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NORTHERN PULP
NOVA SCOTIA CORPORATION
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NORTHERN PULP NOVA SCOTIA

ENVIRONMENTAL ASSESSMENT
REGISTRATION DOCUMENT

Replacement Effluent Treatment Facility

January 31, 2019

NOVA SCOTIA ENVIRONMENT
1903 Barrington Street, Suite 2085
Halifax, Nova Scotia
B3J 2P8

Attention: Ms. Helen Yeh
Environmental Assessment Officer

Northern Pulp Nova Scotia Effluent Treatment Facility
Environmental Assessment Registration Document

We respectfully submit the following Registration Document, in accordance with requirements for the Nova Scotia Environmental Assessment Regulations for a Class 1 project, regarding the proposed Replacement Effluent Treatment Facility for Northern Pulp Nova Scotia Corporation, located at Abercrombie Point, Pictou County, Nova Scotia.

We thank Pictou Landing First Nation for their engagement on this significant project. They, and many others, including the Fishermen's Working Group, community members, stakeholders, and all levels of government have provided valuable input and raised important questions. These questions revolved around not only the design of this project, but also frame how to approach major decisions under an environmental assessment.

It is our hope that this document provides the next step in these conversations. The Registration Document describes the project and identifies a proposed approach for construction and operation activities. It presents a balanced approach to achieving a defensible environmental assessment while considering community values, legislative requirements, business operation, and economic impact.

Sincerely,

DILLON CONSULTING LIMITED

Sarah Devereaux, M.Eng., P.Eng., FEC
Partner

SLD:jes
Our file: 17-6461-1300

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Acronyms, Abbreviations

AC CDC	Atlantic Canada Conservation Data Centre
AOX	Adsorbable Organic Halides
ARD	Acid Rock Drainage
AS	Activated Sludge
ASB	Aerated Stabilization Basin
amsl	Above Mean Sea Level
AST	Activated Sludge Treatment
ASTM	American Society for Testing and Materials
ATV	All-Terrain Vehicle
AWWA	American Water Works Association
BAS™	Biofilm Activated Sludge™
BCTMP	Bleached Chemi-Thermo Mechanical Pulp
BHETF	Boat Harbour Effluent Treatment Facility
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
$CaCO_3$	Calcium Carbonate
CAO	Chief Administrative Officer
CAPP	Canadian Association of Petroleum Producers
CCME	Canadian Council of Ministers of the Environment
CDWQG	Canadian Drinking Water Quality Guidelines
CEAA, 2012	Canadian Environmental Assessment Act, 2012
CEA Agency	Canadian Environmental Assessment Agency
CEPA	Canadian Environmental Protection Act
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalents
COD	Chemical Oxygen Demand
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRA	Commercial, Recreational or Aboriginal (in relation to fisheries)
CSA	Canadian Standards Association
DAS	Disposal at Sea
DDT	Dichlorodiphenyltrichloroethane
DFO	Fisheries and Oceans Canada (Department of)
DO	Dissolved Oxygen
DU	Ducks Unlimited
EA	Environmental Assessment
EARD	Environmental Assessment Registration Document
ECCC	Environment and Climate Change Canada
ECF	Elemental Chlorine Free
EEM	Environmental Effects Monitoring
EMP	Environmental Management Plan
EMS	Environmental Management System

EPP	Environmental Protection Plan
EPS	Extracellular Polysaccharides
ERCP	Emergency Response and Contingency Plan
EQS	Environmental Quality Standards
ETF	Effluent Treatment Facility
FAC	Facultative
FACU	Facultative Upland
FACW	Facultative Wetland
FWAL	Fresh Water Aquatic Life (CCME guidelines)
GHG	Greenhouse Gases
GIS	Geographic Information Systems
GLC	Ground-Level Concentrations
GNS	Government of Nova Scotia
GPS	Geographical Positioning System
GSL	Gulf of St. Lawrence
H_2S	Hydrogen Sulphide
HDD	Horizontal Directional Drilling
HDPE	High Density Polyethylene
HVAC	Heating, Ventilation, Air Conditioning
IA	Industrial Approval
IBA	Important Bird Area
iBoF	Inner Bay of Fundy population (in reference to Atlantic salmon)
ISO	International Organization for Standardization
LAA	Local Assessment Area
Leq	Sound Level Equivalent
LFA	Lobster Fishing Area
Lmax	Sound Level Maximum
MAL	Marine Aquatic Life (CCME guidelines)
MBBA	Second Atlas of Breeding Birds of the Maritime Provinces (Maritime Breeding Bird Atlas)
MBBR	Moving Bed Biofilm Reactor
MBCA	Migratory Birds Convention Act
MBR	Migratory Birds Regulations
MEKS	Mi'kmaq Ecological Knowledge Study
MLA	Member of Legislative Assembly
NAAQO	National Ambient Air Quality Objective
NAD	North American Datum
NBSK	Northern Bleached Softwood Kraft
NCNS	Native Council of Nova Scotia
NPNS	Northern Pulp Nova Scotia
N_2O	Nitrous oxide
NO_X	Nitrogen oxides
NO	Nitrogen monoxide
NO_2	Nitrogen dioxide
NPA	Navigation Protection Act
NRC	National Research Council
NS	Nova Scotia

NSCSR	Nova Scotia Contaminated Sites Regulations
NSDLF	Nova Scotia Department of Lands and Forestry
NSDNR	Nova Scotia Department of Natural Resources
NSE	Nova Scotia Environment (Department of)
NS ESA	Nova Scotia Endangered Species Act
NSTIR	Nova Scotia Department of Transportation and Infrastructure Renewal
NSWA	Nova Scotia Wildlife Act
NWWG	National Wetland Working Group
O_3	Ozone
OAA	Office of Aboriginal Affairs
OBIS	Ocean Biogeographic Information System
OBL	Obligate
PAH	Polycyclic Aromatic Hydrocarbons
PDA	Project Development Area
PFA	Project Footprint Area
PIC	Public Information Centre
PID	Parcel Identification (number)
PIRI	Partnership in Risk-Based Corrective Action Implementation (Atlantic)
PLFN	Pictou Landing First Nation
PM10	Particulate matter 10 micrometres or less in diameter
PM2.5	Fine particulate matter (particulate matter 2.5 micrometres or less in diameter)
POL	Petroleum, Oil or Lubricants
PPE	Personal Protective Equipment
PPER	Pulp and Paper Effluent Regulations (under the Fisheries Act)
PRP	Premium Reinforcement Pulp
RAA	Regional Assessment Area
RAS	Return Activated Sludge
RBCA	Risk Based Correction Action
RBSLs	Risk-Based Screening Levels
RCNM	Roadway Construction Noise Model
ROW	Right of Way
SAR	Species at Risk
SARA	Species at Risk Act
SES	Significant Ecological Area
SBS	Styrene Butadiene Styrene
sCOD	Soluble Chemical Oxygen Demand
SES	Sites of Ecological Significance
SO_X	Sulphur Oxides
SO_2	Sulphur Dioxide
SOCC	Species of Conservation Concern
SWPP	Source Water Protection Plan
TBD	To Be Determined
TC	Transport Canada
TDS	Total Dissolved Solids
TEU	Total Equivalent Units
TN	Total Nitrogen

TP	Total Phosphorus
TPH	Total Petroleum Hydrocarbons
TRS	Total Reduced Sulphur
TSP	Total Suspended Particulate
TSS	Total Suspended Solids
UKP	Unbleached Kraft Pulp
UPL	Upland
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UTM	Universal Transverse Mercator
VEC	Valued Environmental Component
WAM	Wet Areas Mapping
WAS	Waste Sludge
WESP-AC	Wetland Ecosystem Services Protocol-Atlantic Canada
WHMIS	Workplace Hazardous Materials Information System
WMA	Wildlife Management Area
WMP	Waste Management Plan
WWTF	Wastewater Treatment Facility(ies)

MEASUREMENT UNITS

%	Percent
°C	degree(s) Celsius
1-hour Leq	mean hourly equivalent (sound levels)
µS/cm	microSiemen(s) per centimetre
µg/L	microgram(s) per liter
cm	centimetre(s)
dB	decibel (s)
dBA	A-weighted decibels
g/s	grams per second
ha	hectare(s)
Hz	Hertz
kHz	kilo Hertz
km	kilometre(s)
km/hr	kilometer(s) per hour
L	Litre(s)
L/m^2	Litre(s) per square metre
L/min	Litres per minute
Lp90	90th percentile (sound levels)
m	metre(s)
m^3	cubic metre(s)
m^3/d	cubic metre(s) per day
m/s	metre(s) per second
mg/L	milligrams per litre
mm	millimeter(s)

Mt CO_2eq	metric tonnes as CO_2-equivalents
T/d	tonne(s) per day
TCU	true colour unit(s)

Definitions

Activated Sludge	A biological wastewater treatment process that uses aeration and a biological flocculant composed of bacteria, fungi and protozoa to remove organic (carbonaceous) pollution from wastewaters. The term 'activated' comes from the fact that a good portion of the settled biological flocculants, after treatment, are returned to the beginning of the treatment process to "activate" it, thereby beginning the process again.
Aeration Basin	A holding and/or treatment pond provided with artificial aeration to promote the biochemical oxidation of wastewaters.
Airshed	The atmospheric environment above a defined reference area.
Anadromous	Describes the migration pattern of certain fish, such as Atlantic salmon, that spend most of their life in oceanic waters before travelling to reproduce in the upper reaches of rivers and streams.
Anthropogenic	Resulting from the influence of humans on nature.
Aquifer	A geological formation, group of formations or part of a formation that contains sufficient saturated permeable material to yield economical quantities of groundwater to wells or springs.
Avian	Pertaining to or derived from birds.
Background Sound	All-encompassing sound of a given environment without the sound source of interest.
Baseline	The environmental conditions prior to initiating construction of the project.
Bedrock	A general term for rock that underlines soil or other unconsolidated material.
Benthic	Of, or relating to, the bottom or floor of a water body.
Bioaccumulation	A term used to describe the process by which chemicals are accumulated in the tissues of an organism directly from exposure to water or soil.
Biodiversity	The number and variety of organisms found within a specified geographic region.
Biota	The organisms, including animals, plants, fungi, and micro-organisms, found in a given area.
Blasting	The process of reducing a solid body, such as rock, to fragments by using an explosive. Conventional blasting operations include (1) drilling holes, (2) placing a charge and detonator in each hole, (3) detonating the charge, and (4) clearing away the broken material.

Catadromous	Describes the migration pattern of certain fish, such as American eel, that spend most of their life in freshwater before travelling to deep oceanic waters to reproduce.
Clarification	The removal of fibres and other easily settle-able solids prior by conventional gravity separation.
Climate	The statistical averages of precipitation, temperature, humidity, sunshine, wind velocity, and other phenomena such as fog, frost and hail storms for a particular region and time period, generally taken over a 30 year period.
Climate Change	Changes in the earth's climate, which can be caused both by natural forces and human activities. Most commonly associated with global warming and the global greenhouse effect, which highlight discernable changes to the earth's climate, (i.e., increasing temperatures, due to man-made activities and processes).
Commercial, Recreational, and Aboriginal Fisheries	Fish that are part of commercial, recreational or Aboriginal fisheries are interpreted to be those fish that fall within the scope of applicable federal or provincial fisheries regulations, as well as those that can be fished by Aboriginal organizations or their members for food, social or ceremonial purposes or for purposes set out in a land claims agreement. The prohibition against "serious harm" to fish applies to fish and fish habitat that are part of or support commercial, recreational or Aboriginal fisheries.
Compensation	A mitigation method that counterbalances or makes up for an adverse effect.
Construction Phase	The phase of the Project when Project components will be built.
Contaminant	A biological, chemical, physical or radiological substance that becomes harmful for humans or living organisms, when accidentally or deliberately introduced to air, water, soil or food.
Contingency Plan	A set of predetermined actions to be taken in the advent of an accident, malfunction, or unplanned event.
Cumulative Environmental Effects	The environmental effects on the environment, over a certain period of time and distance, resulting from the environmental effects of the project when combined with those of other past, present, or reasonably foreseeable future projects or activities.
Cyprinid	Soft-finned, mainly freshwater fishes typically having toothless jaws and cycloid scales. Fish belonging to the family Cyprinidae, which includes carp and minnows.
Deciduous	Refers to trees that shed all leaves annually, and having a dormant period without leaves.
Decommissioning Phase	The phase of a project during which the proponent permanently ceases commercial production and commences removal from service of any components of the project, and that continues until the site is restored.
Deleterious Substance	A substance that is dangerous and harmful.

Detailed (Engineering) Design	The process of and result from refining and expanding the preliminary design of a system or component to the extent that the design is sufficiently complete to be implemented.
Diadromous	Fish that spend portions of their life cycles partially in fresh water and partially in salt water.
Diffuser	A device for utilizing part of the kinetic energy of a fluid passing through a machine by gradually increasing the cross-sectional area of the channel or chamber through which it flows so as to decrease its speed and increase its pressure.
Dilution	The process of making weaker or less concentrated.
Disturbance	A temporary or permanent alteration of the physical structure or arrangement of biotic and abiotic elements.
Diurnal	Relating to or occurring in a 24-hour period; daily.
Dredge(ing)	To deepen a portion (e.g., trench) of a waterbody with a machine that removes earth, usually by buckets on an endless chain or a suction tube.
Ecosystem	A spatially defined system including all biological organisms and abiotic media.
Effluent	As defined under the Fisheries Act Pulp and Paper Effluent Regulations, effluent includes waste water from a mill, other than waste water from the treatment of intake water, including process water, gas scrubbing water, boiler blow-down water, wash-down water, cooling water, leachate from any site at the mill where solid residues generated by any mill are treated or disposed of, and leachate from any site at the mill where wood chips or hogfuel are stored.
Emergency Response and Contingency Plan	A plan that describes roles, decision-making and communication processes, expertise and capacity so that the response to an environmental emergency is quick and effective.
Emissions	Technically, all solid, liquid, or gaseous discharges from equipment or facility, but normally referring to gaseous and particulate air emissions (typically solids are referred to as residue and liquids as effluent).
Endangered	A species facing imminent extirpation or extinction.
Engineered	Designed and built using scientific principles.
Environment	As defined under Nova Scotia's Environment Act, environment means "the components of the earth, including: (i) air, land and water, (ii) the layers of the atmosphere, (iii) organic and inorganic matter and living organisms, (iv) the interacting natural systems that include components referred to in subclauses (i) to (iii), and (v) for the purpose of environmental assessments, the socio-economic, environmental health, cultural and other items referred to in the definition of

	environmental effect."
Environmental Assessment	A process by which the environmental effects of an undertaking are predicted and evaluated and a subsequent decision is made on the acceptability of the undertaking.
Environmental Effect	As defined under Nova Scotia's Environment Act, environmental effect means: (i) Any change, whether negative or positive, that the undertaking may cause in the environment, including any effect on socio-economic conditions, on environmental health, physical and cultural heritage or on any structure, site or thing including those of historical, archaeological, paleontological or architectural significance, and (ii) any change to the undertaking that may be caused by the environment, whether the change occurs inside or outside the Province.
Environmental Management Plan	Environmental Management Plans (EMPs) outline the environmental protection measures to be implemented on the project to eliminate or reduce environmental effects. These procedures include performance-based environmental requirements in accordance with regulatory approvals, best management practices (BMPs), and engineering specifications.
Environmental Effects Monitoring	In the context of this project, Environmental Effects Monitoring (EEM) is a science-based performance measurement tool used to evaluate the adequacy of effluent regulation in protecting fish, fish habitats and the usability of fisheries resources. Normally refers to studies of fish and benthic invertebrate communities to determine if they are experiencing lethal or sub-lethal effects from exposure to effluent.
Environmental Quality Standards	Environmental quality standards are the "measuring stick" against which the acceptability of the presence and concentration of substances in soil, surface water, ground water, vapour and sediment are determined. They help improve the assessment of the quality of the environment.
Environmental Protection Plan	A practical tool that describes the actions required to minimize environmental effects before, during and after project implementation. The Environmental Protection Plan may include details about the implementation of the mitigation measures identified in the environmental assessment, such as who is responsible for implementation, where the measures are intended to be implemented, and within what timeframe.
Estuary	That part of a river or stream or other body of water having unimpaired connection with the open sea, where the sea water is measurably diluted with freshwater derived from land drainage. The estuarine environment is typically defined as the aquatic environment where a river meets the sea.
Existing Conditions	Existing conditions are studied as part of the environmental assessment process to understand baseline conditions against which to assess anticipated environmental change. See "Baseline" definition.
Extinction	In biology and ecology, extinction is the ceasing of existence of a species or group of

	taxons. The moment of extinction is generally considered to be the death of the last individual of that species.
Extirpation	To eliminate completely from a region.
Fauna	Animal species.
Feedstock	A raw material required as an input to an industrial process.
Fish	Under Section 2 of the Fisheries Act, includes: (a) parts of fish, (b) shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and (c) the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals.
Fish Habitat	As defined under the Fisheries Act, fish habitat includes the spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.
Flora	Plant species.
Forage	The act of looking or searching for food or provisions.
Fossils	Preserved traces or remains of a pre-existing organism of a past geologic age.
Geotechnical Studies	Below-ground investigation by boring, sampling, and testing the soil strata to establish its compressibility, strength, and other characteristics likely to influence a construction project, and to prepare a subsurface profile and soil report.
Greenhouse Gases (GHGs)	Gaseous compounds that inhibit the release of heat from the atmosphere. The primary greenhouse gases considered in this project are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O).
Hazardous Material	A hazardous material is any item or agent (biological, chemical, radiological, and/or physical), which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.
Headwater	A small stream which is the most distant point from the river mouth in the drainage basin from which the surface water flows.
Herptile	A reptile or amphibian.
Hydric Soils	Soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part.
Hydrogeology	Study of the properties, distribution and circulation of water below the ground surface.
Hydrology	Study of the properties, distribution and circulation of water on the ground surface.
Hydrophytic Vegetation	Plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.
Horizontal	A construction technique whereby a tunnel is drilled under a waterway or other

Directional Drilling	designated area, and a pipeline or other utility is pulled through the drilled underground tunnel.
Important Bird Area	Discrete sites that support specific groups of birds: threatened birds, large groups of birds, and birds restricted by range or by habitat.
Industrial Development	The production of goods or related services within an economy, typically of a large scale (e.g. manufacturing and natural resources extraction).
Infiltration	The movement of water from the land surface into the soil.
Intertidal	The region between the high tide mark and the low tide mark.
Invertebrates	Animals lacking a backbone or spinal column.
Lift station	Sewage/wastewater lift stations, also called pump stations, are used for pumping wastewater or sewage from a lower to higher elevation, particularly where the elevation of the source is not sufficient for gravity flow and/or when the use of gravity conveyance will result in excessive excavation and higher construction costs.
Linear Facility	Linear infrastructure including roads, railroads, pipelines, conveyors, and power supply lines.
Local Assessment Area	The local assessment area is the maximum area within which environmental effects from the project activities and components can be predicted or measured with a reasonable degree of accuracy and confidence (i.e., the zone of influence of the project's releases or footprints on the surrounding environment)
Microclimate	A local set of atmospheric conditions that differ from those in the surrounding areas, often with a slight difference but sometimes with a substantial one. The term may refer to areas as small as a few square metres (e.g., a garden bed or a cave) or as large as many square kilometres.
Mitigation	With respect to a project, refers to the elimination, reduction or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means.
Mixing Zone	In the context of this project, refers to the marine area within a 100 m distance from the termination of the effluent pipeline.
Monitoring	Periodic or continuous surveillance or testing to determine the characteristics of a substance or the level of compliance with statutory requirements and/or contaminant levels in various media or in humans, plants, and animals.
Moving Bed Biofilm Reactor (MBBR)	MBBR is a biological wastewater treatment process that uses engineered polyethylene carriers (media) to create a large protected surface on which biofilm can attach. The media is mixed in the reactor, and the large surface area provides more treatment capacity in a smaller volume compared to conventional treatment methods.
Neap Tide	A less than average tide occurring near the first and third quarters of the moon cycle.

Noise	Noise is defined as unwanted, undesired, or unpleasant sound.
Non-vascular plant	Non-vascular plants include mosses, hornworts and liverworts, and some algae. They are generally small plants limited in size by poor transport methods for water, gases and other compounds. They reproduce via spores rather than seeds and do not produce flowers, fruit or wood.
Northern Bleached Softwood Kraft	Northern Bleached Softwood Kraft (NBSK) pulp in its finished form is made up of long slender fibres that provide excellent bonding and tensile properties. NBSK pulp is used for manufacturing a variety of paper products including printing and writing paper, specialty grades and a range of tissue products.
Omnivorous	Feeding on both animal and plant tissues.
Open Cut Crossing (watercourse)	A construction method for pipes crossing watercourses. The pipe trench is excavated and backfilled using either a backhoe, excavator or dredging equipment in the stream channel.
Open Cut Crossing (road)	A construction method for pipes crossing roadways, where a trench is excavated across the road.
Operation and Maintenance Phase	The phase of the project during which the commercial production takes place, including periods during which commercial production may temporarily cease, and that continues until the start of decommissioning.
Outfall	In the context of the project, outfall describes the location where the effluent pipeline terminates, and treated effluent is released into the Northumberland Strait.
Overburden	Material in the top layer of the earth's surface.
Parameter	A variable that defines a system and can be varied in an experiment to determine its behaviour.
Potable Water	Water that is fit for drinking by humans and animals.
Project Footprint Area	The geographic area covered by the proposed development. The area includes the maximum extent of all temporary and permanent areas of ground and marine disturbance.
Rare Plants	Rare plants may be scarce because the total population of the species may have just a few individuals, or be restricted to a narrow geographic range, or both. Some rare plants occur sparsely over a broad area.
Raw Water	Untreated freshwater.
Reach (fisheries context)	In the context of this project, a reach is a section of watercourse of defined length (usually 100 m) in which fish and fish habitat surveys are completed, and water quality measurements are taken.
Receiving Water Study	A study that provides short-term and long-term information on potential effluent-related patterns in effluent receiving streams in different ecoregions, system types (warm or coldwater), instream effluent concentration gradients, and mill process types.

Regional Assessment Area	In the context of this project, the regional assessment area is defined as the area within which potential cumulative environmental effects are assessed.
Residual Environmental Effect	An environmental effect that remains, or is predicted to remain, even after mitigation measures have been applied.
Return Activated Sludge	Settled activated sludge that is collected in the secondary clarifier or the membrane basin and returned to the aeration basin to mix with incoming raw or primary settled wastewater.
Right of Way	A term used to describe the legal right, established by usage or grant, to pass along a specific route through grounds or property belonging to another.
Run-off	The portion of precipitation that does not infiltrate into the ground surface and flows to surface water bodies.
Salmonid	A species of fish belonging to the family Salmonidae – a group of fish including salmon and trout.
Scour	To clear, dig, or remove by a powerful current of water.
Secure species	A secure species is one that is listed or known to be secure (including those designated S4 or S5 by AC CDC, or designated as “Secure” by NSDNR).
Sediment	Fragmented material from weathered rocks and organic material that is suspended in, transported by and eventually deposited by water or air.
Serious Harm	For the purposes of the Fisheries Act, serious harm to fish is the death of fish or any permanent alteration to, or destruction of, fish habitat.
Shovel Test Pit	Typically, a 50 cm by 50 cm hand dug hole, dug in areas of elevated archaeological potential, to confirm the presence or absence of archaeological materials.
Significance	A defined threshold of acceptability. The significance of adverse environmental effects is determined by a combination of scientific data, regulated thresholds, standards, social values and professional judgment. For example, the ecological context of a project may be a determinant of whether likely adverse effects are significant.
Significant Ecological Area	Ecologically and Biologically Significant Areas (EBSAs) are spatially defined areas that provide important services - either to one or more species or populations in an ecosystem, or to the ecosystem as a whole.
Sites of Ecological Significance	Fragile, relatively undisturbed ecosystems such as relict old-growth forest, sand dunes, river floodplains, coastal islands, lakeshores, and estuaries.
Source Water Protection Plan	A plan to ensure a safe source water supply by preventing drinking water problems from developing.
Species at Risk	An extirpated, endangered or threatened species or a species of special concern.

Species Rank	A provincial rarity ranking assigned for the purpose of setting protection priorities for a species and/or ecological community. This ranking system is used by conservation data centres (CDCs) and natural heritage programs.
Spill	An accidental release.
Spill Basin	In the context of this project, the spill basin will hold effluent in the event of a shutdown of the system when material currently in the treatment process would be shunted to the spill basin for holding until operations resumed, at which time the effluent would be pumped back into the ETF system to continue treatment. The spill basin will be constructed from an earthen berm lined with an impermeable barrier.
Spring Tide	Tide with large amplitude occurring twice per lunar month, near full moon and new moon.
Staging Area	A construction staging area is a physical location used for the storage of construction related equipment and materials such as vehicles, temporary office trailers, piping and stockpiles.
Standpipe	A high vertical pipe or reservoir that is used to secure a uniform pressure in a water-supply system.
Threatened	A wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.
Topographic	The configuration of a surface including its relief and the position of its natural and man-made features.
Treated Effluent	For the purposes of this project, waste water from a mill (other than waste water from the treatment of intake water, including process water, gas scrubbing water, boiler blow-down water, wash-down water, cooling water, leachate from any site at the mill where solid residues generated by any mill are treated or disposed of, and leachate from any site at the mill where wood chips or hogfuel are stored) that has been through the secondary clarifiers of the ETF following biological treatment.
Trench	Typically, a long and narrow, steep-sided hole (ditch) that is dug into the ground.
Valued Environmental Component	An element of the environment that has scientific, economic, social or cultural significance.
Vascular plant	Plants that have specialized tissues for conducting water, including ferns, flowering plants, and conifers.
Vegetation	Plants in general or plants that are found in a particular area.
Untreated Effluent	For the purposes of this project, waste water from a mill that has not been through the AnoxKaldnes BAS™ Biological Activated Sludge process or the Aerated Stabilization Basin Facility (BHETF).

UTM	Universal Transverse Mercator. A mapping grid developed by the National Imagery and Mapping Agency (USA). The globe is divided into numbered zones, and within each zone northing and easting values are used to locate any point on the Earth's surface.
Waste Management Plan	A project document that outlines the activities and methods of waste management from waste generation to final disposal.
Watercourse	A natural or artificial channel through which water flows.
Wetland	Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. Nova Scotia Environment (1989) defines wetlands as "land commonly referred to as marsh, swamp, fen or bog that either periodically or permanently has a water table at, near or above the land's surface or that is saturated with water, and sustains aquatic processes as indicated by the presence of poorly drained soils, hydrophytic vegetation and biological activities adapted to wet conditions".
Wildlife Management Area	Areas designated by the Province of Nova Scotia for the protection of wildlife, such as the Abercrombie Wildlife Management Area.

Executive Summary

The Northern Pulp Nova Scotia (NPNS) pulp mill is located at Abercrombie Point, adjacent to Pictou Harbour in Pictou County, Nova Scotia. Like any Chemical pulp process, NPNS has to return its treated wastewater ('effluent') to the waterway, in this case the Northumberland Strait.

To remain in operation, NPNS must replace the Boat Harbor Effluent Treatment Facility (BHETF) with a new treatment system as the *Boat Harbour Act* will prohibit the use of the existing provincially-owned facility for the receiving and treatment of effluent from NPNS.

The proposed project will consist of building a new effluent treatment facility (ETF) on NPNS property including a pipeline to transport treated effluent to Caribou Harbour. Ultimately, the effluent discharge will be into the Northumberland Strait, as has been the case since 1967 via the existing facility. The installation of a modern engineered diffuser provides an improvement in effluent dispersion. The improvement is such that as unlike the visual impact experienced today, it is anticipated that the effluent plume will not be visible when it reaches the water's surface.

This document is being submitted to Nova Scotia Environment (NSE) to register the project for a Nova Scotia Class 1 undertaking per the Nova Scotia *Environmental Assessment Regulations*. This document includes a description of the proposed components of the project and their locations, an explanation of the reason for the project and considerations of alternatives to the project.

Additionally the document also details methods of construction, operation and maintenance of the equipment along with project-related emissions and wastes. Key standard mitigation measures to be implemented are described. Finally, the document also outlines project planning and management strategies to minimize the environmental effects of the project.

Potential environmental effects are identified and predicted for both the construction and the operation and maintenance phases of the project. The residual environmental effects of each project phase are evaluated as either not significant ("NS"), significant ("S"), with the likelihood of occurrence identified in such cases, or positive ("P"). The environmental effects of accidents, malfunctions and unplanned events as well as cumulative environmental effects of the project in combination with other past, present, or reasonably foreseeable future projects or activities are also assessed. The following table summarizes the studies and the effect of the project.

Table E.1.1-1: Summary of the Significance of Project-Related Residual Environmental Effects

Valued Environmental Component (VEC)	Project Phase		Accidents, Malfunctions, and Unplanned Events	Project Overall
	Construction	Operation and Maintenance		
Atmospheric Environment	NS	NS	NS	NS
Acoustic Environment	NS	NS	NS	NS
Soils and Geology	NS	NS	NS	NS
Surface Water	NS	NS	NS	NS
Groundwater	NS	NS	NS	NS
Freshwater Fish and Fish Habitat	NS	NS	NS	NS
Wetlands	NS	NS	NS	NS
Flora/Floral Priority Species	NS	NS	NS	NS
Terrestrial Wildlife/Priority Species	NS	NS	NS	NS
Migratory Birds and Priority Bird Species/Habitat	NS	NS	NS	NS
Harbour Physical Environment, Water Quality and Sediment Quality	NS	NS	NS	NS
Marine Fish and Fish Habitat	NS	NS	NS	NS
Marine Mammals, Sea Turtles, and Marine Birds	NS	NS	NS	NS
Socio-Economic Environment	NS	NS	NS	NS
Indigenous Peoples' Use of Land and Resources	NS	NS	NS	NS
Marine Archaeological Resources	NS	NS	NS	NS
Terrestrial Heritage Resources	NS	NS	NS	NS
Effects of the Environment on the Project	NS	NS	NS	NS

Notes:
NS = No Significant Residual Environmental Effect Predicted.
S = Significant Residual Environmental Effect Predicted.
L = Residual Environmental Effect is Likely to Occur.
U = Residual Environmental Effect is Unlikely to Occur.
P = Positive Residual Environmental Effect Predicted.

In addition to the table, the document answers several specific concerns and the associated mitigation:

- Water quality has been assessed through modelling of the treated effluent discharge. Through the analysis it has been determined that under 'worse case' conditions water quality at the end of the

mixing zone for the three-port diffuser will reach ambient conditions within less than 2 m from the diffuser in terms of total nitrogen, total phosphorous, TSS, DO, pH, and salinity. Colour will return to baseline conditions within 5 m of the diffuser. Temperature will be within 0.1 °C of background at the end of the 100-m mixing zone.

- An update of NPNS air dispersion modelling was undertaken. The facility is expected to be in compliance with the provincial and federal air quality criteria for both existing and future conditions with the new ETF operational. Follow up and monitoring using Northern Pulp's current regulated source emission testing program will verify the environmental effects predictions.
- It is not predicted that the installation of the pipeline will result in long term serious harm to fish or fish habitat.
- Environmental Effects Monitoring (EEM) and a Follow Up and Monitoring Plan, including toxicity testing of treated effluent and water quality sampling, will be completed to monitor the potential effects of the effluent discharge. In addition, NPNS has had a Toxicity Prevention and Remediation Plan in place for many years which provides a structured approach for addressing treated effluent toxicity problems, should they occur.

In summary, based on the results of this environmental assessment registration with planned mitigation and the implementation of best practices to avoid or minimize adverse environmental effects, the wastewater treatment facility projects effect on the environment during all phases is rated as not significant.

1.0 Introduction

1.1 Project Information

Project Name

This undertaking will be known as the "Northern Pulp Nova Scotia Replacement Effluent Treatment Facility".

Nature of the Undertaking (general)

The project will include a new ETF, effluent transmission pipeline, marine outfall location, and associated ancillary facilities. The ETF will employ a an AnoxKaldnes BAS™ Biological Activated Sludge process purchased from Veolia Water Technologies, which combines Moving Bed Biofilm Reactor (MBBR) technology with conventional activated sludge (AS).

Once treated, effluent will be sent through an approximately 15.5 km long pipeline. The pipeline follows the Highway 106 right-of-way for approximately 11.4 km, and then enters the marine environment adjacent to the Northumberland Ferries marine terminal and continues for approximately 4.1 km through Caribou Harbour to the Northumberland Strait, terminating in an engineered marine outfall.

Public Funding of the Undertaking

At the date of Registration, the Province of Nova Scotia has made contributions to the cost planning and design of the project. The contributions may be off set against any future award Northern Pulp may be granted for damages against the Province in any respect due to early termination of the present BHETF lease.

Project Schedule

Construction will commence pending EA and subsequent/concurrent permitting and approvals (see **Section 3**, Regulatory Environment). The ETF, pipeline, and marine outfall are estimated to be completed, with the system fully operational, within 21 months of construction start in the spring of 2019. Additional schedule detail is provided in **Section 5,** Project Description.

Project Location

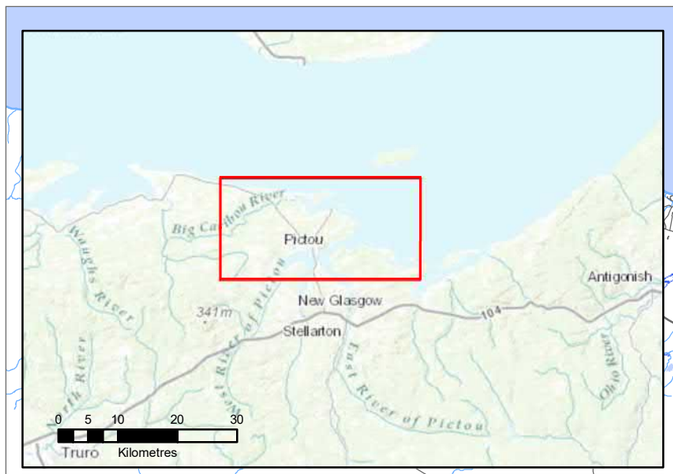
The NPNS pulp mill is located at Abercrombie Point adjacent to Pictou Harbour in Pictou County, Nova Scotia. The replacement ETF will be sited on Parcel Identification (PID) 00864538, which is owned by NPNS. The pipeline will be sited within highway right-of-way (multiple PIDs) and then water lot of Caribou Harbour. Refer to **Table 1.1-1** for a list of PIDs included in the proposed project.

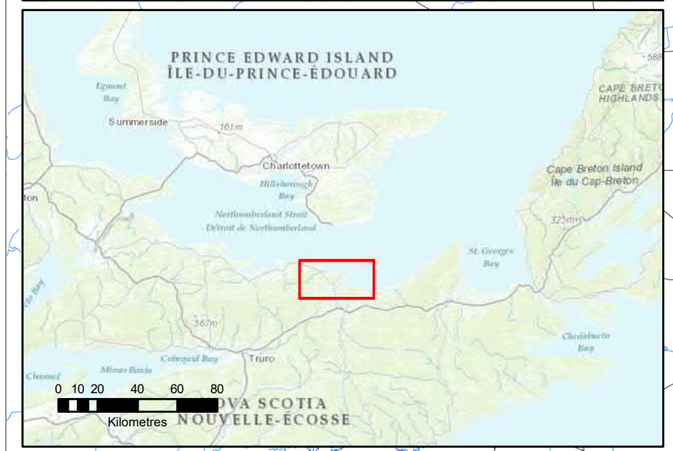
Refer to **Figure 1.1-1** for the project location, the existing NPNS site, and surrounding communities, and **Figure 1.1-2** for the on-land pipeline and outfall setting.

Table 1.1-1: List of PIDs Involved in the Proposed Project

PID	PID Owned By:
00864538	NORTHERN PULP NOVA SCOTIA CORPORATION
65103798	ROAD PARCEL OWNER UNDETERMINED
65106288	PICTOU HABOUR - CAUSEWAY SPILLWAY
65103947	ROAD PARCEL OWNER UNDETERMINED
65095036	ROAD PARCEL OWNER UNDETERMINED
65096851	TOWN OF PICTOU (Jitney Trail)
65095010	ROAD PARCEL OWNER UNDETERMINED
65094971	ROAD PARCEL OWNER UNDETERMINED
65131369	ROAD PARCEL OWNER UNDETERMINED
65094955	TOWN OF PICTOU
65131336	ROAD PARCEL OWNER UNDETERMINED
65094948	ROAD PARCEL OWNER UNDETERMINED
65094930	ROAD PARCEL OWNER UNDETERMINED
65094922	ROAD PARCEL OWNER UNDETERMINED
65094914	ROAD PARCEL OWNER UNDETERMINED
65094906	ROAD PARCEL OWNER UNDETERMINED
65094880	ROAD PARCEL OWNER UNDETERMINED
65131252	ROAD PARCEL OWNER UNDETERMINED
65049850	HER MAJESTY THE QUEEN (CANADA)
65166746	HER MAJESTY THE QUEEN (CANADA)
65166753	HER MAJESTY THE QUEEN (CANADA)
65055139	HER MAJESTY THE QUEEN (CANADA)
65097099	WATERLOT IN CARIBOU HARBOUR

NOTE: "Road Parcel Owner Undetermined" is unofficially identified as Nova Scotia Department of Transportation and Infrastructure Renewal.





Northern Pulp Nova Scotia Corporation

Replacement Effluent Treatment Facility
Environmental Assessment

Site Location Map

Figure 1.1-1

NORTHERN PULP
NOVA SCOTIA CORPORATION
A PAPER EXCELLENCE COMPANY

Approximate Project Footprint Area*
Approximate Outfall Location
Pictou Landing First Nation
Wetland
Open Water
Roads
Watercourse
Rail

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY Northern Pup Nova Scotia, GeoNova, ESRI

MAP CREATED BY: SCM
MAP CHECKED BY: AB
MAP PROJECTION: NAD 1983 UTM Zone 20N

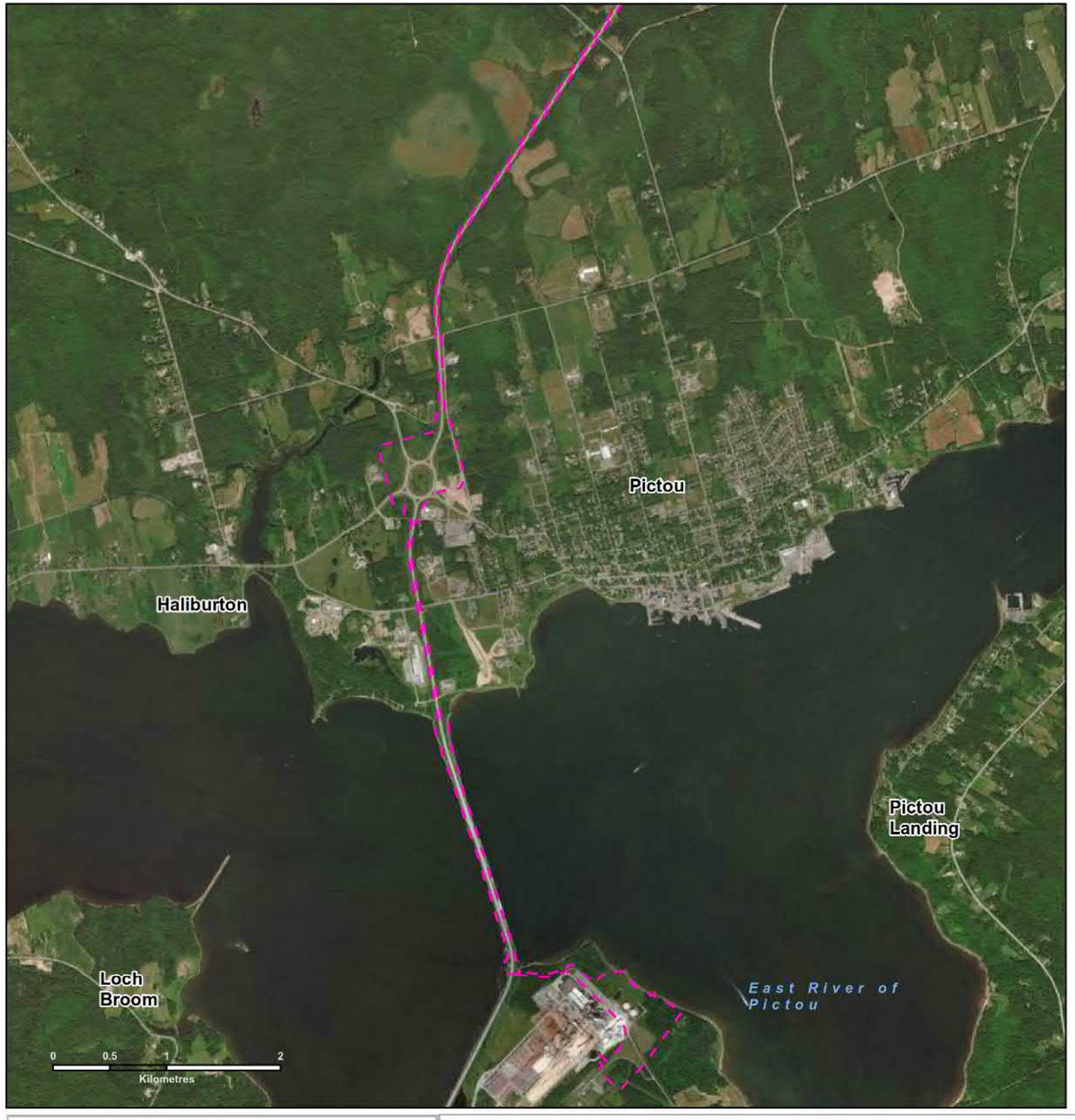
0 0.5 1 2 3 4
Kilometres

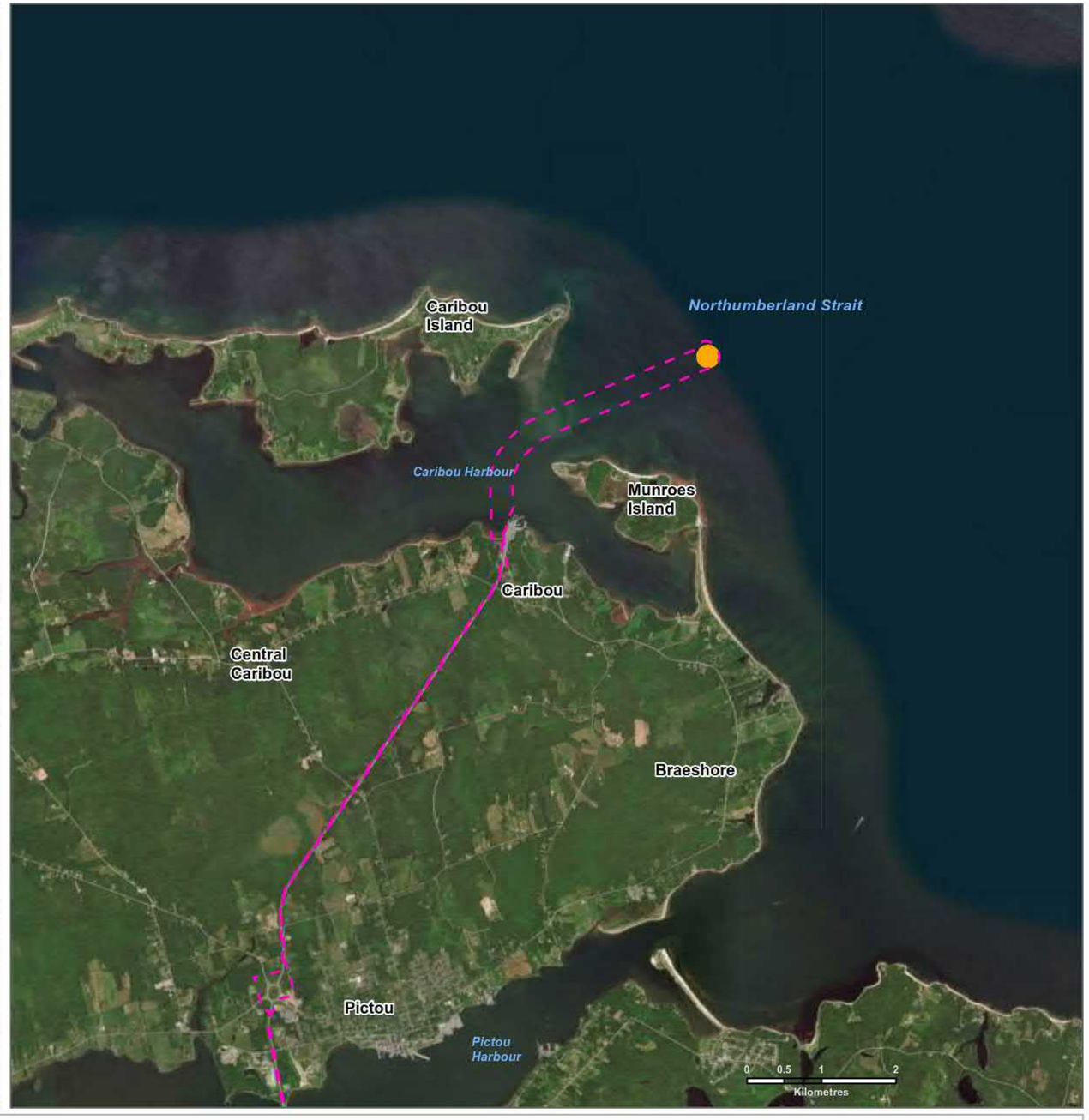
N
W E
S

*Precise Project Footprint to be determined following completion of detailed design

PROJECT: 17-6461

Date: 2019-01-30





Northern Pulp Nova Scotia Corporation

Replacement Effluent Treatment Facility
Environmental Assessment

Outfall Setting
Figure 1.1-2

NORTHERN PULP
NOVA SCOTIA CORPORATION
A PAPER EXCELLENCE COMPANY

Approximate Outfall Location

Approximate Project Footprint Area*

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY Northern Pup Nova Scotia, ESRI

MAP CREATED BY: SCM
MAP CHECKED BY: AB
MAP PROJECTION: NAD 1983 UTM Zone 20N

N
W E
S

*Precise Project Footprint to be determined following completion of detailed design

PROJECT: 17-6461

Date: 2019-01-30

1.2 Proponent Information

Proponent

Northern Pulp Nova Scotia Corporation
Mailing Address:
P. O. Box 549 Station Main
New Glasgow, Nova Scotia
B2H 5E8
Civic Address:
260 Granton Abercrombie Road
Abercrombie, Nova Scotia
B2H 5C6

NPNS Contact
Kathy Cloutier
Director of Communications
902 759 - 7246
kcloutier@paperexcellence.com

Proponent Executive
Bruce Chapman
General Manager
902 752 8461 x 273
bruce.chapman@northernpulp.com

Signed

Appendix A provides the Joint Stock Registration for NPNS.

Environmental Assessment Contact
Sarah Devereaux, P.Eng.
Dillon Consulting Limited
137 Chain Lake Drive
Halifax, Nova Scotia
B3S 1B3
Tel: 902-450-4000
Fax: 902-450-2008
sdevereaux@dillon.ca

1.3 Purpose and Need for the Undertaking

As is typical of pulp mills, NPNS produces wastewater ('effluent') as a by-product of its industrial process. NPNS' effluent is currently treated in the Boat Harbour Effluent Treatment Facility (BHETF). The BHETF is owned by the Province of Nova Scotia and has been operated by NPNS and its predessors under lease since 1996. Prior to 1996, the BHETF was owned and operated by the Province of Nova Scotia.

The project is fundamental to the continued operation of the NPNS mill. The *Boat Harbour Act*, which received Royal Assent on May 11, 2015, will prohibit the use of the provincially owned facility for the receipt and treatment of effluent from NPNS after January 31, 2020. In order for NPNS to remain operational, a replacement ETF is required to treat and dispose of effluent.

The continued operation of the NPNS mill meets global market demands and supports the local and provincial forestry sector. An explanation of how the recommended project was determined (including alternatives to the project, and alternative methods) is documented in **Section 4**, Project Justification and Alternatives Considered.

The project purpose is to provide a new means for treating and disposing of the effluent from the NPNS mill to replace the BHETF.

1.4 Report Organization

Table 1.4-1 identifies the sections of the document where requirements for a Nova Scotia Class 1 Environmental Assessment Registration may be found.

Table 1.4-1: Concordance Table with Nova Scotia Environmental Assessment Registration and Class 1 Requirements

EA Requirement	Location in Document
Name of Undertaking	Section 1.1
Location of Undertaking	Section 1.1
Proponent Name, Address, Identification	Section 1.2
Undertaking Contact	Section 1.2
Signing Authority	Section 1.2
Nature and Sensitivity of Surroundings	Section 8
Purpose and Need of Undertaking	Section 1.3 , Section 4
Proposed Construction and Operation Schedules	Section 5.4
Description/Nature of Undertaking	Sections 1.1 and 5
Environmental Baseline	Section 8
List of Various Authorizations Required	Section 3

EA Requirement	Location in Document
Sources of Public Funding for the Undertaking	Section 1.2
Steps to Identify Public and Aboriginal Concerns about Adverse Effects or Environmental Effects	Section 6
List of Public and Aboriginal Concerns about Adverse Effects or Environmental Effects	Section 6.7
Steps to Address Public and Aboriginal Concerns about Adverse Effects or Environmental Effects Identified	Sections 6.7, Section 14

2.0 Environmental Assessment Approach

The general approach to the EA of the project is discussed in this section, including:

- A brief history of the NPNS mill;
- A brief introduction to EA;
- A general overview of the approach taken for the project EA; and
- A brief description of the environmental planning and management considerations that will be employed throughout the project.

2.1 Background and History of the Project

2.1.1 Ownership

The NPNS mill was built in 1967 by Scott Paper Company. The mill has had several owners over the years, including Kimberly-Clark Corporation and Neenah Paper Company of Canada. Under its current name, Northern Pulp Nova Scotia Corporation, the plant was held by Atlas Holdings and Blue Wolf Capital Management (2008), prior to its current ownership under Paper Excellence Canada Holdings Corporation (2011).

Since purchasing NPNS in 2011, Paper Excellence has completed several mill improvements to achieve improvements in environmental performance:

- Reduced odorous emissions by more than 90% on average;
- Reduced recovery boiler particulate emissions by 99% on average;
- Reduced mill wide particulate emissions by more than 80% on average;
- Reduced greenhouse gas emissions by replacing fossil fuels with natural gas;
- Reduced organics loading to the effluent so that biological oxygen demand (BOD) is now less than 20% of the federal *Pulp and Paper Effluent Regulations* (PPER); and
- Reduced solids loading to the effluent so that total suspended solids (TSS) is now less than 15% of the federal PPER.

2.1.2 Origins of the Existing Boat Harbour Effluent Treatment Facility (BHETF)

In 1965 the Nova Scotia government envisioned a heavy industrial park in Abercrombie Point. It offered raw water supply and effluent treatment to incentivize incoming industries. Three companies were attracted to the County through these incentives. Scott Paper Company (now NPNS) and Canso Chemicals took advantage of both the raw water supply and the effluent treatment. Michelin Tire opted for the raw water supply only.

The BHETF has been used to treat effluent from the mill facility from 1967 to present. Untreated effluent is currently piped from Abercrombie Point along the bottom of the East River and across land to the BHETF. Many upgrades to the BHETF have occurred since its opening, and are described below. For its

entire 50 year history, the BHETF has discharged into the Northumberland Strait at the outlet of the Boat Harbour estuary.

The BHETF was originally owned and operated by the Province of Nova Scotia. In 1995, NPNS's predecessor took over the operation of the BHETF under a 10 year lease, which was later extended to 2030. Today, the facility is still owned by the province and is operated under lease agreement by NPNS.

In 1967, there was no formal treatment process at ther BHETF as it was believed that nature and time were enough to treat the effluent from the industries using the facility. What is now operated as the BHETF is very different from its original state. Several major changes have occurred over the years improving treated effluent quality leaving the BHETF.

In 1972, the treatment process was significantly modified with the inclusion of settling ponds, an aeration basin and a dam structure to discharge to the Northumberland Strait. Prior to installing the dam in 1972 the Boat Harbour Basin was under tidal influence. Canso Chemicals also used the BHETF from 1972 until the manufacturing operations concluded in 1992. Canso Chemicals was a chlor-alkali electrolysis facility that generated sodium hydroxide, chlorine and hydrogen using a mercury cell process and brine solution.

From 1992 to 1996, the federal government implemented new regulations under the *Fisheries Act* that called for significant improvements to effluent, specifically for the pulp and paper industry. Multiple upgrades were made at the BHETF including: additional aeration, separation curtains in the aeration basin, and the addition of a nutrient feed system to optimize microbiological treatment activity. The effect of these upgrades, along with process improvements at NPNS itself, resulted in significantly improved effluent quality that met, and continues to meet, all applicable regulations.

In 1997, NPNS moved away from elemental chlorine to chlorine dioxide for bleaching to meet new federal *Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations*. The BHETF that exists today operates within all federal and provincial regulations, including for dioxins and furans.

Following upgrades made over the life of the existing facility and considerable improvement in effluent quality, the 'regulatory point' where compliance to federal regulations is measured was changed. As of June 30, 2010, NPNS ceased using the portion of the BHETF known as the Stabilization Basin (Boat Harbour Basin) as an active part of the treatment facility. The regulatory point was instead moved back to the outlet of the aeration stage. **Refer to Figure 2.1-1**.

Figure 2.1-1: Sampling Location for Regulatory Compliance over Time for BHETF

2.1.3 The Boat Harbour Act

The BHETF is owned by the Province of Nova Scotia and has been operated by NPNS and its predessors under lease since 1996. Prior to 1996, the BHETF was owned and operated by the Province of Nova Scotia.

In June 2014, there was a leak of untreated effluent due to a breach in the transmission pipeline from NPNS to the existing BHETF. This leak prompted conversations between the Province and Pictou Landing First Nation (PLFN), eventually culminating in a commitment to close the BHETF and remediate the area.

The introduction of the *Boat Harbour Act*, which received Royal Assent on May 11, 2015, prohibits the use of the provincially-owned facility for the receipt and treatment of effluent from NPNS after January 31, 2020.

This project, necessitated by the *Boat Harbour Act*, proposes a new ETF for NPNS. In order for NPNS to remain operational, a replacement ETF is required to treat and dispose of effluent.

2.2 What is Environmental Assessment?

Enivormental Assessment (EA) is a planning and decision-making process to predict environmental effects of proposed initiatives before they are carried out. The objectives of an EA are to:

- Promote better project planning by identifying potential effects before they occur, at the earliest stages of project development; and
- Incorporate environmental factors into decision making.

An EA identifies potential adverse environmental effects, proposes measures to mitigate adverse environmental effects, predicts whether there will be significant adverse environmental effects after mitigation measures are implemented, and includes a follow-up program to verify the accuracy of the EA and/or the effectiveness of the mitigation measures.

2.3 Context of the EA Registration for the Project

As discussed in **Section 2.1** above, the project has been proposed directly in response to the passing of the *Boat Harbour Act* in May 2015, which will prohibit the use of the provincially-owned BHETF for the receipt and treatment of effluent from the mill after January 31, 2020.

This document provides the content to initiate a Class 1 Nova Scotia EA process for a new replacement ETF, transmission pipeline, and ancillary facilities. The replacement ETF project will be located on NPNS property and will direct treated effluent to the marine environment. In the siting and assessment of the marine discharge, the future tidal state of the Boat Harbour Basin was assumed.

NPNS filed a Supreme Court Appeal of its Industrial Approval (IA) which was updated in 2015. The 2015 IA, anticipating the passing of the *Boat Harbour Act*, contained effluent conditions and conditions specific to a new alternative effluent treatment system that, based on the opinion of NPNS's consultants KSH Solutions Inc. (KSH), Ekono Inc. and Callan Brooks Inc., included unachievable conditions. NSE provided written correspondence in February 2016 removing or clarifying the conditions of particular concern, and the IA appeal was withdrawn.

In 2016, following the resolution of the IA, NPNS embarked on a process to review possible options that could permit them to continue operations following the closure of the BHETF. As discussed further in **Section 4**, various means of treating effluent were considered, including various treatment technologies, conveyance methods, disposal methods, and disposal locations. The alternatives evaluation led to the selection of the project as currently proposed and described in detail in **Section 4**.

Planning and design was undertaken by NPNS with a view to have a new ETF operational to coincide with the closure of the BHETF. In March of 2018 the main equipment vendor for the ETF was selected and engineering activities related to the replacement facility continued. However, engineering concerns with potential for ice scour damage of the pipeline in relation to a proposed marine location (in the Pictou Road area of the Northumberland Strait) prompted the need to consider an alternative outfall location. Considerable evaluation of alternative locations and potential pipeline routes in Pictou Road

and a new location in Caribou were then initiated in June of 2018, leading to an alternative pipeline corridor being identified in the fall of 2018.

The EA Registration process, initiated in late 2017 was paused in June 2018 while NPNS investigated, confirmed and developed alternate outfall plans and then resumed in early fall 2018. There is an expected construction period of approximately 21 months which would begin following the approval of the EA Registration Document and subsequent/concurrent applicable permits and approvals for the project. The new facilities cannot be constructed, commissioned, and operational by the time the existing BHETF is required to cease operations on January 31, 2020. The EA Registration Document (EARD) is being submitted to advance the project by beginning the permitting process and thus to limit the delay of project completion.

Due to the EA Registration submission timing, the study period did not facilitate full biological field assessments for the current proposed transmission pipeline corridor. Field studies were completed on the NPNS property for the ETF in 2017 and 2018. Field studies for the marine environment have been hampered by both seasonal constraints and by physical opposition and obstruction. A land-based site reconnaissance for the revised pipeline corridor was completed in the fall of 2018 but it was not possible to conduct field work in the new pipeline corridor or marine environment in order to inform this EA Registration.

The existing environmental conditions and associated potential environmental effects of the project therefore have been defined based on existing available information from literature and other desktop information sources. Commitments to conduct follow up work to confirm existing environmental conditions, if required, and to inform detailed design are summarized in **Section 13**, based on the results of impact assessments documented in **Section 8**. Follow up field work as appropriate for the work proposed will be completed in parallel to the EA Registration review by Nova Scotia Environment (NSE) and other government agencies, as a measure to confirm the environmental effects predictions. This practice is consistent with federal and other provincial EA processes that occur when environmental conditions cannot be determined due to seasonal challenges, access restrictions, public safety, or other constraints that limit the ability to collect site-specific data.

2.4 The Role of the EA Registration

As described in **Section 2.2** EA is a key instrument for planning and implementing the project in an environmentally-compatible manner. Preparation of the EARD has involved a public, stakeholder and indigenous engagement program, a variety of analyses of potential environmental effects, the development of measures for avoiding or mitigating potentially significant adverse environmental effects, the development of measures to compensate for adverse environmental effects that cannot be avoided or mitigated, and the preparation of this EA Registration for public review and government review and approval.

This work will be supplemented by field data collection programs including in the spring and summer of 2019 as required to complete environmental approvals applications and to verify the environmental effects predictions contained herein. Follow-up work is an integral part of the engineering design and corporate planning for the project so that the EA is both a project planning tool and a government review and decision-making tool. As such, the EA Registration is a key mechanism for implementing sustainable development for the project.

In carrying out the EA Registration, potential environmental effects of the project have been considered for all phases of the project, including those potentially arising from credible accidents, malfunctions and unplanned events. Potential interactions and overlapping environmental effects with other past, present, or reasonably foreseeable future projects or activities have also been considered. The public and stakeholder consultation, and Indigenous engagement undertaken by NPNS, and the input received as part of these activities, has informed the EA Registration and the factors required to be considered as part of it.

The EA Registration is the first milestone in working to obtain project approvals and permitting. The EARD describes the project and identifies a proposed approach for construction and operation activities and associated mitigation and follow-up. It presents a balanced approach to assessing potential environmental effects while also considering community values, legislative requirements, business operation, and economic impact.

2.5 Overview: Environmental Planning and Management Considerations

NPNS is committed to developing the project in an environmentally responsible manner consistent with its environmental policy **(Figure 2.5-1)**. The policy will be updated when the project is completed to reflect inclusion of the proposed project. To this end, NPNS will implement project planning and management strategies that:

- Avoid or minimize the adverse environmental effects of the project, and enhance positive ones;
- Comply with applicable laws and regulations; and
- Consider the presence of the project and the NPNS mill and compatibility with the way of life that the people of Pictou County know and enjoy.

This project will improve environmental conditions in comparison to the conditions related to those of the existing BHETF. Environmental considerations have included:

- Conducting a detailed alternatives assessment of effluent treatment technologies, means, and locations for conveying the treated effluent, and methods and locations for releasing treated effluent to the receiving environment;
- Developing a new modern ETF which,
  - Meets current environmental laws, regulations for release of treated effluent from pulp and paper mills;

  - Includes standard mitigation and best practices for similar projects while considering the local requirements for site-specific mitigation as required;
  - Evaluates the environmental effects of the project during all phases (including cumulative environmental effects) as well as for accidents, malfunctions, and unplanned events;
- Assessment designed with input from the local population, First Nations and stakeholders;
- Implementing technically and economically feasible components and technologies that are proven, and which limit the footprint and visual effects of the project; and
- Implementing progressive environmental protection, mitigation, and management strategies and concepts that avoid or minimize adverse environmental effects, and enhance positive ones.

2.5.1 Design Standards and Codes

The project will be constructed to meet applicable environmental, industrial, building, and safety codes and standards. The engineering design of the project will consider and incorporate potential future changes in the forces of nature that could affect its operation or integrity (e.g., climate change), and project components and infrastructure will be designed and built to adapt to or withstand these effects.

The project components will be designed to meet the federal PPER, the National Building Code of Canada, the Canadian Standards Association, best practices for effluent treatment and pipeline construction, and other design codes and standards. These standards and codes provide factors of safety regarding environmental loading (e.g., snow load, high winds, seismic events), and project specific activities and events. Compliance with these standards and codes reduces the potential for adverse environmental effects as a result of an accident, malfunction or unplanned event. Operation will be conducted under a provincial Industrial Approval for the overall pulp facility.

A listing of applicable regulations for the project is included in **Section 3**.

2.5.2 Environmental Protection Measures

A variety of environmental protection and management measures have been adopted through the development of the project to date in order to guide the planning, design, construction, operation and maintenance, and ultimate decommissioning of the project. These include, but are not limited to, the following measures:

- Siting the project components to avoid sensitive areas such as wetlands, watercourses and important habitat types, where possible, and to reduce the size and number of natural drainages that may be affected;
- Minimizing the “footprint” of project facilities and activities to consequently reduce the amount of disturbed land, wetlands and water resources;
- Siting of the marine outfall to minimize potential impact to marine water quality;
- Employing good planning, design and management practices to comply with regulated standards for air emissions, water releases, storage or disposal of solid wastes, and handling and disposal of hazardous materials;

- Constructing and operating methodologies conducted in a manner consistent with NPNS' Environmental Management System (EMS) which incorporates operational policies and practices for monitoring and management of, for example, land and soil resources, air and water, noise and vibration, hazardous materials and waste, community health and safety, and cultural heritage; and
- Developing and implementing an overall Environmental Management Plan (EMP) and Environmental Protection Plan (EPP) for construction activities that will be included in, and enforced through, construction contracts.

NPNS has emphasized project design and siting so that the location and configuration of the project facilities considers the above measures wherever possible so as to avoid or minimize the potential environmental effects of the project. To the extent possible, project facilities have been sited to avoid and reduce interactions with watercourses, wetlands, areas of elevated archaeological potential, and other sensitive environmental features. Where avoidance was not possible, mitigation or compensation measures have been developed as part of the EA, and will be implemented in consultation with the applicable regulatory authorities.

Further information on planned environmental management strategies and key mitigation to be employed to avoid or reduce environmental effects is provided in **Section 5.7**.

2.5.3 Follow-up and Monitoring Program

A follow-up and monitoring program will be developed as part of the project. The objectives of the program are to:

- Propose follow-up measures that are intended to verify the environmental effects predictions in this EARD or to assess the effectiveness of mitigation, as required;
- Propose environmental monitoring measures aimed at monitoring the project's environmental effects; to demonstrate compliance with environmental acts, regulations, and approvals/permits/authorizations issued for the project; and
- Provide a basis for long-term adaptation to changing environmental conditions occurring naturally or as a result of the project.

The framework for, and proposed elements of, the follow-up and monitoring program for the project as conceived at this planning stage of the project are outlined in **Section 13**. The program will be adjusted as required over the life of the project in response to the results of follow-up or monitoring initiatives, changes in regulatory requirements, or other factors.

NORTHERN PULP
NOVA SCOTIA CORPORATION

Environmental Policy

Northern Pulp Nova Scotia is committed to achieving excellence in environmental management for its pulping operations. Improving environmental performance is a priority and will be achieved by implementing and maintaining good environmental practices. We recognize that the long-term future of our Company and local communities depends on the performance of our operations and care of the environment.

Northern Pulp Nova Scotia will:

- Comply with applicable environmental laws and regulations, and other legal requirements;
- Exercise environmental due diligence by ensuring that the environmental aspects and impacts associated with pulping, utilities and associated operations at facilities located at Abercrombie Point and Boat Harbour are identified, assessed and managed to minimize impact;
- Consider future environmental impacts of contemplated changes to our manufacturing processes;
- Encourage and maintain the involvement, training, participation and full engagement of our employees, to ensure full compliance with our environmental policy;
- Communicate in a transparent and open manner with our employees, contractors and stakeholders;
- Set objectives and targets and review performance annually;
- Commit to continuous environmental improvement leading to a reduced environmental footprint.

Bruce Chapman
General Manager
December 2018

Figure 2.5-1: 2018 NPNS Environmental Policy (to be updated to include the project after construction completion)

3.0 Regulatory Environment

3.1 Environmental Legislative Requirements

In addition to the requirements for a Class 1 EA Registration under the Nova Scotia *Environmental Assessment Regulation* under the *Environment Act*, NPNS is committed to adherence with applicable municipal, provincial and federal regulatory requirements. Approvals/permits required will be obtained prior to construction and operation, as applicable. **Table 3.1-1** provides a summary of potential key regulatory requirements and their applicability to this project. Key environmental regulatory requirements are discussed further below. It is noted that consultation with the regulatory authorities in parallel to and following the EA registration will confirm specific requirements.

Table 3.1-1: **Potentially Relevant Environmental Legislative Requirements Applicable to the Project**

Legislation	Summary of Applicability	Potential Need for Approval/Permit
FEDERAL		
Canadian Environmental Assessment Act (CEAA)	Project is not listed under the Regulations Designating Physical Activities, however Sections 67-72 requires that, for any project occurring on federal lands, the federal authority responsible for administering those lands or for exercising any power to enable the project to proceed must make a determination regarding the significance of environmental effects of the project. It is the responsibility of the federal authority to make and document this determination.	Section 67 assessments will be required by federal authorities in relation to the federal lands including the outfall and associated approvals. (The requirement for further EA review is being considered by Canadian Environmental Assessment Agency.)
Canadian Environmental Protection Act (CEPA) – Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations	Pollution prevention requirements and direction on priority substances and deleterious substances to be met where applicable.	No approval required. Monitoring and prohibitions will be met by the project.
CEPA - Disposal at Sea (DAS) regulations	Pollution prevention requirements and direction on priority substances and deleterious substances to be met where applicable.	Potential DAS permit (may be required if ocean based disposal of dredge material is required during construction of the marine pipeline).
Fisheries Act	Section 35 – Prohibition against "serious harm" to fish that are part of a commercial, recreational or Aboriginal fishery, or fish that support such a fishery.	To be determined (TBD) if "serious harm" is anticipated (Department of Fisheries and Oceans Canada (DFO) determination required).
Fisheries Act –PPER	Section 36 – Prohibition of deposition of deleterious substance. NPNS is required to meet the PPER, which sets limits on	No (requirements are defined by regulation, no site-specific approvals or permits required).

Legislation	Summary of Applicability	Potential Need for Approval/Permit
	maximum deposits of TSS/BOD. PPER does not allow deposits of effluent acutely lethal to fish, and contains requirements for environmental effects monitoring (EEM). Authorizations may be requested for exceeding maximum specified concentrations or for combining treated effluent with other effluent.	
Fisheries Act – Marine Mammal Regulations	Protection of marine mammals.	No. Prohibitions on killing/disturbance to be met.
Migratory Birds Convention Act (MCBA) and regulation (MBR)	Protection of migratory birds, nests, eggs and young. Prohibition related to deposit of substances harmful to migratory birds. Authorizations or permits are required to destroy or take a migratory bird nest or to be in possession of a live bird/nest/egg or a carcass.	No, assuming prioritizing clearing outside of nesting season and marine construction timed appropriately. If timing above not possible, mitigation and approval as required from Environment and Climate Change Canada – Canadian Wildlife Service (ECCC-CWS).
Navigation Protection Act (NPA)	Potential triggers are activities that may interfere with navigation – e.g. construction activities and presence of the outfall and pipe. The Atlantic Ocean is a Scheduled Water under NPA.	Permit likely required. Consultation with TC (Navigation Protection Program) required to confirm and approval as required prior to construction in the marine environment.
Transportation of Dangerous Goods Act and Regulations	Documented handling, storage, emergency response requirements for transportation of dangerous goods, if to be used on-site either for construction or operation, to be met.	No permits required. All carriers will be in compliance with the Act and Regulations.
PROVINCIAL		
Boat Harbour Act	Is part of project rationale.	Act does not directly apply to the new facility.
Environment Act and Regulations, Environmental Assessment Regulation	Project requires Ministerial Approval.	Yes.
Environment Act and Regulations, Activities Designation Regulations	Section V permits– construction of treatment facility and outfall pipe	Yes.
	Industrial Approval (IA) – the ETF will be operated following the overall IA for the NPNS operation. Wetland or Watercourse Alteration.	Not specifically for the ETF component but is an overall facility requirement. Yes.

Legislation	Summary of Applicability	Potential Need for Approval/Permit
	Construction related for on-site fuel storage; sewage disposal; or water withdrawal.	To be determined by contractor.
Environment Act and Regulations, Contaminated Sites Regulations	Requirements for contaminated sites on provincial land (no contaminated sites identified). Applicable regulations will be adhered to if contaminated sites are identified during construction.	Not currently anticipated.
Environment Act and Regulations, Petroleum Management Regulations	Petroleum storage requirements to be met as applicable.	Not specific to the project.
Environment Act and Regulations, Environmental Emergency Regulations	To meet requirements if environmental emergency occurs.	No.
Endangered Species Act (NS ESA)	Protection of listed species (impacts to listed species not identified for project).	Not currently anticipated.
Wildlife Act (NSWA)	Among other wildlife management requirements; prohibits killing of raptors, or disturbance of bird and turtle nests (turtle nests not identified for property, however contingency planning in place).	No (assuming prioritizing clearing outside of nesting season for both birds and turtles). If timing above not possible, mitigation and approval as required by ECCC-CWS or provincial regulators.
Special Places Protection Act	Heritage Research Permits are required for archaeological assessment work.	Yes.
Forests Act – Forest Fire Protection Regulations	Requirements for fire suppression equipment for operations in forests to be met.	No.
Sulphide Bearing Material Regulations	If within an area of sulfide-bearing material notification and approval required.	Not currently anticipated.
Dangerous Goods Transportation Act and Regulations	Requirements for safe transport of dangerous goods to be met if applicable.	No permits required. All carriers will be in compliance with the Act and Regulations regarding placards and training.
Other Permitting/Approvals Various non-environmental permits/approvals may be applicable including those noted below.		
Labour Standards Codes, Building Code	Applicable labour requirements and building codes to be met.	No.
Nova Scotia Crown Lands Act and Regulations (Beaches Act)	Crown land easements, leases and licences. Although the land portion of the ETF is on private land; leases or right-of-way agreements will be required for the pipeline/outfall. Beaches Act permit could be required if removal of sand, gravel, stone or other materials from beaches is required.	Yes.

Legislation	Summary of Applicability	Potential Need for Approval/Permit
Nova Scotia Public Highways Act	Any work within the public road would require a Work Within Highway Right-of-Way from the Nova Scotia Department of Transportation and Infrastructure Renewal and approval from the Minister.	Yes.
Occupational Health and Safety Act and Regulations	Workplace health and safety requirements to be met.	Activity specific.
Special Move Permit	Required to move a vehicle exceeding weight or dimension limits on a public road.	Likely required for delivery of large ETF components.
Industrial Approval		
Permits to Construct and Operate	Permit to construct under IA - Amendment to IA to allow for the operation.	Not Applicable to ETF project.
Pesticide use or storage permits	Permitting for pesticide use and/or storage will be required as an amendment to the existing IA.	Not Applicable to ETF project.
Municipal		
Land Use By-law Municipality of Pictou County Town of Pictou	Development permit(s) as required, from Municipality of Pictou County and the Town of Pictou.	Yes.

3.2 Key Federal Regulations

No federal EA triggers have been determined. The Canadian Environmental Assessment Agency previously determined (correspondence dated May 16, 2017) that the proposed undertaking did not appear to involve activities that would be considered to be a designated project under the *Canadian Environmental Assessment Act, 2012 (CEAA 2012)* and its *Regulations Designating Physical Activities*. On February 23, 2018, based on a public request for review, the Agency requested information from NPNS to allow the Agency to review the project and its potential effects and make a recommendation to the Minister of Environment and Climate Change Canada (ECCC) on whether the project should be designated. This information was submitted in April of 2018. On July 19, 2018, CEAA requested an updated submission after changes to the pipeline routing are finalized and related studies, including a new Receiving Water Study where available. On November 1, 2018 CEAA advised that the agency would not complete its analysis of the designation request until after the submission of the provincial EARD.

Federal regulatory processes that may be required for the proposed project include review and potential authorization/approvals under the *Fisheries Act* and the *Navigation Protection Act,* and potentially, if dredging with spoil removal occurs, for a Disposal At Sea (DAS) permit under the *Canadian Environmental Protection Act.* In addition, effluent quality requirements are set under the *Fisheries Act* PPER, and other pulp and paper regulations. In February 2018 Health Canada also requested that the EA Registration include review of potential health effects.

Fisheries Act (DFO, Serious Harm Process)

Portions of proposed project including the effluent pipeline and diffuser/outfall will be located within the marine environment. Potential for fish habitat within the footprint of the marine proposed pipeline/outfall is identified in **Section 8**. Additional assessment will be undertaken as part of the design process to determine requirements under the *Fisheries Act*. A marine benthic habitat study will be undertaken as part of on-going design and to provide information for a DFO Request for Review. In addition, geotechnical investigations will be completed in order to facilitate detailed design and provide sufficient information to estimate the harbour/marine footprint of the pipeline/outfall. Habitat assessment and preliminary proposed project footprint information will form a component of a DFO Request for Review to determine authorization requirements under the federal *Fisheries Act*. **Section 8** identifies predicted potential impacts to fish and fish habitat in relation to the proposed project and, if "serious harm" to fish is predicted, an application for authorization under Section 35(2) of the *Fisheries Act* will outline offset requirements, if determined to be required by DFO to address serious harm to fish.

Navigation Protection Act (Transport Canada Navigation Protection Program Process)

In addition to the waterlot lease/licence requirement, input from TC regarding navigation requirements has been initiated and will continue through the design process. Pipeline and outfall design (including construction) will reflect TC requirements and, based on preliminary discussions with TC, should address public safety concerns related to ferry navigation during construction, consider the 3rd party lease for the ferry terminal and ensure that the project does not interfere with future expansion plans at the ferry terminal. It is noted that the project is occurring in the Atlantic Ocean which is identified on the List of Scheduled Waters under the *Navigation Protection Act*. Detailed engineering design will be provided to TC for review and will be completed such that it meets TC Navigation Protection Program requirements. Reflective of the final pipeline routing and guidance from TC, a 'Notice to the Minister' application for works including construction, and final placement of the pipeline and outfall will be made if required.

Disposal at Sea (DAS)

Detailed design has not been completed for the construction of the marine outfall and pipeline. Underwater geotechnical investigations and underwater habitat surveys are planned to inform pipeline routing and construction methodology. The preferred method for trenching the marine pipeline will likely be by side-cast excavation methods with re-use of bottom materials without bringing to surface. However, if required to address localized subsurface conditions, dredge disposal may potentially be requireed. If ocean-based disposal of dredge material is appropriate and environmentally acceptable, a DAS permit application will be made. Alternative disposal options will be identified as a contingency to this approach if required.

Pulp and Paper Effluent Regulations (PPER)

The PPER were developed to manage threats to fish, fish habitat and human health (related to fish consumption) from pulp and paper mill deposits into water frequented by fish. The PPER, and those

regulations cited by the PPER, regulate the quality of effluent and remain under the jurisdiction of ECCC. Continued compliance with PPER was a requirement of project design and a significant consideration in the design of future monitoring programs. The treated effluent is anticipated to meet compliance with federal PPER, and with key established water quality guidelines that will meet ambient water quality (current background) at the edge of the mixing zone defined as the 100 m distance from the outfall pipe (Stantec 2019).

3.3 Key Provincial and Municipal Legislation

Nova Scotia Environment Act

Environmental Assessment Regulations

Provincial regulatory officials have been made aware of the intention to submit an EARD for this undertaking. Provincial regulators have provided assistance in scoping by bringing forth potential issues of concern. NSE (Environmental Assessment Branch) has indicated that they will continue to seek input from federal agencies when reviewing the EARD. It is understood that input will be provided by several federal agencies, as outlined above.

Boat Harbour Act

The introduction of the *Boat Harbour Act*, which received Royal Assent on May 11, 2015, will prohibit the use of the provincially-owned facility for the receipt and treatment of effluent from NPNS' mill after January 31, 2020. The BHETF is owned by the Province of Nova Scotia and has been operated by NPNS and its predessors under lease since 1996. Prior to 1996, the BHETF was owned and operated by the Province of Nova Scotia. This project, while necessitated by the *Boat Harbour Act*, does not interact with the *Act*..

In addition to the provincial EA Registration process, the project is anticipated to require the following provincial approvals/permits:

- Wetland and Watercourse alteration approval - Expected approval requirement due to footprint of replacement ETF and spill basin being in conflict with a wetland and watercourse and potential for approvals requirements along the pipeline route to be determined following geotechnical investigation assessment. Relevant policy guiding legislation such as the Nova Scotia Wetland Conservation Policy will also be followed.
- Crown lands Permit or Grant for submerged lands usage during construction - Construction of the effluent pipeline may require a permit where the pipeline requires an easement within the submerged lands within the confines of Caribou Harbour.
- Nova Scotia Special Places - A permit issued by the Nova Scotia Department of Culture, Communities and Heritage, Special Places Program for an archaeological assessment. The assessment has been carried out following the *Special Places Protection Act*. A small Pre-contact archaeological site was identified. The footprint of the proposed ETF has been modified to avoid the limits of the archaeological site and maintain a buffer of unaltered land. Potential for harbour/marine cultural resources will be assessed as part of underwater investigations planned for spring 2019.

- Additional provincial permitting may be identified during the subsequent construction planning process as well in completing any conditions of approval following submission and review of the EA. Typical contractor permitting may include; temporary fuel storage, transportation, and public highway use are additional approvals potentially required for construction activities.

Municipal Requirements

NPNS will obtain necessary development permits from the Municipality of Pictou County and/or the Town of Pictou prior to the start of construction.

3.4 Other Relevant Guidance

In addition, relevant guidelines, codes or industry standards that will be used as applicable, in design, construction and operation of the project are identified in **Section 8** and summarized in **Table 3.4-1.**

Table 3.4-1: Other Relevant Guidance

Jurisdiction	Guidance/Code/Standards
Federal	• CCME Canadian Environmental Quality Guidelines, Water: ▪ Canadian Water Quality (human health) Guidelines, Recreational Water Quality and Aesthetics, Canadian Freshwater Aquatic Life (FWAL) and Marine Aquatic Life (MAL) guidelines for the protection of aquatic life and marine life uses (CCME 2018) • CCME Canadian Environmental Quality Guidelines, Sediment Quality Guidelines for Protect of Aquatic Life (CCME 2001) • Health Canada Guidelines for Canadian Drinking Water Quality (Health Canada 2017) • National Ambient Air Quality Objectives (ECCC 2004) • National Fire Code of Canada (National Research Council (NRC) 2015)
Provincial	• Atlantic Risk Based Corrective Action (RBCA) for Petroleum Impacted Sites in Atlantic Canada (Atlantic Partnership in Risk-Based Corrective Action Implementation (PIRI) 2015) • Government of Nova Scotia Policy and Guidelines: Consultation with the Mi'kmaq of Nova Scotia (Government of Nova Scotia (GNS) 2015) • Proponent's Guide: Engagement with the Mi'kmaq of Nova Scotia (Office of Aboriginal Affairs (OAA) 2012) • Nova Scotia Guide to Addressing Wildlife Species and Habitats in and EA Registration (NSE 2009) • Nova Scotia Tier 1 Environmental Quality Standards (NSE 2013) • Nova Scotia Wetland Conservation Policy (NSE 2011) • NSE Guidelines for Environmental Noise Management and Assessment • NSE Erosion and Sediment Control Handbook for Construction Sites (NSE 1988) • Nova Scotia Department of Transportation and Infrastructure renewal (NSTIR) Standard Specifications (NSTIR 2001) • Generic Environmental Protection Plan for Construction of 100 Series Highways (NSTIR 2007)

4.0 Project Justification and Alternatives Considered

In this section, a high-level discussion of alternatives to the project (i.e., other ways of achieving the project purpose) is provided, leading to a discussion to justify the project as proposed. Then, alternative means of carrying out the project (i.e., other methods of accomplishing the project as proposed) are discussed.

4.1 Alternatives to the Project, and Project Justification

The project purpose was discussed in **Section 1.3**, and is intended to provide a new means of treating and disposing of effluent from the NPNS mill to replace the BHETF. Alternatives to the project that were considered to meet the project purpose included:

- Project Alternative 1: Do Nothing and Close the NPNS Mill;
- Project Alternative 2: Construct a Closed Loop System;
- Project Alternative 3: Change the NPNS Mill Type, Make a Closed Loop System; and
- Project Alternative 4: Construct a New Modern Effluent Treatment Facility.

Further discussion of these alternatives to the project, and the justification for the project as planned, are provided below.

Project Alternative 1: Do Nothing, Close the NPNS Mill

The *Boat Harbour Act* will close the existing wastewater (effluent) treatment facility used by NPNS by January 31, 2020. Without a replacement ETF, NPNS as it currently operates will close.

In light of NPNS' central location in the Nova Scotia forestry industry, closure of the NPNS mill would have a significant adverse effect on the local community, surrounding communities, reaching across the province due to NPNS' central place in the Nova Scotia forestry industry. NPNS directly employs over 330 residents in Pictou County and northern Nova Scotia. Through its direct and spinoff activities, the mill creates about $100 million in labour income in Nova Scotia. (Gardiner Pinfold, 2015). NPNS provides over 2000 indirect and induced jobs to Pictou County and the Province of Nova Scotia in general. NPNS' operations maintain jobs in the forestry sector which employs over 11,500 annually (Gardiner Pinfold, 2016). NPNS is uniquely connected with many partners in the forest industry. Together with its supply chain companies, NPNS produces a total annual value output of $535 million.

NPNS exports over $200 million worth of goods annually, which constitutes a significant portion of the province's total forestry exports. NPNS is the single largest exporter out of the Port of Halifax, exporting in excess of 1,700 Ocean Freight Containers (20 ft. TEU Equivalents - twenty-foot equivalent unit, a measure used for capacity in container transportation) per month through the Port of Halifax. NPNS

exported over $193 million to China in 2018, making wood pulp and NPNS exports in particular over 1/3 of the province's exports to China.

In order to prevent the closure of NPNS, an ETF would need to be constructed. The other project alternatives below consider scenarios if NPNS continued to operate.

Project Alternative 2: Construct a Closed Loop System, not Commercially Available
NPNS is an Elemental Chlorine Free (ECF) Bleached Kraft pulp process. ECF is a chemical process to form pulp, and the bleaching process generates the majority of the effluent from a mill. Recycling of the bleach plant effluent in the bleached Kraft industry is often referred to as "Closed Loop Pulping Technology".

The main problems with the bleach plant effluent recovery are equipment corrosion and accumulation of chloride and non-process elements in the mill's water systems. Accumulation of chlorides and potassium are especially corrosive for the mill's boilers and often lead to scale build-up. It is important to note that the chloride ion is naturally present in salt water, in the form of sodium chloride. The presence of chloride in the ocean does not represent a concern for the environment.

Closed Loop Pulping Technology has been investigated since the mid-seventies, but remains unviable for long term operation of a commercial mill. Over 30 years ago, Canadian researcher Dr. Howard Rapson presented a method for bleach plant effluent recovery back into the process. The world's first closed loop bleach plant was attempted in Thunder Bay, Ontario (Reeve, D., et al 1979). The pilot process was not successful and because of the lack of success at that mill, the technology was not tried again for another decade or more.

In the nineties, closed loop technology was again investigated, prompted by new and tighter effluent regulations being introduced across the globe. Different techniques were developed. However, in spite of decades of research (as reported in NCASI, 2003), pilot tests, and mill scale trials, viable closed loop technology for Kraft pulp was never developed. This technology remains unavailable for ECF Bleached Kraft pulp mills.

Project Alternative 3: Change the NPNS Mill Type and Make a Closed Loop System, Market Prohibitive
NPNS manufactures Northern Bleached Softwood Kraft (NBSK) pulp, more commonly referred to as Kraft pulp. As a result of the Eastern Canadian spruce and fir fibres and other unique conditions in Nova Scotia, pulp from NPNS is recognized as premium reinforcement pulp (PRP) due to its high quality and strength. Customers from around the world purchase pulp from NPNS to manufacture common household products such as tissue, paper towel, and writing paper. This premium product makes NPNS globally competitive.

As outlined in Project Alternative 2, there are no known mills that produce ECF bleached Kraft pulp like NPNS that successfully operate a closed loop system, but there are mills that make a different type of pulp and can operate as closed loop systems. Bleached Chemi-Thermo Mechanical Pulp and Unbleached Kraft Pulp have been shown to operate with closed loop systems. A market study undertaken by Brian McClay and Associates examined the business potential for NPNS to change processes to produce different products (McClay and Associates, 2017). It found that NPNS would not remain competitive due to high wood and electricity costs as compared to other BCTMP or UKP mills. NPNS must continue to operate by producing NBSK to be economically viable. The full market study is provided in **Appendix B**.

Project Alternative 4: Construct a New Modern Effluent Treatment Facility

As discussed in **Section 3**, regulations are in place federally to govern effluent discharge through the CEPA as administered by ECCC and the *Fisheries Act* as administered by DFO. Modern effluent treatment facilities, as proposed by this project, can be built to treat effluent to a quality that meets regulations while being protective of the local receiving environment. Different treatment processes are used around the world, all involving a treated discharge to the receiving environment (either marine or freshwater). An alternatives review to identify the recommended treatment process and its effects on the receiving environment has been completed.

In summary, the alternatives to the project that were considered by NPNS are summarized in **Table 4.1-1** below.

Table 4.1-1: Summary of project Alternatives, Evaluation and Recommendation

Project Alternative	Recommendation and Explanation
Project Alternative 1: Do Nothing and Close the NPNS Facility If NPNS did nothing, when the BHETF closes in 2020, NPNS will have nowhere to treat its effluent unless a new facility is built. NPNS would have to close.	A global market study shows that the pulp produced by NPNS will remain a viable and even premium product. Closing an operational mill isn't a preferred option for the company or the Nova Scotia forestry industry if a suitable effluent treatment option can be found. *Not Recommended*.
Project Alternative 2: Construct a Closed Loop System In this alternative, NPNS would reuse the wastewater so that a discharge from an effluent treatment facility isn't needed.	Many decades of research into closed loop systems for bleach Kraft effluent have not resulted in the development of this technology. This process is not commercially available for NPNS. *Not Recommended.*
Project Alternative 3: Change the NPNS Mill Type, Make a Closed Loop System In this alternative, the production process of NPNS would be changed to produce a different type of pulp so that a closed loop system is possible.	Production of a different type of pulp can allow operation using closed loop systems. A market study examined the business potential for NPNS to change products. It found that NPNS would not be economically viable with a different product. *Not Recommended.*

Project Alternative	Recommendation and Explanation
Project Alternative 4: Build a New Modern Effluent Treatment Facility In this alternative, NPNS would build a new modern ETF to treat NPNS effluent once the BHETF is closed.	Modern effluent treatment systems exist for Kraft mills, which are able to treat effluent to meet water quality and local environmental regulations. Different treatment systems are possible, and would be evaluated. *RECOMMENDED*
CONCLUSION:	Proceed with identifying and evaluating alternative methods for a new effluent treatment facility, including discharge options.

4.2 Alternative Methods Considered

Alternative methods (or alternative means of carrying out the project) that were considered for building a new modern ETF with treated release to the receiving environment are discussed below.

4.2.1 Effluent Treatment Process Alternatives

KSH completed an engineering scoping study to determine the best means of replacing the BHETF. KSH based their evaluation on the following design criteria:

- Effluent flow rate is 85,000 m^3/day maximum;
- The average flow rate is proposed to be approximately 62,000 m^3/day; and
- Treatment must be completed to PPER and associated applicable guidelines.

The alternative technologies (processes) were identified based on their potential to meet the PPER, minimize environmental risks, and be cost effective. The recommended process was then selected based on the following criteria:

- Optimization and Reliability - What process will reliably result in required treatment quality, given the characteristics of the effluent needing to be treated?
- Efficiency - Can the process treat the volume of effluent?
- Economic Viability - Can the process allow for the continued viable operation of the mill?
- Flexibility - Can the process operate across operating conditions? (e.g., seasons)
- Footprint - Can the process fit on the NPNS or other public property, without affecting adjacent natural features and property owners off the mill site?

Advantages and drawbacks of each technology are included in **Table 4.2-1** below as outlined in the KSH report of July 2018 entitled “Preliminary Engineering for Effluent Treatment Facility Replacement – Technology Selection Summary” (**Appendix C**).

Table 4.2-1: Effluent Treatment Technology Comparison

Process	Advantages	Drawbacks
Activated Sludge (AS)	Process flexibility Large industry experience Upgradability	Potential sludge settle-ability issues Foaming is sensitive to operational variability Higher energy use for aeration
Sequencing Batch Reactors	Compact system Very flexible for nutrient removal Highly automated	Not common at high (>40,000 m^3/day) flows More complex design (electrical/mechanical) Intermittent discharge
Rotating Biological Contactors	Simple to operate High process stability Modularity Low energy requirements	High colour discharge Limited degree of process automation Mechanical concerns
Biological Aerated Filters	High loading rates Small footprint Modularity Highly automated	More complex design (electrical/mechanical) Fine solids screening required Potential for loss of media Limited degree of process automation Limited implementation
Moving Bed Bio-reactors (MBBR)	Simplicity of design Small footprint Demonstrated use for pulp mill effluent	System sensitive to risk of loss of media Limited degree of process automation
Anaerobic	Low sludge generation Small footprint Biogas generation	Required a high strength effluent to be applicable Additional aerobic treatment required to address toxicity of treated effluent Sensitive to operational variability (process upsets)
Tertiary	Used when conventional treatment cannot remove a specific contaminant that is found harmful to a specific local ecosystem.	Environmental footprint can be worse than the problem it addresses (power use, chemical additions, generation of sludges, etc.) High operating costs Sensitive to operational variability (process upsets)
Conclusion	Preliminary recommendation identified AS treatment as the recommended solution (presented at public open houses December 2017). Detailed engineering design resulted in a combination of AS treatment and MBBR technology – a BAS™.	

The replacement ETF will employ an AnoxKaldnes BAS™ process purchased from Veolia Water Technologies, which combines MBBR technology with conventional AS. BAS™ and MBBR systems have been used in many applications to treat pulp mill type effluent and the combination alleviates the key drawbacks identified for individual system types. **Appendix D** provides a reference list of the many applications and their locations around the world as well as a brochure outlining the technology.

As part of the design process, several facilities were visited to confirm if the chosen system was suitable for the NPNS application. A group including individuals from NPNS and the design consultant (KSH) travelled to visit the Domtar Mill in Johnsonburg, Pennsylvania in March 2017. The integrated Kraft pulp and paper mill is similar in size to that of NPNS and discharges its treated effluent into the neighbouring

Clarion River. The Domtar Mill uses an activated sludge treatment (AST) system for their Kraft mill effluent and the discharge of the ETF is into a freshwater stream.

The group also visited two NBSK pulp mills that operate Veolia BAS™ treatment systems (Södra Cell Värö mill in Väröbacka, Sweden and the Södra Cell Mörrum mill in Mörrum, Sweden) in May 2018. Both of these mills successfully manage the BAS™ treatment system to meet applicable regulations and have ocean discharges for their treated effluent. These visits confirmed that the proposed Veolia BAS™ treatment system will provide the required treatment needs for NPNS to meet current and anticipated future regulations. The information gathered during these visits was incorporated into the design of the replacement ETF.

Three mills that produce bleached softwood Kraft pulp that most closely compare to the NPNS project are listed below. Two of the three mills were visited by the NPNS group.

- Södra cell Mörrum, Sweden;
- Södra Cell Värö, Sweden; and
- Stendal Mill, Germany.

The same group also visited with the research laboratory of Veolia/AnoxKaldnes in Lund, Sweden in May, 2018. The purpose of the visit was to review the lab trials that were performed on NPNS's raw effluent to ensure the proper design and sizing of the replacement ETF. The trial results confirmed that the BAS™ effluent treatment system that was initially chosen for NPNS will provide appropriate treatment for the mill's raw effluent to meet the discharge criteria.

4.2.2 Aerated Stabilization Basin Treatment versus Biological Activated Sludge Treatment

The BHETF is an aerated stabilization basin (ASB) and the proposed replacement system is a BAS™ process (MBBR/AS). The following table compares the two types of treatment. While it would cost less to build and to operate a new ASB, it was not selected for the following reasons:

- Lower BOD and COD removal efficiencies than BAS™;
- A large surface area is required and without continuous sludge removal, odour control is more difficult;
- ASB is not a current technology; and
- Insufficient space to construct on the mill site.

Table 4.2-2: AS vs BAS Treatment

Aerated Stabilization Basin (ASB)	Biological Activated Sludge Treatment (BAS™)
• The ASB process, also known as the aerated lagoon, treats effluent through the removal of BOD by aerated digestion with micro-organisms developed and maintained in the basins. • ASB's have no sludge recycle. The sludge is used as a food for other micro-organisms, which digest it, usually close to the bottom of the basin	• The BAS™ process combines Moving Bed Biofilm Reactors (MBBR) with a conventional activated sludge (AS) process. Treatment in the process involves the conversion of soluble organic matter into solid biomass through the digestion of micro-organisms. This is then converted to CO_2, H_2O and microbial sludge. The sludge is then

Aerated Stabilization Basin (ASB)	Biological Activated Sludge Treatment (BAS™)
(facultative digestion). • ASB's are characterized by: – relatively low bacterial concentration; – large residence times (in the order of 10 days) resulting in large land requirements and the absence of a secondary sludge clarifier; – Typically yield soluble BOD reductions of 50 to 75% in industrial applications; – Typically less sensitive to process overloads and swings; and – Typically have lower capital and operating costs than AST's.	removed from the liquid stream, dewatered and disposed of. • BAS™ involves a number of process stages: a contact media stage followed by aeration, clarification and recycle stage. It is characterized by: – The contact media reactor attenuates peak loading and reduces influent organic concentration to the AS there by stabilizing that process; – 90 to 95% removal of soluble BOD; – Residence times in the process are measured in hours (6-18) reducing land footprints for the facility; – Capable of treating wastes with BOD concentrations as high as 5,000mg/L; and – AST's (including BAS™) are more susceptible to process upsets and spills than ASB's and require greater operator attention to maintain optimum treatment conditions.

4.2.3 Alternative Means for Disposal of Treated Effluent (Conveyance Means and Locations)

Alternatives for effluent disposal methods were also reviewed as part of the assessment of alternative methods. This review looked at both the means of moving the treated effluent from the NPNS property to a disposal site or facility (conveyance options) and final disposal options (final discharge location). Criteria that were considered at this stage to screen what options should be carried forward for further consideration included:

- Meeting applicable laws and regulations. For example, discharge from any pulp mill is regulated by the PPER;
- Ability to handle the volume and flow rate of effluent (maximum 85,000 m^3/day, annual average 62,000 m^3/day);
- Financial viability of the NPNS operation; and
- Environmental Protection
  - Minimize potential for impact and risk to the environment.
  - For freshwater or marine discharge options, targeting to meet applicable CCME guidelines for freshwater or marine environments, respectively.

Three conveyance options were examined for this assessment: trucking, pipeline, and transport via barge, as detailed in Table 4.2-3 below.

Table 4.2-3: Alternatives Considered for Conveyance of Treated Effluent

Conveyance Method	Description/Considerations	Recommendation
Trucking	The average daily flow is estimated to require between 1,400 (avg. day) and 1,950 (max. day) truck loads daily (based on a tanker capacity of 44,000 L) for transport of liquid. The increased use of major and/or minor highways would be expected to require upgrading of current conditions and could increase the maintenance efforts for these routes. There is an increased project risk due to lack of reliability in disposal: weather conditions, vehicle maintenance/problems, and appropriate staffing redundancy to accommodate volume of discharge. There will be a significant increase in truck traffic, which will increase noise and potentially the risk to public safety.	Not Recommended.
Pipeline	Use of a pipeline increases the reliability of disposal as it is not as subject to weather conditions and staffing as trucking. Additional infrastructure may be necessary, including additional pumping and length of pipe, which includes risks of potential failure. NPNS may be required to purchase/lease additional land to construct a pipeline. Additional approvals and studies will be necessary.	Carry forward for further design review.
Barge	A pier for barge loading would be necessary - assumed to not be at the NPNS mill location. Liquid would have to be either stored and trucked or stored and pumped to a facility to offload to an ocean going barge/tanker to be discharged outside of coastal waters in an approved area, with a large number of tankers. There would be increased industrial vessel movements in the Northumberland Strait, potentially disrupting fisheries. Project specific permits would be required as the effluent does not fall under materials permitted to dispose of offshore.	Not Recommended.
	Conclusion: Carry Forward Pipeline as Conveyance Method	

Table 4.2-3, above, identifies that a pipeline is the recommended technical approach for the conveyance of treated effluent. Detailed design of a pipeline system will be completed (e.g., to identify size, location, material recommendation). It is noted for both other options, an ultimate discharge location such as a marine discharge would still be required.

The next step in alternatives evaluation is to consider, at a high level, where a final discharge location could be constructed. Table 4.2-4, below, discusses alternatives for final discharge location and evaluates them based on the screening criteria.

Table 4.2-4: Alternatives Considered for Final Discharge Location or Method

Final Discharge Method/Location	Description/Considerations	Recommendation
Release into Pictou Harbour	NPNS property (Abercrombie Point) sits on Pictou Harbour. This alternative considered constructing a discharge pipeline off of NPNS property into Pictou Harbour. Preliminary modeling indicated that Pictou Harbour has limited mixing with the Northumberland Strait – water in Pictou Harbour tends to stay	Not Recommended

Final Discharge Method/Location	Description/Considerations	Recommendation
Release into Middle River (upstream of causeway)	within the Harbour. Though treated, effluent would therefore result in the accumulation and increasing concentration of residual contaminants contained in the treated effluent, over time. Given the discharge rate, effluent contaminant accumulation could result in negative effects on the Harbour over time. The water used by NPNS comes from Middle River. This option considers discharging back to Middle River (i.e., upstream of the Highway 106 causeway). Similar environmental concerns are anticipated as those described for Pictou Harbour. Increasing effluent contaminant concentrations over time would likely adversely affect the Middle River ecosystem. Further, this option is expected to increase chlorides in the Middle River and potentially affect the maintenance of the equipment at the Middle River Pumping Station and inside the mill (similar style impacts as described in regarding the use of a closed loop system above).	Not Recommended
Permitted Municipal Wastewater Treatment Facility (WWTF)	The proposed treated effluent criteria is in compliance with the applicable Nova Scotia Model Sewer Use Guideline parameters and would be compatible with discharged to most municipally operated sewage collection systems in the province. However, amendments to operating permits would likely be required. Local WWTF such as Pictou and New Glasgow release treated effluent to the Pictou Harbour but do not have the capacity to treat effluent from NPNS without significant modification. Pictou Harbour is not a recommended outfall location, as outlined above. Therefore, the local WWTF are not recommended. According to the PPER if a mill discharges within a municipal WWTF and that the relative loading (hydraulic and/or organic) is more than 20% of the total loading of the plant, then the ENTIRE flow from the WWTF is subject to the PPER limits. This may require treatment changes depending on the municipal system characteristics.	Not Recommended.
Privately Owned WWTF	Private WWTF exist for the treatment of specialized materials, or industrial processes. Similar to what is described above for municipally owned WWTF, existing private facilities would require expansion. The closest privately owned WWTF facility is in Debert, approximately 80 km away. Trucking as a transport option has been ruled out above. A pipeline to Debert is not considered technically or economically feasible. A discharge to a water body would still be required.	Not Recommended.
Land Based Disposal	Rapid land irrigation is the process of spraying treated waste water over land for absorption. Land based disposal would require a significant area. The Atlantic Canada Wastewater Guidelines Manual (Environment Canada 2006) recommends a typical value of 6,000-100,000 L/m^2/day in ideal soils.	Not Recommended

Final Discharge Method/Location	Description/Considerations	Recommendation
	Ideal soils are considered loam and gravels with high permeability. For an average day discharge, approximately 5 hectares (ha) of land would be required weekly to allow for rotation and soil recovery from the applied loading. A number of sites may be required to allow for further rotation and/or efficiency. Overland runoff to watercourses nearby to the land application sites would likely result. This disposal option would not be applicable for winter discharge due to frost penetration and freeze up, and would not be applicable in very wet seasons as the liquid would not infiltrate, resulting in overland runoff to watercourses. Land application of wastewater effluent has not yet been approved in Nova Scotia.	
Marine Outfall Location	This option assumes the release of treated effluent into an area of the marine environment with appropriate mixing, and depth of water. A key consideration is to develop a solution that does not affect Boat Harbour in the future tidal state, as identified in consultation with PLFN. All project modelling considered a future tidal state with the removal of the existing dam at Boat Harbour. Preliminary review confirmed possible marine locations.	Carry forward for further design review
Outlet of Boat Harbour	This option would see the release of treated effluent continue from the same location as the BHETF presently discharges. This would mean that, even if the discharge characteristics remain the same or improve, there would be no appreciable changes to existing conditions today in the local communities and in the Strait. A key consideration is to develop a solution that does not affect Boat Harbour in the future tidal state, as identified in consultation with PLFN. If a new outfall was constructed in vicinity of the mouth of Boat Harbour, then effluent would be carried back into Boat Harbour.	Not Recommended
	Conclusion: Carry Forward Marine Outfall Location	

4.2.4 Marine Outfall Location Alternatives

Stantec Consulting Ltd. prepared a receiving water study to determine the optimum location for the effluent outfall that would achieve effluent diffusion that will meet or exceed applicable regulations and guidelines. The receiving water study is a hydrodynamic model that takes into account a wide range of variables including physical oceanographic data, tidal currents, winds, river discharge, density flows, and particle dynamics. The complete evaluation (Stantec 2018) is included in **Appendix E**.

Alternative sites were considered within and outside of Pictou Harbour. As described in **Table 4.2-4**, sites within Pictou Harbour were not recommended because the effluents would not flush properly out

of Pictou Harbour which would result in a likely increase in effluent concentrations in marine waters of the harbour, over time.

Alternatives outside of Pictou Harbour, in the Pictou Road/Northumberland Strait area, showed much better potential for dilution and transport away from the shoreline and Boat Harbour. An alternative which was identified for relatively deeper water while balancing construction costs was identified as the initial recommended location and was presented to all levels of Government, the Mi'kmaq, public and stakeholders during the project launch in December 2017. Engineering design of the pipeline route and outfall began. In Spring 2018, significant engineering constraints were identified, in that ice scour would likely damage the outfall at the Pictou Road location. The engineering team looked for design and route alternatives, and the environmental assessment registration process was paused in June of 2018 while NPNS investigated, confirmed and developed alternate outfall plans. The EA evaluation resumed in early fall 2018 and a new alternative was brought forward that would involve a land-based pipeline route leading to a marine outfall offshore of Caribou Harbour, in the Northumberland Strait. The current and previously proposed marine outfall locations are shown in **Figure 4.2-1**.

Both proposed options had hydrodynamic modelling completed (see **Appendix E**) to confirm that they would satisfy criteria in the immediate surrounding environment in the mixing zone, and an evaluation of the potential for sediment accumulation was also conducted.

The Caribou Harbour outfall option is recommended, and forms the basis for the project described in this EARD.

4.3 Summary

For NPNS to remain viable, an ETF is required (see previous **Table 4.3-1**). Technical alternatives of ETF designs were considered, and a BAS process is considered to be the best available technology (**Table 4.3-1**). An ETF will require an outfall where treated effluent can be discharged. Screening criteria assessed different ways to transport and different locations to construct an outfall. A pipeline discharging to a marine location is recommended (see previous **Table 4.3-3** and **Table 4.3-4**). Alternative locations for a marine discharge location were considered. A location outside of Caribou Harbour, in the Northumberland Strait is recommended.

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Replacement Effluent Treatment Facility
Environmental Assessment

Current and Previously Proposed Outfall Locations

Figure 4.2-1

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- Approximate Currently Proposed Outfall Location
- Approximate Previously Proposed Outfall Location
- Pictou Landing First Nation
- Wetland
- Open Water
- Roads
- Watercourse
- Rail

DILLON CONSULTING

MAP CREATED BY: SCM
MAP CHECKED BY: AB
MAP PROJECTION: NAD 1983 UTM Zone 20N

0 0.5 1 2 3 4
Kilometres

N W E S

PROJECT: 17-6461

Date: 2019-01-30

5.0 Project Description

This section provides a description of the facilities and equipment and activities that will comprise the project, as currently conceived and based on the available information at the time of writing. The project description provided in this section allows a conservative estimate of the scope, footprint, and environmental effects of the project. The project is likely to evolve as project planning and engineering design is completed. The project will be built and operated within the described parameters or envelope as presented in this EARD.

The key aspects of the project are described below, including:

- The project components, including the infrastructure and associated facilities, and planned mitigation for potential environmental effects;
- The activities that will be carried out during construction, operation, and eventual decommissioning of the project; and
- Project-related emissions, wastes, and other requirements, and their management.

5.1 Project Definition and Location

The project will include a new ETF, effluent transmission pipeline, marine outfall location, and associated ancillary facilities. Employing a BAS™ system, the ETF will accept wastewater that is created through the bleached Kraft pulp process at the plant. The ETF will be constructed on the NPNS property (PID: 00864538) in Abercrombie, in Pictou County, Nova Scotia.

Once treated, effluent will be sent through an approximately 15.5 km long pipeline. The approximately 11.4 km land-based portion of the pipeline will cross NPNS property, exiting the property at the north side, and then runs within the Highway 106 right-of-way, generally along the existing road shoulder. The pipeline then enters the marine environment adjacent to the Northumberland Ferries marine terminal on property owned by TC, and continues for approximately 4.1 km through Caribou Harbour to the Northumberland Strait, terminating in an engineered marine outfall.

5.1.1 Project Footprint Area

The project footprint area (PFA) is defined as the maximum extent of the physical area of disturbance associated with the project. The PFA will include all temporary and permanent areas of ground and marine disturbance, including:

- The new ETF, situated within the property boundaries of the NPNS mill, west of the NPNS mill main access road and southeast of the existing NPNS facility;
- The pipeline, including land-based and marine footprint; and,
- Temporary and permanent works for access including any roadway improvements, realignment, materials storage, staging or other terrestrial and marine working areas required to support construction.

A 15 m wide assessment corridor for the pipeline has been selected. This area will include the area of permanent pipeline, as well as area temporarily disturbed during construction (described in **Section 5.3.1**). **Figure 5.2-1** and **Figure 5.2-2** illustrate the PFA.

The project does not include the decommissioning of the existing BHETF effluent treatment system, effluent piping system downstream of the existing standpipe, and ancillary components, which is covered under a separate regulatory process.

5.1.2 Property Ownership

The ETF and beginning of pipeline from the ETF will be fully within the NPNS property boundaries. The majority of the pipeline will be constructed within the Right-of-Way (ROW) for Highway 106, predominately within the existing road shoulder, owned and administered by NSTIR, then to the west of the Northumberland Ferries marine terminal owned by TC, until it intersects Caribou Harbour and eventually extends into the Northumberland Strait. The marine environment is administered by federal authorities. Refer to Table 1.3-1 for a list of PIDs included in the proposed PFA.

5.2 Description of Project Infrastructure and Components

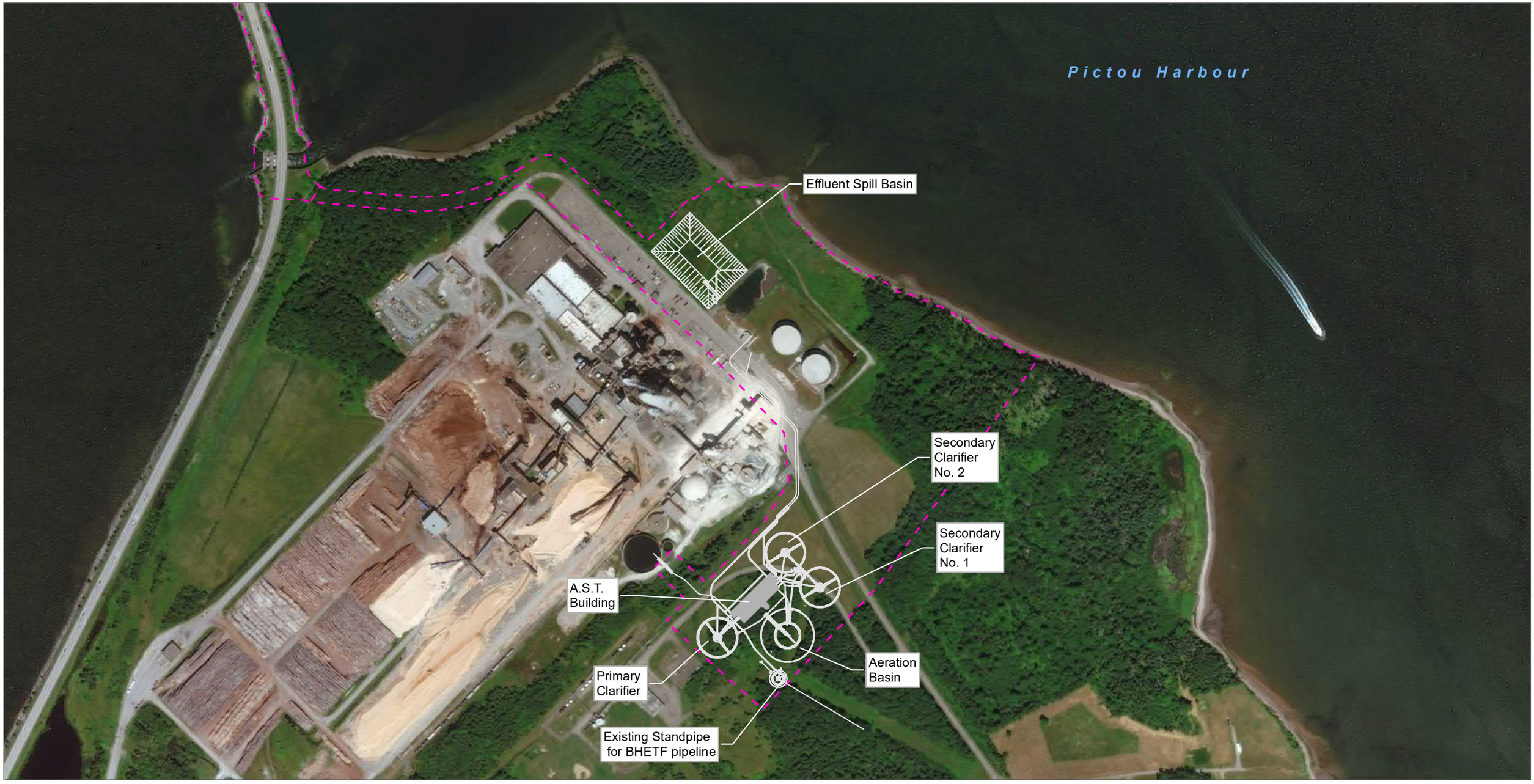
In the sections below, each of the major components and facilities for the project is described. The specific locations of the various project facilities are shown in the ETF portion of the PFA as presented in **Figure 5.2-1** and the pipeline portion of the PFA presented in **Figure 5.2-2**.

5.2.1 Alteration to Existing Infrastructure: Mill Connection

The existing NPNS effluent pump lift station and piping manifold will collect raw effluent from the mill that will tie-in to the new pipeline feeding the primary clarifier. The existing effluent pipe from the effluent pump lift station to the existing standpipe runs under the area where the new ETF will be constructed. This pipe segment will be relocated around the new ETF as the first step, in advance of site preparation.

The access road (driveway) to the Canso Chemicals property utilizes access across NPNS property. This driveway is in conflict with the construction of the ETF and will be realigned during the first stages of construction. Construction for the project is described in **Section 5.3.1**.

The ETF will include a new coarse screen constructed in front of the existing lift station to remove large solids before pumping to a new primary clarifier. The clarifier will remove fibres and other solids prior to treatment by conventional gravity separation.



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Replacement Effluent Treatment Facility
Environmental Assessment

ETF Project Footprint Area
Figure 5.2-1

NORTHERN PULP
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Approximate Project Footprint Area*

Generalized Preliminary ETF Layout

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY Northern Pup Nova Scotia, ESRI

MAP CREATED BY: SCM
MAP CHECKED BY: AB
MAP PROJECTION: NAD 1983 UTM Zone 20N

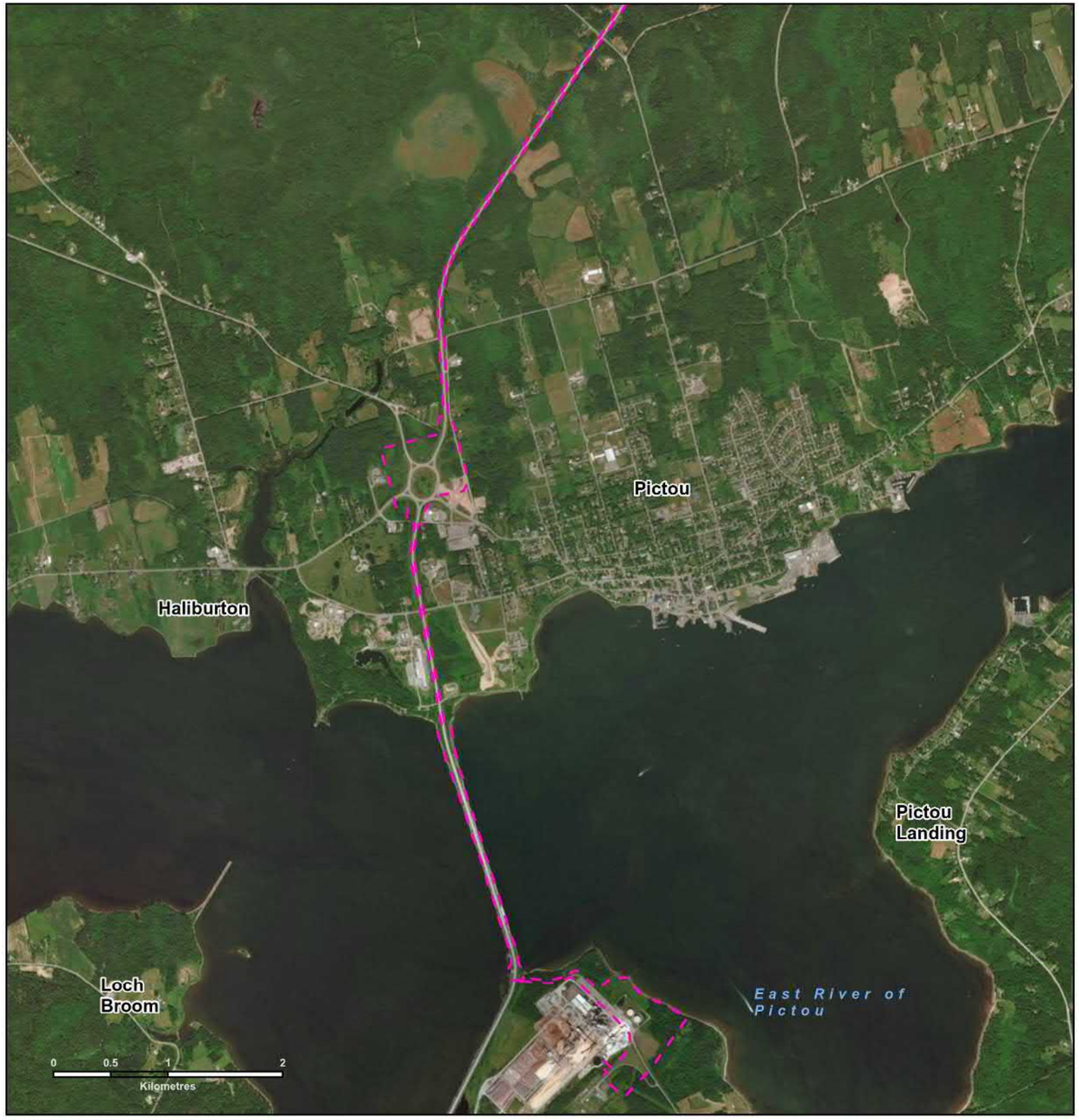
0 50 100 200 Meters

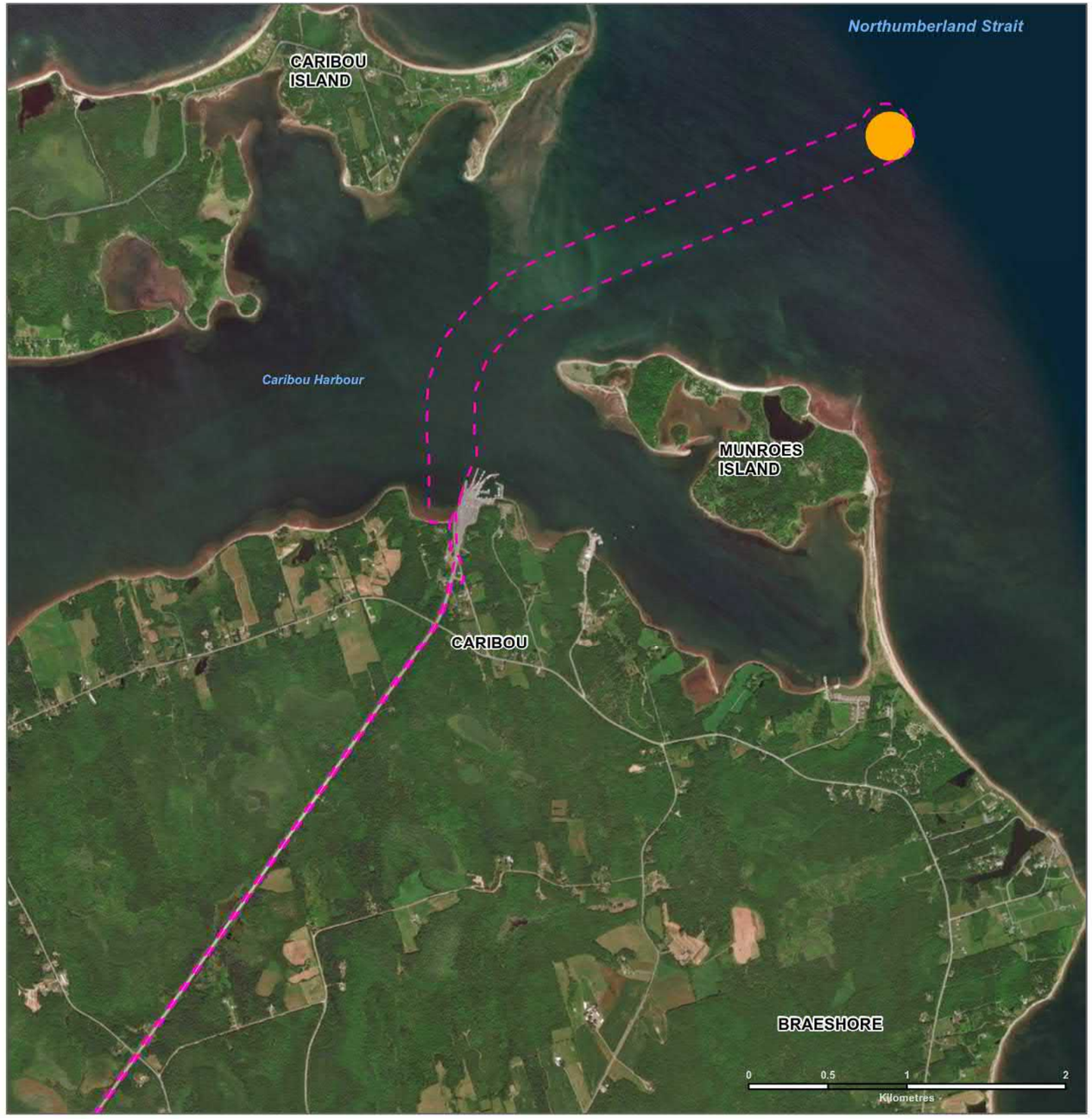
N W E S

*Precise Project Footprint to be determined following completion of detailed design

PROJECT: 17-6461

Date: 2019-01-30





Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Pipeline Project Footprint Area
Figure 5.2-2

NORTHERN PULP
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Approximate Outfall Location

Approximate Project Footprint Area*

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY Northern Pup Nova Scotia, ESRI

MAP CREATED BY: SCM
MAP CHECKED BY: AB
MAP PROJECTION: NAD 1983 UTM Zone 20N

N W E S

*Precise Project Footprint to be determined following completion of detailed design

PROJECT: 17-6461

Date: 2019-01-30

5.2.2 Effluent Treatment Facility and Process

The primary components associated with the replacement ETF will be constructed on NPNS property, southwest of the main NPNS driveway, and south of the existing mill buildings. It will allow for simplified connection to existing mill outlet. The natural slope of this area is incorporated into the design to assist with the movement of effluent by gravity (hydraulic profile) through the ETF process.

The primary components associated with the new ETF include:

- Coarse screening;
- Feed system (existing effluent lift pumping system);
- Primary clarifier;
- Activated sludge aeration tank (including the MBBR chamber);
- Two secondary clarifiers;
- Sludge management system; and
- Spill collection system.

The ETF is designed to treat the NPNS effluent to meet the *Pulp and Paper Effluent Regulations* before entering the transmission pipeline and exiting NPNS property. The facility is designed to remove, among others, solid materials, organic loads, and chlorinated compounds. A simplified diagram of the treatment process is presented in **Drawing-1** below**.**

5.2.2.1 A BAS Process

The ETF will use a BAS™ process, which combines MBBR technology with conventional AS.

- MBBR is a biological wastewater treatment process that uses engineered polyethylene carriers (media) to create a large protected surface on which biofilm can attach. The media is mixed in the reactor, and the large surface area provides more treatment capacity in a smaller volume compared to conventional treatment methods; and
- AS is a biological wastewater treatment process that uses aeration and a biological floc composed of bacteria, fungi and protozoa to remove organic (carbonaceous) pollution from wastewaters. The term 'activated' comes from the fact that a good portion of the settled biological flocs, after treatment, are returned to the beginning of the treatment process to "activate" it, thereby beginning the process again.

By using MBBR technology prior to an AS system under the BAS™ process configuration, the physical size of the treatment system can be reduced allowing for a smaller total footprint. Most significantly, it will provide a more reliable facility by protecting the AS system from upset conditions, reduce nutrient consumption, and allow for low effluent total phosphorus (TP) and total nitrogen (TN), and improve the AS effluent sludge settling characteristics.

NORTHERN PULP: BIOFILM ACTIVATED SLUDGE (BAS) TREATMENT PROCESS

Lime Water System (pH Control)

Existing CO_2 Supply

***65,000 - 85,000 m³/d** (peak)*
3,500 m³/hr max

Existing TME Lift Pumps (x4)

From Existing TME Station

Bar Screen

Overflow

Pump

Spill Basin
35,000 m³
(11 hours retention time at maximum flow)

Primary Clarifier
56 m Diam.
(5.5m water depth)

Primary Sludge

Pump

Pump

Effluent Indirect Heat Exchangers

Hot Water Cooling Towers
Water Vapour to Atmosphere

<37° C

Pump

Aeration Blowers
(Enclosed)
On-line Spare

Sludge Storage Tank

Pump

Sludge Flocculation Tank

Flocculant System

Pump

Pump

Sludge Presses

Thickened Sludge to Bark Boiler

Filtrate Tank

Secondary Clarifier #1
56 m Diam. (7.7m water depth)

Sodium Hypochlorite Supply

Waste Sludge (WAS)

Caustic Supply

Sulfuric Acid Supply

Nitrogen (Urea) Supply

Phosphorus (H_3PO_4) Supply

Defoamer

Moving Bed Biofilm Reactor (MBBR)
6,000 m³, 7.0m water depth

Pump

Pump

Treated Effluent to Marine Outfall

Secondary Clarifier #2
56 m Diam. ***(7.7m water depth)***

Pump

Activated Sludge Treatment (AST) Basin
23,000 m³, 7.0m water depth

Pump

Recycled Sludge (RAS)

Pump

Legend:

TME: Total Mill Effluent

Process lines:

- Effluent
- Water / Chemicals
- Air
- Sludge / Solids
- Emergency use only

KSH Consulting

NORTHERN PULP NOVA SCOTIA CORPORATION

Project #	10 1113A-001
Area:	AST Treatment Flowsheet
Drawing #	10-1113A-01
Drawn by	GRM
Date:	2019-01-07
Revision	4

In this process, the MBBR pre-treatment removes much of the easily biodegradable chemical oxygen demand (COD) and also acts as a buffer to protect the AS system from peak loads or upset conditions. This promotes a stable and more efficient process with improved sludge settling characteristics. The performance of the AS stage is improved if the MBBR is operated under conditions that are nutrient limited. Nutrient-limited conditions will result in a biofilm that limits reproduction and produces extracellular polysaccharides (EPS). The EPS-rich biomass passes through the MBBR and becomes a readily available food source for the microorganisms in the activated sludge step. Consumption of EPS-rich biomass has been shown to improve sludge characteristics as well as reduce the sludge production.

5.2.2.2 Screen and Feed Systems

The existing NPNS effluent system will be used to collect the raw effluent. The raw effluent will initially be coarse-screened to remove fibres or large objects that could otherwise damage process equipment. Following the screen, the effluent will be directed to the lift station, where centrifugal pumps will direct the effluent to the new treatment system. The pH will be adjusted using the existing control system. This will consist of the addition of either carbon dioxide (CO_2) to lower pH or lime slurry to raise pH at the inlet of the pumps.

5.2.2.3 Spill Collection System

When process flows from the mill are outside of the tolerances of the ETF to handle, the systems will be protected with the use of the new 35,000 m^3 raw effluent spill basin that adds 10 to 13 hours of full mill effluent diversion, assuming the spill basin is kept empty other than during upset conditions. This new spill basin is to be constructed in the low-lying area north of the existing ash pond and east of the mill gate/parking areas. Two of the four walls of the earthen basin will be largely in place with fill required for the remaining two. The basin walls will be earthen with a 2:1 slope. The inside of the spill basin will be covered with a 1.9 mm thick HDPE liner to avoid leakage. A ramp will descend into the basin to empty accumulated solids should the need arise.

Flow will be diverted from the effluent pump lift station in one of two ways:

- Pumped:
  - In cases where effluent flow is slightly out of range in terms of flow, temperature or loading, a percentage of the effluent can be diverted via a 0.3 m line branching from the 0.9 m line headed to the ETF. This 0.3 m line will join the 1.0 m gravity overflow line that runs north along the east side of the lift station towards the new raw effluent spill basin;
  - This system can also be used to cycle warm effluent in the winter to maintain proper levels and avoid freezing of the basin and pumps.

- Overflow:
  - The forebay of the effluent pump lift station will be modified to add an overflow weir at level 8.8 m. This will overflow to a new small sump that is drained via a 1.2 m gravity line to the spill basin.

The overflow will allow the untreated effluent to drain to the spill basin, but not to overflow into the ash pond which is at 9 m elevation;

- Diversion via the overflow will occur when the operators decide to shut the lift pumps or should any failure occur with the lift pumps;
  - The overflow will be located after the existing and newly planned bar screen to ensure that large particles do not enter the spill area.

The spill basin should never be kept full, since it would then have no capacity to absorb any system upsets. The moment the ETF is capable of reintegrating the effluent into treatment, vertical lift pumps located in the raw effluent spill basin will direct effluent back to the mill forebay for pumping back to the ETF.

5.2.2.4 Primary Clarifier

Initial clarification will be provided by a single clarifier. Clarification is the removal by gravity of easily settle-able solids. The clarifier will be circular with a central-drive with a standard segmented blade, with multiple rakes slowly directing the settled solids to a central hopper. The primary clarifier will be of durable construction (concrete). Peak influent TSS loads (resulting from process upsets and mill shutdowns), will result in a thick layer of dense sludge at the bottom of the clarifier. For example, instantaneous TSS peak concentrations of up to 2,350 milligrams per litre (mg/L) may be expected, with typical operations of TSS in the range of 300 mg/L and higher. The TSS settles into a thick, dense and heavy sludge blanket, resulting in a very significant torque on the clarifier drive when pushing the sludge to the collection pit. The central drive mechanism will provide appropriately high torque, to be able to move the dense sludge to the central collection point.

The new circular primary clarifier will be constructed partially above ground (approximately 1 m height above ground surface, 56 m diameter and 5.5 m total depth with open top) and will receive the unclarified (feed) raw effluent and facilitate removal of primary sludge. Sludge will be drawn from the centre of the clarifier and pumped to an enclosed sludge storage tank within the treatment compound. Sludge will be removed on a regular basis by the operator to suit raw effluent characteristics. This has a two-fold effect in reducing potential for odour generation and decreasing strain on equipment. The sludge will be used as a fuel for the NPNS power boiler.

5.2.2.5 Clarified Effluent Cooling

Prior to introduction to the aeration basin, the wastewater will need to be cooled to ensure proper biological treatment. The effluent cooling system will use cooling towers in a closed-loop cooling system design. This closed-loop approach eliminates odours from the cooling towers, significantly reducing clogging of the tower fill and allowing for a more compact and efficient cooling tower system. The system will include multiple cooling loops, each including a cooling tower, a heat exchanger, and a recirculation pump connected to one common cooling water holding pan. The water volume and water

quality within the cooling loop is managed from this pan. Make-up water is required to compensate the water losses due mainly to evaporation, but also for blow-down or purging.

5.2.2.6 BAS™ Process

The BAS™ process is designed for a soluble COD (sCOD) removal efficiency of 70%. Based on an inlet sCOD of 1,000 mg/L, the BAS should remove 700 mg/L of sCOD.

MBBR System

MBBR technology is based on attached biomass growth (also known as fixed films or biofilms). In MBBRs, the biofilm grows on small plastic "carriers", which are designed to provide a large surface area within a small volume. The carriers are submerged in the wastewater, into which the wastewater enters at one end and treated discharge exits at the other (through stainless steel sieves which keep the carriers in the tank). Biomass accumulated on the carriers sloughs off due to turbulence in the tank, automatically regulating biofilm thickness. Sloughed biomass exits with treated effluent, and is removed in a downstream clarification step. A manufactured coarse bubble aeration system will disperse air at the bottom of the tank, providing oxygen to the biomass and mixing of the carriers (refer to process flow diagram – **Drawing-1).**

The MBBR system is designed to remove the easily biodegradable fraction of the sCOD, which is usually about 40% of the sCOD on a Kraft mill wastewater at mean flows.

AS Aeration Tank

Downstream biological treatment occurs in fully aerobic AS system. The location of the tank is noted on Figure 5.2-1. It will be partially below ground and will have an open top. A coarse bubble aeration system will be installed to cover the floor of the aeration tank. A coarse bubble aeration system ('blower system') provides ease of maintenance, while using high efficiency blowers for energy efficiency. The blower system is based on running three large units in parallel, with a fourth unit provided as a standby blower. The three operating blowers all feed a main header which also feeds the MBBR reactor and aeration tank with a separate line.

Following this process, the aeration tank effluent will go to a flow splitter box, where flow must be divided into two streams of 50% of the total flow. Each 50% stream will be fed to a designated secondary clarifier.

Process Chemical Requirements

The effluent treatment process requires the use of chemicals: mainly nutrients (nitrogen and phosphorus) to support biological growth, and acid and sodium hydroxide for pH control.

Nitrogen is the main limiting nutrient, and dosage is required continuously. Urea is proposed as the nitrogen source. Phosphorus requirements are much lower, and there will be sufficient phosphorus

available in the plant raw effluent to support growth under average conditions. Additional phosphorus would only be required under peak COD load. Sulfuric acid will be used to decrease pH (under 8.0, to target 7.0 to 7.5) to prevent any risk of calcium carbonate ($CaCO_3$) precipitation. These chemicals are added to the feed stream from points located within ETF buildings.

An anti-foam agent system will also be installed and available for use, if required. Foam tends to be more prevalent within the MBBR portion. Airlift foam showers are provided to help keep foam low using mechanical energy rather than chemical dosages.

5.2.2.7 Secondary Clarifiers

The effluent from the AS aeration tank will be piped (by gravity) into two, open-topped, circular secondary clarifiers as noted on **Figure 5.2-1**. The secondary clarifiers are suction header-type with central drive. Suction headers allow for a low sludge blanket, reducing solids entrainment to the effluent and fast sludge collection and return to the aeration tank.

Biological solids will be removed in a similar manner as the primary clarifier. Most of the biomass will be directed back to the inlet of the biological treatment system as Return Activated Sludge (RAS) to maintain treatment operations. The effluent will be retained in the secondary clarifiers to allow remaining biomass to settle out of suspension. Waste Activated Sludge (WAS), excess to that required for biological treatment, will then be pumped to the sludge management system.

5.2.2.8 Sludge Management System

Waste process sludge from primary and secondary treatment (clarifiers) will be sent to a single sludge holding tank located within the AST building.

Generally, sludge dewatering performance is directly linked to the fiber content of the sludge, with higher fiber content (primary solids) leading to dryer cake and better solids capture rate. This is especially true for pulp and paper effluents, as these wastes could contain a significant fraction of fibers.

A rotary press system will be employed, which is based on an operation that pumps the mixed sludge from the sludge holding tank directly to the rotary presses, without prior thickening. When solids enter the system, pressure increases as they move slowly through a tapered channel. Friction intensifies as the solids compress against two rotating filter screens. Filtrate (liquid) takes the path of least resistance and drains through the screens. The dryness of the resulting solid cake varies per application, but averages up to 40% on pulp and paper wastewater treatment sludge dewatering applications.

From the rotary press, sludge will be transported to the mill's existing power boiler for combustion, where it generates heat and steam for use in the mill processes. Burning sludge in this manner reduces the potential for methane emissions from the ETF process and partially displaces the use of fossil fuel that would otherwise be burned in the power boilers for energy production.

5.2.2.9 Effluent Quality

The maximum effluent flow rate of 85,000 m^3/day was used for the analysis of effluent water quality following treatment. The highest flow rate represents the most challenging conditions for plume dispersion at the discharge point and is therefore considered to be worst case. Flows lower than the maximum daily effluent flow will result in improved mixing. The current annual average flow is 63,600 m^3/day for comparison. The below **Table 5.2-1** outlines both expected daily maximum effluent quality and expected monthly average effluent quality results.

Table 5.2-1: Anticipated Daily Maximum Effluent Water Quality (reprinted from Stantec 2018, Table 3.2)

Parameter	Unit	Value
Adsorbable Organic Halides (AOX)	mg/L	7.8
Total Nitrogen (TN)	mg/L	6.0
Total Phosphorus (TP)	mg/L	1.5
Colour	TCU	750
Chemical Oxygen Demand (COD)	mg/L	725
Biochemical Oxygen Demand (BOD_5)	mg/L	48
Total Suspended Solids (TSS)	mg/L	48
Dissolved Oxygen (DO)	mg/L	>1.5
pH	-	7.0 to 8.5
Temperature	°C	25 (winter) 37 (summer)
Total Dissolved Solids (TDS) or Salinity	g/L	4

5.2.2.10 Hazardous Material Use and Storage

The effluent treatment system will require several chemical inputs, including urea, phosphorus, sodium hydroxide, sulfuric acid and an anti-foam agent to support its process. These chemicals will be stored at the project site in a restricted and secure area.

5.2.3 Transmission Pipeline

The transmission pipeline will be a 36 inch (900 millimetres (mm)) diameter high density polyethylene (HDPE) pipe, and will extend approximately 15.5 km from the NPNS facility location in Abercrombie to a marine outfall location in the Northumberland Strait, near Caribou.

The HDPE pipe will be made from a polyethylene resin compound as defined by ASTM (American Society for Testing and Materials) 3350. In order to ensure quality, the pipe will be designed in accordance with the relationship of the ISO (International Organization for Standardization) modified formula stated in ASTM F714. The material used in the manufacture of the pipe will be inspected and tested by the

manufacturer for verification of the resin supplier's adherence to the materials specification as per ASTM'S specification for density, melt flow rate and thermal stability.

HDPE was selected for its flexibility to reduce the need for mechanical bending ('fittings' which are prone to leaks) of the pipe over the length of the pipe. The pipeline will need to adapt to the change in elevation of the terrain, for example to move under existing road infrastructure or at the land-marine transition. HDPE is also an inert material, which means it does not react with nor age and degrade because of the materials it contains or its surrounding environment (e.g., aggressive soils or acid rock). HDPE is an 'industry standard' (best practice) and commonly used for applications that require a long service life and must be low maintenance.

HDPE like other prefabricated pipe materials are produced to a certain length in order to allow for transport to site. The joints where two pieces of pipe are joined together will be heat fused for this project. Fused joints do not leak, and create a strong seal that industry testing has shown to be as strong and durable as the pipe itself. During construction joints will be tested before the pipe sections are buried.

HDPE is well suited to Nova Scotian climate, and the marine application portion of this project. It is able to perform under hot and cold climates when other pipe materials are known to crack or be more prone to damage (Plastic Pipe Institute, 2019).

One or more vent stations will be installed along the pipeline route. Final engineering design will determine the number required and their approximate locations. The stations are typically fitted at the highest points on a pipeline and will typically contain air-release vent valves (designed to relieve air above ground surface), vacuum breaker valves and inspection entry ports. Vent valves are required to continually release air that builds up during start-up and normal system operation to maintain flow and pumping energy efficiency. Vacuum valves draw air into the line to ensure that vacuum conditions do not exist in the line during start-up or shutdown conditions. Specifications for the air release valves and vacuum valves, as well as their locations, will be determined during the detailed design phase. A drain valve will be installed at the beginning of the line near the pump station at the ETF. The need for any additional drain valves along the route will be determined during the detailed design phase.

5.2.3.1 Land-Based Pipeline Portion

The pipeline will begin on land at a pump station where treated effluent from the secondary clarifiers at the ETF is pumped into the pipeline. Pumping will be required to overcome static pressure exerted on the pipeline to achieve proper dispersion of the treated effluent at the outfall. Pumping will also be required to overcome forces of gravity in order for treated effluent to reach the outfall. This facility will operate in a similar manner to municipal pumping stations.

The land-based pipeline portion extending from NPNS property to the edge of shore at Caribou Harbour, will be approximately 11.4 km in length. The pipeline will be buried for the majority of the route. Based on the proposed design there will be one area where the pipeline will be exposed to cross the spillway of the Pictou Causeway, where it will be suspended and attached to the exterior of the bridge due to limited roadway width. The exposed area will be protected from damage by existing guide rails.

For approximately the first kilometre of the pipeline, the pipe will be located on NPNS property. The pipeline then moves across NPNS property and enters NSTIR's Highway 106 (Trans-Canada Highway, also known as Jubilee Highway) ROW at the northwest corner of NPNS property. The pipeline then follows Highway 106 north to Caribou.

The pipeline will be installed generally parallel to Highway 106, within the outer portion of the developed road shoulder. It will be situated on the south side until it reaches the Pictou roundabout. Utilizing horizontal directional drilling (HDD) or other boring method to avoid traffic and roadway disturbance, it will be constructed under the roundabout crossing to the north side of the road, and continuing there for the remaining extent of the land-based portion. HDD or other boring methods, or open cut crossing methods will be used for pipeline crossings of local public roads and driveways as required.

The pipeline will stay within disturbed portions of NSTIR's road right-of-way (Highway 106) until it reaches Caribou Harbour and enters the marine environment, immediately to the west of the Northumberland Ferries marine terminal building and parking areas.

5.2.3.2 Marine Pipeline Portion

The marine-based portion of the pipeline will be approximately 4.1 km in length. The pipe will enter the marine environment to the west of the Northumberland Ferries marine terminal (see **Figure 5.2-2**). Once within the marine environment, the treated effluent pipe will be generally aligned to the northeast, and will extend to the outfall location. The treated effluent pipeline will be buried, adjacent to and west of the navigation channel for the Northumberland Ferries. To counteract the buoyancy of HDPE, the marine pipe must be weighted down using concrete collars. It is anticipated that the marine portion of the pipeline will be placed in a trench, backfilled with existing material (refer to construction details presented in **Section 5.3.1.10**). Armour stone may be used to cover sections of the buried pipeline, to be confirmed in detail design.

At the end of the pipeline will be the 'outfall location'. The engineered design of the outfall is described in **Section 5.2.4** below.

5.2.4 Outfall and Diffuser

The marine outfall location describes the area where the treated effluent will be released into the Northumberland Strait. The outfall location will be approximately 4.1 km to the northeast of the Northumberland Ferries marine terminal.

The transmission pipe will end at what is called the diffuser. A diffuser is a length of pipe designed with a number of separate outlets spaced along it, so that desired dilution ratios are achieved to improve mixing. The diffuser is a section of HDPE pipe that will turn from the end of the transmission pipeline to be aligned perpendicular to the predominant flow direction of the Strait in that location. The diffuser pipe will be approximately 50 m long, with three outlets ('ports') spaced 25 m apart. Each port will be a 0.3 m diameter connected to a 1.0 m tall riser pipe with an elastomeric duckbill check valve opening at the end. The duckbill opening will prevent intrusion of sea water, sediment, and other materials back into the diffuser. The outfall will be capable of conveying discharge up to 85,000 m^3.The peak discharge velocity is calculated to be 4.6 m/s from each port. The proposed design assumes the diffuser pipe will sit on a rock mattress, and armour stone protection would be extended up the riser pipes to an elevation below the diffuser ports.

The main function of the outfall diffuser is to distribute treated effluent into the receiving water body such that desired dilution ratios are obtained. The spacing and sizing of ports for the diffuser will achieve an approximate 144:1 dilution ratio. The diffuser is designed to generally distribute flow equally across each diffuser port to achieve uniform diffusion.

5.3 Description of Project Phases and Activities

The phases of the project are identified as construction (including commissioning), operation and maintenance, and decommissioning (ETF closure). The activities associated with each phase, are provided in this section.

5.3.1 Construction Phase

The construction phase will be initiated following the receipt of EA approval and the receipt of all additional required permits, approvals, licenses, authorizations, or leases for the project (see **Section 3**).

Throughout the construction phase, environmental monitors will enforce the construction specifications, site-specific environmental mitigation measures contained in the project Environmental Management Plan (EMP), and any conditions imposed by regulatory authorities.

The EMP will be completed with the detailed engineering design. The EMP will serve as an umbrella document that includes information such as the Waste Management Plan (WMP), EPP, and the Emergency Response and Contingency Plan (ERCP), as well as other key planning documents. Applicable best practices, restrictions and details from the EMP will be included in the construction drawings so that construction methodology is in compliance with the EMP.

A high-level description of each of the construction activities associated with the construction of the project is included here, identifying general environmental restrictions as is reflective of engineering design completed to date. These descriptions assume the "outer envelope" or conservative estimate of the scope, footprint, and environmental effects of the project, so as to not understate the potential environmental consequences of the project at this planning stage. The project will ultimately be built and operated within the outer envelope as presented in this EA Registration document.

5.3.1.1 Subject Properties

All construction related activities for the ETF plant itself and initial 1 km of pipeline will be within NPNS property boundaries. The majority of the land-based portion of the pipeline will run immediately parallel to Highway 106, within the developed portion of the road shoulder. All site work and project components will stay within disturbed (routinely maintained) areas of NSTIR's ROW until reaching Northumberland Ferries marine terminal and TC property. The transmission pipeline construction area will intersect several existing public and private roads. It is anticipated that access to the construction areas will be from Highway 106, as well as intersecting roads. For the land-based activities (i.e. ETF construction and land-based pipeline portion), the main temporary work area (i.e. equipment and staging areas) will be located at the NPNS property.

For marine-based activities (i.e., marine-based pipeline portion and outfall), the main temporary workspace (staging area) for the marine contractor will be located on the north side of NPNS property, adjacent Pictou Harbour. Pipeline assembly and diffuser component fabrication activities will be undertaken at the NPNS project site, deployed into the water directly from the land-based portion of the staging area, and floated through Pictou Harbour around to the Caribou Harbour portion of the PFA. The marine-based staging area to accommodate temporary pipe storage and project vessels will be located immediately adjacent the land-based work area. This staging approach minimizes disruption around and interference to the Northumberland Ferries terminal.

5.3.1.2 Engineering Survey and Utility Location

Prior to final design and construction, a survey crew will survey and stake the boundaries of the new ETF and the pipeline route, as well as all temporary work spaces and access routes required for construction purposes. The marine-based portion of the project will be surveyed when permitted by weather and/or marine traffic.

Following site surveys, all utilities (e.g., telephone lines, power lines) will be located. Buried services will be "daylighted" if there is any confusion in their location. Temporary and permanent environmental buffer areas will also be marked in the field.

Geotechnical investigations will be required to determine final design details for both terrestrial and marine pipe installations.

5.3.1.3 Vegetation Clearing

Vegetation clearing consists of removing trees, stumps, and brush to allow access for construction. Most of the PFA is clear of substantial vegetation. However, clearing will be required for the following:

- NPNS mill and Canso Chemicals access road relocation;
- at the ETF facility, including the locations of the aeration basin, the primary clarifier, both secondary clarifiers and process pipelines;
- spill basin;
- transmission pipeline on NPNS property;
- staging area for marine components on north side of NPNS property ; and
- adjacent to Highway 106 as required in sections to accommodate construction activities, anticipated to be predominately within the existing zone of maintenance vegetation clearance undertaken by NSTIR.

Along Highway 106, clearing will be limited to pre-disturbed areas to allow for adequate spacing for pipeline installation and road shoulder/embankment re-establishment. Any required vegetation clearing will be defined by staking installed during site preparation activities. It is anticipated that land clearing adjacent to the developed portion of Highway 106 will not exceed a 10 m width, and in most areas will be considerably less.

Vegetation clearing will be completed primarily by using mechanical brush cutter and mulcher attachments on standard forestry type equipment, which is consistent with current highway maintenance practices in this area. Heavy duty mechanical methods may be supplemented by manual methods (e.g., chain saws, brush saws). Vegetation will be maintained along wetlands and watercourses buffers as much as possible, and where necessary (e.g., near wetlands and drainages), clearing will be conducted manually and permits will be obtained, where required.

Clearing activities, to the extent possible, will be conducted outside of mainland Nova Scotia's typical bird breeding season (early April to end of August) to prevent the undue disturbance of migratory birds or their nests (including those that nest in trees as well as on the ground), as per the MBCA. If clearing is required within this season, ECCC-Canadian Wildlife Service (ECCC-CWS) will be consulted and mitigation developed that meets MBCA requirements. This may include survey of these areas by trained avian species specialists to determine if nesting is occurring within these areas, and any nests flagged for avoidance will be avoided until the young have fledged prior to any construction activities.

Erosion and sedimentation control techniques will be employed throughout the vegetation clearing phase as well as for subsequent construction activities discussed below, as required, to minimize erosion of exposed areas and sedimentation in surface water runoff in the PFA (refer to **Section 8.4**). Application of site-specific sediment and erosion control measures is required whenever a 30 m buffer is not maintained to watercourses and wetlands; this requirement will be identified in the EMP/EPP with site-specific recommendations. Sediment and erosion control measures proposed by the contractor will adhere to NSE requirements. Dust suppression will also be employed during vegetation clearing

activities to minimize the potential environmental effects of fugitive dust to offsite locations (refer to **Section 8.1**).

Although not anticipated based on current project design, any merchantable timber will be salvaged during clearing activities and NSTIR will be compensated for trees removed on their property. No open burning will be permitted.

5.3.1.4 Grubbing and Grading

Grubbing includes the removal and disposal of stumps and roots remaining after vegetation clearing. It is not anticipated that grubbing will be required along the land-based portion of the pipeline corridor installed in the developed portion of the road shoulder, which consists predominately of fill material. However, grubbing is anticipated on NPNS property.

Grubbing will be conducted using a skidder or bulldozer to remove the roots and stumps of cleared vegetation. Grubbings will be stored within the defined PFA in inactive areas and used as fill material during construction. Any grubbings will be buried at pre-selected locations and away from watercourses and other sensitive environmental features. Selection of these locations will be done during detailed design in compliance with leaf and yard waste disposal as defined in the Nova Scotia Solid Waste-Resource Management Regulations.

Grading consists of the stripping and conservation of topsoil and development of the base (including proper sloping and sub-base material selection) for construction activities. A central part of preparing any area for construction activities, grading will occur for the ETF components as well as pipeline construction.

Environmental control measures such as sediment fencing, ditching diversion, or other site-specific erosion and sediment control measures will be installed by construction crews prior to commencement of grading activities. Where required, graded areas will be grubbed and topsoil stripped and stockpiled for reuse. The grading crew will conserve the topsoil such that different soil types are not mixed, and appropriate signage will be applied to stockpiles. The conservation of topsoil is important for the successful restoration of certain soils that may be disturbed by construction, and will be salvaged and stored separately from subsoil.

5.3.1.5 Effluent Treatment Facility Construction

To support construction of the replacement ETF, it is anticipated that temporary work space will be located adjacent the new ETF site, since the area is currently vacant, has an access road and is readily available for this purpose. Temporary facilities that will be required for construction personnel and equipment include:

- material laydown areas;
- contractor/material gate house and parking;

- fencing, lighting and security;
- contractor trailers including canteens and washrooms; and
- construction management including site engineering.

The replacement ETF construction footprint will be entirely within NPNS property, and will likely be fenced-in with its own security entrance and materials receiving area. To facilitate construction of the new ETF components, the site will be cleared of all existing vegetation, which includes grasses, shrubs and trees. Following vegetation removal, general excavation and grading for the primary clarifier, two secondary clarifiers, the aeration basin, the process building, and a temporary underground effluent by-pass line will also be completed for the existing infrastructure relocation. Engineered approved backfill material and compaction will be used to meet geotechnical specifications, as required. Conventional earth-moving equipment (e.g., dozers, excavators, tandem trucks) will be used. Surface water and erosion control will adhere to project's EMP/EPP and mitigation measures outlined in **Section 5.7.2.3**.

Contractor parking is assumed to be external to any fenced-in area within the existing NPNS parking lot. It is anticipated that all trucking of materials will arrive via the existing mill access road to the security and receiving area.

The existing access road to the Canso Chemicals property will be blocked off and a new paved road will be provided along the side of the new ETF. To facilitate future maintenance activities, granular access roads will be provided around the ETF, where appropriate.

The design of the AST Building expects structural steel braced-frame construction; complete with insulated metal wall panels and galvanized steel roof deck and single ply Styrene Butadiene Styrene (SBS) modified bituminous roof system and 1 m to 2 m high reinforced concrete dado wall running the full perimeter of the building. The reinforced concrete ground floor slab will be sloped to collecting floor trenches where required. Elevated floors will be made of reinforced concrete over galvanized steel decking. The building's major equipment and tank foundations will be of reinforced concrete mat or spread footing.

Interior walls for electrical, heating ventilation air conditioning (HVAC), Lab/Control and Blower rooms will be of masonry construction.

Primary and Secondary Clarifiers will be of reinforced concrete construction, slab on grade, with either cast-in-place or pre-cast walls founded on shallow spread footings. Access platforms for operation and maintenance will be galvanized steel construction with galvanized serrated steel grating.
The Spill Basin will be earth berm construction with an HDPE liner on geotextile and granular base. The south sides of the basin will be formed against the existing ash settling basin and top of berm level will also match existing basin and adjacent plant road elevations. An access ramp will provide access down into the basin for cleaning. Existing stormwater infrastructure will be relocated around the Spill Basin

area. The Spill Basin will be emptied by a pump located in a reinforced concrete intake structure. Access for removal and pump maintenance will be via a steel platform connecting to the concrete structure where a monorail will be used for removal.

5.3.1.6 Replacement ETF Commissioning

Commissioning is the process of a series of tests and verifications to confirm all systems and components have been installed to specification, and operation can begin. Commissioning will be completed by the contractor and main equipment supplier in conjunction with NPNS. Commissioning will first involve confirming installation, controls and operation between the contractor and the manufacturer.

Once certifications from the manufacturer are received, the ETF will be placed in trial mode to confirm operability of mechanical equipment, likely utilizing fresh water, as agreed upon by the manufacturer. This stage of commissioning is typically completed over a period of a few weeks. Water used in testing and commissioning will be disposed of in accordance with NSE requirements. Following the trial period, the plant will be seeded with base organic sludge from an external source and effluent will gradually be introduced to the ETF to develop conditions for long-term continuous operation. These trial operations typically occur over a period of four to six weeks but may be longer depending on temperature and time of year. During trial operations, sludge removal and sludge management dewatering will be optimized.

Commissioning of the pipeline and marine outfall is described in **Section 5.3.1.12**.

5.3.1.7 Pipeline Installation: Land-based Portion

Construction of the land-based portion of the effluent pipeline will require an approximate working area width of 10 m. Along Highway 106, the pipe will be installed in the unpaved shoulder of the developed portion of the road, and avoidance of excavation of the paved portion of the road will be practiced, where possible. In areas where the road shoulder is too narrow for pipeline installation, the pipe will be installed on the slope of the road embankment with appropriate additional granular cover and widening of the road shoulder, as necessary. The pipe may also be installed within a portion of the paved portion of Highway 106 to avoid existing infrastructure (foundation of overpass structures) or environmentally sensitive features. Any altered pavement or road edge slopes will be remediated and/or stabilized.

Along the Highway 106 section of the corridor, one full traffic lane will be temporarily closed to allow pipe installation activities and safety for both road users and construction workers. It is anticipated that no more than 1 km sections of the road will be under lane reduction at any given time.

Typical details for installation are provided in **Figures 5.3-1** to **5.3-16**.

It is anticipated that a boring method will be employed in sections to mitigate impact to traffic flows at major road crossings (e.g. Pictou Roundabout). HDD will be employed to mitigate risk to sensitive

environmental features (see **Section 5.3.1.7**). Boring methods involve excavations on both sides of the crossing to accommodate the boring equipment to operate with adequate space and at the proper elevation. Augers placed in a bore pipe are used to bore beneath the infrastructure to be crossed to avoid disrupting surface features at the site. When the bore pipe exits on the far side of the crossing, the augers are removed, the carrier pipe or casing pipe is attached to the bore pipe, and the bore pipe is pulled back, drawing the carrier pipe or casing pipe into place.

Smaller road crossings, including residential driveways, farm and forest roads will be crossed using an open cut method and/or directionally drilled.

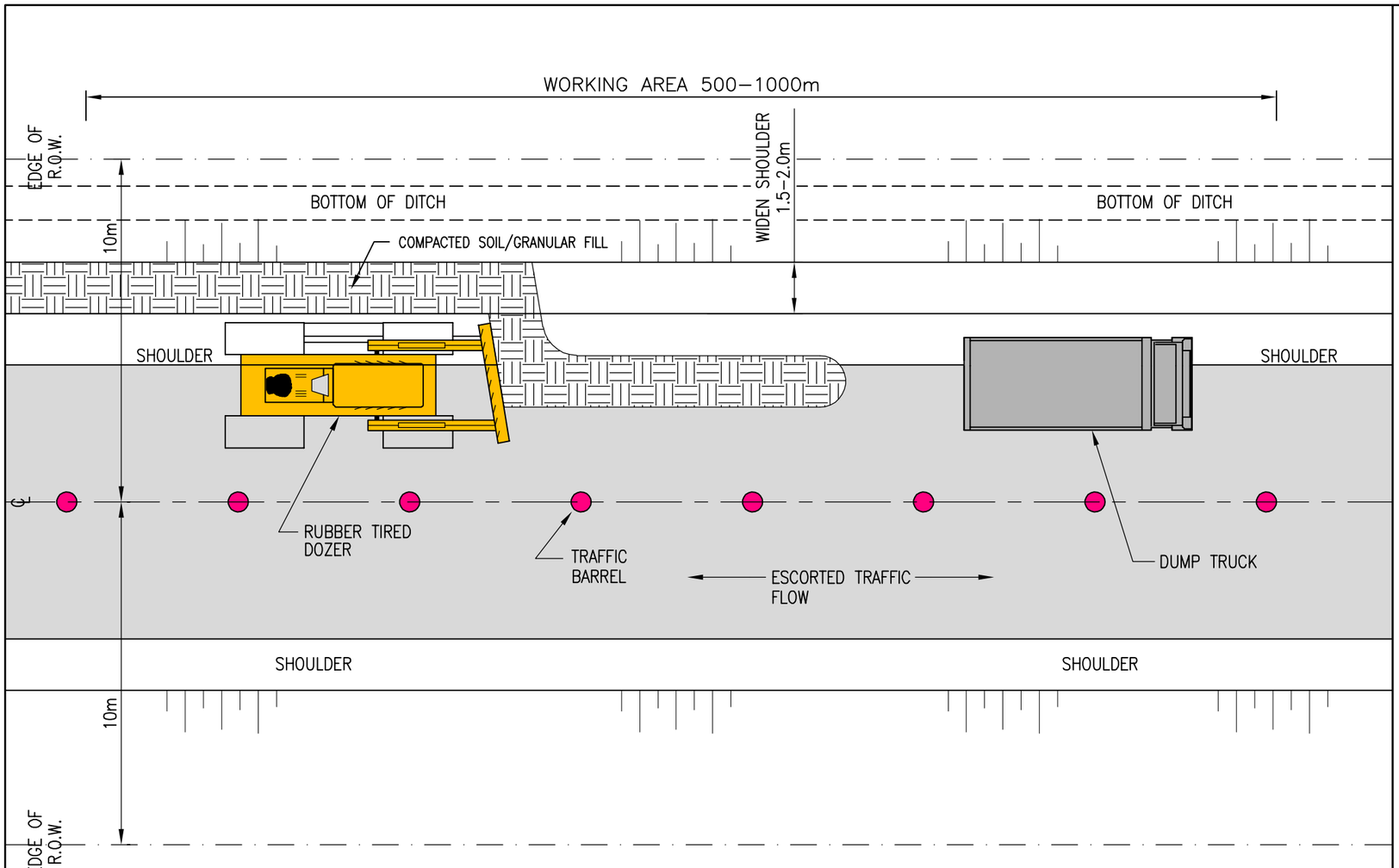
Where trenching, trenches are excavated using backhoes or trenching machines; trenches will be approximately 2 to 3 m wide at the top, and about 2.25 to 2.5 m deep, to provide the required 1 m depth of cover over the pipe. Trench dimensions and depth of pipe burial will be finalized in the detailed design after geotechnical investigations are complete. Pipe sections are lowered into the trench, and backfilling of the trench will commence immediately after the pipe has been installed by using dozers or backhoes. If a road is open cut, the trench is backfilled quickly to restore access and the road surface restored to original cover.

Where water accumulates in the open trench, the trench will be dewatered to a filter bag (and silt basin, where necessary) located, where possible, in a vegetated area removed from watercourses to prevent sediment laden runoff from entering watercourses.

In steep sloped areas, ditch plugs, ROW cross drains, and diversion berms will be installed at regular intervals to prevent trench and surface erosion and promote re-vegetation.

The pipeline trench will be backfilled to the fullest extent possible with excavated soil. Where the backfill material is unsuitable, granular materials will be used around the pipeline. The trench and/or road slopes will be compacted to restore the corridor to the previous grade and to minimize ponding and slope instability.

Pipe sections will be delivered to the ROW by trucks with trailers designed to haul large diameter pipe. The pipe stringing crew is responsible for offloading of the individual pipe joints and positioning them along the edge of the ROW on skids in preparation for connection crews. Where required, the pipe will be bent to allow the completed pipeline to match the contours of the alignment (lateral, vertical and compound deflections). Pipe joints are then fused together.



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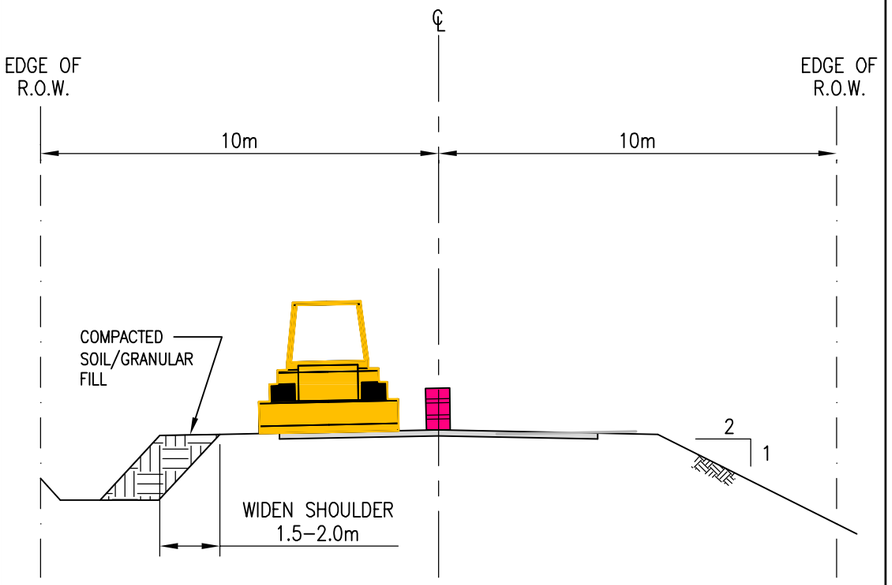

SECTION

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-1
Roadway Shoulder Construction
Activity 1 - Widen Shoulder

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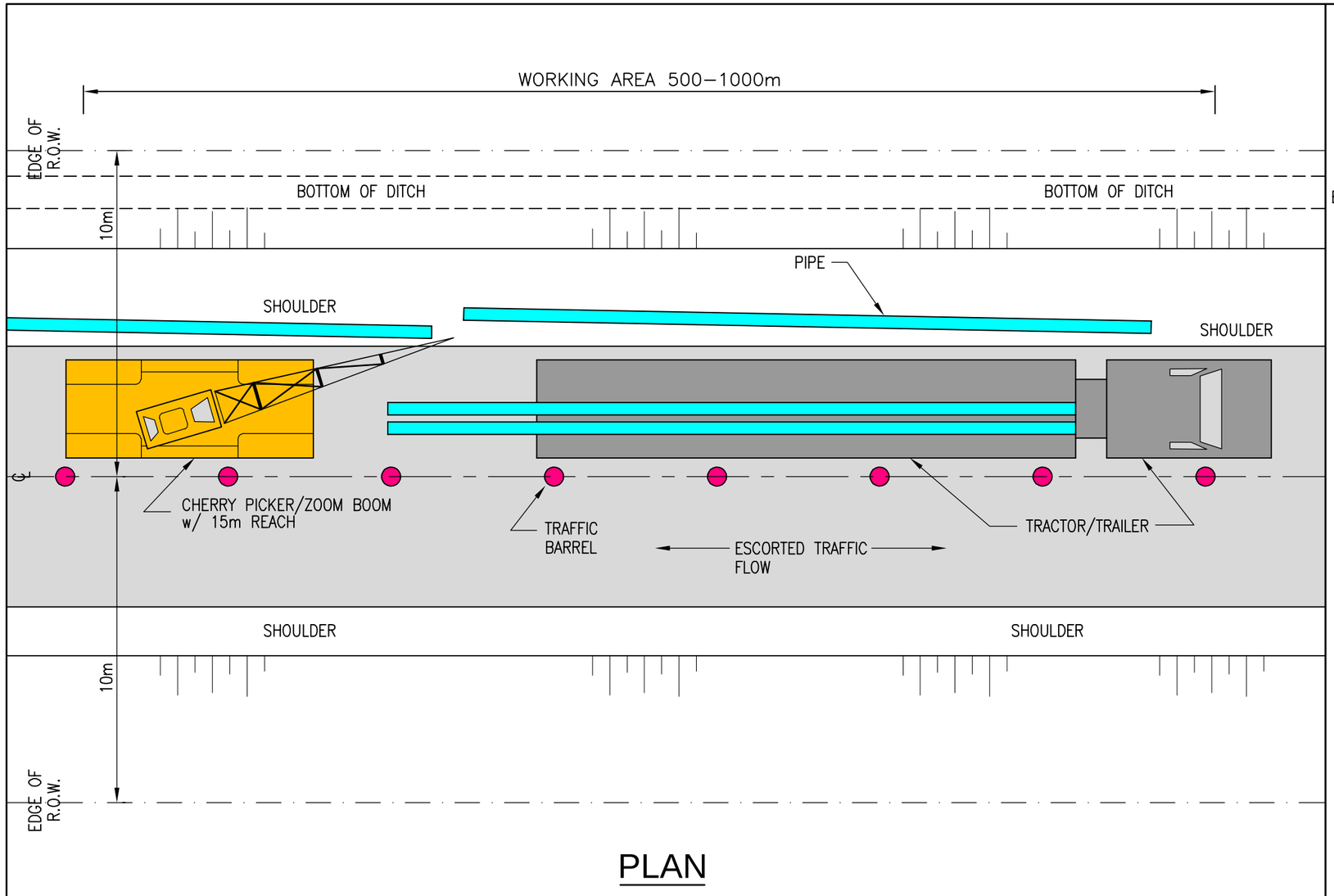

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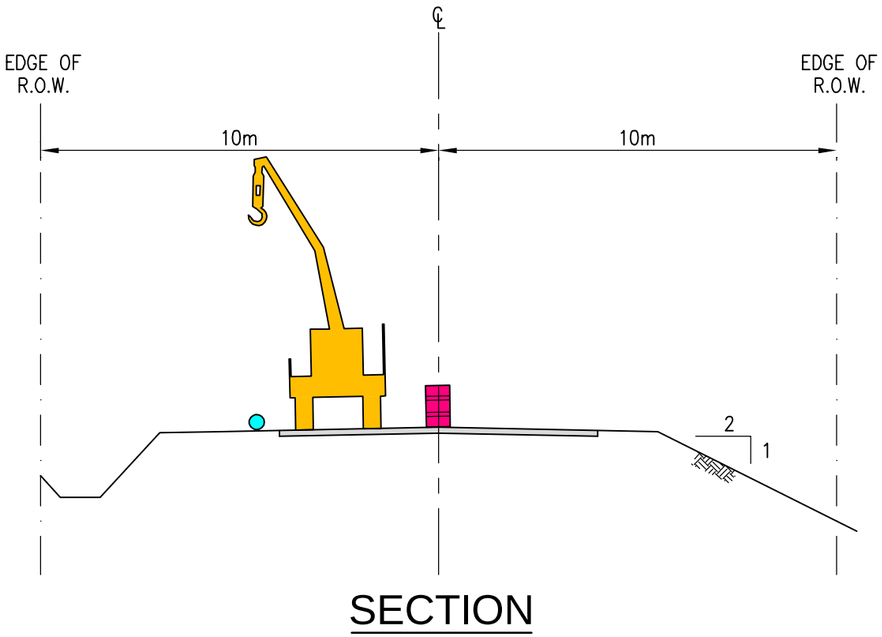

SECTION

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-2
Roadway Shoulder Construction
Activity 2 - String Pipe

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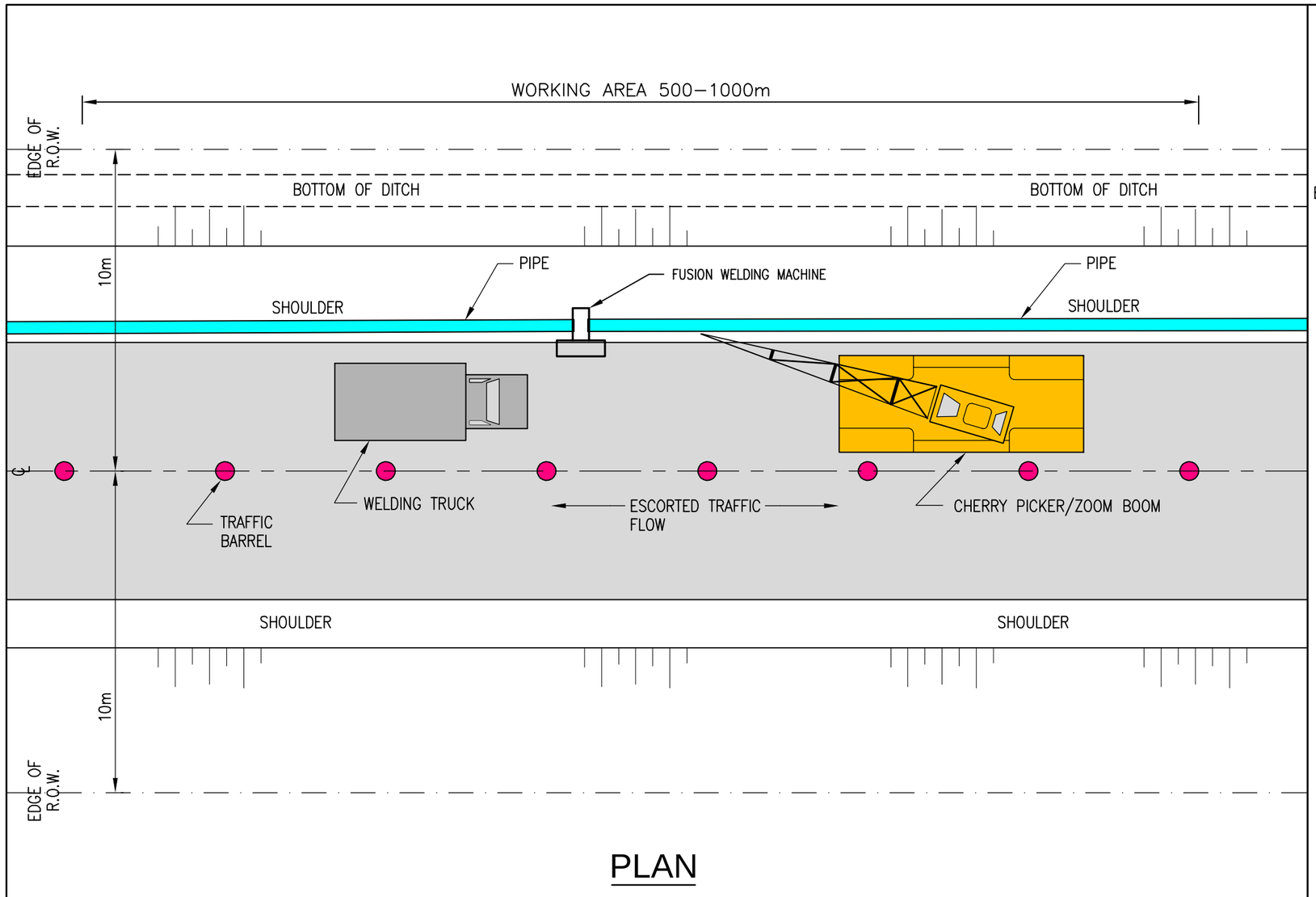

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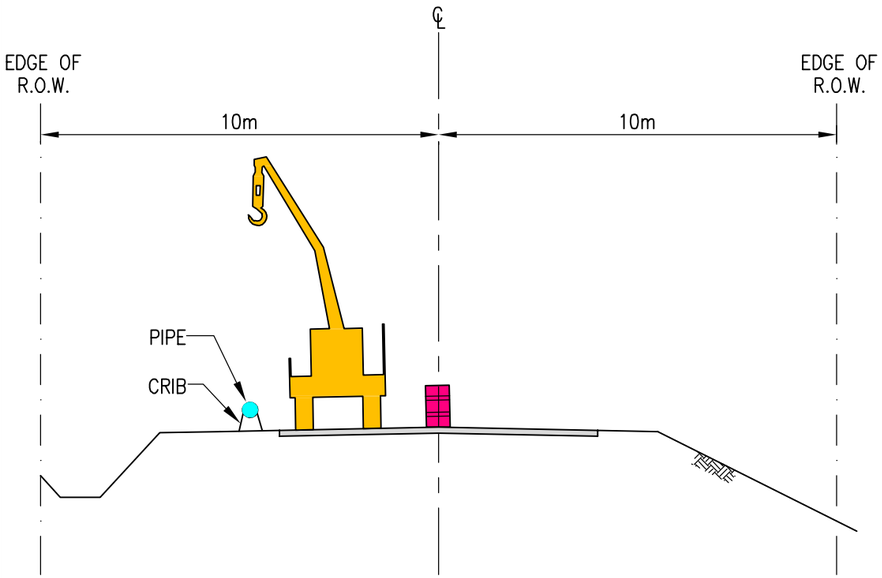

SECTION

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-3
Roadway Shoulder Construction
Activity 3 - Weld Pipe

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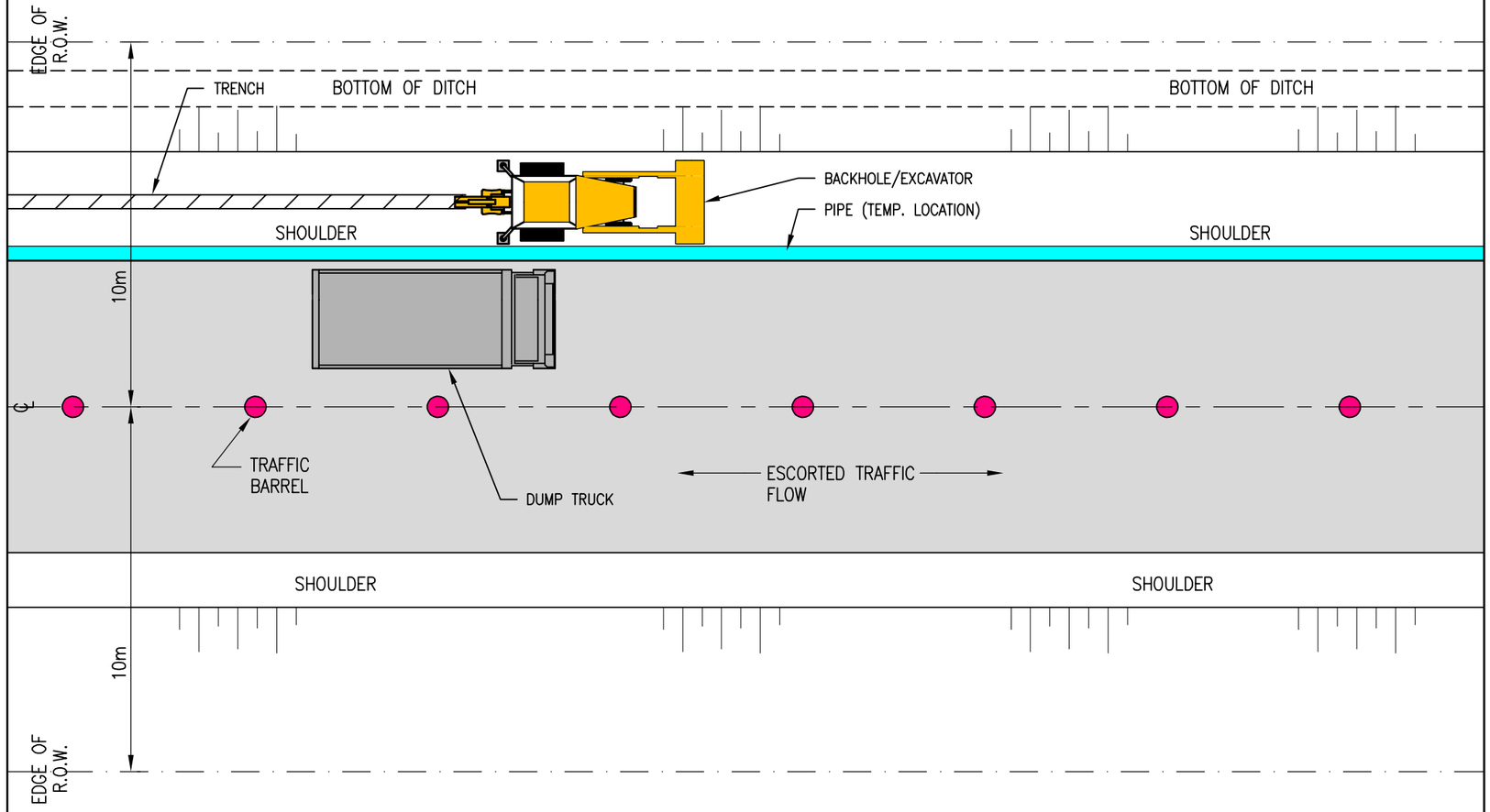

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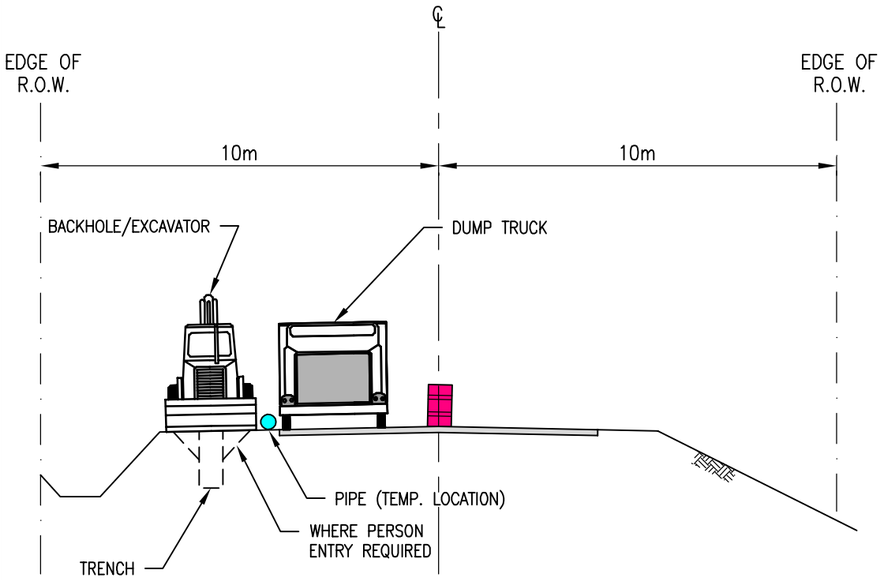

SECTION

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-4
Roadway Shoulder Construction
Activity 4 - Trenching

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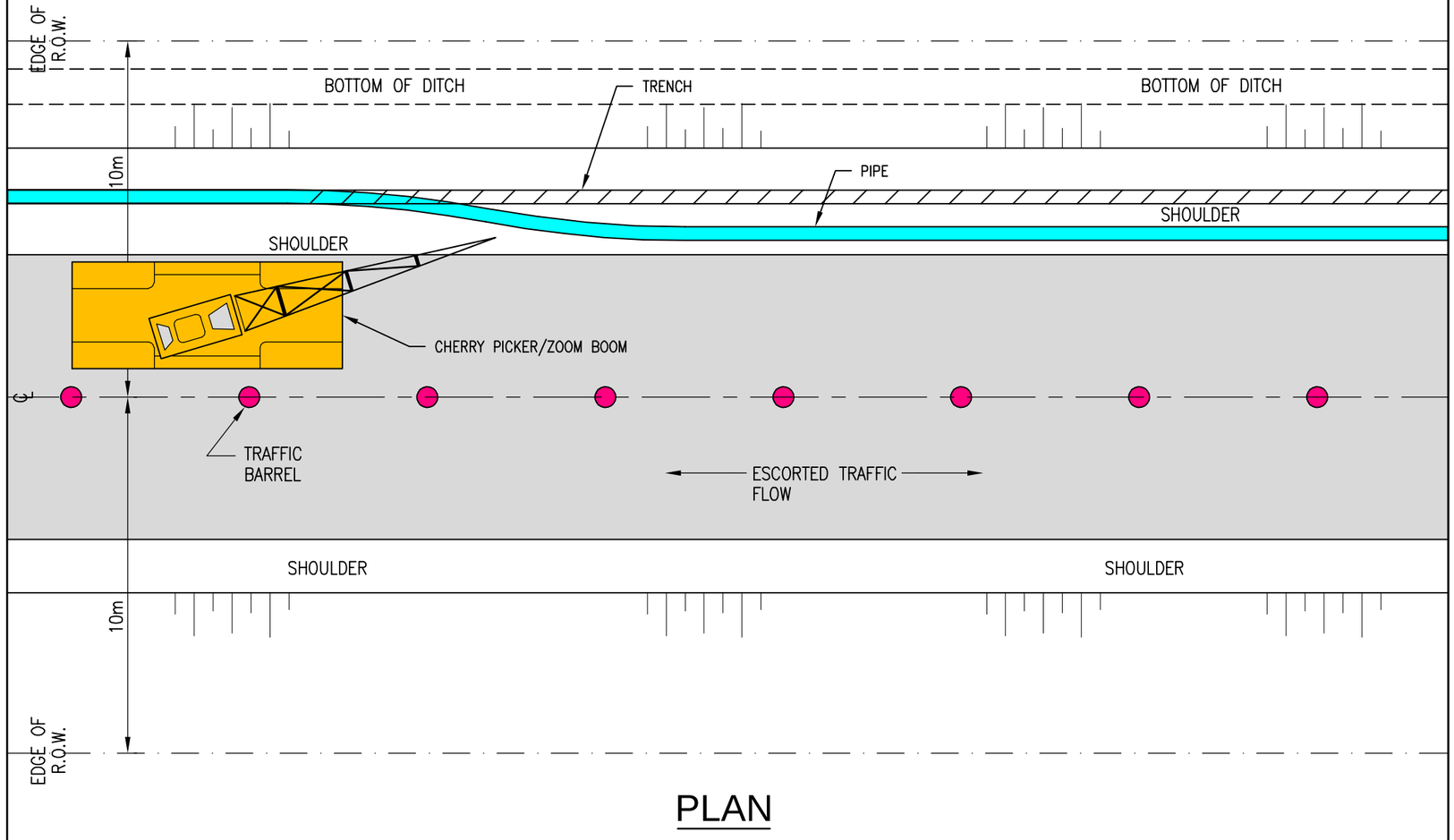

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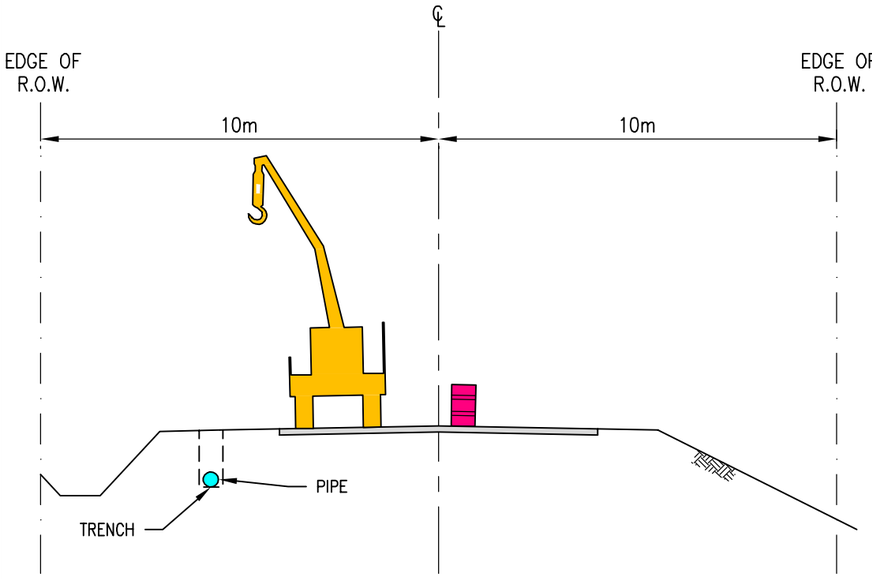

SECTION

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-5
Roadway Shoulder Construction
Activity 5 - Lower Pipe into Trench

NORTHERN PULP
NOVA SCOTIA CORPORATION
A PAPER EXCELLENCE COMPANY

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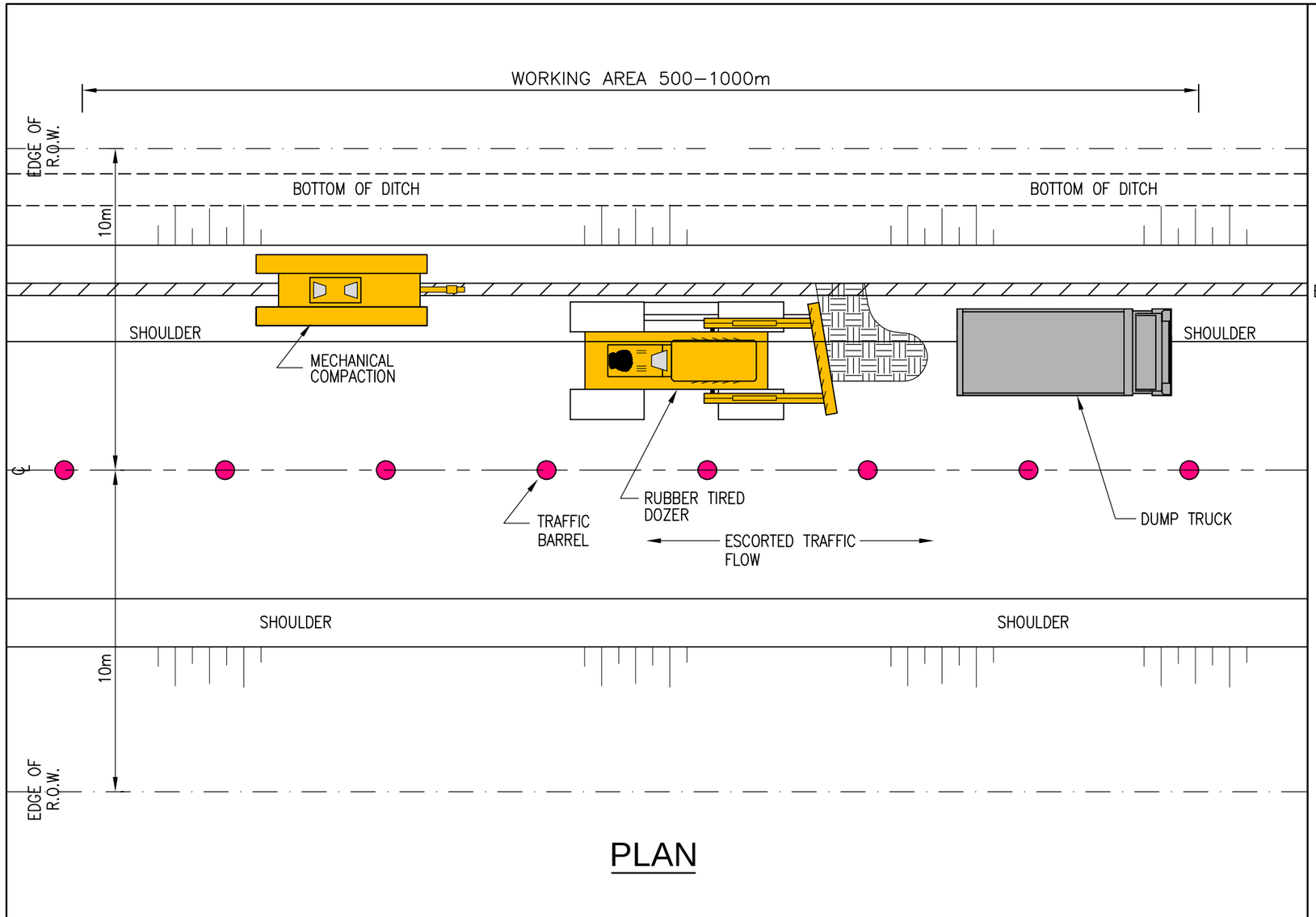

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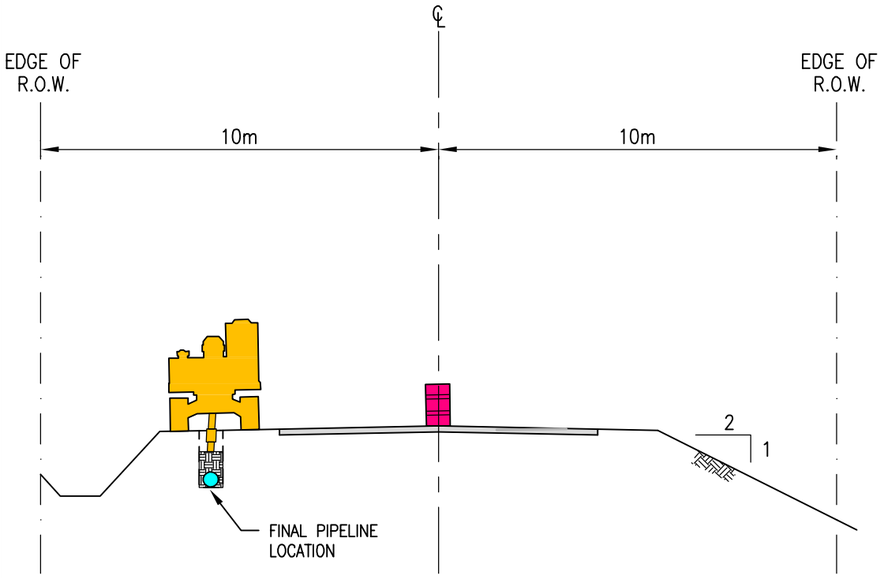

SECTION

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-6
Roadway Shoulder Construction
Activity 6 - Backfilling and Restoration

NORTHERN PULP NOVA SCOTIA CORPORATION
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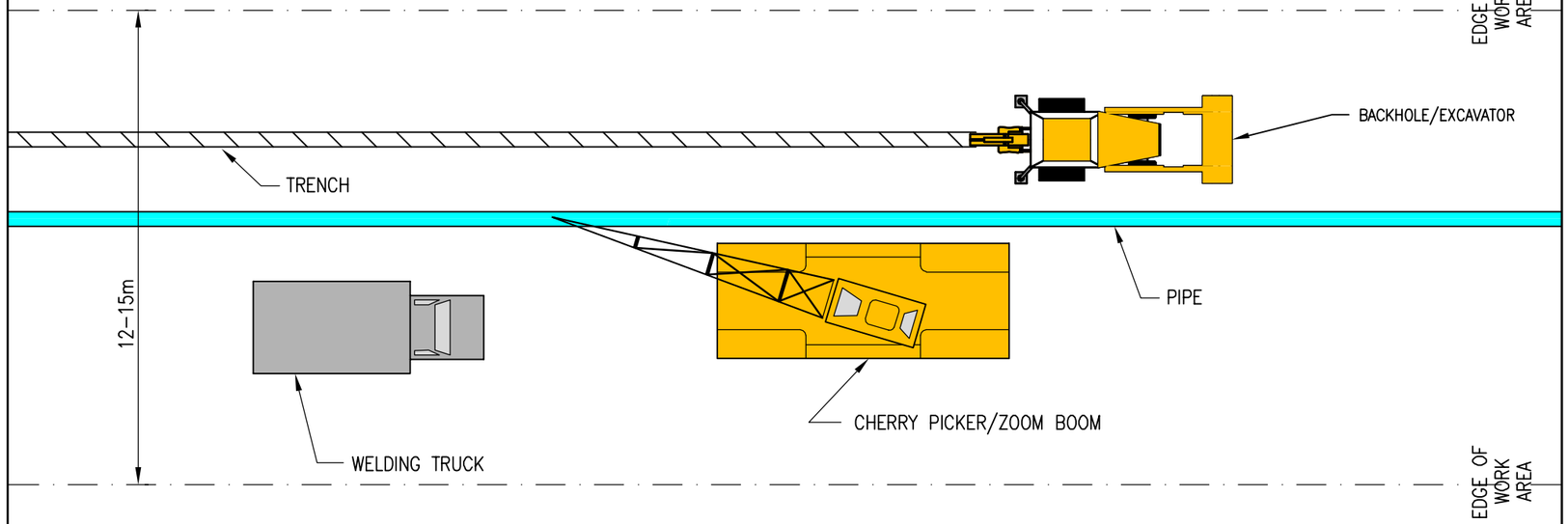

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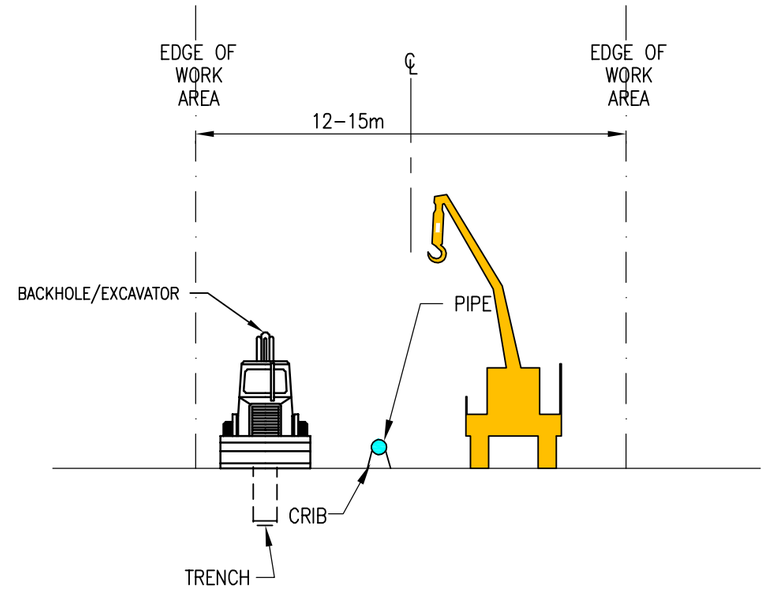

SECTION

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-7
Minimum Work Area

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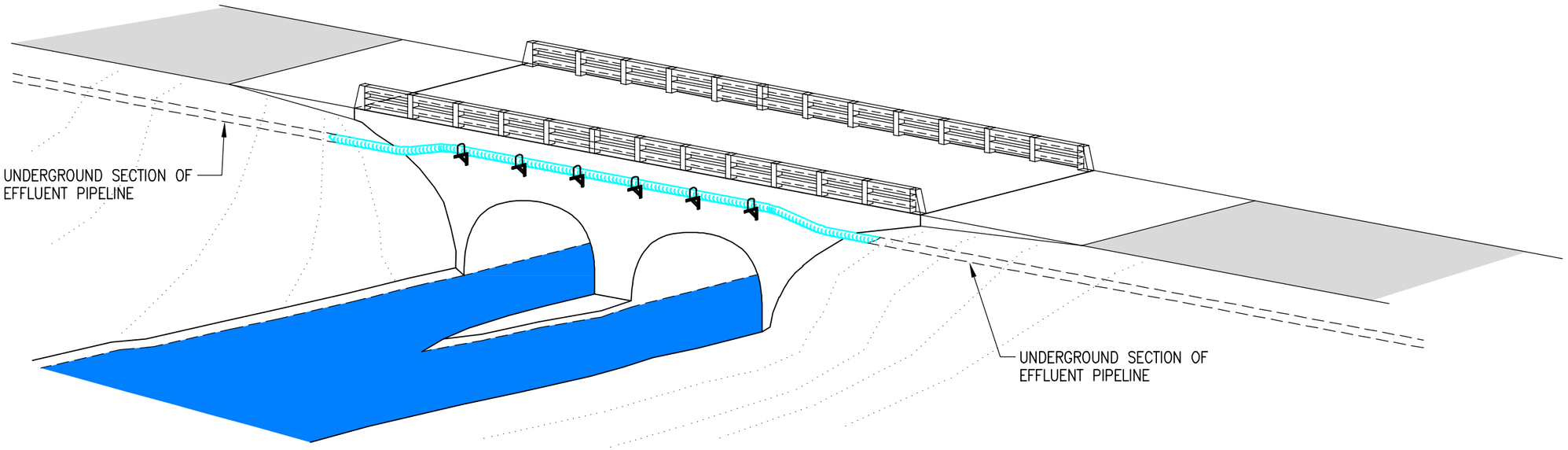
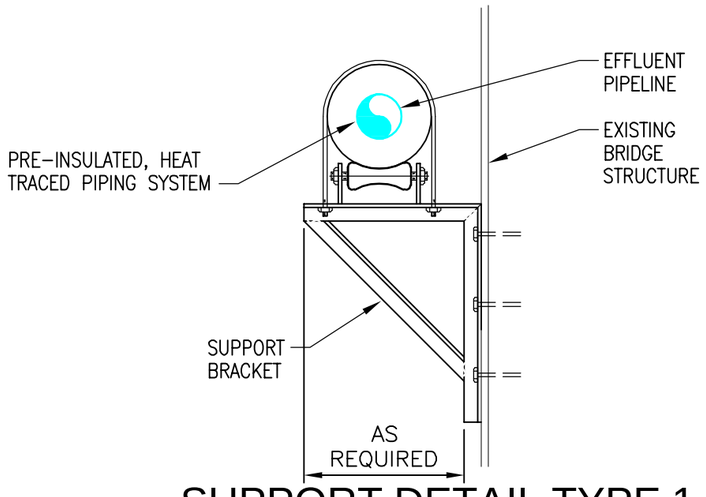
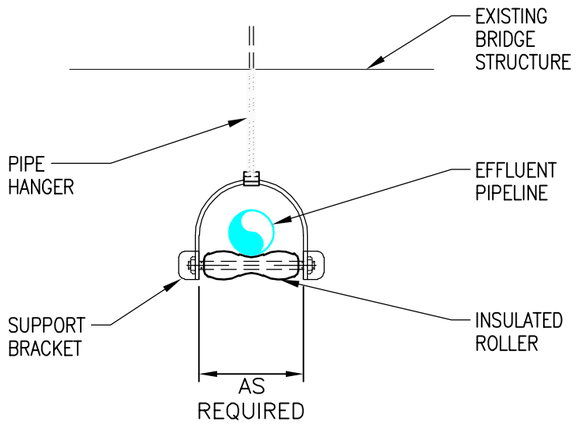


PERSPECTIVE



SUPPORT DETAIL TYPE 1



SUPPORT DETAIL TYPE 2

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-8
Watercourse Construction
Bridge Supported

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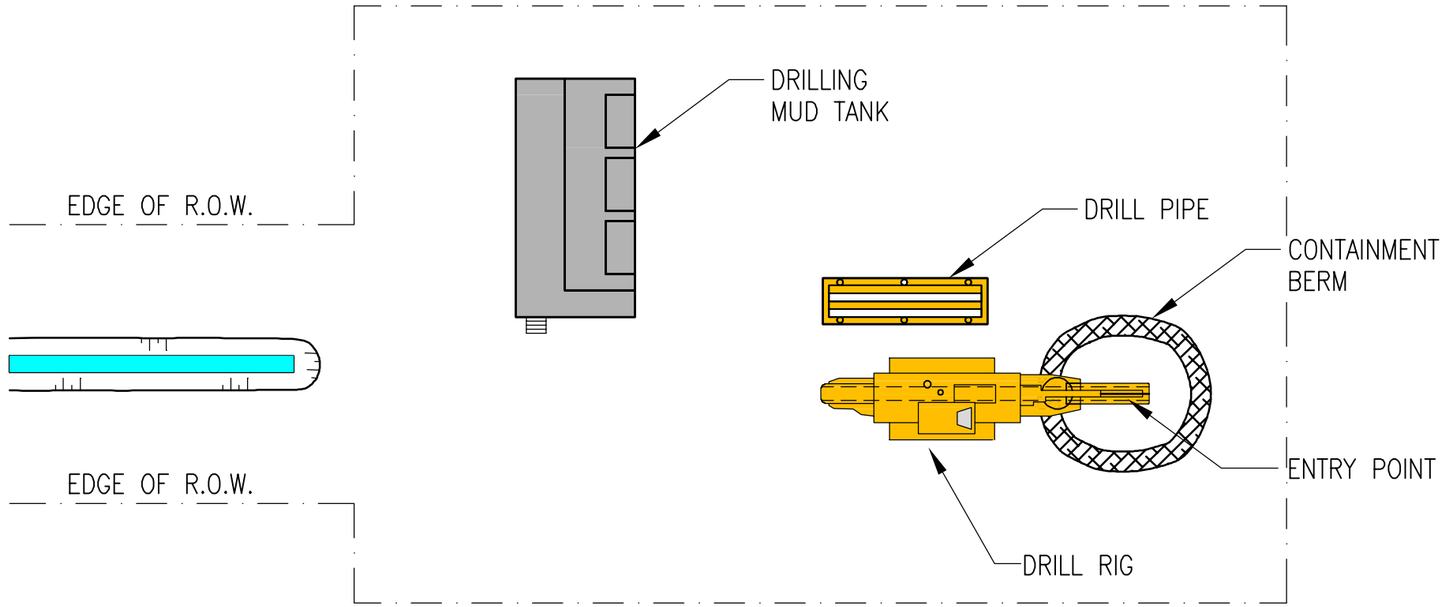
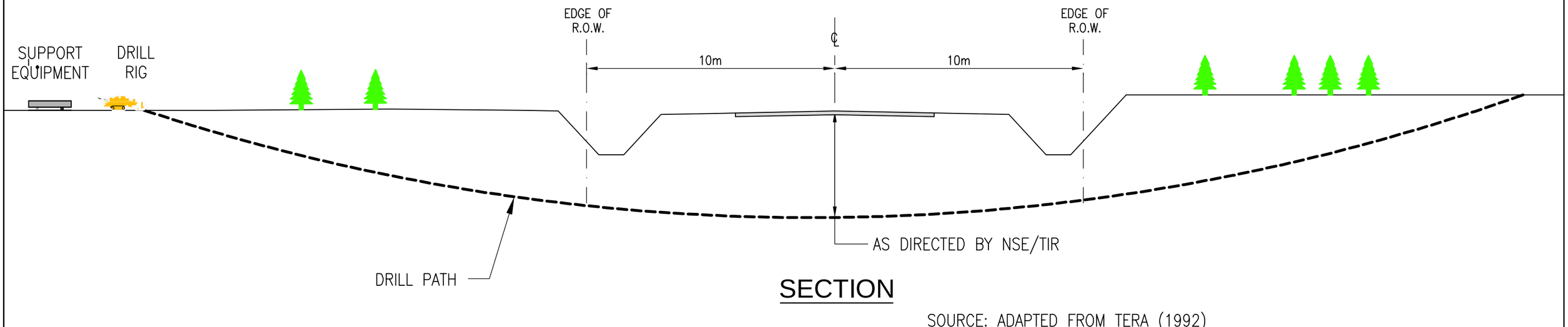


PLAN OF STAGING AREA



SECTION

SOURCE: ADAPTED FROM TERA (1992)

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-9
Roadway Construction
Horizontal Directional Drill Under Road

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PROJECT: 17-6461

DATE: 12/13/2018

In areas of bedrock, the requirements for depth of cover may be reduced in accordance with applicable code requirements. Alternatively, the use of a rock breaker may be required. It is not anticipated that any rock blasting will be completed as part of the project. However, geotechnical studies completed to support final project design will confirm this assumption.

Site specific methods for sediment and erosion control will be in place as appropriate, and as per the EMP.

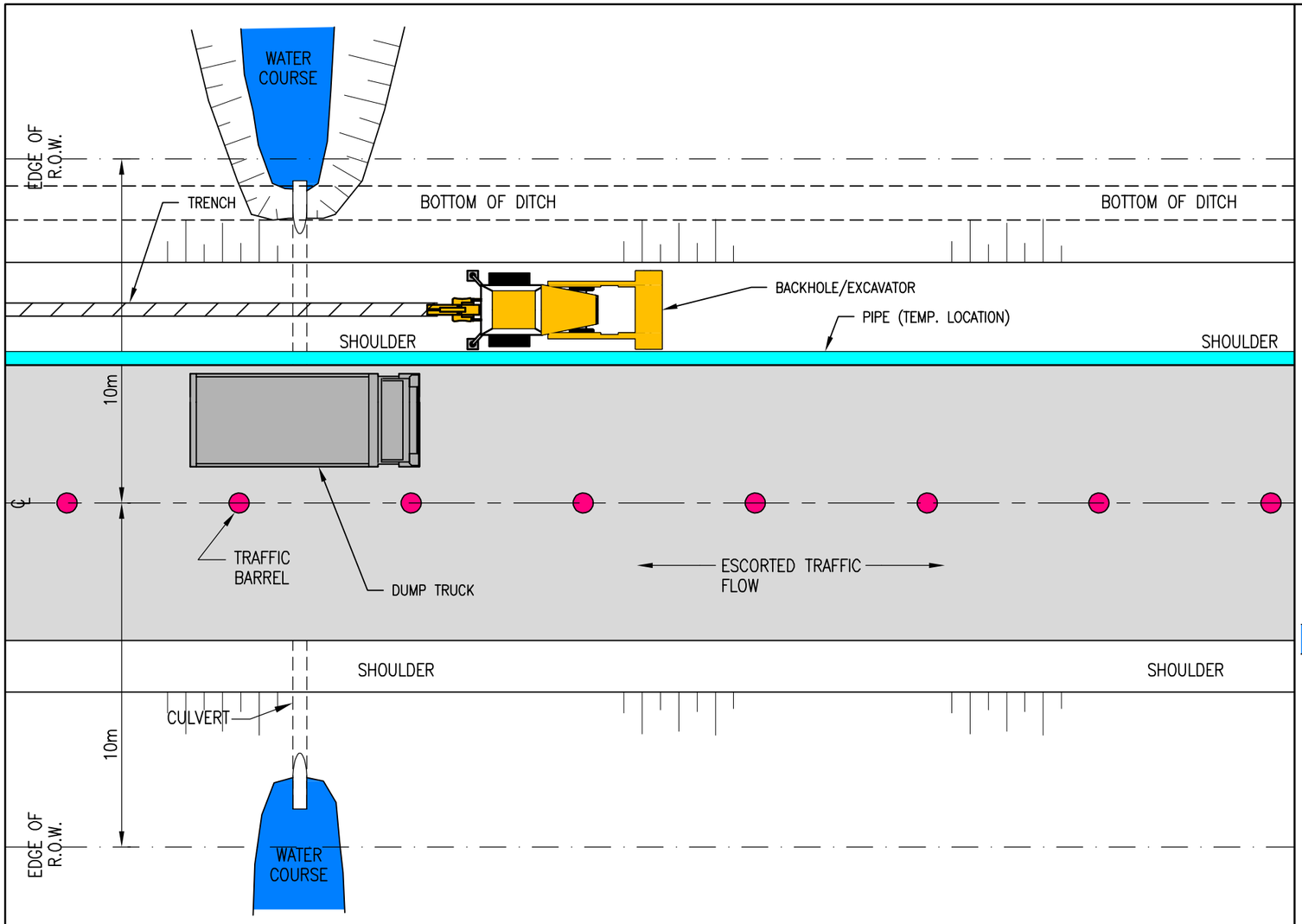
5.3.1.8 Pipe Installation: Watercourse and Wetland Crossings

As part of construction of the project, the effluent pipeline is proposed to "cross" watercourses and wetlands. These are shown on **Figures 5.3-10** to **5.3-16** and are discussed in **Sections 8.4** and **8.7**. The proposed project does not intend to include in-watercourse or in-wetland crossings. Rather, at potential "crossing" locations of watercourses or wetlands, where technically feasible, the alignment will be adjusted toward the center of the road to avoid instream work, wetland alteration or contact with beds/banks of watercourses or an alternate technique to go under the watercourse/wetland will be determined.

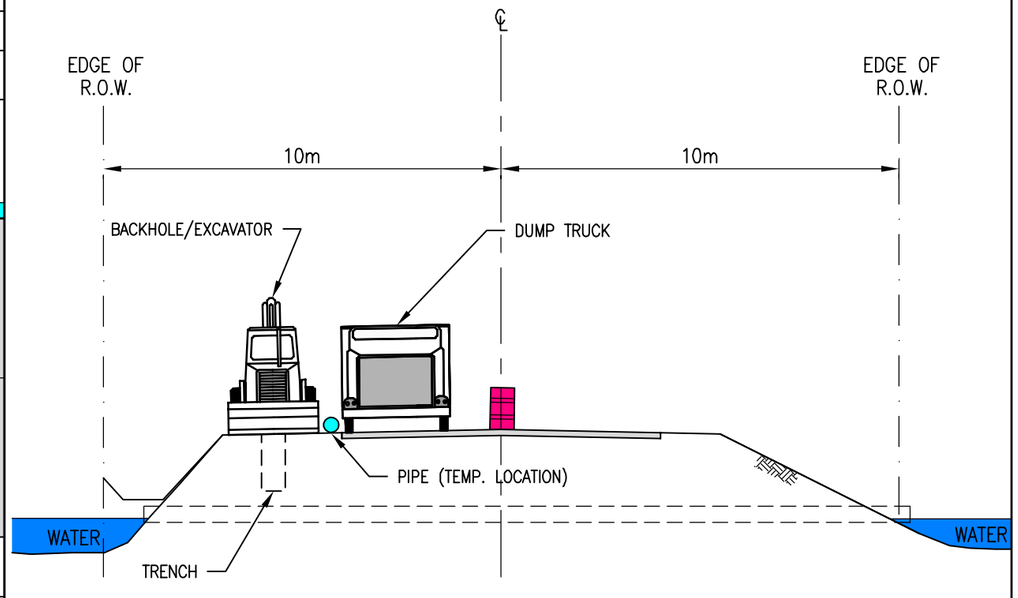
It is not anticipated that temporary bridges and culverts will be required for equipment access over watercourses or to facilitate drainage. This will be confirmed during the detailed design phase, and if required crossing details will be specified in an application for approval for the watercourse alteration. The Nova Scotia Watercourse Alteration Standards (2015) will be followed.

Instream work will not be considered unless additional assessment is made during appropriate seasons of potential habitat effects and approvable mitigation designed. If required, any instream work (including road and/or bank stabilization) will be undertaken following NSE and DFO requirements within the June 1 to September 30 construction window, when aquatic life is least sensitive to potential construction effects. In the unlikely event that NPNS requires construction outside this period, NPNS will develop a specific work plan for approval from NSE and DFO. Watercourse and wetland crossings will be installed as outlined in the Canadian Association of Petroleum Producers (CAPP) manual —"Pipeline Associated Water Course Crossings" (CAPP 2005) which has been endorsed by DFO.

To facilitate equipment for pipeline installation, linear development adjacent to wetlands with relatively low sensitivity may be considered in some locations. No development will occur within wetland boundaries and all activities will be in accordance with the Nova Scotia Wetland Conservation Policy. Any work will be completed to minimize area and location selected that is less sensitive. Care will be taken to minimize permanent disturbance and temporary effects along wetland edges and to ensure that road embankments are stabilized and not susceptible to erosion in these sensitive areas. Sediment and erosion control will be installed prior to work in these areas.



PLAN



SECTION

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-10
Watercourse Construction
Culvert Crossing (Over)

NORTHERN PULP NOVA SCOTIA CORPORATION
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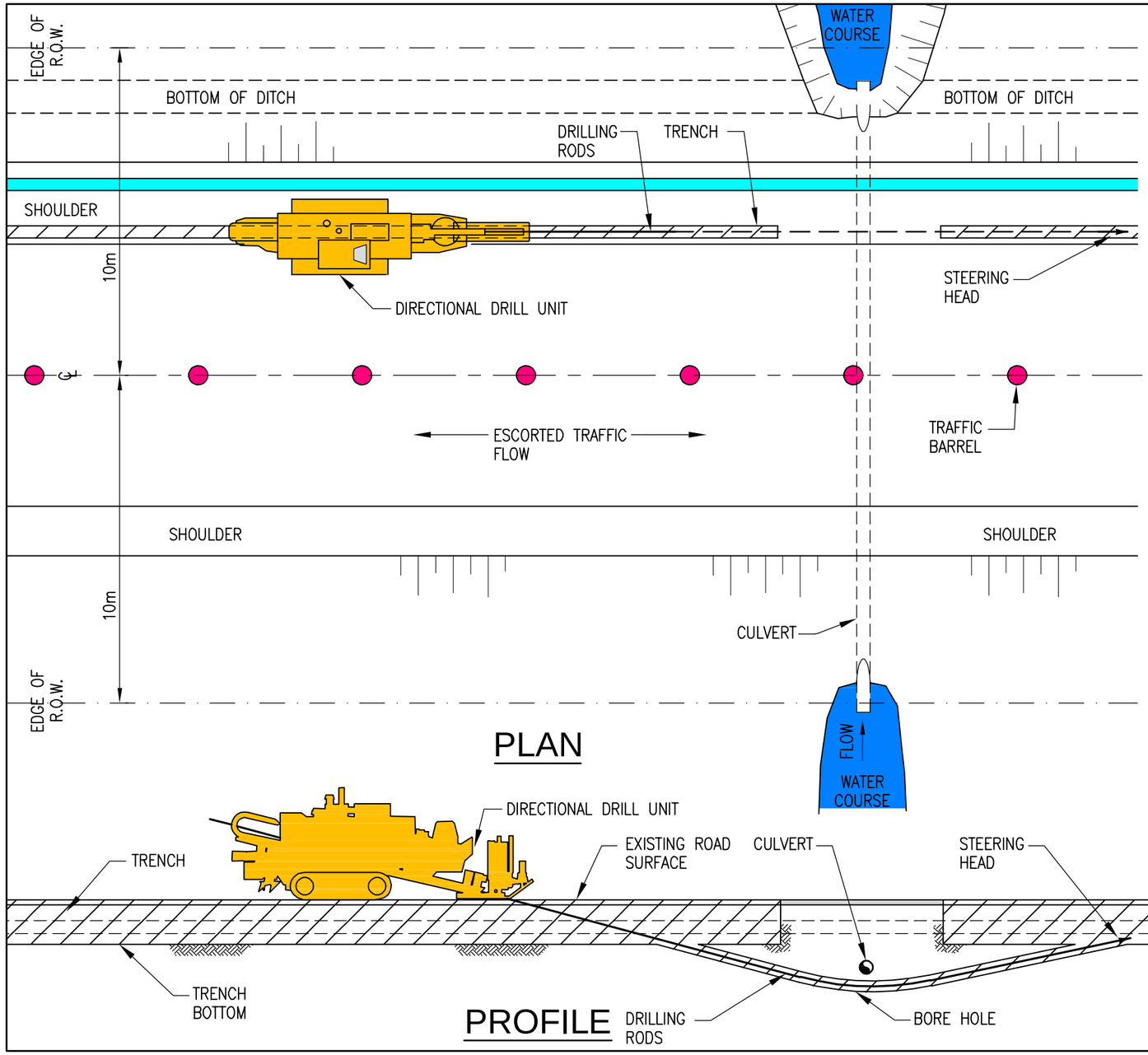
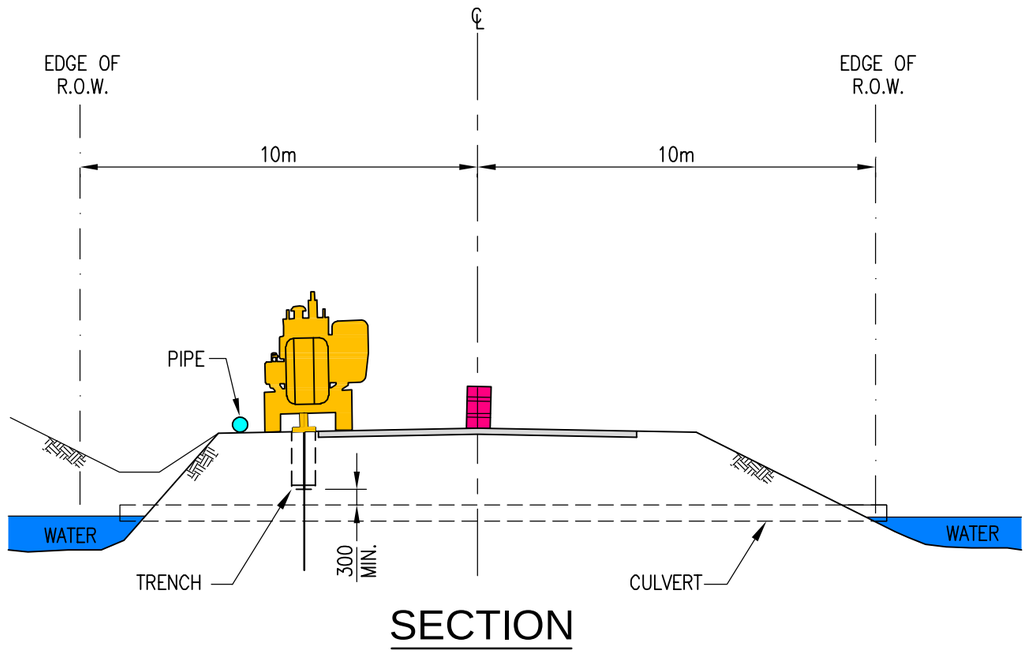


PLAN



SECTION

PROFILE

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-11
Watercourse Construction
Horizontal Directional Drill Under Culvert

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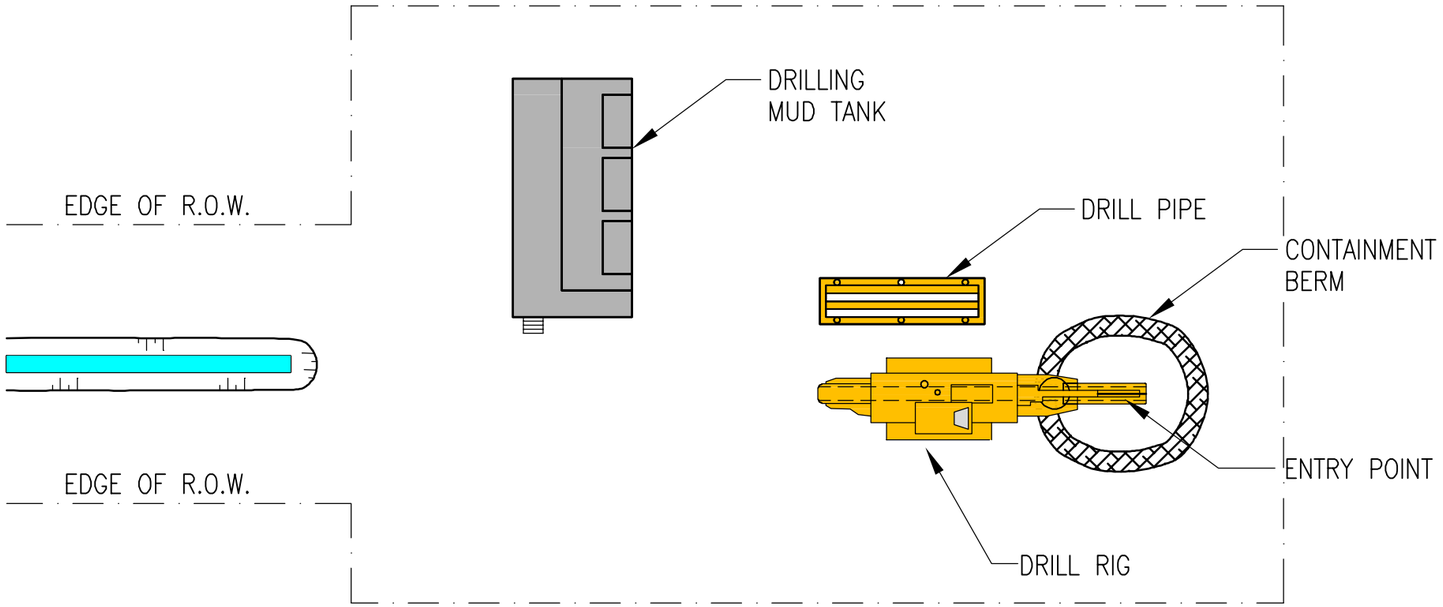
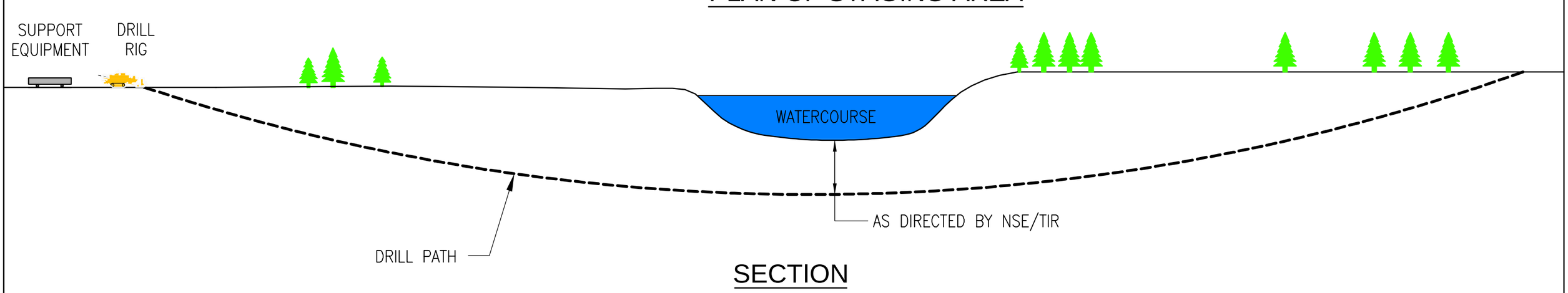


PLAN OF STAGING AREA



SECTION

SOURCE: ADAPTED FROM TERA (1992)

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-12
Watercourse Construction
Horizontal Directional Drill Under
Major Watercourse

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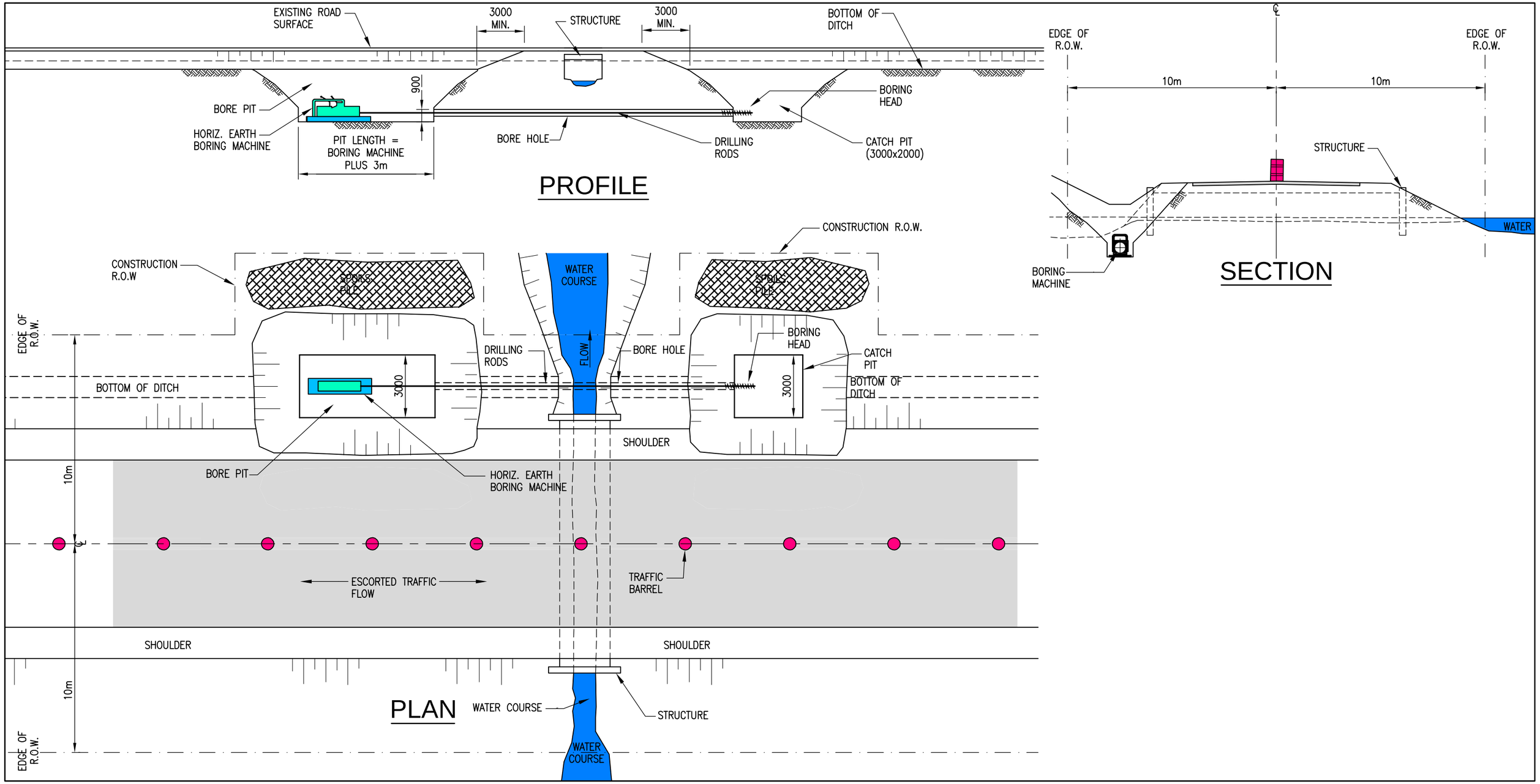
DATE: 12/13/2018



Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-13
Watercourse Construction
Horizontal Bore Under Obstruction

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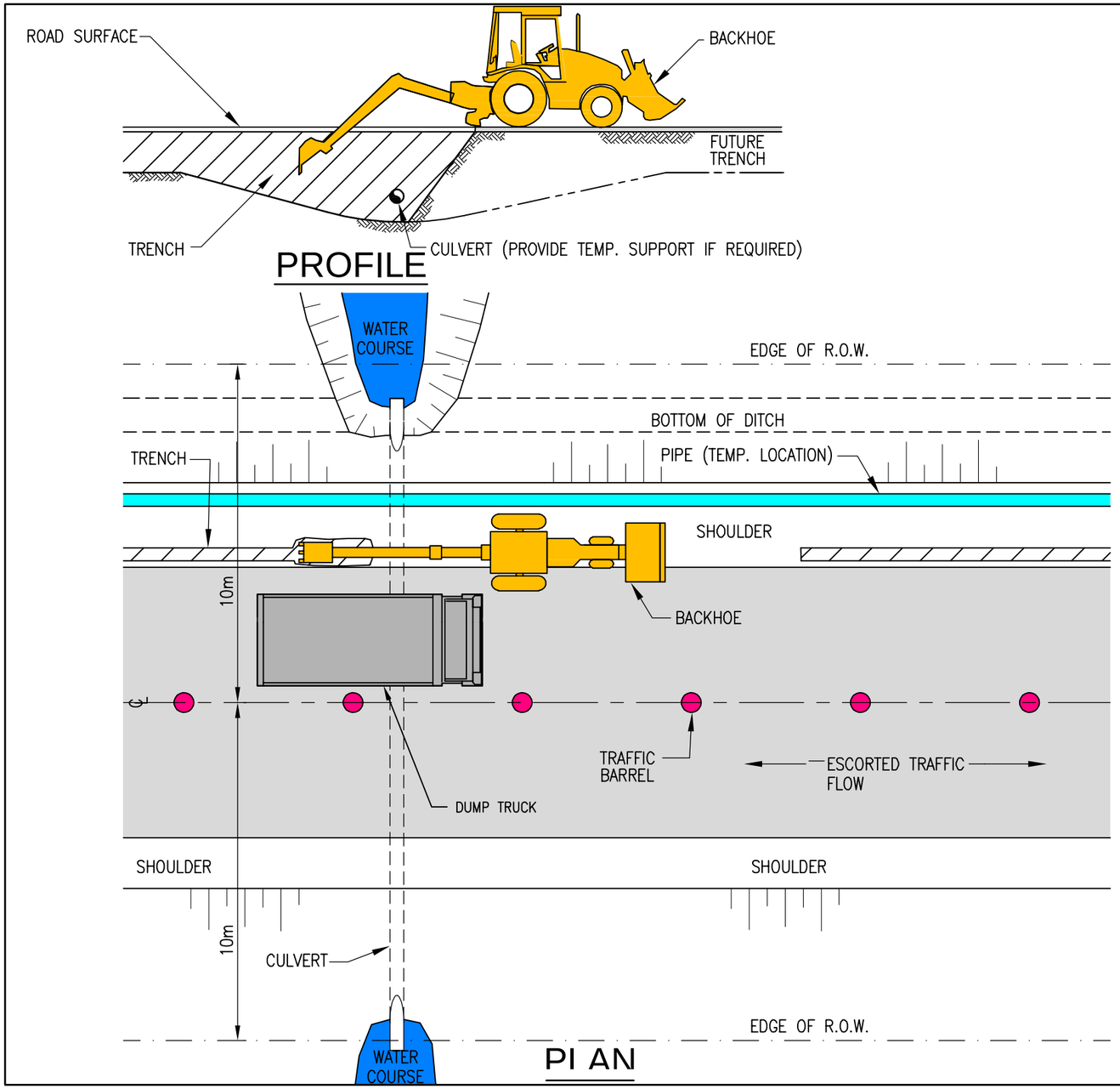
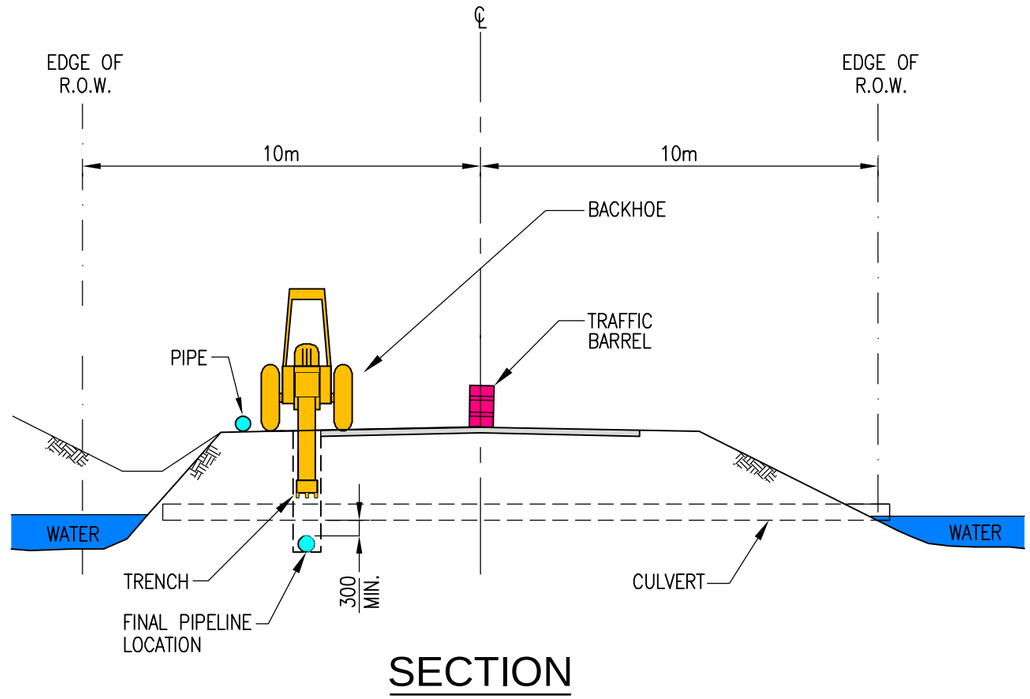
PROJECT: 17-6461 DATE: 12/13/2018





Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-14
Watercourse Construction
Culvert Crossing (Under)

NORTHERN PULP NOVA SCOTIA CORPORATION
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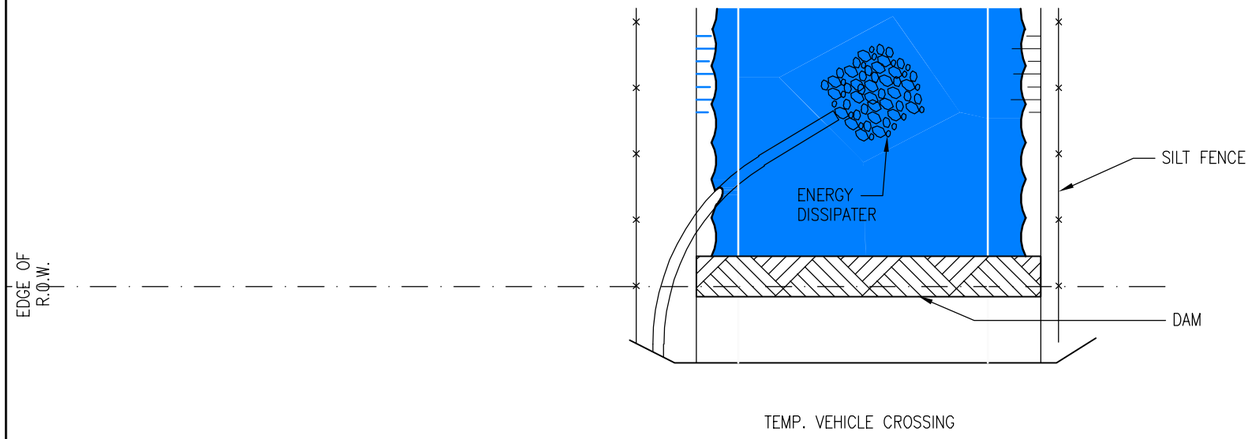
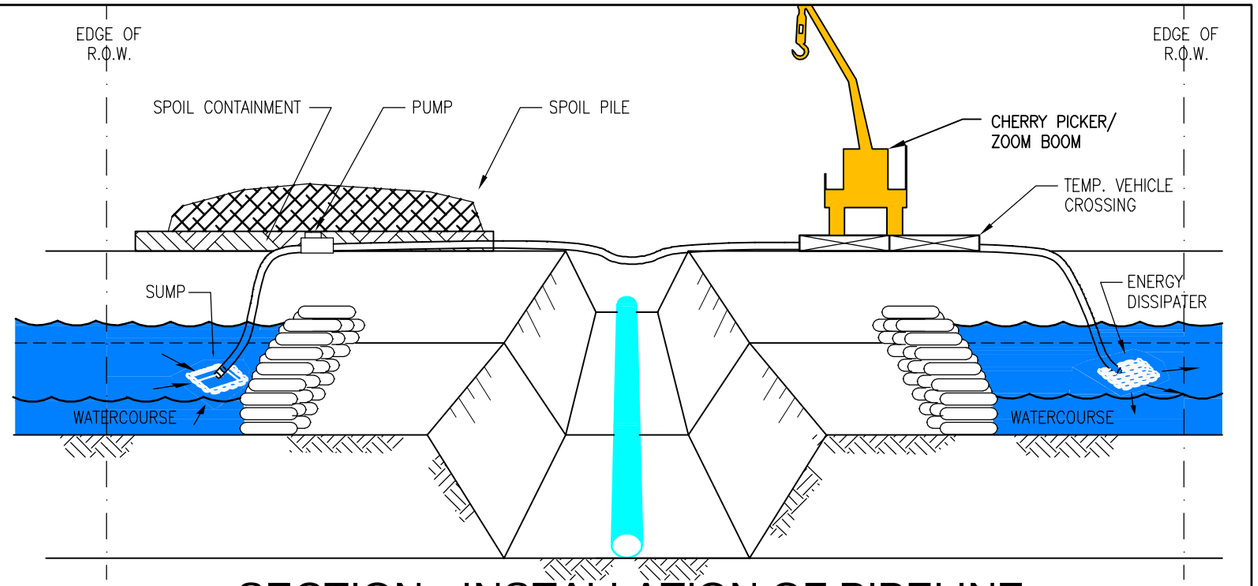
PROJECT: 17-6461

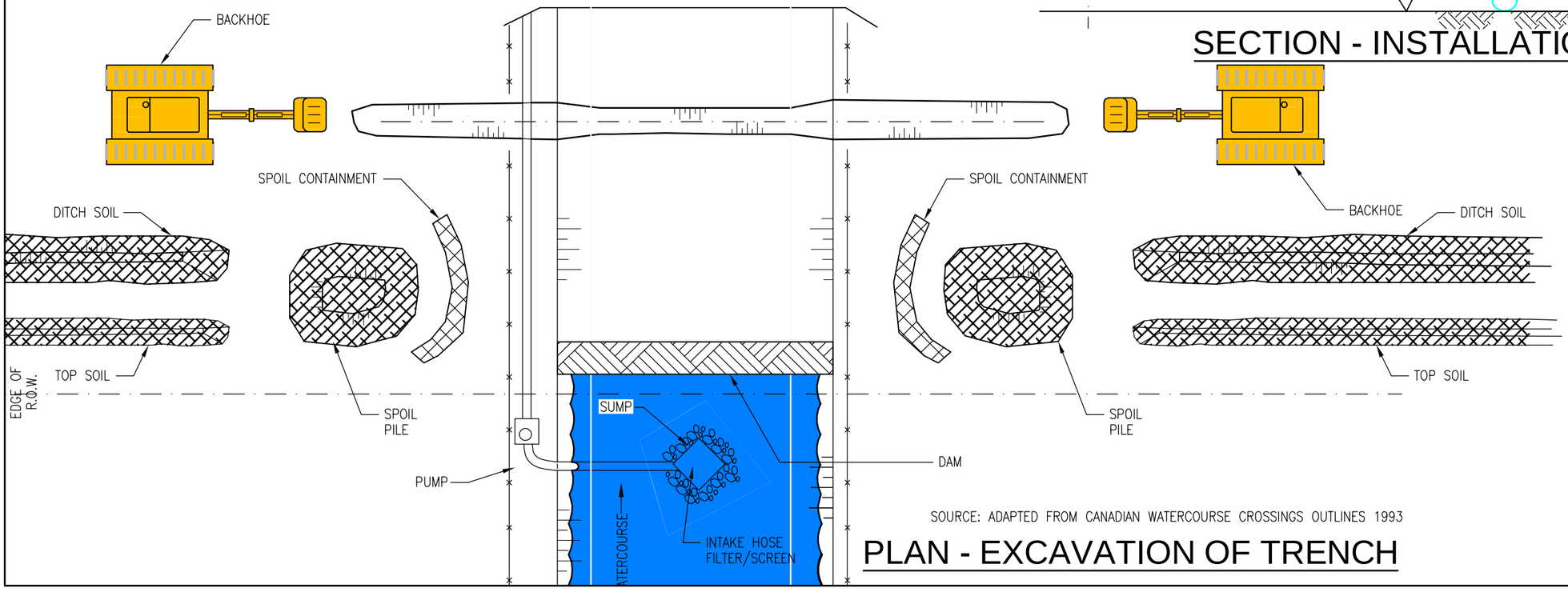
DATE: 12/13/2018



TEMP. VEHICLE CROSSING



SECTION - INSTALLATION OF PIPELINE



SOURCE: ADAPTED FROM CANADIAN WATERCOURSE CROSSINGS OUTLINES 1993

PLAN - EXCAVATION OF TRENCH

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-15
Watercourse Construction
Isolated Crossing (Dam and Pump)

NORTHERN PULP NOVA SCOTIA CORPORATION
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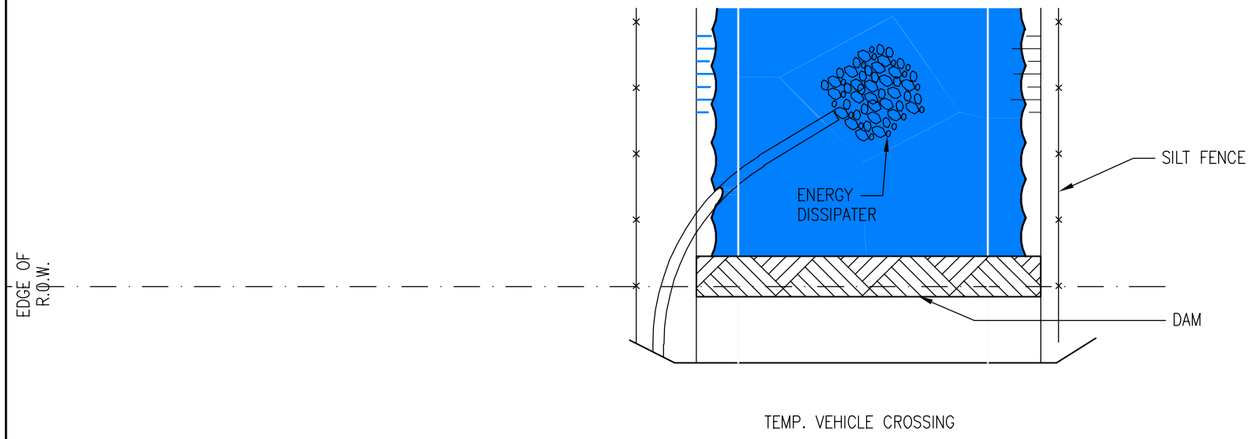
PROJECT: 17-6461 DATE: 12/13/2018



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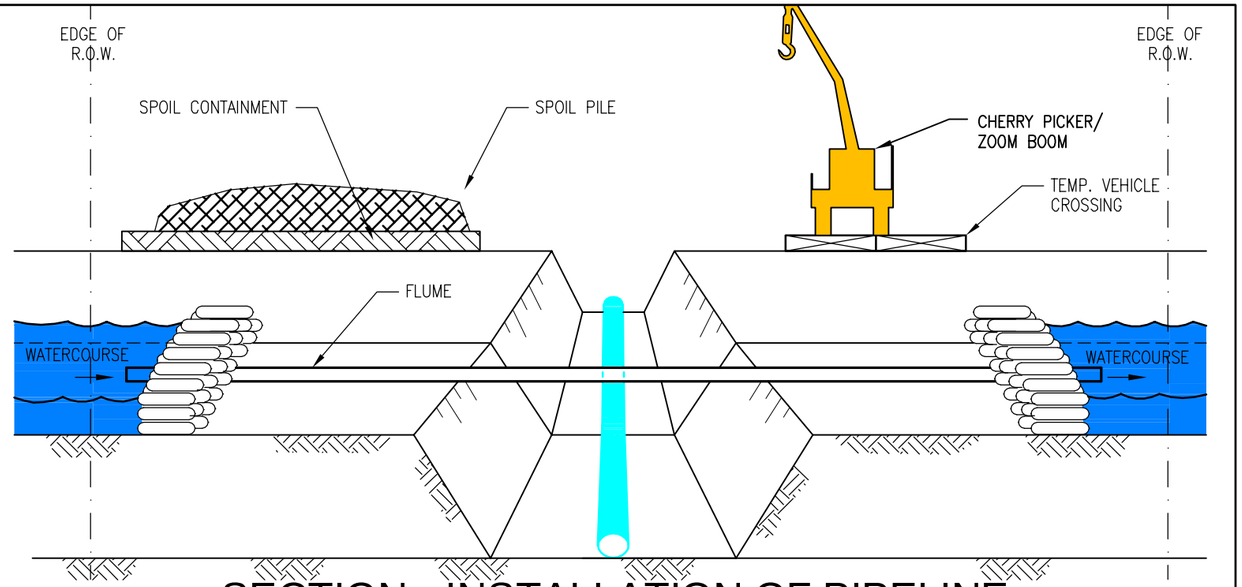
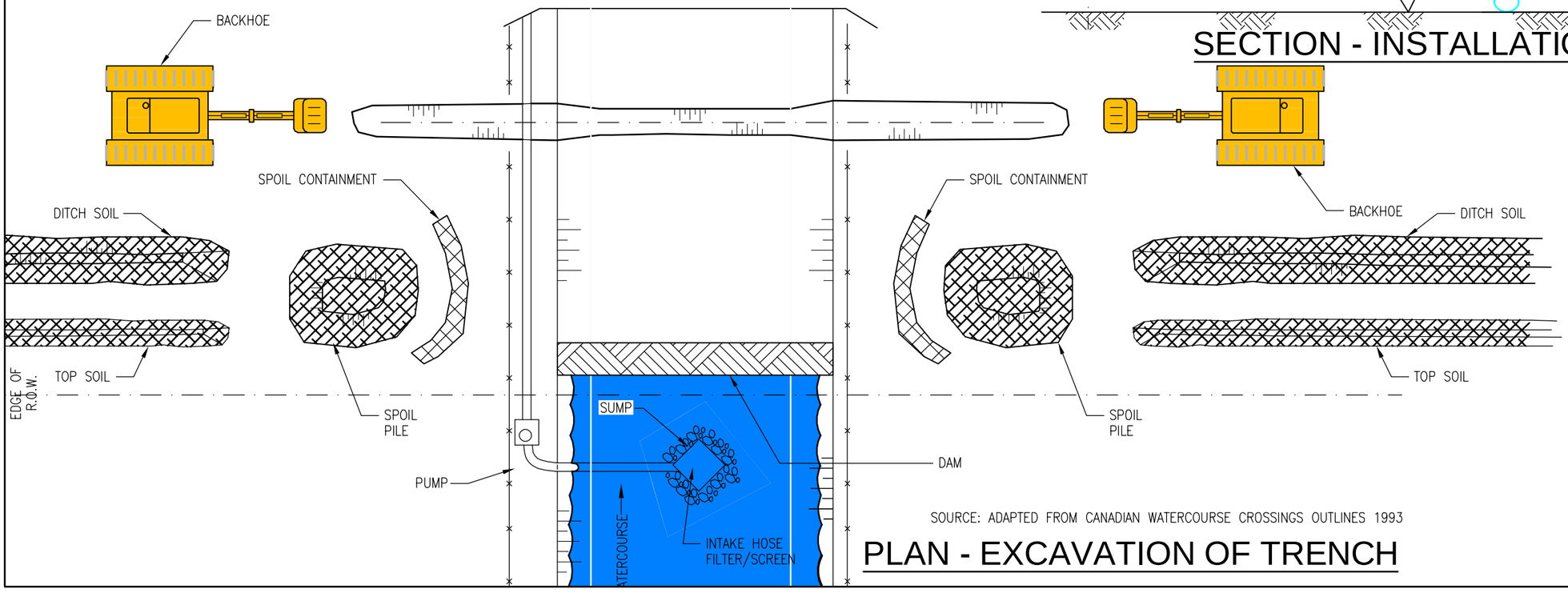


SECTION - INSTALLATION OF PIPELINE



SOURCE: ADAPTED FROM CANADIAN WATERCOURSE CROSSINGS OUTLINES 1993

PLAN - EXCAVATION OF TRENCH

Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 5.3-16
Watercourse Construction
Isolated Crossing (Flume)

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PROJECT: 17-6461 DATE: 12/13/2018

While no NSE approval is expected to be required for any temporary work immediately adjacent wetlands, if such work is considered, the specific approaches to design, installation and restoration of the linear access roads will be discussed with NSE as appropriate.

The width and depth of the watercourse, flow characteristics, environmental sensitivities, time of year that construction takes place, costs, adjacent land use, and soil conditions all influence the choice of crossing method. Since the pipeline will generally be installed within the developed portion of the road shoulder (consisting predominantly of existing fill material), typical construction methods (which may include horizontal directional drilling, micro-tunneling) proposed in relation to watercourses and wetlands crossing Highway 106 are intended to minimize impacts to adjacent watercourses and wetlands. It is anticipated that the pipeline will avoid these sensitive environmental features since it will generally be built into pre-existing infrastructure (e.g., road shoulder consisting of fill material), and culverts, retaining walls and other water management features already in place. If required based on NSTIR directions and/or restrictions, horizontal directional drilling, micro-tunneling will be considered. If open cut crossing or isolation methods are considered, a seasonally appropriate field habitat assessment will be undertaken, appropriate mitigation proposed to meet NSE/DFO requirements, and work would be conducted under applicable NSE and DFO approvals. A general description of these potential crossing methods is provided below.

Horizontal Directional Drilling

HDD involves drilling underneath the watercourse or wetland from a location on one bank to a location on the opposite bank. It can be used for any size watercourse or wetland. The two-stage process involves the drilling of a small diameter pilot hole along a designated directional path, followed by the enlarging of the pilot hole by reaming to a diameter suitable to accommodate the proposed pipeline. A welded section pipe string is then pulled through the drilled hole. Drilling fluid is used in this process; it is primarily a mixture of water and bentonite (i.e., clay). The drilling contractor will manage and monitor drilling fluid as the work progresses.

The technical feasibility of a HDD installation is determined by the distance to be drilled, the diameter of the pipeline, and the subsurface conditions. Geotechnical information is still required to determine whether HDD is feasible at the various crossing locations. Inconsistent bedrock and overburden conditions present impediments to the use of HDD technology.

A typical illustration of this crossing method is illustrated on **Figures 5-13** and **5-14**. The work space requirements are generally larger than those associated with dry crossings due to the requirement to site additional temporary workspace for spoil stockpiling, de-watering activities, and erosion and sediment control measures.

HDD has many environmental advantages. Since the entry and exit points are set back from the watercourse and wetlands to be crossed, the stream bed and generally the stream banks and approach

slopes remain undisturbed. This reduces the potential for instream sediment generation and, at the same time, maintains stream flow and fish passage. An additional advantage of the maintenance of a buffer on each side of the watercourse or wetland is that it will provide a natural barrier to unauthorized vehicles and minimize the release of erodible sediments into watercourses from both construction and off highway vehicles.

Micro Tunnelling

Micro tunneling, like HDD, is a trenchless installation method. Unlike HDD, the pre-assembled pipe follows directly behind the cutting head, allowing the boring of the hole and installation of the pipe to occur in one pass. During micro tunneling, the cuttings are brought to the surface through slurry lines that run through the interior of the pre-assembled pipe. The slurry used for this process is similar to the drilling mud used in HDD. Micro tunneling requires the installation of pits on both sides of the watercourse from which the tunneling equipment and pipe segments are launched, and the tunneling machine is retrieved upon completion. Typically, for a project of this nature, micro-tunneling would not be utilized.

Open Cut/Trenching or Isolation

In an open cut watercourse crossing the pipeline is installed into an excavated trench that is then backfilled. The excavation of the trench would generally not be isolated from the watercourse. This option is typically considered for shallow, low flow environments where diverting the flow of water around the working area is feasible. Permits will be obtained for open cut method use near watercourses or wetlands, if selected. Alternatively if habitat conditions indicate “in the dry” work (isolated from flow) is required this would be undertaken as approved by NSE/DFO.

5.3.1.9 Cleanup and Stabilization for Land Based Activities

Following construction, disturbed areas will be restored and stabilized. Previously graded areas, including road embankments, will be restored to match pre-construction conditions, where practicable. All disturbed areas from construction will be reinstated to existing conditions. Topsoil, where previously segregated, will be graded out onto the PFA and will be seeded. Sediment fencing will remain in areas adjacent to watercourses and wetlands until the vegetation has been re-established.

5.3.1.10 Pipe Installation – Marine Portion

The marine-based portion of the pipeline will be approximately 4.1 km long. The pipe will enter the marine environment to the west of the Northumberland Ferries marine terminal within TC property.

Based on current design, it is anticipated that the marine portion of the pipeline will be placed in a 3 m deep open cut trench, backfilled with excavated native material where possible. Construction methodology is described in **Appendix F**. The installed pipeline will have a 2 m minimum depth of cover to provide protection. The footprint of the installation area will be graded to match back into

surrounding seabed conditions. The planned pipeline route will be verified with marine surveying (e.g. surface vessel multi-beam, side-scan sonar, sub-bottom profiling).

Environmental controls (e.g., isolated work areas, silt curtains) throughout the works as required and as prescribed in environmental permits and approvals will be implemented. Removal and disposal of dredged material is not anticipated. Detailed deployment plans and calculations are completed by the marine contractor to verify the entire installation operation, including in the near shore environment, and diver teams will support underwater activities throughout the pipeline installation, including inspection of the pipeline during the deployment.

Pipeline Assembly and Staging Area

Located on the north side of NPNS property, the staging area will be the main area of work for the marine contractor. The staging area will be required for the fusing, testing, pipe weight installation, and assembly of the pipeline. The pipe is then deployed into the water directly from the land-based portion of the staging area. The marine-based portion of the staging area requires adequate depth and size to accommodate pipe storage and project vessels.

Pipeline components will be assembled on land adjacent the high water mark within a secure and likely fenced off temporary work space. It is anticipated that the pipe will arrive by flat-bed hauler trucks to the staging area in 17 m lengths, unloaded on shore, and individual lengths of pipe will be joined by fusion welding into deployment sections (up to maximum 1000 m lengths) using a fusing machine. A front-end loader with forklift tines or a crane will be used to move the pipe segments within the staging area and to load pipe sections into the fusing machine. When the pipe segments are fused together a blind flange is connected to the end of the first segment. The segment is directed out into the water on roller beds as successive pipe segments are fused on the other end forming a longer and longer pipeline. To support proper alignment and placement of roller beds for pipe deployment, a small jetty may be required. The air-filled pipe floats on the surface of the water and can be directed and controlled by small boats.

As the fabricated pipe is deployed into the water via rollers, concrete collars are added for ballast. Concrete pipe ballast weights will be constructed at a concrete precast yard and transported to the staging area. The pipe is very buoyant and will float with the concrete ballast. The pipe will be towed (floated) from the staging area to the installation area. Once positioned over the pre-established trench, the pipe is slowly ballasted with water and will gradually descend into the trench. For this installation, the pipeline will likely be installed in approximately 1000 m length sections, with adjacent sections connected by fusion joints. This would require jack-up barges for the several at-sea fusion joints.

Land to Marine (Near Shore) Connection

The near shore portion of the pipeline will require planning and management of worksite construction and logistics affected by water depth, fluctuating tidal levels, and ice scour. The trench section across

the shore landing location at Caribou Harbour, connecting the land-based and marine-based pipeline portions will require excavation. It is anticipated that this trench excavation will be completed by traditional mechanical excavation. It may involve the installation of a gravel access causeway/bridge from the shore to facilitate the trench excavation and pipeline installation through the intertidal zone.

It is anticipated that pipe installation between the intertidal/near shore zone and outfall location will be accomplished by trenching pre-lay of pipe sections. Pre-lay trenching reduces any time the pipeline would be exposed. The pipe will be towed (floated) to location, flooded by pumping water into it at the near shore end, and controllably submerged to the base of the trench. It is anticipated that the entire extent will then be covered with the previously excavated seabed material and graded to match existing conditions using a towed grader bar. Pending marine surveys, imported granular fill material may be required in certain areas.

Connecting the marine-based portion of the pipeline to the land-based pipeline portion may have to be accomplished by constructing custom “spool pipe segments”. The contractor will generally assemble a template between the two flanges and then construct a spool piece that exactly matches the template. The spool pieces can be constructed out of HDPE pipe, and connections made by fusion.

5.3.1.11 Marine Outfall Construction

The terminus of the effluent pipe consists of an outfall location with a three-port diffuser, situated at a depth of approximately 20 m. All outfall and port diffusers are HDPE materials. Assembly of components will be by fusion welding. The outfall pipe sections will be connected first to the terminus of the transmission pipeline. Subsequently, connection of the diffuser components to the outfall manifold will be completed by divers.

An underwater survey will be completed to set the design and a post-construction survey will confirm that the pipeline is installed to design grade and alignment. Throughout construction, environmental controls (e.g., silt curtain) will be utilized as required and as prescribed in environmental permits and approvals.

5.3.1.12 Pipeline Testing and Commissioning

The pipeline is hydrostatically tested with water to check pipeline and pipe fusion integrity and to confirm it will be suitable for the intended service and operating pressures.

Testing will be completed on assembled sections on land. All necessary permits will be obtained from regulatory authorities for the use of water from the selected withdrawal sites. It is anticipated that the existing NPNS Middle River raw source can be utilized.

Commissioning of the pipe will consist of inspections by divers of the installed transmission pipe and outfall. The exterior of the marine outfall will be videotaped by divers including the diffusers to confirm diffusion patterns while under operation.

5.3.1.13 Environmental Inspections

During the construction work undertaken by NPNS and its contractors, site inspections will be undertaken by the contractor, NPNS's Environmental Team and/or designate. Site inspections will include environmental monitoring and compliance with the EMP, and legislation. During construction, full-time site personnel will have environmental protection as their responsibility; this individual or group of individuals will complete inspections regularly to ensure that mitigative controls are in place and other EMP measures are followed and maintained. Checklists will be developed for this purpose.

5.3.2 Operation and Maintenance Phase

The operation and maintenance phase will begin immediately following the completion of construction phase activities, including the commissioning of the ETF and all associated project components.

NPNS will be responsible for:

- operation, maintenance, and inspection of ETF components, the effluent pipeline, and marine outfall and diffuser assembly;
- sludge management and operation of the facility's power boiler for incineration of sludge, including air quality monitoring;
- monitoring of effluent quality discharged to the receiving environment;
- ensuring the effluent pipeline system is operated in accordance with applicable regulations;
- maintenance of above and below ground facilities;
- emergency response; and
- awareness and education of local stakeholders, including members of the public and emergency responders.

The EMP addresses the operation and maintenance phase throughout the life of the project. A range of standard operation and maintenance measures have been developed and documented in NPNS's operating manuals. The manuals provide a cross reference to specific tools for environmental protection and system integrity during the operation phase. These tools will include patrolling, monitoring, reporting, corrective action and documentation, as well as emergency response.

5.3.2.1 Effluent Treatment Plant

The ETF will undertake effluent treatment employing a BAS™ process. The ETF will accept an estimate of 62,000 m^3/day annual average (85,000 m^3/day peak flow) of effluent that is created through the Kraft pulp mill process. The process is generally automated with online instrumentation and adjusted either manually or automatically as influent parameters change. Confirmation of ETF performance will be

dictated by NSE permits and will require effluent sampling consistent with conditions of the Industrial Approval. The ETF's operational process is described in detail in **Section 5.2.2** above.

The sludge from the ETF process will be co-combusted with hog fuel in the facility's existing power boiler. Use of the power boiler for this purpose may reduce CO_2 emissions through displacement of other fossil fuels as well as avoided methane emissions from offgassing of sludge. The existing ambient air monitoring program at the facility is expected to continue during future operation and will collect data on the concentration of the various air contaminants over time for comparison to the Nova Scotia Air Quality Regulation Maximum Ground-Level Concentrations (GLCs) and the model predictions conducted for the project.

Maintenance activities will be undertaken as required and are expected to include routine equipment inspections. Routine inspections of clarifiers and aeration stages are typically performed while the equipment is full and in operation. In the unusual event that one of the clarifiers or aeration stages must be emptied for inspection or repair, plans will be developed to gain access without a release of untreated effluent to the environment. A spill containment basin will be used to hold effluent in the event of a power failure and will be sized to allow for an orderly shutdown of the facility. The use of chemicals, outside of the normal process chemicals, for activities such as cleaning or flushing of the ETF plant are not anticipated. The generation of hazardous wastes requiring treatment or disposal is not anticipated.

5.3.2.2 Material Handling and Logistics

Outside of effluent flows, the main inflows of material to the ETF will be in the form of chemical deliveries and the main outflow is dewatered primary and secondary sludge. All truck traffic in and out of the ETF area is via the main access road.

Chemical dosing is such that truck deliveries will occur regularly scheduled throughout the week. Nutrients are the largest incoming chemical, with urea used at a rate of approximately 1,500 kg per day. This is equivalent to one truck every week or two. Other chemicals such as phosphoric acid (2-4 totes per week; one tote is equivalent to approximately 1000 litres), dewatering polymer (1-2 bags per week), sulphuric acid (variable, 1-3 totes/week) and hypochlorite and defoamer at an estimated one tote per month.

Dewatered sludge production is a larger quantity and varies mostly due to the rate of incoming primary solids. The rate of solids generation is approximately 10-12 dry tonnes/day to more than 30 dry tonnes/day. This equates to a volume of approximately 60 – 200 m^3/day of sludge to manage.

5.3.2.3 Maintenance Shutdowns

NPNS undergoes regularly scheduled maintenance shutdowns in order to complete repairs and upgrades to the mill. During maintenance shutdowns at NPNS, operating procedures will be required at

the ETF to address the changes that reduced flow and/or organics have on operation of the system. Procedures will also address the resumption of normal production. The biological environment in the ETF will be adjusted to maintain the growth media for the reduced biological loads. Nutrient addition will be reduced or stopped to match the waste directed to the ETF. Operational procedures such as sludge withdrawal and waste from clarifiers will be adjusted in pace with the reduced loadings to the ETF. The objective will be to maintain a healthy bacterial population such that once the plant shutdown is complete performance at the ETF can ramp-up with resumption of mill production.

During winter conditions additional measures will be made to maintain adequate temperature in the treatment system to prevent biological activity entering the dormant stage, potentially increasing the period required to re-establish normal operation at the ETF.

5.3.2.4 Effluent Pipeline Operation

NPNS will operate and maintain the effluent pipeline in accordance with standard procedures designed to ensure the integrity of system components, including ASTM, American Water Works Association (AWWA) and Canadian Standards Association (CSA) standards. The pipeline will be designed for a minimum 50 year design life. HDPE pipelines depending on local conditions can have an operational service life that could reach 100 years.

Once built, ongoing repair and maintenance will be carried out as necessary to support the operation of the ETF and its associated components indefinitely. Incremental replacement of individual components may be required for continued operation.

During standard operating conditions, an estimate of 62,000 m^3/day on an annual average (85,000 m^3/day peak flow) of treated effluent will be generated daily and will require discharge to the receiving environment via the new effluent pipeline. Treated effluent will be pumped to the diffused outfall from the new ETF. No secondary pumping stations are planned along the pipeline route.

The pipeline locations will be marked with signs and post markings at public and private roads and water crossings and at separation distances so that signage is easily visible along the pipeline route. The signs will allow for rapid identification during inspection surveys and general maintenance activities. Signage and maintenance work will be coordinated with NSTIR.

5.3.2.5 Inspections of Pipeline

An inspection program will be developed and implemented by NPNS, based on specified standard procedures and design recommendations. Inspections may be done using surface vehicles, aircraft surveillance, or walking of the pipeline and may be internal or external.

Although unlikely since the land-based pipeline route is predominantly installed within the Highway 106 road shoulder and on NPNS property and patrol access is relatively easy, aerial patrols may be used to identify unauthorized third party activities in the vicinity of the pipeline.

5.3.2.6 Pipeline Maintenance

Maintenance procedures along the effluent pipeline corridor will be consistent with standard procedures used by the Canadian pipeline industry, with specific modifications made for the Nova Scotia regulatory environment, as required. Maintenance will be performed by NPNS personnel or its designated contractors.

Vegetation control along the pipeline corridor will be similar to existing highway maintenance activities along its road shoulder. It will be accomplished primarily by mechanical means. Limited chemical spraying may be used, where allowed by regulation, to control vegetation growth within the confines of the ETF station and other pipeline facilities. The use of herbicides for vegetation control may be required in areas where physical vegetation management techniques are unsuccessful at controlling noxious weeds. Only herbicides of low persistence and low ecological toxicity will be used, and no chemical spray will be used within or adjacent to wetlands or within 30 m of watercourses. Vegetation management along the Highway 106 road shoulder will be compatible with NSTIR's protocols.

Above ground pipeline facilities will be properly secured to prevent tampering by unauthorized parties. The entire pipeline will be designed for heavy equipment traffic.

5.3.2.7 Marine Outfall and Diffuser Operation

The outfall and diffuser will be designed to accommodate regular inspections and maintenance. Inspections and maintenance activities will typically be undertaken by diver teams. The efficacy of the diffuser will be evaluated as outlined in the Ecometrix Follow up Studies under the plume delineation evaluation (see **Appendix G and Appendix H**).

5.3.3 Decommissioning Phase

The ETF, effluent discharge pipe, and outfall are designed and will be operated and maintained to provide safe and efficient service for several decades and likely much longer with repairs and standard maintenance. However, if unforeseen events occur, some facility components may require decommissioning.

As facilities are no longer required as part of the project, they will be decommissioned or abandoned according to provincial regulations and the most current version of the appropriate CSA standard of the time.

As removing underground pipe may result in environmental effects similar to those that occur during construction, below ground pipeline infrastructure will normally be abandoned in place. The pipeline

will be purged of effluent and physically separated from the ETF. If pipeline structures are abandoned, the necessary work will be undertaken in accordance with the regulatory requirements applicable at the time of decommissioning. An abandonment plan and, if required, a site restoration plan, will be developed in consultation with the appropriate regulatory authorities.

In some instances and locations, the pipe may be removed and salvaged as part of decommissioning activities. If pipe removal becomes necessary, pipe sections under watercourses and wetlands would likely be abandoned in place.

It is anticipated that decommissioning of the marine outfall location would involve removal of the diffuser ports. The ends of the pipe will be capped and left buried as described above.

Salvageable material will be recycled or reused. Waste material such as welding rods and concrete will be disposed of in accordance with relevant regulatory requirements.

5.4 Project Schedule

The anticipated project schedule is as follows.

- **Construction:** Construction will proceed for a period estimated at 21 months, commencing as soon as the EA review has been completed and the applicable permits, approvals or other forms of authorization have been obtained. For the purpose of this EA Registration, it has been assumed that construction will begin in the second quarter of 2019. It should be noted that construction activities are in part weather dependent and the start date could impact the overall project schedule. Commissioning would be completed following construction for a period of 1 to 3 months.
- **Operation and Maintenance:** Operation and maintenance will commence immediately following the construction phase and will continue to operate efficiently and safely for several decades with a well-maintained system. For the purpose of this EA Registration, it has been assumed that the operation and maintenance phase will begin in the fourth quarter of 2020.
- **Decommissioning:** The effluent pipeline to the existing standpipe (feeding the BHETF) will be decommissioned after the replacement ETF is fully commissioned. The precise timing for that phase of the ETF replacement project has not been determined at this time. Decommissioning of the ETF replacement will be conducted following the end of useful service life of the project components (or at the end of the life of the NPNS facility, whichever comes first) and would be carried out in accordance with the regulations and requirements in place at that time.

Table 5.4-1 below provides an approximate schedule based on information available at this time.

Table 5.4-1: Proposed Project Schedule

Project Component	Date
Approvals/Permits	
Register the Project (NS Environmental Assessment Registration Document)	Date of Registration: February 7, 2019
Remaining Schedule based on assumed Environmental Assessment Approval	Mid-March 2019
Other approvals – e.g., DFO , TC, NS Department of Natural Resources, NSE, "lands/lease" permitting (timeline outside of proponent control)	Assumed - Mid-July to Mid-October 2019 following marine component detailed design; however if a DFO authorization is required, approval would be Dec 2019
Pre-Construction Activities	
Avian/turtle Follow-up Field Studies	Mid-April and Early June 2019
Mi'kmaq Ecological Knowledge Study (MEKS) Field Surveys, Archaeological Shovel Testing for pipeline alignment and staging areas at ETF site	Early April to Mid-June 2019
Vegetation, Wetland and Watercourse Follow-up Field Studies	Early April, June - July 2019
Geotechnical surveys for land portion of pipeline	Mid-May 2019 to Mid-July 2019
Detailed Design Complete – Land Pipeline	June 2019
Marine seismic, geotechnical surveys, habitat and confirmation of marine pipeline alignment	April to Mid-June 2019
Detailed Design Complete – Marine Pipeline/Outfall	Mid-July 2019
Construction Activities	
ETF Construction	
Clearing for ETF	Early April 2019 (includes mitigation as required to meet MBCA where required)
ETF Construction	Late April 2019 to Mid-July 2020
ETF Commissioning	Mid-July to Late September 2020
Pipeline Construction (Land Portion)	
Clearing and Winter Construction (if required)	November 2019 to February 2020
Construction (except watercourse and wetland crossings if not in Highway 106)	February to Late June 2020
If required - Watercourse and wetland construction (low flow season)	July – September 2020
Pipeline Construction (Marine Portion)	
Construction	April/May 2020 – October 2020
Commissioning	October through December 2020

5.5 Labour Requirements

Development of the project will provide direct and indirect benefits for the Nova Scotian and Canadian economy, and especially the population of northern Nova Scotia as the NPNS facility will continue to

operate. Direct workforce requirements for constructing the project are considerable, and direct and indirect employment in the Province associated with the operating the NPNS facility amounts to thousands of jobs in Province, in various employment sectors.

Furthermore, NPNS is committed to using local resources where economically and technically feasible to provide benefit to Nova Scotians, particularly residents of Pictou County and neighbouring counties.

During construction, activities will be carried out largely by a third party heavy equipment contractor(s) who will implement land surveying, site clearing, earth moving, leveling, contouring, temporary workspace preparation, water management features, and ultimately ETF, pipeline and outfall construction and commissioning activities for the project. The contractor(s) will work under the supervision of a NPNS representative (or designate). It is expected that the contractor(s) would be required to hire additional staff to carry out these construction activities. In excess of 100,000 person hours of construction is anticipated to complete the ETF project. The construction of the pipeline and outfall is in addition to this estimate.

During operation, it is not anticipated that additional staff will be required since the project replaces the existing ETF and associated infrastructure. Training of personnel will be required for the operation of the new ETF.

Decommissioning requirements are unknown at this time. However, it is assumed that a third party heavy equipment contractor(s) would be required to undertake these activities.

5.6 Emissions and Waste Discharges

The anticipated emissions and wastes associated with the project are discussed in this section. NPNS, through the conditions of the various permits and approvals it will receive to enable construction and operation of the project, will meet or exceed the compliance standards outlined in applicable regulations and guidelines. Where no such standards exist, industry best practices will be adopted, where applicable. Volumes of wastes and concentrations of contaminants will be reduced through best management practices, following applicable legislation, and mitigation planning including the development of an EMP.

5.6.1 Replacement ETF Effluent Discharge

The basis of the project is the construction of a replacement ETF and associated effluent pipeline and marine outfall. The ETF will accept an estimated annual average of 62,000 m^3/day (85,000 m^3/day peak flow) of wastewater that is created through the bleached Kraft pulp process at the plant, and will discharge the treated effluent at an outfall location in the Northumberland Strait.

The prediction of project performance is based upon expected water quality characteristics of the treated effluent as identified below in **Table 5.5-1,** as presented in the Receiving Water Study (**Appendix**

E). The effluent is anticipated to meet compliance with federal PPER. The PPER were developed to manage threats to fish, fish habitat and human health (related to fish consumption) from pulp and paper mill deposits into water frequented by fish. The PPER, and those regulations cited by the PPER, regulate the quality of effluent and remain under the jurisdiction of ECCC. Continued compliance with PPER is a requirement of project design and a significant consideration in the design of future monitoring programs.

Table 5.6-1: Anticipated Daily Maximum Effluent Water Quality (reprinted from Stantec 2018, Table 3.2)

Parameter	Unit	Value
Adsorbable Organic Halides (AOX)	mg/L	7.8
Total Nitrogen (TN)	mg/L	6.0
Total Phosphorus (TP)	mg/L	1.5
Colour	TCU	750
Chemical Oxygen Demand (COD)	mg/L	725
Biochemical Oxygen Demand (BOD_5)	mg/L	48
Total Suspended Solids (TSS)	mg/L	48
Dissolved Oxygen (DO)	mg/L	>1.5
pH	-	7.0 to 8.5
Temperature	°C	25 (winter) 37 (summer)
Total Dissolved Solids (TDS) or Salinity	g/L	4

Additionally, the project is designed with key established water quality guidelines and/or will meet ambient water quality (current background) at the edge of a standard mixing zone (CCME 2009 - Canada-wide Strategy for the Management of Municipal Wastewater Effluent).

Throughout operations, monitoring of effluent quality will be undertaken by NPNS personnel and/or accredited third party laboratories to assess compliance with regulations. The requirement for compliance sampling will be dictated by clauses in the Industrial Approval issued by NSE.

5.6.2 Air Contaminant Emissions

Air contaminant emissions from the project will mostly occur during the construction phase. The potential air contaminant emissions of concern include primarily particulate matter (PM, including its common size fractions PM_{10} and $PM_{2.5}$) from fugitive sources (e.g., excavation and earthworks, material handling, soil storage piles) as well as combustion gas emissions such as carbon monoxide (CO), nitrogen oxides (NO_X), and sulphur dioxide (SO_2) from the combustion of fossil fuel by construction equipment. Measurable emissions of other air contaminants (other than greenhouse gases (GHGs), discussed below in **Section 8.1**), are not expected.

Emissions during construction are generally related to the generation of dust from earth moving activities and unpaved temporary access roads, and routine combustion gas emissions from construction equipment. Equipment used for construction will generally consist of dump trucks, excavators, wheeled loaders, bulldozers, and other mobile equipment, similar to what may be seen on many other commercial or industrial construction sites. Control measures, such as use of water sprays on roads during dry periods or other dust suppression techniques, will be used as required to reduce the fugitive dust, and routine inspection and maintenance of construction equipment as well as the implementation of a no-idling policy will reduce exhaust fumes. Waste wood may be mulched and spread on access roads. The burning of waste brush/slash material or grubbings will not be permitted.

Air emissions of concern will be limited to the operation of the ETF and power boiler, and routine pipeline and facility maintenance activities. Air contaminant emissions include odour, which can be related to a variety of factors, sources and compounds. Similar to instances of reported odour occurrences in the past, there is the potential for odour to be perceived at locations beyond the NPNS property during specific meteorological conditions. However, it is noted that there have been no exceedances of the regulatory criteria for all air contaminants monitored from the existing facility's operations.

Potential air contaminant emissions during decommissioning will be similar in nature to, but lower in magnitude and duration than, emissions associated with construction of the project.

An assessment of the environmental effects of the project on the atmospheric environment is provided in **Section 8.1**.

5.6.3 GHG Emissions

GHG emissions from the project will mostly occur during construction and to a lesser extent during operations. The primary sources of GHGs are CO_2, methane (CH_4), and nitrous oxide (N_2O), as carbon dioxide equivalents (CO_2e), from fossil fuel combustion in heavy construction equipment, trucks and other mobile equipment.

During operations, sludge from the ETF process will be co-combusted with hog fuel in the facility's existing power boiler which may reduce CO_2 emissions through displacement of alternative fuel.

The project will interact with the atmospheric environment through the release of GHGs into the atmosphere as described above for air quality. An assessment of the environmental effect of the project on the atmospheric environment due to project-related GHG emissions is provided in **Section 8.1.**

5.6.4 Noise Emissions

Noise emissions from the project will occur during construction and operation and maintenance phases, and are generally associated with the operation of mobile and construction equipment, ETF operations, the pumping station, and blasting activities (if required).

Construction noise will generally be intermittent, as equipment is transient and operated on an as-needed basis and mostly during daylight hours. There will also be elevated noise emissions during HDD operation, if this method is selected for pipeline construction at wetlands and/or watercourses. Some activities will involve 24-hour a day operation for a period of up to several days, and will emit near continuous noise emissions during drilling. Noise emissions will adhere to local noise bylaws at all times.

Noise sources during operation and maintenance will be mitigated through the use of mufflers on all equipment, carrying out routine maintenance of equipment to maintain it in good working order, and limiting noise producing activities. The new ETF site is isolated from, and relatively distant from (>500 m), nearby residences, and the existing presence of a significant tree buffer will reduce the potential off-site effects of noise emissions such that the project does not cause undue nuisance to off-site receptors.

Noise abatement measures will be installed if deemed necessary in consideration of Health Canada guidelines for day and night noise limits (Health Canada 2010) and local and provincial noise limits.

An assessment of the environmental effects of the project arising from noise emissions is provided in **Section 8.2**.

5.6.5 Liquid and Hazardous Wastes

Liquid wastes generated during construction include oils, grease and fuels from the construction equipment and solvents, plus any inadvertent fuel spills (refer to **Section 10**). These wastes will be collected and disposed of in accordance with applicable local and provincial regulations. Liquid wastes from construction crews, including sewage and domestic waste water, will also be collected and disposed of consistent with local and provincial standards.

Liquid wastes typically produced during ETF operation and maintenance will be primarily from domestic water use. Lube oil for the pumps and other mechanical equipment will be changed regularly, brought into the equipment locations and removed in barrels; the waste product will be taken to an approved disposal and/or recycling facility.

5.6.6 Surface Run-off and Sedimentation

There is potential for erosion and sedimentation effects in both freshwater and marine systems as well as sediment re-suspension associated with in-water construction activities for the marine pipeline installation and development of outfall location. The soils in the project area are characterized by fine-grained texture, and the topography has occasional steep undulating and rolling slopes. These features,

combined with frequent rainfall and runoff, result in these soils being susceptible to erosion. The major element that protects these soils against erosion is vegetation cover. When vegetation clearing occurs within the PFA and the soil is exposed, it will become particularly susceptible to erosion.

Given the effluent pipeline route is predominately within a developed portion of the road shoulder, many direct effects to environmental sensitivities are avoided (e.g., routing to avoid high potential areas for rare plants, potential use of HDD to avoid alteration of wetlands and watercourses). It is also noted that the sensitivity of downgradient receiving waters and the fine-grained texture of soils will be considered. Proper management of sediment, erosion and construction drainage is fundamental to responsible construction of this project.

The EMP (**Section 5.7**) will include plans for erosion and sediment control measures and will be developed prior to commencement of construction activities. At a minimum surface run-off and sedimentation control will adhere to NSE standards and guidelines.

5.6.7 Solid Wastes

Solid wastes generated during construction will include brush, stumps, grubbings, extra subsoil and rock, temporary fencing, signs, metal containers, canisters as well as scrap pipe, cables, welding rods, and domestic wastes. Scrap paper and other office wastes will also be generated. During operation and maintenance, since the sludge from the BAS™ process will be burned in the NPNS boiler, a limited amount of solid wastes may be generated in addition to other solid wastes that are produced during daily operation of NPNS facilities.

As part of the project and similar to existing operations, NPNS will continue to actively cooperate with municipal waste reduction and recycling programs and will encourage conservation throughout its facilities. Solid wastes will be collected and disposed of in a manner consistent with local and provincial standards. Non-hazardous wastes will be separated as recyclable and non-recyclable, with recyclable material collected and transported to a licensed recycling facility. Waste management procedures will be outlined in the EMP and comply with provincial solid waste resource management regulations as well as additional municipal and disposal facility requirements. Non-recyclable wastes will be disposed of according to NPNS's existing waste management procedures.

5.7 Environmental Planning and Management

Environmental protection is a key feature throughout project planning. In particular, the new ETF, pipeline route and outfall have been sited to be adjacent and/or parallel to existing facilities and linear ROWs to avoid sensitive environmental areas wherever possible. The pipeline has been designed to comply with all current codes and standards reflecting the most current knowledge about pipeline safety and integrity.

5.7.1 Environmental Management Planning

NPNS is committed to developing the project in an environmentally responsible manner consistent with good environmental management and sustainability principles. To this end, NPNS will develop and carry out the project in a manner that avoids or minimizes the adverse environmental effects of the project, and enhances positive ones, in a manner that complies with applicable laws and regulations.

Several environmental protection and management measures will be implemented to guide the construction, operation and maintenance, and decommissioning of the project, as follows:

- Employing good planning, design, and management practices to comply with regulated and/or industry design and management standards to satisfactorily deal with environmental risks such as seismicity, unusual weather events, flooding, and erosion;
- Siting facilities to avoid sensitive areas such as wetlands, watercourses and important habitat types, where possible, and maintaining as much of a mature tree buffer as possible surrounding these features;
- Siting the land-based portion of the effluent transmission pipeline within an existing disturbed corridor (i.e., the road shoulder to Highway 106, NPNS property) for most of its length to reduce environmental effects that would otherwise occur from disturbance of previously undisturbed areas;
- Minimizing the footprint of project facilities and activities to consequently reduce the amount of disturbed land, wetlands, and water resources;
- Employing good planning, design and management practices to comply with standards and objectives for air contaminant emissions, noise, vibration, and surface runoff;
- Developing a modern ETF using BAS™ technology as the best available technology currently for treating effluent from Kraft pulping processes;
- Implementing progressive environmental protection, mitigation, and management strategies that avoid or minimize adverse environmental effects, and maintain or enhance positive effects;
- Preparing and implementing an EMP, which will contain mitigation measures to avoid and reduce potential adverse environmental effects that might otherwise occur from routine project activities, including emergency response and contingency procedures. The EMP described in **Section 5.7.1.1** will include procedures related to, but not limited to, the following:
  - management of emissions and noise;
  - management of surface water runoff;
  - heritage resources (including procedures for chance encounters of heritage resources during construction);
  - erosion and sediment control;
  - spill prevention and management;
  - transportation;
  - personnel training and awareness;
- Preparing and implementing project-specific emergency response and contingency procedures as part of the EMP to advise project personnel on how to implement specific actions to respond to accidents, malfunctions, or unplanned events; and

- Completing Indigenous engagement, and public/stakeholder consultation, as described in **Section 6**, such that, wherever possible, concerns about the project have been accommodated to the extent possible in its design, construction, operation, and decommissioning.

5.7.1.1 Environmental Management Plan

Project facilities have been designed to comply with all current codes and standards reflecting the most current knowledge about ETFs, pipelines, and marine protection and safety. A project-specific EMP will be prepared prior to project initiation to provide the required procedures to adhere to regulatory obligations and other environmental commitments.

The purpose of the EMP is to:

- Guide the company's commitments to reduce environmental effects in general, and specific regulatory commitments, will be met;
- Provide concise and clear instructions regarding procedures for protecting the environment, and reducing potential environmental effects;
- Document environmental concerns and appropriate protection measures associated with project operations;
- Provide a reference document for planning and/or conducting specific activities which may have an effect on the environment; and
- Function as a training document/guide for environmental education and orientation; and communicate changes in the program through the revision process.

Environmental management is considered an integral element in the way daily operations are performed and NPNS is committed to upholding this position while complying with applicable laws, regulations, and internal standards. NPNS will develop an EMP in order to communicate this commitment as well as detailed project requirements for environmental management to staff, contractors, regulatory agencies, and the public. By first ensuring that working conditions promote an atmosphere of health and safety for all employees, employees will then incorporate the environmental management practices into their daily work routine. Specific environmental requirements and mitigation practices are identified in this assessment and will be refined in subsequent environmental regulatory permitting processes, and are applicable through the construction phase of the project. The EMP will continue to evolve through the life of the project as new requirements emerge from various permitting and other processes.

A sample table of contents for an EMP for this type of project is presented below:

- Introduction and Scope
- Environmental Policy
- Project Description and Purpose
- Environmental Requirements
  - Federal, provincial, municipal legislation
  - Required environmental approvals

  - Management of environmental commitments
  - Reporting procedures
- Resources, Roles, Responsibility and Authority (including contractors)
- Competence, Training and Awareness
- Communication
  - Key Contacts List
- Environmental Protection Plan
  - Purpose, structure, compliance, mitigation measures
- Emergency Response and Contingency Plans
  - Fuel and hazardous material response
  - Discovery of archaeological or heritage resources
  - Erosion control failure
  - Ground or surface water contamination
  - Others
- Monitoring and Measuring
  - Terms of reference
  - Terrestrial environment
  - Public health and safety
  - Erosion control
  - Fish and fish habitat
  - Current use of land and resources for traditional purposes by Aboriginal persons
  - Archaeological heritage resources
- Incident Reporting
- Control of Records

5.7.2 Standard Mitigation Measures

Standard mitigation measures will be employed, as applicable, to reduce or eliminate adverse effects associated with project activities. These measures are outlined in this section.

A key operational mitigation is the assignment of qualified Operators with specialized training for the BAS™ treatment facility.

5.7.2.1 General Construction

- All components will be constructed according to all applicable regulations, safety codes, and standards;
- All necessary approvals, licences and permits required for a particular activity or construction site are obtained prior to the commencement of the applicable activity or construction at that site;
- Existing infrastructure and previously developed areas (e.g., existing roads, ROWs) will be used where feasible to reduce additional site clearing and the need for new materials;

- Construction activities will be restricted to the approved PFA including the surveyed ETF site, pipeline corridor, outfall location and approved temporary workspace, and existing roads;
- Natural vegetation will be preserved where feasible;
- Material will be sourced from existing, approved pits or quarries, if required to establish grades at the ETF and along the effluent pipeline corridor;
- An Environmental Inspector will monitor the implementation of the EPP during all critical phases (i.e., clearing/mowing, topsoil salvage, replacement, grading drainage and watercourse crossings and clean-up) of construction;
- A tight construction spread (i.e., interval between front-end activities such as brushing and grading, and back-end activities such as clean-up) will be maintained to reduce the duration of activities and effects of the project on land use and wildlife;
- All deliveries to the PFA and transportation of construction and waste materials will be managed within the legal loading requirements and according to spring weight restrictions;
- Notice of construction activity will be appropriately communicated to potentially affected businesses and residents; and
- Roads frequently traveled will be repaired as necessary.

5.7.2.2 Subsurface and Pipe Installation Activities

- The amount of open trench or excavation at any one time will be minimized;
- Trenches and excavations will be backfilled as soon as practical, following pipeline lowering-in, to minimize hazards to wildlife, workers and the public;
- Topsoil and subsoil removed during trenching will be stored in separate spoil piles to avoid mixing. Spoil piles will be managed so that spoil does not spread outside of the PFA;
- Where feasible, the PFA will be graded to divert surface water away from the open trenches and excavations;
- Where the open pipeline trench has the potential to draw down groundwater or contribute to surface water flow then isolation and other methods will be used to prevent the flow of water into/along the trench. Methods will comply with the project erosion and sediment control plan;
- If the pipeline trench or other excavations require dewatering, water will be filtered through vegetated areas or other appropriate sediment filtering devices;
- Dewatering will be completed in a manner that does not cause erosion or allow sediment to enter a watercourse; and
- Trench and excavation water will not be allowed to flow directly into any watercourse.

5.7.2.3 Erosion and Sedimentation Control

- The area of exposed soil will be limited, and the length of time soil is exposed without mitigation (e.g., mulching, seeding, rock cover) will be reduced through scheduled work progression;
- Reduction of the width of grading in order to limit the potential for erosion and subsoil compaction;
- Erosion and sedimentation control structures will be used and maintained throughout construction activities;

- Erosion and sedimentation control structures will be inspected regularly, especially before and after heavy rain events;
- Erosion and sedimentation control structures will remain in place until the disturbed area is stabilized or natural revegetation occurs;
- Dewatering of excavated areas will control the release of sediment-laden water (e.g., filtration through vegetation or engineered erosion control devices);
- Overburden storage piles and exposed topsoil will be covered, or seeded and revegetated, as soon as practicable;
- Engineered surface water drainage and diversion channels will be constructed to direct flow around the construction site and away from watercourses and wetlands;
- Construction material (e.g., gravel) placed in or next to watercourses, where approved, will be free of debris, fine silt and sand, and chemical contaminants;
- All watercourse crossings will be conducted according to the terms of provincial water approvals including site-specific erosion and sediment control plans;
- The following is a brief summary of the erosion and sediment control measures that may be used:
  - Buffer Zones: Buffer zones are areas that will not be grubbed until just prior to construction. Buffer zones will extend 10 m each side of the crest of the slope of a watercourse or wetland, and wider where HDD is employed;
  - Sediment Control Fence: Sediment control fencing is a sheet of geosynthetic fabric imbedded into the ground parallel to the contours. Sediment control fencing is used to filter sheet runoff. It will be used to delineate buffer zones as well as at the edges of the rights-of-way and near water courses. It can also be used around spoil piles, on toe of slopes and at intermediate locations to control siltation;
  - Diversion ditches: A diversion ditch is normally constructed up slope of the work to divert clean water prior to it entering the work area. Diversion ditching established in undeveloped areas up gradient of active working locations to reduce the amount of incoming surface runoff. Stabilized diversion ditches will be used to minimize the amount of off-site water entering disturbed areas;
  - Geotextile Filter Bags: Sediment laden water is pumped into geotextile filter bags such that the water filters out and the sediment remains in the bag. These may be used where small volumes of sediment laden water require filtering;
  - Sediment Pond/Trap: A sediment pond or sediment trap is designed to contain flow for a period of time in order to facilitate the settling out of sediments;
  - Stabilization Methods: Stabilization methods will be used to minimize the potential for erosion. These include hydroseeding, application of tackified straw mulch, erosion control blankets, and gravel (including clear stone, surge rock or riprap);
  - Sediment and Erosion Control measures will be installed and maintained according to provincial standards and will be inspected regularly (including pre/post predicted heavy rainfall events) to ensure proper operation;
  - Exposed soil surfaces will be stabilized and revegetated to limit erosion. Seeding the disturbed areas of the construction ROW will be conducted as soon as practical after final clean-up and as

weather and soil conditions permit. The goal is to reclaim all disturbed lands within one growing season following construction.

5.7.2.4 Vegetation Clearing and Disposal and Restoration

- Along the NSTIR ROW, where limited clearing is required, trees will be felled towards the PFA, wherever possible. Trees that inadvertently fall into adjacent undisturbed vegetation will be recovered;
- On the NPNS property, where clearing is required, trees will be felled towards disturbed areas, wherever possible. Trees that inadvertently fall into adjacent undisturbed vegetation will be recovered;
- Environmentally sensitive features will be avoided during clearing as identified by appropriate signage and fencing;
- The boundaries of the construction PFA, staging, stockpile areas and temporary workspace will be staked prior to work. Brushing or grading beyond the stakes will not be allowed unless temporary workspace right have been obtained;
- Salvageable timber will not be bulldozed;
- Subject to regulatory approval, wooden mats or equivalent in areas of wet soils will be installed to reduce terrain disturbance and soil structure damage. These materials will be removed during clean-up;
- Clearing/grubbing or earth moving activities will be scheduled to avoid periods of heavy precipitation and high winds;
- Clearing/grubbing or earth moving activities shall be minimized to the extent possible, will be limited to areas where soil removal is necessary (e.g., trench lines, areas to be graded), and shall not extend beyond the limits of the PFA without additional assessment of potential sensitivities and development of appropriate mitigation;
- In consultation with landowner(s) or appropriate regulatory agency, potential grubbings and/or wood debris stockpile locations will be determined;
- Grubbings and wood debris stockpiles will be placed in a manner that does not create or enhance a fire hazard;
- Timber material not salvaged for merchantability will be disposed of through mechanical chipping, where possible; and
- No vegetation burning will occur.

5.7.2.5 Topsoil Management

- Soil storage areas will be located in the approved areas of the PFA, including temporary workspaces; and
- Following the salvage of the topsoil, if warranted, topsoil windrows and stockpiles will be stabilized.

5.7.2.6 Watercourse and Wetland Crossings

- The clearing of temporary workspace will be avoided within 10 m of a watercourse or wetland except within the area of existing Highway vegetation clearance. This area shall be clearly marked prior to clearing operation;
- All watercourse crossings, if required, will be conducted according to the terms of provincial water approvals including site-specific erosion and sediment control plans;
- Natural vegetation (especially adjacent to the watercourse) will be preserved as much as possible;
- Regular visual monitoring of surface water conditions and operational observations will be undertaken to ensure that sediment and erosion control measures are working effectively;
- Root grubbing and brushing will be restricted near watercourses and wetlands. Grubbing will not occur within riparian buffers adjacent to watercourses and wetlands;
- Trees will be felled away from watercourses and wetlands;
- Grading will be directed away from waterbodies and wetlands. No fill material will be placed in a waterbody or wetland during grading;
- Earthen berms will not be used to isolate the crossing construction area;
- Excavate a pit or construct berms of packed earth or staked straw bales, if the spoil is likely to be highly saturated, to prevent spoil or silty water from flowing back into the watercourse;
- Temporary berms will be installed on approaches slopes to watercourses and wetlands (where required), and silt fence or an equivalent temporary erosion/sediment control device (e.g., hay bales, coir logs) will be erected near the base of approach slope;
- Bank and riparian protection and reclamation measures will be implemented within 10 m of watercourses or where disturbance of the bank or riparian area occur s to watercourses and wetlands immediately following grading;
- Disturbed riparian buffer areas will be seeded with appropriate seed mix if no woody material will be installed within the riparian area; and
- If wetland disturbance cannot be avoided, it will be undertaken under the relevant provincial requirements.

5.7.2.7 Marine Environment

- All marine-based work will be undertaken by Canadian-registered vessels which will comply with the requirements of the Canada Shipping Act;
- In recognition that the discharge of ballast water from ships is viewed as a principle vector for the introduction and spread of harmful aquatic organisms and pathogens, all ballast water management activities will comply with the Ballast Water Control and Management Regulations (updated Oct 31, 2012), under the Canada Shipping Act;
- All marine-based work undertaken by foreign vessels must be undertaken pursuant to a Coasting Trade Permit issued under the Coasting Trade Act, and will comply with applicable regulations under the International Maritime Organization Conventions including the International Convention for the Prevention of Pollution from Ships (MARPOL);

- All marine project activities will be conducted in accordance with the requirements of the Canadian Coast Guard Marine Communication and Traffic Services (CCG-MCTS);
- The pipeline will be placed in a trench with appropriate cover to prevent damage to the pipeline from ice scour. Ice scour is the possibility of damage to the pipeline by floating ice, both by direct tearing of the pipeline or by deformation of the pipeline by applied pressure to the soil/sediment around it.
- Silt curtains may be used during pipeline construction activities in the marine environment to minimize the transportation of suspended sediments;
- Scheduling of project activities will be coordinated through consultation with local fish harvesters, Northumberland Ferries and other stakeholders and best-efforts will be made to schedule activities to minimize interference;
- Vessel maintenance, inspection and certifications will be required prior to mobilization;
- Shipboard personnel will be qualified, trained and competent prior to mobilization; and
- All marine equipment used during construction will be examined and cleaned to prevent and control marine biofouling. All anti-fouling activities will comply with the Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals (2012), under the Canada Shipping Act, as well as requirements set out by Health Canada and the Pest Management Regulatory Agency regarding approved anti-fouling substances.

5.7.2.8 Horizontal Directional Drilling

- For HDD, the rig layout will include containment facilities designed to contain a release of drilling fluid from the mud circulation system;
- Noise abatement measures will be installed if deemed necessary in consideration of Health Canada guidelines for day and night noise limits (Health Canada 2010) and provincial and local noise limits; and
- An emergency response plan will be developed as part of the Environmental Management Plan (EMP) and will include emergency spill response procedures for potential release of diesel fuel, hydraulic oil and all other types of synthetic oil, drill muds.

5.7.2.9 Blasting and Noise Control

Blasting activities are not anticipated as part of this project. However, if required based on final project design:

- Blasting will be limited to daytime hours;
- Pre-blast surveys will be completed to evaluate the potential for ground vibration and identify potentially affected structures (e.g., wells and foundations);
- Blasting will be conducted according to provincial legislation, and will be subject to terms and conditions of applicable permits;
- Blasting near watercourses will follow the requirements of the *Fisheries Act* and the Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky 1998);
- All equipment will be maintained in good working order to maintain noise suppression;

- Idling of vehicles will be limited. Vehicles and equipment will be turned off when not in use, unless required for effective or safe operation;
- Nearby residents will be given a construction schedule for key noise-generating activities including blasting (if applicable), and provided with contact information in case of complaints; and
- Marine blasting will be completed in accordance with applicable regulations.

5.7.2.10 Dust and Air Emissions Control

- Idling of vehicles will be limited. Vehicles and equipment will be turned off when not in use, unless required for effective or safe operation;
- Burning of brush or slash will not be permitted;
- Permanently cleared areas will be stabilized with native plantings or seed mix as used by NSTIR to minimize dust;
- Natural vegetation will be preserved where possible;
- When dust is a concern, dust suppressants (e.g., water) will be applied to exposed surfaces; and
- Petroleum products will not be applied as a dust suppressant.

5.7.2.11 Traffic Management and Roadway Infrastructure

- Project-related traffic will be managed in accordance with the Nova Scotia Temporary Traffic Control Manual (e.g., traffic control persons, signage, temporary markings) (NSTIR 2018);
- Advance notice will be provided to any property owners and residents of any temporary interruption or temporary alteration to access to their property;
- During construction activities, advance public and governmental department notice will be given for any necessary detours or road closures. Plans will be developed in conjunction with affected stakeholders;
- Planning for required traffic delays will avoid peak traffic times when possible, and will consider other traffic disruptions in the area;
- Vehicles will yield to wildlife and will be operated at appropriate speeds;
- Establish construction traffic speed limits and general public speed limits during construction to reduce the risk of collisions with birds;
- Flag persons, detours, safety barricades, fences, signs and/or flashers will be used as required; and
- Pre and post roadway surveys will be completed.

5.7.2.12 Waste Management

Construction related materials such as survey staking, pallets, construction signage and erosion and sediment control structures will be removed on completion. Waste storage will be minimized by prompt removal of waste following equipment servicing, and project sites will be kept free of loose waste material and debris. However, if liquid waste storage is required, the storage areas will be located following regulatory requirements for fuel and lubrication storage and will not be located within 30 m of a watercourse or wetland. Portable toilet rentals will be used for construction sites; these will be

serviced by the company and disposal in accordance with regulations. Solid waste produced will include materials such as strapping, temporary fencing, bridge material, signs, containers and welding rods.

Construction specifications will also include requirements for litter control and management of construction wastes. Non-hazardous solid waste will be collected and disposed of at an approved facility by a licensed contractor. Food and food waste will be stored and disposed of properly to avoid attracting wildlife.

5.7.2.13 Dangerous Goods Management

- Basic petroleum spill clean-up equipment must be on-site and all spills or leaks must be promptly contained, cleaned up and reported to the 24-hour environmental emergencies reporting system: 1-800-565-1633;
- All fuels and lubricants used during construction will be stored in designated areas. Storage areas will be located at least 100 m from watercourses, wetlands and water supply areas (including known private wells), where possible, except where secondary containment is provided;
- Equipment used will be well-maintained and free of fluid leaks (checks to be conducted). Equipment to be used in or adjacent to a watercourse, wetland or marine environment will be clean or otherwise free of external grease, oil or other fluids, mud, soil and vegetation, prior to entering the waterbody;
- Refuelling of machinery will not occur within 30 m of watercourses, wetlands and water supply areas (including private wells) and where possible will be done on an impermeable surface;
- Storage of all dangerous goods will comply with the Workplace Hazardous Materials Information System (WHMIS) requirements and applicable federal and provincial regulations;
- Transportation of dangerous goods will comply with TC's Transportation of Dangerous Goods Act; and
- Emergency response procedures will be in place for spill response, with trained personnel present onsite at all times.

5.7.2.14 Fire Prevention

- Proper disposal methods for welding rods, cigarette butts and other hot or burning material will be used;
- Smoking will only occur in designated areas;
- Appropriate fire-fighting equipment will be kept on site; and
- Burning of slash (fine or coarse wood debris) will not be permitted.

5.7.3 Emergency Response and Contingency Plan

A project-specific ERCP for unplanned events will be prepared. This will include spill management and response procedures to prevent and respond to spills.

NPNS maintains an emergency response team that is available to respond to incidents during the construction of the project. Consistent with current NPNS operations, the emergency response team will be available 24-hours/day, 7 days/week to support the project. The capacity of local fire and ambulance

services to respond to incidents will also be evaluated during preparation of the ERCP. NPNS will continue to work closely with related agencies on the issue of public safety during all phases of the project.

In the case of an accidental release of materials, reporting and clean-up procedures will follow provincial emergency spill regulations as required. Lubricants and other petroleum products will be stored and waste oils will be disposed of in accordance with provincial regulations. Small spills will be contained by onsite personnel using spill kits kept at the site (see **Section 10** for additional information).
It is anticipated that elements of the ERCP will include:

- purpose and scope of plan coverage;
- general ETF identification information (e.g., name, owner, address, key contacts, phone number);
- ETF and associated infrastructure (i.e., pipeline) locality information (e.g., maps, drawings, description, layout);
- discovery/initial response;
- termination and follow-up actions/prevention of recurrence;
- notification protocols (internal, external, and agencies);
- response management system (e.g., incident commander, safety, liaison, evacuation plan);
- assessment/monitoring, discharge or release control;
- containment, recovery, and decontamination;
- logistics – medical needs, site security, communications, transportation, personnel support, equipment maintenance and support, emergency response equipment (e.g., Personal Protective Equipment (PPE), respiratory, fire extinguishers, first aid);
- incident documentation (accident investigation and history);
- a description of biological and human-use resources that could be impacted;
- an inventory of oil and chemical products and associated storage locations for both construction and operation phases;
- the identification of spill response equipment that will be onsite or available in case of emergency events;
- procedures for responding to operational spills and releases;
- an incident reporting system, including notification and alerting procedures;
- a list of responsible organizations and clarification of the roles of each organization;
- clean-up and disposal procedures;
- training and exercises/drills;
- plan review and modification;
- prevention; and
- regulatory compliance.

The ERCP will also reference relevant and appropriate standards to supplement code requirements as applicable. NPNS commits to submitting the ERCP to appropriate regulatory agencies for review.

6.0 Public, Regulatory and Indigenous Engagement

6.1 Engagement Overview

NPNS has been committed to constructive dialogue with all parties throughout the EA Registration process. For the purposes of this project, five principles were used to establish NPNS' approach to engagement with the public, the surrounding communities, stakeholders and governments, and to fulfill the requirements of the Nova Scotia Environmental Assessment Regulations.

- Inclusiveness: involve those that are to be affected or potentially affected by the project into the decision-making process;
- Responsiveness: address input received in a timely fashion;
- Accessibility: materials, engagement sessions, and processes will be made accessible to a diverse range of participants;
- Transparency: clearly communicate how information received was used in the planning and design decision making processes; and
- Respect: a safe and comfortable environment will be maintained so that individuals can freely communicate their opinions and directions.

Project engagement has coincided with design milestones (see **Table 6.1-1**). The project team has received significant feedback and this input has contributed to the design of the project, fostered important conversations, and shaped how impact assessments were carried out.

Table 6.1-1: Stages of Project Engagement

Stage 1. **Project Launch** October 2017 – January 2018	Introduced the proposed project, and the preliminary design completed to date. Held major engagement sessions to initiate dialogue and hear community interests and understand concerns.
Stage 2. **Project Design** January 2018 – July 2018	Responded to groups that came forward as the result of project launch. Continued meetings with Pictou Landing First Nation, and key stakeholders for further conversation and input.
Stage 3. **Project Re-Design** October 2018 – January 2019	Introduced a major project update - a change in marine outfall location and effluent pipeline route - through meetings with stakeholders and Pictou Landing First Nation.

6.2 Engagement Strategy

The engagement strategy for the project involved the implementation of the following elements:

- In-Person Meetings;

- Direct Written Communication; and
- Digital Input and Information.

6.2.1 Project Contact List

A project contact list was developed and updated throughout the duration of the project. The list includes local representatives, federal agencies, provincial ministries, municipal contacts, Mi'kmaw communities, local agencies, interest groups, and members of the public who indicated that they would like to be informed. Interested parties could request being included on the project contact list through contacting the project team, or through form on the project website.

6.2.2 In-Person Meetings

In-person sessions included a series of public open houses during the project initiation, as well as a community open house at PLFN. Display materials are included in **Appendix I**. Details of engagement with the Mi'kmaq is detailed below in **Section 6.6**.

Four stakeholder meetings were held with the group of representatives from the commercial fishing industry and PLFN. Meeting minutes were distributed to attendees and are included in **Appendix I**.

6.2.3 Written Communication

A project initiation newsletter, which included the invitation to the first open house sessions, was mailed to residents and businesses of Pictou County, commercial fishing groups, representatives of the Mi'kmaq community and government, as described in **Section 6.3**. NPNS also used print media to place notices of public open house events, and provided ongoing responses to media inquiries for print and radio.

6.2.3.1 Response to Individual Inquiries

As demonstration of their commitment to engagement, NPNS has endeavoured to respond to each individual inquiry received from individuals in writing, acknowledging the importance of listening to all individuals. Over 200 letters, comment forms, and emails have been received by the EA team over the course of the EA process itself. These individuals have asked in-depth questions, voiced concerns, and shared ideas. Many wrote in on multiple occasions. The response to questions and how the project has been shaped by input received is documented in **Table 6.7-1**.

6.2.4 Digital Input and Information

A project-specific toll free phone number (1-877-635-8553 x5050) and email address (npns.effluenttreatmentfacility@dillon.ca) were set up to provide the public with an additional means of contacting the project team to submit a comment or ask a question regarding the project. At the time of registration, approximately 80 comments or questions have been received via the project email.

A project website (www.NorthernPulpFuture.ca) was launched to provide interested members of the public with a central point to access updates on the progress of the EA and relevant reports. The project website was publicly accessible beginning on November 5, 2017 coinciding with the notice of project initiation. It has received views from approximately 4,500 users since that time up to date of submission of this report.

There is an online comment form available on the project website where the public can ask questions, make a comment, or request additional information. To date, 103 comment forms have been received through the project website.

The following information is available on the project website and was updated throughout the EA process. A copy of the project website at the time of registration is included in **Appendix I**.

- Home (provides information on the project, including news and project updates);
- Project Overview. Sub-pages include:
  - The ETF at Boat Harbour;
  - About NPNS;
  - Bleach Kraft Process; and
  - In-mill Improvements to Support ETF Replacement;
- Frequently Asked Questions, grouped by the following themes:
  - EA Process;
  - NPNS Facility;
  - Effluent Treatment Facility Design;
  - Outfall Location;
  - Effluent Quality;
  - Air and Water Quality;
  - Marine Life;
  - Environmental Monitoring; and
  - Boat Harbour;
- Project Materials, including reporting from the following:
  - Specialist studies:
    - NPNS Global Market Study, Brian McClay & Associates;
    - Receiving Water Study and supplements, Stantec Consulting Ltd.;
    - 2016 EEM Report (Cycle 7 Interpretive report), Ecometrix Inc.;
    - Technology Selection Summary Report, KSH;
    - Brochure with information of the new ETF;
    - Middle River Water Availability Report, RV Anderson;
  - Engagement Materials:
    - Project Launch: Summary of Engagement- What We Heard;
    - Project Launch Open House Materials; and

- Project Launch: Initiation Newsletter.

- Effluent Treatment Facility, including a description of the purpose of the ETF, and a description of determining the recommended approach (locating the marine outfall, outfall design and facility design):
  - Alternative Processes Considered;
  - Technical Description of the Recommended ETF;
  - Construction, including what to expect during construction; and
  - Existing vs. Proposed;

- Environmental Assessment; and
- Contact Us.

6.2.5 Engagement with Government Regulators, Agencies and Elected Officials

Government engagement for the project has been ongoing since the introduction of the Boat Harbour ACt in May 2015. Regulatory departments from federal and provincial goverments have been consulted on the project in order to present the planned project and receive feedback on regulatory requirements and seek regional or topical expertise.

Elected officials have requested to be kept informed. Meetings have been held with local MLA's and municipal elected officials to provide information on the mill background and existing operations, the proposed project, and EA process. The PEI Standing Committee on Agriculture and Fisheries also requested a presentation. Engagement with regulators, agencies and elected officials include one-on-one meetings or correspondence, group meetings and site visits.

Regulators and agencies have taken an active interest in the project. The following have been consulted on the project:

- NSE
- NSTIR
- NS DLF
- NS OAA
- CEA Agency
- DFO
- ECCC
- Canadian Wildlife Service
- Health Canada
- Transport Canada
- NS Lands
- NS Communities Culture and Heritage

6.3 Stage 1: Project Launch

The EA Registration process initiated in October 2017 with a formal public launch November 27, 2017 through publishing a notice of project initiation in local newspapers, doing a large project initiation newsletter mailout and launching the project website. This first stage of engagement oriented around the 'Project Launch' is described as continuing until January 2018 when the project team began having second or third meetings with those engaging with the project.

6.3.1 Project Initiation Newsletter, Public Open House Invitation

A newsletter to introduce the project and provide an invitation to the Public Open House was prepared to provide a description of the project, the purpose of the project, the EA process, and contact information for the study team. A copy is provided in **Appendix I**. The newsletter was distributed as follows:

- Mailed to the initial project contact list, including Indigenous communities, on November 27, 2017;
- Mailed to approximately 20,000 addresses within Pictou County on November 27, 2017; and
- Advertised in the following newspapers: Nova Scotia (formerly Pictou) Advocate (November 29, 2017), New Glasgow News (November 27, 2017), and the Chronicle Herald (November 27, 2017).

6.3.2 Engagement Sessions

A three day 'Project Launch' series of open houses was held December 4th to 6th, 2017. The same information was presented at all sessions. Sessions were held for: media, the commercial fishing industry, government and elected officials, local business and forestry industry, and the public. Some attendees returned to multiple sessions to better understand the information and ask further questions. Over 600 individuals attended the project launch sessions. During these sessions information on existing fish species in the area of the outfall was provided by PLFN and the public (see **Figure 6.3-1**). Presentation materials are provided in **Appendix I**. In summary:

- Media information session, December 4, 2017 (Pictou County Wellness Centre)
  - Six representatives from four media outlets attended. Information panels were displayed throughout the room and a 30 minute presentation was provided by project representatives from the project team.
- Fishing Industry Meeting, December 4, 2017 (Pictou County Wellness Centre)
  - Meeting invitations were sent to individuals through the major industry associations representing the various sectors and geographies (e.g., Northumberland Fisherman's Association).
  - There were approximately 178 attendees at this session. Attendance was largely from Pictou County, with representation from Antigonish County, Prince Edward Island, and New Brunswick.
  - A 30 minute presentation was provided by project representatives from the project team followed by a panel Question & Answer session from the audience. Information displays were also available throughout the room.
- Government Representatives and Agencies Information Sessions, December 5, 2017 (Glasgow Square) and December 6, 2017 (Abercrombie Fire Hall)
  - Information sessions for government officials and agencies with invitations sent to Mayors, chief administrative officers (CAOs), and Councillors at the five local governments and Pictou County, MLAs and various applicable provincial agencies.
  - Approximately 20 government officials attended over the course of the two sessions.
  - Sessions were facilitated in the same format where information panels were displayed throughout the room and project representatives from the project team were available to explain the project, and to answer questions one-on-one or with small groups.

- Industry Information Sessions, December 5, 2017 (Glasgow Square) and December 6, 2017 (Abercrombie Fire Hall)
  - Information sessions for local businesses and forestry industry representatives Invitations were sent to NPNS suppliers, NPNS employees, local business and industry contacts.
  - Approximately 190 people attended over the course of the two sessions.
  - Sessions were facilitated in the same format where information panels were displayed throughout the room and project representatives from were available to explain the project, and to answer questions one-on-one or with small groups.
- Public Information Sessions December 5, 2017 (Glasgow Square) and December 6, 2017 (Abercrombie Fire Hall)
  - Information sessions open to the general public, as advertised in local papers, media, and mailing.
  - Sessions were facilitated in the same format where information panels were displayed throughout the room and project representatives from the project team were available to explain the project, answer questions one-on-one or with small groups.
  - Over 300 people attended the sessions over the two evenings.

Figure 6.3-1: Fishing Grounds Identified at Engagement Sessions

During the December 4, 2017 meeting, commercial fishermen asked the project team to 'bring them to the design table' seeking rationale behind an outfall pipe into the Northumberland Strait as the marine discharge option. On December 21, 2017 leadership from several commercial fishery associations met with the project team to share concerns about the project and discuss how to continue discussions to

find a path forward. Leaders outlined their strong opposition to a marine outfall within the Northumberland Strait. Project representatives from NPNS, KSH, Dillon, and NSTIR met with representatives from the Northumberland Fishermen's Association, the Gulf Nova Scotia Fishermen's Coalition, the Gulf Nova Fleet Planning Board, the Inverness South Fishermen's Association, the Maritime Fishermen's Union, Prince Edward Island Fishermen's Association, and the Gulf Nova Scotia Bonafide Fishermen's Association. This group of commercial fishery association leadership formed a working group who participated as a stakeholder group for commercial fishing interests and met with the project team throughout the EA Registration process.

Feedback collected during Stage 1 through comment forms, project emails, meetings, and the eight information sessions is summarized below. Comment forms were provided to participants at in-person sessions and were received by Dillon in person (during a session), by email, and mail. At the end of the project launch phase, written responses were provided to comments received via letter. Letters were mailed to individuals in January and February 2018. A total of 145 comment forms and emails in relation to Stage 1 engagement activities were received as of January 10, 2018:

- 53 comment forms were submitted in person at the December 4-6, 2017 sessions;
- 9 comment forms were submitted by mail;
- 51 comments were submitted via the project website "Contact Us" page; and
- 32 comments were submitted via email.

6.4 Stage 2: Project Design

Throughout Stage 2, meetings were held with the government agencies and stakeholder groups to provide information on the project and an update on the design and EA process. Discussions also continued with Pictou Landing First Nation, as documented in **Section 6.5**. Feedback collected during Stage 2 was primarily through comments submitted via the project website and in face to face stakeholder meetings. A total of 56 comments and emails were received between January 10 and June 26, 2018.

6.4.1 Engagement Activities

Meetings with stakeholders included responding to invitations from the Rotary Club of New Glasgow, Central Region Woodlot, and the Atlantic and Nova Scotia Salmon Associations to meet to discuss the project and answer questions specific to the interests of each group. All three groups were interested in the protection of the environment, and the continued operation of the mill. The Salmon Associations were also interested specifically in the protection of salmon and salmon habitat.

In Stage 2, two meetings occurred with the working group of commercial fishing industry leadership: representatives from the Northumberland Fishermen's Association, the Gulf Nova Scotia Fishermen's Coalition, the Gulf Nova Fleet Planning Board, the Inverness South Fishermen's Association, the

Maritime Fishermen's Union, Prince Edward Island Fishermen's Association, and the Gulf Nova Scotia Bonafide Fishermen's Association.

- On February 8, 2018, as follow up to the first meeting in December 2017, the market analysis for NPNS (**Appendix B1**) was presented, and the conclusion of why NPNS cannot change mill process types was explained (see **Section 4**). From that understanding, conversation focused on alternative effluent disposal methods and locations (described in **Section 4**). It was expressed by the stakeholders and PLFN that any risk to the Northumberland Strait was not an acceptable risk to the stakeholder group. Impact assessment methodology was discussed. The conclusion of the discussion with the project team was that the environmental impact assessment would follow typical environmental assessment best practice, recognizing the integration of the environment, and not prioritize the economic value of one species over another. PLFN, including Chief, Council and Fisheries Department staff joined with the commercial fishermen leadership group attending this meeting.
- On February 20, 2018 a third meeting with this group was held to discuss how the Receiving Water Study had been carried out (**Appendix I**), the data used in the modeling and the predicted results of effluent mixing and its interaction with Northumberland Strait water quality. Meeting invitations were extended to PLFN, who ultimately were unable to attend. At that meeting NPNS requested the fishers provide detailed information on fishing locations and followed up with that request in a February 23, 2018 letter. No information or response was directly received.

6.5 Stage 3: Project Re-Design

Stage 3 engagment marked the transition to communicating that NPNS was considering a new alternative for the pipeline route and marine outfall location. Due to engineering constraints associated with ice scour in the vicinity of the proposed outfall location outside of Pictou Harbour, an extention to the Pictou Road outfall and a new outfall and pipeline route to Caribou Harbour were investigated. Engagement was undertaken to provide an update on the project to government agencies and elected officials, stakeholders, and the public. Media outlets, key stakeholder meetings, and update to the project were the main methods of engagement for Stage 3.

During engagement sessions, NPNS specifically sought input before choosing bewteen the two proposed outfall locations. Fishermen and PLFN indicated their opposition to the project in general, and offered no input to the outfall location evaluation. Engineering considerations suggested that the Caribou outfall route would be technically recommended. In the absence of further feedback, NPNS made the decision to move forward with the Caribou outfall route.

6.5.1 Engagement Activities

Meetings with stakeholders representing the forestry industry and commercial fishing industry were the engagement activities outside of ongoing dialogue with PLFN which occurred during this time. Updates to regulators and government were also central.

- Presentation to Canadian Woodlands and Woodlot Owners forums (October 17, 2018) to provide an update on the ETF project;

- Meeting with the Commercial Fishing Leadership and PLFN Working Group (October 22, 2018) to present the two outfall alternatives and, seek feedback and gather comments on the alternatives; and
- Meeting with two Commercial Fisheries Leaders (October 27, 2018) to discuss the blockage of survey work and related safety concerns.

6.6 Engagement with Indigenous Communities

The Supreme Court of Canada has held that the Crown (including the Governments of Canada and Nova Scotia) has a duty to consult with First Nations, and accommodate them as necessary, for any power, duty or function they may exercise that may affect Aboriginal or treaty rights.

While the government's duty to consult cannot be delegated to proponents, procedural aspects can be delegated. The Nova Scotia *Environmental Assessment Regulations* include the requirement to identify concerns of Indigenous People about potential adverse effects of a project and steps taken, or proposed to be taken, by the proponent to address concerns, as well as the steps taken to identify these concerns. The information gathered by the proponent during its engagement with Indigenous Peoples helps to contribute to the Crown's understanding of potential novel impacts of the Project on potential or established Aboriginal or treaty rights and the effectiveness of measures proposed to avoid or minimize those impacts.

In addition to and separate from engagement NPNS completed in relation to this project, the provincial government has been consulting with the Mi'kmaq to understand potential project effects on Aboriginal and Treaty rights.

NPNS engaged with the Mi'kmaq as part of their responsibility as proponent under the *Environmental Assessment Regulations*, and has also attended the Provincial Crown's Formal Consultation meetings when invited. Engagement and consultation with the Mi'kmaq completed by NPNS is documented below.

6.6.1 Approach

Engagement with the Communities of the Mi'kmaq Nation of Nova Scotia was carried out following both the Five Principles described in **Section 6.1**, and following the guidance provided in the *Proponents Guide: The Role of Proponents in Crown Consultation with the Mi'Kmaq of Nova Scotia*, November 2012.

As noted in **Section 6.1**, engagement was completed through direct communication, in person meetings, and digital communication and input. PLFN also participates, with two representatives, in the NPNS Community Liaison Committee. The project website and overall project contact list are described in **Section 6.2**.

6.6.2 Engagement and Consultation Activities

Direct Communication

Letters that explained the project and commencement of undertaking the EA process were sent to the following Indigenous communities and community entities:

- Kwilmu'kw Maw-klusuaqn Negotiation Office;
- Native Council of Nova Scotia (NCNS);
- Pictou Landing First Nation (PLFN);
- Sipekne'katik First Nation; and
- Millbrook First Nation.

PLFN and NCNS requested to be kept informed of the project, and in-person meetings were held to discuss the project as noted in **Table 6.6-1**. PLFN has received, at their request, hardcopies of all project reporting to date. PLFN and NCNS will receive a hard copy of the EA registration package after filing.

Participation in Crown-lead Consultation

The Crown as represented by the Province of Nova Scotia maintains regular consultation with PLFN as with all First Nation communities in the province. Prior to the initiation of the EA Registration process, NPNS as proponent was invited to participate in meetings held by the Province of Nova Scotia and PLFN to discuss early project planning and design of a replacement ETF beginning in March 2017. NPNS has continued to accept invitations to subsequent Consultation meetings when they have been extended. Dillon Consulting, as NPNS' EA consultant, was invited to and attended a Crown formal consultation meeting in November 2017 where the EA was introduced in advance of the public project launch.

In-Person Meetings

A list of engagement activities with Mi'kmaw leadership, communities or community entities completed by the proponent are provided in **Table 6.6-1**.

Engagement was predominantly with PLFN Chief, Council and staff, who met with the proponent and the project team throughout the EA Registration process. The members of PLFN are very concerned about the project. Several submitted comment forms following the January 2018 community engagement session. Fifty two provided interviews as part of the MEKS. Consistently, topics of concern include illness in the community, and the risk of negative impact the project is believed to pose to fisheries and fish habitats. These themes of concern are echoed from other stakeholders and members of the public. PLFN has a clear history and connection to Boat Harbour. The clean up of Boat Harbour was another regular theme of input provided.

PLFN continued to engage respectfully and consistently with the project team, while maintaining stated opposition to the project. Offers were extended by NPNS to PLFN Chief and Council to travel to facilities

in British Columbia and Cape Breton Island to tour mill facilities with AST systems and marine discharges. Unfortunately those tours could not be coordinated.

Table 6.6-1: In-Person Engagement and Consultation Activities

Organization	Date	Means of Engagement	Topics Discussed
Pictou Landing First Nation	February 24, 2017	Mill Tour	Presentation and Mill Tour
	April 26, 2017	Crown Lead Consultation	Technical Review and Preliminary Engineering of ETF by KSH Possible Outfall Locations Pending EA Class determination from NSE Discussion/Questions
	August 25, 2017	Crown Lead Consultation	Project Update Schedule Update Receiving Water Study of Pictou Road Outfall Alternatives by Stantec Discussion/Questions
	September 22, 2017	Meeting	Presentation and Mill Tour with PLFN
	November 23, 2017	Crown Lead Consultation	Project Update EA Process (General) Anticipated EA Process for Project Project Overview and Update Discussions/Questions
	January 8, 2018	Community Open House	Hosted Open House for PLFN Community Members
	February 8, 2018 August 8, 2018	Stakeholder Meeting Meeting	Review of Alternatives Assessment and Project Justification, including Market Analysis Alternative effluent discharge locations Assessment approach used in EA Next Steps PFLN/NPNS communications
	September 10, 2018	Meeting	Caribou Point outfall location presented to Chief Paul. Chief requested a follow up meeting with community fishermen
	October 26, 2018	Meeting	NPNS/3 PLFN Fishermen. Presented both outfall alternatives and discussed types and locations of fisheries by PLFN in both areas.

Organization	Date	Means of Engagement	Topics Discussed
	October 30, 2018	Crown Lead Consultation	Project Update Two Outfall Alternatives BAS™ system Discussion/Questions
Native Council of Nova Scotia	January 10, 2018	Meeting	Overview of NPNS facilities and business Existing conditions at Boat Harbour ETF Project overview EA Process Next Steps

6.7 Response to Key Issues Identified

Engagement was a significant component of this undertaking. Concerns and interests were clearly heard in Stages 1 and 2 of engagement. Engagement which occurred during Phase 3 confirmed that the same key themes remained the focus of PLFN, the public, and stakeholders. The feedback received was valuable to shape and confirm the selection of VECs, assessment processes, mitigation measures built into the design of the project as identified in this EARD, and identify recommendations for follow-up and monitoring. Of particular note, the input received shaped the following decisions over the course of the planning and design:

- Conversation with fishermen of all kinds were consistent that the whole ecosystem of the Northumberland Strait, or any receiving water, is valuable:
  - This approach is consistent with sound environmental assessment approach, where impact to species are not valued more or less than another.
  - This means that the conclusion of the EARD will be respectful of all marine users and the environment itself.
- Both PLFN and other local residents were vocal about how they value recreational and natural landscapes:
  - The socio-economic evaluation balanced economic drivers with community well being.
  - Minimizing potential odour interaction with the community was built into the new ETF design.
  - The diffuser design and outfall location was selected to avoid potential interaction with Boat Harbour in a future remediated and tidal state.
- NPNS and the design team were challenged to find a solution that maintains and protects both the commercial fisheries industry and the forestry industry:
  - Based on the final recommended design, with the mitigation measures identified in this EARD, and the additional commitment to follow-up and monitoring, it is the opinion of NPNS that the project has met this challenge.

Table 6.7-1 summarizes key issues identified, documents response and/or how it was addressed in the project, and refers to a corresponding section in this report for further information.

Table 6.7-1: Questions, Concerns Raised and Response

Theme	Question/Concern	Raised By	Response	Reference Section
EA study, requirements, timeline and project process	The project should have an independent review (e.g. a federal CEAA). Who is involved with reviewing and approving the project?	PLFN Public Stakeholders	This project is presently subject to a Nova Scotia provincial Class 1 process, which dictates review timelines. Information on the project has been provided as reporting has become available. CEAA decided to reopen the project for review in early 2018. CEAA will make final determination if a federal EA process will be undertaken following the registration of the provincial EA . The involvement of any federal agency in a provincial environmental assessment depends on the project. In this case, federal agencies will provide input to NSE. In addition to NSE, other provincial and federal regulatory authorities have been engaged in the EA process including: DFO, NSE, OAA, CEAA, TC, HC, ECCC, NSDLF, NSTIR. After the provincial EA registration and detailed engineering designs are complete, federal and provincial authorities will continue to be involved in various aspects of project permitting.	Section 2.2 Section 2.3 Section 3
	A Class II Provincial EA process would be more appropriate. There isn't enough time for review, and not enough opportunity for public input.	PLFN Public Stakeholders	NSE determined this project would follow a Class 1 process, in accordance with the Environmental Assessment Regulations. Northern Pulp's commitment is to complete the EA Registration with rigor, appropriately assessing potential impacts, identifying mitigation measures and developing a sound environmental plan. NPNS has undertaken engagement above and beyond what is typically completed for a Class 1 process, understanding how significant this undertaking is to the community and to the forestry sector. The Minister of Environment, based on the review of the EA Registration, has the ability accept the plan, to request more information and send the project into an additional review process that could include a review panel and public hearing process similar to a 'Class 2' EA, accept the plan with conditions, or reject it. Even after the provincial EA registration, federal and provincial authorities will continue to be involved in various aspects of project permitting.	N/A

Theme	Question/Concern	Raised By	Response	Reference Section
Project Description and Understanding -	What alternatives have been considered? Why are you proposing an outlet into the Northumberland Strait?	PLFN NCNS Public Stakeholders	Review of alternative methods for effluent disposal recommended a marine outfall and pipeline. It is a safe, technically feasible, and appropriate solution. Several outfall locations were considered during the project preliminary design. Flow characteristics and environmental screening criteria, potential for pipeline and diffuser damage, and constructability were all considerations that led to the Caribou option as the preferred outfall location. A thorough review of alternative treatment processes resulted in the selection and purchase of the BAS™ MBBR/AS treatment process. The BAS™ system offeres proven technology with comparable Kraft mill references worldwide. In addition, it offers improvements over the existing BHETF, with respect to odour, colour, and organic removal efficiencies.	Section 4 Section 5
Project Description and Understanding -	Boat Harbour is so large. How can you do the same thing on NPNS property with less retention time?	Public	The proposed effluent treatment system (MBBR/AS system) and the existing treatment system (ASB system) both have a primary and secondary stage of treatment. Both systems make use of gravity to settle out solids in the primary stages and make use of microorganisms to biodegrade waste in the effluent in the second stage. These organisms are naturally occurring and biodegrade organic material in nature every day. Both effluent treatment systems are designed to create a habitat where the microorganisms can thrive and biodegrade effluent materials. One of the advantages of the MBBR/AS system is its small foot print for the same treatment capability. The reduced retention time is possible due to the addition of more air, better mixing of air and a higher degree of automation to promote and maintain a higher density of microorganisms. In short, MBBR/AS systems are generally more efficient than ASB systems.	N/A

Theme	Question/Concern	Raised By	Response	Reference Section
Project Description and Understanding -	Hasn't the effluent been ending up in the Strait all along? How would the proposed new system be different?	Public	The proposed new system will carry treated effluent through a pipeline to deep waters of the Northumberland Strait outside of Caribou Harbour. It will then be discharged from an engineered diffuser where proper mixing will be carried out in a small mixing zone thereby reducing the footprint of impact significantly. This is an improvement over the BHETF, where there is no diffuser is in place to discharge treated effluent. Existing effluent flows over a 6 foot wide dam at the end of the Boat Harbour Basin into the Pictou Road area of the Northumberland Strait. Effluent is fresh water and warmer than the seawater so it enters the Strait as a visible plume that sits on top of the salt water and does not mix well. It often travels considerable distance before it mixes with the background waters. So yes, all treated effluent does enter the Northumberland Strait and has been doing so for more than 50 years. The addition of an engineered diffuser will be a significant improvement in comparison to the BHETF which does not have an engineered diffuser. The submerged difffused outfall will eliminate the existing visual impact of effluent discharging from Boat Harbour and travelling considereable distances from the discharge point with very little mixing. Engineered diffusion is the industry standard of today and the best available technology world wide. Diffusion allows the effluent plume to meet the applicable CCME guidelines within 100 m of the diffuser.	N/A
	Where else is this type of treatment facility used? Do they discharge to a marine environment?	Public PLFN	8 Kraft mills in Canada use an activated sludge treatment process, but only 3 of these discharge into marine environments, the others discharge to freshwater environments. No mills in Canada operate the BAS™ treatment system selected. Three mills that produce bleached Kraft pulp and use the BAS™ system that most closely compare to the NPNS project are listed below. The two Swedish mills were visited by the NPNS project team and KSH. • Södra cell Mörrum, Sweden • Södra Cell Värö, Sweden • Stendal Mill, Germany	Section 2

Theme	Question/Concern	Raised By	Response	Reference Section
Ownership and Responsibility	What agreements are in place between NPNS and the provincial government? Who will be responsible for future operations, ownership, and responsibility for environmental damage from the project?	Public	Northern Pulp and the Provincial Government are in ongoing negotiations with regards to early termination of the lease agreement to use the BHETF. The BHA takes away the use of the facility much earlier than the Lease Extension Agreement deadline of 2030. Northern Pulp is seeking compensation for this termination. At the date of Registration, the Province of Nova Scotia has made contributions to the cost planning and design of the project. The contributions may be off set against any future award Northern Pulp may be granted for damages against the Province in any respect. Meeting all applicable federal and provincial regulations will be the responsibility of Northern Pulp as the operator of the system.	Section 1.3
Impacts of NPNS closure	NPNS is central to the forestry industry and the region's economy. There needs to be a solution that works for everyone.	Public Stakeholders	NPNS is a vital part of the forestry sector of Nova Scotia and provides 330 direct jobs and an additional 2000 jobs indirectly ('spin off') across the province. The permanent shutdown of NPNS operations will have signficant consequences for many of the 11,500 people employed in the provincical forestry sector. NPNS is uniquely connected with many partners in the forest industry, for example, by both producing materials for and purchasing materials from sawmills across the province. Together with its supply chain companies, NPNS produces a total annual value output of $535 million.	Section 8.14
Improvements from the new facility	What is improved by the new ETF? Does the effluent quality get better?	Public Stakeholders	What was referred to as "Point D" (outlet of the Boat Harbour Basin) was the regulated outfall location with Environment Canada from 1967 until 2009. In 2010, due to significant improvements in effluent quality, the regulated outfall moved back to Point C (outlet of the existing ASB system). When the regulatory point was moved, monitoring continued at both Point C and Point D. The data presented for BOD and TSS show that there was a difference between the discharge of the operating ETF and what enters the Northumberland Strait. Point C results and the discharge from the proposed facility will be similar. The proposed effluent treatment system is designed to meet federal PPER. Additional, more stringent, guidelines were also considered to achieve best practice in the design and operation of pulp and paper effluent treatment facilities.	Section 8.11

Theme	Question/Concern	Raised By	Response	Reference Section
Closed Loop, NPNS Product	Why isn't NPNS proposing a Closed Loop System?	PLFN NCNS Public Stakeholders	There are no closed loop pulp mills producing bleached Kraft pulp. NPNS is an Elemental Chlorine Free (ECF) Bleached Kraft pulp process. ECF is a chemical process to form pulp, and the bleaching process generates the majority of the effluent from the mill. Recycling of the bleach plant effluent in the bleached Kraft industry is often referred to as "Closed Loop Pulping Technology". The main problems with the bleach plant effluent recovery are equipment corrosion and accumulation of chloride and non-process elements in the mill's water systems. Accumulation of chlorides and potassium are especially corrosive for the mill's boilers and often lead to scale build-up. It is important to note that the chloride ion is naturally present in salt water, in the form of sodium chloride. The presence of chloride in the ocean does not represent a concern for the environment. Closed Loop Pulping Technology has been investigated since the mid-seventies, but remains unviable for long term operation of a commercial mill. In spite of decades of research, pilot tests, and mill scale trials, successful closed loop technology for Kraft pulp has never been developed. This technology remains unavailable for ECF Bleached Kraft pulp mills.	Section 4.1
	Can NPNS make a different product that could be closed loop?	PLFN NCNS Public Stakeholders	Brian McClay & Associates Inc. was engaged by NPNS to assess the viability from a future marketing/sales perspective of converting the existing Pictou Northern Bleached Softwood Kraft mill to produce a product that can use a closed loop system: either Unbleached Kraft Pulp or Bleach Chemi-Thermo-Mechanical Pulp. The study findings indicate that continuing to produce premium reinforcement Northern Bleached Softwood Kraft is the most competitively viable option by far for Northern Pulp.	Section 4
Freshwater and Salinity	Why is it okay to let freshwater into the Northumberland Strait?	Public	Freshwater currently enters the Strait from numerous freshwater sources. It is anticipated that although dominantly marine in character, there is some natural variation in salinity (amount of salt versus freshwater) in the vicinity of the proposed outfall. Aquatic species present in nearshore areas tend to be somewhat tolerant of lowered salinities. Based on mixing identified in the Receiving Water Study, the "freshwater" effluent plume is completely mixed with the background salinity within 2 m from the diffuser. At 20 m from the diffuser the effluent is predicted to be diluted by ~100 times. NPNS is supplied by freshwater from Middle River. Study of the Middle River sustainable water withdrawl rate has shown that NPNS' water use is sustainable. Fresh water from Middle River makes its way to the Northumberland Strait whether NPNS uses the water or not, therefore the same volume of fresh and salt water mixing occurs naturally.	Section 8.11

Theme	Question/Concern	Raised By	Response	Reference Section
Follow up and Monitoring	Can you prove you won't have environmental impact?	Public PLFN Stakeholders	Project facilities have been designed to comply with all current codes and standards reflecting the most current knowledge about treatment plants, pipelines, and marine protection and safety. A project-specific Environmental Management Plan will be prepared prior to project initiation to provide the required procedures to adhere to regulatory obligations and other environmental commitments. It is the conclusion of the Environmental Effects Assessment that with identified mitigations, along with identified follow-up and monitoring programs to confirm performance predictions, the project can be carried out as proposed without significant adverse impact. The PPER has requirements for an Environmental Effects Monitoring (EEM) Program. These regulations are specifically designed to identify and evaluate harmful effects to fish and fish habitat. Northern Pulp has participated in this program since it was implemented in the 1990's and will continue to do so once the new outfall is in operation. These programs are developed with input from Fisheries and Oceans Canada (DFO) and are very stringent and involve peer review of the final reports by scientist selected by DFO. Recommendations follow each cycle review and direct the next cycle program study. Seven cycles of Environmental Effects Monitoring (EEM) has taken place since 1996. In addition to the EEM, there will be a follow up and monitoring program that is will include physical parameters and biological species community assessments for baseline and performance monitoring. The follow up program will include toxicity testing on larval lobster and herring eggs: including accute and subleathal effects. Subleathal studies will look at effects on moulting time and growth.	Appendix J

Theme	Question/Concern	Raised By	Response	Reference Section
Health and Wellbeing	The PLFN community has been suffering the effects from the BHETF for the past 50 years. PLFN well-being overall is impacted by the continued operation of Boat Harbour due in part to lack of access to the natural resource for recreaton and traditional uses. There is concern that Pictou County has an abnormally high incidence of cancer and the project will negatively impact human health and well-being.	PLFN Public	NPNS acknowledges the history of the Boat Harbour ETF. NPNS supports the government's actions to fulfill the promise made to Pictou Landing First Nation to close the existing ETF. The Boat Harbour Act requires that the use of the Boat Harbour ETF cease by January 31, 2020. The project is intended to provide a new replacement ETF replacing the existing BHETF that will be taken out of service, for the benefit of PLFN. In this light, the very nature of the project provides a positive environmental effect to Indigenous Peoples (particularly the members of PLFN) who will be able to enjoy the use of Boat Harbour and its resources at some time in the future. NPNS is proposing to construct a world-class ETF and marine discharge. Significant improvement since the 1960's have occurred: in mill processes, government regulations, and effluent treatment. Feedback received consistently outlined the many ways that local residents interact with natural resources: for recreation, for traditional uses, for livelihood. The lands and waters of Pictou County are important to the health and well being of the residents. This understanding has shaped project development and impact assessment. The replacement project is expected to have no negative effect on human health. In addition, the Nova Scotia Health Authority released cancer statistics for the 2011-2015 period in September of 2018. The report outlines the incident rate of all cancers for women in Pictou County to be at or near the provincial average. The report outlines the incident rate of all cancers for men in Pictou County to be below the provincial average. The full report can be viewed from the following link: http://www.cdha.nshealth.ca/system/files/sites/77/documents/nsccpcancerstatisticsreport2018.pdf	Section 8.15 Section 9

Theme	Question/Concern	Raised By	Response	Reference Section
Potential for environmental impacts, and Protection measures	We need to protect the environment. The marine outfall and pipeline should not be constructed because any risk to the envirionment is not acceptable, there's too much at stake.	PLFN NCNS Public Stakeholders	The proposed effluent treatment system is designed to meet federal PPER, similar to the BHETF. The PPER were developed for the protection of fish, bethic and invertebrate species. Additionally, the project anticipated and designed for more stringent effluent quality guidelines expected in the future. The development of monitoring programs will be an outcome of the regulatory process for approval of the facility. Under the PPER, an Environmental Effects Monitoring Program is required. In addition, the development of monitoring programs will be an outcome of the regulatory process for approval of the facility. Project facilities have been designed to comply with all current codes and standards reflecting the most current knowledge about treatment plants, pipelines, and marine protection and safety. A project-specific Environmental Management Plan will be prepared prior to project initiation to provide the required procedures to adhere to regulatory obligations and other environmental commitments. It is the conclusion of the Environmental Effects Assessment that with identified mitigations, along with identified follow-up and monitoring programs to confirm performance predictions, the project can be carried out as proposed without significant adverse impact.	Section 3 Section 5.7 Section 13
	There have been environmental issues in the past. What has been done to address these?	PLFN Public Stakeholders	Beginning in 1972 the treatment process at Boat Harbour was modified and improved including the addition of settling ponds and an aerated basin. Several major changes have occurred over the years improving effluent quality entering the Boat Harbour facility. In 1992 the Canso Chemicals chlor-alkali facility that generated sodium hydroxide, using mercury as a catalyst, closed. In 1997 the Mill moved away from elemental chlorine to chlorine dioxide for bleaching to meet new federal PPER for dioxins and furans. Since Paper Excellence purchased the mill in 2011, many projects and improvements have been completed including modification of the brown stock screen room to reduce water usage and recycle water and the recycling of lime water in the kiln area.	Section 5
	Will there be long term monitoring of marine life and marine water quality?	PLFN NCNS Public Stakeholders	NPNS will continue to test effluent quality as outlined in the PPER, as it does today. NPNS follows all federal and provincial regulations for testing and reporting. The development of monitoring programs will be an outcome of the regulatory process for approval of the facility. Under the PPER, an Environmental Effects Monitoring Program is required and will be developed. Additional monitoring programs will be designed based on approvals requirements.	Section 13

Theme	Question/Concern	Raised By	Response	Reference Section
Accident or Malfunction	What if there's a leak in the effluent pipeline? Are emergencies etc planned for?	Public Stakeholders	Contingency planning is a component of NPNS approval requirements. Various emergency scenarios will be incorporated in planning for operation of the replacement treatment facility, including potential for discharge pipe failure and repair. A central consideration is that the effluent in the discharge pipe is treated before entering the pipe (this is not the case for the BHETF). Secondly the physical design of the pipe itself is proposed to be high density polyethylene (HDPE). HDPE is strong (has greater than 2" thickness) and has some flexibility to allow for the undulating bottom profile. HPDE material has many benefits including fused joints that are as strong as the original pipe and so all but remove the risk of leaks. The service life for HPDE pipelines is expected to be 50 – 100 years. A component of the contingency planning for the replacement treatment facility is the construction of a spill basin with a capacity of 35,000 m^3.	Sectio 10
Impact on water quality.	Quality of water after treatment including concentration of chemicals and particulates in treated effluent Impacts of water temperature, salinity differences in pipe and at point of discharge discharge volume/rates	PLFN NCNS Public Stakeholders	The proposed effluent treatment system is designed to meet federal PPER, similar to the BHETF. The PPER were developed for the protection of fish, bethic and invertebrate species. The development of monitoring programs will be an outcome of the regulatory process for approval of the facility. Under the PPER, an Environmental Effects Monitoring Program is required. The Receiving Water Study modeled performance of how the treated effluent will mix into the Northumberland Strait through the outfall (a three port diffuser) and the resulting predicted water quality. It is expected that under 'worse case' conditions of summer season and peak effluent flow that water quality will reach ambient conditions within less than 2 m from the diffuser in terms of total nitrogen, total phosphorus, TSS, DO, pH, and salinity; colour will return to ambient conditions within 5 m of the diffuser. Temperature will be within 0.1 degrees within 100 m. The project has included mitigation measures to protect the marine environment. With these mitigations in place as well as follow-up and monitoring to confirm performance as predicted, the project is anticipated to not have a significant environmental effect.	Section 8.11 Section 8.12 Section 8.14

Theme	Question/Concern	Raised By	Response	Reference Section
Accumulation of Solids	Will there be long term impacts on marine life and ecosystems of solids building up?	Stakeholders	The Boat Harbour Effluent Treatment Facility (BHETF) has improved significantly from its beginning as changes, both in-mill and at the BHETF, have been completed over the years. BOD loading entering the Strait (leaving the Boat Harbour Basin) has reduced by 90% over the last several decades (based on 1990 operating data). Total Suspended Solids (TSS) loading entering the Strait (leaving the Boat Harbour Basin) has reduced by 75% over the last several decades (based on 1990 operating data). The Federal Government Pulp and Paper Effluent Regulations (PPER) limit the amount of solids that can be released by NPNS. These limits are set based on the protection of fish and fish habitat and human health from fish consumption by governing the amount of allowable discharge from a mill's effluent discharge. The effluent is a liquid with amounts of "suspended solids" (known as TSS) similar to silt being carried in a river. The solids present in the effluent will be very small particles, mostly biodegradable organic material (greater than 98%) made up of the microorganisms used to treat the effluent. Because the solids are generally biodegradable they will naturally degrade in the marine environment. Solids are not expected to accumulate over time at the outfall due to the dispersion characteristics of the effluent leaving the diffuser, significant water currents and the high degree of biodegradability of the solids. The amount of suspended solids are tested on a daily basis and reported to the regulators. In addition, the regulators audit the process by taking their own samples for comparison. Currently NPNS operates at less than 20% of its regulated TSS limit. Switching to the MBBR/AS process, TSS discharge may slightly increase, but will remain well below the regulated limit.	Section 8.12
Metals	Are there harmful metals in the effluent?	Public	Metals, including heavy metals, occur naturally and are released to the environment from a range of human and natural sources. Trees and vegetation (plants) absorb them from soil and water sources. Metals end up in the wood as the tree grows and in the plants that are eventually eaten by humans and animals. Metals are "non-process" elements that primarily come from NPNS's wood supply and water supply. Some metals are washed out of the wood during the pulp making process. Effluents from many types of industrial treatment systems, including municipal treatment systems, also contain metals. Northern Nova Scotia is known to have higher than normal levels of manganese, cadmium and aluminum.	Section 9

Theme	Question/Concern	Raised By	Response	Reference Section
Mussel Leukemia	A study conducted in 2005 showed that healthy mussels deployed into the Pictou Harbour and exposed to mill effluent and untreated municipal sewage for 6 months had developed leukemia.	Public	This statement is not accurate and is missing important context. Leukemia in mussels and other marine bivalve species is not unique to Pictou Harbour, but rather, is a common observation around the world. Leukemia is a naturally occurring and highly variable disease process in many marine bivalve species. The likely causes of leukemia in marine bivalves appear to vary across species and across the locations where outbreaks have been observed. At this time, scientists do not understand what causes leukemia in mussels and other marine bivalves. There are a number of potential causes, including: viral and possibly other infectious agents, natural genetic alterations and factors, elevated water temperatures, invasive species, and potentially some types of chemical contaminants. The scientific literature has not been able to clearly associate leukemia development with chemical contaminant exposure. Overall, leukemia development in marine bivalves is a complex, variable and poorly understood process, and it is not currently possible to conclusively or consistently link this disease to any particular environmental factor(s). The specific study of concern (St-Jean, Stephens, Courtenay and Reinisch, Canadian Journal of Fisheries and Aquatic Sciences, 2005, 62(9): 2055-2066, https://doi.org/10.1139/f05-119) showed high variability in the numbers of mussels that were diagnosed with leukemia across the mussel deployment stations. The mussels deployed in the study were not tested for leukemia prior to their deployment. Station locations included stations distant from the pulp mill effluent point of discharge, as well as stations potentially influenced by other types of discharges and ecological stressors. The stations nearest the pulp mill discharge did not have the highest or the lowest number of mussels displaying leukemia, and all stations (except one) displayed a few or more individual mussels with leukemia. In addition, communication with the study's principal author indicates that more recent research findings might lead to a different interpretation of the data today. As such, it cannot be determined if Pictou Harbour conditions contributed to leukemia development in the deployed mussels. Thus, the findings of this study cannot be considered conclusive or causal in any way.	N/A

Theme	Question/Concern	Raised By	Response	Reference Section
Lobster	Are you assessing all stages of marine life? What about lobster larvae?	Stakeholders Public PLFN	With respect to the lobster fishery specifically, specialist input was sought to advise on the potential for specific impacts to lobster in all life stages. It was the conclusion that it is highly unlikely that there will be serious impact on lobster or lobster larve given the limited area of potential impact. By extension it is unlikely that any significant effect would occur to the commercial fishery from direct interaction with the effluent at the outlet of the diffusers. Lobster landings (catches) have increased significantly in local Zone 26A in the last 50 years, with similar trends experienced in the entire southern Gulf of St. Lawrence region	Section 8.12 Appendix
Impact of ETF on air quality	How will air quality be impacted by burning the sludge? How much and how often will sludge be burned? What's in it?	Public Stakeholders	Combustion of sludge in the power boiler is the preferred approach as it has the potential to increase power generation from green energy. Primary and secondary sludges will be mixed together and dewatered before mixing with the existing biomass feeding the power boiler. Combustion will occur as it does now, on a travelling grate at the bottom of the boiler, using the same controls and combustion temperatures as are currently being used. The quantity of sludge generated will be in the neighbourhood of 5 - 10% of the biomass currently fed to the boiler. The US EPA, in its rulemaking process related to the "Identification of Non-Hazardous Secondary Materials That Are Solid Waste", has made a technical determination that dewatered pulp and paper sludges that are not discarded and are generated and combusted on-site by pulp and paper mills that burn a significant portion of such materials where such dewatered residuals are managed in a manner that preserves the meaningful heating value of the materials, can be considered a standard fuel, with combustion-related emissions that are no different than other forest-based solid fuels such as bark. (Reference: 40 CFR 241, final rule dated February 7, 2013) Emissions of regulated air contaminants are predicted to be below the provincial maximum permissible GLCs for all contaminants except H_2S, where a few exceedances were predicted at receptors immediately east of the project, with an estimated frequency of exceedance of 1%. It is also noted that the source of the exceedances is the new ETF, which is based on conservative estimates and that actual GLCs are likely to be lower than the model results suggest.	Section 8.1

Theme	Question/Concern	Raised By	Response	Reference Section
Dioxins and Furans	Are there dioxins and furans in the effluent?	Public	The Government of Canada is working to control and, if possible, eliminate the release of dioxins and furans into the environment. Canada-wide standards were developed for priority sectors accounting for the majority of Canadian emissions, including regulations requiring the virtual elimination of dioxin and furan releases from pulp mills. In response, environmental regulations for pulp and paper mills (Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulation) were created. This regulation mandates the level of dioxins and furans allowed in the mill effluent for mills using any form of chlorine bleaching process. Dioxins and furans in NPNS's effluent have virtually been eliminated since the conversion to chlorine dioxide bleaching in 1998. NPNS has never exceeded the limits as per the Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations. In fact, dioxins and furans testing for the last 5 years has consistently shown that all of the compounds required to be tested under the regulations have not been detected in NPNS' effluent (non-detect).	Section 9
Boat Harbour	Boat Harbour needs to be remediated What is the status of the remediation project? What happens to the existing facility?	PLFN Public	The replacement effluent treatment facility is required due to the BHA which requires that the use of the BHETF cease by January 31, 2020. The pipeline leaving from the mill will be decommissioned so that it can not be used after the switch over to the new replacement ETF. The remediation efforts are being conducted under a separate and distinct project from the replacement of the effluent treatment facility. The intention of the remediation project is to return Boat Harbour to a natural tidal state. For questions about the Remediation Project, please contact: Ken Swain, Project Leader, Boat Harbour Project, Nova Scotia Lands Tel: 902-403-9744 Email: Ken.Swain@novascotia.ca	N/A

7.0 Environmental Assessment Scope and Methods

7.1 Scope of the Environmental Assessment

As noted in **Section 1**, the proposed project is being registered under the Nova Scotia *Environmental Assessment Regulation*. As described in **Section 3**, there are no known requirements for a federal EA under the *CEAA*, since the project is not a designated project as defined in the *Regulations Designating Physical Activities* under that Act. A determination as to whether an EA is required under Section 67 of CEAA has not been made by the Canadian Environmental Assessment Agency at this time.

The project includes the construction, operation and maintenance, and eventual decommissioning of a replacement ETF at the NPNS mill, associated pipeline located on land between the mill and the Northumberland Strait, and marine outfall in the Northumberland Strait. The specific details of the project are provided in **Section 5** (Project Description). The scope is limited to the facilities to be constructed and activities that will be conducted on the project site, along Highway 106, and in the marine environment. It excludes the existing and future operation of the other components of the NPNS mill as well as the decommissioning and remediation activities associated with the BHETF.

The related project phases, and activities to be conducted within each phase, that are subject to this EARD and that will be carried forward within this assessment, are summarized in **Table 7.1-1**, below.

Table 7.1-1: Project Phases and Activities to be Carried Forward within the EA Registration

Project Phase	Activities to be Conducted
Construction	Engineering Survey, Geotech and Utility Location Vegetation Clearing Grubbing and Grading Effluent Treatment Facility Construction Effluent Treatment Facility Commissioning Pipeline Installation: Land-based Portion Watercourse and Wetland Crossings Cleanup and Stabilization for Land Based Activities Pipeline Installation: Marine Portion Marine Outfall Construction Pipeline Testing Pipeline Commissioning
Operation and Maintenance	Operation and maintenance of ETF

Project Phase	Activities to be Conducted
Decommissioning	Decommissioning activities will be determined at the time of decommissioning

The scope of this EARD has been developed by NPNS, and reflects the current understanding of the project including engineering design and the environmental setting within which it will be carried out through the proposed project phases/activities listed above.

7.2 Selection of Valued Environmental Components

Valued environmental components (VECs) are those components of the environment that are of value or interest to regulatory agencies, the public, other stakeholders, and/or Indigenous peoples. VECs are typically selected for assessment on the basis of: regulatory issues, legislation, guidelines, policies, and requirements; consultation with regulatory agencies, the public, stakeholder groups, and Indigenous communities; field reconnaissance; and professional judgment.

In order to focus on valued, vulnerable or representative components of the environment, the assessment will focus on VECs for potential interactions with the project. The VECs were evaluated to determine if potential pathways or linkages exist by which the project activities or works may affect the VEC. The following VECs were considered as part of this EARD:

- Atmospheric Environment;
- Acoustic Environment;
- Soils and Geology;
- Surface Water;
- Groundwater;
- Aquatic Habitat;
- Wetlands;
- Flora/Floral Priority Species;
- Terrestrial Wildlife/Priority Species;
- Migratory Birds and Priority Species/Habitat;
- Harbour Physical Environment, Water Quality and Sediment Quality;
- Marine Fish and Fish Habitat;
- Marine Mammals, Sea Turtles and Marine Birds;
- Socio-Economic Environment;
- Indigenous People;
- Marine Archaeological Resources;
- Terrestrial Heritage Resources; and
- Effects of the Environment on the Project.

7.3 Study Boundaries (Spatial and Temporal)

7.3.1 Spatial Boundaries

The spatial boundaries represent the area in which potential effects could occur, selected by professional judgment and scientific literature review. The assessment considers interactions and potential effects of the project relating to: the PFA (defined in **Section 5.1**), as well as local and regional assessment areas.

The local assessment area is broader than the PFA and varies as appropriate to each VEC. The local assessment area is intended to represent the "zone of direct influence" of the project, whereas the PFA is limited to the physical footprint of the project components.

The regional assessment area is reflective of the component addressed, if the area of potential effects could extend beyond the local assessment area.

7.3.2 Temporal Boundaries

Temporal boundaries for the assessment of environmental effects on the environment include periods of construction, operation and maintenance, and decommissioning. Construction is estimated to be approximately 21 months, beginning second quarter of 2019, commencing as soon as the EA review has been completed and the applicable permits, approvals or other forms of authorization have been obtained. Operation and maintenance will commence immediately following the construction phase and will continue to operate efficiently and safely for several decades and likely much longer with a well-maintained system. For the purpose of this EA Registration, it has been assumed that the operation and maintenance phase will begin in the fourth quarter of 2020.Decommissioning of the project would occur at the end of mill life following the completion of operations. Once the ETF or pipeline is nearing the end of a useful service life, a decommissioning plan will be developed and will be submitted for a separate review requiring NSE approval.

7.4 Factors to be Considered

The assessment will consider the following factors:

- The environmental effects of the physical activities associated with all phases of the project, including cumulative environmental effects of the project in combination with other projects or activities that have been or will be carried out;
- Mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project, including requirements for follow-up studies or monitoring;
- The environmental effects of malfunctions or accidents that may occur in connection with the project;

- Any change to the project that may be caused by the environment; and
- Comments from the public, Indigenous persons, or other stakeholders.

7.4.1 Scope of Factors to be Considered

The factors to be considered during the assessment as well as the approach that was used to carry out the assessment are further discussed in **Table 7.4-1**, below.

Table 7.4-1: Scope of Factors to be Considered and Approach to the Assessment for each Valued Environmental Component

Valued Environmental Component (VEC)	Scope of Factors to be Considered In each Project Phase	Approach to the Assessment
Atmospheric Environment	• Air contaminant emissions • Ambient air quality • Greenhouse gas (GHG) emissions	• Review of baseline ambient air quality and trends based on review of desktop information • Emissions estimation of air contaminant emissions from the project • Dispersion modelling of air contaminant emissions prior to and following implementation of the Project • Qualitative assessment of GHG emissions • Qualitative and quantitative evaluation of project effects on atmospheric environment • Follow-up
Acoustic Environment	• Sound quality (noise)	• Baseline noise monitoring • Estimation of noise emissions from the project • Noise modelling and quantitative assessment of project contributions to baseline sound quality • Qualitative and quantitative evaluation of project effects on acoustic environment
Soils and Geology	• Soil quality • Surficial geology • Bedrock geology • Potential for acid rock drainage (ARD) or other geo-hazard	• Qualitative assessment of soil quality, potential contaminated soil, potential for karst, potential susceptibility to erosion, and adverse effects to bedrock or surficial geology based on available literature
Surface Water	• Surface water quality • Disturbance of potentially affected watercourses	• Identification of potentially affected watercourses • Initial sampling and analysis for water quality in watercourses • Quantitative assessment of baseline water quality • Qualitative evaluation of project effects on surface water quality • Follow-up program

Valued Environmental Component (VEC)	Scope of Factors to be Considered In each Project Phase	Approach to the Assessment
Groundwater	• Groundwater quality • Groundwater quantity/availability	• Review of available groundwater quantity and quality data from the Nova Scotia Groundwater Atlas and NPNS mill • Qualitative evaluation of project effects to groundwater quality and quantity • Follow-up
Freshwater Fish and Fish Habitat	• Fish habitat characteristics of potentially affected watercourses • Fish populations • Priority species (species at risk and species of conservation concern)	• Review of historical occurrences of fish species and species at risk/species of conservation concern • Biological field studies (fish habitat characteristics, in-situ water quality, water quality sampling and analysis of watercourses) in ETF footprint area and field reconnaissance of the pipeline footprint area • Qualitative and quantitative evaluation of project effects on fish and fish habitat • Follow-up program
Wetlands	• Wetland area and function	• Identification of potentially affected wetlands • Review of historical occurrences of priority species (species at risk/species of conservation concern) • Field delineation and functional evaluation of wetlands in the ETF footprint area • Field reconnaissance of wetlands in the pipeline footprint area • Qualitative and quantitative evaluation of project effects on wetlands • Follow-up program
Flora/Floral Priority Species	• Vegetation species • Priority flora species (species at risk/species of conservation concern) • Terrestrial habitat	• Review of terrestrial habitat characteristics from literature sources • Review of historical occurrences of priority flora species (species at risk/species of conservation concern) • Biological field studies (vegetation survey, identification of priority species) in the ETF footprint area • Field reconnaissance in the pipeline footprint area • Qualitative evaluation of project effects on flora/floral priority species • Follow-up program
Terrestrial Wildlife/Priority Species	• Wildlife and wildlife habitat • Priority wildlife species (species at risk/species of conservation	• Review of terrestrial habitat characteristics from literature sources • Identification of potential species at risk habitat

Valued Environmental Component (VEC)	Scope of Factors to be Considered In each Project Phase	Approach to the Assessment
	concern)	• Review of historical occurrences of priority wildlife species (species at risk/species of conservation concern) • Biological field studies (habitat evaluation, priority herpetile habitat) in the ETF footprint area • Field reconnaissance in the pipeline footprint area • Qualitative and quantitative evaluation of project effects on terrestrial wildlife/priority species • Follow-up program
Migratory Birds and Priority Species/Habitat	• Migratory birds • Priority bird species (species at risk/species of conservation concern)	• Review of historical occurrences of priority bird species (species at risk/species of conservation concern) • Biological field studies (overwintering bird survey, breeding bird survey, migratory stop-over survey) in the ETF footprint area • Field reconnaissance in the pipeline footprint area • Qualitative and quantitative evaluation of project effects on migratory birds and priority species/habitat • Follow-up program
Harbour Physical Environment, Water Quality and Sediment Quality	• Physical environment (bathymetry, tides, currents, wind and wave patterns, sea surface temperature and ice formation) • Water quality • Sediment quality	• Review of harbour physical environment characteristics from literature sources • Review of available literature and other studies in the area for water quality and sediment quality • Qualitative evaluation of project effects on physical environment, water quality, or sediment quality • Follow-up program (geophysical, underwater video, water and sediment sampling)
Marine Fish and Fish Habitat	• Marine plants • Plankton • Benthic invertebrates • Marine fish populations • Commercially important species • Priority species (species at risk and species of conservation concern) • Special areas	• Review of secondary literature on marine plants, plankton, benthic invertebrates, fish populations, commercially important species, and special areas • Review of historical occurrences of species at risk/species of conservation concern • Qualitative evaluation of project effects on marine fish and fish habitat • Follow-up program (environmental effects monitoring)
Marine Mammals, Sea Turtles and Marine Birds	• Marine mammals • Sea turtles • Marine birds (migratory birds, waterfowl) • Inshore seabirds • Priority species (species at risk and	• Review of secondary literature on marine mammals, sea turtles, marine birds, inshore seabirds, and special areas • Review of historical occurrences of species at risk/species of conservation concern • Qualitative evaluation of project effects on marine

Valued Environmental Component (VEC)	Scope of Factors to be Considered In each Project Phase	Approach to the Assessment
	species of conservation concern) • Special areas of importance	mammals, sea turtles, and marine birds • Follow-up program (environmental effects monitoring)
Socio-Economic Environment	• Physical land use (land and water uses) • Municipal and regional infrastructure • River and marine based uses • Recreation and landscapes • Nuisance effects to adjacent receptors • Transportation • Employment and economy (commercial fisheries, manufacturing, tourism)	• Public and stakeholder engagement • Review of available secondary literature and information relating to land uses, regional infrastructure, transportation, employment and economy) • Local planning requirements • Qualitative evaluation of project effects on the socio-economic environment (land and water uses, navigation, local employment, economic opportunity, trail use, commercial and recreational fishing)
Indigenous Peoples Use of Land and Resources	• Biophysical resources of cultural importance • Change in access to land or resources • Change in availability of resources • Traditional use of land and resources	• Indigenous engagement • Mi'kmaq Ecological Knowledge Study • Qualitative evaluation of project effects on Mi'kmaq use of land and resources
Marine Archaeological Resources	• Structures or things of archaeological significance in the marine environment	• Desktop evaluation of available information relating to marine archaeological resources • Qualitative assessment of project effects on marine archaeological resources • Follow-up program (archaeological resource impact assessment [ARIA] in the marine environment)
Terrestrial Heritage Resources	• Structures, sites or things of historical, archaeological, palaeontological, or architectural significance (i.e., built heritage, archaeology, palaeontology)	• Review of available background information relating to historical, archaeological, palaeontological, or architectural resources • ARIA of the ETF footprint area • Field reconnaissance of the pipeline footprint area • Qualitative evaluation of project effects on terrestrial heritage resources • Follow-up program (ARIA of the pipeline footprint area)
Effects of the Environment on the Project	• Changes or potential effects on the project caused by: • Extreme weather	• Qualitative assessment of current regional/local climate normals, extreme weather, and climate predictions

Valued Environmental Component (VEC)	Scope of Factors to be Considered In each Project Phase	Approach to the Assessment
	• Climate change • Seismic activity • Forest Fires	• Desktop evaluation and qualitative assessment of available information relating to seismicity and forest fires

7.5 Impact Evaluation/Effects Assessment Methods

During the environmental effects assessment, project-VEC interactions were first identified through a matrix table. If a project-VEC interaction was not identified, a rationale was provided to explain its exclusion from the assessment.

Following the identification of Project-VEC interactions, effects that may occur as a result of the interactions are predicted and proposed mitigation is outlined. Effects were assessed assuming that standard industry design/mitigation practices will be implemented. The environmental effects assessment methodology involved the following generalized steps, for each VEC:

- **Scope of VEC** – This includes a definition of the VEC and a rationale for its selection, a description of temporal and spatial boundaries, and the definition thresholds that were used to determine the significance of environmental effects. This step relies upon the scoping undertaken by regulatory authorities; consideration of the input of the public, stakeholders, and First Nations (as applicable); and professional judgment.
- **Existing Environment** – This step involved the establishment of existing (baseline) environmental conditions for the VEC, in the absence of the project. In many cases, the existing environment expressly and/or implicitly includes existing environmental effects. Effects may have been caused by other past or present projects or activities that have been or are being carried out are generally encompassed in the existing environmental conditions.
- **Impact Evaluation/Effects Assessment** – Project-related environmental effects are assessed. The assessment includes:
  - A description of how a potential environmental effect could occur (in the absence of mitigation);
  - A discussion of the mitigation and environmental protection measures that are proposed to avoid, reduce, or eliminate the environmental effect; and,
  - A characterization of the residual environmental effects of the project (i.e., the environmental effects that remain after planned mitigation has been applied). Effects are assessed for the construction and operation and maintenance phases of the project.
- **Summary** – A summary of the assessment for the VEC is provided, leading to an overall conclusion in respect of the effects of the project on the VEC. The significance of residual environmental effects is then determined, in consideration of the significance criteria that have been established for each VEC.

The EARD provides consideration of the direction, magnitude, frequency, duration, geographical extent, ecological and socioeconomic context, and reversibility of potential project-related effects. Residual

effects (i.e., those that remain after the application of mitigation, or those that will not be avoided/mitigated) are predicted, and thresholds of significance were characterized using regulatory standards or other thresholds, where available, within the defined spatial and temporal boundaries. Where regulatory standards are not available, the significance criteria were determined through indicators derived from existing scientific knowledge (e.g., status of biological populations and critical habitats). Through this process, potential effects on the environment were evaluated with a view to mitigating them such that effects can be avoided, reduced, or controlled through mitigation. A determination is then provided as to whether residual effects are positive or negative, their significance, and the likelihood of a significant effect occurring.

Finally, where applicable and appropriate, follow-up measures and monitoring programs for potential residual environmental effects are outlined and described, where applicable, for planned implementation as a means of verifying the environmental effects predictions or the effectiveness of mitigation.

In addition to the above methodology for assessing the effects of the project on the environment for each phase of the project as currently planned, an assessment of credible accidents, malfunctions, and unplanned events was also conducted. The cumulative effects of the project in combination with the effects of other projects or activities that have been or will be carried out were also assessed.