



**COMBINED COTW & COUNCIL AGENDA
THURSDAY AUGUST 15, 2024 AT 7:00 PM
Council Chambers Stewiacke NS**

Before we begin our meeting, we would like to acknowledge that Stewiacke is in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq people.

1. Call to Order
2. Attendance
3. Approval of / Changes to Agenda
4. Disclosure of Interest on Agenda Items
5. Approval of Minutes
2024-07-25 Combined COTW & Council Minutes
6. Announcements / Proclamations
7. Presentations
 - i. MNP Financial Services – RE: 2023 Audited Financial Statement
Darren Chaisson, Darren Chiasson, CPA, CA PARTNER, BUSINESS ADVISOR
 - ii. WSP Engineering – Phase 4 Concept Design Report (Town Water)
Stephen R. Pyke, M.A.Sc., P. Eng. Senior Environmental Engineer
8. Written Petitions and Correspondence
9. Business



**COMBINED COTW & COUNCIL AGENDA
THURSDAY AUGUST 15, 2024 AT 7:00 PM
Council Chambers Stewiacke NS**

- a. Staff Reports
 - i. CAO Report
 - ii. 2023 Audit - Consolidated Financial Statements
 - iii. Town Hall Updates
 - iv. Town Of Stewiacke Water Infrastructure and Supply

10. By-laws and Policies

11. Citizen Comments

12. Mayor Report

13. Councillors Reports

14. In-Camera Session
 - i. Personnel Matters

15. Notice of Motion and Reconsideration

16. Adjournment



To: Town Council
From: Marc Seguin, CAO
Re: CAO Report
Date: August 15 ,2024

The following is a list of general updates from the office of the Chief Administrative Officer as of August 15, 2024.

This report is submitted to Council as information only.

2024 Municipal Election:

Town Staff continue to make the necessary preparations for the 2024 Municipal Election, which will take place on October 19th, 2024.

As a reminder, voting will take place online and in person. The online portion will be completed by Intelivote Systems Inc.

Since Councils last update, Staff have received two updates from the province. The updates included:

- 1) Further information about the new Council Code of Conduct – **Please see appendix to this report for full details as provided by the Province of Nova Scotia**
- 2) Information pertaining to the Department of Municipal Affairs and Housing will be offering a training and orientation program for new and returning elected officials.



Training for Members of Council

The Department of Municipal Affairs and Housing will be offering a training and orientation program for new and returning elected officials. This year, they will offer the program in person at the Halifax Convention Centre, 1650 Argyle Street (<https://www.halifaxconventioncentre.com/>) in downtown Halifax!

All Candidates are asked to Please save the dates of November 4th and 5th in your calendars. You will be required to pre-register, so keep an eye out for additional details in the coming weeks. The sessions will begin at 12:00 noon on the 4th and conclude at 4:00 pm on the 5th.

A DRAFT schedule for the training has been placed in election candidate packages.

Advertising for Election

Staff continue to advertise the 2024 Municipal Election. As a reminder to the public the following two advertisements have been sent out in the August Newsletter and a separate election specific mailing has been sent out to each household in the Town of Stewiacke electoral boundary by Canada Post.

NOTICE NOMINATIONS OPEN Municipal Election

TAKE NOTICE that the undersigned will accept nominations for the following offices in the Town of Stewiacke for which an election will be held on the 19th day of October 2024:

One Mayor and four Councillors elected at large.

AND TAKE NOTICE that a nomination shall be filed at the office of the Returning Officer, 295 George Street between 9 am and 4 pm on nomination day which is Tuesday, September 10th, 2024 or by appointment during office hours in the seven (7) business days preceding nomination day.



Janet Fryday Dorey, Returning Officer
Telephone: 902-805-3394
E-mail: 2024election@stewiacke.net

Specific to revisions required to the preliminary list of electors, the following ad will be circulated.

**TOWN OF STEVIACKE
REVISIONS TO THE PRELIMINARY LIST OF ELECTORS
Municipal Election
October 19, 2024**

The preliminary lists of electors have been prepared for the upcoming election. The revising officer(s) may make additions or corrections to the lists upon application by telephone, fax, e-mail, mail or in person. Electors may find out if they are on the list of electors by:

(1) Visiting the municipal office between the hours of 2:00pm – 8:00 pm on Wednesday's August 7th, 14th, 21st and 28th, 2024 @ 295 George Street, Stewiacke, NS.

(2) Contacting the returning officer by:
Telephone: 902-805-3394
E-mail: 2024election@stewiacke.net

You will be asked for your name, your address and your date of birth.

RCMP

No policing matters have been brought forward.

PAC Meeting

The PAC met in July, following receipt of Council comments questions and the presentation by WSP at this evening's meeting of Council a special Public Meeting will be called to address the water supply at the Town and options to consider for future development.

Riverside Dr. Project

Town of Stewiacke | 295 George Street | P.O. Box 8 | Stewiacke, NS B0N 2J0
Office 902-639-2231 | Fax 902-639-2221 |



Progress continues on the Riverside Dr. project. A temporary detour is planned in the area due to the construction. FIRE, EMS and Police services have been made aware.

At the time of writing this report a necessary water shut-off is planned for Monday August 12 from 8pm to midnight. Dexter has hand delivered notices to impacted properties. Additionally, Town Staff have provided information on the Towns web site and social media accounts.

Recreation Update:

A thank you was sent out publicly from the Committee Chair, Pam Osbourne.

On behalf of your 2024 Stewiacke Town Days committee, we extend a huge thank you to everyone who participated in our jammed packed three day event.

Mother Nature cooperated this year bringing the sun and the heat!

As with any event, it would not be possible without the support and help from our many volunteers and sponsors. Thank you to each of them.

We hope you had fun this year and we look forward to next year!

Councillor Pam Osborne
Chair, 2024 Stewiacke Town Days Committee

TOWN *back to the* 80'S DAYS

Thursday, August 1st

10:30am: Traveling Puppet Show @ Stewiacke Community Centre



Friday, August 2nd

10am-12pm: Card Party @ Legion

11:00am: Teddy Bear Picnic @ Dennis Park

5:00pm-7:00pm: Foam Party Sponsored by Stewiacke Home Hardware @ Dennis Park

6:00pm: Ball Tournament @ Stewiacke Rec Grounds

7:00pm: Trivia @ Whistlers

7:00-9pm Variety Concert @ Community Center (Monetary donation in support of Pine Grove Cemetery is recommended at the door)

7:30pm: Sunset Tour @ Shubenacadie Wildlife Park

(Pre register) wildlifeparkbooking@novascotia.ca

10:00pm: Fireworks Sponsored by Stewiacke Tim Hortons @ Rec Grounds
(Rain Date - Aug. 4th @ 10pm)

Saturday, August 3rd

8:00am: Ball tournament @ Stewiacke Rec Grounds

8:00am-10:00am: Breakfast @ Legion

9:00am Fun Run: @ Stewiacke Rec Ground

9am-1pm Farmers Market: @ Big River Café

9:30am: K9 Hi Flyers @ Dennis Park

10:30am: Grand Street Parade Sponsored by Stewiacke Foodland

11:30am: Welcome & Cake @ Dennis Park

11:30am-2:30pm: Food & Fun @ Dennis Park (BBQ until 2pm)

- BBQ, Drinks & Games of Chance Sponsored by Foodland
- Air Brush Tattoos & Bouncers Sponsored by B.J. Electric Motor & Control Limited

11:30pm-3:30pm: Music with Jason Judah Taylor Band @ Dennis Park, sponsored by MGM Architectural Aluminum & Glass (Will be held at Lifepoint Church in the event of inclement weather)



Saturday, August 3rd (Continued)

- 2:00pm - 4:00pm:** Summit Storage Vineyard Open House - bring your own picnic!
6:00pm-8pm: Teen Night @ Dennis Park, sponsored by MGM Architectural Aluminum & Glass and Mastodon Ridge
6:00pm-9:00pm: Live Music featuring Darren Howse @ Whistlers

Sunday, August 4th

- 8:00am:** Ball Tournament @ Rec Grounds
9:30am-10:30am: Mini Golf Senior Special @ Mastodon Ridge
10:00am Lifepoint Church Sunday Service in Dennis Park
10:00am-1pm: Buffet Breakfast @ Whistlers
11:00am-3pm: Music with Dale Grace @ Mastodon Ridge
12:30pm-2:30pm: Touch a Truck @ Community Centre
1:00pm-3:00pm: Celebrate Stewiacke's Birthday with History @ Stewiacke Community Centre
1:00pm: Washer Toss @ Stewiacke Recreation Grounds
2:00pm - 5:00pm Music @ Coldstream Distillery Feat. Mike McGrath

On behalf of the Stewiacke Town Days committee, we are excited to share a jammed packed, fun filled weekend to celebrate Stewiacke!

A few highlights are our Town Days Fireworks on Friday night; Grand Parade on Saturday morning, Teen night, and the popular Touch a Truck and Stewiacke History Display are back on Sunday!

Town Days couldn't be possible without the help of our many sponsors and volunteers.

We hope you have a terrific time celebrating with family and friends!

Happy Town Days!

**~ Councillor Pam Osborne
Chair, Town Days Committee**

STEWIACKE
RIVERS OF OPPORTUNITY



HALF WAY BETWEEN THE EQUATOR & THE NORTH POLE

Tim Hortons



THANKFUL FOR ALL OF OUR SUPPORTERS



Marc Seguin

Marc Seguin
Chief Administrative Officer



Friday, August 9, 2024

RE: Council Code of Conduct – Information for 2024 Municipal Election Candidates.

Dear Municipal Election Candidate:

On Friday August 9, 2024 the Town received correspondence from the Honourable John A. Lohr Minister of Municipal Affairs and Housing pertaining to the Council Code of Conduct.

A request was made by the Minister to share information regarding the Code of Conduct with all 2024 Municipal Election candidates. Therefore the Town of Stewiacke is sharing this information with the public and is including it in all 2024 Municipal Election Candidate packages.

The code of conduct framework will be coming into effect following the October municipal election. The legislative provisions require municipalities and villages to adopt a code of conduct consisting of the model code of conduct as outlined in the regulations.

As Minister, the Honourable John A. Lohr will prescribe that all municipalities and villages must adopt the model code of conduct within 60 days following the October election and provide confirmation of their notice of adoption. Should a municipality or village fail to meet the above requirements, municipal funding will be withheld pursuant to the *Municipal Grants Act*.

As one of the first items to discuss on the agendas of newly elected Council, the Minister has provided detailed information for Candidates, so that there is an unequivocal understanding of the conduct to uphold as an elected official in Nova Scotia.

Regards,

A handwritten signature in black ink, appearing to read 'Marc Seguin', with a stylized flourish at the end.

Marc Seguin
Chief Administrative Officer

Town of Stewiacke | 295 George Street | P.O. Box 8 | Stewiacke, NS B0N 2J0
Office 902-639-2231 | Fax 902-639-2221 | Email kmatheson@stewiacke.net

Appendix A: Recommended Prescribed Code of Conduct

The recommended prescribed code of conduct would be applicable to all municipalities and villages with separate codes being developed to reflect the difference in terminology (e.g. village versus municipality, Chief Administrative Officer versus Clerk).

Code of Conduct shall apply to elected officials from the time that they are declared elected until:

- a) their resignation;
- b) their disqualification while in office; or
- c) their successor is sworn into office, or, if there is no successor, until the meeting at which the successor would have been sworn into office if there was a successor

The guiding principles to be included are:

- a. Collegiality – members of council will work together to further the best interests of the municipality in an honest and honourable way.
- b. Respect – members of council will demonstrate respect towards one another, the democratic decision-making process, and the role of staff.
- c. Integrity – members of council are expected to act lawfully and adhere to strong ethical principles by giving the municipality or village interests priority over private individual interests.
- d. Professionalism – members of council will create and maintain an environment that is respectful and free from all forms of harassment, including sexual harassment and discrimination. They must show consideration for every person's values, beliefs and contributions, and supporting and encouraging others to participate in council activities.
- e. Transparency – members of council will be truthful and open regarding their decisions and actions and make every effort to accurately communicate information openly to the public.
- f. Responsibility – members of council are responsible for the decisions that they make and must be held accountable for their actions and outcomes. They must demonstrate awareness of their own conduct and consider how their words or actions may be perceived as offensive or demeaning.

General Conduct

- Members of Council must be truthful and forthright, and not deceive or knowingly mislead Council, the CAO, or the public.

- Members of Council will respect the presiding officers, colleagues, staff and members of the public that present during the council meeting or other proceedings/meetings of the municipality.
- Members of Council will adhere to procedure and direction of presiding officers in respect to rules of procedure.
- Members of Council must conduct Council business and all of the member's duties in an open and transparent manner, other than for those matters which Council is authorized by law to deal with in private.
- Members of Council must ensure that they are not impaired by alcohol or drugs while attending any meeting of the municipality.

Confidential Information

- No Member of Council will disclose or release by any means to any member of the public, any confidential information acquired by virtue of their office, in either oral or written form, except where required by policy or law or authorized by the Council to do so.
- No Member of Council will use confidential information for personal or private gain or for the gain of any other person or entity.
- Members of Council should not access or attempt to access confidential information in the custody of the municipality unless the information is necessary for the performance of their duties and its access is not prohibited by legislation or by the by-laws or policies of the Municipality.
- Members of council must not discuss any matters relating to an active investigation under this Code of Conduct with anyone other than the investigator or their own legal representative, unless required by law.

Gifts and Benefits

- No Member of Council shall accept a fee, advance, cash, gift, gift certificate or personal benefit that is connected directly or indirectly with the performance of their duties of office, except for the following:
 - i. gifts or benefits that normally accompany the responsibilities of office and are received as an incident of protocol or social obligation;
 - ii. a suitable memento of a function honouring the member of Council;
 - iii. sponsorships and donations for community events organized or run by a member of Council or by a third party on behalf of a member of Council;
 - iv. compensation authorized by the municipality.

- A fee or advance paid, or a gift or benefit provided, with the Member's knowledge, to a person closely connected to a member is deemed to be a gift to the Member of Council.

Use of Municipal Property, Equipment and Services

- No Member of Council shall use, or request the use of, any municipal property, including surplus material or equipment for personal convenience or profit, unless the property is:
 - i. available for such use by the public generally and the member of Council is receiving no special preference in its use; or,
 - ii. made available to the member of Council in the course of carrying out council activities and duties.
- No Member of Council shall use, or request the use of, for personal purpose any municipal property, equipment, services, supplies or other municipally-owned materials, other than for purposes connected with the discharge of municipal duties.
- No Member of Council shall obtain, or attempt to obtain, personal financial gain from the use or sale of municipally-developed intellectual property.
- No Member of Council shall use information, or attempt to use information, gained in the execution of their duties that is not available to the general public for any purposes other than carrying out their official duties.
- No Member of Council, or person closely connected to a member, shall tender on such items such as the sale of older and extra equipment.

Building, Development, Planning, or Procurement Proposals before Council

- No Members of Council shall solicit or accept support in any form from an individual, group or corporation, with any building, development, planning, or procurement proposal before Council.

Improper Use of Influence

- No Member of Council shall use the influence of their office for any purpose other than for the exercise of their official duties.

Business Relations

- No Member of Council shall allow the prospect of their future employment by a person or entity to affect the performance of their duties to the municipality.
- No Member of Council shall borrow money from any person who regularly does business with the municipality, unless such person is an institution or company

whose shares are publicly traded and who is regularly in the business of lending money.

- No Member of Council shall act as an agent of a person or entity before Council or a committee of Council or any agency, board or committee of the municipality.

Employment of Persons Closely Connected to Members of Council

- No Member of Council shall attempt to influence any municipal employee to hire or promote a person closely connected to the member.
- No Member of Council shall make any decision or participate in the process to hire, transfer, promote, demote, discipline or terminate any person closely connected to the member.

Fairness

- No Member of Council shall give special consideration, treatment or advantage to any individual or entity beyond that which is accorded to all.
- No Member of Council shall give special consideration, treatment or advantage to an organization or group due to the member or person closely connected to the member being involved with or a member of the organization or group.

Adherence to Policies, Procedures, Bylaws and Other Laws

- Members of Council will adhere to the Code of Conduct.
- Members of Council will adhere to the applicable national and provincial legislation.
- Members of Council will adhere to the procedures, policies and bylaws of the municipality.
- Members of Council will adhere to the expense and hospitality policy of the municipality.

Respect for Council as a decision-making body

- A Member of Council must abide by and act in accordance with any decision made by Council, whether or not the member voted in favour of the decision.
- Members of Council must not encourage non-compliance with a statute, regulation, bylaw, policy or procedure.

Communicating on behalf of Council

- A Member, other than the Mayor/Warden, must not claim to speak on behalf of Council unless the member has been authorized to do so.
- The Mayor/Warden/designated individual may speak on behalf of Council and must make every effort to convey the intent of Councils' decision accurately.

Interactions of Council with Staff and Service Providers

- Members of Council must respect the role of the CAO as head of the administrative branch of government of the municipality and must not involve themselves directly in the administration of the affairs of the municipality, including, without limitation, the administration of contracts.
- No Member of Council shall direct, or attempt to direct, the CAO, other than through a direction provided by the Council as a whole.
- Members of Council shall be respectful of the role of CAO and municipal employees to advise based on political neutrality and objectivity and without undue influence from any individual member or faction of the Council.
- Members of Council must not direct or influence, or attempt to direct or influence any municipal employees in the exercise of their duties or functions.
- Council cannot direct municipal employees except through the CAO.
- Members of Council are not to issue instructions to any of the contractors, tenderers, consultants or other service providers to the municipality.
- No Member of Council shall require or request that a municipal employee undertake personal chores or tasks for the Council member unrelated to municipal business.
- Members of council shall refrain from making public statements that are critical of specific and/or identifiable municipal employees and/or service providers.

Respectful Interactions

- A Member of Council must not engage in discrimination or harassment on the grounds articulated in the Human Rights Act of Nova Scotia.
- A Member of Council must not sexually harass any person.
- A Member of Council must not engage in any discriminatory or harassing action or conduct, verbal or non-verbal, directed at one or more individuals or groups that creates a poisoned environment.

Reprisal

- A Member must not undertake any act of reprisal or threaten reprisal against a complainant in a matter under this Code of Conduct or any person providing relevant information in relation to a matter under this Code of Conduct.

Appendix B: Recommended Sanctions Framework and Possible Sanctions to be imposed

Sanctions Framework:

A Council or Commission shall consider all of the following criteria prior to imposing a sanction or sanctions:

1. The nature of the code contravention;
2. The length or persistence of the code contravention;
3. If the member intentionally contravened the code of conduct;
4. Has the member taken any steps to remedy the contravention;
5. If the member previously contravened the code of conduct;
6. Any external factors that exist to the member's contravention (e.g. family situation, mental health); and
7. The resources the member will need to complete their job.

Sanctions:

1. Member will receive a letter of formal reprimand or warning, as directed by council.
2. Member will issue a letter to include acknowledgement of breach of code and an apology within 15 days.
3. Require the member to attend training, appropriate to the incident, as directed by council.
4. Censure the member publicly.
5. Limit the member's access to certain local government facilities, equipment and/or property.
6. Suspending or removing the member as deputy head of council and/or the chair of a committee, if applicable.
7. Suspending or removing the member for no longer than 6 months from some or all committees and/or boards.
8. Impose a limit on the member's participation on behalf of the municipality.
9. Impose a limit on the member's travel and/or expense reimbursement on behalf of the municipality.
10. Impose a fine on the member for up to \$1,000 per occurrence, which is to be paid no later than 6 months from the decision of council and to be collected in the same manner as other taxes.
11. Impose an appropriate reduction in remuneration to the member for no longer than 6 months.
12. Make member repay any direct monetary loss realized by the municipality as a result of the member's action in any amounts determined by the investigator.
13. Make member repay any direct monetary gain they obtained from their actions in any amounts determined by the investigator.

Appendix C: Recommended Complaint and Investigator Process

1. Municipality or village will appoint a person or entity other than a Council Member or an employee of the municipality to receive and investigate complaints.
 - a. The person or entity appointed must have experience in conducting investigations and in applying the principles of natural justice and procedural fairness. No conflict of interest can exist between the investigator and the parties involved.
 - b. Municipalities must include the investigator's contact information on their publicly accessible website.
2. A complaint must be submitted to the investigator no later than 6 months from discoverability.
 - a. Any complaints brought forward during the municipal election period of nomination day until ordinary polling day will not be investigated until the election has concluded.
3. When a complaint is received by the investigator, the investigator shall notify the CAO/clerk of the fact that a complaint has been received.
4. Investigator will determine if there is validity to the complaint. If no validity, then complaint can be dismissed.
5. If the investigator finds that the complaint is valid, the investigator shall notify the member who is the subject of the complaint that a complaint has been made about them, and it is proceeding to an investigation.
6. The investigator will begin their investigation and notify Council/the Commission through a confidential email or in camera of the fact that a complaint is proceeding to the investigation phase.
7. The investigator shall protect the confidentiality of the complainant, the subject(s) of the complaint, and all persons involved in the investigation, to the greatest extent possible, while still applying the principles of natural justice and ensuring procedural fairness.
8. The investigator shall present a report to Council, no later than 6 months from the time the complaint is brought forward, on the investigation and include a

recommendation regarding the validity of the complaint and, if applicable, a recommendation regarding an appropriate sanction.

- a. If complaint is brought forward during the municipal election period of nomination day until ordinary polling day it will not be investigated until the election has concluded. Investigations already in progress at the time of nomination day will continue;
 - b. Council may grant the investigator an extension on when the report can be brought to council for extenuating circumstances, including a delay during a municipal election period;
 - c. Council is able to discuss the investigators report in camera; and
 - d. The member who had the complaint lodged against them will have the opportunity to review and respond to the information in the investigator's report, and make submissions to Council, prior to the Council's vote.
9. Council determines if a breach occurred and determines the sanction(s) to impose. If a councillor is the subject of the complaint or has made the complaint under the Code the councillor shall:
- a. In the case of a closed meeting, leave the room in which the meeting is held
 - b. In the case of a public meeting, either leave the room or remain in the room in the part of the room for general public; and
 - c. Refrain from voting on any question relating to the matter
10. Any breach of the code determined by councils shall automatically retrigger the required Code of Conduct training.
11. The section under the Code of Conduct the complaint was lodged and the investigators recommendations are made public.
12. The decision or penalty of Council/Commission on a Code of Conduct matter is final and binding on all parties.

Proposed Recommendations from Code of Conduct Working Group

The Code of Conduct Working Group (COCWG) has developed their proposed recommendations for the code of conduct regulations for the Department of Municipal Affairs and Housing (DMAH) to review. The 25 recommendations below reflect the consensus opinion from the COCWG.

Application:

- There should be one code for all municipalities and villages.
- The code of conduct should operate together and as a supplement to other applicable laws, including the bylaws and policies with the municipality or village.
- The code of conduct should apply to elected officials at all times with respect to their behaviour regarding any action that negatively impacts the municipality or tarnishes its reputation.
- Nothing in the code of conduct is intended to silence elected officials from sharing or expressing dissenting opinions.
- The code of conduct should apply from the time elected officials are declared elected until their resignation, their disqualification, or their successor being sworn into office.

Content to include:

- The code will include 45 provisions under various headings (e.g. general conduct, confidential information, etc.) See Appendix A for detailed provisions.
- 13 possible sanctions that can be imposed on a member for breaching the code of conduct. See Appendix B for the sanctions.
- 7 considerations elected officials shall evaluate before they can impose a sanction. See Appendix B for detailed considerations.
- Failure to comply with a sanction imposed is considered a breach of the code itself and will go to council with the investigator's recommendation only.

Complaint and investigator process:

- Municipalities and villages will appoint an investigator and have their contact information readily available on their website. See Appendix C for detailed complaint and investigator process.
- Investigators should have experience in conducting investigations, and experience applying the principles of natural justice and procedural fairness.
- No conflict of interest can exist between the investigator and the parties involved.
- A complaint can be submitted no later than 6 months from discoverability.
- The CAO/Clerk shall be notified by the investigator that a complaint has been received and Council/Commission shall be notified if a complaint makes it to the investigation stage.

- The investigators report shall be brought to council/commission no later than 6 months from the time the complaint is received by the investigator. Extensions may be granted by council/commission for extenuating circumstances.
- Any complaints brought forward during the municipal election period between nomination day and ordinary polling day will not be investigated until the election has concluded.
- A member who has a complaint lodged against them will be able to review and respond to the information in the investigators report prior to council's vote.
- A member who has had a complaint lodged against them, or who has made the complaint, may not participate in the vote on whether there was a breach, and if applicable, may not participate in the decision regarding what sanction to impose.
- The Code of Conduct will state that a decision of a Council on a code of conduct matter is final and binding on all parties.
- At the conclusion of the investigation, require public disclosure of the section a complaint was lodged under, and the investigator's recommendation.

Training:

- Elected officials should be required to complete the training within 30 days of being sworn into office and failure to do so is considered a breach of the code itself and may go to council without an investigation.
- Any breach of the code determined by council shall result in additional code of conduct training for the person who committed the breach.
- Training to be developed and delivered in an online module format with quizzes and a minimum pass rate to ensure a minimum level of understanding.

Review:

- A review on the code of conduct shall begin 3 years post implementation to consider the effectiveness for municipal elected officials.
- Review the Municipal Elections Act (MEA) to see if there is potential to reduce the gap between the sanctions in the code of conduct and the Municipal Elections Act.



To: Town Council

From: Marc Seguin CAO

Re: 2023 Audit - Consolidated Financial Statements

Date: August 15, 2024

RECOMMENDATION

That, 2023 Audit - Consolidated Financial Statements report be received; and

That Council approve the 2023 Audit - Consolidated Financial Statements.

ORIGIN

The Nova Scotia Municipal Government Act (MGA) mandates that council shall appoint a municipal auditor who is registered pursuant to this Act to be the auditor for each municipality.

The auditor is required to report to the council on the accounts and funds that are:

- administered by the council; and
- where the control is apparent or implied in the council.
- The auditor’s report shall contain the information, and be in the form, required pursuant to this Act.
- The auditor’s report shall be filed with the council and the Minister by September 30 each year.



Furthermore, the act dictates that:

- A) The auditor shall report, to the council and to the Minister, any management letters and any communication from the auditor detailing weaknesses in internal control, deficiencies in management information systems or other areas requiring improvement.
- B) The financial statements of a municipality, as reported on by the auditor, shall set out the remuneration paid to each council member and the chief administrative officer.
- C) The auditor shall certify reports to the council and to the Minister if required by the regulations.
- D) No person shall be appointed as auditor who, at any time during the fiscal year in which the auditor is appointed, is or has been (a) a council member; (b) a contractor hired by the municipality; or (c) an employee of the municipality.

Background

The Town has proceeded in compliance with the Act and appointed a municipal auditor who is registered pursuant to the MGS.

The Town of Stewiacke appointed MNP as the Auditor for the Municipality. [Darren Chiasson, CPA, CA](#) acted as the lead Auditor for the Town of Stewiacke.

The requirement of MGA requires that the auditor shall report, to the council and to the Minister, any management letters and any communication from the auditor detailing weaknesses in internal control, deficiencies in management information systems or other areas requiring improvement.

In compliance with the MGA, Town Staff provided access to the auditor to the books, accounts and vouchers of the municipality and may require from the employees of the municipality such information and explanations as may be necessary for the performance of the auditor's duties. Additionally, Staff, on request, promptly provided access, information and explanations to the auditor as requested.

In order to maintain oversight and compliance, the Town appointed an Audit Committee , which is required annually.

Town of Stewiacke | 295 George Street | P.O. Box 8 | Stewiacke, NS B0N 2J0
Office 902-639-2231 | Fax 902-639-2221 | Email town@stewiacke.net



The responsibilities of the audit committee include

- (a) a detailed review of the financial statements of the municipality with the auditor;
- (b) an evaluation of internal control systems and any management letter with the auditor;
- (c) a review of the conduct and adequacy of the audit;
- (d) such matters arising out of the audit as may appear to the audit committee to require investigation;
- (e) such other matters as may be determined by the council to be the duties of an audit committee;
- (f) any other matters as may be determined by the council

Chaired by Town Councillor Suzanne Lutz , the 2023 Audit Committee was comprised of Mayor George Lloy, Councillor Susan Creelmen and Council appointed residents Beate Acker & Cassandra Swallow. Town Staff Consultations included Kevin Matheson (Interim CAO) and Helen Young, Manager of Finance.

DISCUSSION

The attached consolidated financial statements of the Town of Stewiacke (the “Town”) are the responsibility of the Town’s management and have been prepared in compliance with legislation, and in accordance with Canadian public sector accounting standards. A summary of the significant accounting policies is described in Note 2 to the consolidated financial statements. The preparation of financial statements necessarily involves the use of estimates based on management’s judgment, particularly when transactions affecting the current accounting period cannot be finalized with certainty until future periods.

The Town’s management maintains a system of internal controls designed to provide reasonable assurance that assets are safeguarded, transactions are properly authorized and recorded in compliance with legislative and regulatory requirements, and reliable financial information is available on a timely basis for preparation of the consolidated financial statements. These systems are monitored and evaluated by management.

The audit committee meets with management and the external auditors to review the consolidated financial statements and discuss any significant financial reporting or internal control matters prior to their approval of the consolidated financial statements.



The consolidated financial statements have been audited by MNP LLP, independent external auditors appointed by the Town. The accompanying Independent Auditors' Report attached outlines their responsibilities, the scope of their examination and their opinion on the Town's consolidated financial statements.

POLICIES/LEGISLATION

The NS MGA mandates that council shall appoint a municipal auditor who is registered pursuant to this Act to be the auditor for the municipality. The Town of Stewiacke has proceeded in compliance with the MGA. This audit process has adhered to the act and has produced the required audit and related documents required by the legislation.

CONSULTATIONS

Suzanne Lutz , Councillor – Chair Audit Committee
Beate Acker (Resident)
Cassandra Swallow (Resident)
George Lloy, Mayor
Susan Creelman, Councillor
Helen Young, Manager of Finance, Town of Stewiacke
Kevin Matheson, Interim CAO
Darren Chiasson, Auditor, MNP

ATTACHMENTS

Town of Stewiacke Consolidated Financial Statements *March 31, 2024*

CONCLUSION

After the review of the Town of Stewiacke Consolidated Financial Statements March 31, 2024, Staff recommend that Council accept the statement as attached.



Marc Seguin
Chief Administrative Officer

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**Town of Stewiacke
Consolidated Financial Statements**

March 31, 2024

Town of Stewiacke
Consolidated Financial Statements
For the year ended March 31, 2024

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Management's Responsibility for the Consolidated Financial Statements

The accompanying consolidated financial statements of the Town of Stewiacke (the "Town") are the responsibility of the Town's management and have been prepared in compliance with legislation, and in accordance with Canadian public sector accounting standards. A summary of the significant accounting policies is described in Note 2 to the consolidated financial statements. The preparation of financial statements necessarily involves the use of estimates based on management's judgment, particularly when transactions affecting the current accounting period cannot be finalized with certainty until future periods.

The Town's management maintains a system of internal controls designed to provide reasonable assurance that assets are safeguarded, transactions are properly authorized and recorded in compliance with legislative and regulatory requirements, and reliable financial information is available on a timely basis for preparation of the consolidated financial statements. These systems are monitored and evaluated by management.

The audit committee meets with management and the external auditors to review the consolidated financial statements and discuss any significant financial reporting or internal control matters prior to their approval of the consolidated financial statements.

The consolidated financial statements have been audited by MNP LLP, independent external auditors appointed by the Town. The accompanying Independent Auditors' Report outlines their responsibilities, the scope of their examination and their opinion on the Town's consolidated financial statements.

Mr. Marc Seguin
Chief Administrative Officer

Town of Stewiacke
Consolidated Statement of Financial Position
As at March 31, 2024

	2024	2023
FINANCIAL ASSETS		
Cash and cash equivalents	\$ 5,981,606	\$ 3,753,070
Taxes and rates receivable (note 3)	270,060	205,717
Other receivables (note 4)	793,142	137,936
	7,044,808	4,096,723
FINANCIAL LIABILITIES		
Accounts payable and accrued liabilities	639,819	431,557
Deferred revenue	2,939,831	450,492
Tax sale surplus	31,784	31,784
Long-term debt (note 6)	968,296	1,152,873
Asset retirement obligation (note 7)	202,353	196,251
	4,782,083	2,262,957
NET FINANCIAL ASSETS	2,262,725	1,833,766
NON-FINANCIAL ASSETS		
Tangible capital assets, general capital (note 8)	11,337,704	6,458,282
Tangible capital assets, water capital (note 9)	4,517,960	3,612,874
	15,855,664	10,071,156
ACCUMULATED SURPLUS (note 10)	\$ 18,118,389	\$ 11,904,922

Contingencies (note 16)

See accompanying notes to consolidated financial statements.

On behalf of the Town of Stewiacke:

Mayor

Chief Administrative Officer

Town of Stewiacke
Consolidated Statement of Financial Activities
For the year ended March 31, 2024

	Budget (Unaudited)	2024	2023
REVENUES (Schedule A)			
Taxes	\$ 1,993,586	\$ 2,242,855	\$ 1,941,954
Grants in lieu of taxes	3,300	3,266	3,103
Sale of services	183,462	192,849	209,491
Other revenue from own sources	120,173	343,363	263,434
Unconditional transfers from other governments	205,873	305,777	239,986
Conditional transfers from other governments	25,000	113,702	110,140
Water rates	485,705	549,605	500,118
Capital grants	-	1,213,839	61,574
Contributed capital	-	4,544,609	-
	3,017,099	9,509,865	3,329,800
EXPENSES (Schedule B)			
General government services	739,380	777,266	652,668
Protective services	316,053	362,583	327,307
Transportation services	485,753	829,466	743,255
Environmental health services	209,930	349,860	276,985
Environmental development services	106,200	72,424	160,150
Recreation and cultural services	289,921	453,911	283,426
Water treatment and distribution	509,894	450,888	426,017
	2,657,131	3,296,398	2,869,808
ANNUAL SURPLUS	359,968	6,213,467	459,992
ACCUMULATED SURPLUS, BEGINNING OF YEAR	11,904,922	11,904,922	11,444,930
ACCUMULATED SURPLUS, END OF YEAR	\$ 12,264,890	\$ 18,118,389	\$ 11,904,922

See accompanying notes to consolidated financial statements.

Town of Stewiacke
Consolidated Statement of Change in Net Financial Assets
For the year ended March 31, 2024

	2024	2023
ANNUAL SURPLUS	\$ 6,213,467	\$ 459,992
Other non-financial assets		
Amortization of tangible capital assets	540,165	412,516
Additions to tangible capital assets	(6,338,618)	(663,402)
Disposal of capital assets	13,945	-
INCREASE IN NET FINANCIAL ASSETS	428,959	209,106
NET FINANCIAL ASSETS, BEGINNING OF YEAR	1,833,766	1,624,660
NET FINANCIAL ASSETS, END OF YEAR	\$ 2,262,725	\$ 1,833,766

See accompanying notes to consolidated financial statements.

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Town of Stewiacke
Consolidated Statement of Cash Flows
For the year ended March 31, 2024

	2024	2023
CASH FLOWS FROM OPERATING ACTIVITIES		
Annual surplus	\$ 6,213,467	\$ 459,992
Add		
Amortization of tangible capital assets	540,165	412,516
Accretion expense	6,102	6,101
Change in non-cash items		
Taxes and rates receivable	(64,343)	(22,467)
Other accounts receivable	(655,206)	68,282
Accounts payable and accrued liabilities	208,262	105,383
Deferred revenue	2,489,339	321,772
	<u>2,524,319</u>	<u>1,351,579</u>
CASH FLOWS FROM FINANCING ACTIVITIES		
Repayment of long-term debt	(184,577)	(222,108)
Proceeds of long-term debt	–	265,700
	<u>(184,577)</u>	<u>43,592</u>
CASH FLOWS FROM CAPITAL ACTIVITIES		
Additions to tangible capital assets	(6,338,618)	(663,402)
Additions to tangible capital assets for asset retirement obligation	–	190,150
Disposal of tangible capital assets	13,945	–
	<u>(6,324,673)</u>	<u>(473,252)</u>
INCREASE IN CASH AND CASH EQUIVALENTS	<u>2,228,536</u>	<u>921,919</u>
CASH AND CASH EQUIVALENTS, BEGINNING OF YEAR	3,753,070	2,831,151
CASH AND CASH EQUIVALENTS, END OF YEAR	<u>\$ 5,981,606</u>	<u>\$ 3,753,070</u>

See accompanying notes to consolidated financial statements.

Town of Stewiacke
Notes to Consolidated Financial Statements
For the year ended March 31, 2024

1. CHANGE IN ACCOUNTING POLICY

Revenue

Effective April 1, 2023, the Town adopted the Public Sector Accounting Board's (PSAB) new standard for the recognition, measurement and disclosure of revenue under PS 3400 Revenue. The new standard establishes when to recognize and how to measure revenue, and provides the related financial statement presentation and disclosure requirements. Pursuant to these recommendations, the change was applied prospectively, and prior periods have not been restated.

There was no material impact on the financial statements from the prospective application of the new accounting recommendations.

2. SIGNIFICANT ACCOUNTING POLICIES

(a) Basis of presentation

These consolidated financial statements of Town of Stewiacke (the "Town") have been prepared, in all material respects, in accordance with Canadian public sector accounting standards.

(b) Basis of consolidation

These consolidated financial statements reflect the assets, liabilities, revenue, expenses and changes in fund balances of all resources of the Town. The Town is comprised of all organizations, committees and local boards accountable for the administration of their financial affairs and resources to the Town and that are owned or controlled by the Town. Inter-fund and inter-corporate balances and transactions have been eliminated. The entities included are as follows:

- General Operating and Capital Funds
- Water Operating and Capital Funds
- Reserve Funds

(c) Segment information

The Town of Stewiacke is a diversified entity that provides a wide range of services to its residents. For management reporting purposes, the Town's operations and activities are organized and reported by fund. This presentation is in accordance with the Provincial Financial Reporting and Accounting Manual and was created for the purpose of recording specific activities to attain certain objectives in accordance with special regulations, restrictions or limitations. Town services are provided by departments and their activity is reported in these funds. The services provided by these departments are as follows:

General government services

This segment is responsible for the overall local government administration. Its tasks include direction for Town services, such as planning, engineering, finance, and information technology in adherence to the Municipal Government Act.

Town of Stewiacke
Notes to Consolidated Financial Statements
For the year ended March 31, 2024

2. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

Protective services

This segment is primarily responsible for police, fire protection and bylaw administration for its residents. The Town engages the services of the volunteer fire department in order to fulfill its fire protection role. The Town collects a rate for the fire department.

Transportation services

The Town is responsible for the maintenance of certain local roads, sidewalks and street lights within its jurisdiction.

Environmental health services

This segment is responsible for the maintenance and operations of waste and sewer services provided to residents and other customers. Its tasks include the provision of waste collection through contract, recycling and composting.

Environmental development services

This segment is responsible for the issuance of development permits and approving subdivision applications.

Recreation and cultural services

This segment is responsible for promoting and offering recreation opportunities and activities to the Town's residents, specializing in maintaining and assisting recreational facilities within the Town such as recreation facilities and the library.

Water treatment and distribution

This segment manages water treatment and distribution facilities and services within the Town and includes activities such as plant operation and pumping, water treatment, transmission and distribution.

(d) Fund accounting

The resources and operations of the Town are comprised of the operating, capital and reserve funds. Transfers between funds are recorded as adjustments to the appropriate fund balance. Supporting schedules to the consolidated financial statements are included to show the financial activities and change in the balance of each fund.

(e) Basis of accounting

Revenue and expenses are recorded on the accrual basis of accounting. The accrual basis of accounting recognizes revenue as they are earned and measurable; expenses are recognized as they are incurred and measurable as a result of the receipt of goods or services and the creation of a legal obligation to pay.

(f) Cash and cash equivalents

Cash and cash equivalents is defined as cash on hand and on deposit at banks net of any outstanding cheques or deposits.

2. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

(g) Financial instruments

Initial measurement

Financial instruments are measured at fair value when issued or acquired. For financial instruments subsequently measured at cost or amortized cost, fair value is adjusted by the amount of the related financing fees and transaction costs. Transaction costs and financing fees relating to financial instruments that are measured subsequently at fair value are recognized in operations in the year in which they are incurred.

Financial instruments consist of cash and cash equivalents, tax and rates receivable, other receivables, accounts payable and accrued liabilities and long-term debt.

Subsequent measurement

At each reporting date, the Town measures its financial assets and liabilities at cost or amortized cost (less impairment in the case of financial assets), except for investments, which must be measured at fair value. The Town uses the effective interest rate method to amortize any premiums, discounts, transaction fees and financing fees to the statement of financial activities. The financial instruments measured at amortized cost are cash and cash equivalents, tax and rates receivable, other receivables, accounts payable and accrued liabilities and long-term debt.

Impairment

For financial assets measured at cost or amortized cost, the Town regularly assesses whether there are any indications of impairment. If there is an indication of impairment, and the Town determines that there is a significant adverse change in the expected timing or amount of future cash flows from the financial asset, it recognizes an impairment loss in the statement of financial activities. Any reversals of previously recognized impairment losses are recognized in operations in the year the reversal occurs.

Unless otherwise noted, it is management's opinion that the Town is not exposed to significant interest or credit risks arising from financial instruments.

(h) Asset retirement obligation

An asset retirement obligation is recognized when, as at the financial reporting date, all of the following criteria are met:

- a) There is a legal obligation to incur retirement costs in relation to a tangible capital asset;
- b) The past transaction or event giving rise to the liability has occurred;
- c) It is expected that future economic benefits will be given up; and
- d) A reasonable estimate of the amount can be made.

The liability for the closure and decommissioning of water treatment plant intake has been recognized based on estimated future expenses. The liability associated with the remediation of contaminants present within a number of buildings owned by the Town has also been recognized based on estimated future expenses on closure of the sites and post-closure care.

Town of Stewiacke
Notes to Consolidated Financial Statements
For the year ended March 31, 2024

2. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

(i) Tangible capital assets

Tangible capital assets are reported in the statement of financial position at cost, which includes all amounts that are directly attributable to acquisition, construction, development or betterment of the assets, net of accumulated amortization. They are amortized on a straight-line basis over their estimated useful lives at the following rates:

	Basis	Rate
Buildings	Straight-line	2.5%
Machinery and equipment	Straight-line	5 – 33.33%
Sewers	Straight-line	2%
Sidewalks and crosswalks	Straight-line	4 – 5%
Streets	Straight-line	3.33%
Land improvements	Straight-line	4%
Leasehold improvements	Straight-line	4%
Sewage treatment plant	Straight-line	4%
Water storage plant	Straight-line	1.33%
Water utility equipment	Straight-line	5 - 20%
Water utility mains	Straight-line	1.33%
Water utility services	Straight-line	2%
Water utility meters	Straight-line	5%
Water utility hydrants	Straight-line	1.33%
Water treatment plant	Straight-line	2%

A full year of amortization is charged in the year of acquisition. Assets under construction are not amortized until the asset is available for productive use.

The amortization charge in the water capital fund is required to be transferred to a special bank account which is used to help fund replacement of existing equipment, or subject to approval by the Utility and Review Board, to repay principal of capital debt.

(j) Allocation of municipal costs to water utility funds

Where identifiable, costs incurred by the Town of Stewiacke on behalf of the water utility are charged to the utility funds. Salary and wage related costs are allocated in proportion to time spent performing functions on behalf of the water utility.

(k) Government transfers

Government transfers are recognized in the consolidated financial statements in the period in which events giving rise to the transfer occur, providing the transfers are authorized, any eligibility criteria have been met, and reasonable estimates of the amounts can be made.

Town of Stewiacke
Notes to Consolidated Financial Statements
For the year ended March 31, 2024

2. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

(l) Deferred revenue

Deferred revenue represents user charges, prepayment of taxes, and other fees that have been collected, for which the related services have yet to be performed. These amounts will be recognized as revenue in the fiscal year the services are performed.

(m) Reserve funds

Certain amounts, as approved by Council, are set aside in reserve funds for future operating and capital purposes. Transfers to and or from reserves funds are an adjustment to the respective fund when approved.

(n) Taxation and related revenues

Property tax billings are prepared by the Town based on assessment rolls issued by the Property Valuation Services Corporation. Tax rates are established annually by Council, incorporating amounts to be raised for local services and the requisition made by the Province in respect of education taxes and other mandatory contributions. Taxation revenues are recorded at the time tax billings are due. Assessments and the related property taxes are subject to appeal. Tax adjustments as a result of appeals are recorded when the results of the appeal process are known. An allowance for unresolved assessment appeals is also provided.

(n) Use of estimates

The preparation of financial statements in conformity with Canadian public sector accounting standards requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting period.

Amortization is based on the estimated useful lives of capital assets.

Taxes, rates and other receivables are stated after evaluation as to their collectability and an appropriate allowance for doubtful accounts is provided where considered necessary.

Asset retirement obligations are recognized based upon assumptions and estimates related to the amount and timing of costs for future removal and site restoration.

By their nature, these judgments are subject to measurement uncertainty, and the effect on the financial statements of changes in such estimates and assumptions in future years could be material. These estimates and assumptions are reviewed periodically and, as adjustments become necessary, they are reported in excess of revenues over expenses in the years in which they become known.

Town of Stewiacke
Notes to Consolidated Financial Statements
For the year ended March 31, 2024

3. TAXES AND RATES RECEIVABLE

	2024	2023
Taxes receivable	\$ 152,731	\$ 106,648
Less valuation allowance	(30,000)	(30,000)
Subtotal	122,731	76,648
Sewer rates receivable	40,542	35,971
Less valuation allowance	(1,191)	(1,191)
Subtotal	39,351	34,780
Water rates receivable	109,814	96,125
Less valuation allowance	(1,836)	(1,836)
Subtotal	107,978	94,289
Taxes and rates receivable, net	\$ 270,060	\$ 205,717

4. OTHER RECEIVABLES

	2024	2023
Due from federal government and its agencies	\$ 489,856	\$ 129,784
Due from provincial government and its agencies	230,296	-
Other	72,990	8,152
	\$ 793,142	\$ 137,936

5. BANK LINE OF CREDIT

The Town has available a line of credit of \$250,000 with an interest rate of prime and has signed a security agreement with a first ranking security interest on specific assets. The line of credit was undrawn at March 31, 2024 and 2023.

Town of Stewiacke
Notes to Consolidated Financial Statements
For the year ended March 31, 2024

6. LONG-TERM DEBT

	Interest rate - %	Matures	Balance March 31/23	Proceeds	Repaid	Balance March 31/24
General Capital Fund						
Royal Bank of Canada						
Truck	4.2%	2024	\$ 14,380	\$ -	\$ (14,380)	\$ -
Generator	4.2%	2024	5,380	-	(5,380)	-
			19,760	-	(19,760)	-
Nova Scotia Municipal Finance Corporation						
Streets	0.9 – 1.2%	2026	112,500	-	(37,500)	75,000
Sewage	2.8 – 3.3%	2029	157,500	-	(26,250)	131,250
Grader	0.0 – 2.3%	2032	291,027	-	(20,788)	270,239
Solar	2.6 – 3.8%	2033	265,700	-	(10,827)	254,873
			826,727	-	(95,365)	731,362
			846,487	-	(115,125)	731,362
Water Capital Fund						
Scotia Bank						
Truck	5.9%	2024	5,017	-	(5,017)	-
Nova Scotia Municipal Finance Corporation						
	2.8 – 3.3%	2029	52,500	-	(8,750)	43,750
	2.2 – 2.3%	2024	56,369	-	(28,185)	28,184
	4.8 – 4.9%	2025	192,500	-	(27,500)	165,000
			306,386	-	(69,452)	236,934
			\$ 1,152,873	\$ -	\$ (184,577)	\$ 968,296

Principal payments required in each of the next five years on debt held as of March 31, 2024 are as follows:

	General	Water	Total
2025	\$ 95,423	\$ 201,934	\$ 297,357
2026	95,488	8,750	104,238
2027	58,159	8,750	66,909
2028	58,237	8,750	66,987
2029	58,237	8,750	66,987

Town of Stewiacke
Notes to Consolidated Financial Statements
For the year ended March 31, 2024

7. ASSET RETIREMENT OBLIGATION

The Town's asset retirement obligation consists of the liability for the closure and decommissioning of water treatment plant intake and remediation of contaminants present within a number of buildings owned by the Town. These contaminants represent a health hazard upon demolition and therefore there is a legal obligation for removal of these contaminants on decommissioning. These buildings and plant have expected useful lives ranging from 10-30 years. Estimated costs have been discounted to the present value using discount rates ranging from 3.2% to 3.3% per annum.

Changes to the asset retirement obligation in the year are as follows:

	2024	2023
Opening balance	\$ 196,261	\$ –
Acquired upon adoption	–	190,150
Accretion expense	6,102	6,101
	\$ 202,353	\$ 196,251

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Town of Stewiacke
Notes to Consolidated Financial Statements
For the year ended March 31, 2024

8. TANGIBLE CAPITAL ASSETS, GENERAL CAPITAL

	2024										2023	
	Cost Beginning of Year	Additions and Transfers	Disposals and Write-downs	Cost End of Year	Amortization Beginning of Year	Additions	Disposals	Amortization End of Year	Net Book Value	Net Book Value	Net Book Value	
Land	\$ 292,817	\$ -	\$ -	\$ 292,817	\$ -	\$ -	\$ -	\$ -	\$ 292,817	\$ 292,817	\$ 292,817	
Buildings	1,063,450	208,008	-	1,271,458	569,486	31,955	-	601,441	670,017	493,964	493,964	
Machinery and equipment	1,811,720	-	(3,407)	1,808,313	571,964	116,158	-	688,122	1,120,191	1,239,756	1,239,756	
Sewers	2,038,895	2,480,129	-	4,519,024	856,445	85,610	-	942,055	3,576,969	1,182,450	1,182,450	
Sidewalks	674,770	32,400	(10,538)	696,632	357,121	29,018	-	386,139	310,493	317,649	317,649	
Streets	4,621,415	1,159,923	-	5,781,338	2,085,828	168,429	-	2,254,257	3,527,081	2,535,587	2,535,587	
Land improvements	473,149	-	-	473,149	240,982	17,493	-	258,475	214,674	232,167	232,167	
Sewage Treatment Plant	1,041,642	-	-	1,041,642	1,039,051	236	-	1,039,287	2,355	2,591	2,591	
Leasehold improvements	154,940	-	-	154,940	28,913	6,198	-	35,111	119,829	126,027	126,027	
Computer software	48,102	-	-	48,102	12,828	3,207	-	16,035	32,067	35,274	35,274	
Work in progress	-	1,471,211	-	1,471,211	-	-	-	-	1,471,211	-	-	
	\$ 12,220,900	\$ 5,351,671	\$ (13,945)	\$ 17,558,626	\$ 5,762,618	\$ 458,304	\$ -	\$ 6,220,922	\$ 11,337,704	\$ 6,458,282	\$ 6,458,282	

9. TANGIBLE CAPITAL ASSETS, WATER CAPITAL

	2024										2023	
	Cost Beginning of Year	Additions	Disposals and Write-downs	Cost End of Year	Amortization Beginning of Year	Additions	Disposals	Amortization End of Year	Net Book Value	Net Book Value	Net Book Value	
Water Storage Plant	\$ 1,716,814	\$ -	\$ -	\$ 1,716,814	\$ 328,166	\$ 22,891	\$ -	\$ 351,057	\$ 1,365,757	\$ 1,388,648	\$ 1,388,648	
Equipment	125,912	-	-	125,912	107,077	3,775	-	110,852	15,060	18,835	18,835	
Mains	1,946,865	904,557	-	2,851,422	403,015	38,019	-	441,034	2,410,388	1,543,850	1,543,850	
Services	207,498	-	-	207,498	31,788	4,150	-	35,938	171,560	175,710	175,710	
Meters	33,910	-	-	33,910	27,729	1,695	-	29,424	4,486	6,181	6,181	
Hydrants	77,718	-	-	77,718	23,355	1,036	-	24,391	53,327	54,363	54,363	
Water Treatment Plant	417,277	-	-	417,277	187,872	8,691	-	196,563	220,714	229,405	229,405	
Trucks	28,595	-	-	28,595	28,595	-	-	28,595	-	-	-	
Computer software	24,051	-	-	24,051	6,412	1,604	-	8,016	16,035	17,639	17,639	
Water wells	178,243	82,390	-	260,633	-	-	-	-	260,633	178,243	178,243	
	\$ 4,756,883	\$ 986,947	\$ -	\$ 5,743,830	\$ 1,144,009	\$ 81,861	\$ -	\$ 1,225,870	\$ 4,517,960	\$ 3,612,874	\$ 3,612,874	

Town of Stewiacke
Notes to Consolidated Financial Statements
For the year ended March 31, 2024

10. ACCUMULATED SURPLUS

	2024	2023
Water operating fund	\$ 789,027	\$ 651,033
General capital fund	10,023,844	5,427,402
Water capital fund	4,694,768	3,685,306
Reserve funds	2,610,750	2,141,181
	\$ 18,118,389	\$ 11,904,922

11. DEFINED CONTRIBUTION PENSION PLAN

The Town provides a defined contribution pension plan for their employees. The assets of the plan are held separately from those of the Town in independently administered funds. Contributions paid and expensed by the Town in the current year amounts to \$52,241 (2023 - \$48,005).

12. TRANSFERS TO PROVINCIAL BOARDS AND COMMISSIONS

The Town of Stewiacke is required to share in financing the operations of various Boards and Commissions, along with other municipal units in Colchester County. In addition to any budgeted contributions, the Town shares in the deficits or surpluses of these Boards based on their sharing percentages. The Town's share of the deficit is to be paid in the next fiscal year, while a surplus is to be taken into the next year's estimates.

	2024 Contribution	2023 Contribution
Regional Housing Authority	\$ 63,052	\$ 78,926
Regional Library	10,225	10,500
Chignecto Regional Centre for Education	328,968	287,700
Corrections contribution	17,763	16,355
Assessment services contribution	20,667	15,638
Truro Colchester Regional Enterprise Network	8,485	9,056

Town of Stewiacke
Notes to Consolidated Financial Statements
For the year ended March 31, 2024

13. SEGMENT DISCLOSURE

	General Government Services	Protective Services	Transportation Services	Environmental Health Services	Environmental Development Services	Recreation and Culture Services	Water Treatment and Distribution	Total 2024
REVENUES								
Taxes	\$ 2,003,380	\$ 129,081	\$ —	\$ 110,394	\$ —	\$ —	\$ —	\$ 2,242,855
Grants in lieu of taxes	3,266	—	—	—	—	—	—	3,266
Sale of services	—	—	—	192,849	—	—	—	192,849
Other revenue from own sources	255,584	—	—	—	—	51,387	36,392	343,363
Unconditional transfers from other governments	237,889	—	—	—	—	67,888	—	305,777
Conditional transfers from other governments	88,702	—	—	—	—	25,000	—	113,702
Water rates	—	—	—	—	—	—	549,605	549,605
Capital grants	135,000	—	1,078,839	—	—	—	—	1,213,839
Contributed capital	—	—	3,640,052	—	—	—	904,557	4,544,609
	2,723,821	129,081	4,718,891	303,243	—	144,275	1,490,554	9,509,865
EXPENSES								
Salaries, wages and benefits	418,395	10,468	274,692	26,247	—	175,977	127,615	1,033,394
Operating materials, supplies and general expenses	306,834	352,115	321,063	213,677	72,424	191,385	229,364	1,686,862
Amortization	28,108	—	233,711	109,936	—	86,549	81,861	540,165
Rents and financial expenses	23,929	—	—	—	—	—	12,048	35,977
	777,266	362,583	829,466	349,860	72,424	453,911	450,888	3,296,398
ANNUAL SURPLUS (DEFICIT)	\$ 1,946,555	\$ (233,502)	\$ 3,889,425	\$ (46,617)	\$ (72,424)	\$ (309,636)	\$ 1,039,666	\$ 6,213,467

Town of Stewiacke
Notes to Consolidated Financial Statements
For the year ended March 31, 2024

13. SEGMENT DISCLOSURE

	General Government Services	Protective Services	Transportation Services	Environmental Health Services	Environmental Development Services	Recreation and Culture Services	Water Treatment and Distribution	Total 2023
REVENUES								
Taxes	\$ 1,732,869	\$ 107,016	\$ —	\$ 102,069	\$ —	\$ —	\$ —	\$ 1,941,954
Grants in lieu of taxes	3,103	—	—	—	—	—	—	3,103
Sale of services	—	—	—	209,491	—	—	—	209,491
Other revenue from own sources	184,633	—	—	—	—	61,478	17,323	263,434
Unconditional transfers from other governments	239,986	—	—	—	—	—	—	239,986
Conditional transfers from other governments	85,140	—	—	—	—	25,000	—	110,140
Water rates	—	—	—	—	—	—	500,118	500,118
Capital grants	—	—	—	—	—	—	61,574	61,574
	2,245,731	107,016	—	311,560	—	86,478	579,015	3,329,800
EXPENSES								
Salaries, wages and benefits	391,529	9,840	270,750	23,704	—	146,531	106,905	949,259
Operating materials, supplies and general expenses	225,077	317,467	272,702	170,490	160,150	99,841	228,762	1,474,489
Amortization	17,351	—	199,803	82,791	—	37,054	76,093	413,092
Rents and financial expenses	18,711	—	—	—	—	—	14,257	32,968
	652,668	327,307	743,255	276,985	160,150	283,426	426,017	2,869,808
ANNUAL SURPLUS (DEFICIT)	\$ 1,593,063	\$ (220,291)	\$ (743,255)	\$ 34,575	\$ (160,150)	\$ (196,948)	\$ 152,998	\$ 459,992

Town of Stewiacke
Notes to Consolidated Financial Statements
For the year ended March 31, 2024

14. FINANCIAL INSTRUMENTS

Fair value of financial instruments

The fair value of the Town's financial instruments that are comprised of cash, taxes and rates receivable, other accounts receivable, and accounts payable and accrued liabilities approximate their carrying value due to their short-term nature.

The fair value of long-term debt is based on rates currently available to the Town with similar terms and maturities and approximates its carrying value.

Unless otherwise noted, it is management's opinion that the Town is not exposed to significant interest, currency or credit risks arising from these financial instruments.

15. REMUNERATION OF MEMBERS OF COUNCIL AND CHIEF ADMINISTRATIVE OFFICER

The total remuneration paid to the Mayor, Council and Chief Administrative Officer of the Town is as follows:

Name	Title	Annual Remuneration	Travel and Other Expenses	Total
G. Lloy	Mayor	\$ 13,697	\$ 7,524	\$ 21,221
R. Chapman	Councillor	10,655	-	10,655
S. Lutz	Councillor	9,236	74	9,310
C. Ramsey	Councillor	8,469	-	8,469
P. Osbourne	Councillor	9,236	2,732	11,968
S. Creelman	Councillor	9,236	69	9,305
R. Rogers-Laing	Councillor	9,236	-	9,236
D. Bogle	Chief Administrative Officer	20,280	371	20,651
G. Brown	Chief Administrative Officer	30,167	1,414	31,581
K. Matheson	Interim Chief Administrative Officer	35,135	5,984	41,119
R. Buchi	Interim Chief Administrative Officer	8,654	-	8,654
		\$ 164,001	\$ 18,168	\$ 182,169

16. CONTINGENCIES

The Town has guaranteed the borrowing resolution of the Stewiacke Fire Department for \$639,000.

The loan related to this guarantee had a balance of \$418,066 at March 31, 2024 (2023 - \$478,340).

SUPPLEMENTARY SCHEDULES

DRAFT

Town of Stewiacke
Schedule A – Details of Revenues
For the year ended March 31, 2024
(Unaudited)

	Budget	2024	2023
Taxes			
Assessable property			
Residential	\$ 1,784,517	\$ 1,781,660	\$ 1,519,005
Commercial	396,854	514,129	394,535
Resource			
Taxable assessments	22,359	22,358	23,482
Forest property tax	–	368	369
Business property			
Based on revenue – Aliant	7,058	6,584	7,058
Area rates			
Environmental health services	98,384	110,394	102,069
Protective services	129,262	129,081	107,016
Other			
Deed transfer tax	75,000	192,075	200,445
	<u>2,513,434</u>	<u>2,756,649</u>	<u>2,353,979</u>
Expenditures as a reduction to tax revenue			
Appropriations to Regional Centre for Education	328,970	328,968	287,700
Provincial corrections	17,350	17,763	16,355
Nova Scotia Housing Commission	44,090	63,052	78,926
Tax rebate	129,438	102,157	26,544
Tax exemption	–	1,854	2,500
	<u>\$ 1,993,586</u>	<u>\$ 2,242,855</u>	<u>\$ 1,941,954</u>
Grants in lieu of taxes			
Federal government			
Royal Canadian Mounted Police	\$ 3,300	\$ 3,266	\$ 3,103
Sale of services			
Environmental health services	\$ 163,462	\$ 178,849	\$ 171,491
Sewer connections	20,000	14,000	38,000
	<u>\$ 183,462</u>	<u>\$ 192,849</u>	<u>\$ 209,491</u>

Town of Stewiacke
Schedule A – Details of Revenues (Continued)
For the year ended March 31, 2024
(Unaudited)

	Budget	2024	2023
Other revenue from own sources			
Community Centre	\$ 8,800	\$ 13,661	\$ 11,259
Fines	1,000	215	138
Gasoline rebates	2,800	2,550	2,682
Interest on investments	10,000	188,791	91,178
Interest on taxes	12,000	26,161	14,401
Licenses and permits	10,500	14,291	18,455
Miscellaneous	12,373	50,686	65,092
Down-town decorating	2,000	1,982	1,111)
Summer programs	16,000	–	–
Field rental	200	435	630
Sign permits	200	–	–
Tax certificate	500	2,295	2,407
Solar	28,000	21,344	25,558
Town days	5,000	9,640	2,256
HST offset revenue	7,800	11,612	8,917
Culvert/driveway installation	3,000	(300)	19,350
	\$ 120,173	\$ 343,363	\$ 263,434
Unconditional transfers from other governments			
Provincial government			
Equalization grant	\$ 202,349	\$ 202,349	\$ 202,349
Farm and acreage grant	3,524	8,014	4,622
Other government grant	–	95,414	33,015
	\$ 205,873	\$ 305,777	\$ 239,986
Conditional transfers from other governments			
Federal government			
Federal gas tax rebate	\$ –	\$ 88,702	\$ 85,140
Nova Scotia Health Promotion and Protection			
Recreation	25,000	25,000	25,000
	\$ 25,000	\$ 113,702	\$ 110,140

Town of Stewiacke
Schedule B – Details of Expenditures
For the year ended March 31, 2024
(Unaudited)

	2024		2023
	Budget	Actual	Actual
General government services			
Legislative			
Mayor remuneration and expenses	\$ 21,617	\$ 22,142	\$ 19,902
Council remuneration and expenses	71,577	70,935	59,826
Election	–	221	8,532
	<u>93,194</u>	<u>93,298</u>	<u>88,260</u>
General administrative			
Administration	325,073	287,282	276,412
Equipment rental	9,000	6,326	7,468
Postage	8,000	9,979	8,720
Stationery and supplies	10,000	7,873	5,147
Telecommunications	7,300	6,868	6,384
Utilities	14,000	17,479	16,677
Assessment costs	28,350	20,667	15,638
Legal services	18,000	24,534	30,983
IT and software	20,000	44,139	26,781
Training and development	5,000	5,174	4,075
Advertising	4,000	40,790	10,751
Other	14,000	26,378	10,679
Financial management	20,000	23,929	18,711
Other			
Building maintenance	13,000	7,256	4,627
Employee benefits	19,739	50,182	35,254
Employee pension plans	47,491	17,694	20,434
	<u>562,953</u>	<u>596,550</u>	<u>498,741</u>
Other general government services			
Amortization	–	28,108	17,349
Insurance	47,668	45,862	34,542
Interest and bank charges	9,000	7,714	8,042
Interest on long-term debt	26,565	–	–
Accretion	–	5,734	5,734
	<u>83,233</u>	<u>87,418</u>	<u>65,667</u>
	<u>\$ 739,380</u>	<u>\$ 777,266</u>	<u>\$ 652,668</u>

Town of Stewiacke
Schedule B – Details of Expenditures (Continued)
For the year ended March 31, 2024
(Unaudited)

	2024		2023
	Budget	Actual	Actual
Protective services			
Police protection			
Prosecution services	\$ 1,000	\$ 970	\$ 807
Royal Canadian Mounted Police	209,017	196,802	190,015
	<u>210,017</u>	<u>197,772</u>	<u>190,822</u>
Fire protection			
Fire dispatch service	4,000	4,078	3,937
Fire fighting force	63,336	125,256	99,092
	<u>67,336</u>	<u>129,334</u>	<u>103,029</u>
Emergency measures	7,700	4,589	3,600
Other protective services			
Dog control	12,000	12,000	11,627
Ground search and rescue	7,500	7,500	7,500
Other	11,500	11,388	10,729
	<u>31,000</u>	<u>30,888</u>	<u>29,856</u>
	<u>\$ 316,053</u>	<u>\$ 362,583</u>	<u>\$ 327,307</u>
Transportation services			
Common services			
Amortization	\$ –	\$ 42,391	\$ 54,183
Equipment operation and maintenance	39,000	63,343	48,108
Public works wages	222,382	274,692	270,751
Seminars and training	2,000	1,787	692
Shop tools and equipment	30,000	39,816	24,856
Workshops, yard and other buildings	10,500	11,264	22,102
	<u>303,882</u>	<u>433,293</u>	<u>420,692</u>
Road transport			
Amortization	–	191,320	145,620
Drainage ditches	6,000	13,708	3,774
Insurance and registration	28,713	20,982	21,107
Interest on long-term debt	4,000	20,391	22,345
Roadway services	30,000	70,446	70,605
Snow and ice removal	55,000	48,099	33,670
Street lighting	32,500	31,227	25,442
	<u>156,213</u>	<u>396,173</u>	<u>322,563</u>
	<u>\$ 460,095</u>	<u>\$ 829,466</u>	<u>\$ 743,255</u>

Town of Stewiacke
Schedule B – Details of Expenditures (Continued)
For the year ended March 31, 2024
(Unaudited)

	2024		2023
	Budget	Actual	Actual
Environmental health services			
Amortization	\$ –	\$ 109,936	\$ 82,791
Garbage disposal	108,747	134,634	108,209
Insurance	5,000	3,182	2,841
Wages and benefits	25,658	26,247	23,704
Sewage collection and disposal			
Sewage lift stations	52,000	37,319	31,472
Sewage treatment and disposal	44,183	38,542	27,968
	\$ 235,588	\$ 349,860	\$ 276,985
Environmental development services			
Building inspection	\$ 46,200	\$ 20,656	\$ 58,686
Planning and zoning	30,000	16,970	53,130
Promotional development	20,000	26,313	39,278
Tourism	10,000	8,485	9,056
	\$ 106,200	\$ 72,424	\$ 160,150
Recreational and cultural services			
Recreation facilities			
Amortization	\$ –	\$ 86,549	\$ 37,054
Community Centre		–	43,302
Recreation	274,921	354,026	189,312
Cultural buildings and facilities			
Library	–	3,081	6,128
Regional Library	15,000	10,255	7,630
	\$ 289,921	\$ 453,911	\$ 283,426
Water treatment and distribution			
Administration	\$ 12,718	\$ 32,139	\$ 18,138
Amortization	103,554	81,861	75,519
Interest and bank charges	18,543	12,048	14,257
Plant operation and pumping	2,700	127,435	113,207
Taxes	32,184	33,191	32,184
Transmission and distribution	78,547	50,881	58,077
Water treatment	261,648	112,965	114,267
Accretion	–	368	368
	\$ 509,894	\$ 450,888	\$ 426,017

Town of Stewiacke
Schedule of Reserves
For the year ended March 31, 2024
(Unaudited)

					2024	2023
	Five Year Restricted For Economic Development	Gas Tax Reserve	Special Capital	Special Operating	Total	Total
REVENUES						
Interest	\$ 396	\$ 26,286	\$ 5,535	\$ 71,480	\$ 103,697	\$ 54,107
Nova Scotia Federal Gas Tax Rebate	—	88,702	—	—	88,702	85,140
	396	114,988	5,535	71,480	192,399	139,247
Transfer from other funds	—	—	71,130	206,040	277,170	(205,910)
NET CHANGE IN FUND	396	114,988	76,665	277,520	469,569	(66,663)
FUND BALANCE, BEGINNING OF YEAR	14,616	449,745	168,507	1,508,313	2,141,181	2,207,844
FUND BALANCE, END OF YEAR	\$ 15,012	\$ 564,733	\$ 245,172	\$ 1,785,833	\$ 2,610,750	\$ 2,141,181

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Town of Stewiacke
General Operating Fund
Schedule of Changes in Operating Fund
For the year ended March 31, 2024
(Unaudited)

	2024		2023
	Budget	Actual	Actual
REVENUES			
Taxes	\$ 1,993,586	\$ 2,242,855	\$ 1,941,954
Grants in lieu of taxes	3,300	3,266	3,103
Sale of services	183,462	192,849	209,491
Other revenue from own sources	120,173	203,274	192,004
Unconditional transfers from other governments	205,873	305,777	239,986
Conditional transfers from other governments	25,000	25,000	25,000
	2,531,394	2,973,021-	2,611,538
EXPENDITURE			
General government services	739,380	763,179	646,211
Protective services	316,053	362,583	327,307
Transportation services	485,753	829,466	743,255
Environmental health services	209,930	349,860	276,985
Environmental development services	106,200	72,424	160,150
Recreational and cultural services	289,921	453,911	275,796
	2,147,237	2,831,423	2,429,704
ANNUAL SURPLUS	384,157	141,598	181,834
Transfer of amortization	-	449,952	328,646
Transfer to other funds	(387,157)	(591,550)	(510,480)
NET CHANGE IN FUND BALANCE	-	-	-
FUND BALANCE, BEGINNING OF YEAR	-	-	-
FUND BALANCE, END OF YEAR	\$ -	-	-

Town of Stewiacke
General Capital Fund
Schedule of Changes in Capital Fund
For the year ended March 31, 2024
(Unaudited)

	2024	2023
REVENUES		
Capital grants	\$ 1,213,839	\$ 61,574
Contributed capital	3,640,052	-
	<u>4,853,891</u>	<u>61,574</u>
EXPENDITURE		
Amortization	8,353	8,353
Accretion	5,734	5,734
	<u>14,087</u>	<u>14,087</u>
ANNUAL SURPLUS	4,839,804	47,487
Repayment of long-term debt	115,125	132,154
Amortization of capital assets	(449,952)	(328,646)
Transfer from operating reserve	-	375,662
Transfer from general operating fund	361,465	101,006
NET CHANGE IN FUND BALANCE	4,596,442	327,663
FUND BALANCE, BEGINNING OF YEAR	5,427,402	5,099,739
FUND BALANCE, END OF YEAR	<u>\$ 10,023,844</u>	<u>\$ 5,427,402</u>



To: Town Council
From: Marc Seguin CAO
Re: Town Hall Updates
Date: August 15, 2024

RECOMMENDATION

That, the Town Hall Updates report be received; and

That Council approve an additional \$30,000 in the 2024 operational budget to upgrades to Town Hall.

ORIGIN

The Town of Stewiacke Town Hall located at 295 George St, Stewiacke, NS B0N 2J0, functions as both the main administration building for the Town, Council Chambers and public meeting space.

Background

The Town of Stewiacke Town Hall located at 295 George St, Stewiacke is nearing the end-of-life cycle, however with some upgrades, its use can be extended.

No firm plans have been made for a future Town Hall, however Council and Staff began discussing a future Town Hall years ago. The Town purchased the land at 46 Main St E, Stewiacke, NS B0N 2J0 was made and the proposed intent of the land is to be the future home of the Town of Stewiacke Town Hall. In the absence of firm plans for a new Town Hall property, the land has been leased to the Big River Cafe. The lease on this property expires on March 31, 2025. Subsequently, the Towns Community Garden is also located on the property.



In addition to the property 46 Main St E, Stewiacke the Town also owns the Public Works Building (Old Stewiacke Post Office). This property is another option for consideration of future use.

To date, no decisions have been made on the timing or plans for a new Town Hall, however Council and Staff should begin discussions and planning in the near future. The finished space at Town Hall is currently at capacity and is likely near the end of its life cycle. The space in the building allows no space for Council members to work.

A simple renovation to the unfinished space on the second floor of Town Hall, would provide the necessary space for Town Staff and Council to work and serve the public.

DISCUSSION

The current conditions at Town Hall limit capacity and functional workspace for members of Staff and Council to conduct Town business.

Simple renovations to the second floor of Town Hall would allow for functional space for Council and Staff to conduct Town business.

Council could endorse updates of the existing space or look at other options. Possible options include:

A) Renovate Town Hall

A portion of the Town Hall building on the second floor has remained unfinished. By finishing this area with some simple cosmetic upgrades Staff can extend the life span of our current facility.

The upgrades would include flooring, wall cladding and painting the walls, lighting and electrical upgrades, trim and the purchase of the necessary furniture, fixtures and equipment.

B) Do not update Town Hall and immediately initiate the planning process for a new Town Hall

The land at 46 Main St E, Stewiacke, NS B0N 2J0 could be used as the site for a future Town Hall, although no direction or budget has been provided at this time. This option would require the



design of a building and the construction of a new building. A new Town Hall would serve the current and future needs of the Town of Stewiacke.

C) Do Nothing

Council could elect to do nothing; however this option would continue to have Staff and Council members continue to work as is.

POLICIES/LEGISLATION

N/A

FINANCIAL

Currently the 2024 budget has \$50,000 approved for engineering. The intended purpose of this approved budget line was to conduct the wastewater assessment.

In July 2024 the Town was advised that the Department of Municipal Affairs and Housing has approved a funding request and contributed \$42,675 toward the cost of this project. This funding covers the project cost as awarded via the Wastewater treatment plant Assessment 2024 RFP Award at the June 27, 2024 meeting of Council.

It is recommended that \$30,000 of the \$50,000 approved in the 2024 budget be reallocated to the Town Hall upgrade project. Therefore, there is no impact to the 2024 budget if we proceed.

CONSULTATIONS

Helen Young, Manager of Finance, Town of Stewiacke



ATTACHMENTS

N/A

CONCLUSION

Staff recommended proceeding with basic upgrades of the existing Town Hall building and that Council approve an additional \$30,000 in the 2024 operational budget to complete the necessary work.

Marc Seguin

Marc Seguin
Chief Administrative Officer



To: Town Council

From: Marc Seguin CAO

Re: CAO Report – Town Of Stewiacke Water Infrastructure and Supply

Date: August 15th, 2024

RECOMMENDATION

That, the Town Of Stewiacke Water Infrastructure and Supply report be received; and

That Council confirm receipt of the Phase 4 Concept Design Report (Rev. 02) as supplied by WPS Engineering; and

That Council authorize the CAO to sign a change order with WSP engineering for \$40,140 (plus HST) for the completion of a source analysis for the Phase 4 of the Town’s groundwater assessment to identify the potential origin of the groundwater supplying the new well PW21-01 as identified in the WPS Phase 4 Concept design Report Rev.2; and

That Council direct Staff to enter discussions with the property owner of 378 St. Andrews Street, for the purposes of acquiring the land required to take water and build the Towns future water production and treatment facility and that Staff report back to Council.

ORIGIN/BACKGROUND

A report commissioned by the Town and submitted by CBCL stated that “A key concern about accelerated growth is its impact on existing servicing, and the ability of the current water and wastewater infrastructure to accommodate higher demands”.



Town Staff are aware that the current water treatment plant is nearing its end-of-life cycle and that the Town's growth projections will result in an increased demand for water and wastewater treatment and subsequently have been working with Town Council and related stakeholders on the path forward.

Additionally the Town is aware from data collected that the Town is not able to meet the Ecological Maintenance Flow (EMF) needed during the low flow season." With that in mind a new Town water source has been explored to meet the Town's current and future demands, which would be tied in to a new water treatment facility.

Furthermore, at the meeting of Council on June 25, 2024 the Town awarded a contract to CBCL engineering for a Wastewater Treatment Plant Assessment (Stew2024-WW1) to assess our current and future needs.

Background

WSP was commissioned to explore water sources to meet the Town's future needs and to make recommendations on the infrastructure requirements to treat the water, along with projected costing.

This report summarizes the Town's process, and a general approach for improving hydraulic and treatment capabilities of the Town of Stewiacke's existing potable water infrastructure. It identifies specific treatment processes recommendations for achieving acceptable water quality, as well as provides Preliminary Opinion of Probable Construction Costs to achieve an upgraded water supply system.

The Town's existing potable water supply is sourced from the St. Andrews River.

In recent years, the Town has experienced environmental challenges with the St. Andrews River water source, including:

- Ecological river maintenance flows (EMF) that limit water supply availability during summer.
- River sediment increase that negatively impact on the water treatment process.
- A partially collapsed water supply intake pipe gallery.
- High organic carbon compounds.



In 2012, the Town commenced a water source planning process to create a groundwater-based water supply to replace the St. Andrews River surface water source. Previous phases of this investigation associated with this planning process have focused on locating and developing a groundwater source capable of providing quality water in sufficient quantities to meet the Town's future long-term needs. Combined with the technology recommendations for water treatment, this process should determine the Town's future potable water source and infrastructure needs to support our current and future population needs.

DISCUSSION

The Town has seen rapid growth over the past few years and has come to the point where our current water treatment facility is coming to the end of its lifecycle. With that in mind, the process to look at the Town's water source and water treatment facilities are required to accommodate future growth.

WSP Canada Inc. (WSP) was engaged on behalf of the Town of Stewiacke (Town) to consult and produce a report. This report, titled - **Phase 4 Concept Design Report - REV. 02** is attached as Appendix A.

The purpose of this report is to present potential upgrades to replace the Town's existing potable water treatment, storage, and transmission/distribution piping infrastructure. The primary focus of this report is to:

- Determine the Town's required future treatment capacity based on future population projection assumptions.
- Identify water treatment processes capable of achieving acceptable potable water quality based on currently known water quality analytical results for the source water, Production Well PW21-01 located at 378 St. Andrews Street.
- Prepare an Opinion of Probable Construction Costs for the potential water supply system infrastructure upgrades.



The property located at 378 St. Andrews Street is where production well PW21-01 was drilled. The intended purpose of drilling this well was to find and access a possible water source for the Towns current and future demands.

The Towns Future Water Supply

The Town contracted CBCL to complete a Sustainable Community Growth Development & Resiliency Plan in May 2023. This report references the Towns current water infrastructure situation and the need for reform to build out a “A high- drinking water supply, treatment and distribution system” that can meet the Towns current need and future needs based on population growth and development. The portion of the CBCL report specific to water has been attached to this report for reference.

Under separate cover, CBCL completed a System Assessment Report, conforming with the requirements of the Approval to Operate for the water treatment plant (WTP), issued by Nova Scotia Environment and Climate Change (NSECC).

The CBCL report states that “the current source water supply is the St. Andrews River. An infiltration gallery with a perforated pipe runs across the width of the river at the WTP location, drawing water from the riverbed into the facility. The water quality and flow in the river are highly variable, and susceptible to weather and climatic factors resulting in difficulties with operating the treatment plant to acceptable standards and/or providing adequate hydraulic capacity during these times. These issues can be triggered by drought conditions and intense storm events, but especially by a combination of both factors which may generally become more prevalent or exacerbated in the future due to effects of climate change.

Environmental flow is the minimal flow that has to be discharged maintain healthy ecosystem. The Town of Stewiacke's water withdrawal approval specifies a minimum Ecological Maintenance Flow of 245 liters per second. When the Approval was issued in 2018, it included tighter monitoring and reporting requirements for flows in the St. Andrews River. Town staff access streamflow data online through Environment Canada and are required to report to NSE when flows drop below the EMF.



Staff are in constant contact with the Nova Scotia Department of Environment (NSDOE) and must report EMF levels. The following documents that days per year that the Town encountered instances below EMF levels in the St. Andrews River.

As per documentation to NSDOE:

- 2024 – So far, Town Staff have notified the department 11 days so far that we have been below the Ecological Maintenance flow (EMF).
-
- 2023 – Water withdrawal records were within limits specified in the approval
 - o The St. Andrews River was below the EMF **6 days** between June and October. Number was likely higher during this time at the Environment Canadas equipment was malfunctioning during this time period.
 - o Water Conservation Plan was revised in June.
- 2022 – Water withdrawal records were within limits specified in the approval
 - o The St. Andrews River was below the EMF **56 days** between June and October
 - o Water conservation measures were activated in July
- 2021 – Water withdrawal records were within limits specified in the approval
 - o The St. Andrews River was not below the EMF between June and October
- 2020 – Water withdrawal records were within limits specified in the approval
 - o The St. Andrews River was below the EMF **105 days** between June and October
 - o Water conservation measures were activated in June and in July entered the advisory stage.
- 2019 – Water withdrawal records were within limits specified in the approval
 - o The St. Andrews River was below the EMF **62 days** between June and October
 - o Water conservation measures were activated in August
- 2018 – Water withdrawal records were within limits specified in the approval
 - o New approval issued with tighter monitoring and reporting requirements for flows in the St. Andrews River including the following:

Town of Stewiacke | 295 George Street | P.O. Box 8 | Stewiacke, NS B0N 2J0
Office 902-639-2231 | Fax 902-639-2221 | Email town@stewiacke.net



- section 6(b) – A minimum Ecological Maintenance Flow of 245 liters per second shall be maintained in St. Andrews River immediately downstream of the existing withdrawal point.
 - Section 7 (d) – The approval holder shall record the flow rate in the St. Andrews River on a daily basis from June 1 through October 31.
 - Section 7 (e) – The approval holder shall submit notification to the Department, and copied to DFO, when flow in the St. Andrews River drops below 245 liters per second. This information shall be summarized and submitted on a weekly basis.
- Water Conservation Plan was submitted to the Department
 - The St. Andrews River was below the **EMF 62 days** between June and October

In the first report after the 2018 guidelines changed, the DOE on September 9, 2019 stated that “It is obvious from the data collected to date that the Town is not able to meet the EMF during the low flow season”.

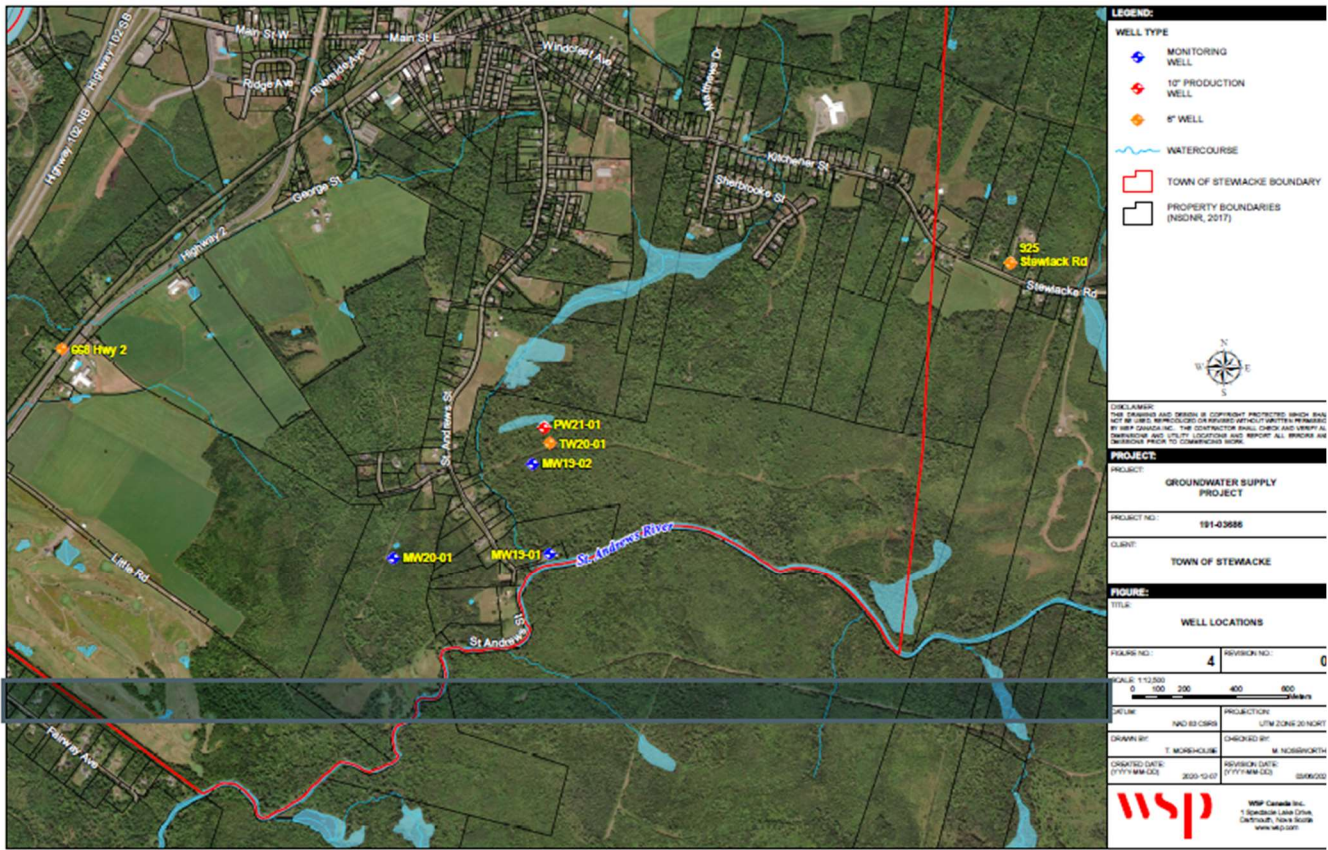
Staff engaged the Nova Scotia Department of Environment and Climate Change to validate the information contained within this report.

The assessment of upgrading the existing infrastructure to further support the current surface water source (St. Andrews River) was not included in the project scope.

The focus on groundwater as a preferred new Town water source was for three reasons:

- 1) Aging infrastructure in the St Andrews. New water treatment infrastructure is required.
- 2) To focus planning on getting away from the Ecological Maintenance Flow (EMF) limitations, placed on the Town by utilizing the river as its water source.
- 3) Focus planning to get away from the sedimentation challenges (including turbidity and colour challenges) that have been increasing with increased rain fall events, that exist based on drawing the Towns water source from the river.

Due to these reasons, it has been the focus to move away from the St. Andrews River as the water source for the Town. Well PW21-01 located at 378 St. Andrews Street, appears to be the Town's best source, however further testing and confirmation are required.



** Well map from page 31 of WSP report attached.



NEXT STEPS

The Town should continue to move towards securing a new water source and the required infrastructure required to meet current and future demands. The immediate future steps required are as follows:

Step 1: Validate if well PW21-01 as identified in the WSP report can be the Towns next water source.

In order for the Town to take the next step in the planning process for the Towns new water source, proper investigation and testing must be completed to validate that the water source is safe and sufficient in supply for the Towns current needs and future growth projections. If well PW21-01 as identified in the WSP report is to be the Towns future water source, we are required to complete the following analysis as outlined within this section.

WSP Canada Inc. (WSP) has submitted a Change Order (CO) to the Town of Stewiacke (Town) for consulting services to complete a source analysis for the Phase 4 of the Town's groundwater assessment to identify the potential origin of the groundwater supplying the new well PW21-01. At this stage, a location with ample water supply has been identified, and groundwater modelling results suggests that the source of the water reaching the new well needs to be better understood prior to completing the Groundwater Withdrawal Application to the Nova Scotia Environment and Climate Change (NSECC) and to complete the water treatment plant design. Phase 4 consists of groundwater withdrawal permit application and pre-design of the required municipal infrastructure to support the groundwater distribution system.

The Town of Stewiacke (Town) currently utilizes the St. Andrews River as a potable water supply. The range of available volumes and fluctuating turbidity in the river present persistent challenges in managing and delivering a reliable water supply. The Town would like to develop a groundwater supply to limit the reliance on the St. Andrews River as a surface water source.

Groundwater exploration and water well drilling within the Town limits has helped to identify the presence of a high yield aquifer unit consisting of gravel and fractured bedrock. In 2020 WSP installed a 6" test well to assess the production capacity of the aquifer unit and a 72-hour pumping test was conducted at a rate of 90 igpm (maximum pumping rate), resulting in a maximum drawdown of 0.13 m. In December 2021 a 10-inch diameter production well was drilled and tested in January 2022. The



2022 testing program produced a 10-day constant rate test at a well discharge of 450 igpm with a maximum observed drawdown of 1.13 m at the well head; a drawdown of 0.55 m at a distance of 1.9 km west of the new well; and a drawdown of 0.68 m at a distance of 2 km east from the new well. The results of the pumping test are promising in terms of water availability, however, prior to completing the application for groundwater withdrawal, points of clarity need to be established regarding the source of groundwater

that will supply the new well. Is the source from the presence of large quantities of groundwater stored within geological formations or due to the presence of a nearby surface water course with a hydraulic connection to the aquifer.

Technical items to be resolved for both types of sources include:

Storage in geological formations:

The aquifer provides a transmissive means by which water moves from the source to the well. Storage could be released from the pores of a sand and gravel layer, noted to be present in the vicinity of the well, or released from bedrock fractures. Hence, would the storage be eventually depleted? Would this type of source be impacted by droughts?

Hydraulic connection with a surface water body:

The presence and proximity of the surface water bodies (St Andrews River and other smaller ones) within the cone of depression for PW21-01 suggests there could be a source of surface water supplying the well, which could be subject to GUDI (Groundwater Under the Influence of surface water).

Effect of rainfall on the aquifer:

During the 10-day test, two rainfall events reduced drawdown, masking the stress on the aquifer from continuous pumping. There was a significant rise in the pumping well water level during the latter stages of pumping – was there recharge through the frozen ground of the early February test or did the rainfall recharge a surface water body which then raised the water level in the aquifer?

Effect of a confining layer above the aquifer:

Although impacted by rainfall, the drawdown values noted in the 10-day pumping test indicate a flat cone of depression, generally seen in confined aquifers. If the aquifer is confined, the presence of a



confining layer (aquitard) above the high yield aquifer unit would protect the aquifer from significant surface infiltration.

The above questions are anticipated during the regulatory review of the Application for Groundwater Withdrawal – it is recommended that a more in-depth analysis of the pumping test results and groundwater modelling results be carried out to provide answers to the questions presented above. The source analysis will also assist in providing support for quantifying the long term sustainable yield of the aquifer hosting PW21-01 and its future redundant well.

SCOPE OF WORK

The Scope of Work necessary to complete the source analysis is supplementary to the previous Change Order No 2, dated February 14, 2023. This additional scope of work includes the following summary of task breakdown.

TASK 1 – BOUNDARY CONDITION EVALUATION

Specific portions of the pumping test drawdown versus time data will be analysed to identify boundary conditions surrounding the aquifer. Overall hydraulic conditions such as confined, unconfined or semi-confined conditions will be evaluated to assess the role of subsurface storage (bedrock fractures / pores within sand and gravel) during the operation of the new well. The effect of rainfall, observed during the 10-day pumping test, will be evaluated to determine if rainfall recharge during the test was via ground surface or surface water and/or via a boundary (such as a surface water body). The use of specialized computer software such as Aqtesolv or AquiferWin and custom Excel spreadsheets will be used to generate graphical and computational solutions.

TASK 2 – WELL EFFICIENCY

The theoretical and true drawdown values for well PW21-01 will be estimated to provide an overall well efficiency. This will be important for the design of the redundant well in this wellfield. For example, should the redundant well be constructed in same manner (perforated casing) or be fitted with a machine-wound continuous wire screen well? Well performance typically degrades with time although alleviated through maintenance programs. This information will assist in developing a long-term well operation and well maintenance program for PW21-01 and the redundant well.



TASK 3 – APPLICATION OF EXISTING GROUNDWATER MODEL

The existing groundwater model will be used to evaluate scenarios related to the origin of the groundwater source for well PW21-01. If applicable, new information from boundary conditions will be applied to the model to better understand forecasts of long term groundwater supply such and issues potentially related to GUDI or aquifer storage. Predictions of groundwater mixing will be generated to inform on the need for additional water treatment related to GUDI issues, if present.

TASK 4 – GUDI analysis (if applicable)

Should the findings of the source analysis suggest that the groundwater from the new well is subject to influence from a surface water source, then a GUDI analysis will be conducted. The analysis will be conducted via specialized computer software and via the groundwater model.

Part of the GUDI analysis includes field sampling of the proposed well. A specific laboratory analysis includes the Microscopic Particulate Analysis (MPA). It is recommended that sampling from a monitoring well near the potential source also be conducted. The GUDI analysis will provide an approximation of the travel time from the source to the new well, which will guide the length of time necessary to pump the well prior to sampling.

DELIVERABLES

The following deliverables will be provided to the Town during and/or following the completion of this work scope:

WSP will complete the groundwater withdrawal application to NSECC. In doing so, the following activities will be conducted:

Summary of relevant assessment and monitoring activities conducted by WSP between 2019-2022; speaking to the site conditions, geology, and hydrogeology.

Review and assessment of available historic water level data for the St. Andrew’s River associated with the current surface water withdrawal permits. WSP will be reliant on the Town to provide a copy of the current surface water withdrawal approval and any available monitoring data.

Review of available water demand data for the Town. WSP will be reliant on the Town to provide all available surface water withdrawals, produced water volumes, and projected future water demands (generated by a third party).



Comments on the location of the source of groundwater supplying the new well PW21-01 and on the possibility that the source is GUDI.

Consultation with the regulator (NSECC Hydrogeologist) on application process and site details.

One final groundwater withdrawal application submitted to NSECC by WSP on behalf of the Town.

WSP's cost to conduct the Source Analysis work is **\$40,140** (not including HST) on a time and materials basis. This amount includes \$19,100 for the GUDI analysis, which may not be needed, should the source analysis rule out the possibility of the potable source being hydraulically connected to a surface water source. The cost breakdown for the project phases and tasks are included in the below cost table. WSP expenses are based on standard rates for equipment and consumables.

Step 2: Secure the land necessary to draw water and build infrastructure.

The Town drilled a well on property located at 378 St. Andes St. Preliminary indications imply that the well can meet current and future Town water needs, however future testing is needed to verify this. The required steps for verification are outlined in Step # 1 above. Town officials should enter discussion with the property owners to discuss securing land. Securing or acquiring land, would be dependent on the successful testing and results as identified within Step # 1 above.

FINANCIAL

WSP proposes to conduct the Source Analysis work for \$40, 140 (not including HST).

Currently the 2024 budget has \$50,000 approved for engineering. The intended purpose of this approved budget line was to conduct the wastewater assessment.

In July 2024 the Town was advised that the Department of Municipal Affairs and Housing has approved a funding request and contributed \$42,675 toward the cost of this project. This funding covers the project cost as awarded via the wastewater treatment plant Assessment 2024 RFP Award at the June 27, 2024 meeting of Council.



It is recommended that \$20,000 of the \$50,000 approved in the 2024 budget be reallocated to the necessary work highlighted in this report and that the remaining funding be taken from the 2024 general operating budget.

To date, WPS has provided an “Opinion Of Probable Costs” which can be found on page 27 of their report. These costs need to be refined with a Class A or B cost analysis. Funding would then need to be solidified. Town Staff would be seeking funding options including looking for Federal and Provincial grant opportunities.

The report states that:

“Costing for wellfield development components, Well Control Building, WTP Control Building, water treatment process components, Water Storage Reservoir, water transmission/distribution piping, electrical, mechanical, instrumentation/controls, pre-design engineering, detailed design engineering, tendering/award, contract administration, and contingencies are summarized in Table 4-1 of the report.

This Preliminary Opinion of Probable Construction Costs is based on a Class D level of accuracy of -20 to +30 percent. Costs have been developed based on WSP’s database of recent construction unit costs, our understanding of the current construction market conditions and budgetary costing obtained from equipment suppliers for specific treatment process equipment.”

The total estimated capital construction costs found on pages 28 and 29 of the WSP report forecast the total capital construction cost at \$20,140,000. As the costing was completed based on a Class D estimate, the cost may fluctuate -20 to +30%. Once plans have been finalized a Cost A or B costing should be completed. The Town should start investigating financing / funding through eligible or available Provincial / Federal Funding Sources (i.e. Gas tax, Grants etc.) immediately.

POLICIES/LEGISLATION

The procurement pertaining to the work contained within this report is subject to Town of Stewiacke Purchasing and Tender Policy # 2000-05.



CONSULTATIONS

- Jeff Sibley, Superintendent of Public Works
- Grant Cooke, Town Planner
- Charles Thompson, Town Solicitor
- Kevin Matheson, Interim CAO (to June 2024)
- WSP Engineering
- From the Environmental Inspection, Inspection, Compliance and Enforcement Division, Nova Scotia Department of Environment and Climate Change (ECC):
 - A) Angelina Polegato, Drinking Water Specialist
 - B) Jennifer McDonald, Hydrogeologist
 - C) Kelly McNally, Environment Officer

ATTACHMENTS

- 1) Phase 4 Pre-Engineering Study - Town of Stewiacke Groundwater Supply System - 2024-07-05_FINAL
- 2) Sustainable Community Growth Development & Resiliency Plan in May 2023 – Water Portion Only

CONCLUSION

The Town is in need of a new water source and the related water infrastructure to treat and supply water for all residents and local businesses. Staff initiated the process long ago and have engaged experts from CBCL, WSP and the Department of Environment.

At this time, Staff recommend that the analysis well PW21-01 be completed (located at 378 St. Andrews Street) to determine the viability of this being designated as the Town's future water source.

After reviewing the proposal received, staff recommend accepting the WSP report and that Council authorizes the Towns CAO to sign a change order request with WSP engineering for \$40,140 (plus HST) for the completion of a source analysis for the Phase 4 of the Town's groundwater assessment to



identify the potential origin of the groundwater supplying the new well PW21-01 as identified in the WPS Phase 4 Concept design Report Rev.2

Furthermore, Staff recommend entering into discussions with the property owner of 378 St. Andrews Street, for the purposes of acquiring the land required to take water and build the Towns future water production and treatment facility and that Staff report back to Council. Staff note that any property acquisitions would be contingent on the successful completion of a source analysis and confirmation from that analysis that the source can meet the Towns water needs.

Marc Seguin

Marc Seguin
Chief Administrative Officer

TOWN OF STEWIACKE WATER SUPPLY SYSTEM

**PHASE 4 CONCEPT DESIGN REPORT
– REV. 02**

JULY 05, 2024

CONFIDENTIAL





TOWN OF STEWIACKE WATER SUPPLY SYSTEM

PHASE 4 CONCEPT DESIGN REPORT – REV. 02

TOWN OF STEWIACKE

**REPORT REV. 02
CONFIDENTIAL**

**PROJECT NO.: CA0001941.4259
DATE: JULY 05, 2024**

**WSP CANADA INC.
1 SPECTACLE LAKE DRIVE
DARTMOUTH, NOVA SCOTIA
CANADA**

**T: 902-835-9955
WSP.COM**



July 5, 2024

Confidential

Town of Stewiacke
295 George Street
PO Box 8
Stewiacke, NS, B0N 2J0

Attention: Jeff Sibley

Subject: Town of Stewiacke - Phase 4 Concept Design Report

Dear Sir:

Attached for your records, review and distribution to the Town Council and Staff is a copy (.pdf) of our **Phase 4 Concept Design Report - Rev. 02** for the Town of Stewiacke's proposed Water Supply System project. This report replaces our previously issued February 22, 2024, report in its entirety.

The primary focus of this Phase 4 report is the proposed water treatment processes and their general relationship with upstream and downstream infrastructure components. Please note that previous WSP Phase 1, 2 and 3 Reports provide additional information pertaining specifically to the development of the wellfield and proposed production well(s).

If you have any questions or comments regarding this report, please contact the undersigned.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'C. Fogarty', written over a light blue horizontal line.

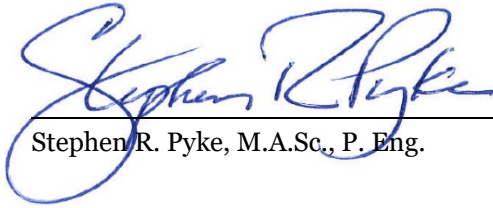
Colin Fogarty, P. Eng.

REVISION HISTORY

FIRST ISSUE		
November 8, 2023	Draft Issue – Phase 4 Concept Design Report - WTP	
Prepared by	Reviewed by	Approved by
Kevin O’Leary, P. Eng.	Colin Fogarty, P. Eng.	Kevin O’Leary, P. Eng.
REVISION REV. 01		
February 22, 2024	Final Issue – Phase 4 Concept Design Report	
Prepared by	Reviewed by	Approved by
Stephen Pyke, M.A.Sc., P. Eng.	Colin Fogarty, P. Eng.	Stephen Pyke, M.A.Sc., P. Eng.
REVISION REV. 02		
July 05, 2024	Final Issue – Phase 4 Concept Design Report – REV. 02	
Prepared by	Input by	Approved by
Stephen Pyke, M.A.Sc., P. Eng.	Hany Abraham, M.Sc., P.Eng., PMP	Colin Fogarty, P. Eng.

SIGNATURES

PREPARED BY



Stephen R. Pyke, M.A.Sc., P. Eng.

July 05, 2024

Date

APPROVED¹ BY



Colin Fogarty, P.Eng.

July 05, 2024

Date

WSP Canada Inc. prepared this report solely for the use of the intended recipient, Town of Stewiacke, in accordance with the professional services agreement. The intended recipient is solely responsible for the disclosure of any information contained in this report. The content and opinions contained in the present report are based on the observations and/or information available to WSP Canada Inc. at the time of preparation. If a third party makes use of, relies on, or makes decisions in accordance with this report, said third party is solely responsible for such use, reliance, or decisions. WSP Canada Inc. does not accept responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken by said third party based on this report. This limitations statement is considered an integral part of this report.

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EXECUTIVE SUMMARY

This report summarizes a general approach for improving hydraulic and treatment capabilities of the Town of Stewiacke's existing potable water infrastructure. It identifies specific treatment processes recommendations for achieving acceptable water quality, as well as provides Preliminary Opinion of Probable Construction Costs to achieve an upgraded water supply system.

Details of the Town's future groundwater supply source, Production Well PW21-01, are presented in this project's Phase 3 Production Well Drilling/Testing Exploration Program. PW21-01 hydraulic capacity was confirmed at a minimum of **2 440 m³/d** (448 USgpm).

The Town's current (2021) serviced population is approximately 1 560 people. Future water demands have been based on the Town's preference for a 35-year horizon serviced population projection to 5 100 people. Using the Town's 2020 Water System Assessment Data as a template, the primary hydraulic capacity sizing criteria (i.e., Max. Day Raw Water Design Flow) representing a future design population of 5 100 people is **3 570 m³/d** (655 USgpm). This flow exceeds the groundwater hydraulic capacity currently available (see above), thus requiring further PW21-01 pump testing or further production well exploration/testing/development.

Water quality analysis performed on PW21-01 indicates the need for treatment to reduce iron, manganese, sulphates, total dissolved solids, turbidity, and hardness. The water treatment processes recommended and discussed in this report are greensand filtration and nanofiltration. Chlorination, dechlorination and antiscalant chemical dosing is also required. These processes will need to be supported by backwash and high lift pumping systems. Note: A biological filtration process option previously considered has been omitted due to the equipment vendor confirming PW21-01 water quality as being unsuitable for their biological treatment process.

Overall, an upgraded Town of Stewiacke water supply system would generally consist of:

- Groundwater supply well PW21-01, an assumed secondary production well and associated well control buildings.
- New water treatment processes (WTP), residual waste storage tankage, backwash, and high lift pumping systems, and WTP control building.
- New water storage reservoir.
- Water transmission/distribution piping interconnecting the above components to the Town's existing water distribution piping network.
- Supervisory Control and Data Acquisition (SCADA) system.

An Opinion of Probable Construction Costs is presented in Table 4-1. Anticipated Total Capital Construction Costs for the Town's water supply system is **\$ 20 140 000**. This cost figure is based on a Class D level estimate (i.e., -20 to +30%) and includes a 20% construction contingency, and costing for preliminary/detailed design engineering, contract administration, site observation and start-up/commissioning services.

1. INTRODUCTION

1.1 PURPOSE

This report, titled - **Phase 4 Concept Design Report - REV. 02**, was prepared by WSP Canada Inc. (WSP) on behalf of the Town of Stewiacke (Town) under TASK B scope-of-work for this project.

The purpose of this report is to present potential upgrades to replace the Town's existing potable water treatment, storage, and transmission/distribution piping infrastructure. The primary focus of this report is to:

- Determine the Town's required future treatment capacity based on future population projection assumptions.
- Identify water treatment processes capable of achieving acceptable potable water quality based on currently known water quality analytical results for the source water, Production Well PW21-01.
- Prepare an Opinion of Probable Construction Costs for the potential water supply system infrastructure upgrades.

In addition, potential water storage and transmission piping options forming part of the Town's future water supply system are also presented herein.

The primary change to this report (i.e., REV. 02) as compared to the previously issued report (i.e., Rev. 01, Feb. 2024) is an increase in hydraulic capacity requirements resulting from increased future design serviced population projections.

1.2 BACKGROUND

The Town's existing potable water supply is sourced from the St. Andrews River. In recent years, the Town has experienced environmental challenges with this water source, including:

- Ecological river maintenance flows that limit water supply availability during summer.
- River sediment increase that negatively impact on the water treatment process.
- A partially collapsed water supply intake pipe gallery.

In 2012, the Town commenced a water source planning process to create a groundwater-based water supply to replace the St. Andrews River surface water source. Previous phase investigations associated with this planning process have focused on locating and developing a groundwater source capable of providing quality water in sufficient quantities to meet the Town's future long-term needs.

To date, groundwater source investigations have included:

- **Phase 1** - Desktop study (June 2019 report).
- **Phase 2** - Monitoring well drilling/testing exploration program (June 2021 report).
- **Phase 3** - Production well drilling/testing exploration program (June 2022 report).

Phase 2 and 3 groundwater test well drilling and testing exploration programs identified a potential groundwater aquifer and production well positioned on the Densmore property located off of St. Andrews Road. Following initial exploration, testing, and modeling results, this aquifer and production well are under review for regulatory approval as a groundwater source for the Town's future potable water supply needs.

Production, test and monitoring well locations identified by the Town's water source planning process are provided in **Appendix A - Town of Stewiacke Zoning Mapping and Water Supply Well Locations**.

1.3 PROJECT UNDERSTANDING

It is proposed the Town's new potable water supply system will consist of the following primary infrastructure components, all of which are to be positioned within the Town's existing municipal boundaries:

- Groundwater production well(s).
- Water treatment process.
- Water storage reservoir.
- Water transmission/distribution piping system.

The Opinion of Probable Construction Costs provided herein for Phase 4 includes probable costing for each of the primary infrastructure components outlined below.

Groundwater Production Well(s):

During the Phase 3 production well drilling/testing exploration program, Production Well 21-01 (PW21-01) was drilled in December 2021 at 250 mm (10") diameter and was pump tested in January 2022 at a flow rate of **2 440 m³/d** (1 680 L/min., 448 USgpm). This was the maximum pump equipment flow rate available during the well testing procedures. These pump tests confirmed the aquifer water bearing zone was not significantly stressed. Whereas PW21-01 is considered capable of a production flow in excess of the amount stated above, additional pump testing will be required to definitively confirm a higher rated safe-yield pumping capacity.

Nova Scotia Environment (NSE) permitting requirements necessitate a secondary (redundant) production well capable of producing 100 percent stand-by capacity for PW21-01. This second production well can be positioned within the existing PW21-01 aquifer, or in an alternate aquifer. Therefore, further well drilling and testing exploration will be required to establish an additional production well(s).

Detailed engineering design will be required to determine preferences and details for specific production wellhead infrastructure, including wellhead chambers, well pumps, well pump controls, well drop piping/valving, pitless adapters, well control building, wellhead power supply, instrumentation, and a Supervisory Control and Data Acquisition (SCADA) system. Infrastructure will also include local yard piping to connect the production well to water transmission piping linking the wellhead to the water treatment facility.

An access roadway will be required to connect from St. Andrews Road through the Densmore property to the PW21-01 site. Electrical power supply and communication lines will also be routed along this access roadway alignment.

Provision of a groundwater supply well concept design is not considered part of this Phase 4 Concept Design Report. This will need to be developed in a subsequent project phase.

Water Treatment Process:

The Water Treatment Process (WTP) is the key component of Phase 4 and the primary focus of this report.

Water quality results obtained to date for Production Well Pw21-01 have been used to identify potential water treatment unit processes capable of producing acceptable potable water quality. In developing potential water treatment processes, consideration was given to technologies and equipment that have the following attributes:

- Considered as ‘tried and true’ treatment technologies.
- Currently used in Atlantic Canada municipal water treatment systems.
- Supported by local equipment vendors/suppliers.
- Possess modular capacity expandability, automation, and remote monitoring capabilities.
- Capable of low power operation.
- Capable of relatively low operation and maintenance costs.

It is intended that a WTP Control Building will house the following water treatment process components:

- Raw water inlet and treated water outlet piping systems, including isolation valving.
- Water treatment processing equipment and associated electrical control equipment.
- Temporary on-site treated water storage tankage.
- High-lift and backwash pumping.
- Chlorination disinfection system.
- Emergency back-up power supply.

- Instrumentation, including pressure, flow, pH, residual chlorine, turbidity.
- Supervisory Control and Data Acquisition (SCADA) system.
- Operations amenities, including central control room, operations offices, washrooms, equipment storage, etc.

Water Storage Reservoir:

The Town's existing water treatment system incorporates two (2) water storage reservoirs, one which was constructed in 2003 (approx. capacity = 500 m³) and the other constructed in 2009 (approx. capacity = 2 400 m³). The ability to incorporate these existing reservoir into the new water supply system will best be determined as part of a hydraulic modeling of the overall water supply/treatment/storage/transmission system. Provision of hydraulic modeling is not considered part of this Phase 4 Concept Design Report. This will need to be developed in a subsequent project phase.

It is intended that a new Water Storage Reservoir will be incorporated as part of the Town's upgraded potable water supply system to provide for adequate treated water volumetric capacity. Cost provisions have been incorporated for a new water storage reservoir in the Opinion of Probable Construction Costs table, Table 4-1.

Water Transmission/Distribution Piping:

New water transmission/distribution piping components will be required to connect from Production Well PW21-01 to the WTP Control Building, from the WTP Control Building to the Water Storage Reservoir, and from the Water Storage Reservoir to the Town's existing water distribution piping network.

Routing locations for the transmission/distribution piping will impact on overall water supply system hydraulics. Hydraulic modeling of the preferred pipeline routing will be necessary to determine optimum pipe sizing and configuration.

1.4 GUIDELINES

Water Quality Guidelines:

Water quality regulations for potable water production in Canada are governed by the Guidelines for Canadian Drinking Water Quality (GCDWQ). Health Canada established these guidelines in collaboration with the Federal-Provincial-Territorial Committee on Drinking Water and other federal government departments. Each GCDWQ parameter was established based on current, published scientific research related to health effects, aesthetic effects, and operational considerations.

The GCDWQ include Maximum Acceptable Concentrations (MAC) established based on health effects, Aesthetic Objectives (AO) set for water quality acceptance by consumers (i.e., taste and odour), and Operational Guidance (OG) values set for parameters that may affect water treatment processes or the water distribution system (i.e., corrosion of pipes).

The GCDWQ are reviewed periodically to assess the current guidelines to determine if the scientific evidence has changed and to determine if new parameters need to be added to the guidelines. The review period typically follows a five-year cycle that includes publication of under review parameters.

Design and Operation Guidelines:

Engineering design of the Town's water supply system shall be undertaken in accordance with the latest version of the Atlantic Canada Water Supply Guidelines (2022). These Guidelines represent a collaborative effort among the participating provinces and are intended to provide a guide for developing drinking water supply projects in Atlantic Canada.

The Guidelines are intended to be used in the evaluation of water supply, treatment, and distribution projects, and including the design and preparation of contract drawings and technical specifications. The Guidelines suggest minimum design requirements and establish, as far as is practical, a best practice design approach.

The operation of water supply, treatment, storage, distribution, and operation of drinking water systems in Nova Scotia is regulated jointly by the Nova Scotia Utilities and Review Board (NSUARB) and Nova Scotia Environment (NSE).

1.5 UPDATES TO SYSTEM DESIGN CRITERIA

This Phase 4 Concept Design Report - Rev. 02 incorporates the Town's preference for a revised future design population of 5 100 people and the use of measured flow data obtained from the Town of Stewiacke 2020 Water System Assessment Report. The previous version of this report (i.e., Rev. 01, Feb. 2024) was based on a projected future design serviced population of 3 000 people.

To illustrate the relative change in design flows of Rev. 02 (this report) versus Rev. 01 (previous report), a comparison of System Design Criteria is provided below in Table 1-1 for general reference.

System Design Criteria parameters include:

- Calculated Average Per Capita Water Demand (i.e., consumption).
- Maximum (Max.) to Average (Avg.) Day Ratio.
- Avg. Daily Treated Design Flow.
- Avg. Daily Raw Water Design Flow.

- Max. Day Treated Design Flow.
- Max. Day Raw Water Design Flow.

Design flow calculations are summarized in Section 2 - System Design Criteria.

Table 1-1: Concept Design Report Comparative Summary: Rev. 01 vs. Rev. 02 System Design Criteria

System Design Criteria Parameter	Units	Concept Design Report – Rev. 01	Concept Design Report – Rev. 02
Design Population	<i>people</i>	3 000	5 100
Per Capita Water Consumption:			
<i>Calculated</i>	<i>Lpcd¹</i>	374	329
<i>Assumed (for prelim. design)</i>	<i>Lpcd¹</i>	400	350
Max to Avg. Day Ratio (<i>for prelim. design</i>)	<i>NA</i>	1.50	1.50
Avg. Daily <u>Treated Water</u> Design Flow	<i>m³/d</i>	1 200	1 785
Avg. Daily <u>Raw Water</u> Design Flow	<i>m³/d</i>	1 600	2 380
Max. Day <u>Treated Water</u> Design Flow	<i>m³/d</i>	1 800	2 680
Max. Day <u>Raw Water</u> Design Flow	<i>m³/d</i>	2 400	3 570

Notes:

1. Litres per capita/day

2. SYSTEM DESIGN CRITERIA

2.1 SERVICE BOUNDARY AREA

It is the Town's preference to proceed with establishing a centralized domestic water supply system to service residential, commercial, and institutional users within its current municipal boundaries. A map of the Town of Stewiacke showing its municipal zoning, street network and boundaries is provided in **Appendix A - Town of Stewiacke Zoning Mapping and Water Supply Well Locations**.

It is currently understood the Town is not planning to extend central water supply services to and existing or future developments positioned beyond the Town's proposed water service area boundaries. However, depending upon the new proposed water supply system configuration, the Town could consider extending water services in the future to accommodate residential, commercial, institutional, or industrial developments located beyond the current water service area boundaries.

For the purposes of Phase 4, it has been assumed that domestic water services will be limited to users located within the existing water service area boundary.

2.2 FUTURE POPULATION PROJECTIONS

The financial and design implications of the Town's new water supply system require the Town to carefully consider its future serviced population expectations. Existing serviced populations and potential future residential, commercial, institutional, and industrial growth will directly impact on the hydraulic capacities of water treatment, pumping, storage, and pipeline conveyance components.

System component capacities are based on existing and anticipated average day and maximum (peak) day water demands. These parameters are directly affected by connected (serviced) population figures. In turn, water supply system capital, operation and maintenance costs are determined in large part from the overall system design capacities.

Population figures for the Town of Stewiacke are outlined below in Table 2-1. These figures are based on the Town's census data as presented by Statistics Canada for 1991 to 2021. The census data shows:

- Current (2021) residential population = 1 557 people and 739 private dwelling units.
- Current (2021) average number of persons per dwelling unit (ppu) is $1\,557 \text{ people} \div 739 \text{ dwelling units} = 2.11 \text{ ppu}$.
- The Town's average annual growth rate at 0.63%, ranging from a high of 13.4% (2016 to 2021) to a low of -4.5% (2011 to 2016) during the 30-year period from 1991 to 2021.

Table 2-1: Statistics Canada Census Data - Town of Stewiacke, NS

Census Year	Population	No. of Dwelling Units	Average Persons per Dwelling Unit (ppu)
1991	1,309	-	-
1996	1,405	-	-
2001	1,388	565	2.46
2006	1,421	618	2.30
2011	1,438	644	2.23
2016	1,373	681	2.02
2021	1,557	739	2.11

Based on feedback received from our Phase 4 Concept Design Report - Rev. 01, it is the Town's preference to proceed with sizing the new water supply system based on the following assumptions for determining the future design population:

- Design horizon projection = **35-years**.
- Commencement population (i.e., year zero) based on 2021 Statistics Canada Census Data of **1 557 people**.
- Doubling of the 2021 census population to $1\ 557 \times 2 = 3\ 114$ people during project design years 1 to 10, inclusive.

Therefore, the 10-year horizon projection design serviced population = **3 100 people**.

- Average annual growth rate of 2.0% over a 25-year period from project design years 11 to 35, inclusive, resulting in a design population of $3\ 114 \times (1 + 0.02)^{25} = 5\ 109$ people.

Therefore, the 35-year horizon projection design serviced population = **5 100 people**.

For this Phase 4 Concept Design Report - Rev. 02, the 35-year horizon projection for serviced population is assumed as **5 100 people**. This represents a population increase of approximately 3 440 people compared to the current (2021) census population.

Assuming the current (2021) dwelling unit population density of 2.11 persons per dwelling unit (see Table 2-1), the anticipated number of future dwelling units is calculated as 2 417 (i.e., $5\ 100 \div 2.11$). This represents an increase of approximately 1 680 dwelling units compared to the current (2021) census.

The average annual serviced population growth rate over the 35-year horizon projection is **3.45%**.

2.3 WATER DEMAND

Based on the Town’s review of Phase 4 Concept Design Report - Rev. 01, the Town expressed its preference for utilizing the Town of Stewiacke’s 2020 Water System Assessment Data for basing future water demands.

The Town’s 2020 Water System Assessment Data is summarized below in Table 2-2.

Table 2-2: Town of Stewiacke Water System Assessment Data Summary

Month	Measured Water Flow to Town’s Water Distribution System			
	Total <i>m³</i>	Avg. Day <i>m³/d</i>	Max. (Peak) Day <i>m³/d</i>	Max : Avg. Day <i>Ratio</i>
Jan.	11 143	359	421	1.17
Feb.	10 572	365	399	1.09
Mar.	11 199	361	471	1.30
Apr.	10 620	354	455	1.29
May	12 265	396	487	1.23
Jun.	14 155	472	586	1.24
Jul.	15 509	500	621	1.24
Aug.	13 236	427	578	1.35
Sep.	11 350	378	501	1.32
Oct.	11 806	381	442	1.16
Nov.	-	-	-	-
Dec.	-	-	-	-
<i>Yearly Average</i>	<i>12 186</i>	<i>399</i>	<i>496</i>	<i>1.24</i>
<i>Yearly Maximum</i>	<i>15 509</i>	<i>500</i>	<i>621</i>	<i>1.35</i>

The 2020 Water System Assessment Report flow data presented above in Table 2-2 identifies the largest Average Day water demand occurring in July at 500 m³/d, and the largest Maximum (Peak) Day water demand occurring in July at 621 m³/d. The largest Max. to Avg. Day ratio occurred in August and was 1.35 : 1. For preliminary design purposes the Max. to Avg. Day water demand ratio (i.e., peaking factor) of 1.50: 1 is assumed.

The Average Per Capita Water Demand represented by the 2020 Water System Assessment Report flow date was calculated based on:

- 2020 population interpolated at 1 520 people from 2016 census data (i.e., 1 373 people) and 2021 census data (i.e., 1 557 people).
- Highest 2020 Avg. Day water demand = 500 m³/d.

Therefore, the Average Per Capita Water Demand is calculated as:

$$500 \text{ m}^3/\text{d} \div 1\,520 \text{ persons} \times 10^3 = 329 \text{ Lpcd (litres per capita/day)}.$$

For preliminary design the Average Day Per Capita Water Demand is assumed at **350 Lpcd**.

2.4 WATER TREATMENT DESIGN CAPACITIES

Future serviced population and per capita water demand design criteria presented above in Sections 2.2 and 2.3 were used to develop preliminary water treatment hydraulic design capacities for 10-year and 35-year horizon projections.

The rationale and calculation details for preliminary water treatment hydraulic design capacities are presented in **Appendix B - WTP Hydraulic Design Criteria**. Design flow criteria for 10-year and 35-year horizon projections are summarized below in Table 2-3.

Table 2-3: Summary of Water Treatment Process Hydraulic Design Capacity Criteria

Design Flow Criteria	Design Capacity Criteria			
	m ³ /d	L/min.	L/s	USgpm
10-Year Horizon Projection - Serviced Population = 3 100 people				
Average Daily <u>Treated Water</u> ¹ Design Flow	1 085	750	13	200
Average Daily <u>Raw Water</u> ² Design Flow	1 450	1 010	17	270
Maximum (Peak) Day <u>Treated Water</u> ¹ Design Flow	1 630	1 130	19	300
Maximum (Peak) Day <u>Raw Water</u> ² Design Flow	2 170	1 510	25	400
35-Year Horizon Projection - Serviced Population = 5 100 people				
Average Daily <u>Treated Water</u> ¹ Design Flow	1 785	1 240	21	327
Average Daily <u>Raw Water</u> ² Design Flow	2 380	1 650	28	436
Maximum (Peak) Day <u>Treated Water</u> ¹ Design Flow	2 680	1 860	31	490
Maximum (Peak) Day <u>Raw Water</u> ² Design Flow	3 570	2 480	41	655

Notes:

1. Treated Water quantities represents the water flow delivered directly to the serviced population.
2. Raw Water qualities are greater than Treated Water quantities. They account for water flow loss resulting from inherent treatment process waste reject flow streams.

For the 10-year horizon projection, the Max. (Peak) Day Raw Water Design Flow is 2 170 m³/d (400 USgpm). This flow rate falls within the water supply capacity currently confirmed for Production Well PW21-01 of 2 440 m³/d (448 USgpm).

For the 35-year horizon projection, the Max. (Peak) Day Raw Water Design Flow is 3 570 m³/d (655 USgpm). This flow rate exceeds the water supply capacity currently available from Production Well PW21-01 of 2 440 m³/d (448 USgpm). Until an upper pumping capacity limit (i.e., rated safe-yield capacity) is determined for the PW21-01 aquifer, there currently is insufficient data to confirm that this well can accommodate the Max. (Peak) Day Raw Water Design Flow for the 35-year horizon projection.

NSE will impose groundwater allocations and limitations on municipal groundwater aquifer water withdrawal permits. Typically, groundwater allocations are based on the applicant's current water needs, rather than potential future needs. The applicant (i.e., Town) must demonstrate the need for the volume of water requested. The applicant cannot typically reserve water for future use beyond the expiry date of the approval, which is up to 10-years under the Approvals Procedure Regulations.

Whereas the current available PW21-01 pumping capacity is capable of accommodating the initial 10-year horizon projection for the Max. (Peak) Day Raw Water Design Flow, it has not been established that it is capable of accommodating the 35-year horizon projection for the Max. (Peak) Day Raw Water Design Flow. Therefore, the Town must undertake further development and pump testing of the PW21-01 aquifer in order to establish a suitable upper limit of its rated safe-yield capacity, as well as undertake further wellfield exploration to establish a secondary (redundant) water supply production well or wells.

2.5 WATER QUALITY

Production Well PW21-01 water quality analytical results for six (6) samples collected between January 31 and February 10, 2022, are provided in **Appendix C - Production Well PW21-01 Water Quality Analytical Results**.

PW21-01 water quality meets all criteria under Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ). These guidelines consist of two (2) primary water quality categories, namely Maximum Acceptable Concentrations (MAC) and Aesthetic Objectives (AO).

For PW21-01 water quality, no parameters exceed the MAC. Noted AO exceedances involve the following parameters:

- Dissolved iron - 3 of 6 samples.
- Dissolved manganese - 6 of 6 samples.
- Dissolved sulphates - 6 of 6 samples.
- Total dissolved solids - 6 of 6 samples.

- Turbidity - 6 of 6 samples.
- True colour - 1 of 6 samples.
- *Note: Hardness, although not an AO, is reported as being very high in 6 of 6 samples.*

Based on Appendix C water quality results, those PW21-01 parameters identified as requiring treatment to achieve an acceptable potable water quality are summarized in Table 2-4 below.

Table 2-4: Summary of Key PW21-01 Parameters Requiring Treatment

Parameter	GCDWQ ¹				
	Units	MAC ²	AO ³	Avg. Conc.	Range
Dissolved Iron (Fe)	µg/L	-	300	433	59 – 1 040
Dissolved Manganese (Mn)	µg/L	120	20	74	66 - 85
Dissolved Sulphates (SO ₄)	mg/L	-	500	962	800 – 1 270
Total Dissolved Solids (TDS)	mg/L	-	500	1 590	1 410 – 1 890
Turbidity	NTU	0.1 – 1.0 ⁴		9.5	5.7 – 12.4
Hardness (as CaCO ₃)	mg/L	-	-	1 260	1 120 – 1 360

Notes:

1. Health Canada Guidelines for Canadian Drinking Water Quality
2. Maximum Acceptable Concentration
3. Aesthetic Objectives
4. Range covers membrane technology to traditional gravity sand.

PW21-01 contains elevated iron (Fe) and manganese (Mn) concentrations. Whereas no MAC is established for iron, manganese does not exceed the MAC. However, iron and manganese removal is required to meet acceptable AO water quality. Unless reduced less than AO concentrations, iron and manganese will undoubtedly produce objectionable aesthetic effects, such as staining of plumbing fixtures and laundry.

Elevated sulphate (SO₄) concentrations occur in PW21-01. At current concentrations, water taste will be impacted. Sulphate can also result in sulphide formation within the distribution system, which can render water taste and odour unpalatable at concentrations above the aesthetic objective. Therefore, sulphate removal is required to achieve acceptable potable water quality.

Total dissolved solids (TDS) are typically composed of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, chloride, sulphate, and nitrate. Excessive water pipe, water heater, boiler and appliance scaling will result based on current PW21-01 TDS concentrations. TDS removal is required to achieve acceptable potable water quality.

Current PW21-01 turbidity concentrations are considered excessive for acceptable potable water quality. However, turbidity results obtained during typical pump testing programs can be misleading as much lower turbidity is usually consistently achieved during normal well operation. The most important health-related function of turbidity is as an indicator of drinking water treatment filtration process effectiveness with respect to removal of potential microbial pathogens. Health Canada identifies turbidity reduction, particle removal and pathogen removal as dependent upon the source groundwater quality and the selection and operation of the treatment technology. Therefore, the proposed water treatment technology must consider turbidity removal/reduction.

3. WATER SUPPLY SYSTEM CONFIGURATION

3.1 WATER TREATMENT APPROACH

Selection of water treatment processing to achieve acceptable potable water quality for the Town is based on two (2) separate unit processes operated in series.

Each unit process will address specific water quality parameters. One unit process focuses primarily on the removal/reduction of iron (Fe), manganese (Mn, and sulphates (SO₄). The other unit process focuses primarily on the removal/reduction of total dissolved solids (TDS), turbidity and hardness. Water treatment will also include chlorine disinfection to achieve an acceptable chlorine residual throughout the water supply storage and distribution piping systems.

Where possible and where permitted by the selected treatment process technologies, a continuous hydraulic line as established from groundwater well pumps to water treatment and through to clearwell storage within the WTP Control Building will be considered as part of the overall water supply system design. It is recommended that confirmation of water treatability be established as part of a comprehensive on-site pilot study for the preferred water treatment technologies.

Water treatment technologies considered capable of producing acceptable potable water quality based on PW21-01 water quality characteristics are discussed in the following sub-sections.

3.2 IRON, MANGANESE AND SULPHATE REMOVAL

Two (2) separate iron and manganese (Fe/Mn) treatment technologies were identified as part of the previous Phase 4 Concept Design Report – Rev. 01. These technologies were greensand filtration and biological filtration.

As follow-up for updating this Phase 4 Concept Design Report – Rev. 02, iron and manganese treatment vendors were again contacted to provide process equipment sizing and costing updates to accommodate the revised future design population of 5 100 people.

Discussions with the biological filtration vendor revealed their apprehension and concerns regarding the capability of their treatment system to adequately achieve an acceptable treated water quality. Their rationale was based specifically on Well PW21-01 having an elevated pH range (i.e., 7.6 to 7.9). The vendor's biological filtration experience is for a water quality consistently at a pH less than 7.2. It is the vendor's opinion that PW21-01 water quality would be unsuitable for their biological treatment processes. As such, the vendor expressed their preference for withdrawing the biological filtration process from further project consideration.

Given that this equipment vendor is the only known manufacturer of an iron and manganese biological filtration process, this specific process has been removed from further consideration as a potential treatment option for the Town of Stewiacke. As a result, discussion of biological filtration as a treatment option has been omitted from this report.

Moving forward, consideration of potential iron and manganese removal technology is now limited to greensand filtration.

Greensand Filtration:

Greensand filtration technology is commonly used across North America, including in Atlantic Canada, as an effective Fe/Mn treatment solution. A typical greensand filtration process is shown below in Figure 3-1.



Figure 3-1: Three Vessel Greensand Filtration Process

Greensand filters typical include a multi-layered proprietary coated media and anthracite within a steel pressure vessel. Chlorine (typically sodium hypochlorite) and/or potassium permanganate are injected (metered) into the raw water flow stream upstream of the greensand filters to serve as a strong chemical oxidant. This chemical oxidation process facilitates Fe/Mn precipitation from solution and also serves to maintain overall reactivity of the greensand media.

In addition to Fe/Mn removal, greensand filtration also achieves oxidation and subsequent precipitation of sulphates (SO₄).

It is proposed that the greensand filtration process be configured as multiple (typically three) pressurized filter vessels operated in parallel. Sufficient filter through-put hydraulic capacity shall be provided to accommodate the maximum (peak) day design flow with one (1) filter vessel removed from service for maintenance purposes.

A control panel will be mounted to each filter vessel. A master control panel will house a programmable logic controller (PLC) and human machine interface (HMI) panel for local system control. The greensand filtration process will also be integrated into a centralized SCADA system.

Precipitated Fe, Mn, and SO₄ solids are captured (filtered) within the greensand filter vessel media. These solids are held within the media until they are eventually removed during filter backwashing procedures. On-site storage of treated water in Clearwell Basins will be required for filter backwashing purposes (see Section 3.4 – Clearwells, Backwash and High Lift Pumping).

Spent backwash water will represent a residual waste stream requiring off-site disposal. Typically, this waste stream is routed to a communal wastewater treatment system for disposal. Subsurface disposal may also be an option but will require further discussions with NSE. Disposal options for spent backwash water are not discussed herein. Further development of this item is deferred to a future project phase.

A preliminary process flow schematic showing the greensand filtration process is provide in **Appendix D - Simplified Greensand Filtration Process Flow Schematic**.

Biological Filtration:

As noted above in Section 3.2, the equipment vendor has withdrawn biological filtration from further consideration as a water treatment process option for the Town of Stewiacke. Therefore, the biological filtration technical discussion previously presented in Phase 4 Concept Design Report – Rev. 01 has been removed for this report. The biological filtration treatment option for iron and manganese removal is no longer considered for the Town of Stewiacke.

3.3 SO₄, TDS, TURBIDITY AND HARDNESS REMOVAL

Membrane technology has been selected as a single process approach to effectively remove total dissolved solids (TDS), turbidity, and hardness from the greensand effluent stream. The selected membrane technology for the Town's water quality is nanofiltration (NF).

Nanofiltration:

NF uses a semi-permeable membrane with a small pore size and is operated under high pressure (i.e., 150 - 200 psi) to remove dissolved solids. Feed water passes through a cartridge pre-filtration, and then is pressurized within the NF membrane housings. Two (2) flow stream outlets are created, a treated water flow stream (at 10 - 15 psi), and a reject flow stream (at 120 - 150 psi). The treated flow stream will be blended with a by-pass slipstream from the upstream greensand filtration process. The reject flow stream, consisting of a brine solution containing high concentrations of captured sulphates, total dissolved solids, turbidity, and hardness particulate matter, will be sent to waste.

A typical nanofiltration process skid is shown below in Figure 3-2.



Figure 3-2: TDS/Turbidity/Hardness Nanofiltration Membrane Treatment Process

Based on a preliminary membrane selection, a feed water recovery efficiency of 75 to 85% is expected for the Town's water quality. The recovery efficiency will depend primarily on pretreatment, type of membrane, water quality, and temperature. Thus, 15 to 25% of the feed water entering the NF process is expected to be wasted in the reject flow stream.

Assuming a Maximum (Peak) Day Raw Water Design Flow throughput of 3 570 m³/d for the 35-year horizon projection (see Table 2-3), and a reject flow of 15 to 25%:

- The expected maximum treated water flow stream is in the **2 680 to 3 030 m³/d** range. This is the available treated water flow available for delivery to the serviced population.
- The expected reject (waste) flow stream is in the **540 to 890 m³/d** range. This flow stream will need to be directed to waste for eventual treatment in the Town of Stewiacke's wastewater treatment system.

It is anticipated that the NF process will consist of two (2) membrane skids. Each skid would be designed and sized to a minimum flow rate capacity of **2 500 m³/d**. When operated together the total available capacity would be 5 000 m³/d (i.e., 2 x 2 500), which would readily accommodate the Maximum (Peak) Day Raw Water Design Flow of 3 570 m³/d. Should a skid be removed from service for maintenance purposes, the 2 500 m³/d capacity of the remaining skid would be able to accommodate the Average Daily Raw Water Design Flow of 2 380 m³/d.

Under low demand flow conditions one (1) skid would be operated and the second train would serve as a standby unit. Under peak flow conditions the two (2) skids would be operated.

Each skid is expected to consist of cartridge pre-filtration, a high-pressure feed pump, sample sink, valves, and instrumentation. Local controls will include including a programmable logic controller (PLC) and human machine interface (HMI) panel. An antiscalant chemical injection upstream of the NF process is typically recommended to minimize membrane scaling/fouling, loss of operating performance and to extend runtime between membrane cleanings.

A complete nanofiltration membrane skid package will typically include the following ancillary NF process equipment:

- Clean-in-place system skid (i.e., tank, heater, circulation pump, valves, instrumentation).
- Antiscalant system (i.e., dosing pumps, valves, instrumentation).
- pH adjustment system (i.e., dosing pumps, valves, instrumentation).
- Disinfection system (i.e., dosing pumps, valves, instrumentation).

Membrane treatment technology will require de-chlorination of the flow discharged from the greensand filtration process prior to it entering the NF process. De-chlorination can be achieved effectively by sodium bi-sulphate injection positioned upstream from the NF process.

Membrane technology will result in a high percent removal of the all target parameters (i.e., TDS, turbidity, hardness). As such, this will result specially in near zero hardness concentrations. It will be important to maintain hardness concentrations in the range of 80 to 100 mg/L (as CaCO₃) to provide an acceptable balance between protecting piping systems from corrosion and preventing excessive scaling and incrustation.

To maintain adequate hardness concentrations in the final treated water, a flow slipstream representing approximately 5% +/- of the feed water flow entering the NF process will be purposely by-passed around the NP process and re-blended with the final treated water flow stream discharged from the NF process. The high hardness concentrations in the by-pass slipstream will impart a final hardness concentration of in the blended flow stream.

A simplified process flow schematic showing the NF membrane technology process in combination with the greensand filtration process is provided in **Appendix E - Preliminary Schematic of the Overall Water Supply System**.

3.4 CLEARWELLS, BACKWASH AND HIGH LIFT PUMPING

Treated flow from the NF membrane process will be combined (blended) with a by-pass slipstream flow from the greensand filtration process to provide for hardness adjustment (see discussion above in Section 3.3). These combined flow streams will then be chlorinated using sodium hypochlorite and directed into a series of Clearwell Basins.

The Clearwell Basins will be constructed as in-ground concrete tankage as part of the WTP control building foundation structure. The Clearwell Basins will provide for the following process features:

- A hydraulic break to atmosphere of the pressurized flow stream.
- Tankage in which to establish the necessary chlorine disinfection contact time.
- Necessary water storage volumetric capacity for greensand filtration backwashing.
- Flow balancing between water treatment process production and high-lift pumping.
- High lift and backwash pump basins.

Sizing and configuration of the Clearwell Basins will be determined during detailed design.

Two (2) backwash pumps (one duty, one stand-by) will be positioned within the Clearwell Basins to access treated water for greensand filtration backwashing purposes. The backwash pumps will convey treated water from the clearwell basins through the greensand filtration unit process and will discharge the spent backwash flow to waste.

Two (2) high lift pumps (one duty, one stand-by) will also be positioned within the Clearwell Basins. These pumps will convey the final treated water from the WTP Control Building through interconnecting water transmission piping to the Water Storage Reservoir.

High lift pump flow output and ON/OFF operation will be automated to maintain adequate Water Storage Reservoir operating levels. This will require automated coordination with the water treatment process throughput flow rate and the Clearwell Basin operating liquid level.

3.5 RESIDUAL WASTES

Residual waste streams will be created from backwashing of the greensand filtration treatment process, and from the NF membrane technology reject flow stream. These waste streams will be initially discharged to an in-ground Residual Waste Storage Tank positioned at the WTP Control Bldg. site. This tankage will provide temporary storage and flow equalization prior to the residual waste stream being conveyed to the Town's wastewater treatment system for ultimate disposal. Further evaluation will be required regarding the means of conveying the waste flow stream (i.e., gravity, pumping, trucking) to the Town's wastewater treatment system and the capability of the wastewater treatment system to effectively manage this waste stream.

Membrane technology will generate a reject waste stream of significant volume. This residual waste stream is anticipated to represent 15 to 25% of the feed water throughput flow, or up to 600 m³/d. Described as a concentrated brine solution, the reject waste stream will require off-site disposal at the Town's wastewater treatment facility. Given the potential impact of a large and concentrated brine solution on the communal wastewater treatment system operations, further evaluation of how to properly accommodate this waste stream is required.

Subsurface disposal of spent backwash and/or the membrane reject flow stream may represent a potential residual waste disposal option. However, consideration of this option will require further evaluation and follow-up discussions with NSE.

Please Note: This Phase 4 report does not incorporate specific treatment solutions for either spent backwash or membrane reject flow streams. As such, handling and treatment of these waste streams will be deferred to future study prior to detailed design.

3.6 WATER STORAGE RESERVOIR

For the purposes of this report, it is assumed that a new Water Storage Reservoir will be constructed and configured as a water standpipe. The standpipe shall be sized to provide adequate volumetric capacity to accommodate the Town's water supply needs, including:

- Diurnal flow demands.
- Peak flow balancing to accommodate flow demands in excess of the water treatment process design capacity.
- Emergency storage to accommodate water demand needs to enable:
 - Taking the production well and/or water treatment process temporarily offline (scheduled or unscheduled).
 - Provision of water supply should the water transmission or network distribution piping systems suffer major a leak due to line breakage.
 - Regularly scheduled system maintenance, such as a network pipe maintenance flushing program.

- Fire flow demands based on the Fire Underwriters Survey (2020), assuming fire flow protection is required or desired by the Town.
- Dead storage to provide for adequate geodetic elevation within the standpipe to maintain usable system pressure.

A typical bolted steel tank water reservoir/standpipe is shown in Figure 3-3.



Figure 3-4: Glass-lined Bolted Steel Water Storage Reservoir/Standpipe

It is anticipated that a standpipe having a total storage volume of approximately 3 300 m³ will be required to meet the various water demand conditions noted above, including fire flow protection. Water reservoir storage volumetric calculations are presented in **Appendix F – Water Storage Reservoir Volumetric Calculations**. Assessment of the optimum reservoir diameter to height ratio will be required during detailed design.

Municipal water storage reservoirs are typically constructed using coated welded steel plates or glass lined bolted steel plates. Internal hydraulic or mechanical operated mixing systems are often provided to ensure thorough mixing, minimal thermal stratification and preventing ice formation at the water surface interface.

The Water Storage Reservoir will be equipped with a chlorine analyzer and chlorine dosing equipment to continuously monitor and maintain adequate chlorine residuals within the discharge flow stream. Continuous water level monitoring will also be provided. Reservoir operating level and chlorine residual data will be conveyed to a central SCADA system.

Location of the water storage reservoir is critical for effective delivery of the Town's water supply. Positioning it at a suitably elevated and readily accessible location within the Town, will be critical for establishing adequate water pressures (typically 40 to 90 psi) under gravity flow conditions throughout the water distribution piping network. In such circumstances, supply of potable water throughout the Town will continue uninterrupted in the event of a power outage.

Final confirmation of the reservoir size, construction type, mixing, instrumentation and geodetic elevations of operating water levels will be made during the detailed design phase.

3.7 OVERALL WATER SUPPLY SYSTEM LAYOUT

A conceptual layout of the overall water supply system is provided as a preliminary schematic in **Appendix E - Preliminary Schematic of the Overall Water Supply System**. This schematic identifies the primary system components as briefly described below.

- **Production Well and Associated Well Control Building:** A submersible well pump will extract raw water from the production well and routes it through the Well Control Building where water flow and pressure are monitored. This building will also contain well pump controls and a SCADA communication system. An emergency back-up power supply will be provided for uninterrupted well pump operation during power outages.
- **Water Transmission Piping – Part 1:** Water transmission piping will interconnect with the Well Control Building to convey raw water under pressure to the Water Treatment Process (WTP) Control Building. This piping will be supplied as either polyvinylchloride (PVC) or ductile iron (DI) pipe, depending upon the Town's preference.
- **WTP Control Building:** This building will contain the selected water treatment unit process for iron/manganese and sulphate removal (i.e. greensand filtration), and for total dissolved solids, turbidity, and hardness removal (i.e., nanofiltration). The building will also house Clearwell Basins, backwash pumps and high lift pumps, along with electrical controls for the associated process equipment and a SCADA communication system. Chemical dosing pump systems will be provided for sodium hypochlorite (chlorination) and sodium bi-sulphate (dechlorination) injection requirements. Instrumentation will include flow, pressure, water level, residual chlorine, and turbidity monitoring.

Residual waste management facilities (i.e., solids settling/waste flow equalization tankage) will also be provided at this building location. Additional building features will

include an operations control room, operations staff office(s), electrical room, mechanical room, washrooms, and chemical and spare equipment storage areas. An emergency back-up power supply will be provided to maintain water treatment process and pumping operations during power outages.

- **Water Transmission Piping – Part 2:** Water transmission piping will interconnect with the WTP Control Building to convey treated water under pressure from the Clearwell Basins through to the Water Storage Reservoir. This piping will be supplied as either polyvinylchloride (PVC) or ductile iron (DI) pipe, depending upon the Town’s preference.
- **Water Storage Reservoir:** This reservoir will include an internal mixing system, chemical dosing pumps, instrumentation for pressure, water level, flow and residual chlorine monitoring, and a SCADA communication equipment.
- **Water Distribution Piping:** Water distribution piping will interconnect from the Water Storage Reservoir to the Town’s existing water distribution network to convey treated water under gravity flow throughout to serviced areas. This piping will be supplied as either polyvinylchloride (PVC) or ductile iron (DI) pipe, depending upon the Town’s preference.

Proposed preliminary routing of the water transmission/distribution pipeline is provided in **Appendix G - Water Transmission Plan and Profile Drawings** as a series of preliminary plan and profile drawings.

3.8 ELECTRICAL POWER SUPPLY

A reliable power supply will be essential for operation of the wellfield pump(s), the water treatment process, and SCADA communications equipment. It is understood that 600VAC, 3-phase electrical power is available within the Town. Should only single-phase power be available, use of transformers and variable frequency drives (VFDs) can be used to provide 3-phase power.

Emergency back-up power will be incorporated at each of the Well Control and WTP Control Buildings to provide for near uninterrupted power supply.

Follow-up with Nova Scotia Power Inc. (NSPI) will be required to confirm power supply availability, condition, and location prior to detailed design.

3.9 ITEMS FOR FURTHER CONSIDERATION

This Phase 4 report provides treatment options for producing an acceptable potable water quality based on the water quality results presented for Production Well Pw21-01. This report also outlines the major infrastructure components of an overall water supply system concept that will convey raw water to treatment, treated water to storage and treated water to the Town's water distribution system.

Based on the concepts presented herein, there are additional key factors that will require follow-up, evaluation or study prior to the Town commencing detailed design of a new water supply system. These factors are identified below for the Town's further consideration.

1. Confirm the Town's preference for extending water services to existing and/or future developments beyond its current water service area boundaries.
2. Additional pump testing to confirm the upper safe-yield capacity limit for Production Well PW21-01 beyond the currently establish flow of > 2 400 m³/d (448 USgpm).
3. Undertaken further wellfield exploration and well drilling/development to establish a second, redundant production well capable of providing 100 percent stand-by capacity for Production Well PW21-01.
4. Follow-up discussions with NSE to obtain confirmation of the 10-year projection water withdrawal permit and associated conditions for the PW21-01 aquifer.
5. Confirm optimum/preferred locations for each of the major water supply system components, including PW21-01 Control Building, WTP Control Building, Water Storage Reservoir, and routing of water transmission/distribution pipelines. Explore options for property purchase and/or obtain right-of-way access to the various proposed sites, including Production Well PW21-01 and the Well Control Building.
6. Perform a detailed hydraulic computer modeling of the proposed water system supply system to determine the optimum grade line and geodetic positions for key water supply pumping and treatment process components. This modeling will also provide hydraulic analysis for sizing of well, backwash and high lift pumps, and pipelines.
7. Confirm fire flow requirements in accordance with Fire Underwriters Survey (2020).
8. Undertake evaluation and assessment of treatment/conveyance/disposal options for residual waste flows generated from the water treatment processes (i.e., backwash, reject brine flow stream), including follow-up discussions with NSE to assess the potential for a sub-surface disposal option.
9. Undertake evaluation and assessment of anticipated hydraulic and organic loading impacts of the water treatment process residual waste flows on the Town's existing wastewater treatment system.
10. Undertake bench-scale and on-site pilot studies of the preferred water treatment unit process in conjunction with the selected equipment manufacturers and local vendors.

11. Commence discussions for obtaining project financial support from the applicable provincial and federal infrastructure funding regulators.
12. Perform a detailed groundwater supply well concept design.
13. Follow-up with Nova Scotia Power Inc. (NSPI) to confirm power supply availability, condition, and location.

4. OPINION OF PROBABLE COSTS

An update of the Preliminary Opinion of Probable Construction Costs previously presented (in Concept Design Report - Rev. 01) for the proposed water supply system is presented below in Table 4-1. This update incorporates the 35-year future design serviced population projection of 5 100 people and revised water demand data based on the Town of Stewiacke 2020 Water System Assessment Report.

Costing for wellfield development components, Well Control Building, WTP Control Building, water treatment process components, Water Storage Reservoir, water transmission/distribution piping, electrical, mechanical, instrumentation/controls, pre-design engineering, detailed design engineering, tendering/award, contract administration, and contingencies are summarized in Table 4-1.

This Preliminary Opinion of Probable Construction Costs is based on a Class D level of accuracy of -20 to +30 percent. Costs have been developed based on WSP's database of recent construction unit costs, our understanding of the current construction market conditions and budgetary costing obtained from equipment suppliers for specific treatment process equipment.

Cost figures presented in Table 4-1 represent 2024 costing. WSP's recent experiences with cost variability due to supply chain and inflationary pressures for other similar municipal water infrastructure projects, it is recommended that the Town apply a suitably conservative cost escalation factor when extrapolating project costs into future years.

Updated and detailed Opinion of Probable Construction Costing is recommended during the Preliminary Engineering Design and Detailed Engineering Design phases to reflect the updated system and building layouts and configuration, selected process equipment and the Town's preferred features and amenities.

Table 4-1: Preliminary Opinion of Probable Construction Costs

No.	Preliminary Opinion of Probable Construction Costs ¹	Cost ² (2024 \$)
1.	Wellfield Development of Production Well PW21-01: Well pump; downhole well piping/equipment; Well Control Bldg. (concrete foundation, pre-engineered bldg. superstructure, HVAC, electrical, mechanical); above floor slab process piping; electrical power distribution; electrical control panels/wiring; instrumentation/controls; site civil works; security fencing.	\$ 600 000
2	Wellfield Development of Secondary Production Well: Well pump; downhole well piping/equipment; Well Control Bldg. (concrete foundation, pre-engineered bldg. superstructure, HVAC, electrical, mechanical); above floor slab process piping/valving system; electrical power distribution; electrical control panels/wiring; instrumentation; site civil works; security fencing.	600 000
3.	Water Treatment Process (WTP) Control Bldg. (<i>approx. 5000 sq. feet</i>): Concrete foundation; pre-engineered bldg. superstructure (HVAC, electrical, mechanical,); in-ground concrete clearwell basins; access hatches/vent piping; above floor slab process piping/valving system; electrical power distribution; electrical control panels and control wiring; instrumentation; site civil works; security fencing.	2 000 000
4.	Iron/Manganese/Sulphate Treatment Process (<i>based on greensand filtration process located in WTP Control Bldg.</i>): Multiple filter vessels; interconnecting filter vessel process piping/valving; by-pass piping; multiple chemical injection systems; electrical control panels and control wiring; instrumentation.	1 400 000
5.	Total Dissolved Solids/Turbidity/Hardness Treatment Process (<i>based on nanofiltration membrane process located in WTP Control Bldg.</i>): Dual nanofiltration process trains (12:6) , 6 element array per train); antiscalant/clean-in-place skid; chemical dosing systems for pH adjustment, chlorination, dechlorination; reject flow piping; electrical control panels/wiring; instrumentation.	2 500 000
6.	Clearwell Basin Pumping/Piping Equipment: High lift pumps and control panels; backwash pumps and control panels; internal interconnecting basin piping/valves; internal overflow piping; electrical control panels/wiring; instrumentation.	600 000
7.	Residual Waste Storage Tankage (<i>for greensand, nanofiltration treatment processes</i>): In-ground concrete waste storage tankage constructed at exterior of WTP Control Bldg.; access hatches/ladders/vent piping; interconnecting process piping/valving; internal storage tank mixing/pumping systems; electrical power distribution; electrical controls and control wiring; instrumentation.	400 000
8.	Water Storage Reservoir/Standpipe: Concrete foundation; glass-lined, bolted steel plate tank construction; geodesic aluminum dome roof; internal active mixing system; access ladders; overflow piping; cathodic protection; hydraulic testing; site civil works; fencing; on-site assembly of reservoir/standpipe tankage/piping; electrical control panels/wiring; instrumentation.	2 200 000
9.	Water Transmission/Distribution Piping: Supply and installation of 150/300mm diameter pipeline from Production Well PW21-01 and Secondary Production Well to the WTP Control Bldg.; treated water pipeline from WTP Control Bldg. to Water Storage Reservoir/Standpipe, and: pipeline from Water Storage Reservoir/Standpipe to existing community water distribution network; trench excavation/backfilling and pipeline hydraulic testing.	2 500 000
10.	Process Equipment Installation: Installation of process equipment at Production Well PW21-01, Secondary Production Well, WTP Control Bldg. (incl. Residual Waste Storage Tankage), Water Storage Reservoir/Standpipe.	500 000

No.	Preliminary Opinion of Probable Construction Costs ¹	Cost ² (2024 \$)
11.	Supervisory Control and Data Acquisition (SCADA): SCADA system, incl. programmable logic controllers (PLCs), software, hardware, licensing and computer programming for overall water supply system.	400 000
12.	Electrical Site Power: Nova Scotia Power Inc. supply to Production Well PW21-01 site; Secondary Production Well site; WTP Control Bldg.; Water Storage Reservoir/Standpipe site.	400 000
13.	Process and Process Equipment Start-up/Commissioning: Start-up/commissioning procedures by process equipment and instrumentation vendors/suppliers at Production Well PW21-01, Secondary Production Well, WTP Control Bldg., and Water Storage Reservoir/Standpipe; on-site operator instructions and training.	300 000
14.	On-site Piloting of Preferred Water Treatment Processes: Incl. on-site supervision/operation of pilot equipment by selected equipment vender, water sampling/analyses; interim/final reporting.	300 000
15.	Sub-total Capital Construction Cost (<i>Sum of Item Nos. 1. to 14.; not incl. HST</i>)	\$ 14 700 000
16.	Construction Contingency (<i>20% of Item No. 15.</i>)	\$ 2 940 000
17.	Preliminary Engineering Design: Preliminary engineering of overall water supply system, incl. engineering calculations/sketches/drawings for water treatment process development/evaluation/final selection; on-site equipment piloting coordination; layout/sizing of buildings/structures, property investigations, water transmission and distribution pipeline alignment/routing, hydraulic modelling, geotechnical site investigations; ongoing liaison w. Town officials, governing authorities.	600 000
18.	Detailed Engineering: Detailed engineering design of overall water supply, incl. engineering calculations for buildings/structures, water treatment processes, mechanical systems, electrical systems, and SCADA system. Preparation and review submittal of contract drawings/technical specifications at approx. 30%/75%/100% of design. Preparation of tender package; tendering, bids evaluation and award process, issuing of construction package.	1300 000
19.	Contract Administration/Site Observation/Start-up and Commissioning Services: Contract management services and full/part-time on-site observation services for full duration of the various construction phase. Start-up/commissioning of process equipment, processes and overall water supply system. Operator instructions and training services.	600 000
20.	Total Capital Construction Cost (<i>Sum of Item Nos. 15. To 19.; not incl. HST</i>)	\$20 140 000
<p>Notes:</p> <ol style="list-style-type: none"> Costs based on treatment capacity for a 35-year horizon design serviced population of 5 100 people. Based on Class D estimate (i.e., -20 to +30%). 		

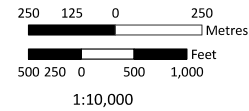
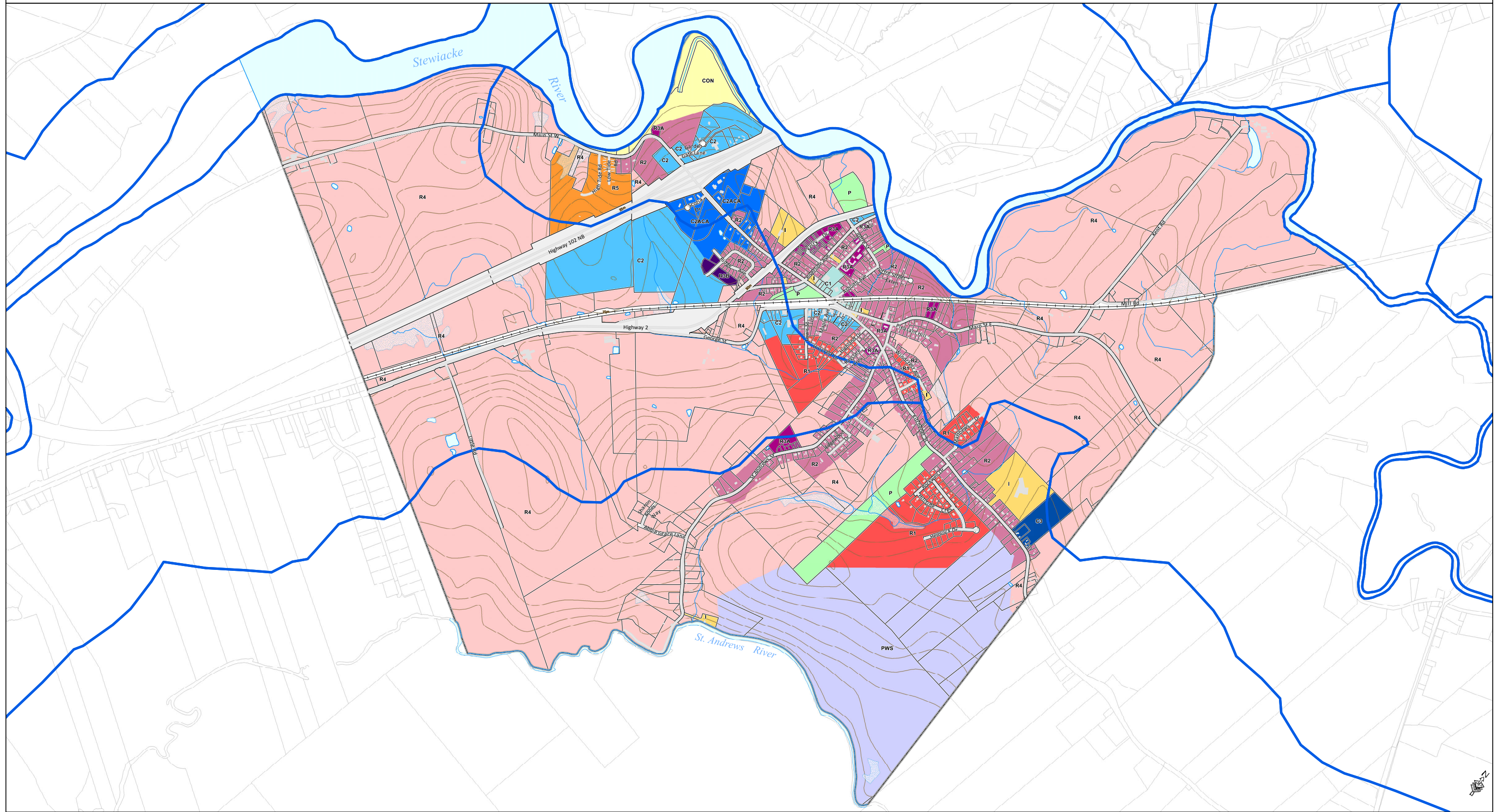
APPENDIX

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TOWN OF STEWIACKE ZONING MAPPING AND WATER SUPPLY WELL LOCATIONS

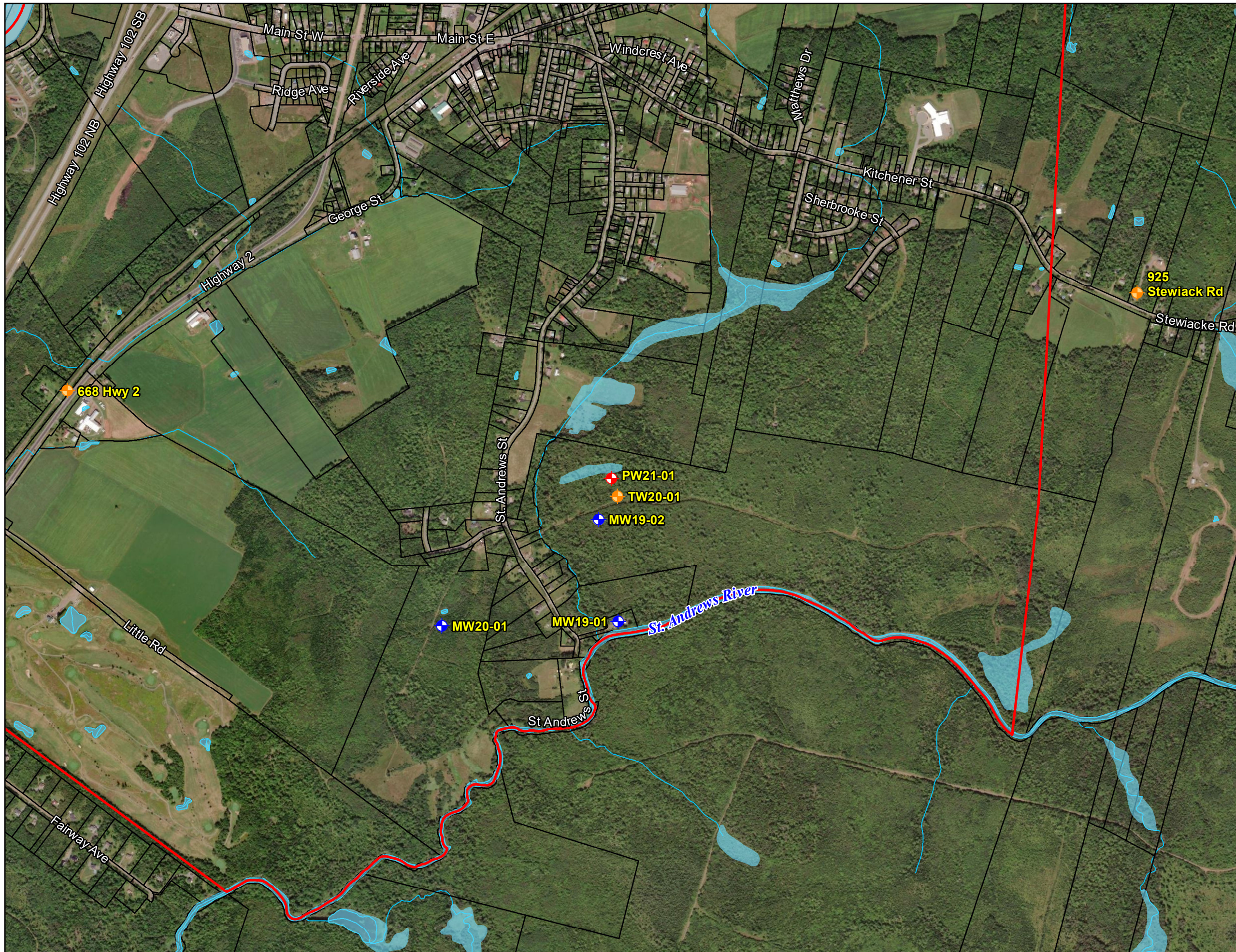


TOWN OF STEWIACKE ZONING MAP



- Railway
- Wetland
- C2-Highway Commercial
- CON-Conservation
- PWS-Protective Water Supply
- R3A-Multiple Residential Medium
- R5-Mini Home Park
- Watershed Boundary
- Contour
- C2ACA-Highway Commercial Architectural Control Area
- I-Institutional
- R1-Single Unit Residential
- R3B-Multiple Residential High
- Town Boundary
- C1-Downtown Commercial
- C3-Special Commercial
- P-Park
- R2-General Residential
- R4-Rural Residential

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LEGEND:

WELL TYPE

- MONITORING WELL
- 10" PRODUCTION WELL
- 6" WELL
- WATERCOURSE
- TOWN OF STEWIACKE BOUNDARY
- PROPERTY BOUNDARIES (NSDNR, 2017)

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PROJECT:
 PROJECT: **GROUNDWATER SUPPLY PROJECT**

PROJECT NO.: **191-03686**

CLIENT:
TOWN OF STEWIACKE

FIGURE:
 TITLE: **WELL LOCATIONS**

FIGURE NO.: 4	REVISION NO.: 0
----------------------	------------------------

SCALE: 1:12,500

DATUM: NAD 83 CSRS	PROJECTION: UTM ZONE 20 NORTH
DRAWN BY: T. MOREHOUSE	CHECKED BY: M. NOSEWORTHY
CREATED DATE: (YYYY-MM-DD) 2020-12-07	REVISION DATE: (YYYY-MM-DD) 03/06/2022

WSP Canada Inc.
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 Dartmouth, Nova Scotia
 www.wsp.com

APPENDIX

B

WTP HYDRAULIC DESIGN CRITERIA



Appendix B

The following is a summary of calculations for determining 10-year and 35-year horizon design flow criteria projections for the Town of Stewiacke's future water supply system.

10-Year Horizon Projections:

Design Capacity Criteria:

- Future serviced design population = **3 100 people**.
- Average daily per capita consumption/demand = 329 Lpcd. **350 Lpcd** assumed for preliminary design purposes.
- Assumed Max to Avg. Day ratio = **1.5** (peaking factor).
- Assumed reject flow stream (diverted to waste) = 15 to 25% of Average Daily Raw Water Design Flow. *Note: Membrane reject flow stream of **25%** assumed for preliminary design.*

Design Flow Calculations:

- Average Daily Treated Water Design Flow discharged from water treatment process:
 - 3 100 people x 350 Lpcd = 1 085 000 L/d, or **1 085 m³/d (200 USgpm)**.
- Average Daily Raw Water Design Flow entering water treatment process from groundwater supply well:
 - Average Daily Treated Water Design Flow ÷ 0.75 (to account for 25% of feed water flow diverted to waste as a membrane reject flow stream)
 - 1 085 m³/d ÷ 0.75 = **1 450 m³/d (270 USgpm)**.
- Maximum (Peak) Day Treated Water Design Flow = Average Daily Treated Water Design Flow x 1.5 (peaking factor):
 - 1 085 m³/d x 1.5 = **1 630 m³/d (300 USgpm)**.
- Maximum (Peak) Day Raw Water Design Flow entering water treatment process from groundwater supply well:
 - Maximum (Peak) Day Treated Water Design Flow ÷ 0.75 (to account for 25% of feed water flow diverted to waste as a membrane reject flow stream)
 - 1 630 m³/d ÷ 0.75 = **2 170 m³/d (400 USgpm)**.
- Production Well PW21-01 Pumping Capacity > **2 440 m³/d (448 USgpm)**.

*Note: Available pumping capacity available from Production Well PW21-01 is currently established as being greater than 2 440 m³/d. Therefore, sufficient capacity is available from PW21-01 to accommodate the 10-year horizon Max. (Peak) Day Treated Water Design Flow projection of **2 170 m³/d**.*

35-Year Horizon Projections:

Design Capacity Criteria:

- Future serviced design population = **5 100 people**.
- Average daily per capita consumption/demand = 329 Lpcd. **350 Lpcd** assumed for preliminary design purposes.
- Assumed Max to Avg. Day ratio = **1.5** (peaking factor).
- Assumed reject flow stream (diverted to waste) = 15 to 25% of Average Daily Raw Water Design Flow. *Note: Membrane reject flow stream of **25%** assumed for preliminary design.*

Design Flow Calculations:

- Average Daily Treated Water Design Flow discharged from water treatment process:
 - 5 100 people x 350 Lpcd = 1 785 000 L/d, or **1 785 m³/d** (327 USgpm).
- Average Daily Raw Water Design Flow entering water treatment process from groundwater supply well:
 - Average Daily Treated Water Design Flow ÷ 0.75 (to account for 25% of feed water flow diverted to waste as a membrane reject flow stream)
 - 1 785 m³/d ÷ 0.75 = **2 380 m³/d** (436 USgpm).
- Maximum (Peak) Day Treated Water Design Flow = Average Daily Treated Water Design Flow x 1.5 (peaking factor):
 - 1 785 m³/d x 1.5 = **2 680 m³/d** (491 USgpm).
- Maximum (Peak) Day Raw Water Design Flow entering water treatment process from groundwater supply well:
 - Maximum (Peak) Day Treated Water Design Flow ÷ 0.75 (to account for 25% of feed water flow diverted to waste as a membrane reject flow stream)
 - 2 680 m³/d ÷ 0.75 = **3 570 m³/d** (655 USgpm).
- Production Well PW21-01 Pumping Capacity > **2 440 m³/d** (448 USgpm).

*Note: Available pumping capacity available from Production Well PW21-01 is currently established as being greater than 2 440 m³/d. However, until a pumping capacity upper limit is confirmed in the field for PW21-01, there is insufficient data to confirm that the 35-year horizon Max. (Peak) Day Treated Water Design Flow of **3 570 m³/d** can be accommodated by PW21-01.*

APPENDIX

C

PRODUCTION WELL PW₂₁₋₀₁ WATER QUALITY ANALYTICAL RESULTS



Groundwater Analysis - General Chemistry & Metals
 Town of Stewiacke, Stewiacke, Nova Scotia
 Project No.: 191-03686



Parameter	Units	RDL	CDWQ ¹	Water Samples					
				PW21-01 S1 3470271 31-Jan-22	PW21-01 S2 3471805 1-Feb-22	PW21-01 S3 3487335 6-Feb-22	PW21-01 S5 3500775 10-Feb-22	PW21-01 S6 3500777 10-Feb-22	PW21-01 S7 3500778 10-Feb-22
pH	-	-	7.0-10.5	7.8	7.88	7.85	7.6	7.7	7.67
Reactive Silica as SiO2	mg/L	0.5	-	9.9	8.6	9.8	7.7	7.1	7.1
Chloride	mg/L	1.0	250 AO	27	28	28	34	34	34
Fluoride	mg/L	0.1	1.5	0.47	0.47	0.41	0.49	0.19	0.17
Dissolved Sulphate (SO4)	mg/L	2.0	500 AO	1250	1270	847	802	800	803
Total Alkalinity (as CaCO3)	mg/L	25.0	-	114	116	113	114	114	115
True Color	TCU	5.0	15 AO	<5.00	17.3	<5.00	<5.00	<5.00	<5.00
Turbidity	NTU	1.0	0.1 - 1.0 ²	5.7	10.6	12.4	7	10.7	10.5
Electrical Conductivity	uS/cm	1.0	-	2070	2010	2070	2020	2060	2030
Nitrate + Nitrite as N	mg/L	0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrate as N	mg/L	0.05	10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite as N	mg/L	0.01	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ammonia as N	mg/L	0.05	-	<0.03	<0.03	<0.03	<0.03	0.14	<0.03
Total Organic Carbon	mg/L	0.5	-	0.8	1.1	1.6	0.9	1.1	1.2
Ortho-Phosphate as P	mg/L	0.01	-	<0.01	<0.01	0.07	<0.01	<0.01	<0.01
Dissolved Sodium	mg/L	0.1	200 AO	40.1	37.7	37.8	42	36.8	42.6
Dissolved Potassium	mg/L	0.1	-	0.9	0.9	<0.1	1.7	1.5	1.6
Dissolved Calcium	mg/L	0.1	-	463	456	403	507	457	488
Dissolved Magnesium	mg/L	0.1	-	30.8	27.8	27.8	22.3	30.5	21.3
Dissolved Phosphorous	mg/L	0.01	-	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02
Bicarb. Alkalinity (as CaCO3)	mg/L	1.0	-	114	116	113	114	114	115
Carb. Alkalinity (as CaCO3)	mg/L	1.0	-	<10	<10	<10	<10	<10	<10
Hydroxide	mg/L	5.0	-	<5	<5	<5	<5	<5	<5
Calculated TDS	mg/L	1.0	500 AO	1880	1890	1410	1480	1430	1460
Hardness	mg/L	1.0	-	1280	1250	1120	1360	1270	1310
Langelier Index (@20C)	NA	-	-	0.81	0.89	0.81	0.66	0.71	0.72
Langelier Index (@ 4C)	NA	-	-	0.49	0.57	0.49	0.34	0.39	0.4
Saturation pH (@ 20C)	NA	-	-	6.99	6.99	7.04	6.94	6.99	6.95
Saturation pH (@ 4C)	NA	-	-	7.31	7.31	7.36	7.26	7.31	7.27
Anion Sum	me/L	-	-	29.1	29.5	20.7	19.9	19.9	20
Cation sum	me/L	-	-	27.5	26.8	24.1	29.1	27	28
% Difference/ Ion Balance (NS)	%	-	-	2.8	4.9	7.6	18.7	15.2	16.8
Dissolved Aluminum	ug/L	5.0	100 OG AO	<5	<5	<5	<5	<5	<5
Dissolved Antimony	ug/L	1.0	6	<2	<2	<2	<2	<2	<2
Dissolved Arsenic	ug/L	1.0	10	<2	<2	<2	<2	<2	<2
Dissolved Barium	ug/L	1.0	2000	15	16	15	15	13	15
Dissolved Beryllium	ug/L	1.0	-	<2	<2	<2	<2	<2	<2
Dissolved Bismuth	ug/L	2.0	-	<2	<2	<2	<2	<2	<2
Dissolved Boron	ug/L	50	5000	145	133	118	137	124	127
Dissolved Cadmium	ug/L	0.01	7	<0.017	<0.017	<0.017	<0.09	<0.017	<0.017
Dissolved Chromium	ug/L	1.0	50	2.00	2.00	2.00	<1	2.00	2.00
Dissolved Cobalt	ug/L	0.4	-	<1	<1	<1	<1	<1	<1
Dissolved Copper	ug/L	0.5	1000 AO	<2	<2	<2	<1	<2	<2
Dissolved Iron	ug/L	50	300	607	755	77	1040	59	62
Dissolved Lead	ug/L	0.5	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Manganese	ug/L	2.0	120	80	75	66	85	67	68
Dissolved Molybdenum	ug/L	2.0	-	2	2	2	2	2	2
Dissolved Nickel	ug/L	2.0	-	9.00	9.00	11.00	13.00	15.00	7.00
Dissolved Selenium	ug/L	0.5	50	2.00	1.00	2.00	2.00	2.00	1.00
Dissolved Silver	ug/L	0.1	-	0.20	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Strontium	ug/L	20.0	7000	4320	4360	4610	4900	4610	4860
Dissolved Thallium	ug/L	0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Tin	ug/L	2.0	-	<2	<2	<2	<2	<2	<2
Dissolved Titanium	ug/L	2.0	-	<2	<2	<2	<2	<2	<2
Dissolved Uranium	ug/L	0.1	20	0.5	0.3	0.2	0.4	0.2	0.3
Dissolved Vanadium	ug/L	2.0	-	<2	<2	<2	<2	<2	<2
Dissolved Zinc	ug/L	5	5000 AO	22.00	8.00	6.00	14.00	7.00	7.00

Notes:

¹ Health Canada Guidelines for Canadian Drinking Water Quality , September 2020. AO denotes an exceedance in aesthetic guidelines.

² Health Canada guideline for distribution systems / treated water. Not applicable to current samples but used for reference.

shading denotes a guideline exceedance
BOLD bold lettering denotes a guideline exceedance in aesthetic objectives
 RDL denotes laboratory reported detection limit
 - denotes no value/not analysed

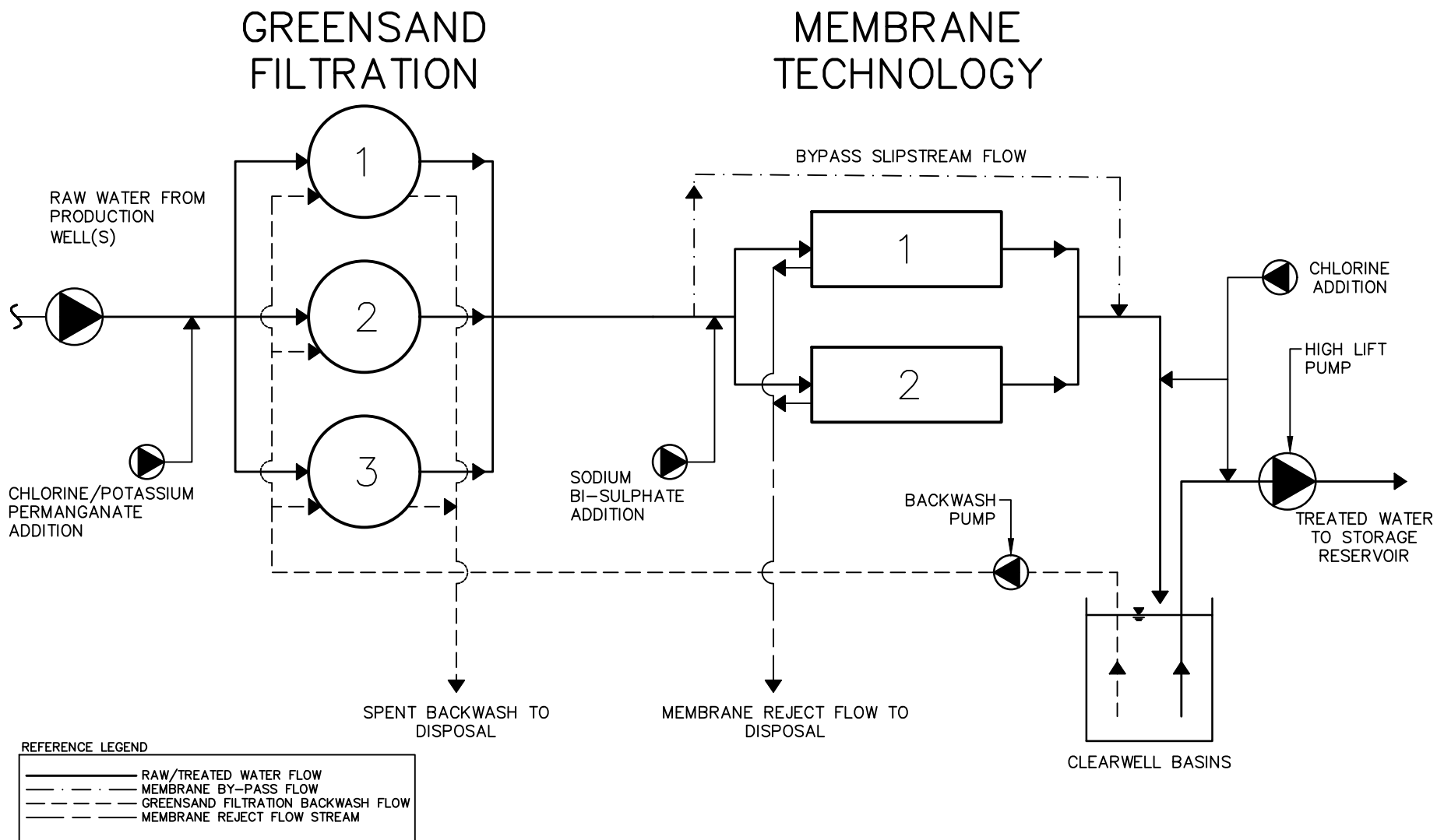
S1 WSP Sample ID
 LEK354 Laboratory Sample ID
 29-Oct-19 Sampling date

APPENDIX

D

SIMPLIFIED GREENSAND FILTRATION PROCESS FLOW SCHEMATIC





TITLE:

PRELIMINARY WATER TREATMENT PROCESS FLOW SCHEMATIC

GREENSAND FILTRATION + MEMBRANE TECHNOLOGY

SCALE:

N/A

DATE: (YYYY/MM/DD)

202402/22

PROJECT NO:

CA0001941.4259

REVISION:

0

DRAWING NO:

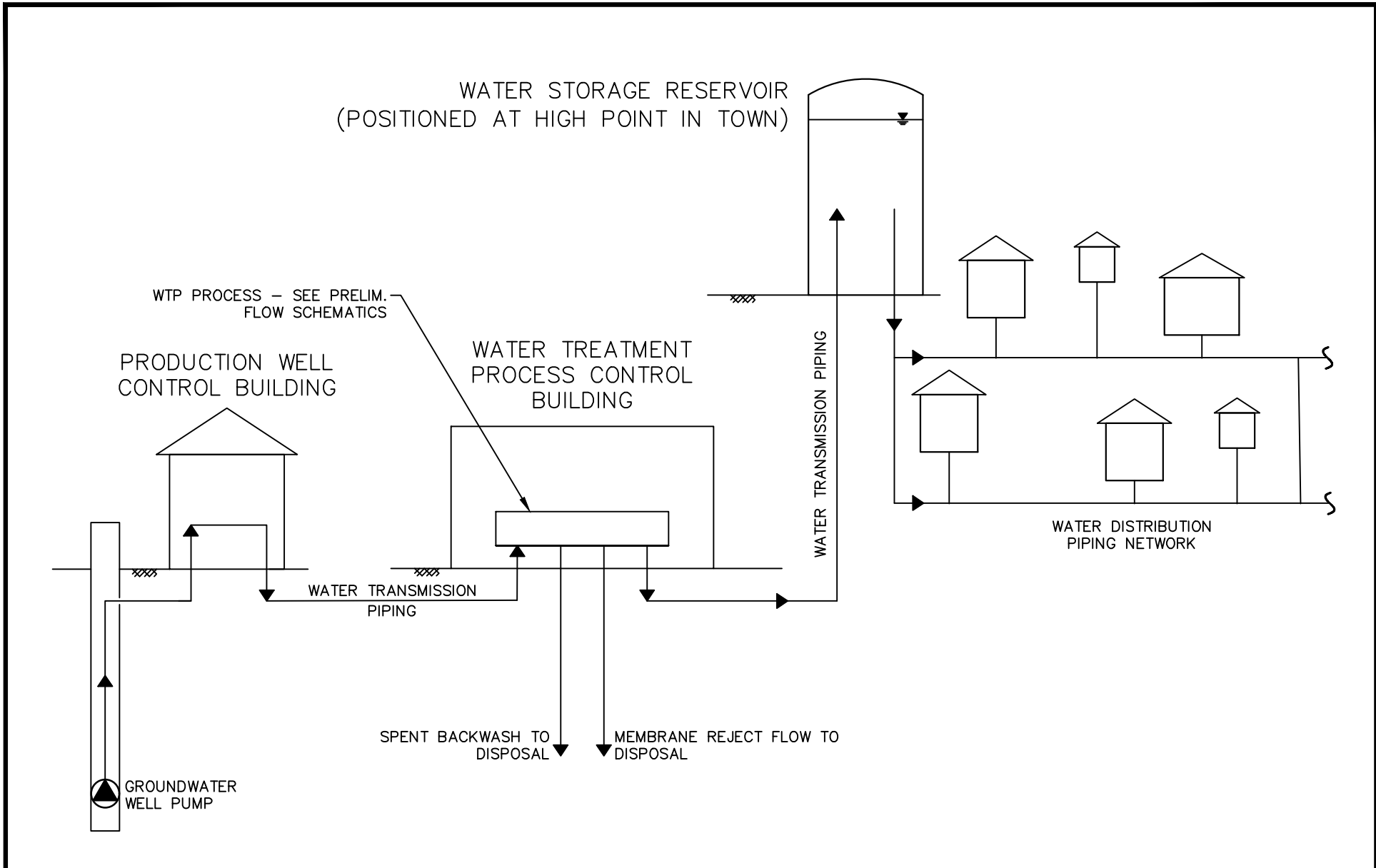
SK02

APPENDIX

E

PRELIMINARY SCHEMATIC OF THE OVERALL WATER SUPPLY SYSTEM





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TITLE:
PRELIMINARY WATER SUPPLY SYSTEM SCHEMATIC

SCALE:
 N/A
 DATE: (YYYY/MM/DD)
 2024/02/22
 PROJECT NO:
 CA0001941.4259

REVISION:
 0
 DRAWING NO:
 SK03

APPENDIX

F

WATER STORAGE RESERVOIR VOLUMETRIC CALCULATIONS



Appendix F

The following is a summary of calculations for determining revised Water Storage Reservoir sizing. Reservoir sizing is based on the 35-year horizon Treated Water design flow criteria projections for the Town of Stewiacke’s future water supply system. These flow criteria are summarized below.

Design Flow Criteria	Design Capacity Criteria			
	m ³ /d	L/min.	L/s	USgpm
35-Year Horizon Projection - Serviced Population = 5 100 people				
Average Daily <u>Treated Water</u> Design Flow	1 785	1 240	21	327
Average Daily <u>Raw Water</u> Design Flow	2 380	1 650	28	436
Maximum (Peak) Day <u>Treated Water</u> Design Flow	2 680	1 860	31	490
Maximum (Peak) Day <u>Raw Water</u> Design Flow	3 570	2 480	41	655

For preliminary design purposes, it is assumed that a new Water Storage Reservoir will be configured as a bolted steel standpipe type structure.

Total water storage volumetric requirements are based, in part, on the maximum (peak) day demand for Treated Water using the following formula:

$$\text{Total Storage} = \text{Fire Storage} + \text{Peak Balancing Storage} + \text{Emergency Storage} + \text{Dead Storage}$$

Where:

Fire Storage = assumed at a 2 000 Igpm fire flow rate over a 2-hour (120 minute) duration

$$= 2\,000 \text{ Igpm} \times 120 \text{ minutes}$$

$$= 240\,000 \text{ lgal, or } \mathbf{1\,090 \text{ m}^3}$$

Peak Balancing Storage = 25% of the total maximum (peak) day demand (for Treated Water)

$$= 0.25 \times 2\,680 \text{ m}^3, \text{ or } = \mathbf{670 \text{ m}^3}$$

Emergency Storage = 25% of Peak Balancing Storage and Fire Flow Storage

$$= 0.25 \times (670 \text{ m}^3 + 1\,090 \text{ m}^3), \text{ or } = \mathbf{440 \text{ m}^3}$$

Dead Storage = assumed as 33.3% of the overall total Water Storage Reservoir volume

$$= [(1\,090 + 670 + 440) \div 0.67] - (1\,090 + 670 + 440)$$

$$= 3\,280 \text{ m}^3 - 2\,200 \text{ m}^3, \text{ or } \mathbf{1\,080 \text{ m}^3}$$

Therefore: Total Storage = 1 090 m³ + 670 m³ + 440 m³ + 1080 m³, or = **3 300 m³**

APPENDIX

G

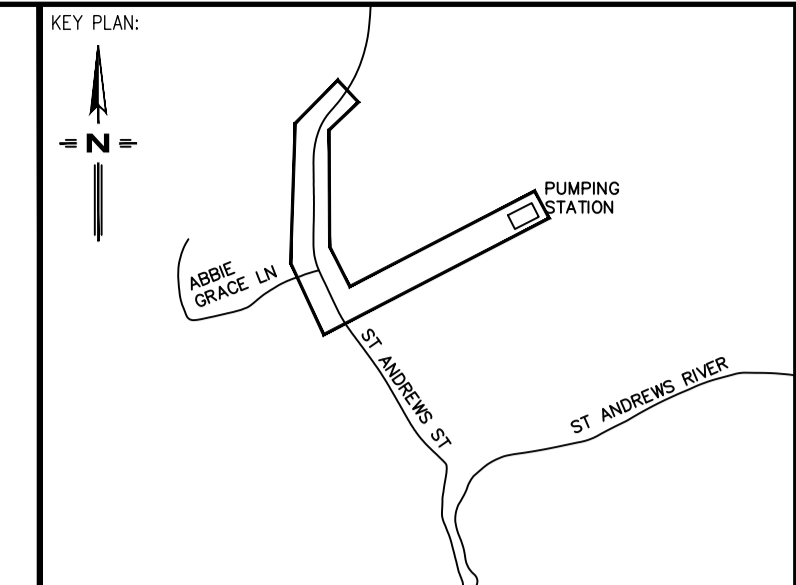
WATER TRANSMISSION
PLAN AND PROFILE
DRAWINGS



PLAN: STA: 0+000 TO 0+300

SCALE: H=1:500

NOTE:
EXISTING GROUND CONTOURS AND SURFACE
LINWORK ARE BASED ON LIDAR SURFACE
FROM NSGI DATA LOCATOR.



LEGEND:	PROPOSED	EXISTING
EDGE OF PAVEMENT	---	---
LOTLINE	---	---
WATERMAIN & GATE VALVE	---	---
SANITARY PIPE & MANHOLE	---	---
STORM PIPE & MANHOLE	---	---
UTILITY LINES & POLE	---	---
STREET BOUNDARY	---	---
PROPERTY BOUNDARY	---	---
EASEMENT	---	---
CURB & DRIVEWAY CUT	---	---
CATCH BASIN	---	---
FIRE HYDRANT	---	---
STREET TREE	---	---
ROAD SIGN	---	---
	SANITARY LATERAL	---
	WATER LATERAL	---
	STORM LATERAL	---
	CATCH BASIN LEAD	---
	CULVERT	---
	HEADWALL	---
	SIDEWALK	---
	FENCE	---

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DESIGNED BY: M. KIDD	DRAWN BY: M. KIDD
CHECKED BY: C. FOGARTY	APPROVED BY: K. O'LEARY

SCALE: 1:500 METRIC

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CLIENT:
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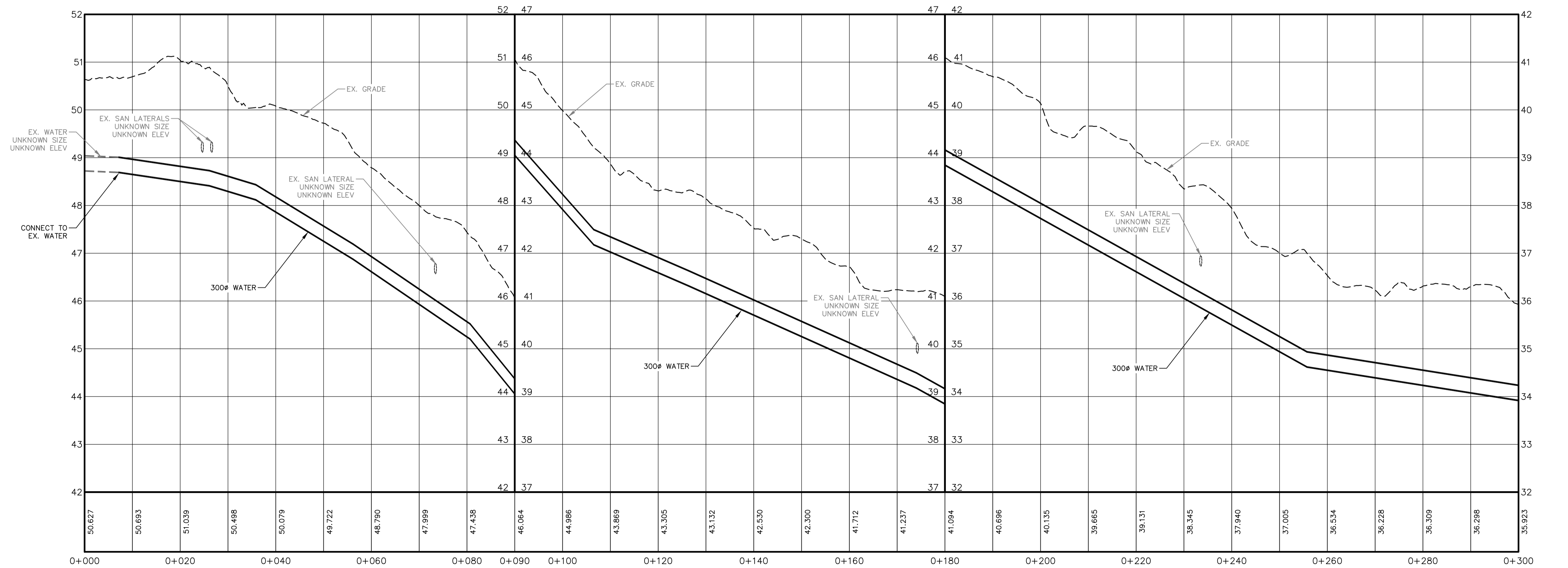
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**PUMPING STATION
WATER TRANSMISSION LINE
STEWIACKE, NS**

TITLE:
**PLAN AND PROFILE
WATER TRANSMISSION LINE
0+000 to 0+300**

SHEET NUMBER: 1	1 OF 3
ISSUE: ISSUED FOR 30% DESIGN	REV # 0
DATE OF: 2023/10/05	

PROFILE: STA: 0+000 TO 0+300

SCALE: H=1:500, V=1:50



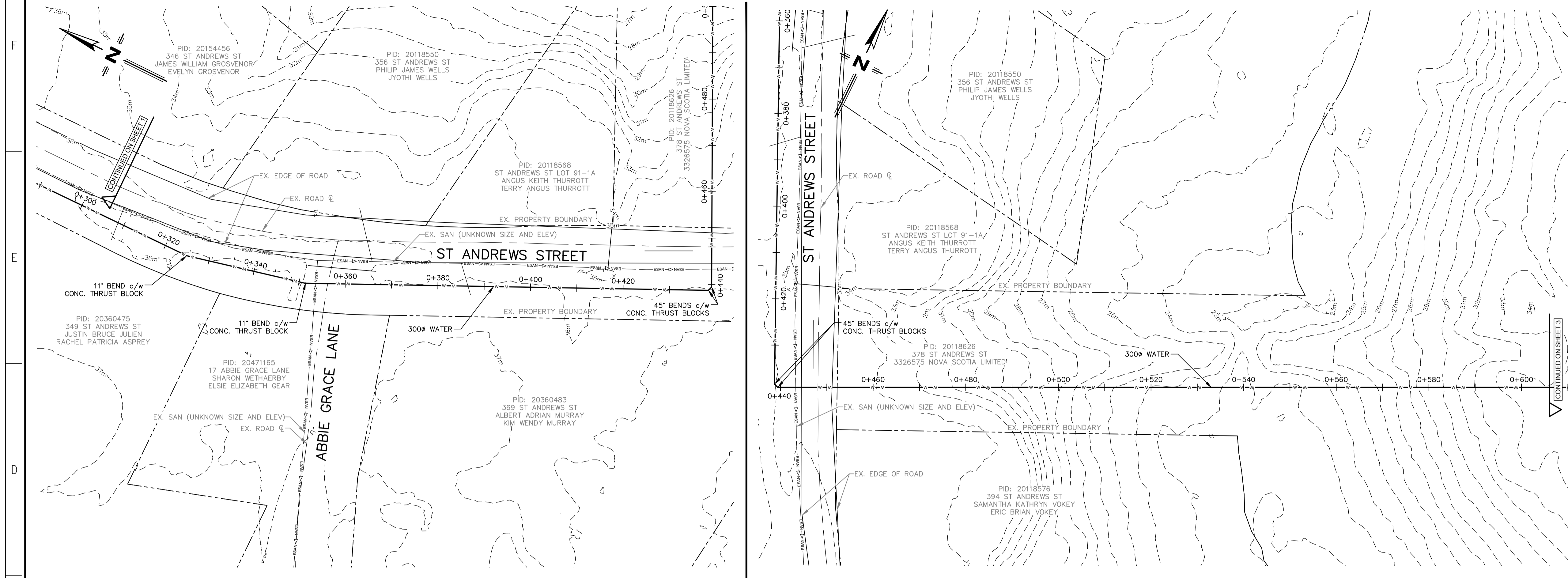
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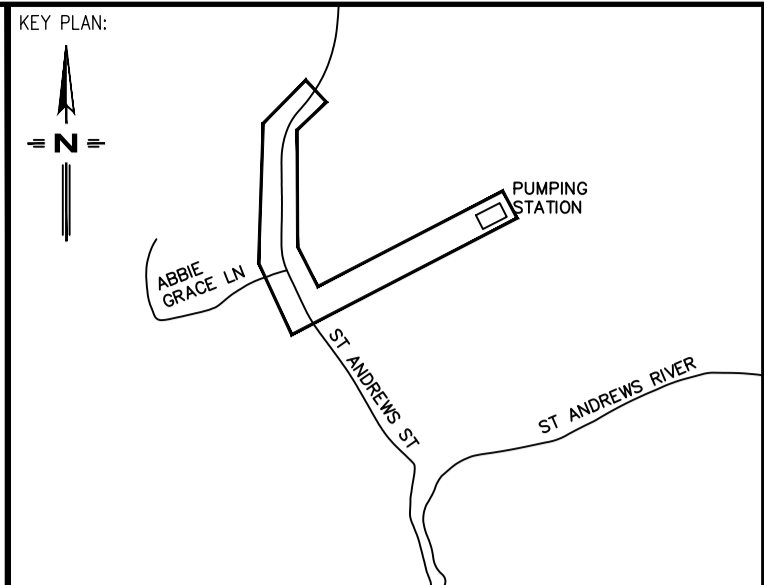
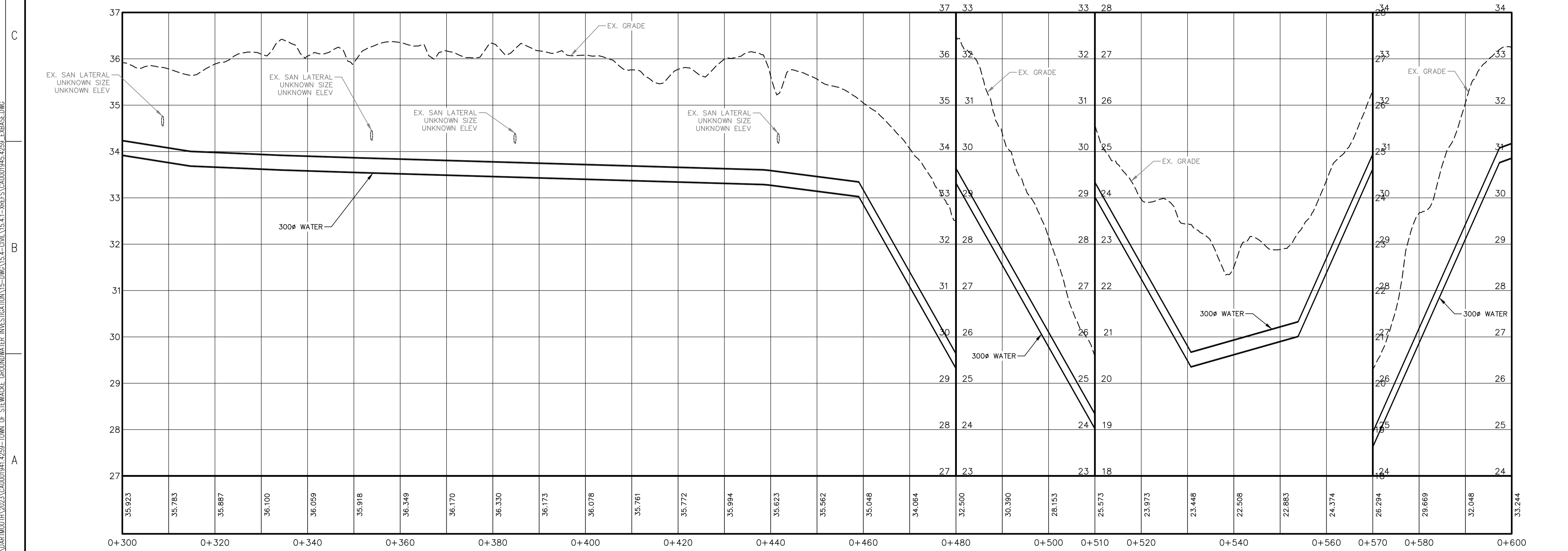
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NOTE:
EXISTING GROUND CONTOURS AND SURFACE
LINEWORK ARE BASED ON LIDAR SURFACE
FROM NSGI DATA LOCATOR.



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SCALE: H=1:500, V=1:50



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LOTLINE	---	---
WATERMAIN & GATE VALVE	---	---
SANITARY PIPE & MANHOLE	---	---
STORM PIPE & MANHOLE	---	---
UTILITY LINES & POLE	---	---
STREET BOUNDARY	---	---
PROPERTY BOUNDARY	---	---
EASEMENT	---	---
CURB & DRIVEWAY CUT	---	---
CATCH BASIN	---	---
FIRE HYDRANT	---	---
STREET TREE	---	---
ROAD SIGN	---	---
	SANITARY LATERAL	---
	WATER LATERAL	---
	CATCH BASIN LEAD	---
	ENDCAP	---
	CULVERT	---
	HEADWALL	---
	PHONE PEDESTAL	---
	SIDEWALK	---
	URD BOX	---
	FENCE	---

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DESIGNED BY:	M. KIDD	DRAWN BY:	M. KIDD
CHECKED BY:	C. FOGARTY	APPROVED BY:	K. O'LEARY
SCALE:	1:500 METRIC		

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WATER TRANSMISSION LINE
STEWIACKE, NS**

TITLE:
**PLAN AND PROFILE
WATER TRANSMISSION
0+300 to 0+600**

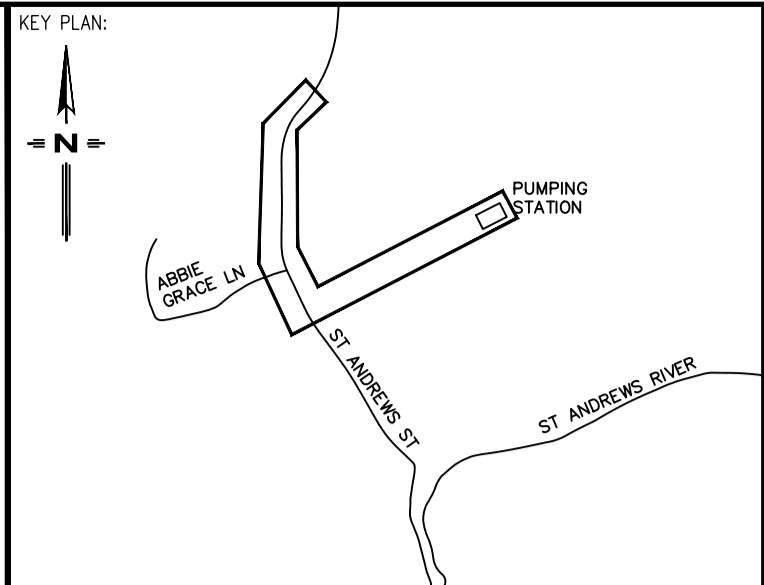
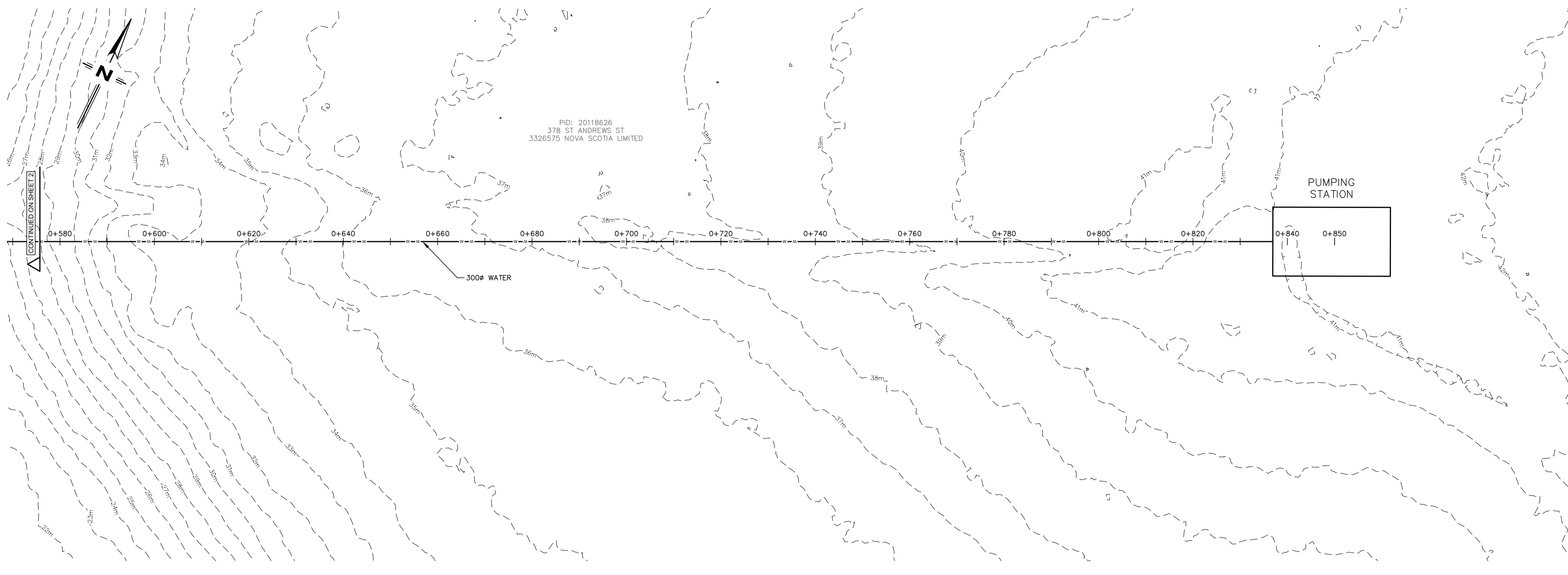
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SHEET #:
2 OF 3
ISSUE:
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DATE OF: 2023/10/05
REV #:
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(A) PLAN: STA: 0+600 TO 0+850
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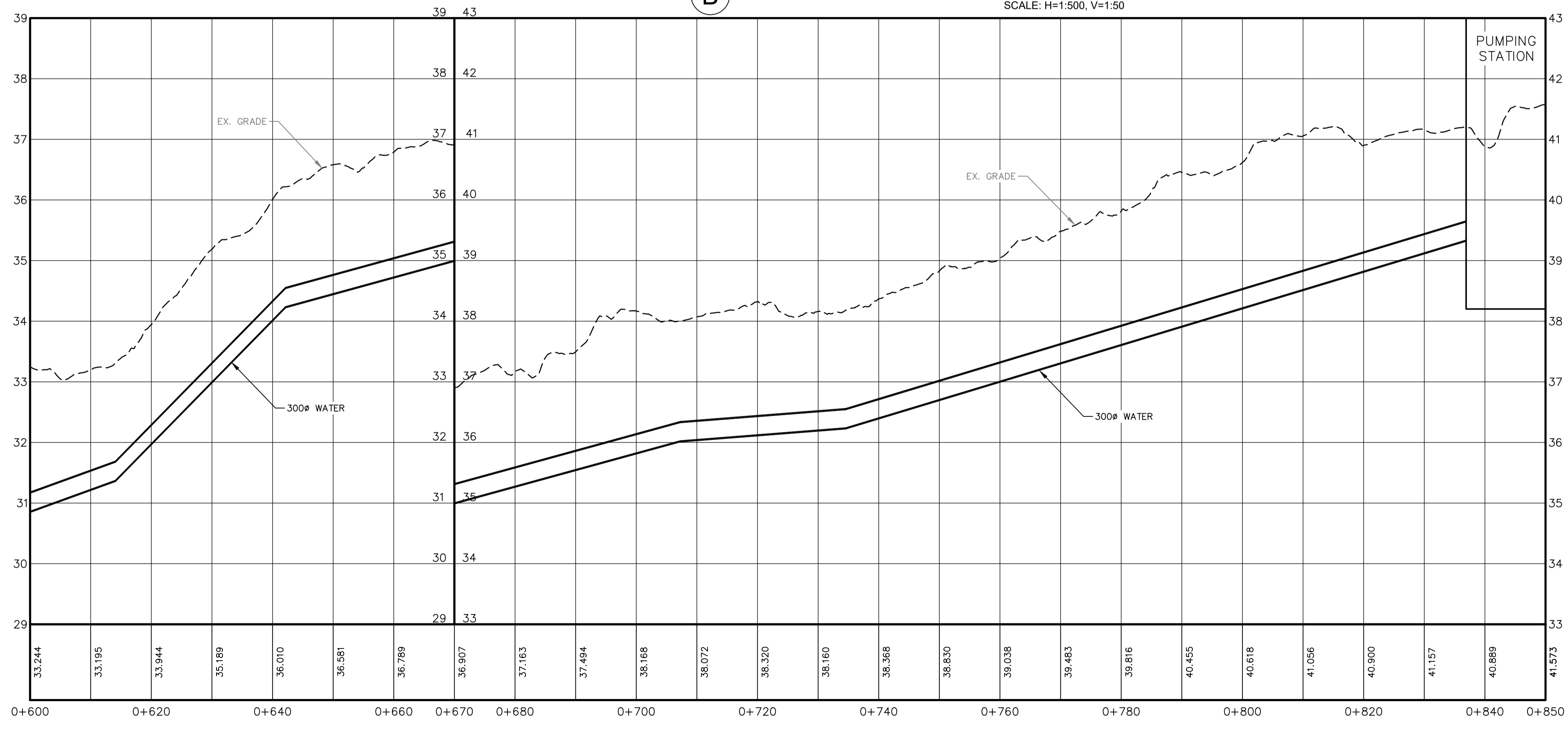
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WATERMAIN & GATE VALVE		— —	— —
SANITARY PIPE & MANHOLE		— —	— —
STORM PIPE & MANHOLE		— —	— —
UTILITY LINES & POLE		— —	— —
STREET BOUNDARY		---	---
PROPERTY BOUNDARY		---	---
CURB & DRIVEWAY CUT		---	---
CATCH BASIN		---	---
FIRE HYDRANT		---	---
STREET TREE		---	---
ROAD SIGN		---	---
		SANITARY LATERAL	---
		STORM LATERAL	---
		WATER LATERAL	---
		CATCH BASIN LEAD	---
		HEADWALL	---
		SIDEWALK	---
		FENCE	---

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(B) PROFILE: STA: 0+600 TO 0+850
SCALE: H=1:500, V=1:50



PROJECT NUMBER: CA0001941.4259 DATE: 2023/10/03

DESIGNED BY: M. KIDD DRAWN BY: M. KIDD

CHECKED BY: C. FOGARTY APPROVED BY: K. O'LEARY

SCALE: 1:500 METRIC

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PROJECT:

**PUMPING STATION
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STEWACKE, NS**

TITLE:

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WATER TRANSMISSION LINE
0+600 to 0+850**

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5 INFRASTRUCTURE ASSESSMENT

A key concern about accelerated growth is its impacts on existing servicing, and the ability of the current water and wastewater infrastructure to accommodate higher demands. This study therefore included a review of the water, wastewater and transportation infrastructure to understand the condition of treatment plants, their capacities, and the requirements that would be imposed by continued growth.

5.1 Water Servicing

A high-level assessment is presented of the Town's existing drinking water supply, treatment and distribution system. Under separate cover, CBCL has also recently completed a System Assessment Report, conforming with the requirements of the Town's Approval to Operate for the water treatment plant (WTP), issued by Nova Scotia Environment and Climate Change (NSECC).

The current source water supply is the St. Andrews River. An infiltration gallery with a perforated pipe runs across the width of the river at the WTP location, drawing water from the riverbed into the facility. The water quality and flow in the river are highly variable, and susceptible to weather and climatic factors resulting in difficulties with operating the treatment plant to acceptable standards and/or providing adequate hydraulic capacity during these times. These issues can be triggered by drought conditions and intense storm events, but especially by a combination of both – factors which may generally become more prevalent or exacerbated in the future due to effects of climate change.

The current water treatment system has served the Town since 1996, when it was installed as a demonstration/pilot plant in collaboration with the Nova Scotia Department of the Environment – Environmental Industries Technology Division (currently Nova Scotia Environment and Climate Change). This system replaced an existing raw water pump station, and has been in operation substantially unchanged since this time with the exception of a modern supervisory control and data acquisition (SCADA) system which enables the Town to closely track the hydraulic and water quality performance of the system. The core treatment process consists of coagulation, dissolved air flotation, rapid gravity filtration and chlorination. The system is illustrated on Figure 5-1 and Figure 5-2.



Figure 5-1: Current Water Treatment Plant on St. Andrews Street.

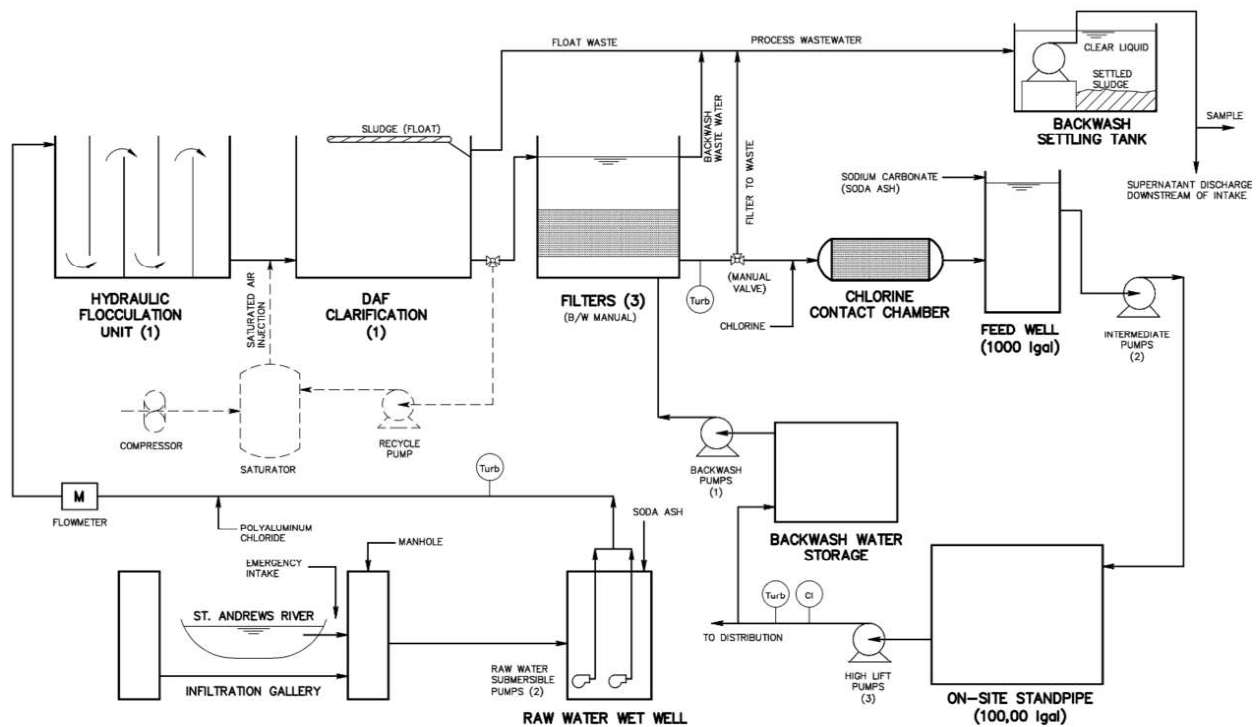


Figure 5-2: Stewiacke Water Treatment Plant Process Flow Diagram

5.1.1 Treatment and Storage Capacity

The St. Andrews River is without significant headwater impoundment and is fed from many small tributaries. This type of water is highly variable in terms of flow and quality. Low flow events occur regularly, causing outstanding regulatory issues for water withdrawal in the context of Ecological Maintenance Flow (EMF) requirements. A more drastic drought condition could potentially reduce the river flow to a point where demand from the Town exceeds the full flow in the river. Currently, when the river flow is below 0.245 m³/s, water conservation and contingency measures required by NSECC are triggered. The actual river flow vs. EMF requirement for the past 5 years is illustrated below in Figure 5-3,

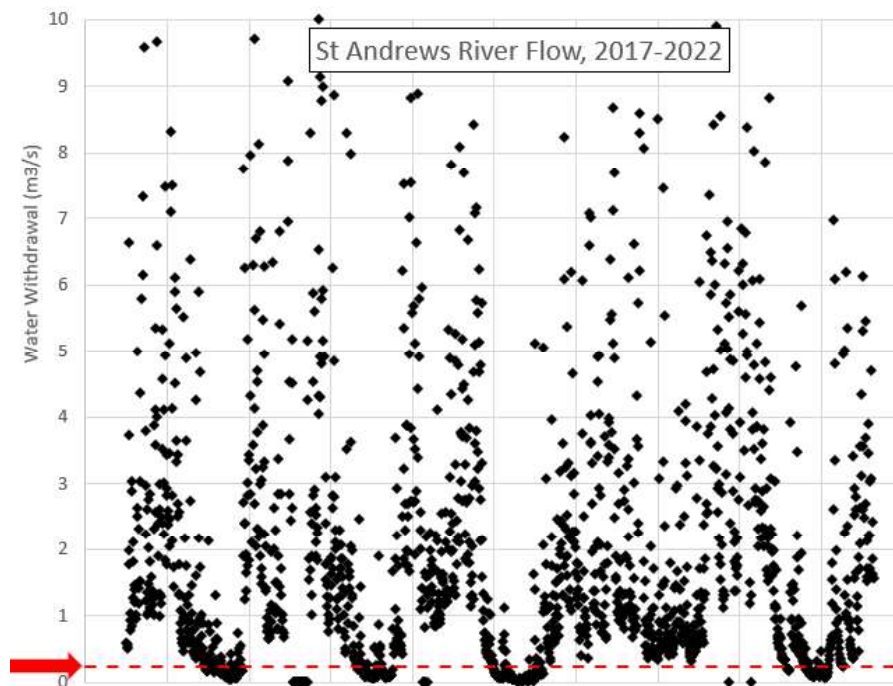


Figure 5-3: Low Flow Events Triggering Ecological Maintenance Flow Requirements

At the opposite extreme, capacity issues may be caused by higher than typical flows in the river, particularly if occurring suddenly due to extreme rainfall events. The nameplate capacity of the treatment system is close to 2,000,000 L/d, which is approximately 4 times higher than the current average demand. However, the actual capacity at any given time is based on the combined individual filter capacity at the facility. The filter capacity is subject to water quality factors; a disruption of source water quality and/or poor performance of upstream pre-filtration processes (e.g. coagulation, flocculation and clarification) can effectively reduce this nameplate filtration capacity drastically. Based on feedback from operations staff, this scenario has not resulted in a water shortage in the Town to date, but it has caused staff to shut down the facility for several days to allow source water quality to recover to the point where adequate treatment could be achieved. As demand in the system increases from population growth, and the frequency and severity of water quality events increases due to climate factors, a water shortage scenario appears increasingly

likely to occur at some point. A “typical” upset sequence caused by extreme rainfall and sudden high river flows is illustrated below in Figure 5-4, corresponding to the period between September 22 to Oct 1, 2020.

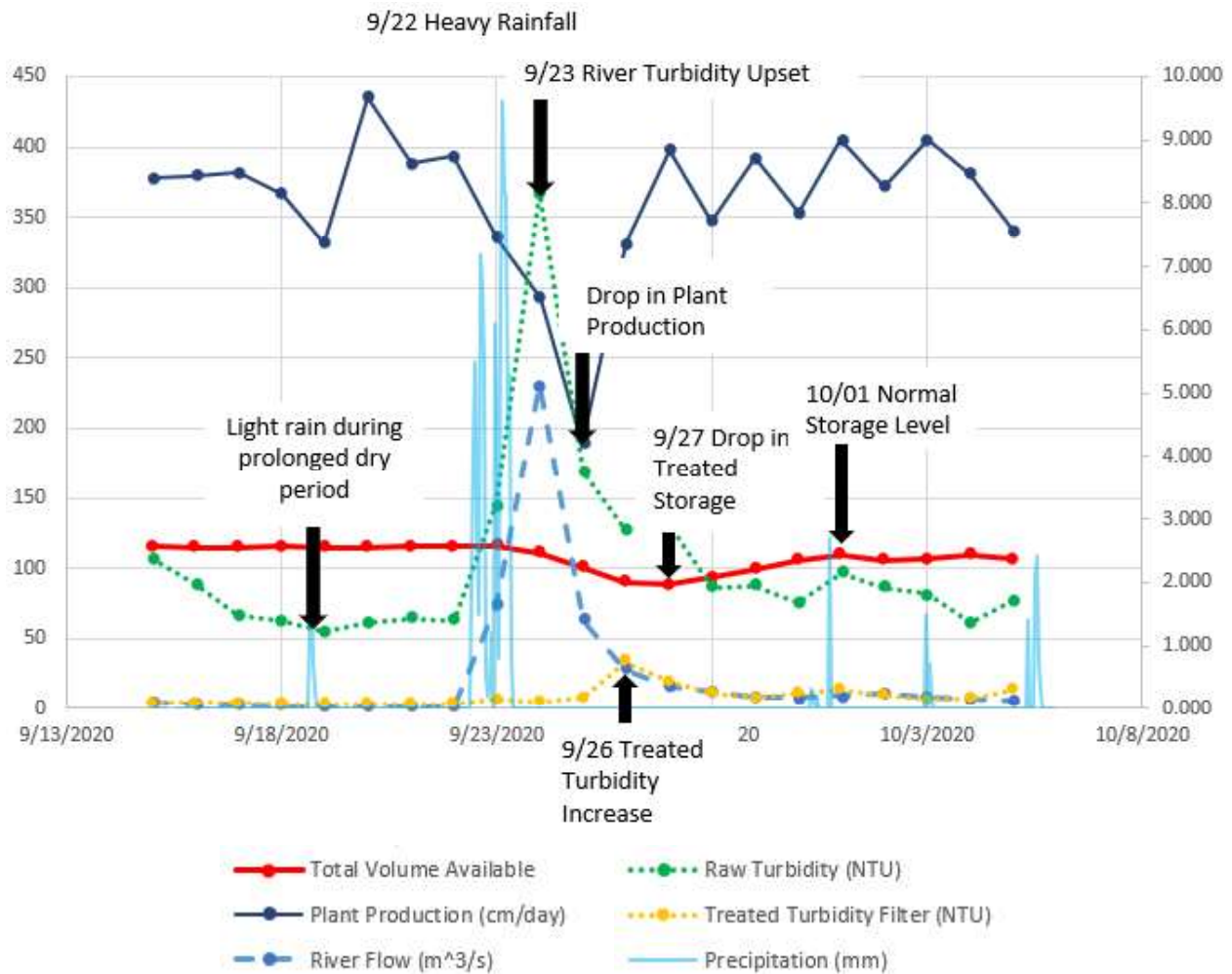


Figure 5-4: Water Quality Upset Event Sequence

During significant upsets, the Town relies on stored water to meet demand. The Town has a water storage capacity equivalent to approximately five days at normal demand, assuming the storage facility is at full capacity at the outset of the event.

5.1.2 Distribution System

The Town's water distribution system extends along the road network to cover much of the built-up area, as illustrated on Figure 5-5.

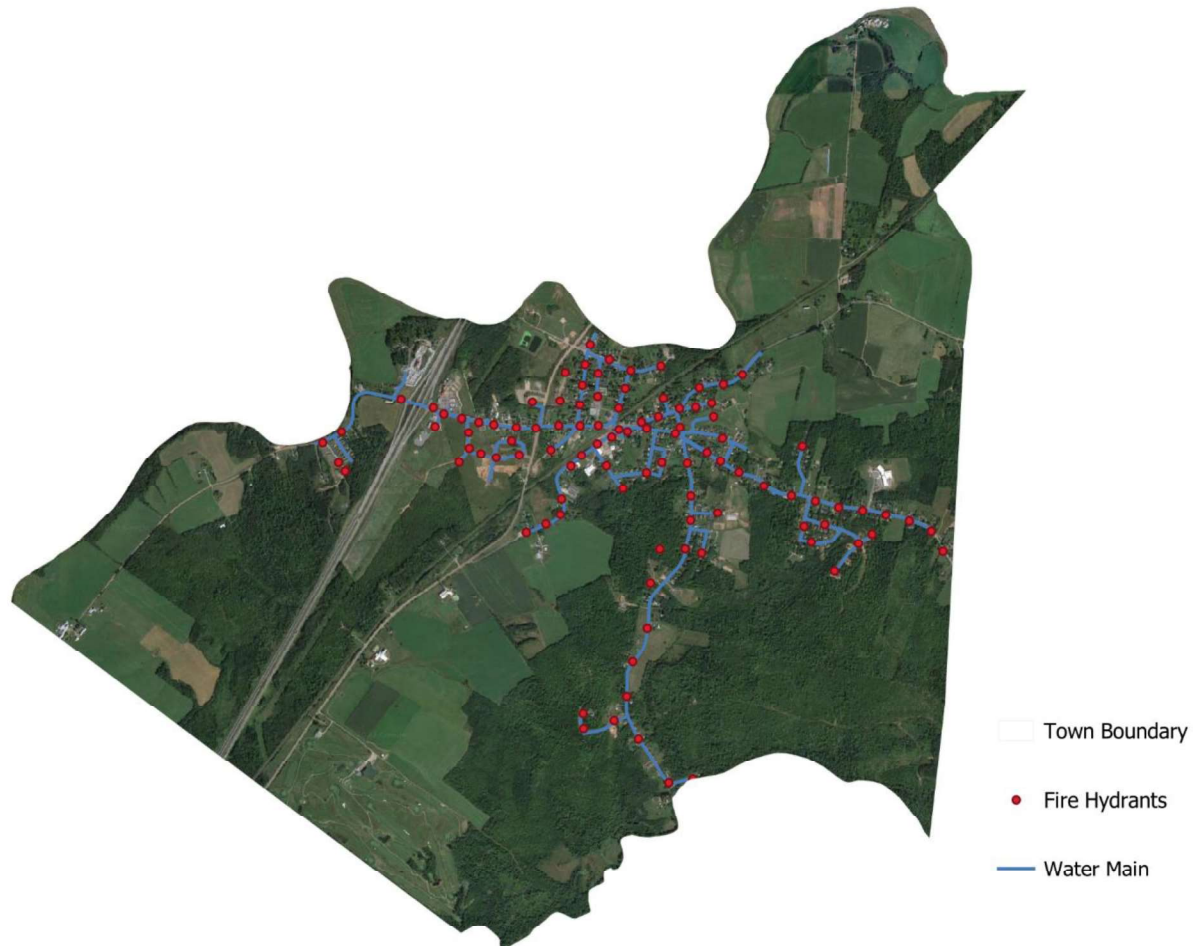


Figure 5-5: Water Distribution System

Review of the Town's asset management reports indicates that most of the distribution water mains have a condition rating of 3, based on their age and material; the majority date to around 1969, and most are PVC. This suggests generally few leaks that might affect the overall stored water volume and pressure in the system.

The condition reports indicate that close to half of the water distribution pipe valves in the system carry a condition rating 5 based on their age, and some cracks on the valve boxes. While a third of the inventory dates from around 1969, they may be in good condition. The rest have been added or replaced in more recent periods, as the system has been extended, and have only minor or moderate deficiencies.