

5.0 Environmental Effects Assessment and Mitigation

An analysis of the potential effects for each of the interactions identified in Table 4-1 is undertaken in the following sections. For each of these interactions the potential impact and boundaries are identified, the effect prior to mitigation is evaluated, mitigation is proposed, and significance of residual effects are predicted. The process is depicted in Figure 5-1. The predicted residual effect assumes that each of the recommended mitigation measures will be implemented.

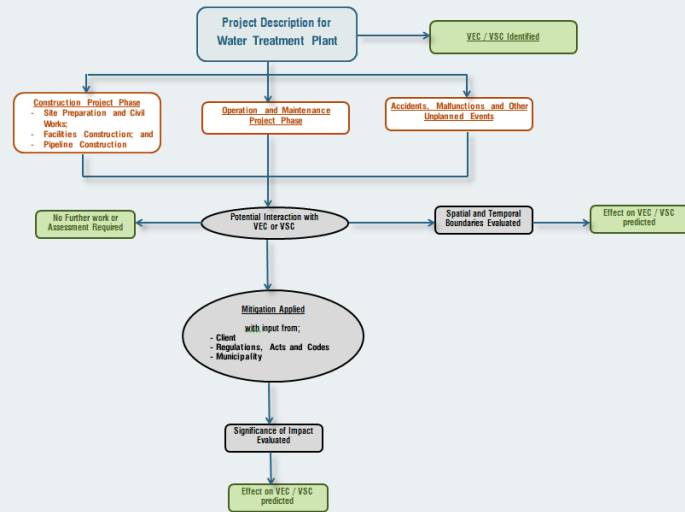


FIGURE 5-1: SUMMARY OF WWTP IMPACT ASSESSMENT PROCESS

5.1 Methodology

5.1.1 Potential Impact from Interaction

Each action completed during the project phase (or component if applicable) was recognized and potential interactions with Valued Ecological Components/Valued Socio-Economic Components (VECs/VSCs) in the environment in the project area were considered. If the interaction was expected to result in a net negative impact to the VEC/VSC it was included in the potential impact section and carried forward for mitigation and a residual effect was predicted.

Impacts that were not expected to pose a net change to the project area (i.e. noise levels for the new WWTP are expected to be similar to the existing WWTP located approximately 150 m west of the project area) were not considered under the potential impact section.

5.1.2 Impact Effects Boundaries

5.1.2.1 Spatial and Ecological Boundaries

The spatial and ecological boundaries for the environmental effects assessment (EEA) encompasses the physical or geographical limit for which impacts related to a proposed project

will be considered and assessed. For the purpose of this assessment the spatial boundary for the EIA encompasses a 1 km area surrounding the proposed WWTP boundary as identified on **Figure 2-2**. This area encompasses the southern shoreline of the Saint John River, western portion of Burton, the Oromocto First Nation community (in the Town) and the Garrison Area of the Base. Spatial and ecological boundaries may be extended for certain valued ecosystem components (VECs). The spatial boundary (the “Study Area”) for the assessment of the potential environmental effects of the project on the following VECs are as follows:

- **Atmospheric Environment:** The spatial boundaries of the potential environmental effects that the project could have on the atmospheric environment were selected by professional judgment and scientific literature review.
 - **Change in Air Quality:** The spatial boundaries for a change in Air Quality due to the project are identified as a zone extending approximately 500 m from the project’s footprint. The 500 m range should generally provide mixing of emissions from the project with ambient air.
 - **Change in Climate from Generation of GHGs:** The spatial boundaries for the assessment of the environmental effects on a change in GHG generation are the global environment.
 - **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.
- **Terrestrial Environment:** encompasses the flora, wildlife/wildlife habitat, birds/bird habitat within the project boundaries and 1 km area (i.e., study area) for protected areas.
- **Species at Risk:** encompasses Species at Risk and of Conservation Concern within a 100m radius (i.e., study area) of the project boundary.
- **Aquatic Environment:** encompasses surface water potentially impacted within 30 m of the project footprint.
- **Archaeological and Cultural Resources:** encompasses a 1 km radius for cultural and heritage resources as well as those areas identified on the predictive modeling with 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.
- **Socio-Economic:** encompasses a 2 km radius around the project footprint within the community of the Town and the Garrison at the Base.

5.1.2.2

Temporal Boundaries

The temporal boundaries for the EIA define the time periods for which likely environmental effects of the project are considered, such as, the duration of the construction phase of the project or lifetime of the WWTP. Temporal boundaries vary according to project phase. In the construction phase, specific construction-related effects are short. For the purposes of this EIA

the construction phase will likely be phased over subsequent 2-5 years. Effects associated with the operational period are long term, as the WWTP is intended to be operational for 25 years.

For purposes of this EIA, it was assumed that the project life-cycle consists of the following two (2) phases:

- Construction Phase - including Site Preparation and Civil Works, Facilities Construction and Effluent Line Construction; and,
- Operations and Maintenance Phase.

Accidents and malfunction events could occur during either phase of the project lifecycle, and as their nature is unknown, the temporal boundary varies. However, most of these events are relatively short in duration and as such, the effects are considered to be short-term unless otherwise stated.

5.1.3 Effect Prior to Mitigation

Following the identification of the interaction between the site activity and VEC/VSC and the expected duration of the interaction, a potential effect is predicted using professional judgment. This predicted effect assumes no mitigation has been completed.

The predicted significance of the interaction will be evaluated using the following questions as a guide:

1. What is the magnitude of the effect?
2. What is the geographic extent of the effect?
3. What is the duration (short or long term) and frequency of the effect?
4. How does the net effect compare to the existing environment? Does it represent a substantive or order of magnitude negative change in baseline conditions?
5. Is there a substantive public, government or agency concern?
6. What is the ecological and/or social context for the effect?
7. Is the effect reversible?

The predicted effect is then classified on the following scale;

- Negligible – the magnitude of the effect is relatively small spatially or temporally, the effect will not irreparably impact the surrounding environment, and there are no substantive public or ecological concerns;
- Limited - the magnitude or frequency of the effect is measurable either spatially or temporally, however effect will not irreparably impact the surrounding environment or an alternate environment is available, and there are no substantive public or ecological concerns. Species of conservation concern are not expected to be impacted;

- **Moderate** - the magnitude or frequency of the effect is relatively significant spatially and/or temporally, and is predicted to impact the surrounding environment, however an alternate environment is available. Species of conservation concern may be impacted. There may be substantive public or ecological concerns; and,
- **Significant** - the magnitude of the effect is significant spatially or temporally, the effect will irreparably impact the surrounding environment, and there are substantive public or ecological concerns.

The quantification of the effect may vary depending on the VEC/VSC.

5.1.4 Mitigation

Mitigation is identified for each interaction and/or effect in an attempt to reduce the severity, magnitude or duration of the interaction. In addition, several acts, codes, regulations and guidelines may require appropriate actions be conducted as mitigative measures prior to or during the interaction. **Appendix B** provides a summary of acts, codes, regulations and guidelines that have been reviewed in the development of the mitigative measures. To minimize impacts to the environment, an environmental management planning will be undertaken as part of the design and implementation phase. .

5.1.5 Significance and Residual Effect

The significance of the residual effect of the interaction will be predicted and classified on the same scale as the effect prior to mitigation, see section 5.1.3.

5.2 Atmospheric Environment Results

The atmospheric environment was selected as a VEC/VSC due to the possible environmental impacts resulting from:

- A change in air quality due to vehicle and equipment emissions, generation of dust and other potential air contaminants;
- A change in the existing sound quality during the construction phases of the WWTP; and,
- A change in air quality due to an accident or malfunction (i.e., hazardous material spill).

5.2.1 Construction Phase

5.2.1.1 Potential Effects

During the construction phase, the potential for adverse environmental effects exists due to the release of combustion gases from vehicles and heavy equipment (including earth movers, excavation equipment and grading equipment), wind raised dust (particulate matter) from

material handling or stockpiled soil, release of GHG from vehicles and equipment, and noise from construction equipment and activities.

Potential Effects on Air Quality

Fugitive dust is particulate matter that originates primarily from the movement of mobile equipment on unpaved surfaces, from material handling, from wind erosion of exposed soils or stockpiles of friable materials, and from blasting of rock. Construction activities that could generate fugitive dust include clearing and grubbing, grading, leveling, handling of fill, and other earth moving activities. Dust raised from construction activities tends to be transient in nature, both temporal and spatially, and is dependent on factors such as the soil moisture content, level of construction activities at a particular location, and meteorological conditions at the time.

It has been shown that particulate matter from construction activities settles out of the atmosphere quickly and a level of $150 \mu\text{g}/\text{m}^3$ will be exceeded at a distance of 50 m from the activity only 2% to 3% of the time (Schexnayder and Ernzen, 1999). The province of New Brunswick has an acceptable level of $120 \mu\text{g}/\text{m}^3$ for a daily averaging period and $70 \mu\text{g}/\text{m}^3$ for an annual averaging period.

Construction equipment produces gaseous emissions including nitrogen oxides, carbon monoxide, VOCs and some minor quantities of SO_2 and particulate matter. Most of these primary pollutants are transformed in the atmosphere, through a series of physical and chemical reactions, to secondary pollutants including smog, ozone and various nitrogen and sulphur compounds.

Potential Effects on Sound

Construction activities will result in elevated noise levels during the construction period. There will be temporary changes in sound pressure levels in the vicinity of the project due to activities such as blasting and the operation of heavy equipment associated with site preparation work and construction. Preliminary construction information indicates that excavators, cranes, loaders, bulldozers, concrete trucks and various other trucks will be required during the construction period. Typical sound pressure levels of some commonly used construction equipment is provided in **Table 5-1**.

TABLE 5-1: TYPICAL CONSTRUCTION EQUIPMENT SOUND PRESSURE LEVELS AT A DISTANCE OF 4.5 M (15 FT) FROM THE RECEPTOR 1

Equipment	Max Sound Pressure Level (dBA)
<i>Backhoe</i>	80
<i>Blasting</i>	94
<i>Compactor (ground)</i>	80
<i>Concrete Mixer Truck</i>	85
<i>Concrete Pump Truck</i>	82
<i>Crane</i>	85
<i>Dozer</i>	85
<i>Dump Truck</i>	84
<i>Excavator</i>	85
<i>Flat Bed Truck</i>	84
<i>Front End Loader</i>	80
<i>Man Lift</i>	85
<i>Paver</i>	85
<i>Pickup Truck</i>	55
<i>Roller</i>	85
<i>Pumps</i>	77

Note: ¹ Courtesy of the Federal Highway Administration (FHWA), 2006

5.2.1.2 Effect Prior to Mitigation

The effect of the potential impacts identified above on the atmospheric environment (including air quality and noise) prior to mitigation is predicted to be limited. The construction phase is expected to occur over a relatively short time period and is not expected to result in lasting or irreparable damage to the atmospheric environment.

5.2.1.3 Mitigation

The following mitigative measures will be employed to reduce the impact to air quality and noise quality in the area of the subject site prior to commencing the construction phase of the project:

- Noise reduction requirements will be specified in the design documents.
- A plan for handling soil and construction materials for the site will be developed (i.e. excavated soil will be stockpiled and covered in defined areas or removed from site to a predetermined location) with an intent to minimize soil stockpiled at the site.

The following mitigative measures will be employed during the construction phase of the project:

- Vehicles and equipment will be properly muffled and maintained according to emission and noise suppression standards;
- The estimated hours of construction will be 7am to 7pm. Longer hours may be required to meet the project schedule but will not go beyond the hours of 7am to 11pm, as specified by the Town noise bylaw (Town of Oromocto, 2013);
- All construction equipment will be turned off when not in active use to minimize emissions of NOX, CO, VOCs and SO2 and noise levels near the project area;
- Monitoring of weather (wind conditions) and stabilization of stockpiles and bare slopes will be conducted on an as needed basis. In windy conditions, stabilization or covering of stockpiles and bare slopes will be completed to reduce fine particulate matter uplift;
- Water will be used on gravel/dirt road and parking areas to reduce fugitive dust, where necessary;
- Exposed soils will be stabilized as soon as practical;
- Proper labeling of chemical storage containers will be completed and appropriate MSDS will be stored onsite;
- Rubbish and waste materials will be kept at minimum quantities and burning of this material will be prohibited;
- Oily rags will be stored in approved receptacles onsite and disposed of at approved waste facilities;
- Operation requirements will be completed in accordance with the NBDELG Approval to Operate Certificate; and,
- Complaints related to noise from the construction will be addressed by the contractor.

5.2.1.4 Significance of Residual Effects

With these mitigation measures in place the potential atmospheric environmental residual effects during the construction phase of the project are decreased from limited (prior to mitigation) to negligible.

5.2.2 Operational Phase

5.2.2.1 Potential Effects

The facility will be operated in accordance with the Certificate of Approval to Operate. It is expected that the operation of the project will result in a net positive effect by reducing the production of air emissions by implementing upgraded operating systems.

5.2.3 Accidents and Malfunctions

5.2.3.1 Potential Effects

During both phases of the project there is a potential for accidents to occur, and some have the potential to significantly impact the ambient air quality. The following accidents and unplanned events are more likely to impact the air quality and have been considered:

- Chemical and fuel spills – malfunctions or accidents may result in the loss of petroleum hydrocarbons, hazardous materials or other substances that may volatilize and adversely impact the ambient air quality.
- Fires – accidental fires associated with construction, operation or vehicular accidents at the subject site. Significant fires may result in smoke which could impact the air quality.

5.2.3.2 Effect Prior to Mitigation

The effect of the potential impacts of accidents and malfunctions prior to mitigation on the atmospheric environment (including air quality and sound) is predicted to be moderate.

5.2.3.3 Mitigation

The following mitigative measures will be employed prior to construction to reduce the potential for air quality to be impacted by a hazardous material spill or fire:

- An ERP will be completed and detailed in the project EMP and the contractor will be required to provide spill response training to construction personnel;
- Prior to commencing construction, the contractor will be required to ensure that spill response equipment is readily available onsite and each piece of machinery is equipped with a spill response kit; and,
- The contractor will be responsible for submitting a fire safety plan for the construction site prior to commencement of construction work. The fire safety plan must conform to the National Fire Code of Canada and submitted for review by local fire department. Any comments by local fire department will be implemented by the Contractor.

The following mitigative measures will be employed during the construction phase of the project:

- Proper labeling of chemical storage containers will be completed and appropriate MSDS will be maintained onsite;
- Any spills or leaks that occur will be reported to the appropriate regulatory authorities, if applicable, as soon as possible;
- Remedial action, or engineered controls, for any spills or leaks that occur will be completed;
- Rubbish and waste materials will be kept at minimum quantities and burning of this material will be prohibited;
- Oily rags will be stored in approved receptacles and disposed of at approved waste facilities;
- Water will be used on gravel/dirt road and parking areas to reduce fugitive dust, where necessary; and,

- Exposed soils will be stabilized as soon as practical.

The following mitigative measures will be employed during the operational phase of the project:

- Chemical and petroleum hydrocarbons will be stored in appropriate containers and in specifically designated areas to reduce potential for leaks. Where applicable, secondary containment of chemicals or petroleum hydrocarbons will be employed;
- Proper labeling of chemical storage containers will be completed and appropriate MSDS will be maintained onsite;
- Any spills or leaks that occur will be reported to the appropriate regulatory authorities, if applicable, as soon as possible;
- Remedial action, or engineered controls, for any spills or leaks that occur will be completed;
- The EMP will include an emergency response plan to provide guidance on incidents related to process system failures;
- All personnel handling fuels and chemicals will be trained in WHMIS to be qualified to handle the materials in accordance with the manufacturer’s instructions and applicable regulations; and,
- Work entailing use of toxic or hazardous materials, chemicals and/or explosives, or otherwise creating hazard to life, safety of health, will be conducted in accordance with National Fire Code of Canada to minimize the potential for spills or fires.

5.2.3.4 Significance of Residual Effects

With these mitigation measures in place the potential environmental residual effects of the accidents, malfunctions and unplanned events during all phases of the project are decreased from moderate (pre-mitigation) to negligible.

5.3 Terrestrial Environment

The terrestrial environment (flora and fauna and their habitat; including migratory birds) was selected as a VEC as it is located in an area where habitat and wildlife populations are present. The project area is also located within the “Lower Saint John River (Sheffield / Jemseg)” IBA. This VEC has the potential to be affected from:

- A change in vegetation (flora) quality and/or quantity due to the activities associated with the construction of the WWTP;
- Although birds present in the local area are accustomed to disturbance in the area and are already breeding successfully in disturbed areas, a potential disruption of bird

species inhabiting the project footprint due to the construction of the WWTP may occur;

- A change in the wildlife and bird habitat due to the activities associated with the construction of the WWTP; and,
- A change in vegetation and designated habitat from hazardous materials spills or fires.

5.3.1 Construction Phase

5.3.1.1 Potential Effects

The local wildlife habitat (including birds) within the assessment area has the potential to be permanently and temporarily affected by the site preparation activities for the WWTP project. Clearing and grubbing activities in particular will reduce the quality of habitat within the immediate area. The construction has the potential to affect the following:

- Construction noise may lead to the temporary disturbance of terrestrial animals;
- Visual impacts from the presence of humans in the area, as well as vehicles and construction equipment, may cause disruption of sensitive wildlife activity such as breeding and/or feeding;
- Clearing and grubbing activities may remove or reduce the quantity and quality of habitat within, and in proximity to, the project area and may result in the permanent displacement of wildlife;
- Attraction of nuisance wildlife through unsuitable waste management;
- Heavy equipment use during the construction activities may cause direct injury or death of wildlife through collisions or destruction of dens and food sources; and,
- The construction of the project may interact or cause a temporary disruption in wildlife migration patterns such as amphibians, reptiles, small and/or large mammals during sensitive periods in particular feeding and breeding requirements.

5.3.1.2 Effect Prior to Mitigation

The effect of the potential impacts during construction prior to mitigation on the terrestrial environment is predicted to be limited. The construction phase is expected to occur over a relatively short time period and is not expected to result in lasting or irreparable damage to the terrestrial environment or significantly impact a wildlife population.

5.3.1.3 Mitigation

The following mitigative measures will be employed to reduce the impact to the terrestrial environment during the construction phase of the project:

- Vegetation will be preserved where possible to provide wildlife habitat;

- Construction crews and machinery are to use designated roadways and access-points to limit disturbance off the project footprint and minimize the interactions with wildlife and wildlife habitat;
- To minimize wildlife encounters site and working areas shall be kept clean of food scraps and garbage will be removed from the site daily;
- In the case of wildlife encounters the following shall be implemented:
 - No attempt will be made by any worker at the project site to chase, catch, divert, follow or otherwise harass wildlife by vehicle or on foot;
 - Equipment and vehicles will yield the right-of-way to wildlife; and,
 - Any wildlife sightings or encounters shall be reported to the site supervisor as soon as possible.
- Workers will adhere to the Environment Canada's Migratory Birds Convention Act, 1994 (MBCA) and the Migratory Birds Regulations (MBR);
- Clearing (trees and shrubs) shall not be undertaken between April 1 and August 31 (i.e., sensitive nesting period for "Nesting Zone 3") without consultation with a bird specialist or Environment Canada, to minimize impacts to Migratory Birds. Note: as identified on Environment Canada's "nesting zone" calendar this timing has been identified as the most sensitive breeding/nesting periods in wetland, open and forest habitats for migratory birds in this region (Region C3);
- Grubbing will be initiated as early as possible in the calendar year, and must be completed in 30 days;
- No one shall disturb, move or destroy migratory bird nests. If a nest or young birds are encountered, the contractor shall cease work in the immediate area of the nest and contact a DND Environment, bird specialist or Environment Canada for further mitigation. A 20 m buffer zone will be flagged around identified active nests and work in the area may be delayed until after the birds have fledged; and,
- To minimize disruptions with bird activity at night, the project construction activities will be limited to daylight hours. If construction is required at night or during twilight hours, lighting will be shielded to shine downwards to minimize the impacts of birds.

5.3.1.4 Significance of Residual Effects

With these mitigation measures in place the potential environmental residual effects of construction activities during the project are reduced from limited (pre-mitigation) to negligible.

5.3.2 Operational Phase

5.3.2.1 Potential Effects

It is not anticipated that operations will result in a negative impact to the terrestrial environment as there were no site specific sensitive habitat features identified within the proposed WWTP project boundary to indicate potential for terrestrial effects.

5.3.3 Accidents and Malfunctions

5.3.3.1 Potential Effects

During all phases of the project there is a potential for accidents to occur, and some have the potential to impact the local terrestrial environment. The following accidents and unplanned events are more likely to impact terrestrial environment and have been considered:

- Chemical and fuel spills – petroleum hydrocarbons and some chemicals have the potential to kill vegetation, resulting in a loss of habitat or food sources.
- Fires – Fire may result in a loss of vegetation which has the potential to impact important riparian areas, food sources and nesting habitats.

5.3.3.2 Effect Prior to Mitigation

The effect of the potential impacts of accidents and other unplanned events prior to mitigation on the terrestrial environment is predicted to be moderate. Because the nature and outcome of unplanned events is difficult to predict the moderate effect was selected based on a worst case scenario in which a chemical spill could significantly damage the terrestrial environment (vegetation and habitat) for a significant period of time.

5.3.3.3 Mitigation

The following mitigative measures will be employed prior to construction to reduce the potential for the local terrestrial environment to be impacted by a chemical spill or fire:

- An ERP will be completed and detailed in the project EMP and the contractor will be required to provide spill response training to construction personnel;
- Prior to commencing construction, the contractor will be required to ensure that spill response equipment is readily available onsite and each piece of machinery is equipped with a spill response kit; and,
- The contractor will be responsible for submitting a fire safety plan for the construction site prior to commencement of construction work. The fire safety plan must conform to the National Fire Code of Canada and be submitted to the Town for review by local fire department. Any comments by local fire department will be implemented by the Contractor.

The following mitigative measures will be employed during the construction phase of the project:

- Proper labeling of chemical storage containers will be completed and appropriate MSDS will be stored onsite;

- Any spills or leaks that occur will be reported to the appropriate regulatory authorities, if applicable, as soon as possible;
- Remedial action, or engineered controls, for any spills or leaks that occur will be completed;
- Refueling, oiling, and maintenance of equipment will be completed in specifically designated to minimize the potential for terrestrial impacts;
- Servicing of equipment will be completed offsite by a licensed mechanic; however if required to be completed onsite the work will be completed over and impervious surface or trap;
- Rubbish and waste materials will be kept at minimum quantities and burning of this material will be prohibited; and,
- Oily rags will be stored in approved receptacles and disposed of at approved waste facilities.

The following mitigative measures will be employed during the operational phase of the project:

- Chemical and petroleum hydrocarbons will be stored in appropriate containers and in specifically designated areas to reduce potential for leaks. Where applicable, secondary containment of chemicals or petroleum hydrocarbons will be employed;
- Proper labeling of chemical storage containers will be completed and appropriate MSDS will be stored onsite;
- Any spills or leaks that occur will be reported to the appropriate regulatory authorities, if applicable, as soon as possible;
- Remedial action, or engineered controls, for any spills or leaks that occur will be completed; and,
- Work entailing use of toxic or hazardous materials, chemicals and/or explosives, or otherwise creating hazard to life, safety of health, will be conducted in accordance with National Fire Code of Canada to minimize the potential for spills or fires.

5.3.3.4 Significance of Residual Effects

With these mitigation measures in place the potential environmental residual effects of chemical spills and/or fire incidents during all phases of the project are reduced from moderate (pre-mitigation) to negligible.

5.4 Aquatic Environment

The aquatic environment (surface water) was selected as a VEC as it is located within 30 m of a drainage ditch and potential wetland habitat for the access road construction. Aquatic environment (groundwater) was also selected as a VEC because the groundwater table is

expected at relatively shallow depths <3 m in the project area. Water quality is protected under the NB Clean Water Act. In addition, because this proposed project is currently on DND lands, DND is required to follow their internal wetland management policy in which it provides guidance to ensure that all activities conform to the objectives of Federal and Provincial Acts, policies and regulations regarding wetlands. No net loss, in habitat or function is the defined objective of wetland management for wetlands on DND property (DND, 2006).

- A change in surface water quality due to sedimentation events and erosion;
- A change in surface water quality due to runoff from improper stormwater management;
- A change in surface water quality in the adjacent aquatic receptor (watercourses and wetlands) due to deleterious substances or hazardous materials being preferentially directed from the subject site by the drainage ditch following an unplanned event; and,
- A change in groundwater quality due to the vertical migration of chemicals and petroleum hydrocarbons following a spill or equipment failure.

5.4.1 Construction Phase

5.4.1.1 Potential Effects

Aquatic habitat within the assessment area has the potential to be permanently and temporarily affected by the construction related activities for the WWTP project. Clearing and grubbing activities in particular has the potential to impact water quality within the immediate area and within the drainage area. All stages of construction including clearing, grubbing, facility construction, access road construction and surfacing, and paving have the potential to affect the following:

- Increased sediment loading in the watercourse or wetlands resulting from construction and ground breaking activities;
- Potential impacts to downgradient aquatic habitat (watercourses and wetlands) through sedimentation events; and,
- Increased sediment loading in the watercourse due to improper stormwater management of the subject site during construction.

5.4.1.2 Potential Effects

The effect of the potential impacts during construction to the aquatic environment is predicted to be limited. The construction phase is expected to occur over a relatively short time period and is not expected to result in lasting or irreparable damage to surface water in the subject site. The groundwater table in the area of the subject site is not used as a source for potable water.

5.4.1.3

Mitigation

The following mitigative measures will be employed prior to construction to reduce the potential for impact to the watercourse:

- A sediment erosion control plan will be developed and implemented prior to commencing construction activities;
- Construction activities within 30 m of a watercourse or wetland will be carried out in accordance with a Watercourse and Wetland Alteration (WAWA) Permit as issued under the NB Clean Water Act. Work will be conducted between June 1 and September 30 unless otherwise authorized by DELG;
- Construction and temporary access roads shall avoid watercourses. Equipment is not permitted to enter a watercourse or wetland;
- Appropriate erosion and sediment control measures will be designed and implemented to manage surface water drainage (i.e., check dams, off take ditches, ditching);
- Ground disturbance must be minimized to reduce the potential for erosion and sedimentation the watercourse;
- Natural vegetation (especially adjacent to the watercourse) will be preserved as much as possible;
- Trees must be felled away from the watercourse during clearing;
- All stock piled materials will be kept at a minimum of 30 m away from the watercourse;
- Vehicles shall not be washed out where wash water could enter a watercourse;
- If practical, work will be scheduled so as to avoid outdoor work during periods of significant precipitation, defined as rainfall in excess of 25mm in 12 hours, or an intensity of greater than 5mm/hour for 2 or more hours. This shall be considered a minimum; conditions may require more stringent criteria to adequately control erosion and sedimentation;
- Prior to heavy rainfall events sediment control measures will be checked to ensure they are continuing to operate properly;
- Refueling, oiling, and maintenance of equipment will be completed in specifically designated areas at least 100 m from the Saint John River and 30m from the drainage ditch located to the west of the proposed building footprint to minimize the potential for offsite migration of; and,
- Servicing of equipment will be completed offsite by a licensed mechanic; however if required to be completed onsite the work will be completed over and impervious surface or trap.

5.4.1.4 Significance of Residual Effects

With these mitigation measures in place the potential environmental residual effects on the watercourse and wetlands are reduced from limited (pre-mitigation) to negligible.

5.4.2 Operational Phase

5.4.2.1 Potential Effects

It is anticipated that the operation of the project may result in a net positive effect by improving the current operations of the existing WWTP, and updating safety controls to current standards. The new plant in conjunction with the recent upgrades to the effluent line will be an overall benefit to the environment, through mitigation of unintended overflows on neighbouring properties.

5.4.3 Accidents and Malfunctions

5.4.3.1 Potential Effects

During all phases of the project there is a potential for accidents to occur, and some have the potential to impact the local aquatic environment. The following accidents and unplanned events are more likely to impact the aquatic receptors and have been considered:

- Chemical and fuel spills – petroleum hydrocarbons and some hazardous chemicals have the potential to vertically migrate through surficial soil to the groundwater table beneath the subject site; and,
- Due to the presence of the drainage ditch, chemicals and petroleum hydrocarbons also have the potential to be collected, preferentially directed and discharged to the adjacent aquatic receptor (the Saint John River).

5.4.3.2 Effect Prior to Mitigation

The effect of the potential impacts of accidents and other unplanned events prior to mitigation on the aquatic environment is predicted to be moderate. Because the nature and outcome of unplanned events is difficult to predict the moderate effect was selected based on a worst case scenario in which a chemical spill reached the watercourse. This scenario could significantly impact the surface water quality in the receiving environments, however alternative environments are available in the local area.

5.4.3.3 Mitigation

The following mitigative measures will be employed prior to construction to reduce the potential for impact on the aquatic environment:

- An ERP will be completed and detailed in the project EMP and the contractor will be required to provide spill response training to construction personnel;
- The EMP will include an emergency response plan to provide guidance on incidents related to process system failures;
- Prior to commencing construction the contractor will be required to ensure that spill response equipment is readily available onsite and each piece of machinery is equipped with a spill response kit; and,
- The contractor will be responsible for submitting a fire safety plan for the construction site prior to commencement of construction work. The fire safety plan must conform to the National Fire Code of Canada and submitted to the Town for review by local fire department. Any comments by local fire department will be implemented by the Contractor.

The following mitigative measures will be employed during the construction phase of the project to reduce the potential for impact on the aquatic environment:

- Proper labeling of chemical storage containers will be completed and appropriate MSDS will be stored onsite;
- Any spills or leaks that occur will be reported to the appropriate regulatory authorities, if applicable, as soon as possible;
- Remedial action, or engineered controls, for any spills or leaks that occur will be completed;
- Refueling, oiling, and maintenance of equipment will be completed in specifically designated areas and 30m from any watercourse or wetland habitat to minimize the potential for offsite migration;
- Servicing of equipment will be completed offsite by a licensed mechanic; however if required to be completed onsite the work will be completed over and impervious surface or trap;
- The subject site will be kept clear of rubbish and construction debris;
- Sediment control measures will be installed at locations to prevent sedimentation to the wetlands and watercourses; and,
- Prior to heavy rainfall events, sediment control measures will be checked to ensure they are continuing to operate properly.

The following mitigative measures will be employed during the operational phase of the project to reduce the potential for impact on the aquatic environment:

- Chemical and petroleum hydrocarbons will be stored in appropriate containers and in specifically designated areas to reduce potential for leaks. Where applicable, secondary containment of chemicals or petroleum hydrocarbons will be employed;

- Proper labeling of chemical storage containers will be completed and appropriate MSDS will be stored onsite;
- Any spills or leaks that occur will be reported to the appropriate regulatory authorities, if applicable, as soon as possible;
- Remedial action, or engineered controls, for any spills or leaks that occur will be completed;
- All personnel handling fuels and chemicals will be trained in WHMIS to be qualified to handle the materials in accordance with the manufacturer's instructions and applicable regulations;
- Work entailing use of toxic or hazardous materials, chemicals and/or explosives, or otherwise creating hazard to life, safety of health, will be conducted in accordance with National Fire Code of Canada to minimize the potential for spills or fires; and,
- Ground surface coverage will be maintained with vegetation, crushed rock or other impermeable surfaces to reduce sediment erosion at the subject site.

5.4.3.4 Significance of Residual Effects

With these mitigation measures in place the potential environmental residual effects on the aquatic environment are reduced from moderate (pre-mitigation) to negligible.

5.5 Species at Risk

Species at Risk was selected as a VEC due to the potential to encounter wood turtle (protected under the provincial and federal Species at Risk Acts) as the project footprint is located in an area where foraging habitat may exist. Five (5) bird species at risk/of conservation concern (Canada Warbler, Chimney Swift, Whip-poor Will, Sedge Wren and Purple Martin) were also identified as potentially inhabiting the area within the proposed project footprint This VEC has the potential to be affected from:

- A change in habitat due to the activities associated with the construction of the WWTP and effluent lines;
- A disruption of wood turtle species during the construction of the WWTP and effluent lines; and,
- A potential disruption of bird species inhabiting the project footprint due to the construction of the WWTP may occur.

5.5.1 Construction Phase

5.5.1.1 Potential Effects

Species at risk identified could potentially be located within the assessment area and have the potential to be permanently and temporarily affected by the construction related activities for the WWTP project. Clearing and grubbing activities in particular will reduce the quality of

habitat and food sources within the immediate area. The construction has the potential to affect the following:

- The presence of humans, as well as vehicles and construction equipment, in the project area may cause disruption of sensitive wildlife activity and migration;
- Clearing and grubbing activities may remove wildlife habitat within the immediate project area; and,
- Heavy equipment use during the construction activities may cause direct injury or death of wildlife through collisions or destruction of food sources.

The habitat in the project area that may support wood turtle may be impacted; however, this habitat is not unique or limited to the region.

5.5.1.2 Effect Prior to Mitigation

The effect of the potential impacts during construction on species at risk is predicted to be negligible. The construction phase is expected to occur over a relatively short time period and is not expected to result in lasting or irreparable damage to identified sensitive wood turtle or the five (5) bird species at risk/of conservation concern (Canada Warbler, Chimney Swift, Whip-poor-Will, Sedge Wren and Purple Martin habitat).

5.5.1.3 Mitigation

The following mitigative measures will be employed prior to construction to reduce the potential for impact on the local Wood Turtle population;

- Contractor(s) are to be provided guidance on proper species identification by using the "Species at Risk in Atlantic Canada Identification and Information Guide for DND land users" (2014). Guidance will focus on the potential occurrence of SAR and their habitat requirements; and,
- Contractors will be notified of potential environmental constraints (i.e. potential habitat areas) in the project area prior to the commencement of work.

The following mitigative measures will be employed during the construction phase of the project;

- Vegetation will be preserved where possible to provide wood turtle habitat;
- Construction crews and machinery are to use designated roadways and access-points to limit disturbance off the project footprint and minimize the interactions with wildlife and wildlife habitat;

- Tree clearing shall not be undertaken between April 1 and August 31 (sensitive nesting period for “Nesting Zone 3”) without consultation with DND Environment, a bird specialist or Environment Canada, to minimize impacts to Migratory Birds;
- No one shall disturb, move or destroy migratory bird nests. If a nest or young birds are encountered, the contractor shall cease work in the immediate area of the nest and contact a bird specialist or Environment Canada. A 20 m buffer zone will be flagged around identified active nests and work in the area may be delayed until after the birds have fledged;
- To minimize disruptions with bird/bat activity at night, the project construction activities will be limited to daylight hours. If construction is required at night or during twilight hours, lighting will be shielded to shine downwards to minimize the impacts of birds;
- In the case of wildlife encounters the following shall be implemented:
 - No attempt will be made by any worker at the project site to chase, catch, divert, follow or otherwise harass wildlife by vehicle or on foot;
 - Equipment and vehicles will yield the right-of-way to wildlife; and,
 - Any wildlife sightings or encounters shall be reported to the site supervisor as soon as possible.
- Grubbing will be initiated as early as possible in the calendar year, and must be completed in 30 days; and,
- If a SAR is encountered, the Contractor will immediately stop work and notify Environment Canada or a professional biologist for further mitigation measures.

5.5.1.4 Significance of Residual Effects

With these mitigation measures in place, the potential environmental residual effects on the Wood Turtle, Canada Warbler, Chimney Swift, Whip-poor Will, Sedge Wren and Purple Martin are not expected to be significant are reduced from limited (pre-mitigation) to negligible.

5.5.2 Operational Phase

5.5.2.1 Potential Effects

It is not anticipated that operations will result in an interaction with Wood Turtle, Canada Warbler, Chimney Swift, Whip-poor Will, Sedge Wren and Purple Martin however, the creation of cleared gravel areas may encourage wood turtle to nest in the area and thus creating the opportunity for human interaction.

5.5.2.2 Effect Prior to Mitigation

The effect of the potential impacts during operation and maintenance of the WWTP on species at risk is predicted to be limited. The construction phase is expected to occur over a relatively short time period and is not expected to result in lasting or irreparable damage to the wood

turtle or the five (5) bird species at risk/of conservation concern (Canada Warbler, Chimney Swift, Whip-poor Will, Sedge Wren and Purple Martin habitat).

5.5.2.3 Mitigation

The following mitigative measures will be employed prior during the operation of the WWTP to reduce the potential for impact on the local wood turtle population or other potential SAR:

- In the case of wildlife encounters the following shall be implemented:
 - No attempt will be made by any worker at the project site to chase, catch, divert, follow or otherwise harass wildlife by vehicle or on foot;
 - Equipment and vehicles will yield the right-of-way to wildlife; and,
 - Any wildlife sightings or encounters shall be reported to the site supervisor as soon as possible; and,
- If a SAR is encountered, the Contractor will immediately stop work and notify Environment Canada for further mitigation measures.

5.5.2.4 Significance of Residual Effects

With these mitigation measures in place the potential environmental residual effects on the wood turtle or other potential SAR are reduced from limited (pre-mitigation) to negligible.

5.5.3 Accidents and Malfunctions

5.5.3.1 Potential Effects

During all phases of the project there is a potential for accidents to occur, and some have the potential to impact to the local terrestrial environment. The following accidents and unplanned events are more likely to impact terrestrial environment and have been considered:

- Chemical and fuel spills – petroleum hydrocarbons and some chemicals have the potential to kill vegetation, resulting in a loss of habitat or food sources.
- Fires – Fire may result in a loss of vegetation which has the potential to impact important riparian areas, food sources and nesting habitats.

5.5.3.2 Effect Prior to Mitigation

The effect of the potential impacts of accidents and malfunctions events prior to mitigation on the terrestrial environment is predicted to be limited. Because the nature and outcome of unplanned events is difficult to predict the effect was selected based on a worst case scenario in which large scale fire destroyed habitat for the wood turtle and other potential SAR. However, habitats are likely to be restored over time.

5.5.3.3 Mitigation

The following mitigative measures will be employed prior to construction to reduce the potential for the local environment to be impacted by fire:

- The contractor will be responsible for submitting a fire safety plan for the construction site prior to commencement of construction work. The fire safety plan must conform to the National Fire Code of Canada and be submitted to the local fire department. Any comments by local fire department will be implemented by the Contractor.

The following mitigative measures will be employed during the construction and operational phases of the project:

- Rubbish and waste materials will be kept at minimum quantities and burning of this material will be prohibited; and,
- Oily rags will be stored in approved receptacles and disposed of at approved waste facilities.

5.5.3.4 Significance of Residual Effects

With these mitigation measures in place the potential environmental residual effects on the wood turtle and other potential SAR are reduced from limited (pre-mitigation) to negligible.

5.6 Cultural and Heritage Resources Environment

Cultural and heritage resources were selected as a VEC as the subject site has the potential to impact either Native (both Pre-contact and historic) or Euro-Canadian archaeological resources. However, as stated in Section 2.5 the area has been cleared of potential interactions with the exception of the high and moderate potential areas (80 m) from Bear Trap Brook. Horizontal directional drilling will be employed for the effluent line in these high/moderate areas to avoid potential interactions as identified in **Appendix G**. Interactions during the construction and operations phases would be only identified through an unplanned event.

5.6.1 Accidents and Malfunctions

5.6.1.1 Potential Effects

During the construction phase of the project, there is a potential for an unplanned discovery of archaeological artifacts and/or human remains. The following accidents and unplanned events have been considered:

- Potential discovery and destruction or alteration of all or part of an archaeological resource; and,

- Potential discovery of human remains.

5.6.1.2 Mitigation

The following mitigative measures will be employed prior to construction to reduce the potential for destruction or alteration of an archaeological resource or human remains:

- Construction crews will be made aware of the potential for archaeological resources within the construction area.
- The contractor will be educated on the proper mitigative activities if an archaeological resource or human remains are unearthed.

The following mitigative measures will be employed during the construction phase of the project if archaeological resources are unearthed:

- Work in the area must cease immediately and Archaeological Services New Brunswick (ASNB) will be contacted at (506) 453-3014 for further mitigation.
- Until a qualified archaeologist arrives at the scene, no one shall disturb, move or rebury any uncovered artifact.
- Construction at the site may resume only when authorized by ASNB and once mitigative measures have been completed.

The following mitigative measures will be employed during the construction phase of the project if human remains are found:

- Work in the area must cease and the RCMP should be immediately notified.
- No one shall disturb, move or rebury any uncovered human remains.
- If it is a suspected First Nations burial site, the Oromocto First Nations should be contacted.

5.6.1.3 Significance of Residual Effects

With these mitigation measures in place, significance of residual effects the potential environmental residual effects of the accidents and malfunctions during the construction phase of the project are rated negligible.

5.7 Socio-Economic Environment

The socio-economic environment of the project including public health and safety, First Nations, labour and economy and land use was selected as a VSC. This VSC has the potential to be affected during both the construction and operational phases of the project by:

- Additional jobs, both short term during the construction phase and long term during the operational phase will be added to the Oromocto economy.

5.7.1 Construction Phase

5.7.1.1 Potential Effects

The socio-economic environment has the potential to be affected by the construction related activities for the WWTP project by:

- Construction of the WWTP is likely to have positive impacts on the local and regional economy in terms of employment. During construction, numerous contractors will be hired to complete the various phases of construction and it is expected that a portion of the construction workforce will be hired locally;
- Construction activities and increased traffic may disrupt the public access to the NB walking trail; and,
- Safety of the public (i.e., military personnel at the Base and general public) is a concern.

5.7.1.2 Effect Prior to Mitigation

The potential effects of the construction of the WWTP on the local socio-economic environment are expected to be limited due to land access disruption but positive due to job creation.

5.7.1.3 Mitigation

The following mitigative measures will be employed prior to construction to reduce the potential for impact on the socio-economic environment;

- A traffic plan will be completed prior to construction;
- Proper signage will be posted to re-direct traffic where necessary;
- Fencing will be installed around the perimeter of the worksite to prior to construction to prevent the public from accessing the project area during construction.

5.7.1.4 Significance of Residual Effects

With these mitigation measures in place the potential environmental residual effects on the socio-economic environment are reduced from limited (pre-mitigation) to negligible.

5.7.2 Operational Phase

5.7.2.1 Potential Effects

The potential effects of the operation of the facility relate to job creation.

5.7.2.2 Effect Prior to Mitigation

The potential effects of the operation of the WWTP on the local socio-economic environment are expected to be insignificant.

5.7.2.3 Mitigation

No mitigation is required.

5.7.3 Accidents and Malfunctions

5.7.3.1 Potential Effects

During all phases of the project, there is a potential for accidents to occur, and some have the potential to impact the local public. The following accidents and unplanned events are more likely to impact the local public and have been considered:

- Chemical and fuel spills – petroleum hydrocarbons and some hazardous chemicals have the potential vertically migrate through surficial soil to the groundwater table beneath the subject site. Due to the presence of the drainage ditch chemicals and petroleum hydrocarbons also have the potential to be collected, preferentially directed and discharged to the adjacent surface water receptors (wetlands and watercourses); and,
- Fire – Smoke from a larger fire may reduce visibility and air quality to the point where the local residents and military users may be affected or at risk.

5.7.3.2 Effect Prior to Mitigation

The effect of the potential impacts of accidents and other unplanned events prior to mitigation on the local public is predicted to be significant. Because the nature and outcome of unplanned events is difficult to predict the significant effect was selected based on a worst case scenario in which an accident or facility malfunction were to occur. This scenario could significantly impact the local public's quality of life.

5.7.3.3 Mitigation

The following mitigative measures will be employed prior to construction to reduce the potential for impact on the aquatic environment:

- An ERP will be completed and detailed in the project EMP and the contractor will be required to provide spill response training to construction personnel;
- The EMP will include an emergency response plan to provide guidance on incidents related to process system failures; and,
- The contractor will be responsible for submitting a fire safety plan for the construction site prior to commencement of construction work. The fire safety plan must conform

to the National Fire Code of Canada and submitted to the Town for review by local fire department. Any comments by local fire department will be implemented by the Contractor.

5.7.3.4 Significance of Residual Effects

With these mitigation measures in place the potential environmental residual effects of the accidents and malfunctions during the operations phase of the project are reduced from significant to negligible.