VILLAGE OF NEW MARYLAND - SUNRISE WELLFIELD DEVELOPMENT

ENVIRONMENTAL IMPACT ASSESSMENT, REGISTRATION DOCUMENT

VILLAGE OF NEW MARYLAND

VERSION 2 – JUNE 15, 2020

VILLAGE OF NEW MARYLAND - SUNRISE WELLFIELD DEVELOPMENT

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VILLAGE OF NEW MARYLAND

WSP PROJECT NO.: C-84510.70
VERSION: 2
DATE: JUNE 15, 2020

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June 15, 2020

New Brunswick Department of Environment and Local Government
Environmental Impact Assessment
P.O. Box 6000
Fredericton, New Brunswick E3B 5H1
Canada

Attn: Mr. Shawn Hamilton, P. Eng.

Dear Sir:

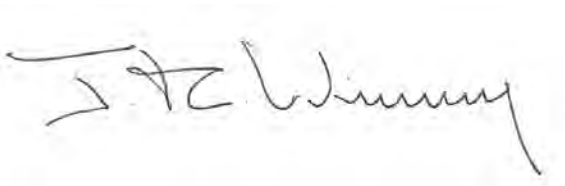
Subject: Village of New Maryland Sunrise Wellfield Development EIA

The Village of New Maryland is proposing the development of the Sunrise Wellfield project. The proposed wellfield is located on the southern border of the Village. The Project involves the development of a new wellfield water supply source and the construction of water supply wells, a water treatment facility, water supply and distribution mains, booster stations and pressure reducing valve stations. Construction of the Project began in late-February 2020, with an anticipated completion date of October 30, 2023.

This Project is considered to be an "Undertaking" as defined in Schedule A of the *Environmental Impact Assessment Regulation* 87-83, as described by item (s) of Schedule "A" ("all waterworks with a capacity greater than fifty cubic metres of water daily").

The following document includes an overview of existing conditions, a screening of the identified Project - Valued Environmental Component interactions, and the approach for completing the assessment of any residual effects and their significance.

Yours sincerely,



John McKinney, P. Eng.

cc: Cynthia Geldart, CAO/Clerk (Village of New Maryland)

WSP ref.: C-84510.70

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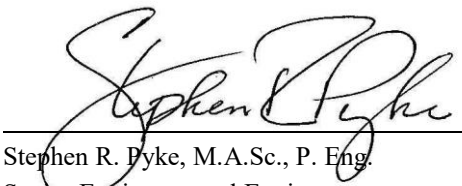

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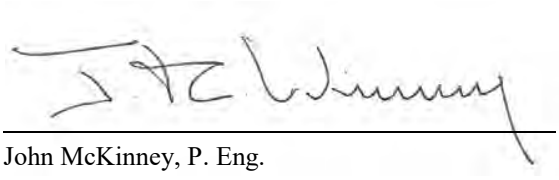

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Senior Municipal Engineer
Atlantic Infrastructure

EXECUTIVE SUMMARY

The Environmental Impact Assessment (EIA) represented by this document has been prepared for submission to the New Brunswick Department of Environment and Local Government (DELG) on behalf of the Village of New Maryland ("Proponent") by WSP Canada Group Limited (WSP). The proposed "Project" is titled - Sunrise Wellfield Development. The proposed Project is located on the Village's southern municipal boundary. The Project involves the development of a new wellfield water supply source and the construction of water supply wells, a water treatment facility, water supply and distribution mains, water booster stations and pressure reducing valve (PRV) stations.

This Project is an "Undertaking" as defined in Schedule A of *Environmental Impact Assessment Regulation 87-83*. Schedule A of the Regulation identifies the types of undertakings that must be submitted for registration with the New Brunswick DELG, Environmental Science and Protection Division, Environmental Impact Assessment Branch.

The proposed construction schedule for the Project is dependent on receiving all necessary approvals and funding. Site preparation and construction began in late-February 2020 and will take approximately four (3) years to complete. It is anticipated that the Project will be operational by October 30, 2023 and fully completed by March 31, 2024.

The Proponent has commenced engagement of First Nation communities in proximity to the Project and will continue to do so throughout its development, construction and operation to ensure that all questions and concerns are addressed.

The Proponent has and will continue to hold focused meetings with government representatives and key stakeholders to ensure that they are kept apprised of all Project-specific information and planning activities. The New Brunswick DELG has been the primary source of consultant. The Proponent has also been proactive by engaging with elected federal and provincial government representatives to inform them of the potential development in the Project area.

Site-specific baseline information has been collected to support the assessment of effects in the final Impact Assessment, including hydrogeology (2017, 2018), rare plants (2018), breeding birds (2018), wetlands (2018), fish and fish habitat (2018), and archaeology (2018).

From a review of Project activities and applicable legislation, combined with WSP's previous assessment experience, has resulted in select Valued Environmental Components (VECs) being potentially impacted by the proposed Project:

- Ambient Air Quality
- Ambient Noise Levels
- Groundwater Resources
- Surface Hydrology
- Fish and Fish Habitat
- Terrain and Soils
- Flora Species of Conservation Concern (SOCC) and Associated Habitats
- Fauna SOCC and Associated Habitats
- Migratory Birds
- Economy
- Heritage and Archaeological Resources
- Human Health
- Land Use

This registration document provides a complete EIA of the proposed project, as well as, an approach for completing the VEC screening step. It is expected that the majority of VEC interactions will not result in residual effects. Appropriate mitigating measures will be incorporated to avoid or reduce potential effects.

ABBREVIATIONS

ACRONYMS:

AAS	Aboriginal Affairs Secretariat
AM	*Ante merīdiem*, meaning “before midday”
ANSI	American National Standards Institute
AO	Aesthetic Objective
ASNB	Archeological Services New Brunswick
CAAQS	Canadian Ambient Air Quality Standards
CEAA	Canadian Environmental Assessment Agency
CO	Carbon monoxide
DELG	Department of Environment and Local Government
DTI	Department of Transportation and Infrastructure
ECCC	Environment and Climate Change Canada
EIA	Environmental Impact Assessment
EMPP	Environmental Management Protection Plan
H&S	Health and Safety
HRIA	Heritage Resource Impact Assessment
Hwy.	Highway
IBA	Important Bird Area
IBA ICIP	Infrastructure Bilateral Agreement for the Investing in Canada Infrastructure Program
LAA	Local Assessment Area
MAC	Maximum Acceptable Concentration
MBCA	Migratory Birds Convention Act
MBR	Migratory Birds Regulations
Met	Meteorology
NB	New Brunswick
NO_2	Nitrogen dioxide
NSF	National Sanitation Foundation
O_3	Ozone
O&M	Operation and Maintenance
PID	Parcel Identifier
PLC	Programmable Logic Controller
PM	*Post merīdiem*, meaning “after midday”
FPM	Fine Particulate Matter
PRV	Pressure Reducing Valve
RAA	Regional Assessment Area
ROW	Right-of-Way
SAR	Species at Risk
SARA	*Species at Risk Act*

SCADA	Supervisory Control and Data Acquisition
SOCC	Species of Conservation Concern
TRC	Technical Review Committee
TW	Test Well
VEC	Valued Environmental Component
WATCM	Work Area Traffic Control Manual
WAWA	Watercourse and Wetland Alteration
WMP	Water Management Plan
WSP	WSP Canada Group Limited
WSSA	Water Supply Source Assessment
WTP	Water Treatment Process

UNITS OF MEASUREMENT:

d	Day
ft.	Feet
ha	Hectares
hr.	Hour(s)
km	Kilometer(s)
L/s	Liters per second
Lpcd	Litres per capita per day
m	Meter(s)
m^2	Square meters
m^3	Cubic meters
mm	Millimeters
USgpm	US gallons per minute
V	Volts
$\mu g/m^3$	Micrograms per cubic metre
yr.	Year

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FIGURES

TABLES

APPENDICES

1 INTRODUCTION

This document represents the Environmental Impact Assessment (EIA) Registration Document for the Project titled - Sunrise Wellfield Development. This document has been prepared for submission to the New Brunswick Department of Environment and Local Government (DELG) on behalf of the Village of New Maryland ("Proponent") by WSP Canada Group Limited (WSP).

The Project is intended to provide a new and secure communal water supply and distribution system for existing and future water users connected to the Village's communal water system. The Project involves development of a new wellfield water supply source, as well as, construction of water supply wells, a water treatment facility, water supply and distribution mains, water booster stations and pressure reducing valve (PRV) stations. The proposed Project is located on the Village's southern municipal boundary.

1.1 PROPONENT

1.1.1 NAME OF PROPONENT

Village of New Maryland

1.1.2 ADDRESS OF PROPONENT

584 New Maryland Highway

New Maryland, NB, Canada E3C 1K1

Phone: (506) 451-8508

Fax: (506) 450-1605

E-mail: office@vonm.ca

1.1.3 PRINCIPAL PROPONENT CONTACT

Cynthia Geldart

Chief Administrative Officer

Phone: (506) 451-8508

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E-mail: Cynthia.Geldart@vonm.ca

1.1.4 PRINCIPAL CONTACT PERSON FOR PURPOSE OF EIA

John McKinney, P. Eng.

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80 Bishop Drive

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E-mail: John.McKinney@wsp.com

1.1.5 PROPERTY OWNERSHIP

The Sunrise Wellfield Property, Parcel Identifier (PID) 75534586, was obtained by the Village of New Maryland as an expropriated freehold land acquisition from the [redacted] property (PID 75062174). Local Government Services Easements (also referenced as Municipal Services Easements) have been obtained from the [redacted] Property (PID 75062174) and the [redacted] Property (PID 75064840).

1.2 REGULATORY FRAMEWORK

This section describes the regulatory framework within which the Project EIA will be completed.

1.2.1 FEDERAL

The federal Environmental Assessment process and requirements are outlined in the *Canadian Environmental Assessment Act* (CEAA). The federal process is triggered if the project is a "designated project" as defined by the *Regulations Designating Physical Activities*. Based on the current understanding of the Project, the federal process will not be triggered because the type of project represented by the Proponent's proposed undertaking is not listed in the *Regulations Designating Physical Activities*.

1.2.2 PROVINCIAL

The New Brunswick EIA Process involves three primary steps; a Registration Document, a Determination Review, and a Comprehensive Review that requires the submission of an EIA Report.

The first step in the EIA Process is to determine whether a project is likely to be an "Undertaking" as defined in Schedule A of *Environmental Impact Assessment Regulation* 87-83. Schedule A of the Regulation identifies the types of undertakings that must be submitted for registration. Because the Project falls under waterworks with a capacity greater than fifty cubic meters of water daily (i.e., 50 m^3/d) it is an Undertaking for the purposes of the Regulation and must be registered with the DELG, Environmental Science and Protection Division, Environmental Impact Assessment Branch.

Section 5 (2) of the Regulation requires that proponents deliver a completed registration document to the Minister. It is understood that final engineering details of a project will typically not be available at the time of project registration. However, full and accurate descriptions of the project location, proposed activities, the existing environment, potential impacts, and proposed mitigation are required. This can partially be completed for the Project using a high-level desktop review of potential environmental and socio-economic effects for the Project location. It is recommended that the registration document be submitted early in the planning process so that the ability to modify the Project to address government and stakeholder concerns is maintained.

Once the Project is registered, it must undergo a Determination Review. The Determination Review is used to identify and evaluate the environmental issues surrounding the proposed Project. The review is coordinated by the EIA Branch of the DELG. A specially constituted Technical Review Committee (TRC) comprised of experts and specialists from federal agencies, various departments of the New Brunswick Government and the rural district planning commission or municipality having jurisdiction over the project location will assist in the review. The purpose of this Review is to determine if a Comprehensive Review is required.

If the Minister decides that a Comprehensive Review is required, the following would be required prior to proceeding with the Undertaking:

- Review Committee formulates draft guidelines for the Comprehensive Review;
- Completion of an EIA study and preparation of a report describing the results;
- TRC completes detailed examination of the draft EIA Report;
- Public review and comment on the EIA Report; and
- Ministry issues or denies an approval for the Undertaking.

1.2.3 MUNICIPAL

The following municipal by-laws and policies will apply to this Project:

1. Erection of Telecommunications Tower and Antenna Policy. Original adoption by Village Council – January 17, 2007; revisions approved by Village Council – February 2018. This Village policy covers the erection of telecommunication towers within the municipality. Six (6) radio tower locations will be required to facilitate Supervisory Control and Data Acquisition (SCADA) communications among the various Project sites. An amendment to this policy will not be required to accommodate to proposed communication towers.
2. Parklands and Public Usage By-law. This municipal by-law will govern the positioning and operation of the proposed Water Treatment Process (WTP) Building on the designated parkland property (PID 75349068) located within Village of New Maryland Sunrise Estates. An amendment to this by-law will not be required to accommodate the location or operation of the WTP Building within the existing Sunrise Estates parkland.
3. Municipal Plan Provisions and Zoning By-laws:
    - Municipal Plan - 10.3.1 Municipal Water Systems Policy;
    - Zoning By-law - 4.1 Infrastructure and Utilities; and
    - Zoning By-law - 7.1 Uses Permitted in All Zones.

    Amendments to the above noted Municipal Plan provisions or re-zoning under existing Zoning By-laws will not be required to accommodate the proposed water infrastructure on Village properties or Local Government Services Easements.

1.2.4 APPROVALS AND PERMITTING

Like any project in New Brunswick, provincial and federal approvals and permits are required before the Project can proceed. Permitting occurs after ministerial determination or approval of the EIA report. Permitting can include submission of applications to obtain specific construction and operating approvals. All supporting infrastructure will likely require specific permits for construction. Temporary/permanent access roadways and water supply/distribution piping system may require a provincial permit, such as a Watercourse and Wetland Alteration (WAWA) permit, and federal review if crossing fish-bearing watercourses.

Table 1 presents the Acts, Regulations, permits, and approvals that may apply to the Project. Many of these requirements are site specific and are dependent upon existing environmental and socio-economic conditions in the proposed Project Area and the existing infrastructure.

In addition to approvals and permits identified in Table 1, the NB Department of Transportation and Infrastructure (DTI) mandates the following permitting requirements that may apply to this project.

1. Access Road Permit/Certificate of Setback: DTI District Office 5 (Kevin Richard – 506-453-2611).
2. Highway Usage Permit: DTI Highway Corridor Management (Peter McDonald – 506-453-6724).
3. Special Permit: DTI Special Permits Office (Tanya Mitchell – 506-453-2982).

Table 1: Federal and Provincial Acts, Regulations, Permits, and Approvals That May Be Required

ACTS	RELATED REGULATIONS	APPROVALS OR PERMITS REQUIRED
Federal		
Canadian Environmental Protection Act	No specific regulations related to this Act.	No specific permit required. The Project will prevent pollution and protect the environment and human health to contribute to sustainable development.
Fisheries Act	Applications for Authorization under Paragraph 35(2)(b) of the Fisheries Act Regulations	It is anticipated that no in water work will be required. If any destruction to fish or fish habitat will occur as a result of the Project, Authorization for Work that May Result in Serious Harm to Fish is required.
Species at Risk Act	No specific regulations related to this Act	No specific permit required. Adhere to species specific activity restrictions and recovery initiatives.
Migratory Bird Conventions Act	Migratory Birds Regulations	No specific permit required. Notification only.
Provincial		
Clean Environment Act	Environmental Impact Assessment Regulation	Registration with the DELG, Environmental Science and Protection Division, Environmental Impact Assessment Branch. Authority of permission to discharge contaminant into waters during construction (i.e., site run-off). Water Supply Source Assessment (WSSA) permit must be obtained and a WSSA completed.
	Water Quality Regulation	Permit for a WAWA permit if within 30 meters (m) of a watercourse or wetland. Approval required to construct and operate for all waterworks. The Proponent will seek to obtain Approval to Construct certificates for the following water system components: Drinking water treatment plant, connection of water source wells (i.e., Test Well (TW) 05-02, TW17-01) to the water treatment plant and water distribution system, and water booster pumping station Nos 1 and 2. The Approval Holder shall ensure that all new chemicals/materials/equipment added to the drinking water system be National Sanitation Foundation/American National Standards Institute (NSF/ANSI): Standard 60 & 61.

ACTS	RELATED REGULATIONS	APPROVALS OR PERMITS REQUIRED
Protected Natural Areas Act	No specific regulations related to this Act	Permits for Activity in Protected Natural Areas, if required for the Project.
Crown Lands and Forests Act	No specific regulations related to this Act	No specific permit required; this Project is not being developed on Crown Lands.
Occupational Health and Safety Act	Occupational Health and Safety Regulations	No specific permit required.
Community Planning Act	Provincial Building Regulation	Building permits for construction and operation of the Project.
Species at Risk Act	No specific regulations related to this Act	Notification to the DELG; authorization may be required for clearing and site preparation.
Heritage Conservation Act	General Regulation - Heritage Conservation Act	Site alteration permit and Heritage Resource Impact Assessment (HRIA).
Electrical Installation and Inspection Act	Electrical Installation and Inspection Regulations	Approval for electrical installation.
Motor Vehicle Act	Vehicle Dimensions and Mass Regulation	Permits for moving large structures on provincial highways.
Highway Act	Highway Usage Regulation	Application for public property easements for installation of utilities along public highways from the DTI.
Topsoil Preservation Act	General Regulation - Topsoil Preservation Act (N.B. Reg. 95-66)	Permit required for removal of topsoil from a site.
Transportation of Primary Forest Products Act	No specific regulations related to this Act	Compliance with specified documentation requirements for the transportation of primary forest products within New Brunswick.
Transportation of Dangerous Goods Act	No specific regulations related to this Act	Permit required for the transportation of dangerous goods.
Clean Water Act	Wellfield Protected Area Designation Order	No specific permit required. The project is not within an existing Wellfield Protected Area. Development of a new municipal wellfield must undergo designation through the wellfield protection program.
Forest Fires Act	No specific regulations related to this Act	A work permit for industrial operations on forest land may be required.

ACTS	RELATED REGULATIONS	APPROVALS OR PERMITS REQUIRED
Public Health Act	On-site Sewage Disposal System Regulation	Approval from the Department of Public Safety.

1.3 DOCUMENT STRUCTURE

The intent of this document is to support the Proponent's registration to provincial agencies. Provided herein is a Project description that includes proposed construction and restoration activities. This document's contents include:

- **Section 1** – Introduction
- **Section 2** – Project Description
- **Section 3** – Physical Components and Dimensions of the Project
- **Section 4** – Description of the Existing Environment
- **Section 5** – Identification of Environmental Impacts
- **Section 6** – Classification of Residual Environmental Effects and Determination of Significance
- **Section 7** – First Nations and Public Involvement
- **Section 8** – Funding
- **Section 9** - References

Site-specific baseline information was collected in 2017 and 2018 to support the assessment of residual effects in this document submission. This information, as well as approvals and permits, figures, and other reports relevant to the Project are included in the following appendices:

- **Appendix A**
  - Sub-Appendix A-1: A1 Sized Figures (Figures 1, 2 and 3)
  - Sub-Appendix A-2: Reference Plan Figures (Figures A-1 to A-8)
- **Appendix B** – Water Management Plan
- **Appendix C** – Associated Reports
  - Sub-Appendix C-1 – Hydrogeological Assessments:
    - TW05-02 (BGC Engineering Ltd., 2017)
    - TW17-01 (BGC Engineering Inc., 2018)
  - Sub-Appendix C-2 – Breeding Bird, Rare Plant, and Wetland Surveys (Boreal Environmental Ltd., 2018)
  - Sub-Appendix C-3 – Archaeological Field Research (Stratis Consulting Ltd., 2018)
  - Sub-Appendix C-4 – WSSA Initial Applications:
    - WSSA - Step One Application No.1 for PID 75062174 (Opus International Consultants Ltd., 2016)
    - WSSA - Step One Application No.2 for PID 75062174 (Opus International Consultants Ltd., 2017)
- **Appendix D** – Notification Letter and Supplemental Information

2 PROJECT DESCRIPTION

2.1 PROJECT NAME

The Project name is: Village of New Maryland Sunrise Wellfield Development.

2.2 PROJECT OVERVIEW

It has been the Project Proponent's long-term goal to obtain a second, more secure and plentiful water supply source within its boundaries to augment or replace its existing wellfield located in Applewood Acres. The Proponent has committed itself over the past 10+ years to search for a new wellfield and this project represents an entirely new water supply source and system. The Proponent is very confident that the proposed project will provide the necessary water supply security for its future long-term water needs.

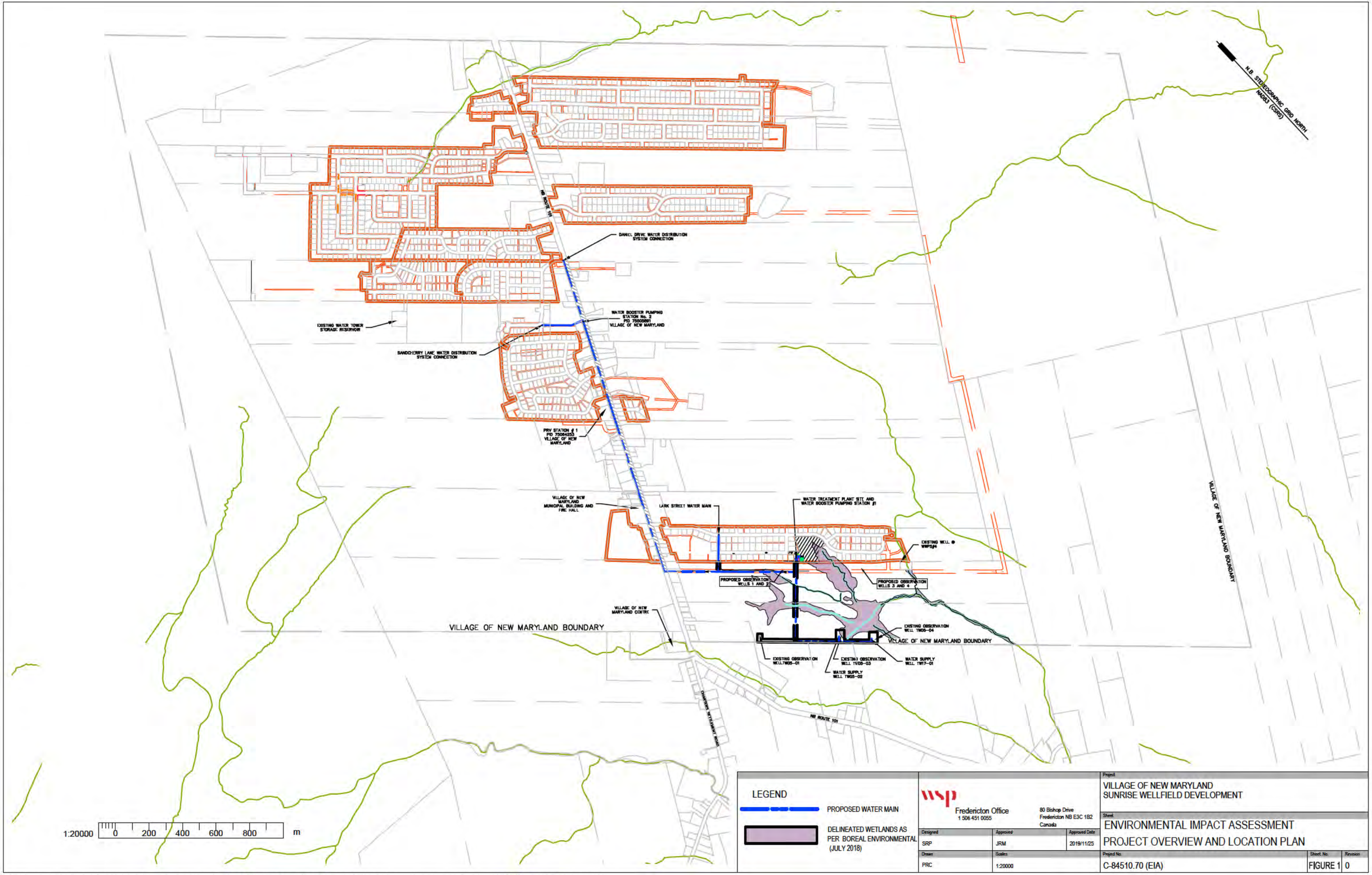
This Project involves the development of a new wellfield water supply source and the construction of water supply wells, a water treatment facility, water supply and distribution mains, water booster stations, and pressure reducing valve stations. The proposed components will enable transmission of a groundwater supply to a treatment process, through to a distribution main and then onto the Village's existing water piping network and storage infrastructure. It is intended that this new water supply and treatment system will replace the existing Applewood Acres wellfield water supply source as the Village's primary water supply system. The Village intends to maintain and utilize its existing water supply wells for the foreseeable future.

2.2.1 PROJECT LOCATION

The Project site is positioned in the south-eastern portion of New Maryland, NB on PID 75062174; see Appendix A, Figure 1 (on A1-sized sheet). The Project site is generally accessible from NB Route 101, as well as, through existing streets in the Sunrise Estates Subdivision. The 45-hectare property is primarily composed of undeveloped, forested land, and has a wetland in the approximate centre. In addition to TW17-01 and TW05-02, there are three (3) other existing test/observation wells located on the Property (TW05-01, TW05-03 and TW05-04).

Property has been purchased by the Proponent from the affected private property owners to accommodate construction, operation and maintenance access to the well sites. Property purchases for the raw water supply and transmission components of this project include:

- **PID 75534586**: Freehold land acquisition to accommodate wellheads at TW05-02, TW17-01 and TW05-1, plus a 20 m wide strip of land adjoining the three (3) wellhead sites to serve as a portion of the overall services corridor for vehicles, power and interconnecting water supply piping.
- **PID 75062174**: A 20 m wide Local Government Services Easement to provide access across this PID as a connecting services corridor from the Freehold Land Acquisition (PID 75534586) to the adjacent PID 75064840.
- **PID 75064840**: A 20 m wide Local Government Services Easement to accommodate access across this PID. This easement aligns with the easement crossing PID 75062174 to provide for a services corridor from the Freehold Land Acquisition (PID 75534586) across to PID 75064840.



LEGEND

PROPOSED WATER MAIN

DELINEATED WETLANDS AS PER BOREAL ENVIRONMENTAL (JULY 2018)

msp
Fredericton Office
1 506 451 0055
80 Bishop Drive
Fredericton NB E3C 1B2
Canada

Designed	Approved	Approved Date
SRP	JRM	2019/11/25
Drawn	Scales	
PRC	1:20000	

Project
VILLAGE OF NEW MARYLAND
SUNRISE WELLFIELD DEVELOPMENT

Sheet
ENVIRONMENTAL IMPACT ASSESSMENT
PROJECT OVERVIEW AND LOCATION PLAN

Project No.	Sheet No.	Revision
C-84510.70 (EIA)	FIGURE 1	0

Original Sheet Size ANSI B [11"x17"] Plot Date 2020-06-15 at 2:20:01 PM Path G:\JOBFILES\800\845_NewMaryland\C-84510.70 - Arsam Property - EIA For Wellfield Development (2018)\04_Project Working Files\CADD\C-84510.70 building footprint.dwg FIGURE 1

2.3 PURPOSE, RATIONALE, AND NEED FOR THE UNDERTAKING

2.3.1 PURPOSE

The Proponent's objective is to develop a secure and plentiful water supply source (wellfield) within its boundaries capable of satisfying the current and future water needs of its communal municipal water system. A new wellfield will be used to augment or completely replace the existing wellfield. Thus, the purpose of this project is to provide for a complete infrastructure system that will enable extraction, treatment and conveyance of groundwater from its wellfield source through to the Proponent's water distribution network and storage facilities.

2.3.2 RATIONALE

In 2016, the Proponent undertook to develop written narrative for managing its drinking water resources. Known as a Water Management Plan (WMP), this narrative documented the Village of New Maryland water resources, water utility and a plan devised to manage them. A copy of the WMP is provided in Appendix B.

Primary among the goals and objectives of the WMP are the following:

- Operate and maintain the Village's drinking water utility to meet its customers' water needs indefinitely.
- Preserve the ability of Village water resources to attain clean, safe drinking water at acceptable water quality and quantity for current and future populations.
- Ensure sustainable use of drinking water.
- Ensure efficient supply of drinking water.
- Manage and protect the watersheds that provide the Village's water as natural assets.
- Identify the water utility's vulnerabilities and solutions to rectify these vulnerabilities.
- Explore for and secure additional water sources within the Village municipal boundaries.

Presently, the Proponent's municipal drinking water needs are supplied from four (4) groundwater wells, namely Wells A10, A11 and A20 - located in Applewood Acres wellfield (west of NB Route 101), and Well S4 - located in Springwater Place wellfield (east of NB Route 101). These wells generally provide acceptable water quality and quantity. However, the following concerns impact on the long-term capability and security of the current wellfield:

- Two of the four existing water supply wells consistently exceed the *Guidelines for Canadian Drinking Water* aesthetic objective (AO) for manganese by up to 7.5 times.
- Recent well drawdown levels occurring in the last two-years suggest declining aquifer levels, which are resulting in reduced well production capacities.
- Efforts using super-chlorination have only been partially successful in restoring well production.
- Current diurnal water demands can result in production well run-times exceeding several days to achieve and maintain acceptable water storage reservoir levels.
- The loss of the largest production well will put significant stress on remaining production wells to satisfy water demands, especially during periods of peak demand.
- Water quality security of the existing wellfield is somewhat compromised by the presence of the Trans Canada Highway crossing through the wellfield catchment area and protection zones, and to within 120 m of a production well.
- Water quality security is potentially compromised by the presences of a growing industrial park located up-gradient from and immediately adjacent to the wellfield protection area.

2.3.3 NEED

Approximately 1,900 people are serviced by two separate communal water supply systems within the Village - Applewood Acres and Springwater Place. These systems service Applewood Acres, Springwater Place Phase 2, Pine Ridge Estates, Forbes Subdivision, Baker Brook Court, Centennial Gardens Subdivision, and NB Route 101 – portion north of Crown Avenue. The Village's communal water supply system has a fully metered water supply system. The remaining Village population (approximately 2,500 people) are serviced by individual private wells.

For the four-year period from 2012 to 2015, inclusive, the Village's total annual well production ranged from 139,500 to 151,400 m^3, averaging 143,600 m^3/yr., or 393 m^3/d. On a per capita basis, and including water supply system losses, water consumption averaged 187 Lpcd during this same period. This consumption rate compares very favourably to the following residential consumption figures reported on Environment Canada's website: New Brunswick = 394 Lpcd (2009); Nova Scotia = 292 Lpcd (2009); Prince Edward Island = 189 Lpcd (2009); municipalities with serviced populations of 1,000 to 2,000 people = 371 Lpcd (2009).

The ability of the Village's existing wellfield to support future water demand growth based on achieving water savings from water conservation measures alone is very limited. The WMP identified the ability of the Village's communal water system (wellfield) to accommodate continued growth and withstand potential 'worst-case' operating conditions to be dependent upon locating and developing additional water sources (i.e., new wellfield).

The proposed new wellfield is a more capable source for the Village's existing and long-term future water supply needs. Both new production wells (TW05-02 and TW17-01) each have a supply a safe-yield capacity of 250 USgpm (15.8 L/s), thus representing a total production of 500 USgpm (31.6 L/s). With the largest well out-of-service the new wellfield is capable of suppling 250 USgpm (15.8 L/s). In comparison, the existing wellfield has a total safe-yield capacity of 220 USgpm (13.9 L/s). With the largest well out-of-service it is capable of 114 USgpm (7.2 L/s), which represents 46% of the new wellfield capacity.

Existing and new wellfield capacities are summarized in Table 2.

Table 2: New and Existing Wellfield Capacities

Wellfield	Total No. of Wells	Total available safe-yield capacity[1] (all wells)		Available Safe-yield capacity[1] *(largest well out of service)*	
		USgpm	L/s	USgpm	L/s
Existing	3	220	13.9	114	7.2
New	2	500	31.6	250	15.8

Note: [1] Capacity is based on continuous operation of 24 hrs/d, 7 d/week, and 365 d/yr.

Development of a new wellfield positioned within a separate aquifer was noted as the most favourable approach in the WMP, as it would provide additional risk reduction against contamination or water quality deterioration of a single wellfield. Therefore, the proposed new wellfield is necessary in achieving the goals of sustaining existing demands and future growth.

The scope-of-work for this project is generally summarized as follows:

- Development and testing of one (TW05-02) of the two water supply wells to provide for a safe-yield capacity. Note: The other well (TW17-01) has been developed, tested and has obtained a safe-yield capacity rating.
- Property and property easement acquisition from private property owners for establishing access within the wellfield to the water supply well locations, and for obtaining lands for locating a water booster pump building.

- Preparation of an EIA submission document for review and approval by the DELG and subsequent Ministerial determination.
- On-site piloting of a selected manganese and hydrogen sulphide treatment technology.
- Detailed engineering design involving water supply, transmission, treatment and distribution, and including overall system control.
- Tendering of the overall project in specific phases that generally align with the primary project components - water supply/transmission, treatment, distribution and overall control.
- Construction of the project components in phases that align with the above noted project tendering phases. Project construction services are to include contract administration, on-site observation, equipment start-up and system commissioning, operator training and project close out.

2.4 SITING CONSIDERATIONS

Many of the environmental impacts associated with production well infrastructure can be avoided or reduced with proper planning. The following considerations were incorporated into the preliminary design concept to minimize the overall environmental impact of the Project:

- Maximizing avoidance of the delineated wetland areas on the [redacted] (PID 75062174) and [redacted] properties (PID 75064840; see Figure 1), on which the water supply pipeline, access roadway and power supply route have been sited.
- Utilizing the existing service corridor along Route 101 for the distribution water main, thus minimizing the potential for environmental (e.g., watercourses, wetlands, and sensitive features and habitats) and socioeconomic (e.g., aesthetics, cultural resources, and residential concerns) impacts.
- Establishing an area that meets the requirement for proper classification of land use zoning and future development in the area.

As previously mentioned, the two production wells (i.e., TW17-01 and TW05-02) and area for associated infrastructure (i.e., including routing of access roadway and water transmission pipe from the wellheads to the WTP building are located on portions of PIDs 75062174 and 75064840. These PIDs are currently vacant.

The water supply pipeline, access roadway and power supply will commence on the Village of New Maryland Sunrise Wellfield Property (PID 75534586), extend to a Local Government Services Easement that traverses the [redacted] (PID 75062174) and [redacted] (PID 75064840) properties, terminating at the Village of New Maryland Sunrise Estates Subdivision property (75349068). The access roadway will provide permanent site access to the transmission pipeline and power supply line. Preference for positioning and aligning the water supply pipeline, access roadway and power supply route is based on providing a direct route between the water supply wells and the WTP, with minimal disruption to the [redacted] and [redacted] properties and with minimal impact on the surrounding wetland areas.

An existing service corridor for the Village's sanitary sewer system exists as a Local Government Services Easement stretching along the Sunrise Estates Subdivision's southern boundary, eastward from NB Route 101 to the existing sanitary pumping station Sunrise PS2. Water distribution main piping would be located within this easement, extending from the WTP Building to NB Route 101. The water distribution piping would then head northward in the NB Route 101 right-of-way (westside), connecting to a PRV station on the New Maryland Woman's Institute property (PID 75064253) and then to a water booster station located on (or near) an existing storm water retention pond property (PID 75505891). The water distribution main would extend to connect to the Village's water distribution system network at both Sandcherry Lane and Daniel Drive.

The Heritage Resource Impact Assessment (HRIA) conducted for this Project (see Appendix C, Sub-Appendix C-3) did not identify any site related issues requiring site-specific mitigation measures.

Specific siting considerations for each of the project infrastructure sites are provided in the following sub-sections.

2.4.1 WELL TW05-02 SITE

- This site is part of the Village of New Maryland Sunrise Wellfield property (PID 75534586). The Village acquired the Well TW05-02 site in 2019 as Freehold Land from the [redacted] property (PID 75062174), which is a 45-hectare primarily composed of undeveloped forested land that also includes wetland areas.
- The overburden on the Well TW05-02 site is a silt-dominated till, which is typically 1 to 20 m (3 to 66 ft.) thick, deposited by advancing glaciers (Allard and Gilmore 2016). The bedrock in the area is part of the Minto Formation of the Pictou Group of rocks, consisting of Late Carboniferous aged, coarse-to-fine-grained sediments, including grey and red-brown beds of conglomerate, sandstone, siltstone, mudstone, and shale, with thin seams of coal (St. Peter and Fyffe 2005).
- There exists a known uranium occurrence located in Hanwell, NB at an approximate distance of 5 to 6 km from Well TW05-06. It is categorized as a minor uranium occurrence and is associated with fossilized plant fragments hosted within the Carboniferous rocks. Well TW05-02 is underlain by the same rock type. Although there is potential for elevated uranium in this area, it is impossible to predict where it might occur. To date, Well TW05-06 uranium concentrations have ranged from <0.1 to 0.1 µg/L. Based on Guidelines for Canadian Drinking Water Quality the maximum acceptable concentration (MAC) for uranium is 20 µg/L. Uranium will be part of all future Well TW05-02 water quality analyses.
- The surface elevation of the overall [redacted] property ranges from approximately 50 to 70 m (164 to 230 ft.) above sea-level. The overall property generally slopes to the southeast.
- Permanent site access roadway is non-existent and will need to be provided as part of this project.
- Site power (3-phase, 600 V) is non-existent and will need to be provided as part of this project.
- Water will be supplied within the Well TW05-02 Control Building as part of this project.
- Preference for positioning Well TW05-02 at this location is based on the well having pre-existed at this site. This well had existed for many years prior to wetland delineations being undertaken. It is positioned within proximity of the delineated wetland and very near (but outside) of the 30 m buffer zone (see Appendix A, Figure A-1). No alternative locations were considered for this well. The Proponent recognizes that wetland compensation will be considered where the wellhead and associated physical structures impact on the wetland.
- Preference for positioning Well TW05-02 at this location is based on the well pre-existing at this site. No alternative locations for locating this well were considered.
- No ecological or cultural considerations were taken in considering the location for Well TW05-02.
- The HRIA conducted for this property did not identify any site related issues requiring site-specific mitigation measures.

2.4.2 WELL TW17-01 SITE

- This site is part of the Village of New Maryland Sunrise Wellfield property (PID 75534586). The Village acquired the Well TW17-01 site in 2019 as Freehold Land from the [redacted] property (PID 75062174), which is a 45-hectare primarily composed of undeveloped forested land that also includes wetland areas.
- There exists a known uranium occurrence located in Hanwell, NB at an approximate distance of 5 to 6 km from Well TW17-01. It is categorized as a minor uranium occurrence and is associated with fossilized plant fragments hosted within the Carboniferous rocks. Well TW17-01 is underlain by the same rock type. Although there is potential for elevated uranium in this area, it is impossible to predict where it might occur. To date, Well TW17-01 uranium concentrations have been <0.1 µg/L. Based on Guidelines for Canadian Drinking Water Quality the maximum acceptable concentration (MAC) for uranium is 20 µg/L. Uranium will be part of all future Well TW17-01 water quality analyses.

- All siting considerations listed for Well TW05-2 apply equally to Well TW17-01.

2.4.3 EXISTING OBSERVATION WELL SITES

- The existing three observations wells, Well Nos. TW05-01, TW05-03 and TW05-04 are part of the Village of New Maryland Sunrise Wellfield property (PID 75534586). The Village acquired these sites in 2019 as Freehold Land from the [redacted] property (PID 75062174), which is a 45-hectare property primarily composed of undeveloped forested land that also includes wetland areas.
- Observation Well TW05-01 is positioned remote from the water supply wells (TW05-02, TW17-01) and the other observation wells.
- All siting considerations listed for Well TW05-2 apply equally to each of the three (3) existing observation wells. Exceptions: Site power - no site power will be provided to the observation wells; Water supply - no water supply will be provided to the observation wells.
- Level logging devices will be installed in each of the three (3) existing observation well to provide for continuous level logging. Level data will be extracted (uploaded) from the level loggers every 3 to 4 months. Level data from the observation wells will be analyzed to determine the impact on all observation wells as the result of operation of water production wells TW05-02 and Well TW17-01.
- An observation well water quality sampling/analysis monitoring plan will be developed. This plan will be submitted to the DELG for review and approval prior to commencing full water supply system operations.

2.4.4 PROPOSED NEW OBSERVATION WELL SITES

- Four (4) new observation wells (Observation Wells 1, 2, 3 and 4) are proposed for location within the existing local government services easement located on the [redacted] property (PID 75064840). The [redacted] property is primarily composed of undeveloped forested land that also includes wetland areas.
- It is proposed that Observation Wells 1, 2, 3 and 4 be constructed as two (2) nested pairs, with each pair constructed as one (1) shallow and one (1) deep well. It is proposed that these observation wells be located immediately south of Sunrise Estates Subdivision, where shown in Figure 3.
- Site access to the proposed new observation wells will be provided by means of the existing service access roadway constructed within the existing local government services easement.
- Site power - no site power will be provided to the proposed new observation wells.
- Water supply - no water supply will be provided to the proposed new observation wells.
- Preference for positioning the proposed new observations wells at these locations is based on proximity to the existing drilled domestic water supply wells within the Sunrise Estates Subdivision, and relative ease of access for groundwater level/quality monitoring purposes.
- Level logging devices will be installed in each of the four (4) new observation wells to provide for continuous level logging. Level data will be extracted (uploaded) from the level loggers every 3 to 4 months. Level data from the observation wells will be analyzed to determine the impact on all observation wells as the result of operation of water production wells TW05-02 and Well TW17-01.
- An observation well water quality sampling/analysis monitoring plan will be developed. This plan will be submitted to the DELG for review and approval prior to commencing full water supply system operations.
- No ecological or cultural considerations were taken in considering the location for the proposed new observation wells.
- The HRIA conducted for this property did not identify any site related issues requiring site-specific mitigation measures involving the proposed new observation wells.

2.4.5 WATER SUPPLY PIPING, WELL SITE ACCESS ROADWAY, WELL SITE POWER SUPPLY ROUTE

- Water supply piping, well site access roadway and well site power will provide physical links between Wells TW05-02 and TW17-01 and the water treatment plant.
- The pipeline/roadway/power supply route is positioned on PID 75534586 (Village of New Maryland Sunrise Wellfield property), PID 75062174 [redacted] property), PID 75064840 ([redacted]-[redacted] property) and PID 75349068 (Village of New Maryland Sunrise Estates Subdivision property). The lands on which these features are located is primarily composed of undeveloped forested land and includes wetland areas.
- The overburden on the pipeline/roadway/power supply route is a silt-dominated till and is typically 1 to 20 m (3 to 66 ft.) thick. The overburden was deposited by advancing glaciers (Allard & Gilmore, 2016). The bedrock in the area is part of the Minto Formation of the Pictou Group of rocks, which consists of Late Carboniferous aged, coarse-to-fine-grained sediments, including grey and red-brown beds of conglomerate, sandstone, siltstone, mudstone, and shale, with thin seams of coal (St. Peter & Fyffe, 2005).
- The surface elevation of the lands surrounding the pipeline/roadway/power supply route ranges from approximately 50 to 70 m (164 to 230 ft.) above sea-level. This area generally slopes to the southeast.
- The pipeline, roadway and power supply will be positioned within a local government services easement, commencing on the [redacted] property, crossing the [redacted] property and terminating at the Village of New Maryland Sunrise Estates Subdivision property.
- The access roadway will provide permanent site access to the water supply pipeline and power supply line.
- Site power will be provided by extending NB Power's 3-phase, 600 V power supply from within the Sunrise Estates Subdivision and along the length of the water supply pipeline to service the WTP Building and Wells TW05-02 and TW17-01.
- Hydrants will be strategically positioned along the water supply pipeline route (at approximately 90 m interval spacing) to provide for water access.
- Preference for positioning and aligning the pipeline/roadway/power supply route is based on providing a direct route between the water supply wells and the WTP, with minimal disruption to the [redacted] and Village of New Maryland Sunrise Wellfield properties, and with minimal wetland impact. The proposed access roadway is routed across a narrow section of the delineated wetland positioned on both the [redacted] and [redacted] properties. This portion of the access roadway also crosses through the 30 m setback zone on the [redacted] property (see Appendix A, Figure A-2). Additionally, a portion of the access roadway positioned near Well TW05-02 will also cross through the delineated wetland (see Appendix A, Figure A-1). The Proponent recognizes that wetland compensation will be considered where the access roadway impacts on the wetland.
- Ecological factors accounted for in the pipeline/roadway/power supply route siting considerations are based on maximizing avoidance of the delineated wetland areas.
- No cultural considerations were taken in considering the water supply pipeline/roadway/power supply route location.
- The HRIA conducted for these properties did not identify any water supply pipeline/roadway/power supply route related issues requiring site-specific mitigation measures.

2.4.6 WATER TREATMENT PROCESS SITE

- The Water Treatment Building will contain the WTP, Booster Station No. 1 and PRV Station No. 1. This building will be positioned on Village of New Maryland property positioned within the Sunrise Estates Subdivision.

- The proposed Water Treatment Building site is the former site of a decommissioned wastewater lagoon treatment system serving the Sunrise Estates Subdivision. As such, geotechnical site testing and evaluation will be undertaken as part of the building's structural foundation design.
- This Sunrise Estates Subdivision property includes storm water drainage piping (from the subdivision) and Sunrise Park, a municipal playground/park area. The overall property generally slopes to the southeast.
- Permanent site access to the Water Treatment site will be provided as an upgraded extension from the intersection of Kingston and Weston Streets within the Sunrise Estates Subdivision.
- A 3-phase, 600 V power supply will be provided to the site by extending a NB Power line from within the Sunrise Estates Subdivision.
- Water service will be provided within the Water Treatment Building from the WTP and will be used for water treatment backwashing requirements, general process wash-down and exterior lawn/shrub/plant watering needs.
- Preference for positioning the WTP Building at the Sunrise Estates Subdivision property location is based on the Village's property ownership, ease of site access from within the subdivision, proximity to Wells TW05-02 and TW17-01 and overall system hydraulic positioning. The [redacted] property (PID 75062174) was considered as an alternative site for locating the WTP and WTP Building. However, the Sunrise Estates Subdivision property was considered to offer the more favourable advantages for these criteria versus the [redacted] property.
- No ecological or cultural considerations were taken in considering the location for the WTP/Building.
- The HRIA conducted for this property did not identify any site related issues requiring site-specific mitigation measures.

2.4.7 WATER DISTRIBUTION PIPING ROUTE – WATER TREATMENT PROCESS BUILDING TO NB ROUTE 101

- This 1.7 km long section of the water distribution pipeline is to be positioned within the existing Local Government Services Easement located on the [redacted] property (PID 75064840). It will be routed eastward from the WTP Building and along the southern boundary of the Sunrise Estates Subdivision to NB Route 101, including crossing to the east side of NB Route 101.
- The overburden on the Local Government Services Easement site consists of the common excavation and granular backfill materials placed during construction of the trunk sanitary sewer system.
- The lands along this section of water distribution piping generally slope to the southeast.
- Permanent access to the Local Government Services Easement site is provided from within the Sunrise Estates Subdivision off Kingston Avenue and Sunrise Estates Drive (near the existing Wastewater Pumping Station No. 4). Additional service access to water distribution piping only will be established from within the Sunrise Estates Subdivision off Lark Street.
- No site power will be provided to the local government services easement site along this section of water distribution piping.
- Hydrants will be strategically positioned along the water distribution pipeline route (at approximately 90 m interval spacing) to provide for water access.
- Preference for positioning the water distribution piping at this location is based on the availability of the existing local government services easement providing a direct route to NB Route 101. Locating the water distribution piping within the Sunrise Estates Subdivision street right-of-way (ROW) was considered as an alternative route but would cause disruption within the residential community during the construction phase.

- No ecological or cultural considerations were taken in considering the location for this section of water distribution piping.
- The HRIA conducted for this site did not identify any site related issues requiring site-specific mitigation measures.

2.4.8 WATER DISTRIBUTION PIPING ROUTE - ALONG NB ROUTE 101

- This 3.8 km long section of the water distribution pipeline is to connect to the water distribution piping described above. It will be routed from the east side to the west side of NB Route 101 and then northward from near the Sunrise Estates Subdivision entrance to the existing water distribution network at Daniel Drive.
- This section of water distribution piping will be located within the west-side ROW along NB Route 101, and for the most part on the west side of the existing roadway within the existing water drainage ditch. The west-side ROW ditching slopes from north to south along Route 101.
- Permanent access to this section of water distribution piping to be provided from NB Route 101 along its entire length.
- A 3-phase NB Power line and communication cables exists along the entire west-side of NB Route 101 and will remain in place during installation of the water distribution pipeline.
- Hydrants will be strategically positioned along the water distribution pipeline route (at approximately 90 m interval spacing) to provide for water access and fire-fighting capabilities.
- Preference for positioning this section of water distribution piping at this location is based on ease of connection with the existing water distribution piping infrastructure at Daniel Drive and Sandcherry Lane. Both existing connection points are positioned on the west-side of NB Route 101. The ROW along the east-side of NB Route 101 was not considered as an alternative routing location for this section of water distribution piping due to existing sanitary and storm water sewer trunk services being located within the ROW.
- No ecological or cultural considerations were taken in considering the location for this section of water distribution piping.
- The HRIA conducted for this site did not identify any site related issues requiring site-specific mitigation measures.

2.4.9 PRESSURE REDUCING VALVE STATION NO. 2 SITE

- The proposed PRV Station No. 2 site is to be located near Victoria Hall on the New Maryland Women's Institute Property (PID 75064253). This property is owned by the Village and contains the historic Victoria Hall structure, a park and garden area and a Veteran's Memorial. PRV Station No. 2 will be positioned at the opposite (northern) end of the property from the Victoria Hall structure.
- The site overburden is a silt-dominated till and is typically 1 to 20 m (3 to 66 ft.) thick. The overburden was deposited by advancing glaciers (Allard and Gilmore 2016). The bedrock in the area is part of the Minto Formation of the Pictou Group of rocks, which consists of Late Carboniferous aged, coarse-to-fine-grained sediments, including grey and red-brown beds of conglomerate, sandstone, siltstone, mudstone, and shale, with thin seams of coal (St. Peter and Fyffe 2005).
- Permanent access to the PRV Station No. 2 site will be provided directly off NB Route 101.
- Site power (3-phase, 600 V) will be provided to the PRV Station No. 2 site from the existing nearby overhead NB Power supply line positioned along NB Route 101.
- Water supply within the PRV Station No. 2 Building will be provided as part of this project.
- Preference for positioning the PRV Station No. 2 Building at this location is based on system hydraulic

requirements and availability of property owned by the Village. No other alternative locations were considered in siting the PRV Station No. 2 Building

- No ecological or cultural considerations were taken in considering the location for this section of water distribution piping.
- The HRIA conducted for this site did not identify any site related issues requiring site-specific mitigation measures.

2.4.10 PRESSURE BOOSTING STATION NO. 2 AND PRESSURE REDUCING VALVE STATION NO. 3 SITE

- The proposed Pressure Boosting Station No. 2 and PRV Station No. 3 site is to be located along NB Route 101 on the Village of New Maryland owned PID 75505891.
- The overburden is a silt-dominated till and is typically 1 to 20 m (3 to 66 feet) thick. The overburden was deposited by advancing glaciers (Allard and Gilmore 2016). The bedrock in the area is part of the Minto Formation of the Pictou Group of rocks, which consists of Late Carboniferous aged, coarse-to-fine-grained sediments, including grey and red-brown beds of conglomerate, sandstone, siltstone, mudstone, and shale, with thin seams of coal (St. Peter and Fyffe 2005).
- Permanent access to the Pressure Boosting Station No. 2 and PRV Station No. 3 site will be provided directly off NB Route 101 and/or Sandcherry Lane.
- Site power (3-phase, 600 V) will be provided to the Pressure Boosting Station No. 2/PRV Station No. 3 site from the existing nearby overhead NB Power supply line positioned along NB Route 101.
- Water supply within the Pressure Boosting Station No. 2/PRV Station No. 3 PRV Station No. 2 Building will be provided as part of this project.
- Preference for positioning the Pressure Boosting Station No. 2 + PRV Station No. 3 Building at this location is based on system hydraulic requirements. No other alternative locations were considered in siting the Pressure Boosting Station No. 2/PRV Station No. 3 Building
- No ecological or cultural considerations were taken in considering the location for this section of water distribution piping.
- The HRIA conducted for this site did not identify any site related issues requiring site-specific mitigation measures.

2.4.11 WATER TOWER CONTROL ROOM

- The Water Tower Control Room is positioned within the Village's existing Water Storage Reservoir (PID 75456004).
- Permanent access to the Water Tower Control Room is provided from the Water Storage Reservoir site access roadway off Sprucewood Drive.
- Site power is currently available at the Water Tower Control Room.
- Water supply is provided within the Water Tower Control Room.
- The Water Tower Control Room contains pre-existing water reservoir control equipment, thus the preference for locating the additional SCADA equipment necessary for controlling the proposed upgraded water supply system. No other alternative locations were considered.
- No ecological or cultural considerations were taken in considering the location for this section of water distribution piping.
- The water storage reservoir property was not included in the HRIA for this project.

3 PHYSICAL COMPONENTS AND DIMENSIONS OF THE PROJECT

3.1 PROJECT INFRASTRUCTURE

This section summarizes the physical components and dimensions for the proposed project infrastructure. Existing and proposed infrastructure are summarized herein in Table 3.

The following components are identified in Table 3 as Existing Infrastructure components:

- Water Supply Well TW05-02 (Site 1A);
- Observation Well TW05-03 (Site 1A);
- Water Supply Well TW17-01 (Site 1B);
- Observation Well TW05-04 (Site 1B);
- Observation Well TW05-01 (Site 1D);
- Water Tower Control Room (Site 10B).

All remaining components listed in Table 3 (not including properties) are considered as 'new' construction components for this project.

Project location and site plans are provided on A1-sized sheets in Appendix A as Figures 1, 2 and 3. A simplified schematic of the proposed water supply, treatment, transmission and distribution system is presented in Figure 4.

3.2 IMPACTED WATERCOURSES AND WETLANDS

Wetlands impacted by the proposed undertaking's new construction are identified herein as Wetland No. 1 (WL1) and Wetland No. 2 (WL2).

Proposed new construction components to be located within a watercourse and/or wetland, or within the 30-meter buffer setback from a watercourse and/or wetland (see Figure 2), are:

1. Well TW05-02 site, identified herein as Site No. 1A, will include proposed construction components positioned within the 30-meter buffer setback of Wetland No. 1 (WL1). Refer to Appendix A, Figure A-1.
2. Proposed pipeline/roadway/power supply route crossing the [redacted] property (PID 75064840) - identified herein as Site No. 2. A portion of this pipeline/roadway/power supply will cross through the 30-meter buffer setback of WL2, through the 30-meter buffer setback of WL1 and through WL1. Refer to Appendix A, Figure A-2.
3. Proposed pipeline/roadway/power supply route positioned on the Village of New Maryland Sunrise Wellfield Property - identified herein as Site No. 1C. A portion of this pipeline/roadway/power supply route will cross through WL1 and the 30-meter buffer setback of WL1 at two locations. Refer to Appendix A, Figures A-1 and A-2.

ON SITE No. 3B
PROPOSED WATER TREATMENT PLANT (WTP)
AND BUILDING CROSSES THROUGH
WL1 30 METRE SETBACK

WETLAND No. 1
(WL1)

PROPOSED OBSERVATION
WELLS 3 AND 4

N.B. STEREOGRAPHIC GRID NORTH
NAD83 (CSRS)

WETLAND No. 1
(WL1)

WATER TREATMENT PLANT SITE AND
WATER BOOSTER PUMPING STATION #1

PID 75349068

PID 75064840

PID 75062174

ON SITE No. 2
PROPOSED PIPELINE/ROADWAY/POWER SUPPLY
CROSSING OF AN UNNAMED WATECOURSE AND
THROUGH WL1 30 METRE BUFFER SETBACK

Weston Street

PID 75349076

EXISTING OBSERV
WELL TW05-04

PROPOSED OBSERVATION
WELLS 1 AND 2

PID 75064840

WATER SUPPLY
WELL TW17-01

SUNRISE ESTATES

Sunrise Estates Drive

Kingston Avenue

PID 75062174

EXISTING OBSERVATION
WELL TW05-03

PID 75061754

LARK STREET
WATER MAIN SPUR

WETLAND No. 2
(WL2)

WATER SUPPLY
WELL TW05-02

ON SITE No. 1C
PROPOSED PIPELINE/ROADWAY/
POWER SUPPLY CROSSING
THROUGH WL1 AND
WL1 30 METRE BUFFER SETBACK

ON SITE No.4A
PROPOSED DISTRIBUTION WATER MAIN
CROSSING THROUGH WL2 AND WL2
30 METRE BUFFER SETBACK

MUNICIPAL SERVICES EASEMENT FOR
ACCESS ROAD, WATER MAIN AND UTILITIES

SUPPLY WATER MAIN

SUPPLY WATER MAIN

ON SITE No. 1A
WELL TW02-05 CROSSES THROUGH
WL1 30 METRE BUFFER SETBACK

ON SITE No. 1C
PROPOSED PIPELINE/ROADWAY/
POWER SUPPLY CROSSING
THROUGH WL1 AND
WL1 30 METRE BUFFER SETBACK

PID 75061515

Lark Street Water Main

DISTRIBUTION WATER MAIN

DISTRIBUTION WATER MAIN

PID 75064840

WETLAND No. 1
(WL1)

PID 75062174

PID 75064840

DISTRIBUTION WATER MAIN

MUNICIPAL SERVICES EASEMENT FOR
EXISTING SANITARY SEWER MAIN
AND NEW WATER MAIN

EXISTING OBSERVATION
WELLTW05-01

VILLAGE OF NEW MARYLAND

Berry Brook

NB ROUTE 101

SON
K

NB ROUTE 101

1:2000 @ A1
1:4000 @ A3
0 20 40 60 80 100 120 140 160 180 200 m

150 mm
100
50
10 mm
0

LEGEND

PROPOSED WATER MAIN

DELINEATED WETLANDS AS
PER BOREAL ENVIRONMENTAL
(JULY 2018)

msp
Fredericton Office
1 506 451 0055
80 Bishop Drive
Fredericton NB E3C 1B2
Canada

Designed	Approved	Approved Date
SRP	JRM	2019/11/25
Drawn	Scales	
PRC	1:40000	

Project
VILLAGE OF NEW MARYLAND
SUNRISE WELLFIELD DEVELOPMENT

Sheet
ENVIRONMENTAL IMPACT ASSESSMENT
LOCATION OF PROPOSED INFRASTRUCTURE WITHIN 30 METRES OF
WATERCOURSES AND OR WETLANDS

Project No.	Sheet No.	Revision
C-84510.70 (EIA)	FIGURE 2	0

Original Sheet Size ANSI B [11"x17"] Plot Date 2020-06-15 at 1:59:40 PM Path G:\JOBFILES\800\845_NewMaryland\C-84510.70 - Arsam Property - EIA For Wellfield Development (2018)\04_Project Working Files\CADD\C-84510.70 Figure 6.DWG FIGURE 6

Table 3: Physical Components and Dimensions of Project Infrastructure Components

SITE NO.	SITE NAME DESGINATION	REFERENCE	PID	SITE AREA, DIMENSIONS	PHYSICAL COMPONENTS, STRUCTURES, INFRASTRUCTURE
1A 1B 1C 1D	Sunrise Wellfield Property *(Freehold Land Acquisition* - owned by Village*)*	Figure 2 Appendix A, Figure A-1	75534586	Site dimensions – see Appendix A, Figure A-1 Area of 1A+1B+1C+1D = 2.04 ha	• Well TW05-02/Observation Well TW05-03 - **Site No. 1A** *(existing infrastructure)* • Well TW17-01/Observation Well TW05-04 - **Site No. 1B** *(existing infrastructure)* • Water Supply Piping/Well Site Access Roadway/Power Supply – **Site No. 1C** • Observation Well TW05-01 – **Site No. 1D** *(existing infrastructure)*
1A	Well TW05-02/Observation Well TW05-03 Site – part of Village of New Maryland Sunrise Wellfield Property **Existing infrastructure** *(Freehold Land Acquisition* - owned by Village*)*	Figure 2 Appendix A, Figure A-1	75534586	Site dimensions – see Appendix A, Figure A-1 Site area = 2,850 m^2 (i.e., 57 m x 50 m)	• Well TW05-02 wellhead chamber area = 10 m^2 • Observation Well TW05-03 wellhead area = 10 m^2 • Well Control Building area = 25 m^2 • Security fenced area (2 m high) = 200 m^2 • Emergency power generator and propane tank area = 10 m^2 • Service vehicle parking area (gravel) = 100 m^2 • Developed area: 200 + 100 = 300 m^2 • Lighting: On Building interior/exterior; exterior area lighting positioned from utility pole line • SCADA communication tower/antenna • Site impervious surface area: 25 + 10 = 35 m^2 • Within 15 m from wetland - see Figure 3 • Activities: Construction/O&M vehicles and equipment

SITE NO.	SITE NAME DESGINATION	REFERENCE	PID	SITE AREA, DIMENSIONS	PHYSICAL COMPONENTS, STRUCTURES, INFRASTRUCTURE
1B	Well TW17-01/Observation Well TW05-04 Site – part of Village of New Maryland Sunrise Wellfield Property *(Freehold Land Acquisition – owned by Village)*	Figure 2 Appendix A, Figure A-1	7554586	Site dimensions – see Appendix A, Figure A-1 Site area = 2,300 m^2 (i.e., 46 m x 50 m)	• Well TW17-01 wellhead chamber area = 10 m^2 • Observation well TW05-04 wellhead area = 10 m^2 • Well control Building area = 25 m^2 • Security fenced area (2 m high) = 125 m^2 • Service vehicle parking area (gravel) = 100 m^2 • Developed area: 125 + 100 = 225 m^2 • Lighting: On Building Interior/exterior; exterior area lighting positioned from utility pole line • SCADA communication tower/antenna • Site impervious surface area: 25 m^2 • Setback within 30 m of wetland – see Figure 3 • Activities: Construction/O&M vehicles and equipment
1C	Water Supply Piping/Well Site Access Roadway/Power Supply Site – part of Village of New Maryland Sunrise Wellfield Property *(Freehold Land Acquisition – Owned by Village)*	Figure 2 Appendix A, Figure A-1	75534586	Site dimensions – see Appendix A, Figure A-1 Site area = 1.4330 ha (i.e., 716.526 m x 20 m)	• Water supply piping (200-250 mm) length = 475 m • Well site access roadway (6 m wide) length = 700 m • Site power supply (3-phase, 600 V) length = 475 m • Isolation gate valves, hydrants along pipeline length • Developed Area: 10,000 m^2 • Lighting: Area lighting along access roadway positioned from utility pole line • Site impervious surface area: None • Directly impacts on wetland – see Figure 3 • Activities: Construction/O&M vehicles and equipment

SITE NO.	SITE NAME DESGINATION	REFERENCE	PID	SITE AREA, DIMENSIONS	PHYSICAL COMPONENTS, STRUCTURES, INFRASTRUCTURE
1D	Observation Well TW05-01 Site – part of Village of New Maryland Sunrise Wellfield Property **Existing infrastructure** *(Freehold Land Acquisition – owned by Village)*	Figure 2 Appendix A, Figure A-1	75534586	Site dimensions – see Appendix A, Figure A-1 Site area = 1,500 m^2 (i.e., 50 m x 30 m)	• Observation Well TW05-01 wellhead area = 10 m^2 • Developed Area: 300 m^2 • Lighting: None • Site impervious surface area: 300 m^2 (vehicular parking and turn around area) • Impact on wetland: None • Activities: Construction/O&M vehicles and equipment
1E	Water Supply Piping/Well Site Access Roadway/Power Supply Site - located on [redacted] Property *(Local Government Services Easement)*	Figure 2 Appendix A, Figure A-1	75062174	Site dimensions – see Appendix A, Figure A-1 Site area = 4,322 m^2 (i.e., 216.082 m x 20 m)	• Water supply piping (200-250 mm) length = 216 m • Well site access roadway (6 m wide) length = 216 m • Site power supply (3-phase, 600 V) length = 216 m • Air release valve and chamber • Isolation gate valves, hydrants along pipeline length • Developed Area: 3,000 m^2 • Lighting: Area lighting along access roadway positioned from utility pole line • Site impervious surface area: None • Directly impacts on wetland – see Figure 3 • Activities: Construction/O&M vehicles and equipment
2	Water Supply Piping/Well Site Access Roadway/ Power Supply Site - located on [redacted] Property	Figure 2 Appendix A, Figure A-2	75064840	Site dimensions – see Appendix A, Figure A-2 Site area = 4,851 m^2	• Water supply piping (200-250 mm) length = 243 m • Well site access roadway (6 m wide) length = 243 m • Site power supply (3-phase, 600V) length = 243 m • Isolation gate valves, hydrants along pipeline length

SITE NO.	SITE NAME DESGINATION	REFERENCE	PID	SITE AREA, DIMENSIONS	PHYSICAL COMPONENTS, STRUCTURES, INFRASTRUCTURE
	(Local Government Services Easement)			(i.e., 242.56 m x 20 m)	• Developed Area: 2,500 m^2 • Lighting: Area lighting along access roadway positioned from utility pole line • Site impervious surface area: None • Directly impacts on wetland – see Figure 3 • Activities: Construction/O&M vehicles and equipment
3A	Village of New Maryland Sunrise Estates Property *(Owned by Village)*	Figure 2 Appendix A, Figure A-3	75349068	Site dimensions – see Appendix A, Figure A-3 Site area (including Site No. 3B area) = 2.337 ha	• Water supply piping (200-250 mm) length = 60 m • Site access roadway (6 m wide) length = 60 m • Site power supply (3-phase, 600 V) length = 60 m • Asphalt area (access roadway) = 360 m^2 • Developed Area: 600 m^2 • Exterior area lighting positioned from utility poles • Site impervious surface area: 360 m^2 • Directly impacts on wetland – see Figure 3 • Activities: Construction/O&M vehicles and equipment
3B	WTP and Building Site - located on Village of New Maryland Sunrise Estates property *(Owned by Village)*	Figure 2 Appendix A, Figures A-3, A-4	75349068	Site dimensions – 30 m x 40 m; see Appendix A, Figures A-3 and A-4 Site area = 1,200 m^2	• WTP, including spent backwash storage • WTP Building area = 350 m^2 • Emergency power generator and propane tank area = 10 m^2 • Site power supply (3-phase, 600 V) • Asphalt area (service vehicle access/parking) = 150 m^2 • Grassed area = 50 m^2

SITE NO.	SITE NAME DESGINATION	REFERENCE	PID	SITE AREA, DIMENSIONS	PHYSICAL COMPONENTS, STRUCTURES, INFRASTRUCTURE
					• Gravel area = 390 m^2 • Security fenced area (2 m high) = 950 m^2 • Developed Area: 1,200 m^2 • Lighting: On Building interior/exterior; exterior area lighting positioned from utility poles and building • SCADA communication tower/antenna • Site impervious surface area: 350 + 10 + 150 = 510 m^2 • Within 30 m of wetland – see Figure 3 • Activities: Construction/O&M vehicles and equipment
4A	Water Distribution Piping Site – from WTP Building to NB Route 101 *(Local Government Services Easement)*	Figure 2 Appendix A, Figure A-5	75064840	Site dimensions – see Appendix A, Figure A-5 Site area = 4,700 m^2	• Pipeline length = 940 m • Isolation gate valves, hydrants along pipeline length • Developed Area: 4,700 m^2 • Lighting: None • Site impervious surface area: None • Directly impacts on wetland – see Figure 3 • Activities: Construction/O&M vehicles and equipment
4B	Observation Well Nos. 1, 2 Site *(Local Government Services Easement)*	Figure 2 Appendix A, Figure A-5	75064840	Site dimensions - NA Observation Well No. 1 and 2 areas = 10 m^2 each	• Observation Well Nos. 1, 2 wellhead areas = 10 m^2 each • Developed Area: 20 m^2 • One (1) well constructed as a shallow well; one (1) well constructed as a deep well. Level logging devices positioned in both wells. • Lighting: None • Site impervious surface area: None

SITE NO.	SITE NAME DESGINATION	REFERENCE	PID	SITE AREA, DIMENSIONS	PHYSICAL COMPONENTS, STRUCTURES, INFRASTRUCTURE
					• Impact on wetland: None - see Figure 3 • Activities: Construction/O&M vehicles and equipment
4C	Observation Well Nos. 3, 4 Site *(Local Government Services Easement)*	Figure 2 Appendix A, Figure A-5	75064840	Site dimensions - NA Observation Well No. 3 and 4 areas = 10 m^2 each	• Observation Well No. 3 and 4 wellhead areas = 10 m^2 each • Developed Area: 20 m^2 • One (1) well constructed as a shallow well; one (1) well constructed as a deep well. Level logging devices positioned in both wells. • Lighting: None • Site impervious surface area: None • Impact on wetland: None - see Figure 3 • Activities: Construction/O&M vehicles and equipment
5	Lark Street Water Distribution Piping Site - located within Sunrise Estates Road ROW *(Owned by Village)*	Figure 2	NA	Site dimensions – NA Site area - NA	• Pipeline length (in Sunrise Estates Subdivision) = 160 m • Isolation gate valves, hydrants along piping length • Developed Area: 800 m^2 • Lighting: None • Site impervious surface area: None • Impact on wetland: None - see Figure 3 • Activities: Construction/O&M vehicles and equipment
6	NB Route 101 Water Distribution Piping Site - from Sunrise Estates Subdivision to Daniel Drive Water Connection	Figure 2	NA	Site dimensions – NA Site area - NA	• Pipeline length = 2,000 m • Isolation gate valves, hydrants along pipeline length • Developed Area: 10,000 m^2

SITE NO.	SITE NAME DESGINATION	REFERENCE	PID	SITE AREA, DIMENSIONS	PHYSICAL COMPONENTS, STRUCTURES, INFRASTRUCTURE
	(NB Route 101 ROW)				• Lighting: None • Site impervious surface area: None • Impact on wetland: None • Activities: Construction/O&M vehicles and equipment
7	Sandcherry Lane Water Distribution System Site – Water Distribution Piping Connection from NB Route 101 *(Local Government Services Easement)*	Figure 2 Appendix A, Figure A-6	NA	Site dimensions – see Appendix A, Figure A-6 Site area = 1,500 m^2	• Pipeline length = 250 m • Isolation gate valves, hydrants along pipeline length • Developed Area: 1,250 m^2 • Lighting: None • Site impervious surface area: None • Impact on wetland: None • Activities: Construction/O&M vehicles and equipment
8A	New Maryland Woman's Institute Property *(Owned by Village)*	Figure 2 Appendix A, Figure A-7	75064253	Site dimensions - NA Site area (including Site No. 8B) = 5,700 m^2	• PRV Station No. 2 Site • Water pipeline connection from/to NB Route 101 • Isolation gate valves, hydrant • Impact on wetland: None • Activities: Construction/O&M vehicles and equipment
8B	PRV Station No. 2 Site - located on New Maryland Woman's Institute property *(Owned by Village)*	NA	75064253	Site dimensions – NA Site area = 775 m^2	• PRV process equipment and Building • PRV station Building area = 40 m^2 • Site power supply (3-phase, 600 V) • Emergency power generator and propane tank area = 10 m^2 • Asphalt area (service vehicle access/parking) = 30 m^2

SITE NO.	SITE NAME DESGINATION	REFERENCE	PID	SITE AREA, DIMENSIONS	PHYSICAL COMPONENTS, STRUCTURES, INFRASTRUCTURE
					• Grassed area = 10 m^2 • Gravel area = 140 m^2 • Security fenced area (2 m high) = 200 m^2 • Developed Area: 200 + 30 = 230 m^2 • Lighting: On Building interior/exterior; exterior area lighting from utility pole • SCADA communication tower/antenna • Site impervious surface area: 40 + 10 + 30 = 80 m^2 • Impact on wetland: None • Activities: Construction/O&M vehicles and equipment
9A	NB Route 101 Storm Water Attenuation Pond Property *(Owned by Village)*	Figure 2 Appendix A, Figure A-6	75505891	Site dimensions - NA Site area (including Site No. 9B) = 2,800 m^2	• Booster Station No. 1/PRV Station No. 3 • Water pipeline connects from/to NB Route 101 • Isolation gate valves, hydrant • Impact on wetland: None • Activities: Construction/O&M vehicles and equipment
9B	Booster Station No. 1 (+ PRV Station No. 3) Site - located on NB Route 101 Storm Water Attenuation Pond property *(Owned by Village)*	Figure 2 Appendix A, Figure A-6	75505891	Site dimensions - see Appendix A, Figure A-6 Site area = 775 m^2	• Booster pump process equipment and Building • Booster pump station Building area = 50 m^2 • Site power supply (3-phase, 600 V) • Site access roadway • Emergency power generator + propane tank area = 10 m^2 • Asphalt area (service vehicle access/parking) = 30 m^2

SITE NO.	SITE NAME DESGINATION	REFERENCE	PID	SITE AREA, DIMENSIONS	PHYSICAL COMPONENTS, STRUCTURES, INFRASTRUCTURE
					• Grassed area = 10 m^2 • Gravel area = 180 m^2 • Security fenced area (2 m high) = 250 m^2 • Developed Area: 250 + 30 = 280 m^2 • Lighting: On Building interior/exterior; exterior area lighting from utility pole • SCADA communication tower/antenna • Site impervious surface area: 50 + 10 + 30 = 90 m^2 • Impact on wetland: None • Activities: Construction/O&M vehicles and equipment
10A	Water Storage Reservoir Property *(Owned by Village)*	Appendix A, Figure A-8	75456004	Site dimensions – see Appendix A, Figure A-8 Site area = 9,300 m^2	• Water Tower Control Room • Site power supply (1-phase, 120/240 V) • SCADA communication tower/antenna mounted on top of elevated Water Storage Reservoir tankage • Impact on wetland: None • Activities: Construction/O&M vehicles and equipment
10B	Water Tower Control Room Site - located on Water Storage Reservoir Property **Existing infrastructure** *(Owned by Village)*	Appendix A, Figure A-8	75456004	Site dimensions - NA Site area = NA	• Developed Area: Existing • Impact on wetland: None • Activities: Construction/O&M vehicles and equipment

DANIEL DRIVE WATER DISTRIBUTION SYSTEM CONNECTION

WATER BOOSTING PUMPING STATION No. 2 (+PVR STATION No. 3) (SITE No. 9B)

SITE No. 6

VILLAGE OF NEW MARYLAND PID 75505891 (SITE No. 9A)

SITE No. 7

NB ROUTE 101

CASTLE ACRES

SPRINGWATER PLACE PHASE 2

CEDAR ACRES COURT

DISTRIBUTION WATER MAIN

CENTENNIAL HEIGHTS

SITE No. 6

VILLAGE OF NEW MARYLAND PID 75064253 (SITE No. 8A)

PRV STATION # 2 (SITE No. 8B)

SANDCHERRY LANE WATER DISTRIBUTION SYSTEM CONNECTION

PETERSON PARK

PID 75260380 VILLAGE OF NEW MARYLAND MUNICIPAL BOUNDARY AND FIRE HALL

WATER TOWER CONTROL ROOM (SITE No. 10B)

EXISTING WATER STORAGE RESERVOIR (SITE No. 10A)

EXISTING WELL WWPS#4

PID 75064840

VILLAGE OF NEW MARYLAND PID 75349068 (SITE No. 3A)

WATER TREATMENT PLANT SITE, WATER BOOSTER PUMPING STATION #1 AND PVR STATION #1 (SITE No. 3B)

SUNRISE ESTATES

VILLAGE OF NEW MARYLAND BOUNDARY

PID 75062174

PID 75061745

EXISTING OBSERVATION WELL TW05-04 (PID 75534586) SITE No. 1B

WATER SUPPLY WELL TW17-01 (PID 75534586) SITE No. 1B

LARK STREET WATER DISTRIBUTION SYSTEM (SITE No. 5)

SITE No. 2

SUPPLY WATER MAIN, UTILITIES AND ACCESS ROAD

(PID 75534586) SITE No. 1C

EXISTING OBSERVATION WELL TW05-03 (PID 75534586) SITE No. 1A

WATER SUPPLY WELL TW05-02 (PID 75534586) SITE No. 1A

SITE No. 1E

(PID 7534586) SITE No. 1C

DISTRIBUTION WATER MAIN SITE No. 4A

PID 75064840

EXISTING OBSERVATION WELL TW05-01 (PID 75534586) SITE No. 1D

PID 75062331

PID 75061515

PID 75353383

NB ROUTE 101

PID 75064709 NEW MARYLAND CENTRE

CHARTERS SETTLEMENT ROAD

N.B. STEREOGRAPHIC GRID NORTH NAD83 (CSRS)

LEGEND

PROPOSED WATER MAIN

DELINEATED WETLANDS AS PER BOREAL ENVIRONMENTAL (JULY 2018)

1:5000 @ A1
1:10000 @ A3
0 50 100 150 200 250 300 350 400 450 500 m

150 mm
100
50
10 mm
0

msp
Fredericton Office
1 506 451 0055
80 Bishop Drive
Fredericton NB E3C 1B2
Canada

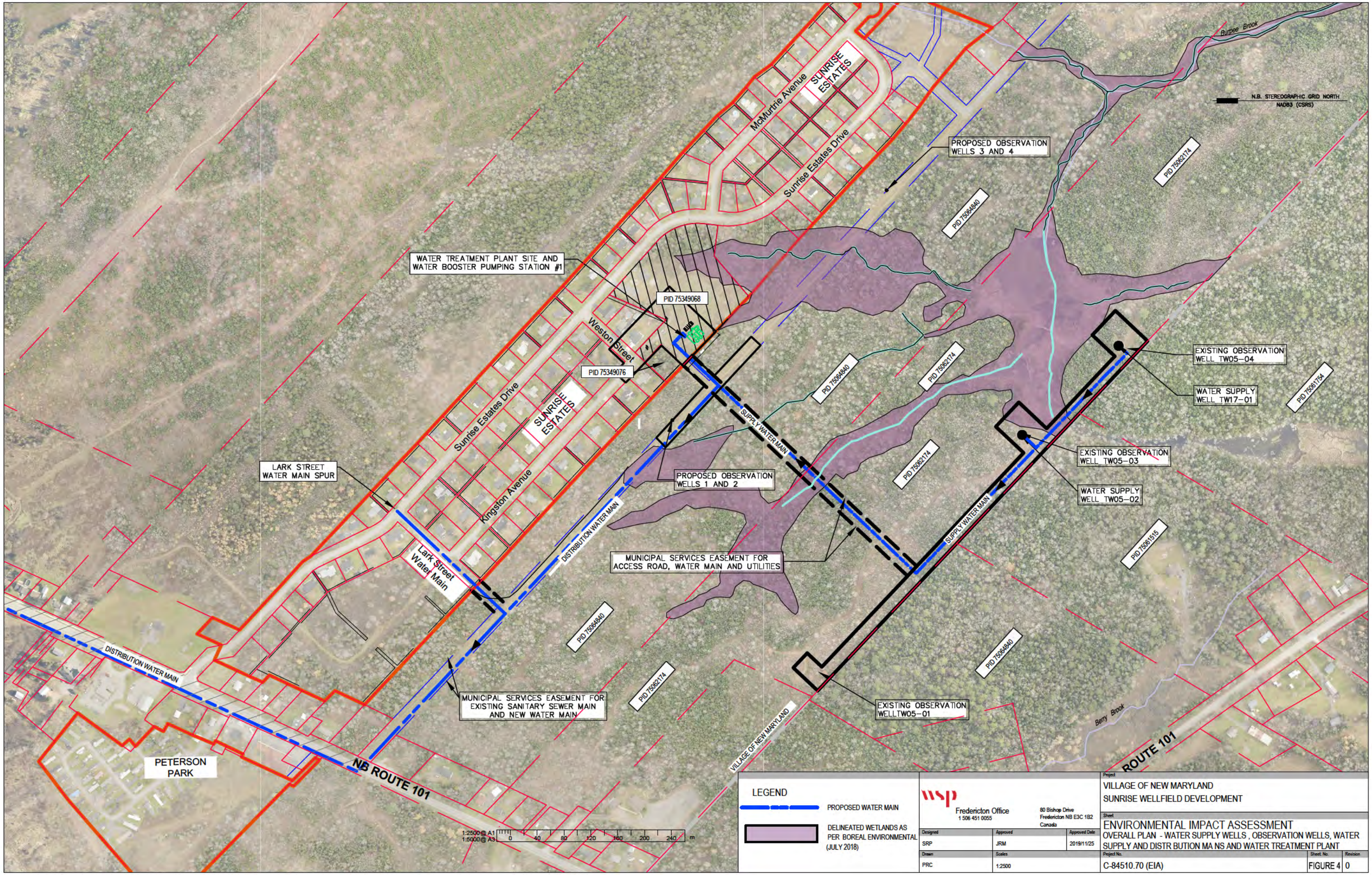
Designed	Approved	Approved Date
SRP	JRM	2019/11/25
Drawn	Scales	
PRC	1:5000	

Project
VILLAGE OF NEW MARYLAND
SUNRISE WELLFIELD DEVELOPMENT

Sheet
ENVIRONMENT IMPACT ASSESSMENT
SITE PLAN

Project No.	Sheet No.	Revision
C-84510.70 (EIA)	FIGURE 3	0

Original Sheet Size ANSI B [11"x17"] Plot Date 2020-06-15 at 2:31:06 PM Path G:\JOBFILES\800845_NewMaryland\C-84510.70 - Arsam Property - EIA For Wellfield Development (2018)\04_Project Working Files\CADD\C-84510.70 building footprint.dwg FIGURE 2 BECOMES 3



LEGEND

PROPOSED WATER MAIN

DELINEATED WETLANDS AS PER BOREAL ENVIRONMENTAL (JULY 2018)

msp
Fredericton Office
1 506 451 0055
80 Bishop Drive
Fredericton NB E3C 1B2
Canada

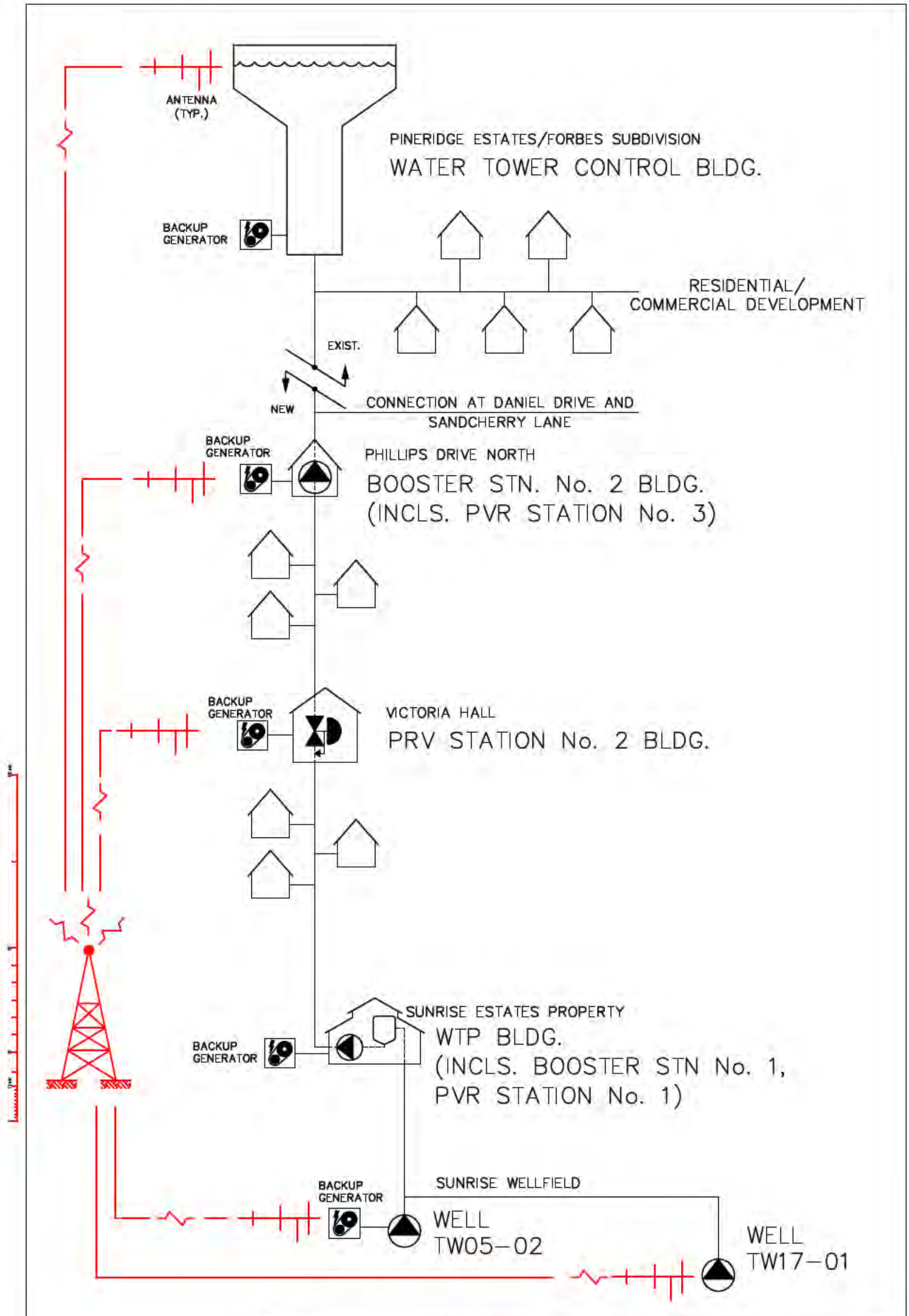
Designed	Approved	Approved Date
SRP	JRM	2019/11/25
Drawn	Scales	
PRC	1:2500	

Project
VILLAGE OF NEW MARYLAND
SUNRISE WELLFIELD DEVELOPMENT

Sheet
ENVIRONMENTAL IMPACT ASSESSMENT
OVERALL PLAN - WATER SUPPLY WELLS , OBSERVATION WELLS, WATER SUPPLY AND DISTR BUTION MA NS AND WATER TREATMENT PLANT

Project No.	Sheet. No.	Revision
C-84510.70 (EIA)	FIGURE 4	0

Original Sheet Size ANSI B [11"x17"] Plot Date 2020-06-15 at 1:31:11 PM Path G:\JOBFILES\800\845_NewMaryland\C-84510.70 - Arsam Property - EIA For Wellfield Development (2018)\04_Project Working Files\CADD\C-84510.70 Figure 4.DWG FIGURE 3



VILLAGE OF NEW MARYLAND
SUNRISE WELLFIELD DEVELOPMENT

FIGURE 5 - SIMPLIFIED SYSTEM SCHEMATIC

C-84510.70

3.3 PROJECT SCHEDULE

3.3.1 MILESTONE CONSTRUCTION ACTIVITIES AND ANTICIPATED CONSTRUCTION PERIODS

Construction details for the proposed undertaking are provided in this section.

The overall Project construction phase is expected to occur over a 3 to 4-year period, depending on availability and access to the Canada/New Brunswick Infrastructure Program Funding. Project information is provided in Table 4 and includes:

- A construction schedule based on an assumed Project completion date of October 30, 2023;
- Anticipated milestone construction activities and the associated calendar periods; and
- Anticipated scope of construction work to be completed in each of the four (4) consecutive years of construction activity.

The anticipated initial physical on-site construction-related activity is clearing of trees. Tree clearing for the access roadway to the well sites was undertaken in late-February 2020, prior to the April to August migratory bird breeding and nesting season. Tree clearing occurred over a two (2) consecutive week period to minimize potential interaction with migratory birds.

A typical construction work day will occur from 7 AM to 7 PM, Monday to Friday. The construction week may be extended to include Saturdays, if required by the Contractor to make-up for time lost due to inclement weather, and/or to assist in accelerating the construction schedule.

Table 4: Project Milestone Construction Activities and Calendar Periods

CONSTRUCTION PHASE AND YEAR	MILESTONE CONSTRUCTION ACTIVITY	CALENDAR PERIOD	DURATION (WEEKS)
Phase 1 - 2020	1. Tree clearing for an access roadway to the wellfield site: • Commencing at intersection of Kingston Avenue and Weston Street in Sunrise Estates to **Site No. 3B** (WTP and Building) then, • Proceeding southward across **Site No. 2** (Water Supply Piping/Well Site Access Roadway/Power Supply Water Supply – [redacted] Property), **Site No. 1E** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - [redacted] Property) and **Site No. 1C** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - Village of New Maryland Sunrise Wellfield Property) then, • Onward to **Site No. 1A** (Well TW05-02/Observation Well TW05-03), **Site No. 1B** (Well TW17-01/Observation TW05-04), and **Site No. 1D** (Observation Well TW05-01. • Additional tree clearing at **Site No. 4B** (Observation Wells 1 and 2) and **Site No. 4C** (Observation Wells 3 and 4). *Note: All sites noted above (Sites Nos. 1A, 1B, 1C, 1D, 1E, 2, 3B, 4B and 4C) will be cleared at the same time.*	February 17, 2020 to February 28, 2020	2
	2. Construct an access roadway: • Commencing at intersection of Kingston Avenue and Weston Street in Sunrise Estates to **Site No. 3B** (WTP and Building) then, • Proceeding southward across **Site No. 2** (Water Supply Piping/Well Site Access Roadway/Power Supply Water Supply – [redacted] Property), **Site No. 1E** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - [redacted] Property) and **Site No. 1C** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - Village of New Maryland Sunrise Wellfield Property) then, • Onward to **Site No. 1A** (Well TW05-02/Observation Well TW05-03), **Site No. 1B** (Well TW17-01/Observation TW05-04), and **Site No. 1D** (Observation Well TW05-01.	September 1, 2020 to November 13, 2020	11

CONSTRUCTION PHASE AND YEAR	MILESTONE CONSTRUCTION ACTIVITY	CALENDAR PERIOD	DURATION (WEEKS)
	3. Install a water distribution water main from the intersection of Kingston Avenue and Weston Street in Sunrise Estates to **Site No. 3B** (WTP and Building).	September 1, 2020 to September 18, 2020	3
	4. Install a water supply main from **Site No. 3B** (WTP and Building), across **Site No. 2** (Water Supply Piping/Well Site Access Roadway/Power Supply Water Supply – [redacted] Property), **Site No. 1E** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - [redacted] Property) and **Site No. 1C** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - Village of New Maryland Sunrise Wellfield Property).	September 21, 2020 to November 13, 2020	8
	5. Install 3-phase power: • From the intersection of Kingston Avenue and Weston Street to **Site No. 3B** (WTP and Building) then, • Across **Site No. 2** (Water Supply Piping/Well Site Access Roadway/Power Supply Water Supply – [redacted] Property), **Site No. 1E** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - [redacted] Property) and **Site No. 1C** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - Village of New Maryland Sunrise Wellfield Property) and, • Onward to **Site No. 1A** (Well TW05-02/Observation Well TW05-03) and **Site No. 1B** (Well TW17-01/Observation TW05-04).	November 2, 2020 to December 11, 2020	6
	6. Install/construct observation wells at **Site No. 4B** (Observation Wells 1 and 2) and **Site No. 4C** (Observation Wells 3 and 4).	November 9, 2020 to November 13, 2020	1
	7. Reconstruct/develop Well TW05-02 at **Site No. 1A** into a full production water supply well, in accordance with the Water Supply Source Assessment (WSSA) Guidelines.	November 16, 2020 to December 18, 2020	5
Phase 2 - 2021	8. Construct Control Building at **Site No. 1A** (Well TW05-02/Observation Well TW05-03) and Control Building at **Site No. 1B** (Well TW17-01/Observation TW05-04), including: site preparation and development; buildings; well pump controls; process piping and valving; electrical; SCADA equipment	May 1, 2021 to October 30, 2021	26

CONSTRUCTION PHASE AND YEAR	MILESTONE CONSTRUCTION ACTIVITY	CALENDAR PERIOD	DURATION (WEEKS)
	and communications tower; stand-by generator (at Well TW05-02 Site No. 1A only); instrumentation and controls; start-up/commissioning of well pumps and equipment; site security fencing.		
	9. Install well supply pumps at **Site No. 1A** (Well TW05-02/Observation Well TW05-03) and **Site No. 1B** (Well TW17-01/Observation TW05-04), including: well head piping; concrete chambers with lockable hatches; well data loggers; circulation piping; electrical; instrumentation and controls.	May 1, 2021 to October 30, 2021	26
Phase 3 - 2022	10. Construct Water Treatment Process (WTP), Water Booster Station No. 1 and PRV Station No. 1 at **Site No. 3B** (WTP and Building), including: site preparation and development; WTP Building; water treatment equipment; water booster pumps; water storage tanks and backwash equipment; chlorination equipment; process piping and controls; electrical; SCADA equipment and communications tower; stand-by generator; start-up/commissioning of treatment process; landscaping; asphalt paving.	May 1, 2022 to October 30, 2023	80
	11. Construct pressure reducing valve (PRV) station at **Site No. 8B** (PRV Station No. 2 – New Maryland Woman's Institute property), including: site preparation and development; building; chlorination equipment; process piping and valving; electrical; SCADA equipment and communications tower; instrumentation and controls; stand-by generator; start-up/commissioning; landscaping; site security fencing.	September 1, 2022 to September 30, 2023	56
	12. Construct water booster/PRV stations at **Site No. 9B** (Booster Station No. 2 + PRV Station No. 3 – NB Route 101 Storm Water Attenuation Pond property), including: site preparation and development; building; water booster pumps; process piping and valving; instrumentation and controls; electrical; SCADA equipment and communications tower; stand-by generator; start-up/commissioning; landscaping; asphalt paving.	September 1, 2022 to September 30, 2023	56
Phase 4 - 2023	13. Install water distribution main from **Site No. 3B** (WTP and Building) to **Site 4A** (Water Distribution Piping Site from WTP Building to NB Route 101). Work to include testing, flushing, disinfection and commissioning.	May 15, 2023 to June 15, 2023	4

CONSTRUCTION PHASE AND YEAR	MILESTONE CONSTRUCTION ACTIVITY	CALENDAR PERIOD	DURATION (WEEKS)
	14. Install water distribution main northward on **Site No. 6** (NB Route 101 Water Distribution Piping Site from Sunrise Estates Subdivision to Daniel Drive Water Connection). Work to include testing, flushing, disinfection, commissioning and reinstatement.	June 16, 2023 to September 15, 2023	15
	15. Install water distribution main on **Site No. 5** (Lark Street Water Distribution Piping Site located within the Sunrise Estates Road ROW), and on **Site No. 7** (Sandcherry Lane Water Distribution Piping Connection from NB Route 101). Work to include testing, flushing, disinfection, commissioning and reinstatement.	September 16, 2023 to October 15, 2023	5
	16. Install SCADA and communications equipment and a stand-by generator at **Site No. 10A** (Water Storage Reservoir Property) and **Site No. 10B** (Water Tower Control Room) on Sprucewood Drive.	June 16, 2023 to October 30, 2023	21

3.4 CONSTRUCTION ACTIVITIES

This section summarizes the anticipated construction activities and equipment required to undertake construction and installation of the major project components. The construction activities and equipment needed at each of the major construction sites are provided herein in Tables 5 to 10. The following is a general outline of the anticipated construction sequencing for this project.

The initial construction activity priority is to establish a well site access roadway connecting **Site No. 3B** (WTP and Building) with **Site No. 1A** (Well TW05-02/Observation Well TW05-03) and **Site No. 1B** (Well TW17-01/Observation TW05-04). This activity will also involve **Site No. 2** (Water Supply Piping/Well Site Access Roadway/Power Supply Water Supply – [redacted] Property), **Site No. 1E** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - [redacted] Property) and **Site No. 1C** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - Village of New Maryland Sunrise Wellfield Property). This routing description is also provided in Table 4, Phase 1, Item 1.

The area on which the well site access roadway is located has been cut-over in the past but is currently heavily treed and must be cleared and grubbed to facilitate construction of the proposed water infrastructure. **Site No. 4A** (Water Distribution Piping Site from WTP Building to NB Route 101) is located on an existing Local Government Services Easement, which is relatively clear and will only requires minor tree and brush cutting, trimming and removal.

In March 2020, the Proponent undertook tree clearing operations in advance of the migratory bird nesting period (i.e., prior to mid-April) along the access roadway route. Tree cutting, removal and disposal was undertaken by a tree clearing contractor using excavators with hydraulic mulching attachments to undertake most of the tree/vegetation clearing and removal activities. Cut trees and vegetation not considered as merchantable were chipped/mulched and utilized for erosion control ground cover.

In Spring 2020 a general civil contractor will proceed with several concurrent construction activities, including:

- Setting-up environmental protection measures;
- Grubbing/disposal off-site of grubbed materials and stockpiling of topsoil material for reuse in covering disturbed soils, stabilizing ditch slopes and erosion control;
- Establishing temporary drainage control facilities;
- Open trench excavations to facilitate installation of water main pipeline;
- Trench rock and site rock to be removed/excavated by mechanical methods, hydraulic rock hammers, breakers, etc. Note: Blasting will not be permitted;
- Installation and backfilling of water main pipeline, incl. pressure testing, flushing and disinfection;
- Excavation, shaping and contouring of access road to top of subgrade;
- Installation of permanent drainage facilities, such as ditches, culverts, swales and rip-rap;
- Installation, shaping and compaction of roadway granular materials; and
- Site restoration/stabilization (i.e., hydroseeding and other erosion control measures, as required).

Following completion of the well site access road, NB Power will install 3-phase power from the intersection of Kingston Avenue and Weston Street to **Site No. 3B** (WTP and Building) then, across **Site No. 2** (Water Supply Piping/Well Site Access Roadway/Power Supply Water Supply – [redacted] Property), **Site No. 1E** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - [redacted] Property) and **Site No. 1C** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - Village of New Maryland Sunrise Wellfield Property) and, onward to **Site No. 1A** (Well TW05-02/Observation Well TW05-03) and **Site No. 1B** (Well TW17-01/Observation TW05-04).

Water Supply Well TW05-02 at **Site No. 1A** will be reconstructed and developed into a full production well after completion of the access road and installation of power utilities. Installation of a total of four (4) new observation wells at **Site No. 4B** (Observation Wells 1 and 2) and **Site No. 4C** (Observation Wells 3 and 4). At each location one observation will be positioned at a higher (shallow) elevation to monitor domestic well elevations, and one observation well will be positioned at a lower (deeper) elevation to monitor municipal water supply elevations. **Site No. 4B** and **Site No. 4C** will be constructed prior to undertaking 72-hr pump testing for the redeveloped Well TW05-02.

During the construction phase of this project the Proponent will undertake to prepare Project Record Documentation, including Record (As-Built) Drawings. Project Record Documents will made be available to DELG upon request.

3.4.1 ACCESS ROAD, WATER SUPPLY MAIN, AND WELL CONSTRUCTION / REDEVEOPLMENT

Table 5 provides applicable information for construction of the access roadway, installation of the supply water main, installation of observation wells, and development of Well TW05-02 to full production.

Table 5: Construction Equipment and Procedures – Access Road, Water Supply Main and Well Construction/Redevelopment

CONSTRUCTION ACTIVITY	RELATED CONSTRUCTION EQUIPMENT
Tree Removal/Clearing Operations: Cut/remove, or mulch in place trees: • Commencing at intersection of Kingston Avenue and Weston Street in Sunrise Estates to **Site No. 3B** (WTP and Building) then, • Proceeding southward across **Site No. 2** (Water Supply Piping/Well Site Access Roadway/Power Supply Water Supply – [redacted] Property), **Site No. 1E** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - [redacted] Property) and **Site No. 1C** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - Village of New Maryland Sunrise Wellfield Property) then, • Onward to **Site No. 1A** (Well TW05-02/Observation Well TW05-03), **Site No. 1B** (Well TW17-01/Observation TW05-04), and **Site No. 1D** (Observation Well TW05-01. • Additional tree clearing at **Site No. 4B** (Observation Wells 1 and 2) and **Site No. 4C** (Observation Wells 3 and 4).	Transporting equip. (floats); logging trucks; backhoes equipped with hydraulic mulching attachments; chain saws; skidders; front end loaders for snow removal; construction pick-up trucks.
Project Mobilization: Construction equipment and labour to site; set-up construction/traffic control signage; set-up equip. lay down area; initial construction layout.	Transporting equip. (floats); materials delivery trucks; backhoes; dozers; construction pick-up trucks; dump trucks; construction pick-up trucks.
Grubbing: Set-up environmental protection measures; where required grub areas previously cleared of trees; remove grubbed materials from site and dispose of material in an approved Contractor secured site.	Pick-up trucks; backhoes; tractors; dump trucks.

Excavation and Rough Site Grading: Remove and stockpile topsoil; complete earthworks to rough grade site and make it accessible; construct temporary drainage control facilities.	Excavators/backhoes; dump trucks; compaction equipment; tractors; construction pick-up trucks; front-end loader.
Construction Activity	Related Construction Equipment
Well Disinfection: Well(s) must be disinfected, sampled, and tested according to the latest version of AWWA C654 Disinfection of Wells. Further, before putting a new well in service, approval must be obtained by the DELG Authorizations Branch Director (this is a requirement of the current Approval to Operate).	Chemical dosing pumps; sodium hypochlorite; dechlorination equipment and chemicals.
Water Supply Main Installation – Open Trench Method: Excavate trench for installation of water main and related appurtenances; import material for bedding pipe; keep trenches dry; excavate rock as required using hydraulic breakers; bed pipe and backfill trenches in lifts to specified compaction limits.	Excavators/backhoes; tractors; dump trucks; front end loaders; construction pick-up trucks; compaction equipment; hydroseed spray equipment.
Water Main Pressure Testing, Disinfection, Sampling and Acceptance: Pressure test/flush/disinfect/sample water mains to NB Department of Health requirements in accordance with latest version of AWWA C651 Standard for Disinfecting Water Mains.	Water hauling tankers/trucks; pumping, flushing and disinfection equipment; construction pick-up trucks.
Roadway Construction: Excavate, grade, shape and contour access road to top of subgrade; install permanent ditches, culverts, swales and rip rap erosion protection; import granular subbase and base course materials, shape and compact granulars in place; fine grade roadways and ditches and complete site restoration/stabilization; install final erosion control measures and hydroseed all exposed non- granular materials.	Excavators/backhoes; tractors; grader; dump trucks; compaction equipment; construction pick-up trucks; front-end loader.
Installation of 3-Phase Power: NB Power will be contracted to install 3-phase power: • From the intersection of Kingston Avenue and Weston Street to **Site No. 3B** (WTP and Building) then, • Across **Site No. 2** (Water Supply Piping/Well Site Access Roadway/Power Supply Water Supply – [redacted] Property), **Site No. 1E** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - [redacted] Property) and **Site No. 1C** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - Village of New Maryland Sunrise Wellfield Property) and, • Onward to **Site No. 1A** (Well TW05-02/Observation Well TW05-03) and **Site No. 1B** (Well TW17-01/Observation TW05-04). Power lines to be installed adjacent to the new access road.	Specialized utility equipment, excavator/backhoe; tractor; construction pick-up trucks.

3.4.2 WATER TREATMENT PROCESS AT SITE 3B

Table 6 summarizes the construction equipment and procedures associated with the WTP and Building at **Site 3B**.

Table 6: Construction Equipment and Procedures – Water Treatment Process at Site 3B

CONSTRUCTION ACTIVITY	RELATED CONSTRUCTION EQUIPMENT
Project Mobilization: Construction equipment and labour to site; set-up equip. lay down area; initial construction layout.	Transporting equip. (floats); materials delivery trucks; excavators/backhoes; tractors; construction pick-up trucks.
Grubbing: Set-up environmental protection measures; where required grub areas previously cleared of trees; remove grubbed materials from site and dispose of material in an approved Contractor secured site.	Pick-up trucks; backhoes; tractors; dump trucks.
Excavation, Structural Fill Placement and Rough Site Grading: Remove and stockpile topsoil; complete earthworks to rough grade site; excavate for foundations and over-excavate to remove soft soil materials under building footprint; construct temporary drainage control facilities; place and compact structural granular material to underside of footings.	Excavator/backhoe; dump-trucks; pumps; compaction equipment; construction pick-up trucks; front-end loader.
Building – Foundation and Floor Slabs: Erection of formwork; installation of reinforcing steel; placing concrete; troweling, protection and curing of concrete.	Materials delivery trucks; concrete trucks; concrete pumper; boom-truck; construction pick-up trucks; temporary site power generator.
Building – Superstructure: Assembly of building panels and structural steel; erection of roof trusses and installation of metal roof; construction of cavity walls (concrete block inside with split block and exterior metal panels).	Materials delivery trucks; boom-truck; cranes; construction pick-up trucks; mortar mixers; movable platform lifts.
Building – Interior: Construct interior walls and partitions with moisture resistant materials; install exterior overhead and metal entry/exit doors, interior doors; windows; construct offices and storage space.	Materials delivery trucks; boom-truck; cranes; construction pick-up trucks; movable platform lifts.
Building – Electrical, Mechanical and SCADA: Installation of: electrical power supply entrance equipment; back-up power supply; power distribution and control wiring; SCADA equipment with outside communication tower; lighting, heating, ventilation equipment; below slab mechanical piping; water supply plumbing, incl. water heater; lighting; security system.	Construction pick-up trucks; materials delivery trucks; cranes, movable platform lifts.
Building – Misc. Components: Installation of: washroom; lab counter; storage cabinets and shelves; lab sink; office space.	Construction pick-up trucks; materials delivery trucks.
Building – WTP Equipment and Water Booster Pumps: Installation of: skid mounted water treatment equipment and controls; filter backwash/equalization tanks and equipment and controls, skid mounted duplex water booster pumps and controls; chemical addition system/controls; chemical storage tank; emergency power	Construction pick-up trucks; material delivery trucks; boom-truck; movable platform lifts.

CONSTRUCTION ACTIVITY	RELATED CONSTRUCTION EQUIPMENT
generator/controls. Install chlorine mixing, injection and monitoring equipment. Install pressure relief valve and associated components.	
Disinfection of Water Treatment Plant: The Water Treatment Plant (WTP) will be disinfected, sampled and tested according to the latest version of AWWA C653 Disinfection of Water Treatment Plants prior to being put into service.	Chemical dosing pumps; sodium hypochlorite; dechlorination equipment and chemicals.
Landscaping: Grade site to subgrade, construct parking areas and driveway with granular subbase and base materials, place concrete curb and gutter and walkways; pave parking areas and driveway; install plantings; place topsoil and hydroseed; install security fencing and gates.	Materials delivery trucks; tractor; dump trucks; excavator/backhoe; concrete mixing trucks, curbing machine; compaction equipment; asphalt spreader and rolling/compaction equipment; front end loader; hydroseeding spray equipment; grader; lawn rollers; construction pick-up trucks.
Commissioning, Start-up: Fill process train (water treatment equipment) with water from wells. Undertake start-up of individual processes and process equipment components; commence full treatment process operation. Undertake start-up of water booster pumps. Undertake start-up of SCADA components and system, test communications between sites and process equipment components; commence fully automated process control. Verify back-up power supply equipment is operating, fully functional and positioned to automatically assume power supply functions in the event of a power grid failure.	Construction pick-up trucks.
Operator Training, System Operating Transition Period: On-site hands-on training of operations staff with individual equipment components, SCADA and the overall operation of the water supply wells.	Construction pick-up trucks.
Site Clean-up: Removal of all residual construction debris and remnant materials.	Construction pick-up trucks; materials delivery trucks; dump trucks; front-end loader.

3.4.3 DEVELOPMENT OF WELL TW05-02 AND WELL TW17-01 SITES

Table 7 summarizes the construction equipment and procedures associated with development of **Site No. 1A** (Well TW05-02/Observation Well TW05-03) and **Site No. 1B** (Well TW17-01/Observation TW05-04).

Table 7: Construction Equipment and Procedures – Development of Well TW05-02 and Well TW17-01 Sites

CONSTRUCTION ACTIVITY	RELATED CONSTRUCTION EQUIPMENT
Project Mobilization: Construction equipment and labour to site; set-up equip. lay down area; initial construction layout at **Site No. 1A** (Well TW05-02/Observation Well TW05-03) and **Site No. 1B** (Well TW17-01/Observation TW05-04).	Transporting equipment (floats); materials delivery trucks; dump trucks; excavators; backhoes; tractors; construction pick-up trucks.
Grubbing: Set-up environmental protection measures. Where required, grub areas previously cleared of trees; remove grubbed materials from site and dispose of material in an approved Contractor secured site.	Pick-up trucks; backhoes; tractors; dump trucks.
Excavation, Structural Fill Placement and Rough Site Grading: Remove and stockpile topsoil; complete earthworks to rough grade sites; excavate for foundations and over-excavate to remove soft soil materials under building footprint; construct temporary drainage control facilities; place and compact structural granular material to underside of footings.	Excavator/backhoe; dump-trucks; pumps; compaction equipment; construction pick-up trucks; front-end loader.
Building – Foundation and Floor Slabs: Erection of formwork; installation of reinforcing steel; placing concrete; troweling, protection and curing of concrete.	Materials delivery trucks; concrete trucks; concrete pumper; boom-truck; construction pick-up trucks; temporary site power generator.
Building – Superstructure: Assembly and construction of cavity walls (concrete block inside with split block exterior); erection of roof trusses and installation of metal roof.	Materials delivery trucks; boom-truck; cranes; construction pick-up trucks; mortar mixers; movable platform lifts.
Building – Interior: Construct interior walls and partitions with moisture resistant materials; install metal entry/exit door.	Materials delivery trucks; boom-truck; cranes; construction pick-up trucks; movable platform lifts.
Building – Electrical, Mechanical and SCADA: Installation of: electrical power supply entrance equipment; back-up power supply (at Site No. 1A only); power distribution and control wiring; SCADA equipment with outside communication tower; lighting, heating, ventilation equip.; below slab mechanical piping; lighting; security system.	Construction pick-up trucks; materials delivery trucks; cranes, movable platform lifts.
Building and Well Development: In both wells install well pumps, discharge piping, pit-less well adaptor, power cable, level controls and recirculation tubing; install protective precast concrete chambers with lockable cover hatches over each well; extend discharge piping, power cable, level controls and recirculation tubing back to well house building; install flowmeter, valving and piping to connect pump discharge to water supply main; install pump controls; emergency power generator/controls	Construction pick-up trucks; material delivery trucks; boom-truck; excavator/backhoe; loader; tractor; compaction equipment.

CONSTRUCTION ACTIVITY	RELATED CONSTRUCTION EQUIPMENT
(at Site No. 1A only). For well TW05-02, it is a requirement that as part of the well reconstruction that it must have casing grouted.	
Well Disinfection: Well(s) must be disinfected, sampled, and tested according to the latest version of AWWA C654 Disinfection of Wells. Further, before putting a new well in service, approval must be obtained by the DELG Authorizations Branch Director (this is a requirement of the current Approval to Operate).	Chemical dosing pumps; sodium hypochlorite; dechlorination equipment and chemicals.
Landscaping: Grade sites to subgrade, construct parking areas and driveway with granular subbase and base materials; install security fencing and gates; place topsoil and hydroseed all areas impacted by the work.	Materials delivery trucks; tractor; dump trucks; excavator/backhoe; compaction equipment; front end loader; hydro-seeding spray equipment; grader; lawn rollers; construction pick-up trucks.
Commissioning, Start-up: Undertake start-up of individual equipment components; commence full operation of facilities. Undertake start-up of SCADA components and system, test communications between sites and equipment components; commence fully automated process control. Verify back-up power supply equipment is operating, fully functional and positioned to automatically assume power supply functions in the event of a power grid failure.	Construction pick-up trucks.
Operator Training, System Operating Transition Period: On-site hands-on training of operations staff with individual equipment components, SCADA and the overall operation of the water supply wells.	Construction pick-up trucks.
Site Clean-up: Removal of all residual construction debris and remnant materials.	Construction pick-up trucks; front-end loader; dump trucks.

3.4.4 DEVELOPMENT OF SITE NO. 8B (PRV STATION NO. 2) AND SITE NO. 9B (BOOSTER STATION NO. 1 + PRV STATION NO. 3)

Table 8 summarizes the construction equipment and procedures associated with development of **Site No. 8B** (PRV Station No. 2 on New Maryland Woman's Institute property) and **Site No. 9B** (Booster Station No. 1 + PRV Station No. 3 on NB Route Storm Water Attenuation Pond property).

Table 8: Construction Equipment and Procedures – Development of Site No. 8B (PRV Station No. 2) and Site No. 9B (Booster Station No. 1 + PRV Station No. 3)

CONSTRUCTION ACTIVITY	RELATED CONSTRUCTION EQUIPMENT
Project Mobilization: Construction equipment and labour to site; set-up equip. lay down area; initial construction layout.	Transporting equip. (floats); materials delivery trucks; excavators/backhoes; tractors; construction pick-up trucks.
Clearing & Grubbing: Set-up environmental protection measures; where required clear and grub areas; remove felled trees and grubbed materials from site and dispose of material in an approved Contractor secured site.	Pick-up trucks; chainsaws; backhoes; dump trucks.
Excavation, Structural Fill Placement and Rough Site Grading: Remove and stockpile topsoil; complete earthworks to rough grade sites; excavate for foundations and over-excavate to remove soft soil materials under building footprint; construct temporary drainage control facilities; place and compact structural granular material to underside of footings.	Excavator/backhoe; dump-trucks; pumps; compaction equipment; construction pick-up trucks; front-end loader.
Building – Foundation and Floor Slabs: Erection of formwork; installation of reinforcing steel; placing concrete; troweling, protection and curing of concrete.	Materials delivery trucks; concrete trucks; concrete pumper; boom-truck; construction pick-up trucks; temporary site power generator.
Building – Superstructure: Assembly and construction of cavity walls (concrete block inside with split block exterior); erection of roof trusses and installation of metal roof.	Materials delivery trucks; boom-truck; cranes; construction pick-up trucks; mortar mixers; movable platform lifts.
Building – Interior: Construct interior walls and partitions with moisture resistant materials; install metal entry/exit door.	Materials delivery trucks; boom-truck; cranes; construction pick-up trucks; movable platform lifts.
Building – Electrical, Mechanical and SCADA: Installation of: electrical power supply entrance equipment; back-up power supply (at Site No. 9B only); power distribution and control wiring; SCADA equipment with outside communication tower; lighting, heating, ventilation equip.; below slab mechanical piping; lighting; security system.	Construction pick-up trucks; materials delivery trucks; cranes, movable platform lifts.
System Components: At Site No. 8B: Install pressure relief valve and associated components and chlorine mixing, injection and monitoring equipment. **At Site No. 9B:** Install skid mounted quadplex water booster pumps and controls, flowmeter, pressure relief valve and associated components and chlorine mixing, injection and monitoring equipment; emergency power generator/controls.	Construction pick-up trucks; material delivery trucks; boom-truck; movable platform lifts.

CONSTRUCTION ACTIVITY	RELATED CONSTRUCTION EQUIPMENT
Landscaping: Grade sites to subgrade, construct parking areas and driveway with granular subbase and base materials; install security fencing and gates; place topsoil and hydroseed all areas impacted by the work.	Materials delivery trucks; tractor; dump trucks; excavator/backhoe; compaction equipment; front end loader; hydroseeding spray equipment; grader; lawn rollers; construction pick-up trucks.
Commissioning, Start-up: Undertake start-up of individual equipment components; commence full operation of facilities. Undertake start-up of SCADA components and system, test communications between sites and equipment components; commence fully automated process control. Verify back-up power supply equipment is operating, fully functional and positioned to automatically assume power supply functions in the event of a power grid failure.	Construction pick-up trucks.
Operator Training, System Operating Transition Period: On-site hands-on training of operations staff with individual equipment components, SCADA and the overall operation of the facilities.	Construction pick-up trucks.
Site Clean-up: Removal of all residual construction debris and remnant materials.	Construction pick-up trucks; front-end loader; dump trucks; boom-truck.

3.4.5 EQUIPMENT INSTALLATION IN EXISTING WATER TOWER CONTROL ROOM AT SITE 10B

Table 9 summarizes the construction equipment and procedures associated with equipment installation at Site 10B (Water Tower Control Room).

Table 9: Construction Equipment and Procedures – Equipment Installation in Existing Water Tower Control Room at Site 10B

CONSTRUCTION ACTIVITY	RELATED CONSTRUCTION EQUIPMENT
System Components: Install emergency power generator/controls, modify electrical power entrance equipment and power distribution and control wiring. Install SCADA equipment and add a new antenna to the top of the water tower.	Construction pick-up trucks; material delivery trucks; boom-truck.
Commissioning, Start-up: Undertake start-up of SCADA components and system, test communications between sites and equipment components; commence fully automated operations control. Verify back-up power supply equipment is operating, fully functional and positioned to automatically assume power supply functions in the event of a power grid failure.	Construction pick-up trucks.

Operator Training, System Operating Transition Period: On-site hands-on training of operations staff with individual equipment components, SCADA and the overall operation of the facilities.	Construction pick-up trucks.
Site Clean-up: Removal of all residual construction debris and remnant materials.	Construction pick-up trucks; boom-truck.

3.4.6 INSTALLATION OF WATER DISTRIBUTION MAINS ON SITE NO. 4A, SITE NO. 5, SITE NO. 6 AND SITE NO. 7

Table 10 below summarizes the construction equipment and procedures associated with installation of water distribution mains on Site No. 4A, Site No. 5, Site No. 6 and Site No. 7.

Table 10: Construction Equipment and Procedures – Installation of Water Distribution Mains on Site No. 4A, Site No. 5, Site No. 6 and Site No. 7

CONSTRUCTION ACTIVITY	RELATED CONSTRUCTION EQUIPMENT
Scope of Water Distribution Main Installation: 1. Install water distribution main from **Site No. 3B** (WTP and Building) to **Site 4A** (Water Distribution Piping Site from WTP Building to NB Route 101). 2. Install water distribution main northward on **Site No. 6** (NB Route 101 Water Distribution Piping Site from Sunrise Estates Subdivision to Daniel Drive Water Connection). 3. Install water distribution main on **Site No. 5** (Lark Street Water Distribution Piping Site located within the Sunrise Estates Road ROW), and on **Site No. 7** (Sandcherry Lane Water Distribution Piping Connection from NB Route 101).	Transporting equip. (floats); logging trucks; backhoes equipped with hydraulic mulching attachments; chain saws; skidders; front end loaders for snow removal; construction pick-up trucks.
Project Mobilization: Construction equipment and labour to site; set-up construction/traffic control signage; set-up equip. lay down area; initial construction layout.	Transporting equip. (floats); materials delivery trucks; backhoes; dozers; construction pick-up trucks; dump trucks.
Clearing and Grubbing: For work Site No. 5 and Site No. 7 only: set-up environmental protection measures; where required clear and grub areas; remove felled trees and grubbed materials from site and dispose of material in an approved Contractor secured site.	Logging trucks; backhoes equipped with hydraulic mulching attachments; chain saws; skidders; excavator/backhoe; dump trucks, tractor; construction pick-up trucks.
Excavation and Rough Site Grading: For Site No. 5 and Site No. 7 only: remove/stockpile topsoil; rough-grade earthworks and make accessible; construct temporary drainage control facilities.	Excavators/backhoes; dump trucks; compaction equip.; tractors; construction pick-up trucks; front-end loader.
Water Supply Main Installation – Open Trench Method: Set-up environmental protection measures to control run-off and ground water from trenches; excavate trench for installation of water main and related appurtenances; import material for bedding pipe; keep trenches dry; excavate rock, as required, using hydraulic breakers;	Excavators/backhoes; tractors; dump trucks; front end loaders; construction pick-up trucks; boom-truck; compaction equipment.

CONSTRUCTION ACTIVITY	RELATED CONSTRUCTION EQUIPMENT
bed pipe and backfill trenches in lifts to specified compaction limits.	
Water Main Testing and Acceptance: Pressure test, flush and disinfect water main to NB Department of Health requirements. The new watermains be disinfected, sampled and tested according to the latest version of AWWA C651 Standard for Disinfecting Water Mains prior to be put into service.	Water hauling tankers/trucks; pumping, flushing and disinfection equipment; construction pick-up trucks.
Roadway Reinstatement: Excavate, grade, shape and contour roadways to top of subgrade; install permanent roadway ditches, culverts, swales and rip rap erosion protection; import granular subbase and base course materials, shape/compact granulars in place; fine grade roadways, ditches; place concrete curb/gutter, sidewalk, walkways; pave roadways with base and surface asphalt, parking areas and driveways; complete site restoration and stabilization; install final erosion control measures and hydroseed all exposed non-granular materials; reinstate pavement markings and remove construction/traffic control signage.	Excavators/backhoes; tractors; grader; dump trucks; compaction equipment; construction pick-up trucks; boom-truck; concrete mixing trucks, curbing machine; compaction equipment; asphalt spreader and rolling/compaction equipment; front end loader; hydroseeding spray equipment; grader; lawn rollers.

3.5 ENVIRONMENTAL MANAGEMENT AND PROTECTION PLAN

Prior to undertaking any project construction activities, the Proponent will prepare an Environmental Management and Protection Plan (EMPP). The EMPP will identify, for the General Contractor(s) and the Proponent's operation and maintenance (O&M) personnel, the contractual requirement and lawful obligation to abide by specific preventative construction and O&M practices and protocols wherever the potential risk for deposit of deleterious substances exist. These measures will be intended to ensure that appropriate environmental protection and preparedness are recognized and followed in all manners of construction, commissioning and operation of the proposed facilities.

The EMPP shall address those construction, commissioning and operation activities having potential for deleterious substance deposition into fish habitat waterways, including but not be limited to:

- Exposure of acid generating bedrock;
- Spilling and/or leaking of fuels or chemicals;
- Exposure of soils susceptible to erosion;
- Chlorination of the water supply wells and piping systems;
- Flushing of water supply and distribution piping systems; and
- Management of filter backwash water.

The EMPP and the Project's contractual technical specifications will also address handling, storage and general use of hazardous materials and waste products during construction, commissioning and operation of the proposed facilities. Both the EMPP and technical specifications will require that the General Contractor and Proponent O&M personnel develop and document contingency plans for, but not limited to, waste management, hazardous spill

response and emergency response. These plans will include appropriate on-site response procedures and emergency reporting contact information.

3.6 OPERATION AND MAINTENANCE

Operation and maintenance details of the various project infrastructure components are summarized for each project site in the following sub-sections.

3.6.1 WATER SOURCES, YIELDS AND MONITORING

- Water supply sources are Well TW05-02 (Site No. 1A) and Well TW17-01 (Site No. 1B).
- Anticipated average daily water demand, based on the current connected population, is 300 m^3/d (80 000 USgpd).
- Sustainable safe-yield capacity for Well TW05-02 (Site No. 1A) = 250 USgpm (16 L/s). Hydrogeological testing undertaken to date by BGC Engineering Inc. has accounted for the respective location of these wells to one another in determining their anticipated safe-yield capacities. Safe-yield capacity is to be confirmed following further well reconstruction and pump testing (anticipated in 2020). It is proposed that these wells will not be operated simultaneously but will be typically operated on an alternating basis.
- Reconstruction of Well TW05-02 (Site No. 1A) will be undertaken in accordance with the Province of New Brunswick Water Supply Source Assessment (WSSA) Guidelines.
- Sustainable safe-yield capacity for Well TW17-01 (Site No. 1B) = 250 USgpm (16 L/s).
- Level logging devices will be installed in each water supply well to continuously monitor well levels. The SCADA system will provide for well level drawdown and well level recovery data logging to enable assessment of critical well performance characteristics. Well drawdown and recovery rate data will be analyzed annually to assess overall well performance.
- Well level logging will enable provisions for automated well pump shutdown at a pre-determined (and adjustable) low liquid level. The level at which low-level pump shutdown will be initiated will be determined in consultation with BGC Engineering Inc.
- Each water supply well sites will be equipped with a magnetic flow meter. Water supply flow data will be continuously monitored and stored within the SCADA computer system database. Flow data will include average, maximum and minimum flow rates and total daily well production volumes pumped (extracted) from each well.

3.6.2 OPERATION STAFFING REQUIREMENTS

- Typically, weekday operations of the complete water supply system will require approximately 4 man-hours per day. This time can be shared among 1 to 3 operations staff.
- Typically, weekend operations will require 1 to 2 hours per day for general site visits/inspections.
- Certain bi-annual and annual maintenance routines will require additional man-hours, shared among 1 to 3 operations staff.

3.6.3 SYSTEM LIFE-SPAN

- The anticipated life-span of the buildings housing the water supply well equipment, the WTP and the PRV valve and booster stations is 75-years.

- The activities of raw water delivery to the treatment process, raw water treatment/filter backwashing, water distribution, water pressure boosting, and water pressure reduction will endure for the entire life-span of the water supply system.

3.6.4 RAW, FINISHED PRODUCTS AND WASTE BY-PRODUCTS

- Raw, untreated water represents the raw product. Raw water is stored as groundwater until extracted from Site No. 1A (Well TW05-02/Observation Well TW05-03) and Site No. 1B (Well TW17-01/Observation Well TW05-04) for treatment purposes.
- Minor amounts of process wash-down water generated within the Control Building structures at Site No. 1A (Well TW05-02/Observation Well TW05-03) and Site No. 1B (Well TW17-01/Observation Well TW05-04) will be discharged via a floor drain into a connected on-site infiltrator sub-surface disposal pit/field. To facilitate on-site sub-surface disposal, the Proponent will seek to obtain the required permit for waste by-product diversion into a disposal field. The disposal field will be designed in accordance with On-site Sewage Disposal System Regulation and New Brunswick Technical Guidelines for On-site Sewage Disposal Systems. Construction of the sub-surface disposal pit/field will require a permit from the New Brunswick Department of Justice and Public Safety.
- Chlorinated water will be discharged from the annual super-chlorination procedures conducted on Well Nos. TW05-02 (Site No. 1A) and TW17-01 (Site No. 1B). The chlorinated waste flow will be dechlorinated prior to either surface discharge or to sub-surface disposal into the on-site infiltrator pit/field (as provided for in the above item for Control Building process wash-down water). To facilitate on-site sub-surface disposal, the Proponent will seek to obtain the required permit for waste by-product diversion into a disposal field. The disposal field will be designed in accordance with On-site Sewage Disposal System Regulation and New Brunswick Technical Guidelines for On-site Sewage Disposal Systems. Construction of the sub-surface disposal pit/field will require a permit from the New Brunswick Department of Justice and Public Safety.
- Treated water (i.e., removal of manganese, hydrogen sulphide and chlorination) represents the finished product. Treated water will be distributed for consumption within the distribution system or will be temporarily stored at Site No. 10A (Water Storage Reservoir).
- Spend backwash water and backwash solids represent treatment process waste by-products. A portion of spend backwash water will be recycled as treated water (i.e., finished product). Spend backwash water will be temporarily placed in storage vessels located at Site No. 3B (WTP and Building/Booster Station No. 1/PRV Station No. 1). Spent backwash water will be stored until recycled into treated water or discharged to the nearby sanitary sewer. Backwash solids will be temporarily placed in the same storage vessels until discharged to the nearby sanitary sewer. *Note: Discharged backwash water and backwash solids are eventually routed to the Village's Main Wastewater Treatment Facility.*
- Domestic wastewater generated at Site No. 3B (WTP and Building/Booster Station No. 1/PRV Station No. 1) from washroom, shower and lab sink sources will be discharged through a gravity lateral into a nearby sanitary sewer.
- NaOCl (sodium hypo-chlorite) will be stored and used for disinfection at Site No. 3B (WTP and Building/Booster Station No. 1/PRV Station No. 1) and at Site No. 8B (PRV Station No. 2). Spill containment will be provided to contain any potential chemical spills.
- Minor amounts of process wash-down water generated within the control Building structures at Site No. 8B (PRV Station No. 2) and Site No. 9B (Booster Station No. 2/PRV Station No. 3) will be discharged via a floor drain and into a gravity lateral connecting to the sanitary sewer.

3.6.5 ENERGY REQUIREMENTS

Each of the following sites will require a 3-phase, 600 V power supply. In each case the power supply will be delivered to the site via an NB Power utility (hydro) pole transmission line.

- **Site No. 1A** (Well TW05-02/Observation Well TW05-03) – NB Power supply routed from Kingston Avenue and Weston Street across **Site No. 2** (Water Supply Piping/Well Site Access Roadway/Power Supply Water Supply – [redacted] Property), **Site No. 1E** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - [redacted] Property) and **Site No. 1C** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - Village of New Maryland Sunrise Wellfield Property), then onward to **Site No. 1A** (Well TW05-02/Observation Well TW05-03) and **Site No. 1B** (Well TW17-01/Observation TW05-04).
- **Site No. 1B** (Well TW17-01/Observation Well TW05-04) – NB Power supply routed as for Site No. 1A above.
- **Site No. 3B** (WTP and Building/Booster Station No. 1/PRV Station No. 1) – NB Power supply routed from Kingston Avenue and Weston Street to **Site No. 3B**.
- **Site No. 8B** (PRV Station No. 2) – NB Power supply route direct from NB Route 101.
- **Site No. 9B** (Booster Station No. 2/PRV Station No. 3) – NB Power supply route direct from NB Route 101.
- **Site No. 10A** - Water Storage Reservoir Property – Power supply currently exists at this site.

3.6.6 SERVICE VEHICLE TRAFFIC

The anticipated typical service vehicle traffic at each of the project sites are as follows.

- **Water Supply Wells** - 5 to 7 visits/week to:
    - **Site No. 1A** (Well TW05-02 and Control Building)
    - **Site No. 1B** (Well TW17-01 and Control Building)
- **Observation Wells** – 1 visit/month to:
    - **Site No. 1A** (Observation Well TW05-03)
    - **Site No. 1B** (Observation Well TW05-04)
    - **Site No. 1D** (Observation Well TW05-01)
    - **Site No. 4B** – (Observation Well Nos. 1, 2)
    - **Site No. 4C** – (Observation Well Nos. 3, 4)
- **Water Supply Piping** - 5 to 7 visits/week to:
    - **Site No. 1C -** Water Supply Piping (on Village of New Maryland Sunrise Wellfield Property)
    - **Site No. 1E -** Water Supply Piping (on [redacted] Property)
    - **Site No. 2** – Water Supply Piping (on [redacted] Property)
- **Water Treatment** - multiple visits/weekday; 1 visit/weekend day:
    - **Site No. 3A -** Village of New Maryland Sunrise Estates Property
    - **Site No. 3B** - WTP and Building/Booster Station No. 1/PRV Station No. 1
- **Water Distribution:**
    - **Site No. 4A** - Water Distribution Piping (from WTP Building to NB Route 101) – 1 visit/month

- **Site No. 6** – NB Route 101 Water Distribution Piping (from Sunrise Estates Subdivision to Daniel Drive) – 1 visit/month
- **Site No. 7** - Sandcherry Lane Water Distribution System (connection from NB Route 101) – 1 visit/month.
- **Site No. 8B** - PRV Station No. 2 - 5 to 7 visits/week
- **Site No. 9B** - Booster Station No. 2/PRV Station No. 3 - 5 to 7 visits/week
- **Site No. 10A** - Water Storage Reservoir Property - 5 to 7 visits/week
- **Site No. 10B** - Water Tower Control Room - 5 to 7 visits/week

3.6.7 KEY FEATURES OF OPERATION

The primary process components requiring operating and maintenance attention consist of the following:

- **Water Supply Wells:**
  - Operable equipment at **Site No. 1A (**Well TW05-02/Observation Well TW05-03):
    a) Well TW05-02 well pump - design capacity = 250 USgpm (16 L/s).
    b) Well pump control panel, including local Programmable Logic Controller (PLC).
    c) Emergency power generator (to operate pump, controls and Building light/heat/ventilation) - capacity to be determined. Tasks: Exercise emergency power generator – monthly.
    d) Process piping.
    e) Process valving (isolation, check, throttling). Tasks: Exercise valve operators – yearly.
    f) Process instrumentation: magnetic flow meter, pressure gauges, level loggers, water leak detector. Tasks: Calibration - every 6-months.
    g) SCADA communication and data logging equipment.

  - Operable equipment at **Site No. 1B (**Well TW17-01/Observation Well TW05-04):
    a) Well TW17-01 well pump - design capacity = 250 USgpm (16 L/s).
    b) Well pump control panel, including local PLC.
    c) Process piping.
    d) Process valving (isolation, check, throttling). Tasks: Exercise valve operators – yearly.
    e) Process instrumentation: magnetic flow meter, pressure gauges, level loggers, water leak detector. Tasks: Calibration - every 6-months.
    f) SCADA communication and data logging equipment.

  - Real-time equipment status updates (i.e., pump flow, pump run time, pump operating speed, pump ON/OFF status) and alarming available locally at each well site and remotely at **Site No. 3B** (WTP and Building/Booster Station No. 1/PRV Station No. 1).

  - Tasks to be performed at both well sites to include:
    a) General inspection - 2 to 5 times per week.
    b) Water sampling at wellhead – quarterly (or as required).
    c) Well super chlorination – yearly.
    d) Snow plowing of well access roadway and site parking area – as required during winter.
    e) Well pump inspection – every 5 to 10-years.

- **Water Supply Piping:**
    - Operable equipment at **Site No.** 1E (Water Supply Piping - [redacted] Property), **Site No. 2** (Water Supply Piping - [redacted] Property) and **Site No. 1C** (Water Supply Piping/Well Site Access Roadway/Power Supply Site - Village of New Maryland Sunrise Wellfield Property) include:
        a) Isolation gates valves and chambers. Tasks: Exercise isolation gate valves – yearly.
        b) Hydrants. Tasks: Exercising hydrants and hydrant isolation valves – yearly.
        c) Air release valve and chamber. Tasks: Inspection of air release valve – quarterly.
- **Water Treatment:**

  The primary operable equipment at **Site No. 3B** (WTP and Building/Booster Station No. 1/PRV Station No. 1) and associated operational/maintenance tasks include the following:

    - Raw water chlorination station consisting of a duplex NaOCl dosing pump set-up (including injection quills, chemical storage, control panel) - capacity to be determined. Tasks - daily inspection; quarterly pump dosing calibration.
    - Raw water turbidity analyzer. Tasks: Cleaning/calibration as per equipment manufacturer
    - Raw water chlorine analyzer, including integrated pH analyzer. Tasks: Cleaning/calibration as per equipment manufacturer.
    - WTP equipment generally consisting of:
        a) Overall treatment capacity: 250 (raw water) + 25 (recycle) = 300 USgpm (19 L/s).
        b) Three (3) filter vessels, including filtration media. Hydraulic loading rate = 4.5 to 7 USgpm/ft^2 (11 to 17.1 m/h). Each filter vessel capacity = 125 USgpm (7.9 L/s). Tasks: Media inspection/top-up - yearly; replace full media - every 10 to 15 years.
        c) Duplex air scour blower package.
        d) Process piping, including raw water inlet header pipe and treated water outlet header pipe.
        e) Automated process valving (flow control, isolation, check, drainage). Tasks: Exercise valve operators – yearly.
        f) Emergency WTP by-pass piping.
        g) Process instrumentation - pressure, temperature. Tasks: Calibration - every 6-months.
        h) WTP control panel.
        i) SCADA communication equipment.
        j) Tasks: Visual inspection – daily.
    - Backwash recycling system equipment system generally consisting of:
        a) Spent backwash storage tankage – storage capacity to be determined.
        b) Spent backwash tank level control monitoring.
        c) Backwash recycle duplex pump-skid package and control panel – pump capacity 25 USgpm (1.6 L/s)
        d) In-line bag filtration system. Tasks: Filtration bag replacement every 2 to 4 weeks.
        e) Process piping.
        k) Process valving (isolation, check, throttling). Tasks: Exercise valve operators – yearly.

f) Duplex waste sludge pumps, including discharge pipe to sanitary - pump capacity to be determined.
g) Process instrumentation: magnetic flow meter, pressure gauges. Tasks: Calibration - every 6-months.
h) Emergency overflow piping to WTP Building drainage system.
i) Tasks: Visual inspection – daily.

- Treated water chlorination station consisting of a duplex NaOCl dosing pump set-up (including injection quills, in-line mixer, chemical storage, control panel) - capacity to be determined. Tasks - daily inspection; quarterly pump dosing calibration.

- Booster Station No. 1 consisting of:
  a) Variable-speed controlled duplex booster pump package.
  b) Booster pump package control panel, including PLC.
  c) Magnetic in-line flow meter.
  d) Tasks: Visual inspection – daily.

- PRV Station No. 1 consisting of:
  a) PRV, including solenoid valve for locking valve in closed position.
  b) Isolation and check valves.
  c) Tasks: Visual inspection – daily; Exercise isolation valve operators – yearly.

- Treated water turbidity analyzer. Tasks: Cleaning/calibration as per equipment manufacturer.

- Treated water chlorine analyzer, including integrated pH analyzer. Tasks: Cleaning/calibration as per equipment manufacturer.

- Wastewater flow generated from the WTP and Building will be conveyed by gravity through a sanitary sewer lateral and into the Village's nearby sanitary sewer system. The wastewater sources from the WTP Building will consist of:
  a) Washroom.
  b) Shower.
  c) Lab sinks.
  d) Misc. process floor wash-down.
  e) Residual backwash water solids.
  f) Waste-to-drain from filter following filter backwash sequence.
  g) Spent backwash storage tank emergency overflow.

- **Water Distribution:**

  - Operable equipment at **Site No. 4A** (Water Distribution Piping from WTP Building to NB Route 101), **Site No. 6** (NB Route 101 Water Distribution Piping from Sunrise Estates Subdivision to Daniel Drive) and **Site No. 7** (Sandcherry Lane Water Distribution System - connection from NB Route 101) include:

a) Isolation gates valves and chambers. Tasks: Exercise isolation gate valves – yearly.
b) Hydrants. Tasks: Exercising hydrants and hydrant isolation valves – yearly.

- Operable equipment at **Site No. 8B** (PRV Station No. 2 on New Maryland Woman's Institute Property) includes:
  a) Normal flow PRV, including solenoid valve for locking valve in closed position. Tasks: Valve inspection – yearly.
  b) Fire flow PRV, including solenoid valve for locking valve in closed position. Tasks: Valve inspection – yearly.
  c) Chlorination station consisting of a duplex NaOCl dosing pump set-up (including injection quills, in-line mixer, chemical storage, control panel) - capacity to be determined. Tasks - daily inspection; quarterly pump dosing calibration.
  d) Chlorine analyzer, including integrated pH analyzer. Tasks: Cleaning/calibration as per equipment manufacturer.
  e) Process piping.
  f) Process valving (isolation, check). Tasks: Exercise valve operators – yearly.
  g) Process instrumentation: magnetic flow meter, pressure gauges, water leak detector. Tasks: Calibration - every 6-months.
  h) SCADA communication equipment.
  i) Emergency power generator (to operate chlorination system, controls and Building light/heat/ventilation) - capacity to be determined. Tasks: Exercise emergency power generator – monthly.
  j) Tasks: Visual inspection – daily.

- Operable equipment at **Site No. 9B** (Booster Station No. 2/PRV Station No. 3 on NB Route 101 Storm Water Attenuation Pond Property) includes:
  a) Variable-speed controlled quadplex booster pump package and control panel, including PLC.
  b) Normal flow PRV, including solenoid valve for locking valve in closed position. Tasks: Valve inspection – yearly.
  c) Fire flow PRV, including solenoid valve for locking valve in closed position. Tasks: valve inspection – yearly.
  d) Chlorine analyzer, including integrated pH analyzer. Tasks: Cleaning/calibration as per equipment manufacturer.
  e) Process piping and valving (isolation, check). Tasks: Exercise valve operators – yearly.
  f) Process instrumentation: magnetic flow meter, pressure gauges, water leak detector. Tasks: Calibration - every 6-months.
  g) SCADA communication equipment.
  h) Emergency power generator (to operate chlorination system, controls and Building light/heat/ventilation) - capacity to be determined. Tasks: Exercise emergency power generator – monthly.
  i) Tasks: Visual inspection – daily.

3.6.8 PROJECT SITES ENGAGED IN DAILY OPERATION

Under typical daily operations, the following project sites are engaged to supply, treat and distribute the water supply from the well source through to the distribution system and water storage reservoir:

- **Water Supply Wells:**
  - **Site No. 1A** - Well TW05-02 and Control Building
  - **Site No. 1B** - Well TW17-01 and Control Building
- **Water Supply Piping:**
  - **Site No. 1C** - Water Supply Piping (on Village of New Maryland Sunrise Wellfield Property)
  - **Site No. 1E -** Water Supply Piping (on [redacted] Property)
  - **Site No. 2** – Water Supply Piping (on [redacted] Property)
- **Water Treatment:**
  - **Site No. 3B** - WTP and Building/Booster Station No. 1/PRV Station No. 1
- **Water Distribution:**
  - **Site No. 4A** - Water Distribution Piping (from WTP Building to NB Route 101)
  - **Site No. 5** – Lark Street Water Distribution Piping – within Sunrise Estates Road ROW)
  - **Site No. 6 –** NB Route 101 Water Distribution Piping (from Sunrise Estates Subdivision to Daniel Drive)
  - **Site No. 7 -** Sandcherry Lane Water Distribution System (connection from NB Route 101)
  - **Site No. 8B -** PRV Station No. 2
  - **Site No. 9B -** Booster Station No. 2/PRV Station No. 3
  - **Site No. 10B** - Water Tower Control Room

3.6.9 MODES OF OPERATION

Typical, the day-to-day water system operations will be engaged in one of the following three modes of operation:

1. **Production Mode** - Water Production Start-up. This mode is engaged while the Water Storage Reservoir is filling (i.e., liquid level is ascending from a low liquid level to a full condition).

2. **Idle Mode -** Water Production Shutdown. This mode is engaged while the Water Storage Reservoir liquid level is emptying (i.e., liquid level is descending from full to a low liquid level condition).

3. **Backwash Mode -** WTP Filter Backwash. This mode is engaged when the treatment filters require backwashing, regardless of the liquid level condition in the Water Reservoir.

Interaction among the different project sites (see listing above) for each the three modes of operation are described in the following sub-sections.

- **Production Mode - Water Production Start-up:**

  a) The Master PLC, located at Site No. 3B (WTP and Building), continuously monitors the elevated storage tank level reported from the Water Tower Control Room. At a pre-determined low liquid level set-point within the reservoir, the Master PLC will call for water production by placing the duty well pump into stand-by start-up mode at either Site No. 1A (Well TW05-02/Observation Well TW05-03) or Site No. 1B (Well TW17-01/Observation Well TW05-04).

  b) Simultaneously with a well pump stand-by start-up, the Master PLC will also undertake the following:
     - Activate **Site 3B** (WTP/Booster Station No. 1/PRV Station No. 1) by placing the WTP in stand-by production mode, placing booster pump package in stand-by mode and changing state of PRV solenoid valves to dormant (closed) position.
     - Activate **Site No. 8B** (PRV Station No. 2) by changing state of PRV Station No. 2 solenoid valves to dormant (closed) position.
     - Activate **Site No. 9B** (Booster Station No. 2 + PRV Station No. 3) by placing the booster pump package into stand-by mode and changing state of PRV Station No. 3 solenoid valves to dormant (closed) position.

  c) Once the Master PLC receives confirmation from each of the remote PLC that all systems are in the stand-by start-up mode, the Master PLC will initiate a duty well pump start, which will initiate immediate start-up of the all subsequent processing equipment required to supply, treat, boost, distribute and store the water supply.

  d) The Master PLC will then receive acknowledgement from each remote PLC that the respective equipment is operating within the normal operation bounds. The Master PLC will then transmit confirmation to **Site No. 10B** (Water Tower Control Room) that the overall water supply system is operating in ***Production Mode***.

- **Idle Mode - Water Production Shutdown:**

  a) The Master PLC receives real-time Reservoir operating liquid level data from **Site No. 10B** (Water Tower Control Room). At a pre-determined high liquid level set-point, the Master PLC will request Production Mode shutdown.

b) The Master PLC simultaneously initiates the following:
   - Deactivate (stop) duty well pump at either **Site No. 1A** (Well TW05-02/Observation Well TW05-03) or **Site No. 1B** (Well TW17-01/Observation Well TW05-04).
   - Deactivate (stop) the booster pump package, change the state of the PRV solenoid valves to the active (openable) position, and change the state of the WTP Filtration System to Idle Mode at **Site 3B** (WTP and Building/Booster Station No. 1/PRV Station No. 1).
   - Change state of PRV solenoid valves to the active (openable) position at **Site No. 8B** (PRV Station No. 2).
   - Deactivate (stop) booster pump package and change state of PRV solenoid valves to active (openable) position at **Site No. 9B** (Booster Station No. 2/PRV Station No. 3).
   - Change designation of duty/standby well pump between **Site No. 1A** (Well TW05-02/Observation Well TW05-03) and **Site No. 1B** (Well TW17-01/Observation Well TW05-04).

c) The Master PLC will then receive acknowledgement from each remote PLC that the respective equipment has been shut down (i.e., WTP, booster pumps) and the requested change of state (i.e., PRV solenoids) has occurred. The Master PLC will then transmit confirmation to **Site No. 10B** (Water Tower Control Room) that the overall water supply system is now operating in ***Idle Mode***.

- **Backwash Mode - WTP Filter Backwash:**

a) A requirement for backwashing the WTP filter will occur at some point during ***Production Mode*** of operation. The WTP control panel, located **Site No. 3B** (WTP and Building/Booster Station No. 1/PRV Station No. 1) will signal to the Master PLC the need for backwashing based on one of the following filter operating conditions:
   - Achieving the maximum pre-set allowable differential pressure across the filters.
   - Achieving the maximum pre-set cumulative run-time on the filters.
   - Operator initiated.

b) Upon receiving backwash request, the Master PLC will initiate *Idle Mode* (see description above) to stop water production.

c) Once the Master PLC receives confirmation from each remote PLC that ***Idle Mode*** has been initiated, the Master PLC will request that the WTP control panel PLC commence its pre-programmed backwash sequence on the WTP filters.

d) The WTP control panel PLC will initiate the WTP filter backwashing sequence. This will include directing water from the Water Transmission Pipeline (and Water Storage Reservoir) through the filter media at a controlled rate and pressure to provide backwash flow. The WTP control panel PLC will orchestrate the automated backwashing sequence, including opening/closing of valves, duration of backwash flow, routing of spent backwash flow to temporary holding tankage positioned within the WTP Building and temporary direct-to-waste discharge upon re-start of the WTP filters.

e) The WTP control panel PLC will notify the Master PLC on completion of its backwashing sequence.

f) Upon receiving confirmation of completion of the backwash sequence, the Master PLC will initiate ***Production Mode*** of operation (see description above) to restore water production. To the distribution system and Water Storage Reservoir.

3.6.10 SCADA COMMUNICATIONS

The SCADA system proposed for this project is intended to control and monitor the entire new water system, including water supply (i.e., wells; interconnecting water transmission main), water treatment process, water transmission/distribution (i.e., booster pumps, pressure regulating valves, transmission/distribution pipeline) and existing water reservoir.

The basic SCADA architecture will incorporate programmable logic controllers (PLCs) and remote terminal units (RTUs), both of which are microcomputers designed to interact with an array of objects (i.e., wireless modems, human machine interfaces, sensors, end devices), and from which collected information is routed to computers supported by SCADA software. SCADA software will process, distribute, and display the data, thus assisting the operations staff with data analysis and process decision making.

The proposed SCADA system will be designed and configured to provide the operations staff with data to assist with understanding and reacting to both normal and emergency operating conditions. Such operating conditions will include, but not be limited to, the following:

- Operating status of major process equipment such as water supply well pumps, booster pump packages, water treatment process equipment, chemical dosing pumps, pressure reducing valves and emergency power generators.
- Treated water quality, including temperature, pH, turbidity and chlorine residuals.
- Liquid operating levels in the water supply wells, the spend backwater tankage and in the existing water storage reservoir.
- Tracking of specific operations trending data to provide useful and pertinent process performance data, including: water supply volumes and flow rates, water supply well drawdown and recovery levels, remaining water treatment filter run-time until backwash and process equipment run-times.
- Alarming of equipment and process fault conditions, both locally and remotely. Equipment and process related alarm conditions will be automatically logged (and date stamped) by the SCADA system computer software and annunciated locally, as well as, annunciated to a roster list of on-call operations staff through cellphone communications as synthesized voice recordings and text messages.

  As an example, key water quality parameters such as low-level chlorine and high-level turbidity concentrations will be continuously monitored by the SCADA system. Any sustained divergence outside a pre-set operating range deemed appropriate by the Department of Health will initiate an alarm condition.

3.7 FUTURE MODIFICATIONS, EXTENSIONS, OR ABANDONMENT

No modifications, extensions, or abandonment of the proposed project are anticipated.

3.8 DOCUMENTS RELATED TO THE UNDERTAKING

All documents related to the Undertaking are presented in Table 11.

Table 11: List of Documents Related to the Undertaking

REPORT	AREA SURVEYED/ STUDY AREA	REPORT AUTHOR	DATES	REFERENCE
Archaeological Field Research Permit report (Heritage Resource Impact Assessment)	All areas for project-related infrastructure, from the well locations to the Daniel Drive connection, including the Lark Street Spur and the Sandcherry connection and along the New Maryland Highway.	Grant Aylesworth (Stratis Consulting Ltd.)	Desktop research and field investigation completed on October 31 and November 1, 2018; Report revised on April 11, 2019	(Stratis Consulting Ltd., 2018)
Habitat Assessment (Field Survey and Desktop)	Length of the buried pipeline. Spot electrofishing at Northern stream.	Rod Currie (R.A. Currie Ltd.)	Surveys completed on June 4 and September 1, 2018; No formal report but findings were submitted in November 2018	NA
Breeding Bird, Rare Plants and Wetland Survey	Proposed wellfield development site (PIDs 75062174, 75064840, and 75349068).	Derrick Mitchell (Boreal Environmental Ltd.)	Survey completed in June 2018; Report submitted in August 2018	(Boreal Environmental Ltd., 2018)
Hydrogeological Assessment Report (TW17-01)	TW17-01	BGC Engineering Inc.	Report submitted on April 9, 2018	(BGC Engineering Inc., 2018)
Water Supply Source Assessment - Step One Application #1	PID 75062174	Opus International Consultants (Canada) Ltd.	Report submitted on December 19, 2016	(Opus International Consultants Ltd., 2016)
Water Supply Source Assessment - Step One Application #2	PID 75062174	Opus International Consultants (Canada) Ltd.	Report submitted on May 23, 2017	(Opus International Consultants Ltd., 2017)
Hydrogeological Assessment Report (TW05-02)	TW05-02	BGC Engineering Inc.	Report submitted on March 24, 2017	(BGC Engineering Ltd., 2017)
EIA Registration (#928)	NA	Project Engineering Limited	Registered on February 19, 2003	Unknown

4 DESCRIPTION OF THE EXISTING ENVIRONMENT

This section provides a description of the existing environmental conditions for the biophysical and human components that may be influenced by the Project. The information provided in this section is based on existing secondary data sources, databases, and mapping available for the location. Information presented in this section pertains to the Project footprint and the surrounding biophysical environment.

4.1 ATMOSPHERIC ENVIRONMENT

4.1.1 CLIMATE

Most of the climate in New Brunswick is continental as a result of westerly air flows passing over the interior of the continent, as opposed to a Maritime Climate that is impacted by flows over a temperature moderating ocean. The closest Canadian Climate Station that meets the United Nations' World Meteorological Organization standard is found in Fredericton, New Brunswick (Fredericton CDA CS). Climate normal data for this station is presented in Table 12. No weather stations are found within the Project area.

Climate data from Fredericton are expected to be representative of the conditions in the Project area due to the proximity and similar physical conditions. Canadian Climate normals are 30-year averages used to summarize or describe the average climatic conditions of a specific location. The climate normal are calculated from the data between 1981 and 2018.

Table 12: 1981 to 2010 Canadian Climate Normals Data – Fredericton CDA Station, New Brunswick

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	YEAR
Daily Average (C)	-9.4	-7.5	-2.2	4.8	11.3	16.4	19.4	18.6	14.0	7.8	1.8	-5.3	5.8
Rainfall (mm)	42.4	31.7	45.2	68.1	103.1	86.3	89.0	85.9	94.7	89.3	96.3	54.0	885.9
Snowfall (cm)	63.6	39.1	42.4	13.5	0.6	0.0	0.0	0.0	0.0	0.4	13.9	41.4	214.8
Precipitation (mm)	101.9	70.1	90.1	81.6	103.8	86.3	89.0	85.9	94.7	89.7	109.9	91.8	1094.7

Source: (Government of Canada, 2019)

4.1.2 AMBIENT AIR QUALITY

The Air Quality Regulation in New Brunswick's Clean Air Act details the maximum permissible ground level concentrations of several parameters for air quality in New Brunswick. The Air Quality Regulation states that a stationary "source" that releases air contaminants to the environment must obtain approvals to release those air contaminants.

The ambient air quality is monitored by DELG at established monitoring stations throughout the province. The Project is in the New Brunswick's "central air zone". The closest air quality monitoring station to the Project area is

in Fredericton. The most recent annual report is for the 2017 results (Government of New Brunswick, 2019), and provides the current data summarized as follows:

- **Ozone (O_3):** In 2017, the ground level ozone concentration measured over an 8-hour averaging time was 50 parts per billion (ppb) at Fredericton, which is below the Canadian Ambient Air Quality Standards (CAAQS) of 63 ppb.
- **Fine Particulate Matter ($PM_{2.5}$) – Daily Metric:** In 2017, the daily fine particulate matter levels recorded at Fredericton were 14 micrograms per cubic metre ($\mu g/m^3$), which is below the CAAQS standard of 28 $\mu g/m^3$.
- **Fine Particulate Matter ($PM_{2.5}$) – Annual Metric:** In 2017, the annual fine particulate matter metric calculated an average of 5.8 $\mu g/m^3$ at Fredericton This is below the CAAQS standard of 10 $\mu g/m^3$ averaged over a year.
- **Carbon Monoxide (CO):** No Exceedances of carbon monoxide were recorded in Fredericton in 2017.
- **Nitrogen Dioxide (NO_2):** No Exceedances of nitrogen dioxide were recorded in Fredericton in 2017.

4.1.3 AMBIENT NOISE LEVELS

Sources of sound in the Project area are considered normal (i.e., there are no major sources beyond traffic and routine human activity).

4.2 GROUNDWATER RESOURCES (HYDROGEOLOGY)

The general topography, bedding, and groundwater table slope from northwest to southeast. Groundwater levels at an observation well belonging to the Provincial monitoring network, located near Victoria Hall on PID 75064253 in New Maryland, have been monitored by the Government of New Brunswick since 1979 (NB DELG, 2018).

The historical data provide some indication of general water table trends in this aquifer. The high variability in groundwater elevations measured at the Victoria Hall well, up to 10 m between the historical maximum and minimum water levels over the period of record, suggests that this aquifer is highly influenced by precipitation and snowmelt, and the antecedent moisture condition. Additional details about the Study area's hydrogeology are available in the Hydrogeological Assessment Report (BGC Engineering Inc., 2018) in Appendix C, Sub-Appendix C-1.

4.3 SURFACE HYDROLOGY (FRESHWATER RESOURCES)

4.3.1 DRAINAGE

Two brooks, Burpee Brook and its tributary Berry Brook, are located near the Property. Burpee Brook flows north to south across the Property. Berry Brook flows roughly parallel with the Property to the south before entering Burpee Brook. Burpee Brook then joins the North Branch Rusagonis Stream, which flows roughly northwest to southeast through the immediate Study area. The Rusagonis Stream is a tributary to the Oromocto River, which ultimately drains into the St. John River.

4.3.2 AQUIFER RECHARGE

Based on topography, the drainage area contributing recharge to the wellfield aquifer is approximated at 12 km^2. This potential drainage area is based on local drainage divides delineated using topography provided by the GeoNB data catalogue (Service New Brunswick, 2019). Based on an average annual precipitation of approximately 1100 mm (ECCC, 2018), and an assumed annual aquifer recharge rate between 10% (110 mm/year) and 30% (330 mm/year), an estimated range for the total volume of groundwater recharge available in this aquifer is 1,320,000 to 3,960,000 m^3/year (BGC Engineering Inc., 2018).

Considering the presence of up to 400 domestic wells within this drainage area, each assuming to withdraw between 0.6 m^3/d and 1.0 m^3/d (DeOreo, Mayer, Dziegielewski, & Kiefer, 2016), up to approximately 146,000 m^3/year (between 4% and 11%) of the estimated available recharge may be extracted by domestic well use. A portion of this may be offset if some of these homes are eventually connected to the municipal system. Less aquifer recharge may be available during extended dry periods. Under such prolonged dry conditions, there is a higher potential risk of increased drawdowns, and possibly over pumping, if water levels are left unchecked (BGC Engineering Inc., 2018).

4.3.3 WETLANDS AND WATERCOURSES

As per the results of the wetland delineations conducted by Boreal Environmental in June 2018 (see full report in Appendix C, Sub-Appendix C-2), two (2) unmapped wetlands were identified within the Study Area, namely Wetland 1 (WL1) and Wetland 2 (WL2). Both wetlands were identified as forested swamps.

WL1 is a 13.1 hectare (ha) forested swamp complex consisting of forested riverine swamp, forested slope swamp and sedge/reed riparian swamp. Several small intermittent and permanent watercourses flow through WL1 and discharge to a mapped watercourse in the southeastern section of the Study Area.

WL2 is a 0.7 ha deciduous treed riverine swamp. The watercourse that flows through WL2 discharges into WL1. Functional assessment results are available in Boreal Environmental's June 2018 report.

4.3.4 NEARBY POLLUTION OR CONTAMINATION HAZARDS

Within 500 metres of the water supply wells TW05-02 and TW17-01 there are approximately four (4) private residential septic tanks, all of which are located on NB Route 101 near the extremity of the 500-metre radius south of Wells TW05-02 and TW17-01. Approximately 400 metres to the north of Wells TW05-02 and TW17-01 there is a trunk sanitary sewer main that flows west to east and is located approximately 50 metres south of Sunrise Estates' southerly boundary on PID 75064840. This relatively new sanitary sewer main is operated and maintained by the Village of New Maryland.

There are no other known existing pollution or contamination hazards within the 500-m radius of the water supply and observation well sites.

4.4 FISH AND FISH HABITAT

The Project is within the Lower Saint John Recreational Fishery Area (GNB, 2019). There are 53 fish species reported in the Saint John River Basin (Canadian Rivers Institute, 2011). A fish habitat assessment was conducted within the Study area on June 4, 2018, and a follow-up spot electrofishing survey was conducted on September 1, 2018, by R.A. Currie Ltd.

Two (2) small watercourses were observed crossing the route of the proposed water supply pipeline. The more northerly of these watercourses is the larger of the two and it contains defined channel features considered suitable fish habitat. However, a search of this watercourse within the vicinity of the proposed water supply pipeline failed to confirm the presence of fish.

A follow-up spot electrofishing survey was conducted in the northern (larger) watercourse at the location of the flagged ROW where Creek Chub (*Semotilus atromaculatus*) were captured and appeared to be abundant. Further upstream, where the watercourse crosses the cleared access road, about eight (8) small fish (either Creek Chub or Blacknose Dace, *Rhinichthys atratulus*) were observed. These observations confirm that this tributary does support

fish habitat. The smaller of the watercourses crosses the proposed route a bit further to the south. This watercourse in ephemeral and has a poorly defined channel. It is unlikely that this watercourse supports fish or represents fish habitat. See Figure 5 for reference.

Both watercourses described above flow eastward where they converge with a wetland (i.e., WL1). It should be noted that this wetland also likely supports fish habitat because a Stickleback sp. was observed in the water at the edge of the access road near the water supply wells TW05-02 and TW17-01.

MUNICIPAL SERVICES EASEMENT FOR EXISTING SANITARY SEWER MAIN AND NEW WATER MAIN

DISTRIBUTION WATER MAIN

WETLAND No. 2 (WL2)

SUNRISE ESTATES

Weston Street

PID 75064840

PID 75349076

PID 75062174

SEPT 1, 2018 - ELECTRO-FISHING
7 OR 8 SMALL FISH
(CHEEK CHUB OR DACE)
FOUND AT THIS LOCATION

WATER TREATMENT PLANT SITE AND WATER BOOSTER PUMPING STATION #1

PID 75349068

WETLAND No. 1 (WL1)

VILLAGE OF NEW MARYLAND

PROPOSED OBSERVATION WELLS 1 AND 2

WETLAND No. 1 (WL1)

McMurtrie Avenue

Sunrise Estates Drive

SUNRISE ESTATES

MUNICIPAL SERVICES EASEMENT FOR ACCESS ROAD, WATER MAIN AND UTILITIES

SUPPLY WATER MAIN

SEPT 1, 2018 CHEEK CHUB FOUND AT THIS LOCATION

EXISTING OBSERVATION WELL TW05-01

SEPT 1, 2018 - ELECTRO-FISHING
DESCRIBED BY ROD CURRIE, BIOLOGIST
AS AN NON-FISH HABITAT AREA

SUPPLY WATER MAIN

EXISTING OBSERVATION WELL TW05-03

PROPOSED OBSERVATION WELLS 3 AND 4

WATER SUPPLY WELL TW05-02

DESCRIBED BY ROD CURRIE , BIOLOGIST AS A FISH HABITAT AREA

PID 75062331

PID 75064840

WETLAND No. 1 (WL1)

Berry Brook

NB ROUTE 101

WATER SUPPLY WELL TW17-01

PID 75062174

EXISTING OBSERVATION WELL TW05-04

PID 75061516

PID 75061754

N.B. STEREOGRAPHIC GRID NORTH NAD83 (CSRS)

150 mm
100
50
10 mm
0

1:2000 @ A1
1:4000 @ A3
0 20 40 60 80 100 120 140 160 180 200 m

LEGEND

- PROPOSED WATER MAIN
- DELINEATED WETLANDS AS PER BOREAL ENVIRONMENTAL (JULY 2018)
- FISH RELATED COMMENTS BY ROD CURRIE (SEPT. 2018)

Fredericton Office
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Canada

Designed	Approved	Approved Date
SRP	JRM	2020/04/07
Drawn	Scales	
PRC	1:40000	

Project
VILLAGE OF NEW MARYLAND
SUNRISE WELLFIELD DEVELOPMENT

Sheet
ENVIRONMENTAL IMPACT ASSESSMENT
FISH AND FISH HABITAT OBSERVED WITHIN THE STUDY AREA

Project No.	Sheet No.	Revision
C-84510.70 (EIA)	FIGURE 6	0

Original Sheet Size ANSI B [11"x17"] Plot Date 2020-06-15 at 1:45:11 PM Path G:\JOBFILES\800\845_NewMaryland\C-84510.70 - Arsam Property - EIA For Wellfield Development (2018)\04_Project Working Files\CADD\C-84510.70 building footprint.dwg FIGURE 6

4.5 TERRESTRIAL ENVIRONMENT

4.5.1 SITE TOPOGRAPHY

The surface elevation in the greater New Maryland area ranges from approximately 10 to 200 m (33 to 656 ft.) geodetic, with the highest ground elevation being to the north-west in Hanwell. The surface elevation of the Property ranges from approximately 50 to 70 m (164 to 230 ft.) geodetic and generally slopes to the southeast.

Anticipated geodetic elevations of key project components are:

- Water supply well TW05-02 (Site No. 1A) - 55± m (ground elevation at wellhead).
- Water supply well TW17-01 (Site No. 1B) - 56± m (ground elevation at wellhead).
- WTP and Building (Site No. 3B) - 67± m (ground elevation at building).
- PRV Station No. 2 (Site No. 8B) - 85± m (ground elevation at building).
- Booster Station No. 1 + PRV Station No. 3 (Site 9B) – 120± m (ground elevation at building).
- Water Storage Reservoir (Site 10A) - 168± m (normal full water surface elevation).

Light Detection and Ranging (LiDAR) mapping data of the entire Village of New Maryland, including the Project area, has been utilized for developing the details of this Project. Contours of the Project developed from the LiDAR data are available but have not been included in this document. Most recent (2015) aerial photo imagery of the Village, including the Project area, is available and is included as part of Figure 3.

4.5.2 GEOLOGY AND SOILS

The project falls on two Eco-districts: The Valley Lowlands and Grand Lake Lowlands. The overburden on the Property is a silt-dominated till, which is typically 1 to 20 m (3 to 66 feet) thick, deposited by advancing glaciers (Allard & Gilmore, 2016). The bedrock in the area is part of the Minto Formation of the Pictou Group of rocks, consisting of Late Carboniferous aged, coarse-to-fine-grained sediments, including grey and red-brown beds of conglomerate, sandstone, siltstone, mudstone, and shale, with thin seams of coal (St. Peter & Fyffe, 2005). (BGC Engineering Inc., 2018).

4.5.3 TERRESTRIAL FLORA

The Project area is found in the Atlantic Maritime Ecozone. This Ecozone encompasses Quebec's Gaspe peninsula, as well as the entirety of Nova Scotia, Prince Edward Island, and New Brunswick. The ecozone is heavily influenced by the Atlantic Ocean, which provides cooler summers and warmer winters than many areas found inland. Agriculture and forestry are popular in this ecozone, contributing to the lack of old growth forest.

According to the habitat assessment that was conducted by R.A. Currie Ltd. on June 4, 2018, the forest habitat within the Study area includes mixed-forest containing tree cover that has regenerated from previously logged areas (perhaps 40 to 50 years ago), as is evident by old stumps and logging trails (mostly overgrown now). The tree species present within the Study area represent those that are typically found in mixed-forest stands, including Balsam Fir (*Abies balsamea*), Paper Birch (*Betula papyrifera*), Gray Birch (*Betula populifolia*), Yellow Birch (*Betula alleghaniensis*), Trembling Aspen (*Populus tremuloides*) and Red Maple (*Acer rubrum*). In addition to these species, scattered Eastern White Pine (*Pinus strobus*), Striped Maple (*Acer pensylvanicum*), Red Spruce (*Picea rubens*), White Ash (*Fraxinus americana*) and American Beech (*Fagus grandifolia*) are also present. For the most part, these trees are relatively young. However, a few scattered individuals are considerably larger, suggesting they were by-passed when the site was last logged. In a couple of cases, small pure stands of Balsam Fir and White Birch were observed.

In areas of dense shade, such as under Balsam Fir thickets, no understory vegetation was observed. Where sufficient sunlight penetrated to the forest floor, the young trees of the species listed above were regenerating. Herbaceous vegetation was also found in these areas. The species of herbaceous vegetation included Wild Sarsaparilla (*Aralia nudicaulis*), Bunchberry (Cornus canadensis), Bracken Fern (*Pteridium aquilinum*), Star Flower (*Trientalis borealis*), Lady Fern (*Athyrium filix-femina*), Witherod (*Viburnum nudum*) and Wood Sorrel (*Oxalis* sp.). Various species of moss were also noted. In the most open habitats, such as along small streams, grass, Sensitive Fern (*Onoclea sensibilis*), Ostrich Fern (*Matteuccia struthiopteris*), Jack-in-the-pulpit (*Arisaema triphyllum*), Royal Fern (*Osmunda regalis*), and small ash trees (*Fraxinus americana*) were found.

4.5.4 FLORA SPECIES OF CONSERVATION CONCERN

Vegetation and rare flora surveys were conducted by Boreal Environmental in June 2018 (see full report in Appendix C, Sub-Appendix C-2). A complete inventory of plant species observed within the Study area is available in the 2018 Boreal report. At the time of assessment, no rare or uncommon plant species were observed. However, in November 2018, following the field assessment, the Black Ash (*Fraxinus nigra*) was designated as 'Threatened' by COSEWIC and is under consideration for addition to Schedule 1 of SARA.

According to the Atlantic Canada Conservation Data Centre (AC CDC; Data Report #5997), records of the following three (3) rare and/or endangered vascular plant species were found within five (5) km of the Project area: Western Dock (*Rumex aquaticus* var. *fenestratus*), Long-bracted Frog Orchid (*Coeloglossum viride* var. *virescens*), and Common Hop (*Humulus lupulus* var. *lupuloides*). Legal designation and AC CDC ranks for these species, as well as the Black Ash observed during the field assessment, are presented in Table 13.

Table 13: Rare and/or Endangered Flora Species Observed During Dedicated Surveys and/or Recorded within 5 Km of Project Area by AC CDC

COMMON NAME	SCIENTIFIC NAME	COSEWIC	SARA	NB SARA	AC CDC (S-RANK)	DISTANCE (KM)
Black Ash	*Fraxinus nigra*	Threatened	-	-	S4S5	N/A
Western Dock	*Rumex aquaticus* var. *fenestratus*	-	-	-	S1S2	1.5 ± 1.0
Long-bracted Frog Orchid	*Coeloglossum viride* var. *virescens*	-	-	-	S2	3.1 ± 5.0
Common Hop	*Humulus lupulus* var. *lupuloides*	-	-	-	S2?	4.7 ± 0.0

Note: Species are listed in order of concern.

4.5.5 TERRESTRIAL FAUNA

The province of New Brunswick is home to 57 species of mammals, over 350 resident and migratory bird species, as well as roughly 25 species of reptiles and amphibians. Several of these species have potential to be present on or near the Project area intermittently throughout the year.

4.5.6 MIGRATORY BIRDS

The proposed Project in not located within an Important Bird Area (IBA). However, there is an IBA located within 10 km of the Project, namely the Lower St. John River (Sheffield/Jemseg) IBA. The Lower Saint John River IBA, located in south-central New Brunswick, extends 25 km along the St. John River, from five (5) km northeast of the town of Oromocto to 25 km east of Oromocto. The site includes the Portobello National Wildlife Area, Gilbert Island, French Lake, Big Timber Lake, Grand Lake Meadows, and the southern edge of Grand Lake. This area is under tidal influence, as tidal influence extends upstream to Mactaquac dam.

Extensive spring flooding has resulted in the creation of a unique hardwood and flora complex, thus creating the single largest wetland complex in Atlantic Canada. Habitats here include marshy islands, backwaters, creeks and marshes that extend two (2) to five (5) km beyond the main riverbanks. The Lower Saint John River IBA provides breeding habitat for the nationally vulnerable Yellow Rail (*Coturnicops noveboracensis*), as well as, significant numbers of Black Terns (*Chlidonias niger*) and Atlantic Canada's only breeding population of Greater Scaup (*Aythya marila*). (IBA Canada, 2019).

Based on ECCC's calendar for specific "nesting zones" across Canada, the proposed Project is located within "Nesting Zone C3", which identifies mid-April to late August as the sensitive nesting period for the area.

Breeding bird surveys were conducted by Boreal Environmental in June 2018 (see full report in Appendix C, Sub-Appendix C-2). During the dedicated breeding bird survey within the Study area, a total of 204 individuals were observed, representing 40 species. One of these species, the Canada Warbler (*Cardellina canadensis*) is a SAR and is listed as Threatened on both Schedule 1 of SARA and under NB SARA. The most abundant species observed were:

- Ovenbird (*Seiurus aurocapilla*; n=25),
- American Crow (*Corvus brachyrhynchos*; n=17),
- Black-capped Chickadee (*Poecile atricapillus*; n=15),
- Black-throated Green Warbler (*Setophaga virens*; n=15),
- Red-breasted Nuthatch (*Sitta canadensis*; n=13),
- Northern Parula (*Setophaga americana*; n=12), and
- Red-eyed Vireo (*Vireo olivaceus*; n=11).

These results were expected based on the developmental stage and species composition of the forest within the Study area.

A single Canada Warbler was observed incidentally just south of point count station 12 (see report by Boreal Environmental in Appendix C-2) in suitable breeding habitat (i.e., shrubby wetland complex; WL-1). The area of the wetland will not be impacted by the project.

No raptor nests were observed within or in proximity to the Study area. Common Nighthawk surveys were not conducted due to suitable habitat for this species not being present within the Study area. No avian species of conservation concern (SOCC) were observed within the Study area.

4.5.7 FAUNA SPECIES OF CONSERVATION CONCERN

According to the AC CDC (Data Report #5997), the records of following five (5) rare and/or endangered vertebrate and one (1) invertebrate fauna species were found within five (5) km of the Project area: Eastern Whip-poor-will (*Antrostomus vociferus*), Common Nighthawk (*Chordeiles minor*), Brown Thrasher (*Toxostoma rufum*), Turkey Vulture (*Cathartes aura*), Scarlet Tanager (*Piranga olivacea*), and Indian Skipper (*Hesperia sassacus*). One (1) sensitive species location was identified, in this case a bat hibernaculum (i.e., specific species associated with the hibernaculum and/or size, not available). There is a bat hibernaculum within five (5) km of the Project area, thus bats will be addressed with the Fauna SOCC and Associated Habitats VEC in this report.

Legal designation and AC CDC ranks for these species are presented in Table 14.

Table 14: Rare and/or Endangered Fauna Species Recorded within 5km of the Project Area

COMMON NAME	SCIENTIFIC NAME	COSEWIC	SARA	NB SARA	AC CDC (S-RANK)	DISTANCE (KM)
Bat Hibernaculum[a]	Unknown Bat sp.	-	Endangered	Endangered	-	NA
Eastern Whip-poor-will	*Antrostomus vociferus*	Threatened	Threatened	Threatened	S2B, S2M	3.7 ± 7.0
Common Nighthawk	*Chordeiles minor*	Threatened	Threatened	Threatened	S3B, S4M	4.3 ± 0.0
Brown Thrasher	*Toxostoma rufum*	-	-	-	S2B, S2M	4.4 ± 0.0
Turkey Vulture	*Cathartes aura*	-	-	-	S3B, S3M	3.4 ± 0.0
Scarlet Tanager	*Piranga olivacea*	-	-	-	S3B, S3M	2.7 ± 0.0
Indian Skipper	*Hesperia sassacus*	-	-	-	S3	3.4 ± 2.0

Note: Species are listed in order of concern; [a] *Myotis lucifugus* (Little Brown Myotis), *Myotis septentrionalis* (Long-eared Myotis), and *Perimyotis subflavus* (Tri-colored Bat or Eastern Pipistrelle) are all 'Endangered' under the Federal Species at Risk Act and the NB Species at Risk Act.

4.5.8 ENVIRONMENTALLY SIGNIFICANT AREAS

One (1) managed area was identified within five (5) km of the Project area, a woodlot known as the University of New Brunswick Refuge. This woodlot is found north of the Project area, immediately south of Fredericton and across the TransCanada Hwy. This woodlot covers an area of 1,518 ha and contains sensitive ecological areas.

4.6 SOCIAL AND CULTURAL ENVIRONMENT

4.6.1 RECREATION AND TOURISM

There is an Athletic Park located beside the New Maryland Elementary School, which is the central sports and field facility for organized and leisure activities in the Village. A network of walking trails is located behind the New Maryland Centre, which are enjoyed by many residents for walking, nature hikes, snow shoeing, and bird watching. A Recreation Trails and Bikeways Master Plan was officially adopted by the Village on September 19, 2012.

4.6.2 ECONOMY

According to the 2016 Census of Population, there were 99,411 people residing in York County, New Brunswick, with a population density of 12.2 persons per square kilometer (Statistics Canada, 2019). The population of New Maryland was estimated at 4,174 in 2016. In 2015, the median total income of households in the Village of New Maryland is reported at $102,713, thus higher than the reported median for New Brunswick ($59,347). According to the 2016 Census of Population, the unemployment rate for the Village of New Maryland was 5.9%.

4.6.3 HERITAGE AND ARCHAEOLOGICAL RESOURCES

A Heritage Resource Impact Assessment was conducted, and a report prepared by Stratis Consulting Ltd. in October/November 2018 and was filed for review and approval with the Archaeological Services Branch, Government of New Brunswick in June 2019. The complete report is available in Appendix C, Sub-Appendix C-3.

In summary, one (1) historic period site was identified during this assessment: St. Mary the Virgin Anglican Church and Cemetery, located along New Maryland Highway. Since project-related construction is across the highway from the cemetery and the work is being done in a previously disturbed area, archaeological monitoring of construction near the church is not recommended. No pre-contact artifacts were found during the field visits. Archaeological testing is not recommended. (Stratis Consulting Ltd., 2018).

4.6.4 EXISTING LAND USES

New Maryland was a farming community and parish for over 100 years. Several large suburban subdivisions were constructed in the 1970s and 1980s. New Maryland was officially incorporated as a Village in 1991.

Several local businesses are also found in the Village, including a pub, pizza shop, pharmacy, post office, hairdressers, a vehicle repair shop, and two (2) gas stations, amongst others.

5 IDENTIFICATION OF ENVIRONMENTAL IMPACTS

5.1 APPROACH TO THE ASSESSMENT

The proposed Project is considered an "Undertaking" under Schedule A of Environmental Impact Assessment Regulation 87-83 and is therefore subject to the provincial EIA process. The EIA process for this Project followed the outline provided in "A Guide to Environmental Impact Assessment in New Brunswick" (Environment and Local Government, 2018).

The purpose of the EIA is to gather information about the Project and assess potential interactions between the environment and Project activities. The approach considers how each Project activity may interact with the existing environment and result in an environmental effect on one or more of the biophysical and socio-economic components of the environment. The assessment considers Section 2 - Project Description and Section 4 – Description of the Existing Environment.

The approach involves the consideration of how the Project may interact with Valued Environmental Components (VECs) and the potential adverse effect. Where potential adverse effects are identified, mitigation is applied to avoid or minimize (limit) the effects. The assessment includes the analysis of cumulative effects, in combination with other developments, that could result from the Project.

The steps to the assessment include the following:

- Identify VECs;
- Define the spatial and temporal boundaries for the assessment;
- Provide the description of existing conditions for each VEC;
- Identify all possible interactions and effects that the Project may have on VECs;
- Describe plans to mitigate the potential effects from the Project;
- Evaluate and determine the significance of any residual environmental impacts (i.e., effects that remain after mitigation); and
- Discuss follow-up monitoring that may be required.

5.2 VALUED ENVIRONMENTAL COMPONENTS

VECs represent physical, biological, cultural, social, and economical properties of the environment that are determined to be important by the Proponent, stakeholders, public, community groups, scientific community, First Nations communities, and government agencies. The value of a component not only relates to its role in the ecosystem, but also to the value placed on it by humans.

Air, groundwater, and surface water quality represent examples of physical properties that may be considered VECs. Aquatic and terrestrial habitats represent biological properties that may be considered VECs. Access to recreational opportunities and other biophysical properties (e.g., ecological services or resources) can be VECs of the socio-economic environment. The VECs have been selected for the assessment because of their value and potential sensitivity to effects from the Project.

The VECs selected for assessment in the Project are:

- Ambient Air Quality
- Ambient Noise Levels
- Groundwater Resources
- Surface Hydrology
- Fish and Fish Habitat
- Terrain and Soils
- Flora Species of Conservation Concern (SOCC) and Associated Habitats
- Fauna SOCC and Associated Habitats
- Migratory Birds
- Economy
- Heritage and Archaeological Resources
- Human Health
- Land Use

5.3 SPATIAL AND TEMPORAL BOUNDARIES

The assessment boundaries define the geographic and temporal scope or limits of the analysis for the determination of significance of effects from the Project and other developments. The boundaries encompass the areas (spatial boundaries) and time periods (temporal boundaries) that the Project and other developments are expected to interact with VECs.

5.3.1 SPATIAL BOUNDARIES

The selection of the spatial boundaries for the assessment is based on the physical and biological properties of VECs. The spatial boundaries have been defined to be large enough to encompass enough area to complete the evaluation of potential effects that all Project components and infrastructure may have on the environment. Effects from the Project on the environment are typically stronger at a local scale. For example, VECs with limited movement, such as vegetation, will likely be restricted to local changes from the Project footprint, plus a 1-km buffer. For VECs that have larger distributions (i.e., a river system), or which are mobile (i.e., wildlife), the Project effects have a higher likelihood to combine with effects with other developments or activities at a larger scale.

For this assessment, the following areas were defined:

- **Local Assessment Area (LAA).** The LAA is defined to encompass the maximum spatial extent of direct effects from within the Project footprint and small-scale indirect effects. The LAA is VEC specific and the LAA for each VEC is presented in Table 15.
- **Regional Assessment Area (RAA).** The RAA is defined so that it encompasses an area large enough so that an analysis of incremental and cumulative effects from the Project and other developments can be completed. It is also large enough so that it contains reference areas (i.e., areas not expected to be affected by the Project). The RAA is VEC specific. The RAA for each VEC is presented in Table 15.

5.3.2 TEMPORAL BOUNDARIES

The temporal boundaries for this Project are based on the Project phases, which include: Construction; operation; decommissioning and abandonment. For all VECs, residual effects are assessed for all Project phases and not for each specific Project phase. For example, effects on wildlife commence during the construction phase with habitat removal. The effects continue following the decommissioning and abandonment phase until effects are reversed (i.e., until habitat is reclaimed), unless the effects are determined to be either irreversible or permanent.

Table 15: Spatial Boundaries for Potential Environmental Effects

ENVIRONMENTAL COMPONENTS			ASSESSMENT AREA	
Grouping	VEC	Sub-components	Local	Regional
Atmospheric Environment	Ambient Air Quality	NA	Project footprint	1 km
	Ambient Noise Levels	NA	Project footprint	1 km
Hydrological Environment	Groundwater Resources	Water Volume	Aquifer	
		Water Quality	Project footprint	Level 2 Watershed: Oromocto River
	Surface Hydrology	Drainage	12 km^2	
		Annual Aquifer Recharge	1.3 x 10^6 to 3.9 x 10^6 m^3	
		Wetlands and Watercourses	Project footprint	Level 2 Watershed: Oromocto River
		Water Quality	Project footprint	Level 2 Watershed: Oromocto River
	Fish and Fish Habitat	NA	Project footprint	Level 2 Watershed: Oromocto River
Terrestrial Environment	Terrain and Soils	NA	Project footprint	NA
	Flora SOCC and Associated Habitats	NA	Project footprint	1-km
	Fauna SOCC and Associated Habitats	NA	Project footprint	5-km
	Migratory Birds	NA	Project footprint	5-km
Social and Cultural Environment	Economy	NA	Village of New Maryland	York County
	Heritage and Archaeological Resources	NA	Project footprint	
	Health and Safety	NA	Village of New Maryland	
	Land Use	NA	Project footprint	

5.4 IDENTIFICATION OF ENVIRONMENTAL IMPACTS AND MITIGATION

The first step is to identify all potential interactions between the Project and VECs. Identification of potential interaction is then followed by the identification of mitigation that can be incorporated into the Project, to avoid or reduce potential effects of the Project on VECs. Mitigation has been developed for the Project according to the following hierarchy outlined in "A Guide to Environmental Impact Assessment in New Brunswick" (Environment and Local Government, 2018): Impact Avoidance; Impact Reduction; Impact Compensation.

Mitigation is proposed where a potential interaction between the Project and VECs has been identified. Where possible, mitigation measures are incorporated into the Project design and are implemented to avoid or reduce potential adverse effects. The key mitigation options available for the Project are:

- Site selection;
- Choice of construction techniques; and
- Timing of construction activities.

Siting of the Project avoids wetlands, drainages, steep terrain, and unique habitats to the extent practical, and follows existing disturbance corridors where feasible.

Interactions where mitigation can be used to avoid an effect were not considered further because the mitigation removes the interaction and results in no measurable change to a VEC. Interactions where mitigation reduces potential effects but changes to a VEC are small, are also not considered further because they are not expected to result in significant effects to a VEC.

Where mitigation cannot remove an interaction and where residual effects to a VEC are expected, further analysis is required to determine the significance of those Project effects on a VEC (Section 6 – Classification of Residual Environmental Effects and Determination of Significance). For interactions where positive effects are anticipated, opportunities were determined for maximizing the positive effects.

5.4.1 RESIDUAL ENVIRONMENTAL EFFECTS

The following Project-VEC interactions have been identified as having potential to result in residual effects because mitigation cannot remove the interaction. Therefore, further analysis is required to determine the significance of these Project effects.

- **Economy:** Employment and business opportunities

Table 16 presents the potential interactions, proposed mitigation, and predicted residual effects of the Project.

Table 16: Potential Interactions, Proposed Mitigation, and Predicted Residual Effects

VALUED ENVIRONMENTAL COMPONENTS	POTENTIAL INTERACTION AND ENVIRONMENTAL EFFECT	PROPOSED MITIGATION	PREDICTED RESIDUAL EFFECT
Ambient Noise Levels	Elevated noise levels at adjacent and nearby receptors from construction equipment.	• As part of the Environmental Management Plan (EMP), a noise reduction plan will be established and communicated to the contractors prior to construction. • Where practical, construction activities will be planned during daylight hours to reduce noise disturbance to nearby residence. • During construction, nearby residents will be notified of the schedule for construction activities and the likely duration. • Contractors are to ensure that vehicles, tools, and equipment will be properly maintained according to emission and noise suppression standards. • Complaints related to noise from the construction will be addressed by the contractor. • Building construction will incorporate good soundproofing practises and techniques, such that outside ambient noise levels are compatible with surrounding land uses. • Operation and maintenance requirements will be undertaken in accordance with the NB DELG Approval to Operate Certificate.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.
Ambient Air Quality	Generation of dust emmissions and particulate matter from construction activities.	• A plan for handling on-site soil and construction materials will be developed. For example, soil and rock excavated on-site will be stockpiled in predefined areas at a suitable set-back distance from watercourses and wetlands. Alternatively, they will be disposed of off-site at a predetermined location with the intent to minimize the amount and duration that soil and rock are stockpiled at the site. • Monitoring of weather (wind conditions) and stabilization of stockpiles; minimize bare slopes to reduce wind-blown fine particulate matter. • Where necessary, water will be used to reduce dust. • Exposed soils will be stabilized as soon as practical.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.

	Air pollution resulting from construction and operation activity emissions.	• To reduce project-related greenhouse gas (GHG) emissions:
		  ○ Construction equipment will be turned off when not in active use;
		  ○ Equipment will be properly maintained;
		  ○ Forest area/trees will be retained where possible (as these store carbon and their removal would result in a loss of carbon sinks); and
			No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.

VALUED ENVIRONMENTAL COMPONENTS	POTENTIAL INTERACTION AND ENVIRONMENTAL EFFECT	PROPOSED MITIGATION	PREDICTED RESIDUAL EFFECT
		○ Low speed limits will be implemented for vehicles used for construction and/or operation of the Project.	
Terrain and Soils	Construction on unstable lands may increase potential for erosion.	• All necessary permits and approvals will be obtained and be carried on-site. • The Project will be sited on existing roads and disturbed areas as much as possible, thereby minimizing the need to disturb new areas. • When feasible, transporting of equipment and materials will be postponed during adverse weather or wet ground conditions to mitigate rutting, admixing, and compaction. • Upper soil materials and organic material containing seed bank and propagules will be salvaged for replacement during reclamation. • Upper soil materials and organic material will be stripped carefully to a selected depth to reduce admixing. • Stripped soil materials will be stored separate from excavated or graded subsoils to mitigate admixing, loss, and changes to soil quality. • Soil material replacement will be undertaken under dry conditions and will be evenly spread over disturbed areas. • If soil compaction occurs during reclamation, the areas may be deep-ripped to alleviate compacted soils prior to soil material replacement. • Any topsoil required during the completion of original or remediation activities, will not be sourced from agricultural lands (i.e., lands being used for agriculture, lands assessed as agricultural, or lands registered in the Farm Land Identification Program).	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.
	Changes to soil quality through disturbance to soils (i.e., soil loss, admixing, compaction) from site clearing, excavation, and grading.		No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.
Groundwater Resources	Interference drawdown in residential (domestic) wells, particularly in the Sunrise Estates Subdivision.	• Although existing hydrogeological data suggest there is little connectivity between the observation wells and production wells at the rates tested, any marginal domestic wells in the area that are hydraulically connected to this aquifer could potentially be adversely affected. Should this be the case, domestic well mitigation may require well deepening, well replacement, or connection to a municipal supply. • In the event of a complaint by a neighbouring water user that the construction or operation of this water supply well has negatively impacted the quantity of their private water supply, the proponent will need to investigate the complaint and notify the DELG. If it is determined that the proposent is responsible for any negative impacts, the proponent will be required to provide a temporary water supply for short-term impacts,	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.

VALUED ENVIRONMENTAL COMPONENTS	POTENTIAL INTERACTION AND ENVIRONMENTAL EFFECT	PROPOSED MITIGATION	PREDICTED RESIDUAL EFFECT
		or to repair, remediate, or replace any permanently impacted well(s), which might include, but is not limited to, deepening a well or drilling a new well. • Wells will adhere to applicable NB DELG *Water Well Regulation* under the *Clean Water Act*. • Operation requirements will be completed in accordance with the NB DELG Approval to Operate Certificate (under the *Water Quality Regulation – Clean Environment Act*).	
	Water quality in these nearby domestic wells may also be altered, but not necessarily degraded, by the operation of new higher capacity production wells on the Property.	• Baseline and longer-term monitoring of water levels and water quality at selected domestic wells should be undertaken by the Village to address this possibility. • Limit pumping rates from production Wells TW05-02 and TW17-01 to 1,360 m^3/d (250 USgpm) each to minimize impacts on nearby domestic water wells. • In the event of a complaint by a neighbouring water user that the construction or operation of this water supply well has negatively impacted the quality of their private water supply, the proponent will need to investigate the complaint and notify the DELG. If it is determined that the proposent is responsible for any negative impacts, the proponent will be required to provide a temporary water supply for short-term impacts, or to repair, remediate, or replace any permanently impacted well(s), which might include, but is not limited to, deepening a well or drilling a new well.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.
	Well interference and long-term acquifer yield could be affected if both production wells (TW05-02, TW17-01) are operated simultaneously.	• Operating protocol will include operation of one (1) production well at any given time. • Well interference and long-term acquifer yield would need to be evaluated (i.e., using additional testing and 3D numerical modelling) and considered in the operational plans.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.
Surface Hydology	Alteration to wetlands, vegetation, wildlife habitat, SOCC, and land uses from increased erosion following construction.	• Baseline surveys for wetlands, vegetation, and birds have been completed for the Project. • All necessary permits and approvals will be obtained and be carried on-site. • It is anticipated that most construction water requirements will be supplied by water trucks. If required, an on-site groundwater supply may be used, necessitating that a WAWA be obtained prior to withdrawing any on-site water during construction. • A WAWA permit under the Clean Water Act will be obtained prior to any work within 30 m of a watercourse or wetland. Any additional mitigations measures outlined in the terms and conditions of the WAWA will be followed.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to VEC.

VALUED ENVIRONMENTAL COMPONENTS	POTENTIAL INTERACTION AND ENVIRONMENTAL EFFECT	PROPOSED MITIGATION	PREDICTED RESIDUAL EFFECT
	Debris from grubbing operations could impact watercourses through the obstruction of drainage patterns, contamination and siltation	• On-site areas where debris from grubbing are stored will be selected to minimize any potential impacts on watercourses. All grubbed materials will be disposed of off-site in approved disposal areas. • Appropriate erosion and sediment control measures will be implemented against runoff from grubbing debris and topsoil storage areas. • Disposal areas used for grubbing materials shall not obstruct drainage patterns. Run-off from these disposal areas shall not contaminate or cause siltation of any watercourses or wetlands.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to VEC.
Fish and Fish Habitat	Alteration to fish habitat from increased sediment loading from increases in erosion.	• All necessary permits and approvals will be obtained and carried on-site. • The Project will be sited on existing roads and disturbed areas as much as possible, thereby minimizing the need to disturb new areas. • Prior to construction, a Grading Plan, Storm Drainage Plan, and an Erosion and Sedimentation Control Plan will be developed, approved, and implemented for the Project. • The Erosion and Sediment Control Plan will be designed so that landscape features outside of the Project footprint will not be altered. • Salvaged materials will be stored away from and above the high-water mark of waterbodies and watercourses. • Erosion and sediment control measures, including silt fencing, straw bale check dams and diversion channels, will be installed where appropriate in accordance with manufactures' specifications. • Erosion and sediment control measures shall be inspected and maintained during construction.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.
Fish and Fish Habitat Surface Hydrology Flora SOCC and Associated Habitats Fauna SOCC and Associated Habitats	Use of explosives can cause changes to wetlands, vegetation, wildlife, SOCC, and land use.	• On-site blasting will not be permitted.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VECs.

VALUED ENVIRONMENTAL COMPONENTS	POTENTIAL INTERACTION AND ENVIRONMENTAL EFFECT	PROPOSED MITIGATION	PREDICTED RESIDUAL EFFECT
Migratory Birds Land Use			
Terrain and Soils Fish and Fish Habitat Surface Hydrology Flora SOCC and Associated Habitats Fauna SOCC and Associated Habitats Migratory Birds	Contamination from spills and wastes from materials such as fuels and hydraulic fluids.	• A Fuel and/or Hazardous Materials Spills Contingency Plan will be developed and followed in the case of a spill event. • A Spill Response Plan will be prepared for each phase of the project, including a Response Plan for environmental emergencies that involve wildlife, and detailed information regarding: ○ measures to be taken to contain a spill and to clean up an area; ○ individuals/groups responsible for the clean-up; ○ equipment to be available to contain spills; ○ measures to be taken to prevent birds from becoming oiled (i.e. deterrents/measures to get oil off the water or land); ○ wildlife monitoring in the area (i.e. surveys); and ○ a strategy to deal with accidents where birds were oiled (i.e. discussion of rehabilitation or euthanization) and/or sensitive habitat(s) was(were) contaminated. • Dangerous goods will be stored, handled, and transported according to the New Brunswick Clean Environment Act and the Transportation of Dangerous Goods Act. • Appropriately sized spill kits will be available on-site for clean-up efforts. • All work-site activities will be conducted in a manner that minimizes the potential for spills or leaks, including regular inspection and maintenance of machinery and equipment. Spill containment structures for on-site equipment refuelling stations and fuel and oil storage will be provided. • Fueling and servicing of equipment will not be permitted within 50 m of any watercourse or wetland.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VECs.
Terrain and Soils Surface Hydrology Flora SOCC and Associated Habitats Fauna SOCC and Associated Habitats Migratory Birds	Alteration to wetlands, vegetation, wildlife habitat, SOCC, and land uses from increased erosion following construction.	• Remove silt and other accumulated debris from site drainage ditches and keep them free-flowing at all times. Dispose of removed sediment as per an Erosion and Sedimentation Control Plan. • Erosion and sediment control measures will not be removed until there is unlikely to be further erosion. • Dust control methods (i.e., watering roads) will be employed during construction of the Project to minimize wind erosion effects.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VECs.

VALUED ENVIRONMENTAL COMPONENTS	POTENTIAL INTERACTION AND ENVIRONMENTAL EFFECT	PROPOSED MITIGATION	PREDICTED RESIDUAL EFFECT
Land Use		• When during the construction period exposed soils have not been fully stabilized, weather forecasts shall be regularly monitored for extreme weather conditions. • A visual inspection of the worksite shall be conducted for signs of erosion, and implement appropriate mitigation measures if required, during and after each significant rainfall event. • In the event of a sudden and significant rainfall event or the forecast of such event, additional sediment control and erosion control materials must be readily available on-site. • Construction activities will be reduced or stopped during heavy precipitation events. Heavy precipitation is considered to be of a severity to hinder site access and clearing activities, or result in soil rutting and compaction or a threat of local flooding.	
Surface Hydrology Flora SAR/SOCC and Associated Habitats Fauna SAR/SOCC and Associated Habitats Migratory Birds	Loss/alteration of vegetation and wildlife habitat from Project construction.	• The Project will be sited on existing roads and disturbed areas as much as possible, thereby minimizing disturbance to undisturbed areas. • Siting and construction of the Project has been planned to avoid environmentally sensitive areas (i.e., critical wildlife habitat, listed plant species, wetlands, waterbodies, and watercourses, and other identified key habitat areas for bats, legally listed SAR and other SOCC, or sensitive wildlife species). • Construction will be scheduled to occur during periods of lowest sensitivity to wildlife, birds, bats, and legally listed SAR and other SOCC, where practical. • If a plant or fauna species legally listed as a SAR or other SOCC is unexpectedly encountered, the New Brunswick Department of Natural Resources and Energy Development's (NB NRED) SAR program (506-453-5873 or Hubert.Askanas@gnb.ca) will be consulted prior to commensing/resuming any activity that could harm individuals of the species or their habitat. • Should any SAR habitat (e.g., for Canada Warbler or Black Ash) be lost, conservation allowances and post-construction monitoring may be implemented in consultation with ECCC-CWS. • Vegetation will be retained, where possible, to maintain wildlife habitat. • Tree clearing and grubbing will be kept to a minimum and will only be permitted inside the Project footprint as needed. • Disturbed areas not required for Project operation will be re-vegetated with an approved, DTI Highway mix, immedately following construction.	No residual effect is anticipated because mitigation reduces potential effects, but the changes to VECs are predicted to be small and are not expected to result in significant effects to VECs.

VALUED ENVIRONMENTAL COMPONENTS	POTENTIAL INTERACTION AND ENVIRONMENTAL EFFECT	PROPOSED MITIGATION	PREDICTED RESIDUAL EFFECT
		• All workers will adhere to the ECCC *Migratory Birds Convention Act,* 1994 (MBCA) and the Migratory Birds Regulations (MBR).	
Flora SAR/SOCC and Associated Habitats Fauna SAR/SOCC and Associated Habitats	Invasive species	• Cleaning and inspecting construction equipment prior to transport from elsewhere to ensure that no matter is attached to the machinery (e.g., use of pressure water hose to clean vehicles prior to transport). • Regularly inspecting equipment prior to, during and immediately following construction in areas found to support Purple Loosestrife to ensure that vegetative matter is not transported from one construction area to another. • For seeding, native seed mix will be used, if possible. If not possible, a seed mix that does not contain invasive species will be used.	
Ambient Noise Levels Fauna SOCC and Associated Habitats Migratory Birds	Increased noise levels from construction of the Project.	• The Project will conform to existing municipal, local, and regional by-laws and regulatory requirements. • Construction will be scheduled to occur during daytime hours. • Machines will be kept in good working order and comply with applicable provincial and federal requirements. • Heavy equipment will be outfitted with mufflers to dampen noise. • Work will be conducted in a respectful manner using necessary notifications and communications regarding temporary and intermittent increases in noise during project construction. • Construction activities will follow activity restriction guidelines and set-back distances for wildlife.	Changes to VECs are predicted to be small. No significant residual effect is anticipated because mitigation reduces potential effects.
Fauna SOCC and Associated Habitats Migratory Birds	Sensory effects from the presence of the lights, noise, construction equipment, workers, and vehicles.	• Construction will be scheduled to occur during daytime hours. • Project personnel will be instructed to keep a clean work area and to not harass any encountered animals. • Drivers shall be instructed to be aware of wildlife. Where appropriate, slow speed limits will be enforced. • Equipment and vehicles will yield the ROW to wildlife.	Changes to VECs are predicted to be small. No significant residual effect is anticipated because mitigation reduces potential effects.

VALUED ENVIRONMENTAL COMPONENTS	POTENTIAL INTERACTION AND ENVIRONMENTAL EFFECT	PROPOSED MITIGATION	PREDICTED RESIDUAL EFFECT
		• Food wastes will be collected in suitable receptacles that limit attraction or impact to wildlife. • Littering and feeding of wildlife will be prohibited. • Recyclable and waste hazardous materials will be stored on-site in appropriate containers to prevent exposure and shipped off-site to an approved facility.	
Fauna SOCC and Associated Habitats Migratory Birds	Artificial light causes disorientation in birds that migrate at night and bats are sensitive to light while hunting at night; some light sources might potentially blind and disorient them.	• Construction activities will be limited to daylight hours to minimize night-time disruptions to bird and bat activity. If night work is necessary approval from the Village will be required. • Artificial light use at night will be implemented using means to minimize the potential impacts to migratory birds and bats, such as avoiding or restricting time of operation (particularly during the migratory season) • Street and parking lot lighting will be shielded so that little escapes into the sky and it falls where it is required. LED lighting fixtures will be considered, as they are generally less prone to light tresspass. • For lighting installations on structures, full cut-off lighting (i.e., no light is emitted above 90) should be used to reduce attraction to birds, wherever possible.	Changes to VECs are predicted to be small. No significant residual effect is anticipated because mitigation reduces potential effects.
Fauna SOCC and Associated Habitats Migratory Birds	Nuisance wildlife can disrupt production operation.	• Any nuisance wildlife, as identified under the *Nuisance Wildlife Resulation* (97-141) under the provincial *Fish and Wildlife Act* (O.C. 97-987), that is disrupting construction operations may only be removed by a licensed Nuisance Wildlife Control Officer or a licensed trapper.	Changes to VECs are predicted to be small. No significant residual effect is anticipated because mitigation reduces potential effects.
Fauna SOCC and Associated Habitats Migratory Birds	Destruction of migratory bird nests could affect bird populations.	• Clearing of vegetation will be completed outside of the breeding and nesting season for birds (i.e., April 8th to August 28th). If vegetation removal is proposed within the nesting season, a mitigation plan would be required in order to avoid the inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs. This would be done in consultation with the Canadian Wildlife Service (CWS) and provincial regulators. • To discourage ground-nesting or burrow-nesting species (i.e., Common Nighthawk), large piles or patches of bare soil (i.e., lay down areas) should not be left uncovered or un-vegetated during the breeding season. • Should any ground or burrow-nesting species initiate breeding activities on stockpiles or exposed areas (i.e., because they were not covered or because there was a delay	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.

VALUED ENVIRONMENTAL COMPONENTS	POTENTIAL INTERACTION AND ENVIRONMENTAL EFFECT	PROPOSED MITIGATION	PREDICTED RESIDUAL EFFECT
		between clearing and operational activities), nest surveys may be carried out by skilled and experienced observers using appropriate methodology and the Proponent will work with Canadian Wildlife Service and NB DELG to develop buffer and non-disturbance distances and zones that incorporate adaptive management. • Should an active nest of a migratory bird be found during project activities outside of the regional nesting period, measures such as establishing vegetated buffer zones around nests, and minimizing activities in the immediate area until nesting is complete and chicks have naturally migrated from the area may be implemented.	
Land Use	Construction and operation of the Project can have effects on traditional land use.	• Early and meaningful engagement with First Nations communities and all potential stakeholders will be completed for the Project and will continue during the Project. • If discovery in regard to settlement or land use occurs during the Project, activities will cease in the immediate area and the appropriate regulatory agencies will be contacted, as appropriate.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.
	Construction and operation of the Project can cause disruptions to current land use.	• Traffic flow on provincial highways or access roads may periodically be affected by Project construction activities. • Appropriate signage will be erected and traffic directing personnel will be used where required. • Good housekeeping practices will be employed and maintained through the duration of the Project activities. • All litter, garbage, and other debris generated by the Project will be collected and transported to approved disposal locations or facilities. • Disturbed areas will be recontoured and reclaimed to a stable profile to permit existing land uses. • A traffic management program will be developed for the Project to include a detailed schedule and timing of construction traffic. • Project activities will follow applicable local and provincial traffic regulations. • Road cones may be placed at designated areas and warning signs posted in roadways as required. • Heavy goods vehicles will arrive or depart the Project construction site between agreed hours only. • During construction, the approved traffic route will be kept free of mud and debris resulting from Project construction and operation activities.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.

VALUED ENVIRONMENTAL COMPONENTS	POTENTIAL INTERACTION AND ENVIRONMENTAL EFFECT	PROPOSED MITIGATION	PREDICTED RESIDUAL EFFECT
		• Debris found on the local roads will be removed regularly using road brushes and vacuum road sweepers.	
Heritage and Archaeological Resources	Destruction or alteration of heritage and/or archaeological sites. Potential discovery of all or part of an archaeological or cultural resource, or human remains.	• A HRIA has been completed for the Project and submitted on January 25, 2019 (revised on April 11, 2019). Archaeological testing and monitoring was not recommended. • If accidental discovery of heritage resources and/or archaeological materials or human remains are encountered, Archeological Services New Brunswick (ASNB) will be notified and any ASNB protocols related to accidental discovery will be followed.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.
Economy	Employment and business opportunities.	• Local communities will benefit from the development, construction, and operation of the Project. • Local and regional business communities and labour organizations will be informed of the opportunities arising from the construction, operation and maintenance of the Project.	A positive residual effect is anticipated.
Health and Safety	During construction accidents connected to construction activities may pose a physical hazard to the contract workers or the public residing or working in close proximity to the construction activities. Fire may result in damage to adjacent residential properties.	• Rubbish and waste materials will be kept at minimum quantities and burning of this material on-site will be prohibited • Waste materials will be collected on a regular basis and disposed of at an approved off-site facility. • Oily rags will be stored in approved receptacles and disposed of at an approved waste disposal facility. • Contractors will be required to comply with requirements of the New Brunswick Department of Transportation and Infrastructure's (NBDTI) Work Area Traffic Control. • Manual (WATCM), as well as, all applicable Acts, Regulations and By Laws will be enforced for traffic regulation and roadway use. • The contractor will be required to post appropriate signage prior to entering the construction areas and to facilitate passage of traffic around restricted construction areas. • Workers and operators of heavy equipment will be properly trained in order to help avoid hazardous situations. • A site specific and project specific health and safety plan will be developed for all Project construction stages.	No residual effect is anticipated because mitigation will remove the interaction and result in no measurable change to the VEC.

VALUED ENVIRONMENTAL COMPONENTS	POTENTIAL INTERACTION AND ENVIRONMENTAL EFFECT	PROPOSED MITIGATION	PREDICTED RESIDUAL EFFECT
		• Tender documents for Project construction will include a clause that the contractor will adhere to health and safety standards, procedures, policies, safe work practices, etc, as outlined in the NB Health and Safety Act. • An emergency response plan and procedures will be developed to ensure an injured person receives the necessary medical aid as quickly and as safely as possible.	

6 CLASSIFICATION OF RESIDUAL ENVIRONMENTAL EFFECTS AND DETERMINATION OF SIGNIFICANCE

6.1 APPROACH TO DETERMINATION OF SIGNIFICANCE

Assessment (or determination) of the significance of potential effects for this EIA is based on the framework and criteria provided in Canadian Environmental Assessment Agency (Agency) guidance document titled - "Responsible Authorities Guide" (Agency, 1994). *Note: An updated version is now available for Projects designated under CEAA 2012 (Agency, 2015).* The 1994 and 2015 documents are similar in nature and are widely used as guidance documents by Canadian government and regulatory agencies as the basis for determining the significance of potential effects.

Assessment of the significance of potential effects consists of determining the following steps:

- Whether the residual environmental effect is adverse;
- Whether the adverse environmental effect is significant; and
- Whether a significant environmental effect is likely.

For the purposes of the EIA Process, an environmental effect is defined as the change to VECs resulting from Project activities. A project induced change may affect specific groups, populations, or species. Induced change may result in modification of VECs in terms of an increase or decrease in its nature (characteristics), its abundance, or its distribution. Effects are categorized as either negative (adverse) or positive. Adverse effects are determined to be either significant or non-significant in terms of the assessment criteria. The detailed residual effects assessment focuses on those interactions between VECs and Project activities that are likely to cause residual effects.

6.2 CLASSIFICATION OF RESIDUAL EFFECTS AND DETERMINATION OF SIGNIFICANCE

The residual effects classification is based on the magnitude, geographic extent, duration/frequency, reversibility and ecological context and is to describe residual effects predicted for the Project. The criteria are used to describe the nature and type of an effect on VECs. The residual effects classification is then used to determine the environmental significance of Project effects to VECs.

Magnitude is a measure of the intensity of a residual effect or the degree of change caused by a Project on a VEC relative to the existing conditions. Geographic extent and duration of an effect is important in classifying magnitude for a VEC. For magnitude, the criteria are defined as follows:

- **High**: A residual environmental effect affecting a whole stock, population, habitat or ecosystem, outside the range of natural variation that may be near or exceed the resilience limits of a population or community, such that communities do not return to pre-Project levels for multiple generations. For social environment VECs, the residual effect is expected to substantially enhance or interfere with existing conditions in communities in the local area and beyond.
- **Moderate**: A small, measurable residual environmental effect affecting a portion of a population or habitat, or ecosystem, returns to pre-Project levels in one generation or less, rapid and unpredictable change,

temporarily outside range of natural variability. For social environment VECs, the residual effect is noticeable and may be potentially beneficial or detrimental to individuals and communities in the local area, but not beyond.

- **Low:** A negligible residual environmental effect affecting a specific local group, habitat, or ecosystem, returns to pre-Project levels in one generation or less, within natural variation. For social environment VECs, the residual effect is limited to a slight positive effect or nuisance to individuals or communities in the local area.
- **Nil:** No discernable change to a VEC.
- **Unknown:** A residual environmental effect affecting an unknown portion of a population or group or where the changes in a specific parameter are unknown.

Geographic extent refers to the spatial extent of the area affected and is related to the spatial distribution and movement of a VEC. When considering geographic extent in the determination of magnitude, it is important to understand that local scale effects are less severe than those that extend to the regional scale or beyond. Geographic extent is broken into local, regional, and beyond regional. It is defined as follows:

- **Local scale effects**: Largely associated with direct effects from the Project footprint (i.e., removal of vegetation for construction of Project components) and project specific small-scale indirect changes (i.e., within the Local Assessment Area).
- **Regional scale effects**: Associated with incremental and cumulative changes from the Project and other developments but are restricted to within the Regional Assessment Area.
- **Beyond regional**: Includes cumulative residual effects from the Project and other developments that extend beyond the Regional Assessment Area.

Frequency refers to how often a residual effect will occur. It is not to be confused with the frequency of the activity that causes a residual effect. Frequency is explained by identifying when the source of change and residual effect occurs. Frequency is broken into the following categories:

- **Infrequent**: Isolated or confined to a discrete period.
- **Frequent:** Occurs repeatedly over the assessment period.
- **Continuous**: Occurs continuously over the assessment period.

Duration is defined as the amount of time measured from when a residual effect on a VEC commences, to when the residual effect on a VEC is reversed. Duration is the results of two (2) factors, the time occurring between the start and end of a project activity that causes stress on a VEC, and the time required for the stress effect to be reversible.

The duration of individual Project activities and the period in which the residual effect may occur are considered. Some effects are reversible shortly after the stress has been removed (i.e., changes in the distribution of some wildlife species following the removal of noise after decommissioning and abandonment). However, other effects may take longer to be reversed (i.e., the change in abundance of some species until re-vegetation has occurred). In some cases, a prediction of duration may be well beyond the temporal boundary of the Project, it is not known when those effects may be reversed, and a VEC may never return to a state that was unaffected by the Project. For these cases, the likelihood of reversibility is so low that the effect is classified as irreversible.

Duration is broken into the following categories:

- **Short-term**: The residual effect is reversible at the end of construction.
- **Medium-term**: The residual effect is reversible at the end of operation of the Project.
- **Long-term**: The residual effect is reversible within a defined length of time where prediction certainty can predict the effect is reversible after decommissioning and abandonment.
- **Permanent**: The residual effect is predicted to influence a VEC indefinitely. This is applied when an effect is determined to be irreversible.

Reversibility is considered as the likelihood that the Project will no longer affect a VEC, as well as, the ability of a VEC to return to an equal or improved condition once the interaction with the Project has ended. Reversibility has two (2) states, either reversible or irreversible. A reversible state is applicable to short, medium and long-term duration residual effects, where the Project no longer causes changes to a VEC. An irreversible state is applicable to when the residual effect is predicted to influence a VEC indefinitely, or when the duration of an effect is unknown.

For adverse residual effects, the evaluation for the individual criteria will be combined into an overall prediction of significance as follows:

- **Significant:** Potential residual effect could jeopardize the long-term sustainability and decrease the resilience of the resource, such that the residual effect is considered sufficient in magnitude, geographic extent, duration, and frequency, as well as, being considered irreversible. Additional research, monitoring, and/or recovery initiatives should be considered.
- **Not-significant:** Potential impact could result in a decline of a resource's quality and/or quantity. The impact is considered measurable at the local level in its combination of magnitude, geographic extent, duration, and frequency, but does not affect or increase risk to the long-term sustainability of the resource. As such, the potential impact is considered reversible.

Additional research, monitoring, and/or recovery initiatives may be considered. For residual effects of the Project to have a significant effect on VECs, individuals would have to be affected to the extent that there would be a permanent adverse change to survival and reproduction at the population or community level.

6.3 RESIDUAL EFFECTS TO THE LOCAL ECONOMY

The Project will have a significant positive residual effect on the social environment relating to employment and business opportunities (see Table 16). For the Project to proceed, people are required to staff the Project, which will result in income and training opportunities. Project construction and operations will create jobs and generate income. Employees typically spend their incomes where they live, thus indirect benefits will also occur during the Project. It is anticipated that most of the construction workforce will be hired locally. The Project will result in increased training and experience in the labour force, which will have a positive effect on future construction projects. Project spending will result in increased gross domestic product and Project operations will generate tax revenue for municipal, provincial, and federal governments.

Table 17 provides a summary of the associated residual effects classification and predicted significance.

Table 17: Summary of Residual Effects Classification and Predicted Significance

POTENTIAL INTERACTION AND RESIDUAL ENVIRONMENTAL EFFECT	MAGNITUDE	GEOGRAPHIC EXTENT	FREQUENCY	DURATION	REVERSIBILITY	SIGNIFICANCE
Employment and business opportunities	Moderate	Local	Continuous	Long-term	Irreversible	Significant positive effect

6.4 CUMULATIVE RESIDUAL EFFECTS

Cumulative residual environmental effects are defined as the sum of residual environmental effects from all past, current, and reasonably foreseeable projects and/or activities on the physical, biological, social and cultural components of the environment. In addition, natural disturbances such as fire, floods, insects, disease, and climate change can contribute to cumulative residual environmental effects.

The Project will implement mitigation practices to limit any incremental environmental effects that will occur due to the Project. Mitigation implementation is expected to result in minor changes to the biophysical and socio-economic environments relative to baseline conditions. Effects on VECs from surrounding land use are not expected to overlap with effects on VECs in the local area. As such, no cumulative residual environmental effects are expected. As the Project progresses, the Proponent will develop site-specific mitigation measures to further reduce the potential for cumulative environmental effects.

7 FIRST NATIONS AND PUBLIC INVOLVEMENT

Section 6 of the Guide to Environmental Impact Assessment in New Brunswick (NB DELG, 2018) requires engagement of First Nation communities and the public as part of the EIA process. The overall goal of engagement is to inform those potentially affected by the Project of the proposed Undertaking, including providing sufficient information and details that will enable them to express any concerns they may have.

The Village of New Maryland is committed to effective stakeholder consultation, including maximizing Project support by seeking ongoing Project acceptance and approval from local community members and other stakeholders. The Village of New Maryland is committed to undertaking activities to ensure goal of engagement is achieved.

All First Nation and public engagement completed for the Project will be summarized in a Public Consultation Report for submission to DELG later in the EIA Process.

7.1 OBJECTIVES

As outlined in Section 6 of the *Guide to Environmental Impact Assessment in New Brunswick*, "public" includes all stakeholders (i.e., individuals, companies, agencies, organizations, and interest groups) who may be affected by the proposed Project. This includes stakeholders who may have local knowledge of the proposed Project location regarding Project siting and/or design impacts.

To date, the Proponent has commenced with engaging First Nation communities by means of a notification letter (see Section 7.5). The Proponent has not yet engaged with other stakeholders but will undertake to inform them of specific Project details at a future date.

7.2 WELLFIELD PROTECTION IMPACTS TO STAKEHOLDERS

The Village of New Maryland recognizes that the development of a new wellfield could negatively impact Village residents who currently own property and/or live within the wellfield protection zones. Presently, the wellfield protection zones have not been established. As the EIA Process progresses, the Village of New Maryland is committed to ensuring that potentially affected stakeholders are notified early in the process of the wellfield protection zone impacts.

7.3 PUBLIC MEETINGS AND INFORMATION SESSIONS

Public information meetings will be held in the local community to share Project information, solicit feedback (i.e., comments, questions, concerns) from the Village and surrounding community residents, and respond to comments, questions and concerns received from information meeting participants.

7.4 NOTIFICATIONS AND COMMENTS

Representatives of the First Nations of the Wolastogey Nation in New Brunswick (WNNB) were initially informed of the proposed Undertaking, including its location, by e-mail correspondence on April 23, 2019 (see Appendix D). The following representative contacts were provided by Michelle Daigle, Director, Engagement & Consultation, Aboriginal Affairs Secretariat:

- Chief Tim Paul, Woodstock First Nation;
- Chief Gabriel Atwin, Kingsclear First Nation;
- Chief Shelley Sabattis, Oromocto First Nation;
- Chief Patricia Bernard, Madawaska Maliseet First Nation;
- Chief Alan Polchies Jr., St. Mary's First Nation;
- Chief Ross Perley, Tobique First Nation.

The following is a summary of WNNB engagement correspondence generated to-date as follow-up to the April 23, 2019 e-mail (which included a letter of introduction, project overview, and location drawing):

- May 9, 2019 follow-up response from WNNB (Gordon Grey, EIA Coordinator) to Village (Cynthia Geldart, CAO/Clerk) requesting additional details regarding proposed locations of water supply wells, water treatment facility, current water storage reservoir, and proposed water supply and distribution pipelines to assist in determining elevated archaeology potential.
- May 13, 2019 follow-up response from Village (Cynthia Geldart, CAO/Clerk) to WNNB (Gordon Grey, EIA Coordinator) - Village to forward its sub-consultant's HRIA report once it has been received/finalized, as well as, additional requested information once its Consultant's report is completed. The Village also offered to arrange a meeting among representatives of the Village, WNNB, and WSP to discuss Project details and specific concerns.
- June 12, 2019 follow-up response from the Village (Cynthia Geldart, CAO/Clerk) to WNNB (Gordon Grey, EIA Coordinator) provided a revised drawing issued by WSP showing the details regarding previously requested information. This information did not include the HIA report, as it was not available at that time.
- June 21, 2019 follow-up response from the Village (Cynthia Geldart, CAO/Clerk) to WNNB (Gordon Grey, EIA Coordinator) provided a copy of the Village's official funding application submitted to the Infrastructure Bilateral Agreement for the Investing in Canada Infrastructure Program (IBA ICIP).
- June 28, 2019 follow-up response from the Village (Cynthia Geldart, CAO/Clerk) to WNNB (Gordon Grey, EIA Coordinator) provided a copy of the HRIA report.
- June 28, 2019 follow-up email correspondence from the Village (Cynthia Geldart, CAO/Clerk) to each First Nations contact noted above. This correspondence provided supplemental Project information, including: Expression of Interest Form for the IBA ICIP (see Appendix D); HRIA Final Report (see Appendix C, Sub-Appendix C-3); Project Overview and Supplementary Information Document (see Appendix D).
- July 2, 2019 email response from Russ Letica (Madawaska Maliseet First Nation) confirming receipt of the Village's (i.e., Cynthia Geldart, CAO/Clerk) email and stating that they would be responding through the WNNB.

To-date, no additional comments have been received on the initial April 23, 2019 written correspondence or supplementary information provided in the follow-up June 28, 2019 correspondence.

Project notifications will be placed on the Village of New Maryland's website, Facebook page, public information sign (i.e., at the Village's north boundary), and through Twitter to offer information regarding the Project.

7.5 REGULATORY CONSULTATION

Provincial Departments that have been contacted through e-mail and/or telephone communication include:

- Shawn Hamilton – Project Manager, NB DELG Environmental Impact Assessment Branch
- Mallory Gillis – NB DELG, Hydrogeologist
- Sarah Arnold – Wellfield Protection Project Manager
- Michelle Daigle – Director, Engagement and Consultation, Aboriginal Affairs Secretariat
- Cynthia Geldart – Chief Administrative Officer/Clerk (Village of Maryland)

7.6 FIRST NATION – DUTY TO CONSULT

Following the submission and subsequent review of this preliminary document, WSP will be in contact with the Aboriginal Affairs Secretariat (AAS) to determine the Duty of Consult status and the recommended consultation program.

8 FUNDING

The proposed project is being funded by the Village of New Maryland. The Village has applied for additional project funding through the Investing in Canada Infrastructure Program (ICIP), a federal program designed to create long-term economic growth, build inclusive, sustainable and resilient communities and support a low-carbon economy. The ICIP is a cost-shared infrastructure funding program established between the federal government, provinces, territories, municipalities and other recipients. Contact information for Project participants involved in the funding partnership, should ICIP funding be approved, is:

Village of New Maryland
584 New Maryland Hwy.
New Maryland, New Brunswick
E3C 1K1

Province of New Brunswick
Department of Environment and Local Government
20 McGloin Street
Fredericton, NB
E3A 5T8

Province of New Brunswick
Regional Development Corporation
P.O. Box 6000
Fredericton, NB
E3B 1E9

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