90}) range of 39 to 52 dBa(A) as a 24-hour arithmetic average.

3.3 Terrestrial Environment

This section of the report considers the terrestrial environmental setting for the WTP project. For the purposes of this EIA, the description of the terrestrial environment considers the site topography, geology, and flora and fauna (including species at risk) habitat/populations. The description has been prepared from available resources, discussions with resource managers, and field reconnaissance conducted in summer/fall 2014.

3.3.1 Site Topography and Physiography

The proposed WTP footprint area is located within the Grand Lake Lowlands Ecoregion, specifically the Aukpake Ecodistrict encompasses much of the low-lying valley of the Oromocto

River and the Saint John River. It is located east and west of the Oromocto River and north and south of the Saint John River. The Aukpake Ecodistrict is a low-lying, gently rolling area with ridges and valleys that encompass the Saint John River basin and is known to be highly disturbed by intensive settlement, logging activities, and military training (DNR, 2007).

3.3.2 Geology

3.3.2.1 Description of Surficial Geology

Based on the Generalized Surficial Geology Map of New Brunswick (Rampton et al.1984, 2002 Ed.), the surficial geology in the vicinity of the proposed location of the new WTP is Late Wisconsian aged and comprised of loamy lodgement till and minor ablation till deposited as a discontinuous veneer over bedrock. The deposits are generally 0.5 to 3 m in thickness and include silt sand, gravel, and rubble. The surficial geology in the vicinity of the proposed WTP consists of Late Wisconsian aged hummocky, ribbed and rolling ablation moraines generally greater than 1.5 m thick and consisting of loamy ablation till, some lodgment till, minor silts, sand, gravel and boulders.

3.3.2.2 Description of Regional Bedrock Geology

Based on the Department of Natural Resources Geological Map, Bedrock Geology of the Grand Lake Area (NTS 21 G/16), Sunbury and Queens Counties, New Brunswick (Plate 2005-39) (St. Peter, 2005), the regional bedrock geology in the study area is identified as the Minto Formation of the Pictou Group deposited during the Late Carboniferous period. The Minto formation in the Fredericton/Oromocto area is characterized by grey to red, fine to medium grained sandstone; grey, green and red mudstone; minor grey and red granule to cobble conglomerate; and, coal.

Given the local geology in the subject area, acid rock drainage (ARD) producing minerals (iron sulphides) are not expected. Bedrock in the area is typically covered by glacial till and iron sulphide oxidation would be unlikely.

3.3.3 Hydrology and Hydrogeology

The project is located within both the Saint John River basin and the Oromocto River watershed.

The Saint John River Basin encompasses over 55,000 km^2, overlying parts of New Brunswick's three physiographic sub-regions: the Chaleur Uplands, which cross the Quebec–New Brunswick border; the Maritime Plain (or New Brunswick Lowlands); and the New Brunswick Highlands (CRI, 2012). The mean annual discharge for the Saint John River is approximately 1100 m^3 /s (CRI, 2012). Like most eastern Canadian rivers, its peak water levels and discharge occur in the late spring after the spring thaw. The river experiences a second, smaller pulse later in the fall.

The Oromocto River watershed encompasses approximately 2500 km^2. The upper portion of the watershed consists of North Oromocto Lake and South Oromocto Lake with a depth averaging 7 meters (Oromocto River Watershed Association Inc., 2014). The North and South branches of the lakes flow through many towns, villages and settlements. The North and South branches are 45 km and 39 km long respectively and join near Central Blissville, NB and flow 42 km north-northeast to its mouth at the Saint John River by the Town (http://oromoctowatershed.ca/). Both branches are fast running with many tributaries.

The proposed development is not in a watershed protected area as outlined in the New Brunswick Watershed Protection Program and is not located within a wellfield protected area under the New Brunswick Wellfield Protection Program. However, a watershed protection area will need to be defined for the water supply as the intake line will be sourcing from the surface water of the Saint John River.

3.3.4 Environmentally Sensitive Areas

The proposed project is located within the "Lower Saint John River (Sheffield/Jemseg) IBA which extends 25 km along the Saint John River, from 5 km northeast of the Town to 25 km east of Oromocto. The site includes the Portobello National Wildlife Area, Gilbert Island, French Lake, Big Timber Lake, Grand Lake Meadows, and the southern edge of Grand Lake. The area is under tidal influence (tidal influence extends upstream to Mactaquac dam – over 25 km from the project boundary); extensive spring flooding has resulted in the creation of a unique hardwood and flora complex creating the single largest wetland complex in Atlantic Canada" (CIBA, 2014). The area provides important breeding habitat for a number of migratory birds including raptors, waterfowl, shorebirds and passerines (CIBA, 2014). In addition to the IBA, there is one (1) identified environmentally sensitive area (ESA) located 550 m northwest of the proposed project. These areas are identified on **Figure 3-1** and summarized in **Table 3-6**.

TABLE 3-6: SUMMARY OF PROTECTED AND MANAGED AREAS LOCATED WITHIN 5KM OF THE PROPOSED PROJECT ACTIVITIES

Name	Distance from proposed project footprint (km)
Lower Saint John River (Sheffield-Jemseg) IBA	Within the IBA (extends from 5 km northeast of Oromocto to 25 km east)
Thatch Island, Oromocto ESA	550 m west

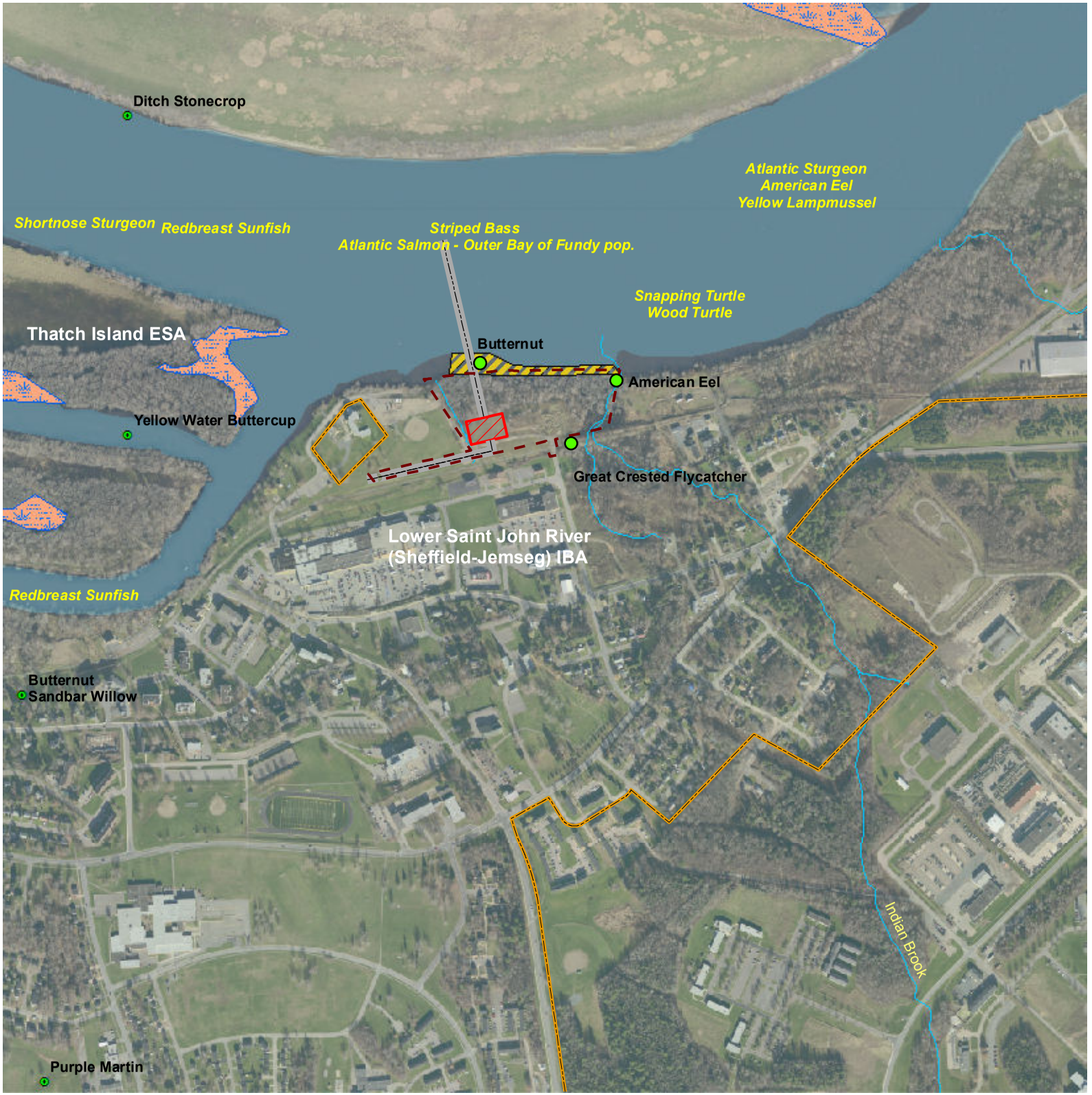
There are no other identified environmentally sensitive area or protected natural areas located within the study area (i.e. within the 1 km area surrounding the proposed WTP).

3.3.5 Vegetation (Flora) Assessments

3.3.5.1 Vegetation (Flora) Surveys

Vegetation assessments were conducted in the project boundary on August 4, 2014. The assessment area consisted of the adjacent habitat comprising of mixed woods and developed recreational lands. Vegetation surveys included recording tree, shrub and herbaceous species within the subject property. The focus of the vegetation assessment was to determine the presence/absence of priority/at risk species, based on existing data and habitat suitability as identified by the ACCDC. Field surveys were targeted on the habitat potential for these identified priority species as identified in **Table 3-7.** During the investigations, other species considered to be of significant status, federally listed and/or regionally documented as a species with conservation concern were also identified.

There are four (4) distinct vegetation communities on the property including intolerant mature hardwood stand, disturbed areas (roadside and proposed WTP location), floodplain (riparian) habitat and open water vegetated habitat (along the shoreline of the Saint John River). A total of 87 plant species were noted within the project boundaries. A total of 66 (76%) are native and 21 (24%) are species considered by ACCDC to be non-native or exotic (SE). Refer to **Appendix D** for the complete list of all plant species within the study area. All species noted during the survey were identified as being common and widespread (S4 to S5) to New Brunswick with the exception of Butternut (*Juglans cinera*) (Endangered, Schedule 1 of SARA) noted at various locations along the Saint John River floodplain. This species is discussed further in Section 3.3.5.2.



TOWN OF OROMOCTO
Water Treatment Plant
Environmental Impact Assessment

Species at Risk and of Conservation Concern
Figure 3-1

- PROPOSED FACILITY
- PROPOSED BOUNDARY
- FIELD IDENTIFIED BUTTERNUT AREA
- FRESHWATER FISH HABITAT (ACCDC)
- PROVINCIALLY SIGNIFICANT WETLAND
- DND PROPERTY BOUNDARY
- PROPOSED INTAKE LINE
- WATERCOURSE
- ACCDC DATABASE *
- FIELD OBSERVATION
- "Abc" POTENTIAL HABITAT AVAILABLE (BASED ON ACCDC AND COSEWIC INFORMATION)

*SIGHTING IDENTIFIED WITIN 100M OF THE AREA (ACCDC, 2014)

0 45 90 180 270 360 450 Meters

MAP CREDITS: ESRI,NRCAN, GEOBASE,

MAP CREATED BY: SCM
MAP CHECKED BY: RMD
MAP PROJECTION: NAD 1983 UTM Zone 19N

DILLON CONSULTING

PROJECT: 148895
STATUS: DRAFT
DATE: 3/18/2016

3.3.5.2 Vegetation (Flora) at Risk and of Conservation Concern

A review of the ACCDC data determined that four (4) vegetation species of conservation concern had the potential to occur within a 1 km radius of the project footprint as summarized in **Table 3-7** and shown on **Figure 3-1**. Refer to **Appendix C** for the complete ACCDC report. During the field investigation surveys, it was noted that butternut (*Juglans cinera*) was identified at various locations ranging from seedling to mature trees along the riparian habitat of the Saint John River as noted on **Figure 3-1**. Butternut is listed as Endangered on Schedule 1 of SARA and with the NBSARA as well as S1 (extremely rare) by the ACCDC. There were no other flora species at risk or of conservation concern identified within the project footprint area during the field studies. The plant species identified by the ACCDC in the study area consisted of: Ditch Stonecrop (*Penthorum sedoides*) and Bog Willow (*Salix pedicellaris*) which were both ranked as S3 (uncommon) and Yellow Water Buttercup (*Ranunculus flabellaris*) which is ranked as S2 (rare). None of these species are listed by COSEWIC or the NBSARA as demonstrated in **Table 3-7**.

TABLE 3-7: SUMMARY OF FLORA OF CONSERVATION CONCERN IDENTIFIED DURING FIELD INVESTIGATIONS AND BY THE ACCDC WITHIN A 1 KM RADIUS OF THE PROJECT FOOTPRINT

Common Name	Scientific Name	ACCDC Status	COSEWIC/ SARA Status	NBSARA Status	TYPICAL HABITAT[1]
Ditch Stonecrop	*Penthorum sedoides*	S3	N/A	N/A	Aquatic - (Fresh water); found on muddy or gravelly shores
Butternut	*Juglans cinerea*	S1	Endangered	Endangered	Found in rich deciduous woods, specifically along the Saint John River
Bog Willow	*Salix pedicellaris*	S3	N/A	N/A	Forest – In bogs, fens and wet, acid, shrubby meadow
Yellow Water Buttercup	*Ranunculus flabellaris*	S2	N/A	N/A	Aquatic – (Freshwater); Found in shallow quiet waters specifically the Saint John River

[1] Habitat information obtained from the NBDNR flora Vascular Plant Distribution list (2002) and Flora of New Brunswick (Hinds, 2000)

Based on the habitat identified during the field investigation studies, there was potential habitat to support Yellow Water Buttercup and Ditch Stonecrop within the riparian areas of the Saint John River, however, none were identified. There was no habitat available to support Bog Willow which is outside of the area of the proposed WTP and infrastructure. As noted in Section 3.3.6.1, all other species (with the exception of butternut) identified during the field investigations were species considered to be common and widespread (S4 to S5) within this region of the province.

3.3.6 Forest Cover

The proposed WTP footprint area is located within the Grand Lake Lowlands Ecoregion, specifically the Aukpake Ecodistrict where the forest habitat in this ecoregion is primarily dominated by red maple (*Acer rubrum*), white birch (*Betula papyrifera*), grey birch (*Betula populifolia*) and trembling aspen (*Populus tremuloides*) with valley forest areas comprised of red spruce (*Picea rubens*), balsam fir (*Abies balsamea*), and hemlock (*Tsuga canadensis*) with red maple (DNR, 2007).

Dominant forest compositions within the proposed WTP footprint has been mapped using the 2009 DNR forest inventory layers and are presented on **Figure 3-2**. According to this database, there is no identified forest with the exception of a small patch located southeast of the project area where the forest composition is comprised of a mature to immature stand of intolerant hardwood dominated by red maple (*Acer rubrum*). It was determined during the field investigation surveys that the WTP building footprint was primarily located in an area of already disturbed lands dominated by a mixture of native and non-native grasses and weeds and the water intake line footprint was dominated by sugar maple (*Acer sacchrum*), red maple, balsam poplar (*Populus tremuloides*) and choke cherry (*Prunus virginiana*), white birch (*Betula papyrifera*).

TOWN OF OROMOCTO
WATER TREATMENT PLANT
ENVIRONMENTAL IMPACT ASSESMENT

Forest Habitat and Bird Survey Locations
Figure 3-2

PROPOSED FACILITY
PROPOSED BOUNDARY
BASE BOUNDARY
POINT COUNT LOCATIONS

FOREST AGE

YOUNG-IMMATURE
MATURE

DOMINANT FOREST SPECIES COMPOSITION

"BS, BF" DOMINANT SPECIES (FIRST, SECOND)

BF	Balsam Fir
BS	Black Spruce
BI	White Birch
EC	Eastern White Cedar
IH	Intolerant Hardwood
JP	Jack Pine
PO	Poplar
RM	Red Maple
RS	Red Spruce
TL	Tolerant Hardwood
WP	White Pine

0 45 90 180 270 360 450
Meters

MAP CREDITS: ESRI,NRCAN, GEOBASE,

MAP CREATED BY: SCM
MAP CHECKED BY: RMD
MAP PROJECTION: NAD 1983 UTM Zone 19N

DILLON CONSULTING

PROJECT: 148895
STATUS: DRAFT
DATE: 3/18/2016

3.3.7 Wildlife (Fauna) and Wildlife Habitat

Given the limited availability of forest habitat and the level of development in the area there is limited potential for diverse wildlife habitat. The area provides habitat that appears to be suitable for small mammals, including river otter (*Lontra canadensis*), muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*), red fox (*Vulpes vulpes*), skunk (*Mephitis mephitis*), and raccoon (*Procyon lotor*) as well as other smaller mammals such as meadow voles (*Microtus pennsylvanicus*), American mink (*Neovison vison*), squirrels (*Sciurus vulgaris*) and chipmunk (*Tamias striatus*). The habitat in this area may also provide occasional foraging for other larger species such as white tailed deer (*Odocoileus virginianus*) and coyote (*Canis latrans*). The objective of the field studies was to characterize the terrestrial ecology of the area in order to assess the potential environmental effects of the proposed project on potential wildlife and wildlife habitat in the area. Direct observations of animal signs (actual sightings as well as auditory detections, tracks, scat, and dens/nests) were documented. General wildlife habitat conditions were also observed to indicate the type of wildlife that the study area has the potential to support and that is typical of the geographic area. The habitat in the area would not provide unique or limited habitat for any of these species.

3.3.7.1 Wildlife (Fauna) Species at Risk and of Conservation Concern

The ACCDC database indicates that there are two (2) wildlife species of conservation concern (excluding birds) historically observed within a 1 km area surrounding the proposed project footprint. These species have been identified as herpetile species: Wood Turtle (*Glyptemus insculpta*), listed as Threatened under the SARA and NBSAR and Snapping Turtle (*Chelyda serpentine*), listed as Special Concern under Schedule 1 of SARA and the NBSAR. Refer to **Table 3-8** for the ACCDC detailed data (ACCDC, 2014).

Based on the available habitat within the project footprint, there was no identified nesting habitat present. The wood turtle and snapping turtle prefer loose gravel areas for nesting and may use the nearby NB trail (located 40 m from the project footprint) for nesting which exhibited marginal nesting characteristics. As the project footprint is situated between the Saint John River and the trail, migrating wood turtle and/or snapping turtle may pass through the WTP project footprint area.

TABLE 3-8: SUMMARY OF WILDLIFE (EXCLUDING BIRDS) OF CONSERVATION CONCERN IDENTIFIED BY THE ACCDC WITHIN A 1 KM RADIUS OF THE PROJECT FOOTPRINT

Common Name	Scientific Name	ACCDC Status	COSEWIC/ SARA Status	NBSARA Status	TYPICAL HABITAT[1]
Wood Turtle	*Glyptemys insculpta*	S3	Threatened	Threatened	Requires rivers and streams with sandy or gravely-sandy bottoms and prefers clear meandering watercourses with a moderate current. The Wood Turtle's natural nesting sites are found on sand or gravel-sand beaches and banks. Other habitats used less frequently by the Wood Turtle include bogs, marshy pastures, beaver ponds, shrubby cover, meadows, coniferous forests, mixed forests, hay, and agricultural fields and pastures.
Snapping Turtle	*Chelydra serpentina*	S1	Special Concern	Special Concern	Shallow water in almost every kind of freshwater habitat, the preferred habitat of the species is characterized by slow-moving water with a soft mud bottom and dense aquatic vegetation. Established populations are most often located in ponds, sloughs, shallow bays or river edges, and slow streams, or areas combining several of these wetland habitats.

[1] Habitat information obtained from the Environment Canada, Species at Risk Registry http://www.sararegistry.gc.ca/sar/index/default_e.cfm

According to Stewart Lusk, SAR biologist with the NBDNR, there are no other records of species of conservation concern identified in the area. Wood turtle have been known to occur at various locations at the Base, however, there are currently no records in this area (pers. comm. D. McCullum, 2014).

There are no other unique or special wildlife (excluding birds) habitat areas identified in the existing data or in the 2014 site surveys within the project boundary of the proposed project. There were no other wildlife species of conservation concern identified as potentially occurring within the assessment area.

3.3.8 Birds and Bird Habitat

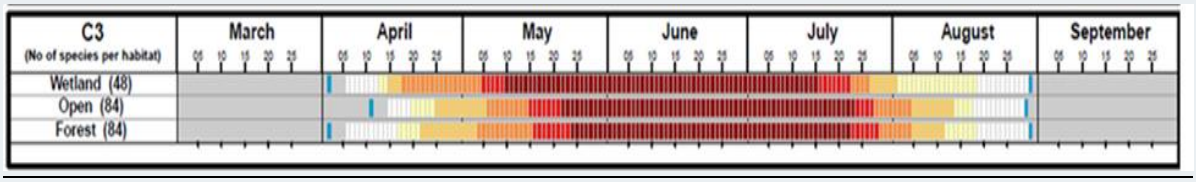
3.3.8.1 Background Data Review

Important Bird Areas (IBA)

As outlined in Section 3.3.4, the IBA Database identifies the proposed WTP is located within the Lower Saint John River Sheffield/Jemseg) IBA (NB010). This IBA extends 25 km along the Saint John River, from 5 km northeast of the Town to 25 km east. The site includes the Portobello National Wildlife Area, Gilbert Island, French Lake, Big Timber Lake, Grand Lake Meadows, and the southern edge of Grand Lake. There are 248 migratory bird species known to migrate, roost, breed and nest in this IBA year round including waterfowl, shorebirds, upland birds, passerine, woodpeckers, raptors and owls.

Environment Canada

Based on Environment Canada's calendar for specific "nesting zones" across Canada, the proposed project area is located within "Nesting Zone 3" which identifies the April 1 to August 31 period as a sensitive nesting period for the area (see the table below).



Environment Canada Nesting Calendar (*https://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=4F39A78F-1# 05*)

Maritime Breeding Bird Atlas

The Maritime Breeding Bird Atlas (MBBA) database provides information on the presence of breeding bird species counts conducted between 2006-2010. It was determined through the on-line search tool that the proposed project lies within the "Maugerville" square (19FL98) with the closest roadside point counts (PC) to the proposed WTP occur at PC# 15 and PC#26. During the atlas period 2006-2010, a total of 92 species of birds were recorded within this square. Of these species, 45 were confirmed as breeding (including two (2) species of conservation concern: Bald Eagle, Endangered under the NB SARA and Barn Swallow, Threatened under Schedule 1 of SARA), six (6) were probable breeders, and 31 were possible breeders.

Atlantic Canada Conservation Data Center (ACCDC)

The ACCDC database indicates that one (1) bird species records of conservation concern, the Purple Martin *(Progne subis)*, with a ranking of S1S2B (extremely rare to rare breeding populations) has the potential to occur within 1 km area of the proposed WTP. This species is not listed by COSEWIC/SARA or NBSARA. Refer to Section 3.3.8.3 for a summary of these results.

3.3.8.2 Breeding Bird Assessments

To establish the level of breeding evidence for bird species within the study area, breeding bird surveys were conducted on June 11 and 16, 2014. Point count surveys were conducted as well as area searches by habitat types, which increase the potential to identify a greater number of species and higher levels of breeding evidence. Area searches were conducted between 0630h and 1000h on June 11th and between 1900h and 2100h on June 16th during the breeding bird season. Point counts stations were chosen at various locations within a 2.0 km radius of the proposed WTP and as shown on **Figure 3-2**. A total of 6 point counts (PC1- PC6) of 5 minutes each using the Canadian Bird Studies Point Count protocol as well as a 3 minute playback recording. Refer to **Appendix E** for the report provided by the project bird specialist (Jim Wilson). Representative habitats were chosen such as mature/immature hardwood, riparian habitat, mixed mature forest, wet habitat and forest edge habitat (forest adjacent open field). All species seen or heard, along with the highest level of breeding evidence, were documented. Survey stations were established with a minimum distance of 300 m between points to maximize coverage of the area. All species noted during both point count surveys were identified as being common and widespread (S4 to S5) to New Brunswick with the exception of two species: Barn Swallow (Threatened, Schedule 1 of SARA) and Great-crested Flycatcher identified as S3B (uncommon with the ACCDC and "Sensitive" on the NBDNR General Status Ranking. These species are discussed further in Section 3.3.8.3.

The habitats provided in **Table 3-9** are based on the observations of the bird survey team and may differ from the habitat information available from NBDNR forest inventory, as illustrated in **Figure 3-2**. The NBDNR data is derived from interpretation of remote sensing data from 2002, while the information contained in **Table 3-9** is recorded directly on location and is considered to be more accurate.

TABLE 3-9: BIRD JUNE 2014 POINT COUNT HABITAT SUMMARY

Point Count (PC) ID	Date	UTM Coordinates (Zone 19)	Identified Habitat
PC#1	06/11/14 & 06/16/14	696531 5080952	Riparian and mature hardwood forest near the Saint John River and a tributary to Saint John River
PC#2	06/11/14 & 06/16/14	696986 5081029	Mature and immature hardwood forest bordering the walking trail
PC#3	06/11/14 & 06/16/14	698030 5081237	Mixed mature forest habitat along the walking trail
PC#4	06/11/14 & 06/16/14	697939 5081033	Wet habitat with mature hardwood stands
PC#5	06/11/14 &	698280 5080760	Forest edge habitat, open field

	06/16/14		bordering a mixed mature forest
PC#6	06/11/14 & 06/16/14	696539 5079794	Forest edge habitat, open field bordering a mixed mature forest

A total of 100 species were observed during the early morning hours and 79 species were observed during the evening/dusk surveys on June 11th and 16th, 2014. Of these species, 39 different species were observed and recorded. The most common species observed were the Red-eyed Vireo (16 individuals), Veery (13 individuals), American Redstart (13 individuals) and Black-capped Chickadee (11 individuals). All of these species are considered common and widespread within New Brunswick.

3.3.8.3 Bird Species at Risk and of Conservation Concern

During the 2014 bird point counts, Barn Swallow (*Hirundo rustica*), listed as Threatened on Schedule 1 of SARA was noted at PC#4 which is located approximately 1.5 km southeast from the project footprint. This species was noted flying over the area and detected by sound and appeared to be foraging the area. It was determined that this species was not likely nesting in the area as there were no indications of this species upon the second survey (June 16th) which was conducted a week later. Refer to **Figure 3-1** for the sighting location.

Although the Great-crested Flycatcher (*Myiarchus crinitus*) noted during the point count surveys is not identified as a Species at Risk under COSEWIC, SARA or NBSAR, it is identified as an "S3B - Uncommon" and "Sensitive" species through the ACCDC ranking and the NB General Status Ranking, respectively. Only one species was noted in one location around PC#1 which is located approximately 50 m south of the project footprint along the Saint John River Floodplain. Refer to **Figure 3-1** for the sighting location. This species was not identified in the area during the second site visit on June 16th. According to Stewart Lusk, SAR biologist with the NBDNR, there are no other records of species of conservation concern identified in the area.

Based on the ACCDC data, there are no potential species of conservation concern within the assessment area (within 1 km).

Based on the bird and bird habitat field studies, the habitat available for these species in the area was not identified as unique and would be present in other areas within the assessment area. The majority of the birds listed, were commonly found in New Brunswick.

3.4 Aquatic Environment

Wetlands and watercourses potentially occurring within the property boundaries and within 30 m were assessed as part of this EIA. Any project proposed within 30 m of a watercourse or wetland that is identified on the GeoNB map must apply for a permit under the Wetland and Watercourse Alteration Regulation (WAWA) under the Clean Water Act.

3.4.1 Wetlands

According to the GeoNB wetland mapping database and field studies conducted in 2014, there are no regulated wetlands or provincially significant wetlands within 30 m of the proposed WTP footprint, as illustrated on **Figure 3-3**.

3.4.2 Watercourses

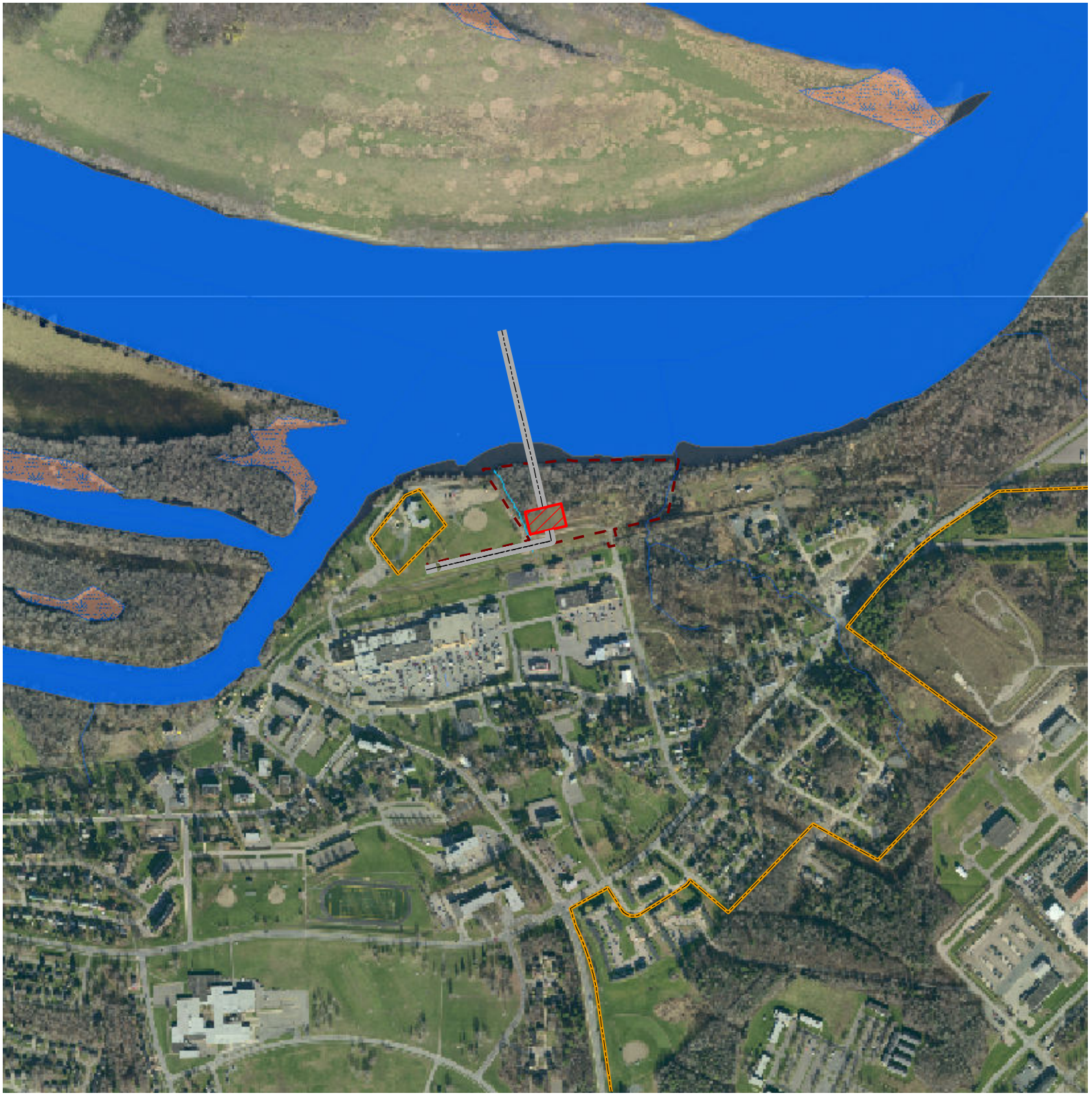
Based on a review of the NBDNR 1:10000 mapping and field studies conducted in 2014, there are three watercourses identified within the property boundaries: one (1) drainage channel identified within 30 m of the proposed project building footprint and two (2) watercourses noted approximately 80 m and 125 m of the project footprint. As outlined on **Figure 3-3** and summarized in **Table 3-10**.

TABLE 3-10: WATERCOURSES WITHIN 30 M OF THE PROJECT AREA

Watercourse ID	Project Component	Fish Bearing (Y/N)[1]	Habitat Description				
			Substrate	Watercourse Width (m)	Dominant Habitat	Depth (m)	% Cover
WC1 – Unnamed Stormwater (Surface Drainage)	Access Roads, parking and WTP (within 10 m)	N	rock/ rubble	0.5	Run	Dry (at time of survey)	30
WC2 – Indian Brook	Access Roads (within 115 m of project components)	Y	rubble, gravel, sand and silt	4-5	Riffle/Run	0.3-1.0 m	60
WC3 – Saint John River	Intake Line (horizontal directional drill), Access Roads, parking and WTP (within 80 m)	Y	rubble, sand and silt	~1,400	Run	1-3 m	10

3.4.2.1 Surface Drainage (WC1) – Field Identified

This stormwater (surface water) drainage channel was identified in the field and was dry at the time of the survey and consisted of a channel width of ~0.5 m with substrates dominated by rock/rubble and overgrown by grass. A drainage culvert was also noted. This channel drains surface water from the nearby commercial and recreational development that runs under ground up to the NB walking trail. The channel becomes evident as it approaches the Saint John River. This channel would not be considered fish habitat. Refer to **Appendix F** for site photographs.



TOWN OF OROMOCTO

WATER TREATMENT PLANT
ENVIRONMENTAL IMPACT ASSESSMENT

Aquatic Habitat
Figure 3-3

- PROPOSED FACILITY
- PROPOSED BOUNDARY
- FIELD DELINEATED WETLAND
- MAPPED WETLAND
- BASE BOUNDARY
- WATERCOURSE
- WATERCOURSE (Field Identified)

0 45 90 180 270 360 450
Meters

MAP CREDITS: ESRI,NRCAN, GEOBASE,

MAP CREATED BY: SCM
MAP CHECKED BY: RMD
MAP PROJECTION: NAD 1983 UTM Zone 19N

N
W E
S

DILLON CONSULTING

PROJECT: 148895
STATUS: DRAFT
DATE: 3/18/2016

3.4.2.2 Indian Brook (WC2)

A 165 m section of this watercourse was surveyed within the study area which extends from the NB trail system culvert outlet to its convergence with the Saint John River as shown on **Figure 3-3**. This watercourse is located approximately 125 m east of the proposed WTP and approximately 40 m of the existing access road. The habitat in this area consisted of a gravel/sand/sediment riffle and pool sequence with an average wetted channel width of 3-4 m. Because this watercourse exists within the Saint John River floodplain, its average bank channel or floodplain area would be saturated during the spring freshet. Refer **Figure 3-3**. The substrate was dominated by sand and sediment (60%) with lesser amounts of gravel (25%) and rubble (15%). This unit was characterized as being good rearing and fair spawning habitat for brook trout, perciformes (i.e., smallmouth bass, perch, etc.) and other cyprinids (minnows). Depths ranged from 15-25 cm in the riffle sections and 45 to 60 cm in the pool habitat. The lower end of this habitat drains to open water and emergent aquatic vegetated habitat along the Saint John River.

Crown closure from the walking trail to approximately 30 m downstream was absent with some small patches of willow and speckled alder providing some overhanging shade, the lower reach extending to the Saint John River consisted of a mature stand of silver maple providing approximately 70% shade. The riparian habitat in the lower sections was primarily bare and unstable with small grassy patch areas causing the banks to become highly erodible. Refer to **Appendix F** for site photographs.

Fish Presence

Electrofishing was conducted on August 26, 2014 for fish species presence/absence from below the NB Trail to the confluence of the Saint John River. Electrofishing surveys were conducted as per DFO permits and requirements and consistent with DFO protocols.

During the survey, five (5) different species were observed and are summarized in **Table 3.11**. Only one species of conservation concern was noted within this area. The American eel (*Anguilla rostrata*) is currently listed as a Threatened species under COSEWIC and the *NBESA,* however, regionally it is listed as S5 (demonstrably widespread) with the ACCDC and secure on the NBDNR General Status list. All the species identified during the survey are common to this region of New Brunswick.

TABLE 3-11: SUMMARY OF ELECTROFISHING RESULTS AT INDIAN BROOK, AUGUST 25, 2014

Species	Size Range (cm)	ACCDC Rank	COSEWIC Status	NBESA Status	General Status Ranking in NB	Number of Individuals Observed
American Eel (*Anguilla rostrata*)	10-30 cm	S5	Threatened	Threatened	Secure	21
Yellow Perch (*Perca flavescens*)	4-6 cm	S5	n/a	n/a	Secure	18
Burbot (*Lota lota*)	9 to 12 cm	S5	n/a	n/a	Secure	4
Brown Bullhead (*Ameiurus nebulosus*)	3-6 cm	S5	n/a	n/a	Secure	4
Common White Sucker (*Catostomus commersoni*)	10-12 cm	S5	n/a	n/a	Secure	4

3.4.2.3 Saint John River (WC3)

The Saint John River is the longest river in northeastern North America and has a basin area of over 55,000 km2 (CRI, 2012). The area of the Saint John River in the vicinity of the proposed WTP is located within the Lower Saint John River basin which extends from the Mactaquac Dam to the Saint John Harbour at the Bay of Fundy. The Saint John River is located approximately 90 m north of the proposed project area. Refer to **Appendix F** for site photographs.

Fish Presence

A review of the information provided in the CRI, 2012 report identified 41 fish species based on historic and recent finds which have the potential to occur within this lower reach of the Saint John River including: Salmoniformes, Anguilliformes, Perciformes, Cypriniformes, and Acipenseriformes.

Underwater Habitat Video (UHV)

Underwater habitat video was conducted by Dominator Marine Services on July 28, 2014. The underwater video was used to characterize the aquatic habitat within the proposed water

intake line footprint. Analysis of the video consisted of three 250 m transects from the shoreline covering an area of approximately 750 m^2 as denoted in **Appendix G**.

Based on the review of the video, the biological environment in the area of the proposed project intake line area is not unique or pristine or considered sensitive spawning areas. However, the bottom substrates which consist primarily of sand and silt may have the potential to support yellow lampmussel (*Lampsilis cariosa*), a species listed as Threatened under Schedule 1 of *SARA*. The underwater video identified little organic material to support aquatic life and only bivalves and small amounts of aquatic vegetation (grass) along the shoreline and little to no vegetation as it moved further into the river with the occasional bivalve observed. There were no other aquatic animals identified during the survey. Refer to **Appendix G** for the complete video transcript and habitat descriptions.

3.4.2.4 Fish Species of Conservation Concern

The ACCDC database and COSEWIC status reports indicate that the habitat within the Saint John and Oromocto Rivers and more specifically the available habitat within the area of the intake line in the Saint John River is suitable for foraging for seven (7) fish species of conservation concern including: yellow lampmussel (*Lampsilis cariosa*), Atlantic salmon (*Salmo salar*) Atlantic sturgeon (*Acipenser oxyrinchus*), shortnose sturgeon (*Acipenser brevirostrome*), redbreast sunfish (*Lepomis auritus*), striped bass (*Morone saxatilis*) and American eel (*Anguilla rostrata*) as presented on **Figure 3-1** and summarized in **Table 3-12**. American eel, a species listed as Threatened by COSEWIC although listed by ACCDC as widespread was also identified during the field investigation surveys in Indian Brook.

Based on the UHV conducted by RMI Marine in the area adjacent the water intake line, the habitat consist primarily of sand and silt with little vegetation. This type of habitat would provide minor foraging habitat for these species and would not provide pristine, sensitive or critical spawning habitat to support these species.

TABLE 3-12: FISH SPECIES OF CONSERVATION CONCERN KNOWN TO OCCUR WITHIN THE SAINT JOHN AND OROMOCTO RIVER, IDENTIFIED BY ACCDC (2014) AND DND ENVIRONMENT (2015)

Common Name	Scientific Name	ACCDC Status	COSEWIC/ SARA Status	NBSARA Status
American Eel	*Anguilla rostrata*	S5	Threatened – No Schedule	Threatened
Shortnose Sturgeon	*Acipenser brevirostrome*	S2	Special Concern – Schedule 1	Special Concern
Striped Bass	*Morone saxatilis*	S2	Special Concern – No Schedule	Special Concern
Atlantic Salmon (Outer Bay of Fundy)	*Salmo salar*	S2	Endangered – No Schedule	Endangered
Atlantic Sturgeon	*Acipenser oxyrinchus*	S3	Threatened – No Schedule	Threatened
Yellow Lampmussel	*Lampsilis cariosa*	S2	Special Concern – Schedule 1	Special Concern
Redbreast Sunfish	*Lepomis auritus*	S3?	Data Deficient – Schedule 3	n/a

3.5 Archaeological and Cultural Environment

3.5.1 Cultural Heritage Resources

There are no cultural heritage resources located immediately within the project footprint; but the following section describes resources that are located within the Town.

A replica of Fort Hughes, an American Revolutionary War Blockhouse is located in Sir Hazen Douglas Park near its original location. The original fort was built in 1780 and remained in use until the end of the revolutionary war. The heritage in reflected in the Town crest, which features two soldiers from the era (New Brunswick, 2014).

The Oromocto Cenotaph is a granite obelisk war memorial located on a grassy area along MacDonald Avenue. The Cenotaph is designated as a local historic place for its importance of highlighting the military history of the Town. Its design is typical of war monuments throughout Canada. It was erected by citizens of the Town is 1963 and memorializes fallen solders of World War I, II, the Korean War and various Canadian peacekeeping missions (New Brunswick, 2014).

St. John's Anglican Church is a block church featuring elements of gothic revival architecture that was built in 1920. It is designated as a local historic place due to its prominence as a longstanding place of worship in the area (New Brunswick, 2014).

The George Brown house, located at 325 MacDonald Road in the Town is a three storey wood-frame gothic house. Considered to be the region's finest example of Carpenter Gothic residences, it is designated as a local historic place for its architectural features and association with the Town's early settlers (New Brunswick, 2014).

Building H12 at the Base, also known as the Drill hall, is a basic two storey structure with a pitched roof. It is located on an open field site, in the central training area of the Base. It is a recognized federal heritage building due to its historical associations, architecture, and central prominence to the Base community (New Brunswick, 2014).

3.5.2 Archaeological and Cultural Features

Cultural Resource Management (CRM) Group Limited was retained to conduct archaeological investigations associated with the proposed project. A preliminary archaeological investigation was conducted on May 29, 2014, according to the terms of Archaeological Research Field Permit 2014NB2, issued the New Brunswick Archaeological Services Branch of the Department of Tourism Heritage and Culture. A second investigation was conducted on November 4-5, 2014 which consisted of shovel testing.

Preliminary Investigations (Phase 1)

The preliminary investigation report as provided in **Appendix H** describes the methodology employed to conduct the background and preliminary field investigations (excluding sub-surface testing) for potential archaeological and cultural resources within the project area footprint.

The background research and field reconnaissance of the WTP study area identified two (2) areas that exhibit elevated potential for encountering either Native (both Precontact and historic) or Euro-Canadian archaeological resources at two locations.

Predictive modeling indicated zones of elevated archaeological potential, totaling 80 m in width, extending back from the bank of the Saint John River. The first 50 m from the river are ascribed high potential, while the following 30 m are ascribed moderate potential.

Shovel Testing Investigations (Phase 2)

Based on the recommendations outlined in the Phase 1 Report, it was determined that an archaeological shovel testing of high potential areas identified within the study area of the proposed WTP should be investigated further. These investigations were conducted on November 4-5, 2014, according to the terms of Archaeological Research Field Permit 2014NB104, issued to CRM through New Brunswick Archaeological Services Branch of the Department of Tourism Heritage and Culture. The complete report is provided in **Appendix H**. This report describes the low level evaluation and shovel testing of locations of elevated

archaeological potential, presents the results of these efforts and offers cultural resource management recommendations.

Through these archaeological investigation attempts, it was determined through consultation with DND that horizontal direction drilling would be employed for the installation of the water intake line to eliminate the risk of encountering potential archaeological resources. No further investigations were conducted.

3.6 Socio-Economic Environment

Oromocto was developed in the 1950s as a planned community to provide housing and essential services to the new Base that was set to open as the largest military training facility in the Commonwealth, at the time (Town of Oromocto, 2015). The Town was designed by McGill professor and prominent community designer Harold Spence-Sales (Town of Oromocto, 2015). He designed the Town to feature the suburban ideals of the day, with a small commercial strip serving the residential neighbourhoods, primarily made up of single family lots. The Town is characterized by its idyllic parkland charm, with mature tree-filled neighbourhoods centered around a system of schools and parkland. All neighbourhoods and schools are connected via a network of active transportation trails. The following information regarding population and employment is based on the most recent census, as reported to Statistics Canada from the 2011 Census (Statistics Canada, 2012) and 2006 Community Profiles (Statistics Canada, 2007).

3.6.1 Population and Labour Force

The Town is a large town located 22 km away from Fredericton, the provincial capital. The Town has a population of 8,932 as of 2011 (Statistics Canada, 2012). The population of the Town increased 6.1% from 2006 to 2011. The population of the town fluctuates depending on demand and flow, and seasonable training at the Base. Additional population trends for the Town and the Oromocto First Nation Reserve subregion can be found in **Table 3-13**. Furthermore, the Town is a commercial and employment centre for 25,000 people who live within a 9 km radius, in the areas communities of Rusagonis, Waasis, Maugerville, Burton, and Geary. With a land area of 33.27 km^2, the population density of the Town is 399.2 persons per km^2 in 2011, whereas, the population density of New Brunswick was 10.5 people per km^2 (Statistics Canada, 2012).

TABLE 3-13: POPULATION STATISTICS FOR THE TOWN OF OROMOCTO AND NEARBY OROMOCTO FIRST NATION RESERVE SUBREGION (STATISTICS CANADA, 2012)

Year	Town of Oromocto Population	Oromocto IR26 Population	Total population	% Annual Increase	% Increase
2011	8,932	286	9,218	1.20%	6.1%
2006	8,402	284	8,686	-0.91%	-4.5%
2001	8,843	249	9,092	-0.77%	-3.8%
1996	9,194	256	9,450	-0.14%	-0.7%
1991	9.325	190	9,515	-0.57	-2.8%
1986	9,655	135	9,790	1.31%	6.7%
1981	9,064	110	9,174	-4.30%	-19.7%

The aboriginal population in the Town represented 2.5% of the total population, which is on par with the provincial representation (2.4%) (Statistics Canada, 2007). Visible minorities in the Town represented 1.9% of the total population, with Black and Southeast Asian representing the majority (Statistics Canada, 2007).

The Town's population achieved higher educational attainment compared to the province as a whole. In 2006, 79.9% of the Town's population 15 years and over had certificates, diplomas or degrees, compared to 70.6% for New Brunswick (Statistics Canada, 2007).

In 2005, the median income of persons 15 years and over was $34,145, which is higher than the provincial average of $22,000 (Statistics Canada, 2007). Males earned on average $50,860 and females earned $16,374 compared to the provincial averages of $28,019 and $17,586, respectively (Statistics Canada, 2007).

3.6.2 Local Economy

In 2006, the last year of the mandatory Canadian long form census, the highest percentage of people in the Town and the Province of New Brunswick were employed in sales and service occupations (52.6% and 26%, respectively). This high proportion is not surprising given the large employment opportunities at the Base. The Base employs 4,500 military personnel and 1,500 civilians, making it the largest public sector employee, after the province itself, in New Brunswick. The Base reportedly contributes 220 million dollars to the local economy annually (Canadian Army, 2014). In Oromocto, the second and third highest proportions of occupations were related to business, finance, and administration (12.9%) and management occupations (10.3%). In New Brunswick, the second and third highest proportions of occupations were related to business, finance and administration (17.9%) and trades, transportation and equipment operators (17.2%). It is worth noting that Oromocto had a small proportion of the population working in occupations unique to processing, manufacturing and utilities (0.06%) compared to the New Brunswick proportion (5%) (Statistics Canada, 2007). The average

employment rate in the Town is 73.5% and unemployment rate hovers around 4.2% (Statistics Canada, 2007). Refer to **Table 3-14** for a summary of the Town's employment characteristics. More recent reported employment figures for the region indicate an employment rate of 59% and unemployment rate of 8.8% for the Greater Fredericton-Oromocto region (Statistics Canada, 2015).

TABLE 3-14: EMPLOYMENT STATISTICS FOR THE TOWN OF OROMOCTO (STATISTICS CANADA, 2006)

	Town of Oromocto
Population (2006)	8,402 (-5.0%)
Population (2001)	8,843
Employment Rate	73.5%
Unemployment Rate	4.2%
Largest occupation group	1. Sales and service occupations (~50% of labour force) 2. Business, finance and administration occupations (~13% of labour force) 3. Management occupations (~10% of labour force)
Largest industry group	1. Other services (~65% of labour force) 2. Business services (~10% of labour force) 3. Retail trade (~8.5% of labour force)

3.6.3 Existing and Historic Land Use

3.6.3.1 Military

The Base is the largest military facility in Eastern Canada and features a 1,200 km^2 training area with 1,500 km of roads, 900 km of tracks, and 740 buildings. The main garrison is located within the Town and has a large impact on the community, with facilities such as a gymnasium, bowling alley, arena, outdoor pool and tennis courts, in addition to offices and training-related facilities (Canadian Army, 2014). The proposed WTP is located approximately 1km from the Base.

3.6.3.2 Industrial

There are no an industrial land uses immediately adjacent to the proposed WTP. A Sobey's distribution plant is located approximately 1km from the site. The Sobeys' property is zoned light industrial and transportation to support its use as a regional distribution center via transport trucks. The Centre is a major employer in the Town, employing 150 individuals (Town of Oromocto, 2013). The next nearest industry are smaller, light industrial operations located in the Restigouche Road Industrial Park, 2.8km away. There are future plans to develop the area along Black Watch Ave, in the Oromocto West neighbourhood (West of the TransCanada Highway) into an industrial park to support industry development in the Town.

3.6.3.3 Commercial

The Oromocto Mall, the commercial core of the Town is a large commercial land use located adjacent to the proposed site. The Mall's major tenants include Atlantic Superstore, Shopper's Drug Mart and Dollarama. There are additional commercial uses further away along Restigouche Road and the new Gateway development, which is undergoing steady expansion and is zoned for highway commercial.

From approximately 1960 to 1999, a bulk petroleum storage facility operated north of the intersection of Onondaga Street and the NB Trail on the property proposed for the new WTP (Dillon, 2014). Additionally, the Oromocto Minor Shore Light operated on a small land parcel within the property boundaries throughout much of the 1900s (Dillon, 2014)

3.6.3.4 Residential

The Town has a population density of 399 people per km^2. The project is not currently zoned for residential use and it is not anticipated that residential use will be permitted on the site. The nearest residences are located nearby at Oromocto First Nation.

3.6.3.5 Cultural/Institutional

Cultural and institutional uses include hospitals, schools, places of worship and post-secondary education facilities. The Town is a secondary cultural and institutional center for the region, after the City of Fredericton. The Oromocto Public Hospital is located less than 1km from the proposed site. The hospital serves the Town and the Base.

There are no places of worship in the immediate area, but there are six places of worship within the Town. There are no schools within the area, but there are five elementary schools, two middle schools and one high school in the Town. Post-secondary facilities are offered in Fredericton. Additionally, the Base serves as a large institutional facility within the Town.

3.6.3.6 Recreational and Tourism

The Town services a regional population of 25,000, which provides a sufficient population base for ample recreational facilities. The largest recreational facility in the area is the base gymnasium at the Base. Additionally, there are facilities for theatre, boating, fishing, golf, tennis, swimming (indoor and outdoor), cross-country skiing, skating, hockey, curling, a library, climbing, biathlon, bowling, playgrounds, picnic areas and parks and trails (Town of Oromocto, 2013).

Sir Hazen Douglas Park and Deer Park provide recreational and tourism opportunities along the St John River and Oromocto River watersheds. There is a marina that operates immediately adjacent to the proposed project site in Sir Hazen Douglas Park (Town of Oromocto, 2013). In

addition, the Military Museum is located on the Base's main garrison and provides further tourism opportunities within the Town (Canadian Army, 2014).

Additionally, the New Brunswick trail runs adjacent to the proposed project property. The New Brunswick trail is part of the TransCanada Trail and is intended for non-motorized use; however, the New Brunswick Federation of Snowmobile Clubs lease and maintain the trail for seasonal, motorized use from October of April, annually (New Brunswick Department of Natural Resources, 2006).

3.6.4 Transportation and Transportation Infrastructure

3.6.4.1 Highway

The Trans-Canada Highway (New Brunswick Highway 2) is located approximately 3.5 km from the project site. There is an interchange with the highway near gateway Business Park on Miramichi Road that provides highway access. New Brunswick Route 102 is a secondary highway that runs adjacent to the project site. The two-lane corridor was the original road connecting Saint John and Fredericton.

3.6.4.2 Rail

The nearest rail facilities are located in Saint John and Moncton (Town of Oromocto, 2013). The original rail line through the Town was decommissioned and converted to a multi-use trail that runs through the project site.

3.6.4.3 Air

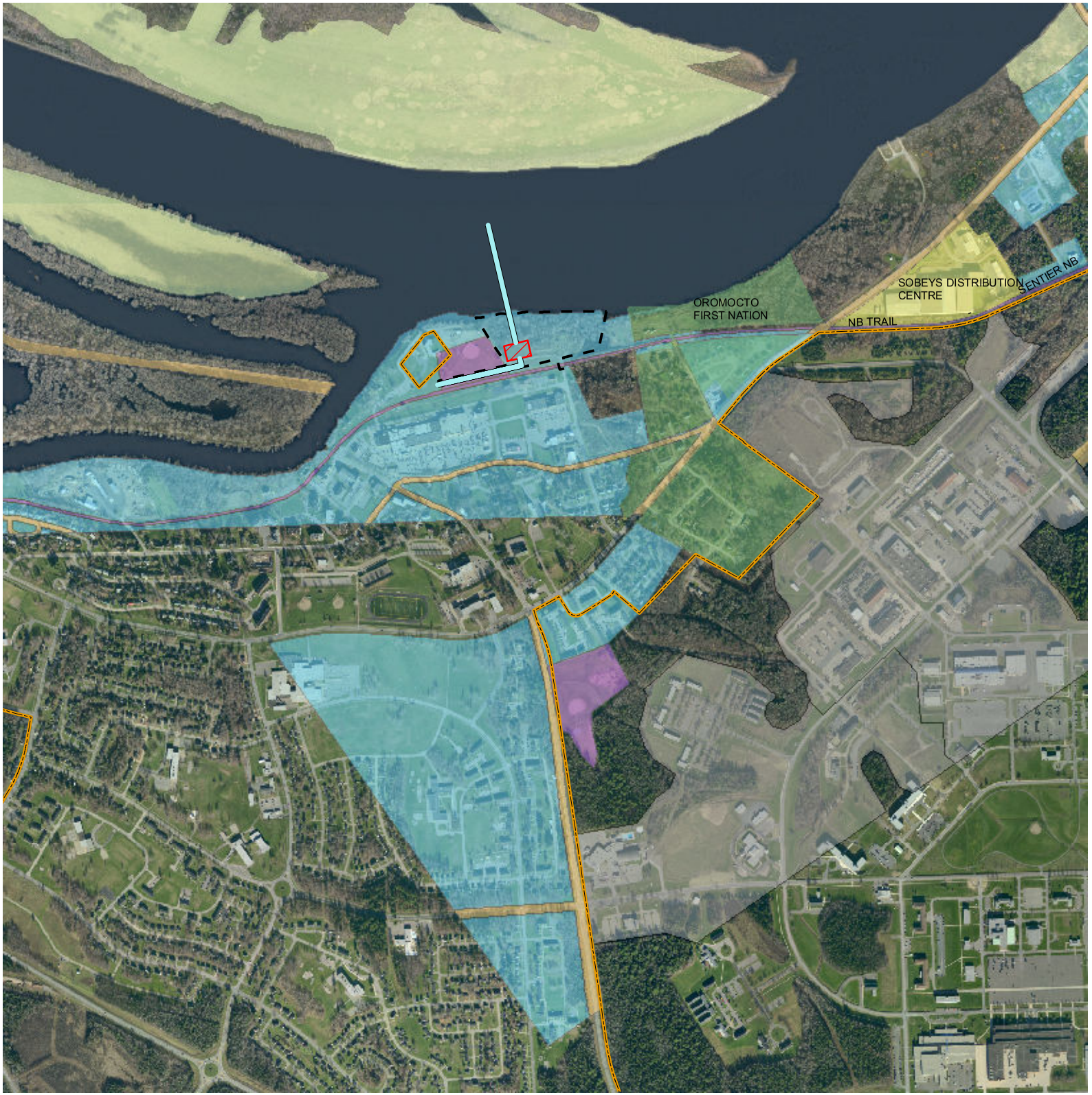
The nearest airport to the project site is the Fredericton Airport, serving domestic and international commercial passenger and cargo flights, approximately 5 km from the Town.

3.6.4.4 Seaport

The proposed project is located 91 km from the regionals largest port, Port Saint John.

3.6.5 Aboriginal Communities

The project site is within 500 m of the Oromocto First Nation, a Maliseet community of 654 persons (304 on-reserve) (AANDC, 2014). Oromocto First Nation is located within Oromocto town limits and has 19.8 hectares of land (Aboriginal Affairs and Northern Development Canada (AANDC), 2014). Refer to **Figure 3-4**. Established in 1895, it is governed by an elected council, Chief and five councilors serving a two-year term. The current council governs until September 13, 2015 (Oromocto First Nation, 2015). The First Nation provides 95 dwellings to 95 households, in developments north and south of Waasis Road, east of the project site (AANDC, 2014).



TOWN OF OROMOCTO
WATER TREATMENT PLANT
ENVIRONMENTAL IMPACT ASSESMENT

Land Use
Figure 3-4

PRIMARY LAND USE

- AGRICULTURAL
- DEPARTMENT OF NATIONAL DEFENSE
- INDUSTRIAL
- INFRASTRUCTURE
- RECREATION
- SETTLEMENT
- OROMOCTO FIRST NATION
- BASE BOUNDARY
- PROPOSED FACILITY
- PROPOSED BOUNDARY

0 70 140 280 420 560 700
Meters

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W E
S

MAP CREDITS: ESRI,NRCAN, GEOBASE,

MAP CREATED BY: SCM
MAP CHECKED BY: RMD
MAP PROJECTION: NAD 1983 UTM Zone 19N

DILLON CONSULTING

PROJECT: 148895
STATUS: DRAFT
DATE: 3/18/2016