TOWN OF LUNENBURG COUNCIL MEETING

TUESDAY, DECEMBER 8, 2020 AT 6:00 P.M.

LUNENBURG TOWN COUNCIL CHAMBER AND LIVE BROADCAST

PRESENT: Mayor Matt Risser
Deputy Mayor Peter Mosher
Councillor Jenni Birtles
Councillor Melissa Duggan
Councillor Stephen Ernst
Councillor Ed Halverson
Councillor Susan Sanford

ALSO PRESENT: Pat Burke, Q.C., Town Solicitor
Lisa Dagley, CPA, CGA, Finance Director
Dennis MacPherson, M. Eng., P. Eng. Town Engineer
Heather McCallum, Assistant Municipal Clerk
Bea Renton, Chief Administrative Officer
Ian Tillard, P. Eng., Town Engineer Consultant

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1. Call to Order

The Mayor called the meeting to order at 6:00 p.m.

2. Acknowledgement of Mi'kma'ki the ancestral and unceded territory of the Mi'kmaq People

The Mayor recognized Lunenburg's location on the unceded territory of the Mi'kmaq People.

3. Agenda

The Mayor noted that the names of the mover and seconder of motions will no longer be recorded, but those who voted in the negative will be.

Motion: moved and seconded to approve the agenda. Motion carried.

4. November 24, 2020 Council meeting minutes

Motion: moved and seconded to approve the November 24 Council meeting minutes. Motion carried.

5. Public Hearings, Presentations and Questions

6. Correspondence, Petitions and Proclamations consideration

   a. RCMP Quarterly Report for the Period July – September 2020

This item was received for information. It was noted that the RCMP has been asked to make a future presentation to Council about community activities as they were unavailable for this meeting.

Council asked the RCMP to advise on the following matters: what are the hours spent patrolling the Town; has there been an increase in suicides and/or domestic violence in the community; and the potential correlation of the pandemic?

7. Business arising from the Minutes/Unfinished Business

   a. Corporate Services

      i. Nova Scotia Federation of Municipalities and Association of Municipal Administrators Nova Scotia Safe Restart Funding request - staff report and draft motion

The Finance Director provided a summary of the report and recommendation (Schedule "A").

Motion: moved and seconded approval of a contribution of $1,039.57 to the Association of Municipal Administrators of Nova Scotia (AMANS) which will be equally divided between AMANS and the Nova Scotia Federation of Municipalities funded from the Town's portion of Safe Restart Funding (Schedule "A"). Motion carried.

      ii. Proposed amendment to section 3 (3), Council and Committee Meetings and Proceedings Policy relating to the start of regular Council meetings from 5:15 p.m. to 6:00 p.m. – motion to approve/ Deputy Mayor

Motion: moved and seconded approval of an amendment to section 3 (3) of the Council and Committee Meetings and Proceedings Policy (Schedule "B") by deleting the time 5:15 p.m. and substituting therefor the time 6:00 p.m. as the start time for regular Council meetings. Motion carried.

   b. Public Works Department

      i. Wastewater Treatment Plant and Outfall Extension Project Update – supplementary staff report and revised draft motion to issue a Request for Proposals (RFP) for pre-design engineering services

The Consulting Town Engineer gave a summary of his report and recommendation (Schedule "C"). Mayor Risser noted that Council toured the Wastewater Treatment Plant on December 5 and had a staff briefing regarding this report after.

Staff responded to Council questions regarding the report in summary as follows: staff have asked the Province for another funding deadline extension to the last one granted of March 31, 2021. They are awaiting a response as it is not anticipated that the RFP can be awarded and resulting engineering work completed by then. If this is not approved, further appeals will have to be made with Council's potential involvement with the Province.

Motion: moved and seconded that Public Works issue an RFP for the Preliminary Design of the WWTP and sewer outfall upgrades based on the scope and timelines as outlined in the staff reports to Council for the November 24 Council meeting and updated in the Supplemental Report (Schedule "C"), to be tendered and awarded by Council in early 2021. Motion carried.

8. Committee Meeting Minutes, Recommendations, Reports and Notices of Motion

    a. Proposed revised Sale, Reproduction and Use of the Town's Flag and Logo Policy allowing staff to approve future reproduction and other requests – notice of motion to amend the Policy/Deputy Mayor Mosher

Deputy Mayor Mosher gave notice of motion of a proposed revised Sale, Reproduction and Use of the Town's Flag and Logo Policy (Schedule "D") which he will give final reading of at the next regular Council meeting on January 12, 2021.

9. New Business

    a. Public Works

        i. FCM Asset Municipal Management Plan Funding Application Approval – information only as approved in the 2020/21 Capital budget for an RFP

The Consulting Town Engineer advised that the Town's earlier project application received $50,000 funding from the Federation of Canadian Municipalities for physical asset management GIS data base development. It will focus of infrastructure such as streets, sidewalks, water services, etc. In response to Council questions it was noted that in future with additional funding sources, more information could be added to the GIS data base including human capital in the community, Development, Heritage and Building Permits and other relevant municipal information.

    b. Recreation

        i. Request of Melissa Risser, Risser Design Build, for donated use of the Lunenburg Arena on December 12 for a Lunenburg Food Bank donation event – staff report and draft motion

Council considered the staff report (Schedule "E"). In response to Council questions, staff advised that if this request is approved, grant recipients are typically asked to include the Town as an event sponsor in any advertising. Further, COVID-19 pandemic spread prevention measures are taken by Recreation Department staff who screen and check the number of entrants to the Arena and obtain contact information. Staff also provide additional facility cleaning.

Motion: moved and seconded approval of a free one hour ice rental in the amount of $151 for Risser Design Build to hold a Lunenburg Food Bank fundraiser on December 12, 2020 (Schedule "E"). Motion carried.

10. Council in camera meeting portion

Motion: moved and seconded that Council meet in camera pursuant to section 22, Municipal Government Act to consider the following agenda items.

a. The potential purchase of lands in the Lunenburg watershed pursuant to section 22 (2) (a), Municipal Government Act.

b. Contract negotiations with the Lunenburg Academy Foundation and a private property owner regarding COVID-19 Pandemic Property Tax Financing Program late application pursuant to section 22 (2) (e), Municipal Government Act.

c. Lunenburg Academy lease negotiations pursuant to section 22 (2) (a), Municipal Government Act.

d. Potential sale of Town lands at 17 and 18 Tannery Road pursuant to section 22 (2) (a), Municipal Government Act.

e. Personnel matters pursuant to section 22 (2) (c), Municipal Government Act.

Motion carried.

6:25 p.m. - 7:42 p.m. – Council recessed for ten minutes then met in camera and reported to Council in open session as follows.

11. Resumption of Council meeting in public session - motion to consider any in camera meeting notices of motion and recommendations pursuant to section 22 Municipal Government Act

The public portion of the Council meeting resumed at 7:42 p.m. The following Council in camera meeting recommendation was reported and voted on by Council.

Motion: moved and seconded approval of the late COVID-19 Pandemic Property Tax Financing Application. Motion carried.

12. Adjournment

The meeting was adjourned at 7:43 p.m. by the Mayor.

_____
Bea Renton, CAO

Schedule "A"

Document No:
Meeting: December 8, 2020
Circulate: Council, BR, KR
File: Budget 2020/21

M E M O R A N D U M

TO: **TOWN COUNCIL**

FROM: **LISA DAGLEY, CPA, CGA - FINANCE DIRECTOR**

DATE: **NOVEMBER 26, 2020**

RE: **NSFM AND AMANS SAFE RESTART FUNDING REQUEST**

1. FACTS

The Nova Scotia Federation of Municipalities (NSFM) and Association of Municipal Administrators of Nova Scotia (AMANS) worked with Nova Scotian municipal units to help secure federal and provincial funding to offset lost revenues and additional operational expenses related to the Covid-19 pandemic. The Town received $287,930 in Safe Restart Funding in early November.

2. ISSUES AND OPTIONS ANALYSIS

NSFM and AMANS have submitted a letter of request to every municipality in the province asking for a small portion (less than ¼%) of the approved funding to help both organizations offset their impacts of Covid-19. Both organizations advocate for municipal issues and typically host numerous conference and training opportunities for both municipal staff and elected officials. They are seeking $1,039.57 from the Town.

3. FINANCIAL IMPACT

This unanticipated expenditure was not included in the approved 2020/21 Operating Budget, which is why staff are seeking Council's authorization for same. With the receipt of the Safe Restart Funding of $287,930 approval of the $1,039.57 NSFM/AMANS request would see the net revenue available to the Town of $286,890.

4. STRATEGIC PLAN RELEVANCE

The NSFM and AMANS contribution outlined in this report is covered in the Town's Comprehensive Community Plan Strategic Direction Goals – 10. Governance.

5. RECOMMENDATION AND DRAFT MOTION

It is recommended that Council approve the following draft motion:

Motion: moved and seconded that a contribution of $1,039.57 is authorized to the Association of Municipal Administrators of Nova Scotia (AMANS) which will be divided equally between AMANS and the Nova Scotia Federation of Municipalities funded from the Town's portion of Safe Restart Funding.

Acknowledged only by:

_____
Bea Renton
CAO

Encls. (2)

November 4, 2020

Ms. Bea Renton
Town Manager/Clerk
Town of Lunenburg
P. O. Box 129
Lunenburg, NS
B0J 2C0

Dear Bea,

The last eight months have been difficult times for everyone, and we recognize the challenges municipalities have had and are still facing. Throughout the pandemic, NSFM and AMANS have been all hands-on deck working on behalf of municipalities. Many staff and volunteer hours have been spent to help provide resources and information to municipalities during the pandemic. Included in these efforts was the data collected for the NSFM Report which identified the need for assistance and formed the basis for the $67M in restart funding for municipalities. In fact, municipalities will be receiving $1,067,000 more than what was identified. This is a good news story!

NSFM and AMA, like municipalities, are feeling the impacts of COVID-19 with significant losses in revenue from cancelled events. While municipalities are receiving the much-needed help that they deserve from the restart funding, NSFM and AMA are still struggling. It is uncertain when the two organizations will be able to resume holding conferences at full capacity again. These events are critical funding mechanisms for both organizations. Therefore, it is proposed that municipalities be billed a one-time restart fee to help the AMA and NSFM at a time when municipalities need the two organizations most. This would equate to 15 percent of the extra $1,067,000 going to municipalities and would be split between the two organizations to help offset lost revenue and operating expenses due to COVID-19. Each municipal unit will be billed based on their allocation of the additional $1,067,000 to ensure an equitable sharing of the redistribution.

We do not believe this is a big ask as it will leave 85 percent of the extra money that municipalities did not initially ask for and equates to less than one quarter of a percent of the total restart funding allocation to municipalities.

Attached to this letter is a one-time invoice for your municipality's allocation. We hope you will support your municipal organizations. If you have any questions, please do not hesitate to contact us.

Yours truly,

Pam Mood,
President, NSFM

Mike Dolter, CD, MBA, CPA, CMA
President, AMANS

cc: *Director of Finance*

1809 Barrington St, Suite 1304, Halifax, NS B3J 3K8 902-718-6269

Association of Municipal Administrators, Nova Scotia

1809 Barrington Street
Suite 1304
Halifax, Nova Scotia B3J 3K8

INVOICE

Invoice No.: 7442
Date: 02/11/2020

Page: 1
Re: Order No.

Sold to:

Town of Lunenburg
P.O. Box 129
Lunenburg, NS B0J 2C0

Business No.: 12473 1324 RT0001

Quantity	Description	Tax	Unit Price	Amount
1	One-time Restart Funding Fee		1,039.57	1,039.57

Shipped By: Tracking Number:

Comment:

Sold By:

Total Amount	1,039.57
Amount Paid	0.00
Amount Owing	1,039.57

Schedule "B"

Update highlighted in yellow on page 2

#96. TOWN OF LUNENBURG PROCEDURAL POLICY

COUNCIL AND COMMITTEE MEETINGS AND PROCEEDINGS

PURPOSE

1. The procedural requirements in this Policy are intended to complement and supplement, and not to replace, the requirements contained in applicable municipal legislation, including but not limited to the Municipal Government Act ("MGA") with such amendments as may be made from time to time. This Policy also applies to Town Committee meetings with the relevant changes in wording.

DEFINITIONS

2. In this Policy, unless the context otherwise requires:

   (1) **"business day"** means a day when the Town Hall office is open for business;

   (2) **"Chair"** means the presiding officer of the Council or Committee;

   (3) **"Committee"** means a group of individuals appointed by the Lunenburg Town Council to serve on a body that makes recommendations by majority vote to Council. This includes sub-committees and advisory groups;

   (4) **"Council"** means the governing Council of the Town of Lunenburg;

   (5) **"Councillor"** includes the Mayor and all elected Councillors unless the context indicates otherwise;

   (6) **"Legislation"** includes Policies, Bylaws and other relevant Municipal, Provincial and Federal laws or approved documents recognized by Council.

   (7) **"Majority"** means more than one half of those present, unless the context indicates otherwise; and

   (8) **"Motion"** a formal proposal put to a Council or Committee by a mover and seconder decided by majority vote of Council or a Committee.

PROCEDURE

Time, Place, Date and Notice of Meetings

3. Unless otherwise specified pursuant to section 4, regular meetings of Council shall be held:

   (1) at the Lunenburg Town Hall;

(2) on the second and fourth Tuesday of every month except in the months of July, August and December when there is only one monthly meeting which shall be on the second Tuesday of those months unless notice is otherwise given; and

(3) commencing at ~~5:15~~ 6:00 p.m.

4. Regular meetings of Council may be rescheduled, relocated or cancelled:

(1) by motion or consensus of Council; or

(2) by the Clerk on behalf of the Mayor owing to unforeseen circumstances, provided the Mayor believes that the majority of Councillors would support such a step.

5. **Additional meetings** of Council may be convened in accordance with the MGA:

(1) by resolution or consensus of Council with advance notice being given;

(2) if the Mayor determines there is an emergency necessitating a meeting with such notice as is possible under the circumstances; or

(3) by the Clerk when required to do so by the Mayor or upon written request signed by a majority of Councillors.

6. Specific **notice** to Councillors need not be provided for:

(1) regular Council meetings held pursuant to section 3; or

(2) meetings held pursuant to subsection (1) of section 4 or subsection (1) of section 5 if the date was set at a Council meeting three or more days in advance;

but, subject to any statutory relaxation of notice requirements, two days' notice shall ordinarily be provided for other meetings to Councillors in the manner described in sections 7 and 8.

7. Subject to section 6, notice of meetings shall be provided verbally in person or by telephone or telephone message or by writing or by email to each Councillor. A Councillor may waive any deficiency in the notice provided to him or her for a Council meeting which he or she attends, and shall be deemed to waive any deficiency in notice to him or her for such meetings unless expressly objecting to the adequacy of the notice at such meeting.

8. Within thirty days following the first meeting of Council after a municipal election or by-election, each elected Councillor shall provide to the Clerk:

(1) a telephone number at which the Councillor ordinarily may be reached, with voice messaging capability with adequate capacity at all times to receive messages of one minute in length regarding Council meetings and Town business, and which the Councillor will regularly check for Town messages; and

(2) shall sign any documents required by the Clerk to use an email address on the Town's email system which the Councillor will regularly check.

The Councillor shall be deemed to have received any notice within one business day of it being distributed pursuant to this section.

9. Notice to the public is not required for regular meetings held under section 3, but subject to any statutory relaxation of notice requirements, two days' notice to the public should be provided for other Council meetings, except meetings considered to be urgent or emergencies, by the following options: posting at the Lunenburg Town Hall; social media; internet; print advertisement; signage; or such other means as determined by Council from time to time noting the time, date and place of the meeting.

Conduct of Meetings: General

10. The Mayor shall serve as the Chair of Council meetings. For Committee meetings, the Chair shall be determined in advance by Council when Committee appointments are made. It shall be the duty of the Chair or alternate as set out herein to:

    (1) open the meeting of Council by taking the chair and calling the Councillors to order if a **quorum** is present;

    (2) declare a meeting dissolved if no quorum has been achieved within fifteen minutes of the scheduled meeting time;

    (3) if the Mayor does not attend within fifteen minutes after the time appointed, the **Deputy Mayor** shall call the Councillors to order and if a quorum is present, shall preside over the meeting or until the arrival of the Mayor;

    (4) in case neither the Mayor nor the Deputy Mayor (or Committee Chair as applicable) is in attendance within fifteen minutes of the appointed time, the Clerk shall call the Councillors (or Committee members as applicable) to order if a quorum be present, and the Councillors shall choose a Chair who shall preside over the meeting or until the arrival of the Mayor or the Deputy Mayor;

    (5) if there is no quorum present within fifteen minutes after the time appointed for the meeting or a quorum is lost during a meeting, the Clerk shall take down the names of the Councillors then present and the Council meeting shall stand adjourned until the next regular Council meeting;

    (6) determine whether a quorum can still be achieved to conduct Council business if an interest is declared by a Council member(s) with reference to the **Municipal Conflict of Interest Act**;

    (7) receive and submit to Council **motions** properly presented by a Councillor;

    (8) put to a **vote** a question which is regularly moved and seconded or necessarily arising in the course of the proceedings and to announce the result of the vote;

    (9) preside over Councillors, when engaged in debate, within the rules of conduct of debate;

(10) enforce on all occasions, the observance of order and decorum, except with concurrence of Council to relax the rules;

(11) call by name any Councillor persisting in a breach of the rules of order of Council thereby ordering him or her to vacate the Council Chambers;

(12) inform the Council when necessary, or when referred to, on a point of order;

(13) permit the Chief Administrative Officer to speak on any point upon request pursuant to the MGA;

(14) permit relevant questions to be asked through the Chair of any official or employee of the Town, or any member of the public in attendance, to provide information to assist any Council debate; and

(15) adjourn the meeting when the business is concluded or, when an adjournment time has been set and approved by majority vote or consensus, when the adjournment time has been reached, except when it is extended by unanimous consent. Meetings should not exceed a maximum duration of three hours or 10:00 p.m. whichever occurs first,

(16) at which time they will be adjourned until the next meeting of Council.

11. At Council meetings, unless a majority consents to a different order for that meeting, **Council shall conduct business in the following order**:

(1) call to order;

(2) acknowledgement of Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People;

(3) approval of agenda, including additions or deletions;

(4) approval of minutes from the previous meeting;

(5) public hearings, presentations and questions;

(6) consideration of correspondence, petitions and proclamations;

(7) business arising from the minutes;

(8) consideration of committee recommendations, minutes, reports and notices of motions;

(9) new business;

(10) in camera business;

(11) in camera notices of motion and recommendations; and

(12) adjournment.

12. Five business days before a Council meeting, a Councillor or member of the public may request of the Mayor and Clerk to **add a Council agenda** item with relevant and sufficient particulars and supporting documentation which the Mayor shall in consultation with the Clerk determine to which Council or Committee meeting the agenda the item shall be added at the upcoming or a subsequent meeting(s).

13. (1) Alternatively, a Councillor may give **notice of motion to add an agenda item** at a Council meeting which shall be:

    a. be in writing;

    b. include the name of the mover;

    c. be received by the Clerk at a regular meeting of the Council; and

    d. be printed in full in the agenda for the next regular meeting and each successive meeting of the Council until considered or otherwise disposed of.

    (2) When a Councillor's motion has been called at two successive meetings of the Council and not proceeded with, it shall be deemed to have been withdrawn and be removed from the agenda unless the Council otherwise decides.

    (3) The mover may withdraw a notice of motion at any time prior to the commencement of debate thereon.

    (4) Council may waive notice of motion on a two-thirds vote of the Council members present and voting except for Policy and Bylaw matters.

    (5) A point of order or personal privilege may be introduced without written notice and without leave.

    (6) The following motions may be introduced without notice and without leave:

    a. a motion to adjourn;

    b. a motion to call for the question;

    c. a motion to refer;

    d. a motion to table or to defer to a day certain;

    e. an amendment to a motion;

    f. a motion to suspend a rule of procedure;

    g. a motion to convene in camera; or

    h. any other procedural motion.

14. The Mayor and Clerk shall confer on the Council **agenda content and format** before it is circulated a minimum two business days before the meeting if possible. The agenda will be accompanied with an **agenda package** containing meeting materials in the agenda sequence.

15. The Chair shall decide all questions of order or procedure subject to an **appeal** to the Council.

16. Every Councillor, prior to **speaking on any question or motion**, shall raise a hand and wait to be recognized by the Chair. When two or more Councillors raise their hands to speak, the Chair shall designate the Councillor who has the floor who, in the opinion of the Chair, first raised their hand.

17. No Councillor shall speak more than ten minutes upon any matter at one time, without the leave of the Chair.

18. During a meeting Council may **recess** for short periods or move to another place, without ending the meeting.

19. At regular meetings of Council, except when Council resolves to defer approval of minutes for a maximum of one additional meeting, the **minutes** of the last preceding regular meeting and subsequent special meetings shall be reviewed and after all necessary corrections and amendments have been made and the minutes approved, the approved minutes shall be entered in the minute book of the proceedings of Council and such entry shall conclusively constitute the minutes of Council.

20. The minutes shall be kept by the Clerk and shall:

    (1) record the time when any Councillor joins or leaves a meeting which is in progress;

    (2) contain all resolutions, decisions by consensus and motions, with the name of the movers and seconders except Committee meetings, and shall record the outcome of each vote; and

    (3) mention reports, petitions and other papers submitted to Council only by their respective titles, or a brief description of their contents, which may be attached in full to the minutes as determined relevant by the Clerk.

Conduct of Meetings: Motions and Voting

21. The Chair shall state every **question** properly presented to Council if no Councillor offers to speak, the Chair shall put the question, after which no Councillor shall be permitted to speak upon it.

22. The usual form of voting on any question shall be by the Chair calling for "yeas" and "nays", but any Councillor, before or after a voice vote can call for, and obtain through the Chair, a show of hands.

23. The Mayor and every Councillor who is present when a motion is put, shall vote thereon unless the Councillor has declared an interest in the motion. A failure to expressly signal a “yea” or “nay” or raise one’s hand shall be deemed to be a “nay” vote. A tie vote results in the motion being defeated.

24. A motion must be seconded and then repeated by the Chair or read aloud by the Clerk before it is debated. The Chair may direct that the motion be put in writing, repeated, displayed or read aloud by the Clerk before it is debated or voted on.

25. After reading of a motion by the Chair or Clerk, it shall be open for discussion. The motion is deemed to be in the possession of Council at this time.

26. A motion which has been seconded and stated by the Chair may at any time before the Council has voted on it be **withdrawn** by the mover with the unanimous consent of Council.

27. When any question is before the Council, the only motions in order shall be:

    (1) a motion to amend the original motion;

    (2) a motion to refer the question, including the motion and amendment if one is moved, to any Committee;

    (3) a motion to defer the consideration of the question either indefinitely or to a specified time;

    (4) a motion to close the debate at a specified time; and

    (5) a motion that the question be put to a vote.

28. A motion

    (1) that the debate be closed at a specified time; or

    (2) that the question be put to a vote,

    shall be put to a vote without further amendment or debate, but a motion that the question be put to a vote shall not be in order until every Councillor who has not spoken on the question and claims a right to speak has been heard.

29. When the question before Council contains two or more distinct propositions upon request of any Councillor a vote upon each proposition may be taken separately in such order as determined by the Chair.

30. After a question is finally put by the Chair, no Councillor shall speak to the question nor shall any other motion be made until after the result of the vote has been declared.

31. Whenever the Chair is of the opinion that a motion is out of order, or contrary to legislation, the Chair shall immediately advise the Councillors thereof. If there is no appeal to Council, or if the Chair is sustained on an appeal, the question shall not be put.

32. A motion to adjourn shall always be in order except in the following cases:

    (1) when a Councillor is in possession of the floor;

    (2) when the "yeas" and "nays" are being called for a vote;

    (3) while Councillors are voting; or

    (4) when the adjournment was the last preceding motion.

33. The following questions shall be decided without debate:

    (1) all motions as to priority of business or as to the suspension of the order of the day;

    (2) a motion to allow any person other than Councillors to address Council;

    (3) a motion to postpone to a specified time or day;

    (4) a motion to lay on the table (suspend consideration of a pending motion); and

    (5) a motion to adjourn.

34. Only one **amendment** to the main motion may be pending at one time. As each amendment is voted on, subsequent amendments may be offered and voted on in succession.

35. (1) A motion to rescind shall not be made at the same meeting when the matter is decided, but may be put once at any subsequent meeting by giving prior notice of motion to rescind if the action or direction of Council has not already been completed.

    (2) A motion to rescind may be put by any Councillor regardless of how they voted on the original matter.

    (3) At a subsequent meeting of Council, the giver of such notice, or in that Councillor’s absence any other Councillor on the Councillor’s behalf, may put forward the motion of rescission.

    (4) A motion to rescind must be seconded.

    (5) A motion to rescind is debatable as to the merits of the question which is proposed to be rescinded.

    (6) A motion to rescind is amendable.

    (7) A motion to rescind shall be passed by a majority of the Councillors present and voting.

36. After any question or motion has been decided, either in the affirmative or negative, a Councillor who voted on the prevailing side may, after the decision has been announced by the Chair, but before adjournment of the meeting, give notice of an intention to move **reconsideration** of the motion approved at the same or next Council meeting. The giving of

such a notice operates as a stay or suspension of Council's decision, except in matters where there is great time sensitivity. Council then vote on whether the motion will be reconsidered at the current or next meeting. If the motion to reconsider is adopted, Council will reconsider and then re-vote on the original motion, possibly with a different outcome.

37. The following matters are not eligible for reconsideration:

    (1) a motion approving the first or second reading of a By-Law enactment, amendment or repeal;

    (2) a motion to decide upon a matter which was the subject of a statutory hearing by Council;

    (3) a matter that has already been reconsidered; and

    (4) a vote to reconsider.

38. Any **notice of motion** given by a Councillor for a subsequent meeting may, in the absence of the Councillor giving such notice, be taken up by any other Councillor.

39. All motions called in pursuance of the general order of the day and not disposed of shall be proceeded with and disposed of at the next meeting of Council.

Conduct of Meetings: Points of Order

40. It shall be the duty of the Chair, and the privilege of any Councillor, to call any Councillor to order, who violates any established rule or order. A point of order must be decided by the Chair before the subject under consideration is proceeded with.

41. When a Councillor is called to order, the Councillor shall remain silent until the point is determined or called upon by the Chair to be heard on the point of order.

42. A point of order is not debatable amongst other Councillors, unless the Chair invites discussion in an effort to assist in making a ruling. Where the Chair permits discussion of a point of order, no Councillor shall speak more than once without the leave of the Chair.

43. Decisions of the Chair on points of order, including an order expelling and excluding a person from the Council Chambers, are not debatable but are appealable to Council by any Councillor. When an appeal is made from the decision of the Chair, the Chair may briefly explain the basis for their ruling and shall then ask Council whether the appeal should be allowed and Council’s decision with reasons given shall be final.

44. No Councillor shall use offensive or unparliamentarily language or speak disrespectfully to or about anyone while in Council, or speak outside the parameters of the question in debate.

45. If a Councillor resists the rules of Council, obstructs the business of Council or disobeys the decision of the Chair, or of Council on appeal, on any question of order or practice or upon the interpretation of the rules of Council after being called to order by the Chair, or otherwise

disrupts the proceedings of Council, the Councillor may be ordered by the Chair to leave the Councillor's seat provided that a majority vote of Council shall be required to have the expulsion extended to additional meetings.

46. If the Councillor refuses to leave the Councillor's seat, the Chair may order the Councillor to be expelled from the Council Chambers. Such Councillor may, by vote of Council be permitted to resume their seat with or without conditions.

47. Persons who are not Councillors, officers or employees of the Town shall observe silence and order in the Council Chambers, unless given permission to speak by Council. Any such persons disturbing the proceedings of Council shall be called to order by the Chair and, if they fail to comply, shall be ordered, by the Chair to be expelled from the Council Chambers, provided that a majority vote of Council shall be required to have the expulsion extended to additional meetings. Such member of the public may, by vote of Council be permitted to re-enter Council Chambers with or without conditions.

48. An order of the Chair to expel a person from the Council Chambers pursuant to this part of the Policy constitutes a direction from the Town to leave the premises for purposes of the Protection of Property Act and other applicable laws.

Conduct of Meetings: Questions of Privilege, Parliamentary Inquiries, and Requests for Information

49. Any Councillor may raise a **question of privilege** relating to the rights of the Council as a whole or of individual Councillors, in which the former take precedence over the latter. A question of privilege must be disposed of before the matter under consideration is proceeded with.

50. Questions of privilege may relate to matters including: the comfort of Councillors with respect to heating, ventilation, lighting, noise, other disturbances, and anything which otherwise encumbers their ability to participate fully in Council proceedings; the conduct of officers, employees, and visitors; the accuracy of published reports of proceedings; or to any other such matters that may infringe upon the established rights of Council as a whole or of individual Councillors.

51. The Councillor raising a question of privilege shall either state the infringement on their privileges and request that the Chair remedy such infringement or make a motion addressing the question of privilege to the Council. The Chair will rule on whether the matter is a question of privilege to be immediately disposed of. Decisions of the Chair on questions of privilege are not debatable but are appealable to Council by any Councillor.

52. If the Chair rules in favour of a question of privilege or Council overrules a negative ruling by the Chair then the infringement will be dealt with or the motion regarding the question put before the Council for debate.

53. Once a question of privilege has been disposed of, the normal business of the Council shall be resumed at the point at which it was interrupted.

54. Any Councillor may make a parliamentary inquiry to the Chair to obtain information on a matter of parliamentary procedure or of the applicable legislation and motions bearing on the business at hand. It is the Chair's duty to answer such questions when it may assist the Councillor to make an appropriate motion, raise a proper point of order, or understand the parliamentary situation or the effect of a motion.

55. Any Councillor may make a request for information either to the Chair or through the Chair to another Councillor, employee, or other relevant person to obtain information relevant to the business at hand but not related to parliamentary procedure.

56. Any of the rules of order may be suspended in its operation by the unanimous consent of the Councillors present.

57. If any question arises that is not provided for by applicable legislation or the foregoing rules, it shall be decided by the Chair in accordance with the latest available version of Roberts Rules of Order.

58. Policy #88 Council Meeting Policy is hereby repealed.

Clerk' Annotation For Official Policy Book

Date of Notice to Council Members of Intent to Consider: April 28, 2020

Date of Passage of Current Policy: May 12, 2020

I certify that this Policy was adopted by Council as indicated above

_____ _____

Municipal Clerk Date

Schedule "C"

Document No: 7 (b) (i)
Meeting: Council, November 24, 2020
Circulate: Council, IT, DMP, LD
File: WWTP

M E M O R A N D U M

TO: **TOWN COUNCIL**

FROM: **IAN TILLARD, TOWN ENGINEER CONSULTANT**

DATE: **NOVEMBER 19, 2020**

RE: **WASTEWATER TREATMENT PLANT AND OUTFALL EXTENSION PROJECT UPDATE**

---

1. BACKGROUND STUDIES AND INVESTIGATIONS

ABL Outfall Extension Report 2014
Extend the outfall, three options, each further apart

ABL Environmental Engineering Report 2017

- Headworks; screening problems
- DAF
    - Level and flow control upgrades
    - Foaming from salt water
    - Some recommendations on potential mechanical improvements related to effectiveness
- MBBR; aeration system upgrade (since completed)

CBCL Evaluation and Options Identification Final Report, 2018

- Headworks; screening problems and odour problems (ventilation upgrade completed since this report was issued)
- MBBR; aeration system upgrade (since completed)
- DAF
    - Level and flow control and other control upgrades needed
    - Salt water
    - Polymer system controls
- Ultraviolet Disinfection system
    - Capacity is inadequate for the flow
- General Asset Condition; varying conditions, some elements at the end of life and need upgrading, considerable corrosion and metals need to be upgraded to stainless for some elements and some elements are ok.

- Performance of the entire plant; occasional exceedances above regulatory limits for BOD, Coliforms and Total Suspended Solids
- Wastewater flow and quality
    - Salt water infiltration
    - Effluent out of compliance
- Proposed WWTP solution options:
    1. Option 1
        - Upgrade screen in headworks
        - Replace MMBR with a fixed media reactor system. Repairs were completed to the MBBR and additional media added in 2020 which has improved performance. Any further upgrades TBA.
        - Instrumentation upgrade
        - DAF optimization
        - New polymer make down system
        - UV system upgrade
        - Emergency generator
        - Other repairs based on condition assessment of all buildings and equipment
    2. Option 2
        - Upgrade screen in headworks
        - MMBR upgrade. Repairs were completed to the MBBR and additional media added in 2020 which has improved performance. Any further upgrades TBA.
        - Instrumentation upgrade
        - DAF replacement including polymer make down system
        - UV system upgrade
        - Emergency generator
        - Other repairs based on condition assessment of all buildings and equipment
    3. Option 3
        - Upgrade screen in headworks
        - Change bio-reactor to activated sludge system.
        - Instrumentation upgrade
        - Change DAF’s to a membrane system including blowers pumps etc. and to be installed in a new building
        - UV system upgrade
        - Emergency generator
        - Other repairs based on condition assessment of all buildings and equipment
- The cost indications for the options are lowest to highest going from 1 to 3
    1. $4.0 M
    2. $7.5 M
    3. $10.0 M

- The ease of operation for the options are better for options 1 and 2 and more intense for option 3. This is reflected in the cost as well of operations with options 1 and 2 being lowest and higher for option 3.
- The amount of disruption and plant bypass are lowest to highest going from 1 to 3
- For all WWTP options, there are some basic upgrades required to replace other worn out elements
- The report deals with the sewer outfall as a separate section and suggests that an extension would be needed for option 1 at a cost of under $1.8 M.

Dillon Peer Review Report, 2019

The Dillon letter report reviews and provides comments on the entirety of the CBCL report. They recommend a variation of Option 1, referred to as “Option 4”, which is to upgrade the existing plant as follows:

- Upgrade headworks if deemed beneficial by the town
- Install emergency generator if deemed beneficial to the town
- Retaining and topping up the existing MBBR media (This has since been successfully completed)
- Replacing the aeration system piping (This has also been successfully completed)
- DAF operational assessment, including polymer salinity trials (Dalhousie study ongoing);
- DAF upgrades, or new DAF units
- UV upgrade if required following DAF upgrades;
- Proceed with sewer outfall extension and suggests that the cost estimate should be $3 M.

The Dillon report details a step by step approach in pursuing Option 4;

1. Identify WWTP upgrades that are associated with worker safety (e.g. grating, handrails, air quality). Consider a H2S sensor/alarm in the headworks building (completed);
2. Proceed with next engineering steps and initiate regulatory discussion for outfall extension;
3. Perform microscopic examination of MBBR reactors to determine if filamentous bacteria are present;
4. Replace MBBR aeration system. Consideration should be given to material selection, life expectancy, and life cycle cost. Estimate media volume when tanks are drained;
5. Top up MBBR media;
6. Engage Suez (DAF manufacturer) to explore options;
7. Perform regular polymer trials as part of DAF optimization. Testing should include an evaluation of salinity effects and limitations for different chemical products;
8. Based on DAF study, proceed with DAF modifications, or consider new DAF units;

9. Evaluate adding capacity of UV disinfection following DAF optimization, when a new baseline for plant UVT is established;
10. Assess optional instrumentation upgrades using a cost-benefit approach. Consider the likelihood of whether the operations' team will use the additional data for operational optimization, operational cost savings, or risk reduction;
11. Rigorous testing and enforcement of sewer bylaw, coupled with a public awareness program;
12. Continue to collect influent, effluent and flow data to better support future operations and design effort; and
13. Implement or increase annual capital maintenance budgeting to account for more routine "wear and tear" upkeep.

These recommendations were subsequently reviewed and supported by CBCL as further described below. This formed the basis of the Request for Proposals for engineering pre-design services for issuance as reported at the July 9, 2020 Council meeting. Staff were recently asked to place the issuance of the RFP on hold until this report could be prepared and reviewed by the new Council for further direction.

CBCL Collection Inflow & Infiltration Report, 2019

The report indicates that there is about 60% more flow going into the collection system as guidelines would be used for designing a system and that is significant. The two aspects are:

1. Infiltration. The chief culprit of this is salt water and that is subject to an ongoing study. The early results of the study indicate that there are clearly a number of areas to address to reduce this.
2. Intrusion. An extensive part of the collection system is a Combined Sewer System. What this does mean is that rainfall and snow melt can enter the system via the catch basins and then gets pumped to the WWTP to be treated. The solution is to separate storm and sewer whereby on the sewer inflows get to the WWTP for treatment. This is a significant effort to achieve this. The steps that are being undertaken are:
    a. Four separation projects have been identified as a part of other studies and will be incorporated in the public works plan for future work. The first of these is planned for next year, pending funding.
    b. A Master Plan of the entire system needs to be developed to provide the data needed to model the storm flows and then determine what measures are needed to reduce these inflows. This is in the Public Works plan for future work.
    c. An initiative to separate roof storm water from direct drains to the collection system would be beneficial. This is in early stages of discussion within Public Works staff on how to develop a program to promote and enforce this within the town.

Lift Station Review

The lift stations were all inspected and repairs identified which have been made. At the same time an ongoing maintenance plan was developed and has been put in place. The plan consists of:

- Semi-annual and Annual checks to be done by a technical rep from the supplier.
- Weekly and monthly checks will be done in-house by PW forces.

2. WORK PLAN

Subsequent to the engineering reviews and recommendations an investigative program and other initiatives were put in place. The recommended options by CBCL (Option #1) and Dillon (Option #4) describe very similar scopes with the main difference being the approach to the project and whether it would be undertaken as a single large project or a project with incremental steps.

Of note is that the aeration project upgrade was completed after the reports were issued and the results demonstrate a marked improvement in the MBBR performance. This does mean that the specific recommendations for the biological reactor have evolved and when the full analysis is complete, there will likely be a hybrid solution – hybrid in the sense that engineered solution may have elements of CBCL's Option #1 and Option #2.

The recommendation for further data collection and assessment was essentially identical for the two engineering reports.

As a result, the program of investigation that is being undertaken was designed to follow the recommended steps to produce the information required for the next steps to upgrade the plant and outfall as recommended in the reports.

MBBR upgrade
This project was completed in 2020. Results are very positive.

Ongoing investigations

1. DAF Review. Suitability assessment and operations improvements. Ongoing discussions with the manufacturer.
2. Flood Study. Assessment of anticipated flood levels and measures needed for new plant. Work is complete and solutions will be incorporated in preliminary design phase. Temporary solution in place.
3. Salt Water Intrusion Study. Determine causes and propose concept solutions and estimates. Ongoing. Initial results indicate that there are some good achievable targets
4. Continuous flow trial of DAF's. Adjustments to process controls to try to improve effectiveness. Work is complete. Does not work with existing control equipment. Control upgrades required.
5. UVT testing. Test UVT regularly. Ongoing and results will be used in preliminary design.
6. Process testing. This work is ongoing with Dalhousie University and CBCL. Will be a part of inputs to the preliminary engineering phase. Scope includes depth assessment of:
    - Phase 1; MBBR assessment and salinity effects on DAF and Aeration
    - Phase 2; Optimization of DAF and UV effectiveness.

Other Initiatives

1. Sewer Discharge Bylaw awareness and enforcement. This is in ongoing effort, with the initial awareness program was started pre-COVID with notices to businesses in town and a request to submit reports. Next steps are to follow up on the initial notices and to determine possible enforcement methods.
2. Storm Water separation. This is an ongoing internal discussion on how to promote and to enforce having residential buildings separate roof rain water leaders from the collection system, e.g., divert the rain water leaders out of the building sewer lines.
3. Master Plan for the collection system. This is a future initiative with multiple steps and the intent is to have essentially a model of the entire wastewater system, based on GIS data and watershed data. The initial step of collecting GIS data is a project that has now been approved and will be completed in 2021.

3. KEY PRESENTATIONS TO COUNCIL

Dec 17, 2019
Dillon presentation of the Dillon Peer Review Report of the CBCL Final Report. The Dillon recommended was described as Option #4, as per notes above.

Mar 10, 2020
CBCL response to the Dillon report. There was general concurrence by CBCL with the conclusions in the Dillon report. CBCL re-iterated their recommendation that Option #1 is the preferred option from their point, which is very similar to the Dillon Option #4

July 09, 2020
Staff presentation to Council on the status of the WWTP project. The presentation consisted of a review of the PW execution plan which consisted of a step by step approach as noted above in the Work Plan. The Town Engineer highlighted that the next steps he was undertaking were a focus on the outstanding unknown issues; salinity reduction, DAF and UV optimization, accommodation of potential future increase in loads and issuance of an RFP with a Terms of Reference for the preliminary engineering design for the upgrades required. The scope of the Preliminary Engineering scope would be laid out to ensure that the work would be done within the budget and within the timeframes set by the funders.

4. NEXT STEPS

To quickly review the current status;

- The MMBR upgrades are complete and the results are outstanding.
- The salt water intrusion study is near completion
- The other investigative work on the DAF units and UV system are well underway
- All results will be available as inputs to the Preliminary Engineering phase within the time frame required to complete the Preliminary Engineering within the timeframe set by the funders.

- An RFP has been prepared for the Preliminary Engineering work based on following the recommended option. It has not been released yet pending Council's review of this report as requested.

The scope of work for this RFP includes:

- WWTP Capital Work
    - Headworks.
    - Aeration Blowers, and separate air header into two zones.
    - Compressor pipework.
    - Instrumentation and service water supply in Bioreactor building.
    - DAF polymer make down equipment
    - DAF level control and other modifications
    - Additional UV disinfection bank and retrofit of UV wiper system.
    - Standby Generator for critical equipment
    - HVAC systems
    - Flood control gates at the Highway 332 culvert
    - Identification of possible future expansion
- Condition assessment of the WWTP and updates required to determine:
    - Component condition and assessment of remaining life
    - Equipment obsolescence,
    - Current design problems and deficiencies
    - Compliance with Codes
    - Compliance with local Bylaws,
    - Confirmation of regulatory testing,
    - Functionality/Serviceability Assessment
    - Accessibility Standards.
    - Work required to maintain the facility in operating condition during the next 25 years for all of the facility elements:
        - Structural
        - Architectural
        - Electrical
        - Mechanical
- Outfall Extension
    - Identify and investigate a minimum of two options for outfall extension, each to a minimum of 1m submergence below LLWLT, and 100 m from shoreline at LLWLT:
        - Extending outfall from its current outfall location.
        - Building new outfall around the Front Harbour by land to a more suitable location.
    - Prepare conceptual dispersion model of the inner Lunenburg Front Harbour to do scenario analysis of the options and the impacts on the Harbour.
    - Open preliminary discussions with all relevant regulators

Time sensitivity

- The funding that has been approved for this work is time sensitive with a completion date of March 31, 2021 (see: Section 5 for additional financial background information). An extension has been requested to June 30, 2021 but approval has not yet been given for which there is no assurance. With just

over four months to issue the RFP, award and possibly complete the engineering work it is essential that the RFP be issued as soon as possible. If not, funding could be at risk should an extension not be granted.

5. FINANCIAL IMPACT

In September 2019 the Town received notification that our Provincial Capital Asset Program (PCAP) application to engage an engineering firm to develop the predesign for the Waste Water Treatment Plant (WWTP) upgrades was successful. The application approval included predesign work for outfall upgrades as well, if required, based on the various WWTP upgrade options being considered by Council. These funds were to be expended by March 31, 2020. In March 2020, the Town requested and was approved for an extension to March 31, 2021. We are seeking an additional extension to June 30, 2021 given this ongoing options review, however, the approval of same has not yet been received from the province.

The total budget for the predesign work is $270,000, funded 50% from PCAP and 50% from the Town's Gas Tax Fund allocation. A portion of these funds were allocated for the background studies described above, preparation of the RFP document and contingency funds. There is an upset limit for the RFP award of $200,000 plus HST.

6. STRATEGIC PLAN RELEVANCE

The Wastewater Treatment Plant predesign engineering work outlined in this report addresses a central component of the Town's Comprehensive Community Plan Strategic Direction Goals – 3. Servicing and Facilities.

7. RECOMMENDATON TO COUNCIL

It is recommended that Council approve the following draft motion:

Motion: moved and seconded that Public Works issue an RFP for the Preliminary Design of the WWTP and sewer outfall upgrades based on the scope and timelines as outlined in this report and to be tendered and awarded by Council in 2020 if possible.

Acknowledged only by:

Bea Renton
Town Manager/Clerk

Attachments - CBCL Power Point
- Dillon Consultant Report
- CBCL response to Dillon Report

Schedule "A"

Lunenburg WWTP Upgrade Options

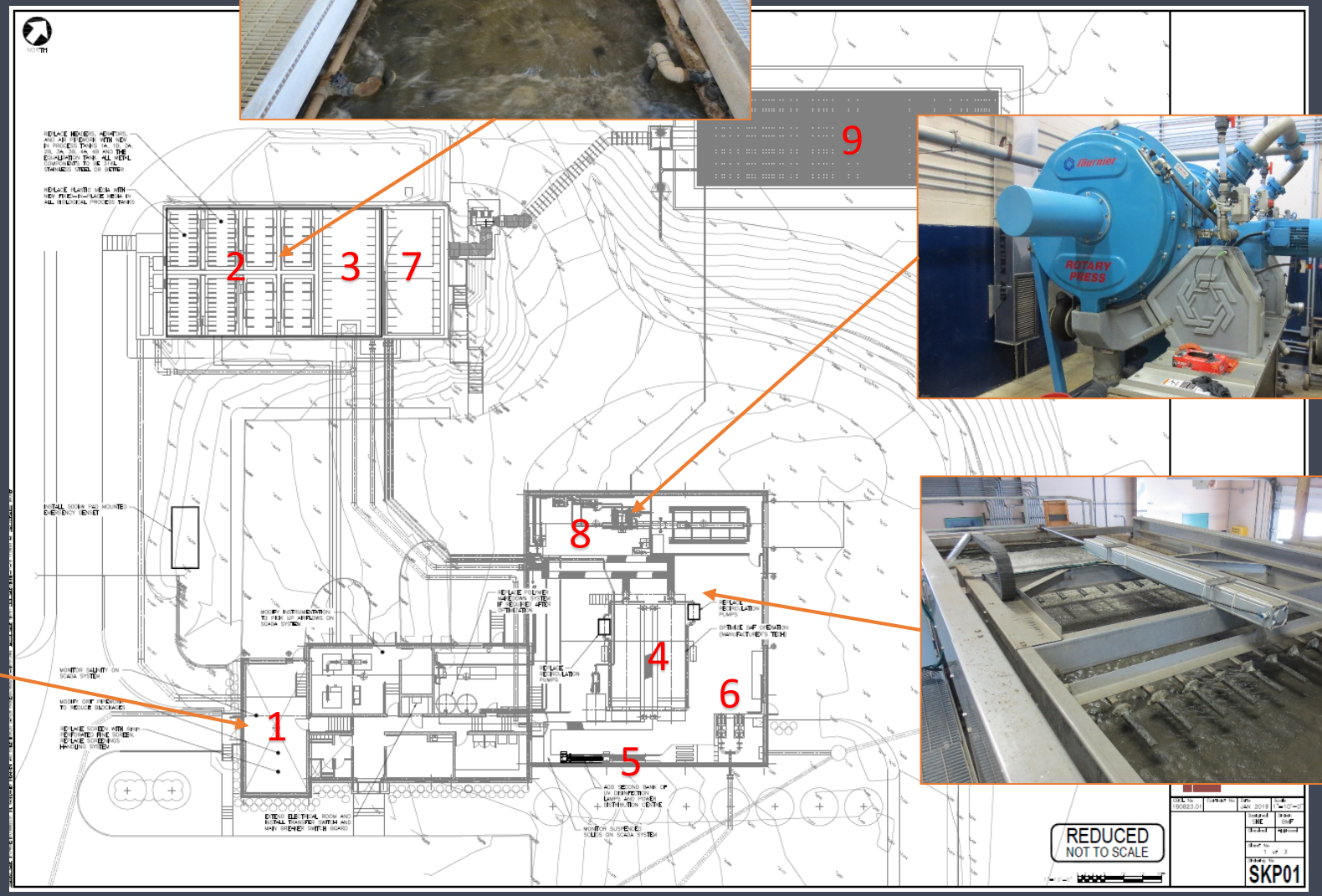
Presentation
May 23, 2019

Outline

- Options for WWTP Upgrade
- Revised Cost Estimates
- Next Steps
- Discussion

Overview of WWTP

1. Headworks
2. Bioreactor Tanks
3. Equalization Tanks
4. Dissolved Air Flotation
5. Ultraviolet Disinfection
6. Effluent Pump Station
7. Sludge Holding Tanks
8. Sludge Dewatering
9. Biofilter



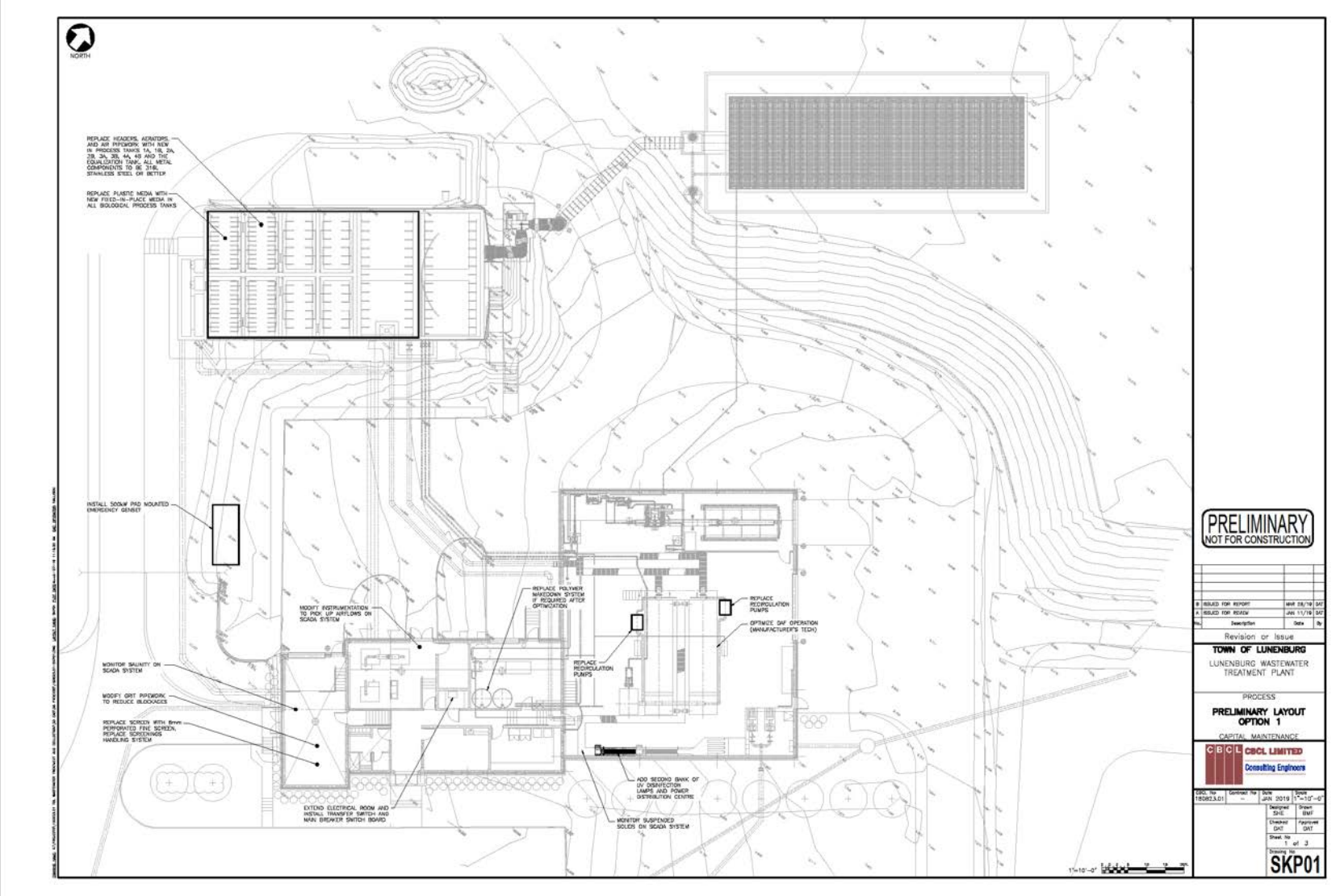
Summary of Existing Issues

- Debris gets past screen
- Bioreactor media is very worn
- Aeration system is in poor condition
- DAFs have polymer and solids carryover, as well as foaming
- UV system doesn’t have enough bulbs to disinfect at low UVT%
- No backup generator
- Outfall is too close to shore and in an inadequately mixed location

Options Identification

- Option 1 – Capital Maintenance of Existing Process
- Option 2 – Upgrade Existing Process
- Option 3 – Replace with MBR Process
- Supplementary Option A – Extend Existing Outfall

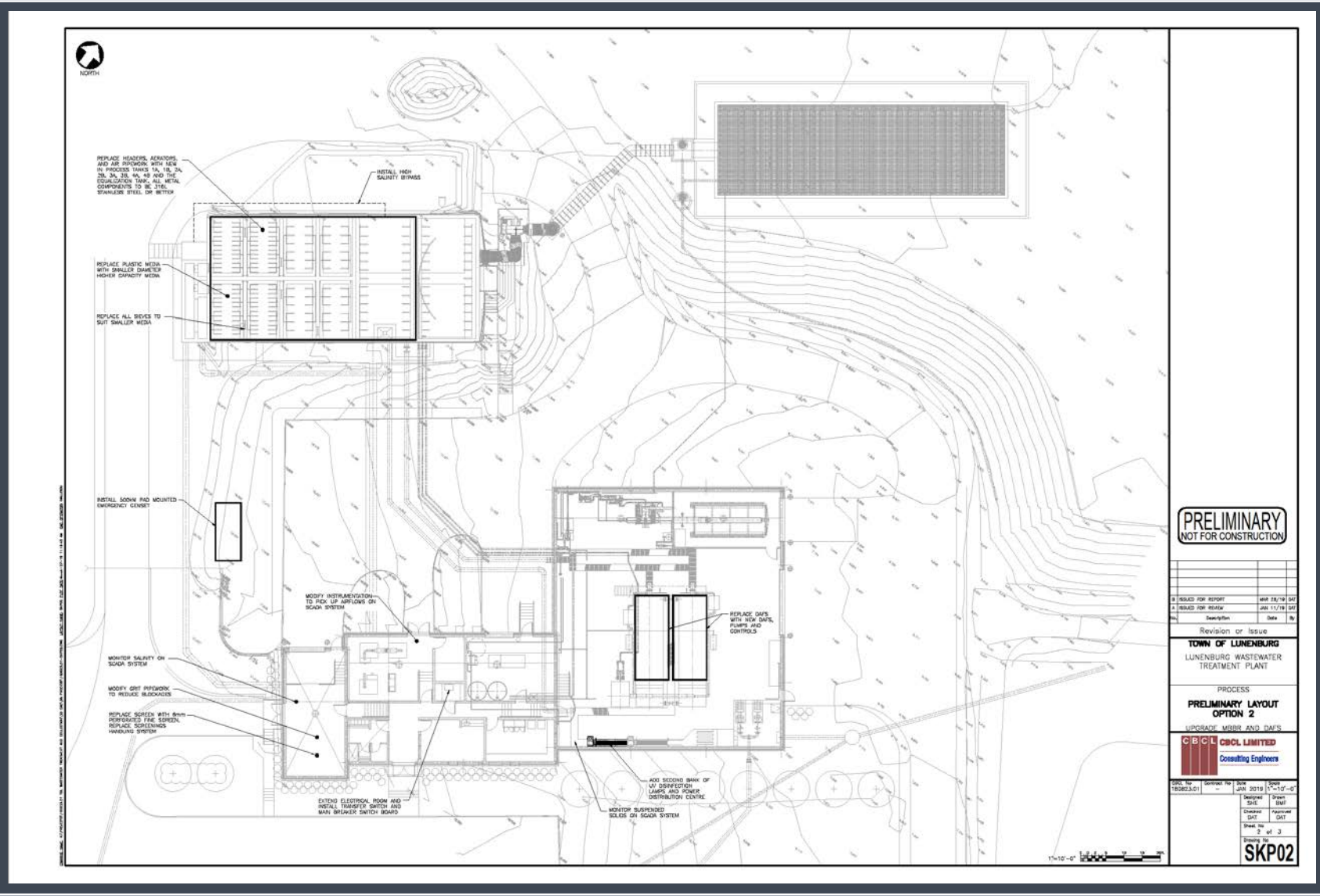
Option 1 – Capital Maintenance of Existing



Summary

- Replace screen/compactor
- Replace in-tank aeration system
- Replace media with fixed media
- Upgrade process instrumentation
- Replace DAF recirculation pumps
- Replace polymer dosing system (optional)
- Add bank of UV lights
- Add emergency generator

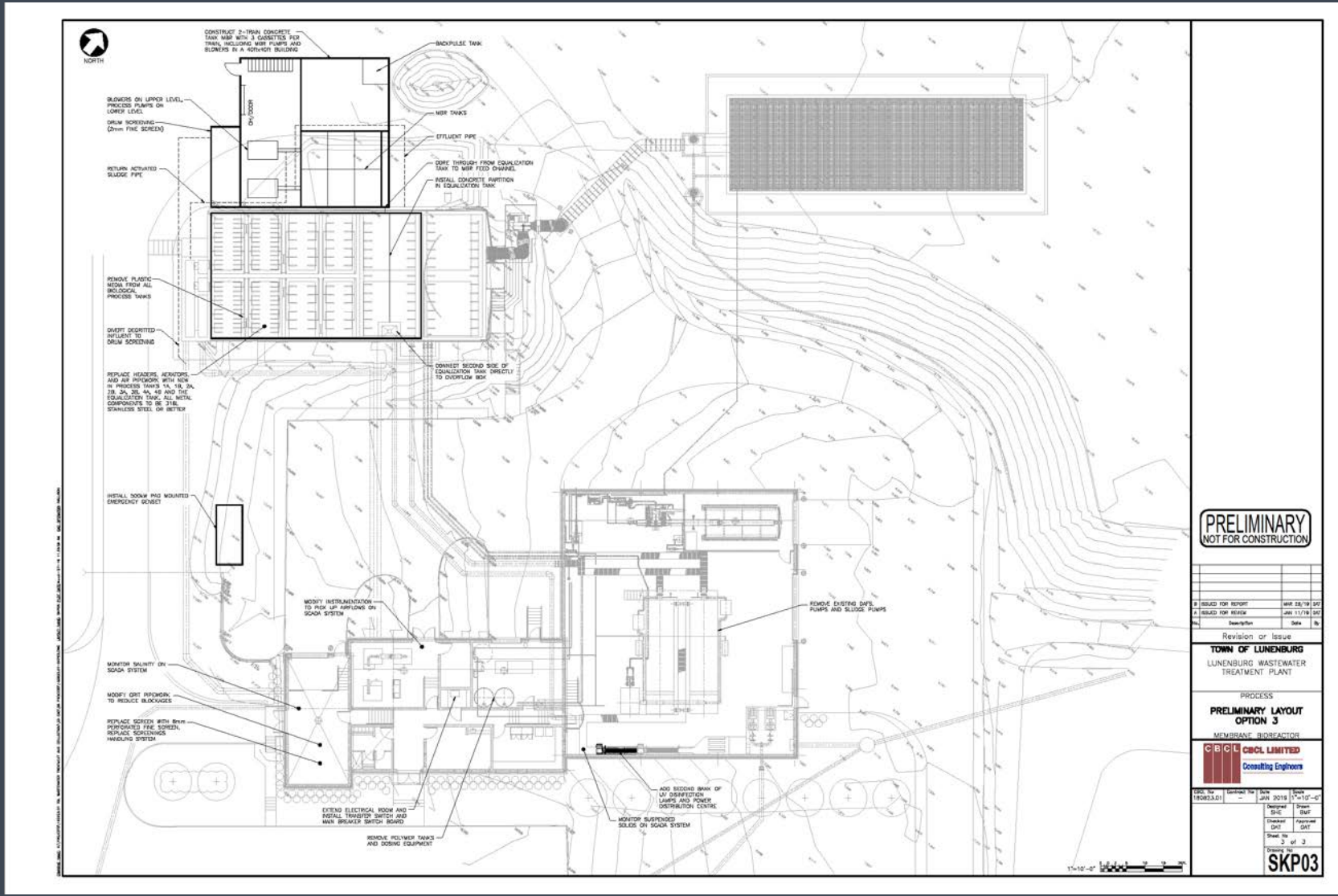
Option 2 – Upgrade Existing Process



Summary

- Replace screen/compactor
- Replace in-tank aeration system
- Replace MBBR media
  Upgrade process instrumentation
- Replace DAFs and polymer dosing system
- Add bank of UV lights
- Add emergency generator

Option 3 – Replace with MBR Process



Summary

- Replace screen/compactor
- Add 2mm drum screen
- Replace in-tank aeration system
- Remove media
- Upgrade process instrumentation
- Remove DAFs and polymer dosing system
- Add new building with membrane tanks and MBR process equipment
- Add bank of UV lights
- Add emergency generator

Opinion of Probable Costs

Category	Option 1 Capital Maintenance	Option 2 MBBR Upgrade	Option 3 MBR	Option A Outfall Extension
Site Works	$69,000	$177,000	$377,000	$1,125,000
Concrete	$0	$0	$526,000	$0
Buildings	$30,000	$40,000	$576,000	$0
Process Equipment	$811,000	$2,285,000	$2,025,000	$0
Mechanical	$890,000	$1,630,000	$2,056,000	$0
Electrical	$599,000	$854,000	$1,134,000	$0
Contractor Overhead	$192,000	$250,000	$335,000	$169,000
Subtotal	**$2,591,000**	**$5,236,000**	**$7,029,000**	**$1,294,000**
Design Development Contingency	$518,000	$1,047,000	$1,406,000	$259,000
Construction Contingency	$259,000	$524,000	$703,000	$129,000
Engineering	$259,000	$524,000	$703,000	$129,000
Total Capital Costs	**$3,627,000**	**$7,331,000**	**$9,841,000**	**$1,811,000**

Lifecycle Costs

Category	Option 1 Capital Maintenance	Option 2 MBBR Upgrade	Option 3 MBR	Option 1A Capital Maintenance & Outfall	Option 2A MBBR & Outfall
Annual Operations Cost	$454,000	$443,000	$582,000	$456,000	$445,000
Operations Cost Present Value*	$4,846,000	$4,729,000	$6,213,000	$4,868,000	$4,750,000
Capital Cost**	$3,627,000	$7,331,000	$9,841,000	$5,438,000	$9,142,000
Net Present Value	**$8,473,000**	**$12,060,000**	**$16,054,000**	**$10,306,000**	**$13,892,000**

* Present Value is the value of the Annual Operations Costs calculated over 25 years and discounted at 8% per year

** Includes allowances/contingencies for Design Development (20%), Construction (10%), and Engineering (10%)

Options Weighting

Each Option was scored and the scores were weighted according to priorities from Town staff, where a higher weighting means it is more important, and a higher score is better. Option 1 does not have a score on its own because it is unlikely to be a feasible option without an outfall extension.

Factor	Weight	Option 2	Option 3	Option 1A	Option 2A
Operations Cost	20%	1.00	0.40	0.80	1.00
Capital Cost	20%	0.60	0.20	0.80	0.20
Process Performance	25%	0.75	1.25	0.25	0.75
Ease of Operations	20%	1.00	0.80	0.40	1.00
Ease of Implementation	15%	0.15	0.45	0.60	0.15
Total	100%	**3.50**	**3.10**	**2.85**	**3.10**

Next Steps

- Preliminary Design
- Detailed Design
- Project Implementation

Wastewater Treatment & Collection System Study

Presentation
May 23, 2019

Thank you for your time

Questions?

Kelly Jardine

Subject: Town of Lunenburg WW Treatment & Collection System Study - Final WW Report

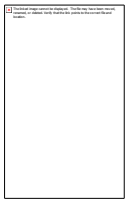
Morning Lee,

Follow-up to our earlier conversations, please see attached FINAL Report on the Wastewater Treatment System.

With respect to the Collection System Study, we are now in receipt of information provided by ABL (dwgs) and Sansom (PS reports). Municipal is in the process of reviewing.

Should you have any questions, or want to talk further on the matter, please do not hesitate to contact me.

Regards,



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W: www.cbcl.ca

"Solving Today's Problems with Tomorrow in Mind"

Town of Lunenburg
Wastewater Treatment Plant
Evaluation and Options Identification
Final Report

180823.01 ● Final Report ● March 2019

Prepared for:

Prepared by:

CBCL LIMITED
Consulting Engineers

Issued as Final	D. Trudel	27-Mar-2019	D. Trudel
Issued as Interim Draft Report	D. Trudel	11-Jan-2019	D. Trudel
Issue or Revision	***Reviewed By:***	***Date***	***Issued By:***

CBCL LIMITED
Consulting Engineers

REGISTERED PROFESSIONAL ENGINEER
DATE 27/03/19
D. Trudel
9146
PROVINCE OF NOVA SCOTIA

Final Report: 180823.01

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www.cbcl.ca

Solving today's problems with tomorrow in mind

March 27, 2019

Mr. Lee Fougere, P.Eng.
Town Engineer
Town of Lunenburg
119 Cumberland Street
Lunenburg, NS B0J 2C0

Dear Mr. Fougere:

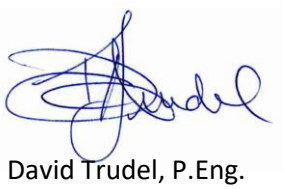
RE: Wastewater Treatment Plant Evaluation and Options Identification Report

Please see attached Wastewater Treatment Plant Evaluation and Options Identification Report, revised following comments from the Town.

Please do not hesitate to contact the undersigned with any questions.

Yours very truly,

CBCL Limited



David Trudel, P.Eng.
Process Engineer
Direct: 902-421-7241 Ext. 2270
E-Mail: dtrudel@cbcl.ca

Project No: 180823.01

CANADA'S BEST MANAGED COMPANIES

Contents

Appendices

CHAPTER 1 INTRODUCTION

1.1 Background

The Town of Lunenburg Wastewater Treatment Plant (WWTP) was constructed in 2003. The plant services a population of approximately 2,600 within the Town of Lunenburg (the Town) and adjacent serviced areas. Major elements of the system include the WWTP, gravity sewers (many of the combined type), sewage pumping stations, and associated force mains. While the plant is relatively new, much of the collection system infrastructure dates back to the early 1900s.

The Lunenburg WWTP was originally developed as a secondary treatment facility having a nominal hydraulic capacity of 0.5 USmgd. Unit processes within the plant include screening; grit removal; biological treatment using Moving Bed Bioreactors (MBBR); Dissolved Air Flotation (DAF) secondary clarification; Ultraviolet (UV) disinfection; and effluent pumping.

In order to address known and suspected problems in the Town's wastewater system, CBCL Limited (CBCL) was retained to investigate and assess the existing collection system and WWTP and develop upgrade options for each. The following report addresses the Town's Wastewater Treatment Plant.

CHAPTER 2 WASTEWATER TREATMENT PLANT

2.1 Overview and History

The existing Lunenburg Wastewater Treatment Plant (LWWTP) was built in 2003, as an innovative Moving Bed Bioreactor (MBBR) and Dissolved Air Flotation (DAF) plant. At that time, the collection system was rerouted from direct discharge to the harbour to being pumped to the plant via a series of pumping stations.

Since construction, the original sludge digestion system was replaced with a sludge dewatering press due to severe odour problems, but the other unit processes have stayed largely the same. A biofilter was installed in 2018 to address ongoing odour problems. In recent years, the plant has struggled seasonally with meeting some effluent criteria, in particular the bacterial criteria. This has come under public scrutiny due to increased bacterial testing in the harbour. The plant generally meets the solids and BOD (Biochemical Oxygen Demand) criteria, but there are occasional discharges of treated solids and polymer that look unsightly and lead to public dissatisfaction with plant performance. A description of the unit processes in the plant, the flow path taken through the plant, and the current asset condition is provided below. A process schematic of the existing secondary treatment process is shown in the figure below:

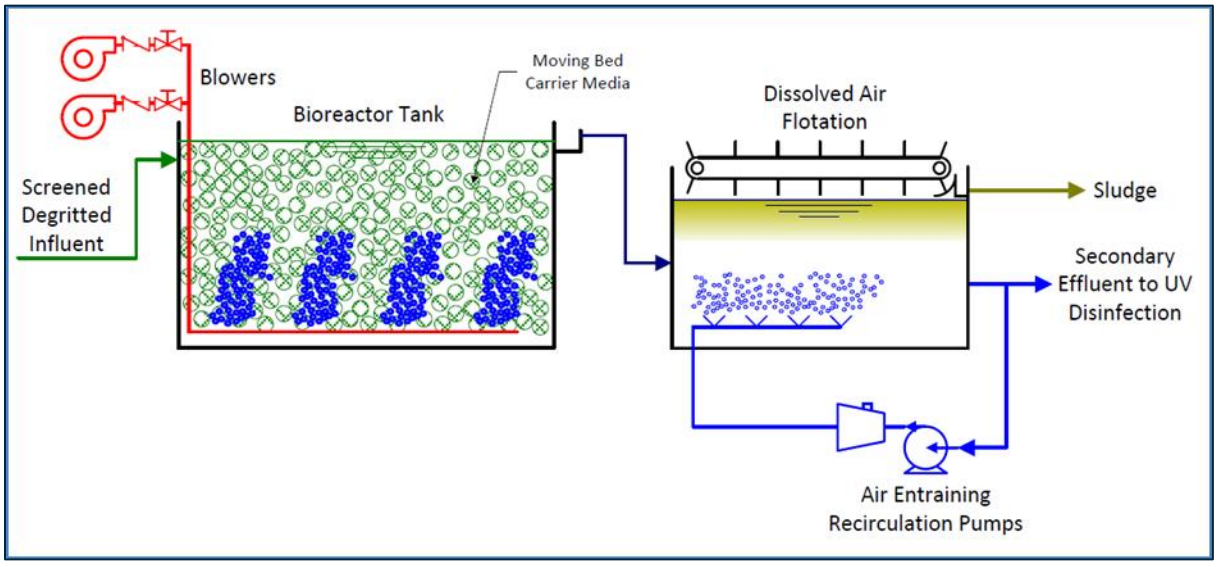


Figure 2.1: Schematic of Existing Secondary Treatment Process

2.2 Description of Plant

The existing plant is comprised of the following unit processes:

- Bar Screen.
- Aerated Grit Chamber.
- Dual-Train Moving Bed Bioreactor (MBBR) with Large Plastic Media.
- Equalization Tank.
- Dual-Train Dissolved Air Flotation (DAF) System.
- Ultraviolet (UV) Disinfection.
- Effluent Pump Station.
- Aerated Sludge Holding Tank.
- Fournier Rotary Press.

All flow to the plant is pumped from one of a number of pumping stations in the Town. Flow entering the plant passes through the headworks screen, then the aerated grit chambers in series, then flows by gravity to the bioreactor building. Here it flows through one of two treatment trains in parallel where soluble BOD is removed, and then enters a common equalization tank. It is batched in the equalization tank until the level rises to the point that the valve to one of the DAF units opens. Flow to the DAFs is by gravity. Polymer is dosed proportional to the flow rate into the flow stream upstream of the DAF units, and mixes in the remaining pipework before the DAF. The DAF provides additional mixing and the recirculation pumps produce tiny air bubbles which float the solids to the top where they are scraped to one end and over a weir to the sludge box. The underflow passes forward to an open channel leading to the UV disinfection system. The treated wastewater passes through one bank of UV lamps in series, then flows over a weir into the effluent pump station. The effluent pump station has two self-priming pumps which pump the effluent to the Front Harbour for discharge through a short outfall on the waterfront.

Sludge is pumped from the sludge boxes to the sludge holding tank. There it is aerated with coarse bubble aerators until it is dewatered using a rotary sludge press. The sludge press is used nearly every weekday to dewater sludge that is conditioned with polymer. The dewatered sludge is conveyed to a sludge cake storage bin in a separate room. Sludge is hauled offsite for disposal about once a week.

2.3 Assessment of the Existing Plant

A site visit to the plant was carried out by CBCL staff on August 15, 2018 to determine the condition and performance of the existing LWWTP assets. The plant operators John Lohnes and Taylor Rombaut gave a tour of all areas of the plant and discussed the overall performance. Several follow up visits were held to gather more data about particular items. During the initial site visit, samples were taken at a number of points in the treatment train and sent for analysis at a certified laboratory. Subsequent samples were taken by plant operators in order to calculate the current plant loads.

2.4 Existing Condition of Assets

The condition of the existing assets is described in the following subsections:

2.4.1 Headworks

Flow enters the plant in the headworks, flows in an open channel to the screen, and then to the grit chambers which are located under the floor. The headworks contains one fine screen (bar screen with 3mm spacing), one screenings dewatering unit, two aerated grit chambers, two grit pumps and one grit classifier. The condition of the existing screen and screenings dewatering unit (both original to the plant) appear to be acceptable although some wear is visible. The operators noted that debris larger than 3 mm in size regularly bypasses the screen and that equipment downstream gets blocked.

The original grit pumps were recently replaced. These have allowed grit removal to be brought back online after a significant period of time with no grit removal, but there are still some problems with blockages in the grit removal pipes due to the current piping layout. This problem could be exacerbated by poor performance by the screen. No notable issues were identified with the performance of the grit chambers themselves, nor with the grit classifier.

The headworks area has recurring problems with hydrogen sulfide concentrations in the air, which cause corrosion and environmental concerns. The ventilation system for the headworks was recently connected to the biofilter, and once this upgrade is complete, the conditions within the headworks should be significantly improved.

2.4.2 Bioreactor Tanks

The bioreactor is in a building with an FRP cover located behind the main plant. Similar to the headworks, the ventilation system has also recently been connected to the biofilter. This building contains widespread evidence of corrosion, due to problems with hydrogen sulfide build up and high salinity in the wastewater. The grating in this building shows signs of deterioration and is getting to the point that it may no longer be safe to walk on.

The bioreactor consists of two trains of four tanks each, all containing large plastic media that is mixed and aerated by the submerged aerators. The first two tanks in each train have fine bubble aerators, and the second two tanks have coarse bubble aerators. Each train of the bioreactors can be isolated for maintenance.

The current condition of the aeration piping, aerators, and media in the bioreactor tanks appears poor. A number of issues with the bioreactor equipment were identified, including worn-down media (approximately 50% of original size, and sometimes smaller), and uneven aeration patterns in the concrete basins, indicating that the aerators were not working properly. The aeration pipework had visible holes in it and the control valves could not be operated because the handles were no longer strong enough to turn the valves. There was widespread evidence of corrosion visible. The aerators, pipework, and media are all original to the process. The heavy wear visible on the media indicates that this media may not suitable for this application. The corroded nature of the metal throughout this building indicates that the typical materials of construction used were not sufficiently corrosion-

resistant for this application, dealing with high concentrations of salinity (discussed in more detail below), in combination with inadequate ventilation.

2.4.3 Equalization Tank

A common equalization tank follows the two bioreactor trains, which is aerated with coarse bubble aerators. The equalization tank has a high level overflow which bypasses the DAF and rejoins the flow prior to UV disinfection. Since the tank is common to both bioreactor treatment trains, the equalization tank can only be isolated by bypassing the bioreactor altogether.

The equalization tank aerators and pipework are in similarly poor condition to the bioreactor tanks. The backup level switches for high level alarm in the equalization tank are not functional.

2.4.4 Dissolved Air Flotation Units

The partially treated flow leaves the equalization tank and flows by gravity to the two parallel DAF units. Each DAF unit has a design capacity of 1040 USgpm, for a combined total capacity of 2080 USgpm. The DAF units consist of two open-top tank clarifiers, and use dissolved air for separation of suspended solids.

As the equalization tank effluent flows to the DAF units, polymer is dosed proportionally to the inlet flow. The polymer and flow mix with the recycled air-water mixture prior to the inlet compartment.

The recycled stream is transferred through a proprietary recirculation pump, and flows through an air saturation system to generate microbubbles, ranging in size from 30 – 50 µm in diameter. The microbubbles adhere to the suspended solids and flocs. Fast-rising particles rise to the top of clarifier and attach to the sludge blanket, to eventually be skimmed off. Heavy particles settle in the hopper at the bottom of the clarifier and are removed by an intermittent drain that conveys the settled solids to the sludge holding tank. Slow-rising particles are separated out by the proprietary corrugated plates located in the clarifier. The clarified water is discharged via effluent channels and flows through open channels to the downstream UV disinfection unit. A portion of the clarified water is recirculated through the recirculation pumps to produce the air-water mix.

The DAF clarifier tanks are in reasonably good shape; however, the proprietary recirculation pumps require frequent rebuilding and pressure setting adjustments by operators. The pumps are currently producing turbulent air-water mixtures and potentially discharging poor quality microbubbles. The corrugated plates located inside the clarifier have been reported to be a maintenance issue as solids accumulate between the plates and reduce the clarifier's capacity, limiting treatment efficiency.

The polymer makedown system uses dry polymer and potable dilution water to mix the solution. The makedown system has limited automation and control; therefore, it is difficult to verify the activation of the solution. Currently, the DAF clarifiers are dosing large volumes of polymer, likely contributing to suspended solids and floc formation downstream of the DAF units and at the outfall. Research indicates that increased salinity (discussed below) can hinder the efficacy of polymer activation and floc formation, which could also contribute to the increased polymer dosage concentrations.

Currently, the treated DAF effluent discharges to an open channel flowing to the downstream UV disinfection unit. The turbulent mixing of the effluent as it drops from the discharge weir in the DAF to the open channel generates foam containing suspended solids that regularly overtops the channel and accumulates on the process room floor. This issue is a significant maintenance item, as the channels require vacuum-truck cleaning frequently. Elevated polymer dosages and the piping configuration of the DAF clarifier discharge are likely the cause of the open channel foaming.

2.4.5 Ultraviolet Disinfection

The effluent from the DAF units flows in an open channel to an ultraviolet (UV) disinfection system with a single bank containing a total of 32 bulbs. Following disinfection, the effluent flows over a weir to the effluent pump station.

This unit is in good condition, and is designed to disinfect the peak flow at 65% UVT to an average of 200 count fecal coliforms/100 mL of effluent. The operators report problems meeting the fecal coliform effluent requirements periodically. The requirements are that 80% of samples meet 1000 count/100 mL, with no sample exceeding 2000 count/100 mL. In 2017, a total of 11 samples exceeded 2000 count/100 mL, beginning in June 2017, and the overall percentage of samples passing was 74%. In 2018, a total of 9 samples exceeded 2000 count/100 mL, and the overall percentage of samples passing was 79%. Investigations showed that the UVT% of the effluent is often less than 40%, and at this value, the existing unit is not capable of emitting enough UV light to disinfect the effluent to the levels required.

There is no cleaning area for the bulbs, so they are cleaned near the UV equipment. This area has noticeable damage to the concrete floor due to the application of Lime-away here.

2.4.6 Effluent Pump Station

Effluent from the plant is pumped to the outfall in the Front Harbour by two self-priming pumps in the effluent pump station. These appear to be in good condition, and no significant issues are noted.

2.4.7 Outfall

The effluent is pumped up the hill towards the Outfall, which is located in the Front Harbour by the Inshore Fishermen's Wharf. This is a very public and visible location for the outfall. The treatment process uses substantial amounts of polymer which can cause foaming in the plant and at the outfall. The solids/polymer mixture may sometimes look like sludge and leads to complaints and misunderstanding from the public, some of whom believe that raw sewage is still being released from the outfall under normal operating conditions. Although the effluent quality is typically good (secondary effluent quality, in line with both federal and provincial standards), the outfall has low potential for mixing and dispersion, and direct public contact with the undiluted effluent is possible.

2.4.8 Sludge Holding Tank

The sludge holding tank is located in the bioreactor building adjacent the equalization tank. Sludge is pumped to the tank using a pair of progressive cavity pumps. There is a macerator on the suction line from the sludge collection tanks on the DAFs to the pumps. The macerator was installed in 2017 to prevent blockages in the sludge return line from hair and rags. The operators report that the macerator produces too much head loss and starves the pumps, so the macerator is routinely bypassed.

The aerators in the sludge holding tank were replaced last year after significant problems were encountered with corrosion within the rotary sludge press. The original coarse bubble aerators were unable to deliver enough air to maintain aerobic conditions in the sludge tank. There were problems in the summer with the pH of the sludge dropping from acid formation in the anaerobic sludge holding tank, as well as many odour complaints. The acidic sludge destroyed the screens in the rotary sludge press, which then required replacement. Following the aerator replacement, the pH in the sludge tank was controlled, and the sludge could be dewatered without damage to the sludge press. The sludge return line has not suffered blockages since the aerators were replaced.

2.4.9 Rotary Sludge Press

The sludge dewatering system consists of polymer makedown and injection into the sludge stream, followed by a flocculation tank and a rotary sludge press. The rotary sludge press receives sludge from the holding tank, conditioned with polymer, and presses out the excess water. This equipment was installed following the removal of the two original Auto-thermal Thermophilic Aerobic Digesters (ATADs). The ATADs resulted in unacceptable odours at the plant. The rotary sludge press works well, according to the operators, and they appear to be in very good condition. They are used nearly every weekday, but there is still capacity to dewater additional sludge if necessary. The capacity of the unit installed is upgradeable by 50% by installing one new channel.

2.4.10 Odour Control Equipment

The odour control system includes a ventilation fan that draws odorous air from the headworks, sludge cake room and bioreactor building to supply the biofilter bed, a high-pressure humidification pump, and a large biofilter bed covered with root mulch, which slowly breaks down as the bacteria feed on it. This equipment was installed in 2018 and is in very good condition, although there are still some outstanding construction deficiencies. It is anticipated to require major maintenance in about 5 to 7 years when the root mulch will need to be replaced.

2.4.11 Asset Condition Summary

The condition of existing assets in the plant is mixed. Some areas have assets in good condition, while others are in need of capital maintenance, which is the selective replacement of assets or pieces of assets at the end of their useful life. A number of items of existing equipment shows significant signs of wear, and replacement of this equipment is required to keep it performing at a satisfactory level into the future. Without a significant level of capital maintenance, the performance of the plant is likely to continue to drop until it can no longer meet the effluent requirements. When a plant is new, as it was in 2003, there is often a “honeymoon” period where very little maintenance beyond routine periodic maintenance is required. After 10–15 years, more substantial capital maintenance to mechanical and electrical assets is typically required to keep the plant running as originally intended.

2.5 Current Wastewater Treatment Performance

The wastewater treatment plant is required to meet the following effluent criteria, under Provincial Approval to Operate 2012-082710-A01 and the Federal Wastewater Systems Effluent Regulations (WSER):

Table 2.1: Effluent Requirements

Description	Provincial Limit	Federal Limit
Effluent BOD	20 mg/L	25 mg/L
Effluent TSS	20 mg/L	25 mg/L
Effluent Fecal Coliforms	1000 MPN/100 mL	N/A
Effluent pH	6.5–9	N/A
Effluent Un-ionized Ammonia	N/A	1.25 mg/L

Compliance with the provincial effluent criteria requires that 80% of annual samples are within the limit, and that no sample be more than twice the limit. The permit currently reads that the Fecal Coliform limit is 200 MPN/100 mL, but correspondence with NSE indicates that this was changed inadvertently when the permit was renewed in 2012, and that there was no intent by NSE to tighten this limit beyond 1000 MPN/100 mL, which would require replacing the UV system with a much larger one compared to the original design criteria. The Town has applied for an amendment to this Approval which would revert the text to 1000 MPN/100 mL, at 80% compliance. This limit is statistically similar, in terms of equipment required, to a limit where the average must be 200 MPN/100 mL.

In addition to the provincial requirements, the Federal limits apply. Compliance with the Federal regulations requires that the quarterly average for each of BOD and TSS is less than or equal to the numeric limits. The un-ionized ammonia limit may not be exceeded.

The Lunenburg WWTP complied with the Federal regulations in 2017. The Provincial limits were met for pH and TSS in 2017, but not for BOD due to one sample more than twice the numerical limit, and also not for Fecal Coliforms, due to not meeting the percentage limits (74% of samples in compliance) and also having multiple samples at more than twice the numerical limit (using 1000 MPN/100 mL, as agreed with NSE to be the appropriate limit notwithstanding the text of the Approval. Data examined for 2018 appears to follow a similar pattern, with a non-compliant BOD sample, multiple non-compliant Fecal Coliform samples, and a non-compliant TSS sample, all of which were more than twice the numerical limit.

CHAPTER 3 WASTEWATER TREATMENT OPTIONS

3.1 Design Criteria

Flow and load data were collected and analysed in order to determine the design criteria for the upgrade options, as well as to compare the current conditions to the original design capacity. The design flows and loads were developed based on the following information:

- Flow data for the past year from flow meters on the DAF feed pipes.
- Influent samples during August and September 2018.
- Salinity measurements taken at the plant by the operators.
- Effluent UVT% measurements taken by CBCL staff.

The flow data from the flow meters on the DAF feed pipes was used because this is the only location in the plant where there are flow meters for the main wastewater flow. The SCADA system also stores a calculated flow value from the level measurement in the Equalization tank. The formula by which it is calculated does not clearly relate to the physical conditions on site, but the values are very similar, so the flow meter data was selected. The flow data is shown in Figure 3.1 below.

The flow data, when reviewed in conjunction with rainfall data, shows clear evidence of infiltration. Nonetheless, the peak day flow is lower than the design peak day flow, and has been for all years between 2011 and 2018, for which we were able to review the data. The average day flow is higher than the design average day flow, but investigation of the tank capacities and blower air available indicates that the plant has adequate capacity to treat current average day flow to the required levels.

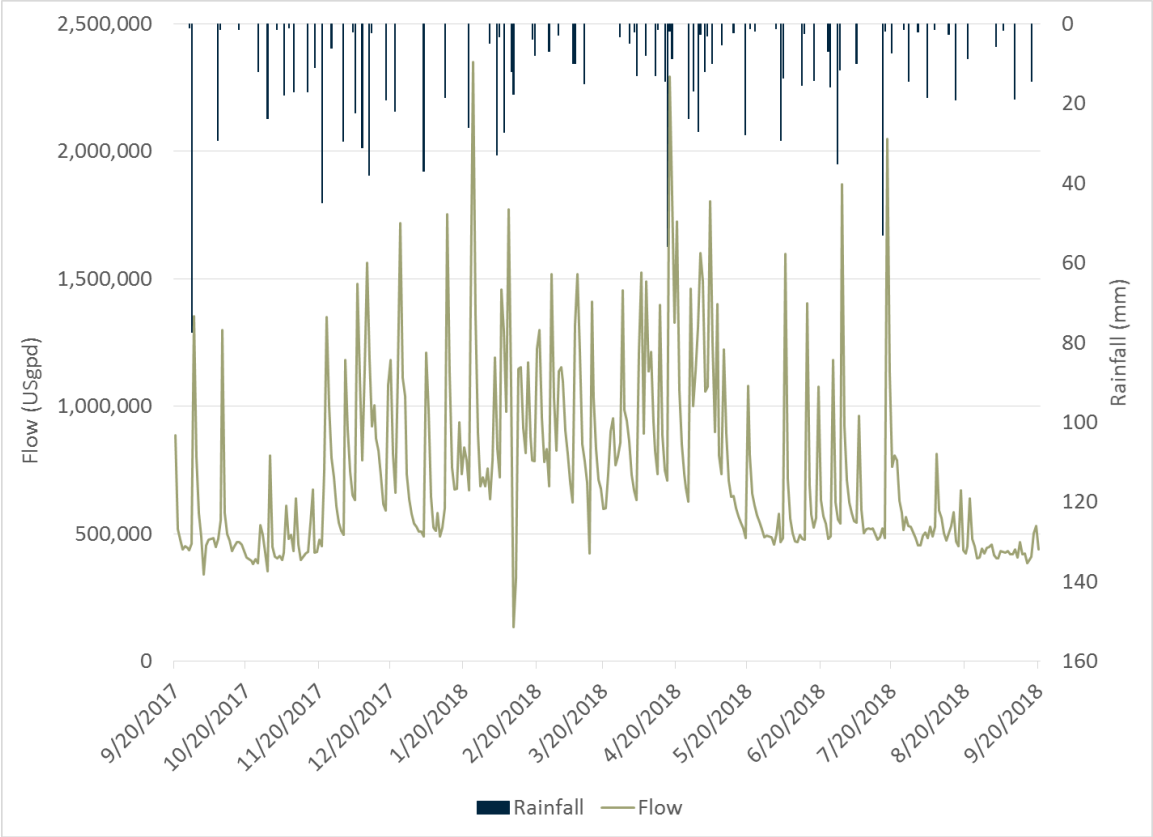


Figure 3.1: Lunenburg WWTP Flow Records and Rainfall Data

Influent samples from the plant were collected in August and September 2018, and tested for CBOD, TSS and Ammonia (NH_3). The sample data were used to calculate the current loading to the plant. The table below shows the current flows and loads from which the options were sized. The full design peak flow was selected even though recorded peaks are lower than this so as not to reduce the available hydraulic capacity. Average plant flows appear to be falling over time, not rising, so we have not included an allowance for growth. Furthermore, reduction of inflow would be a very beneficial way to lower flows if there is the possibility to do this.

Table 3.1: Design Flows and Loads

Parameter	Average	Peak
Flow	759,500 USgpd (2,900 m^3/day)	3,000,000 USgpd (11,400 m^3/d)
BOD Load	160 kg/d	320 kg/d
TSS Load	300 kg/d	600 kg/d
NH3 Load	38 kg/d	75 kg/d

Inflow is significant at the plant, and causes some operational and maintenance challenges. Some of the inflow is suspected to be seawater, and the plant has high concentrations of salinity in the influent and the effluent, compared to typical wastewater, which averages less than 1 part per thousand (ppt). The plant salinity averages 3 ppt, and spikes occasionally, at times correlated with high tides. Furthermore, the size of the spike is also correlated with the height of the tide: higher concentrations occur during higher-than-typical high tides. For reference, seawater has a salinity of 35 ppt. The salinity data from the plant is shown in the following figure:

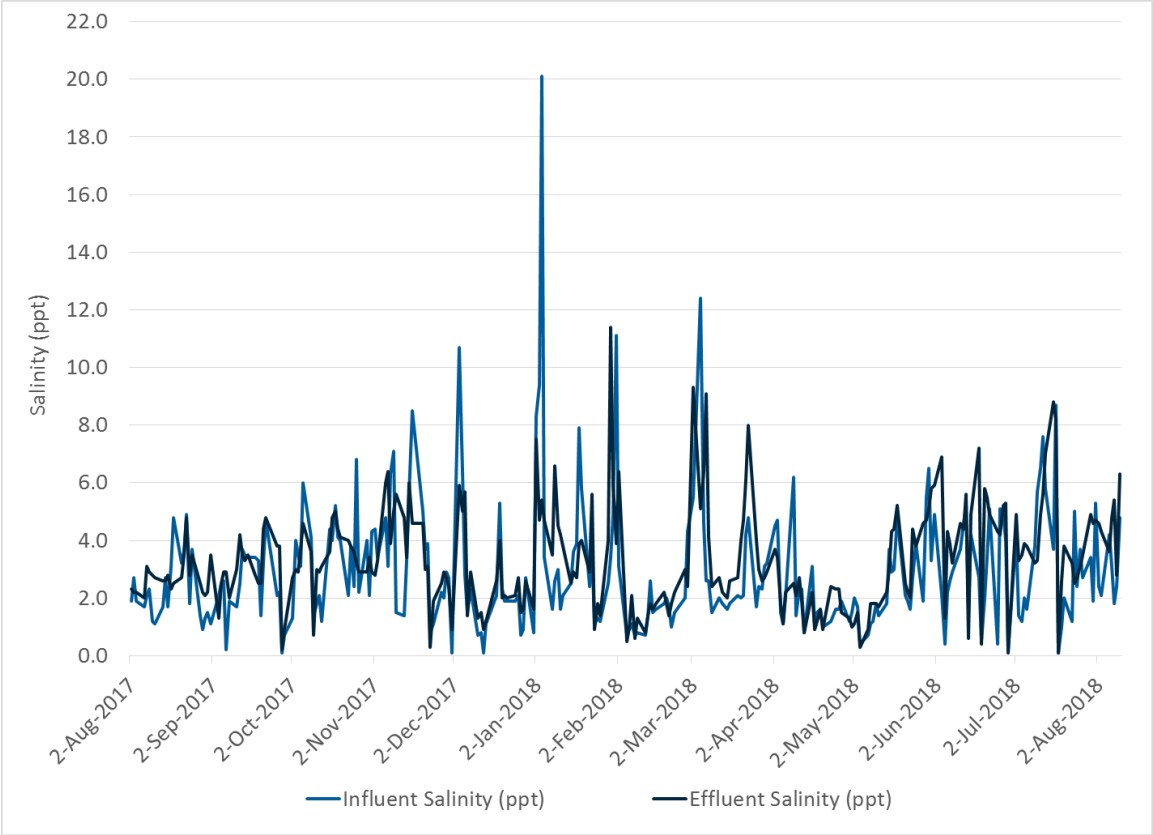


Figure 3.2: Lunenburg WWTP Influent/ Effluent Salinity

If the salinity of the wastewater can be lowered, the life of the components in the plant would be extended and the process would also benefit from improved performance and stability. Varying salinity has a negative effect on the microbes within the bioreactor. When salinity rises 50%, research shows that about 30% of the bacteria are typically inactivated or killed, and when it rises more than 100% (above 6–8 ppt, which happened at least 8 times between August 2017 and Aug 2018) the majority of the biomass would likely be negatively affected, and the treatment capacity would be significantly reduced for a period of time until it could regenerate. There are also effects on the DAF train when salinity is high, because the effectiveness of the polymer is likely reduced.

In addition to salinity measurements taken by the plant operators, UVT% was monitored by CBCL staff over a period of several months to provide design data for the UV disinfection system. The data indicated that seasonally, the UVT% is much lower than the design value of 65%. This means that the effluent does not transmit UV light well enough to achieve the design disinfection rates, and this is reflected in the poor performance of the disinfection system during the period when the UVT% measurements were low. In order to achieve the required permit disinfection rates, either the capacity of the system must be increased to allow the required dose to be maintained even when the transmissivity of the effluent is low, or the component of the effluent that is causing the low UVT% must be identified and prevented from entering the wastewater. This may be possible but the problem has not yet been pinpointed. It may result from coffee and/or brewery by-products entering the sewer. These can contribute to lower UVT%, and are likely to be present within the Town's wastewater. As the flow through the system increased, the UVT% increased significantly until it met the design UVT%, resulting in effluent samples than met or exceeded regulatory requirements.

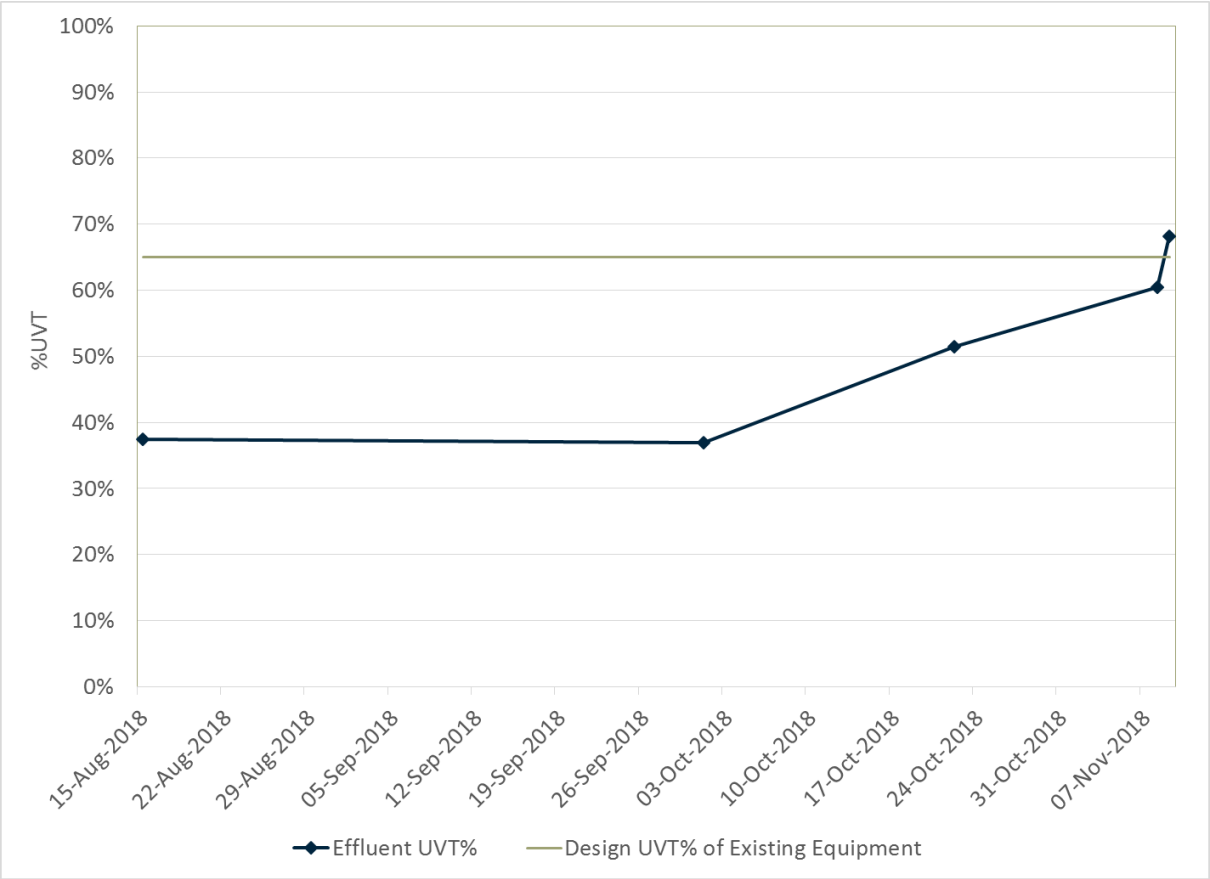


Figure 3.3: Lunenburg WWTP Effluent UVT%

3.2 Upgrade Options

There are several options for upgrading the plant to allow it to perform more reliably. These include capital maintenance (replacement of items that are at the end of their useful life), replacing the equipment with improved equipment, and replacing the equipment with a different type of process. These are each described in more detail below.

Due to the high salinity of the incoming wastewater, the material selected for each option is recommended to be highly corrosion resistant. A minimum of 316L stainless steel is recommended for all exposed metal in the headworks and bioreactor building, whether above or below the waterline. Alternatively, cathodic protection may be used for large, static structures such as tanks.

It is recommended that the selected option is assembled in a complete package instead of being done piecemeal, in order to ensure a concerted effort, be as efficient as possible, and confirm that all process benefits are achieved in the short term rather than upgrading slowly and continuing to experience operational challenges extending into the future.

3.2.1 Option 1: Capital Maintenance Of Existing Process

This option would replace or improve the most critical items in the plant which are causing performance and maintenance issues. The most cost-effective way to replace the media in the bioreactor tank is use

fixed-in-place (stationary) media and change the process from an MBBR into a Fixed Activated Sludge (FAS) process. The existing media type is still available but has not worn well so far and is not recommended for reuse. Stationary media is less subject to wear and would be installed in the existing tanks. The plant would continue to use the existing DAF solids removal downstream. This is anticipated to generally meet the existing effluent quality objectives with regard to BOD and TSS (less than 20 mg/L each for BOD and TSS, less than 1000/100 mL for fecal coliforms), with polymer use possibly reduced. A process schematic for this option is shown in the figure below:

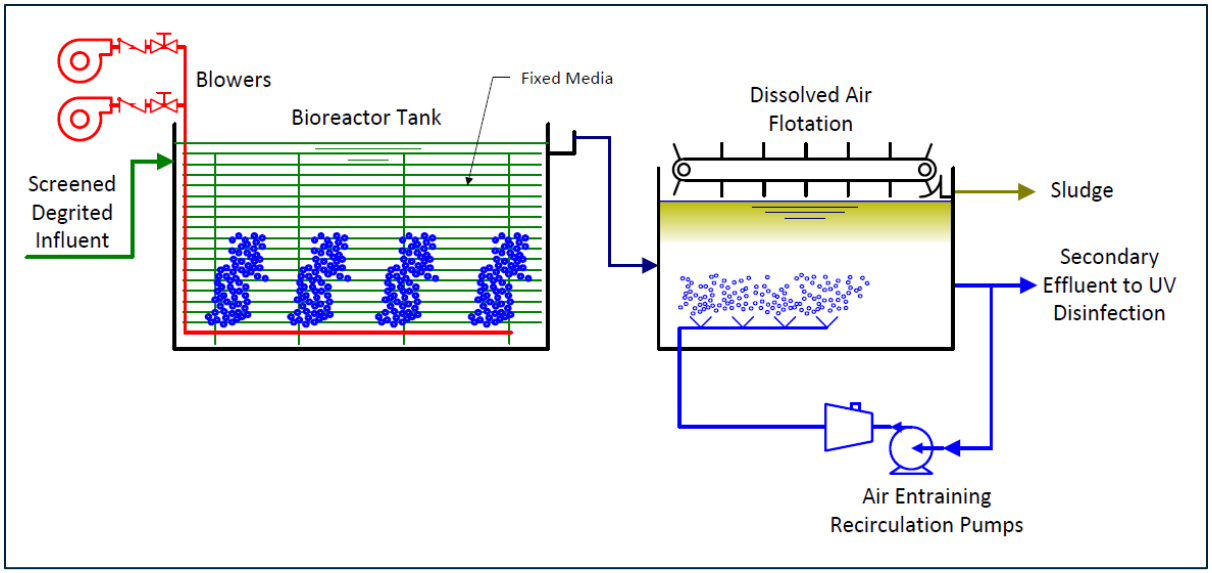


Figure 3.4: Process Schematic of Option 1 Capital Maintenance Secondary Treatment Process

The recommended scope of work is for this option is listed below:

- Replace screen and screenings handling with a new 316L stainless steel 6 mm perforated plate screen (with improved capture ratio compared to the existing bar screen) and washer-compactor, in order to improve the screenings removal and dryness, and to prevent large debris from passing the screen which jams the grit-removal pipework and clogs pumps.
- Replace the plastic media, air pipework and aerators in the bioreactor tanks with new, fixed-in-place media and stainless steel pipework and aerators, to provide additional surface area for biomass and improved aeration performance and control, within existing concrete tanks.
- Add or upgrade instrumentation to provide measurement of air flows, influent salinity, and effluent suspended solids, all connected to SCADA system, as well as a handheld UVT meter, in order to provide improved process monitoring.
- Replace both DAF recirculation pumps with new.
- Process optimization of DAF system by manufacturer Poseidon, to reduce polymer use and prevent solids and polymer carryover.
- Replace polymer makedown system with more efficient system that can automatically adjust polymer dose according to performance (this may not be required depending on the results of the optimization process).
- Add an additional bank of UV disinfection lamps to disinfect properly during low-UVT events as documented during the summer of 2018.

- Add an emergency generator, including enlarging the electrical room, to run critical process equipment and prevent untreated discharges of wastewater to Back Harbour.

3.2.2 Option 2: Upgrade Existing Process to Increase Capacity and Flexibility

This option would replace the main components of the existing process with new, in order to improve the performance and provide better operational controls. This is anticipated to reliably meet the existing provincial effluent requirements for BOD, TSS, and Fecal Coliforms (less than 20 mg/L each for BOD and TSS, less than 1000/100 mL for fecal coliforms), with polymer use significantly reduced. A process schematic for this option is shown in the figure below:

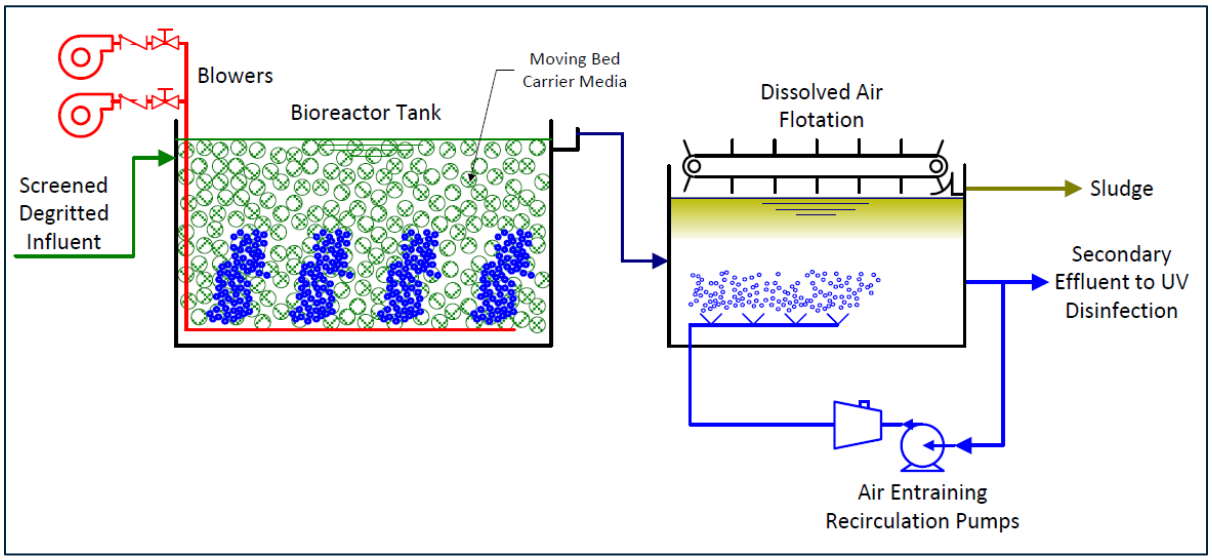


Figure 3.5: Schematic of Option 2 MBBR Secondary Treatment Process

The recommended scope of work is for this option is listed below:

- Replace screen and screenings handling with a new 316L stainless steel 6 mm perforated plate screen (with improved capture ratio compared to the existing bar screen) and washer-compactor, in order to improve the screenings removal and dryness, and prevent large debris from passing the screen which jams the grit-removal pipework and clogs pumps.
- Replace the plastic media, air pipework, aerators, and sieves in the bioreactor tanks with new moving bed media, stainless steel pipework, aerators and sieves, to provide additional surface area for biomass and improved aeration performance and control, within existing concrete tanks.
- Add or upgrade instrumentation to provide measurement of air flows, influent salinity, and effluent suspended solids, all connected to the SCADA system, as well as a handheld UVT meter, in order to provide improved process monitoring.
- Replace both DAF tanks and recirculation pumps with new units with improved flocculation, including replacement of the polymer makedown system with one that only runs during high flow events, in order to reduce polymer use.
- Add an additional bank of UV disinfection lamps to disinfect properly during low-UVT events as documented during the summer of 2018.
- Add an emergency generator, including enlarging the electrical room, to run critical process equipment and prevent untreated discharges of wastewater to Back Harbour.

The existing MBBR/DAF process can be upgraded using the same general concept, concrete tank capacity, and blowers, but with additional biological capacity, improved controls flexibility, and a single source design and equipment supply for the MBBR/DAF process in order to access single-point ongoing process support from the supplier.

3.2.3 Option 3: Replace with MBR Process

This option would replace the main components of the existing process with an MBR (Membrane Bioreactor) process, in order to significantly improve the effluent quality. This would include changing the process in the bioreactor tank from an MBBR into an Activated Sludge (AS) process, with membrane solids removal downstream. This is anticipated to exceed the existing provincial effluent requirements for BOD, TSS, and Fecal Coliforms (approximately 5–10 mg/L each for BOD and TSS, less than 1000/100 mL for fecal coliforms), with polymer use eliminated. A process schematic for this option is shown in the figure below:

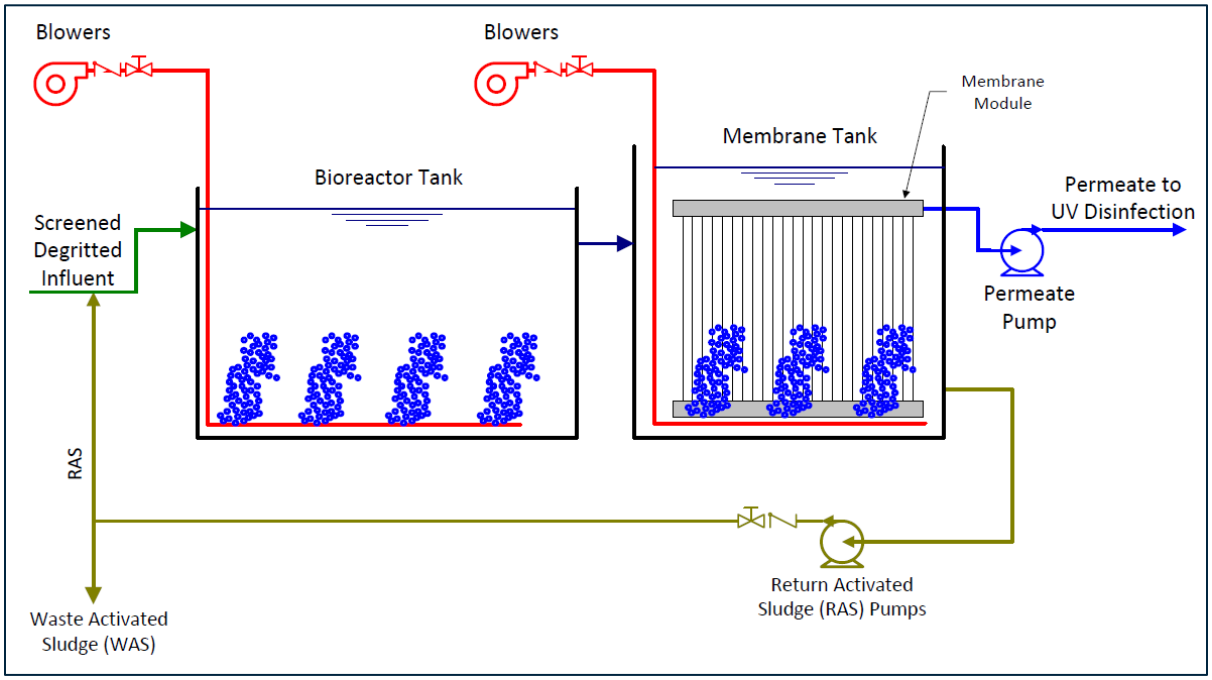


Figure 3.6: Schematic of Option 3 MBR Secondary Treatment Process

The recommended scope of work is for this option is listed below:

- Replace screen and screenings handling with a new 316L stainless steel 6 mm perforated plate screen (with improved capture ratio compared to the existing bar screen) and washer-compactor, and install a new 316L stainless steel 2 mm drum screen in the MBR building, in order to improve the screenings removal and dryness, and prevent large and intermediate debris from passing the screen which could damage the membranes.
- Remove the media, and replace the air pipework and aerators in the bioreactor tanks with new stainless steel pipework and aerators, to transform the process to activated sludge (no carrier media), within existing concrete tanks.

- Add or upgrade instrumentation to provide measurement of air flows, influent salinity, and effluent suspended solids, all connected to the SCADA system, as well as a handheld UVT meter, in order to provide improved process monitoring.
- Remove both DAF tanks and recirculation pumps and add membrane tanks for clarification in a new building, including additional process blowers, membrane cleaning equipment, and Return Activated Sludge (RAS) pumps.
- Add an additional bank of UV disinfection lamps to disinfect properly during low-UVT events as documented during the summer of 2018.
- Add an emergency generator, including enlarging the electrical room, to run critical process equipment and prevent untreated discharges of wastewater to Back Harbour.

3.2.4 Supplementary Option A: Extend Existing Outfall

The existing outfall is located under the Inshore Fishermen's Wharf, which is a very public location, and one that does not have appear to have good mixing. There are occasional discharges of suspended solids and polymer that look unsightly. The wastewater does not currently reliably meet the provincial bacterial effluent requirements with the existing UV system capacity. In addition to improving the effluent quality, particularly the disinfection performance, by implementing one of the three options above, it is possible to extend the outfall to a location with less public contact. This is not a standalone option.

The outfall extension would consist of about 920 m of HDPE pipe laid on the harbour floor adjacent the dredged channel, weighted with concrete collars and fitted with diffuser ports at the end to aid in mixing. The head losses associated with the extension would need to be evaluated and the effluent pumps could be affected. This is a very preliminary assessment of the outfall extension. Additional work on the dilution and mixing available will need to be done to determine the optimal length of outfall. A permit must be obtained, and this may require an Environmental Impact Assessment, and possibly mitigating steps as well.

An outfall extension is recommended if Option 1 is chosen. If Option 3 is chosen, it is unlikely that outfall extension would be required, since the overall effluent quality would be significantly improved, and the polymer use would be eliminated. In the case of Option 2, the WWTP improvements could be implemented first, and the outfall extended only if it still seemed necessary after the disinfection was improved and polymer use was reduced. Outfall extension alone does not help with maintaining regulatory compliance, and would not receive approval on its own.

3.3 Comparison of Options

There are considerable differences between the options outlined above, in terms of performance, ease of operations, and operations cost (including chemicals, replacement items, and sludge disposal). These will be discussed in the section below.

3.3.1 Process Performance

In terms of performance, the best effluent quality would be produced by Option 3, the MBR process. This process can produce tertiary quality effluent, and is the gold standard for effluent quality in wastewater treatment. The effluent from this process would contain no polymer, and would

consistently be below 10 mg/L for both BOD and TSS, since all effluent must pass through a membrane. MBR effluent is readily disinfected and would meet and exceed all provincial and federal standards. This option would not require extension of the existing outfall, due to the high quality effluent and the fact that polymer would no longer be required, the two main factors that cause issues at the moment.

Option 2 would provide effluent quality reliably meeting provincial and federal requirements. It would be easily disinfected. It would require polymer use less often, and would therefore pose less risk of releasing polymer to the harbour, which is not a regulatory issue but appears to add to public perception issues. With this option, the Town could take a phased approach to the effluent outfall, upgrading the plant first and extending the outfall only if and as much as needed.

Option 1 would produce effluent which meets federal requirements, and usually meets provincial requirements, except during peak month conditions when it might occasionally not fully meet provincial requirements. An outfall extension would be recommended in tandem with the plant upgrades to remove the possibility of direct public contact with the effluent, and reduce the occurrence of public perception issues, as well as providing good dilution. The plant could produce better quality effluent than it currently does, but the possibility will remain of solids and/or polymer carry over from the existing DAFs. The risk of bacterial standards not being met would be greatly reduced with an expansion of the UV system.

3.3.2 Ease of Operations

Option 1 would be somewhat easier than the existing plant to operate and maintain, but would not have the additional outside process technical support potential of Option 2 (completely integrated package). Both of these would be fairly similar in tasks and required staffing to current operations.

Option 3 operation would be considerably different than the existing procedures. It might require an operator with Class III certification, and it might also require an additional maintenance person. Its operation would have some similarities to the Town's Water Treatment Plant, including scheduled membrane cleans, and periodic membrane replacements. It would also require more frequent monitoring of the bacterial populations in the bioreactor. There would be less risk of solids release from the system, and no need to use polymer except for sludge dewatering. The dewatering of sludge might be somewhat more difficult, because waste activated sludge from an MBR system has greater volume to start with and won't dewater to the same extent as DAF sludge.

3.3.3 Ease of Implementation

The construction of any of these options would require close coordination and ongoing communication between the contractor and operators. A "Temporary Authorization" must be obtained from Environment Canada under the terms of the WSER legislation, and an Approval to Construct and Operate must be obtained from NSE before beginning. Both should be applied for well in advance of construction. The contractor will be required to develop a thorough construction plan in consultation with the operators, with the intent of minimizing service disruptions. The plan will account for operational flexibility within the current system, scheduling (i.e., periods of low flow), as well as mitigation of longer-term interruptions with mobile treatment equipment. Some interruptions are inevitable during construction, and regulators recognize this.

In order to minimize interruptions, it may be beneficial to add additional pipework, etc. during construction, to allow more specific bypass methods both during and after construction. For example, a connection could be made from the overflow at the head of the bioreactor tank to the DAF supply pipework, in order to bypass only the biological processes while maintaining flows to the DAFs. A duplicate pipe from the EQ tank to the DAFs could be constructed to allow the control valve for each DAF to be taken out of service without affecting the feed to the other DAF.

Option 1 would involve the fewest changes, and therefore would be relatively straightforward to implement. The UV system expansion would require temporary bypass pumping of the effluent for a short period of time while the unit was fitted into the existing channel. Similarly, the replacement screen would fit into the existing channel, and should be installed and commissioned before replacing the media in the bioreactor. The DAF recirculation pumps could be replaced with little difficulty, one at a time, and then the optimization work on the DAFs could take place. Additional instrumentation could be installed with little or no interruption to the existing process. Replacing the aeration equipment and the media can be done one train at a time. Replacing the aeration system in the equalization tank also requires temporary bypass pumping for a period of time, in order to pass bioreactor effluent forward to the DAFs. Installing the backup generator requires expanding the electrical room to provide space for the transfer switch, and relocating the equipment on the back wall. This work can be managed by the contractor without having to bypass parts of the treatment process for more than limited periods of time. Commissioning would be relatively straightforward, because most of the items are familiar to the operators.

Option 2 is more complex to implement, because in addition to the work outlined in Option 1, it includes the replacement of the DAFs, as well as the replacement of significant parts of the control system of the plant. Coordination would be required with the Town's system integrator (monitoring and trending of vendor control cabinets).This would require careful management by the contractor, in consultation with NSE, and could be scheduled so as to reduce negative effects on the receiving water. Commissioning would be less straightforward than Option 1, due to some changes in the systems that the operators would need to gain familiarity with, but the additional automation and remote monitoring and support available from the suppliers would aid in this transition.

Option 3 requires the screen replacement and UV system expansion, along with the backup generator and instrumentation installation, as outlined in Option 1. The MBR processes are mostly built off-line, except for work in the equalization tank, which would require temporary bypass pumping and careful management by the contractor. This option would also include the replacement of significant parts of the control system of the plant. Coordination would be required with the Town's system integrator (monitoring and trending of vendor control cabinets).

Overall, this option is likely similar in construction complexity to Option 2, but would involve more substantial commissioning effort because the process, though highly automated, is less familiar to the operators.

CHAPTER 4 COST ESTIMATES

4.1 Conceptual Capital Cost Estimates

The Class D estimated capital costs for each of the options is provided in the table below. These estimates have been updated based on supplier quotations for the major equipment.

The estimated costs include contingencies for Design Development (20%) and Construction (10%), as well as an allowance for engineering fees (10%). A Design Development Contingency is to allow for growth of quantities, increase material costs as the work is better defined in the future. A Construction Contingency is intended to allow for the cost of additional work that is over and above the original construction contract price. This estimate excludes taxes.

Table 4.1: Conceptual Capital Cost Estimates

Category	Option 1 Capital Maintenance	Option 2 MBBR Upgrade	Option 3 MBR	Option A Outfall Extension
Site Works	$69,000	$177,000	$377,000	$1,125,000
Concrete	$0	$0	$526,000	$0
Buildings	$30,000	$40,000	$576,000	$0
Process Equipment	$811,000	$2,285,000	$2,025,000	$0
Mechanical	$890,000	$1,630,000	$2,056,000	$0
Electrical	$599,000	$854,000	$1,134,000	$0
Contractor Overhead	$192,000	$250,000	$335,000	$169,000
Subtotal	**$2,591,000**	**$5,236,000**	**$7,029,000**	**$1,294,000**
Design Development Contingency	$518,000	$1,047,000	$1,406,000	$259,000
Construction Contingency	$259,000	$524,000	$703,000	$129,000
Engineering	$259,000	$524,000	$703,000	$129,000
Total Capital Costs	**$3,627,000**	**$7,331,000**	**$9,841,000**	**$1,811,000**

This opinion of probable costs is presented on the basis of experience, qualifications, and best judgement. It has been prepared in accordance with acceptable principles and practices. Market trends, non-competitive bidding situations, unforeseen labour and material adjustments and the like are

beyond the control of CBCL. As such we cannot warrant or guarantee that actual costs will not vary from the opinion provided.

4.2 Operational Costs

Operational cost estimates for each option are shown in the table below. These are not exhaustive, but include estimated costs for power, labour, replacement of consumable items including UV bulbs and membranes, sludge disposal, and chemicals.

Table 4.2: Operation Cost Estimates

Category	Option 1 Capital Maintenance	Option 2 MBBR Upgrade	Option 3 MBR
Power	$199,000	$199,000	$241,000
Labour	$137,000	$137,000	$205,000
Sludge Disposal	$61,000	$61,000	$84,000
Supplies/ Equipment/ Parts	$28,000	$28,000	$49,000
Chemicals	$29,000	$18,000	$3,000
Annual Operations Cost	**$454,000**	**$443,000**	**$582,000**
Increase in Operations Costs	**$16,000**	**$5,000**	**$144,000**

Option 1 has operations costs slightly higher than existing. There might be power savings from the new aerators, but there would be an increase in UV power costs. There would likely be some increase in pumping costs from implementing a long (~900 m) outfall extension.

Option 2 has the lowest operation costs, which are estimated to be very similar to current operations costs. Labour, power, periodic maintenance, and sludge disposal would be similar to existing costs, while polymer costs would likely go down. There might be power savings from the new aerators, but there would be an increase in UV power costs. There would likely be some increase in pumping costs if an outfall extension were necessary.

Option 3 would have operations and maintenance costs significantly higher than existing, due to increased power, labour, periodic maintenance, and sludge disposal (more sludge that doesn't dewater as well).

4.3 Life-Cycle Costs

Discounted present value calculations were carried out to estimate the Net Present Value of the treatment plant options. This is the standard method for calculating the relative costs of different options. Net Present Value (NPV) is calculated using Equation 4.1, where "Cost in period n" is the net cost in a given year, "n" is the year from 1 to 25, and "rate" is the real discount rate. This cost is calculated for each year in question and the yearly costs are summed.

Equation 4.1 Net Present Value

$$\text{NPV}=\sum \frac{Cost \text{ in period n}}{(1+rate)^n}$$

The effect of this calculation is that costs which occur soon are weighted more heavily than costs which occur farther down the road, based on the idea that a dollar today is worth more than a (more uncertain) dollar next year. The calculations in the report were carried out without applying an assumed inflation rate. This is called a real NPV. If inflation is used (called nominal NPV), it is applied to both the costs (which are higher by inflation) and the discount rate (nominal discount rate equals real discount rate plus inflation, therefore higher) so that the higher costs are discounted faster, and the two effects cancel each other out, giving the same result whether the real or nominal NPV is calculated. The real discount rate used in these calculations is 8%, and the time period over which it is calculated is 25 years, starting in 2018. The net present value is carried out on the capital costs before taxes. These calculations do not account for the revenue from users.

The options for which the life-cycle costs are shown in the table below include the three options described above, including Option 1, Capital Maintenance; Option 2, MBBR Upgrade; and Option 3, MBR. They also include two of these options combined with an outfall: Option 1A, Capital Maintenance and Outfall; and Option 2A, MBBR and Outfall.

Table 4.3: Life-cycle Cost Estimates

Category	Option 1 Capital Maintenance	Option 2 MBBR Upgrade	Option 3 MBR	Option 1A Capital Maintenance & Outfall	Option 2A MBBR & Outfall
Annual Operations Cost	$454,000	$443,000	$582,000	$456,000	$445,000
Operations Cost Present Value	$4,846,000	$4,729,000	$6,213,000	$4,868,000	$4,750,000
Capital Cost	$3,627,000	$7,331,000	$9,841,000	$5,438,000	$9,142,000
Net Present Value	**$8,473,000**	**$12,060,000**	**$16,054,000**	**$10,306,000**	**$13,892,000**

It is necessary to add an allowance to account for construction cost escalation if the plant is constructed several years in the future. This does not affect the relative net present value ranking, but increases costs for all options in order to inform funding applications. We recommend that capital costs be inflated by approximately 3% per year from the 2019 values given to the intended year of construction.

CHAPTER 5 SCORING OF OPTIONS

5.1 Evaluation Matrix

The three options were scored from 1 to 5, where 5 is excellent, and 1 is very poor. These scores are shown in Table 5.1. Option 2 has the highest score, followed by Options 1A, 2A and 3, which have equal absolute scores. Option 1 was not scored because it does not appear to meet the Town's objectives on its own.

Table 5.1: Scoring of Options

Factor	Option 2	Option 3	Option 1A	Option 2A
Operations Cost	5	2	4	5
Capital Cost	3	1	4	1
Process Performance	3	5	1	3
Ease of Operations	5	4	2	5
Ease of Implementation	1	3	4	1
Total	17	15	15	15

These factors were then weighted by holding discussions with Town staff to determine the relative importance of each factor. The weights and the weighted scores (where each factor score is multiplied by the weighting for that factor) are shown in Table 5.2. Option 2 once again has the highest weighted score, followed by Options 3 finally Option 1, which are similar.

Table 5.2: Weighted Scoring of Options

Factor	Weight	Option 2	Option 3	Option 1A	Option 2A
Operations Cost	20%	1.00	0.40	0.80	1.00
Capital Cost	20%	0.60	0.20	0.80	0.20
Process Performance	25%	0.75	1.25	0.25	0.75
Ease of Operations	20%	1.00	0.80	0.40	1.00
Ease of Implementation	15%	0.15	0.45	0.60	0.15
Total	**100%**	3.50	3.10	2.85	3.10

Based on the scoring, Option 2 appears attractive to be carried forward to the predesign stage; however, this option retains the risk of requiring an outfall extension, at which point the additional capital cost incurred would push the weighted score of Option 2A down to 3.10, which is equal to Option 3. The net present value of Option 2A is still lower than Option 3 because of the higher operating costs required with Option 3.

APPENDIX A

Sketches of Proposed Options

NORTH

REPLACE HEADERS, AERATORS, AND AIR PIPEWORK WITH NEW IN PROCESS TANKS 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B AND THE EQUALIZATION TANK. ALL METAL COMPONENTS TO BE 316L STAINLESS STEEL OR BETTER

REPLACE PLASTIC MEDIA WITH NEW FIXED-IN-PLACE MEDIA IN ALL BIOLOGICAL PROCESS TANKS

INSTALL 500kW PAD MOUNTED EMERGENCY GENSET

MODIFY INSTRUMENTATION TO PICK UP AIRFLOWS ON SCADA SYSTEM

REPLACE POLYMER MAKEDOWN SYSTEM IF REQUIRED AFTER OPTIMIZATION

REPLACE RECIRCULATION PUMPS

OPTIMIZE DAF OPERATION (MANUFACTURER'S TECH)

REPLACE RECIRCULATION PUMPS

MONITOR SALINITY ON SCADA SYSTEM

MODIFY GRIT PIPEWORK TO REDUCE BLOCKAGES

REPLACE SCREEN WITH 6mm PERFORATED FINE SCREEN, REPLACE SCREENINGS HANDLING SYSTEM

EXTEND ELECTRICAL ROOM AND INSTALL TRANSFER SWITCH AND MAIN BREAKER SWITCH BOARD

ADD SECOND BANK OF UV DISINFECTION LAMPS AND POWER DISTRIBUTION CENTRE

MONITOR SUSPENDED SOLIDS ON SCADA SYSTEM

1"=10'-0" 2 0 2 5 10 15 20ft.

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Description	Date	By
B	ISSUED FOR REPORT	MAR 26/19	DAT
A	ISSUED FOR REVIEW	JAN 11/19	DAT

Revision or Issue

TOWN OF LUNENBURG

LUNENBURG WASTEWATER TREATMENT PLANT

PROCESS

PRELIMINARY LAYOUT OPTION 1

CAPITAL MAINTENANCE

CBCL LIMITED
Consulting Engineers

CBCL No	Contract No	Date	Scale
180823.01	–	JAN 2019	1"=10'-0"

Designed	Drawn
SHE	BMF
Checked	Approved
DAT	DAT

Sheet No 1 of 3

Drawing No **SKP01**

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NORTH

REPLACE HEADERS, AERATORS, AND AIR PIPEWORK WITH NEW IN PROCESS TANKS 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B AND THE EQUALIZATION TANK. ALL METAL COMPONENTS TO BE 316L STAINLESS STEEL OR BETTER

INSTALL HIGH SALINITY BYPASS

REPLACE PLASTIC MEDIA WITH SMALLER DIAMETER HIGHER CAPACITY MEDIA

REPLACE ALL SIEVES TO SUIT SMALLER MEDIA

INSTALL 500kW PAD MOUNTED EMERGENCY GENSET

MODIFY INSTRUMENTATION TO PICK UP AIRFLOWS ON SCADA SYSTEM

REPLACE DAFS WITH NEW DAFS, PUMPS AND CONTROLS

MONITOR SALINITY ON SCADA SYSTEM

MODIFY GRIT PIPEWORK TO REDUCE BLOCKAGES

REPLACE SCREEN WITH 6mm PERFORATED FINE SCREEN, REPLACE SCREENINGS HANDLING SYSTEM

EXTEND ELECTRICAL ROOM AND INSTALL TRANSFER SWITCH AND MAIN BREAKER SWITCH BOARD

ADD SECOND BANK OF UV DISINFECTION LAMPS AND POWER DISTRIBUTION CENTRE

MONITOR SUSPENDED SOLIDS ON SCADA SYSTEM

1"=10'-0" 2 0 2 5 10 15 20ft.

PRELIMINARY
NOT FOR CONSTRUCTION

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Revision or Issue

TOWN OF LUNENBURG

LUNENBURG WASTEWATER TREATMENT PLANT

PROCESS

PRELIMINARY LAYOUT OPTION 2

UPGRADE MBBR AND DAFS

CBCL LIMITED
Consulting Engineers

CBCL No	Contract No	Date	Scale
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Designed	Drawn
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Checked	Approved
DAT	DAT

Sheet No 2 of 3

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NORTH

CONSTRUCT 2-TRAIN CONCRETE TANK MBR WITH 3 CASSETTES PER TRAIN, INCLUDING MBR PUMPS AND BLOWERS IN A 40ftx40ft BUILDING

BACKPULSE TANK

MBR TANKS

EFFLUENT PIPE

CORE THROUGH FROM EQUALIZATION TANK TO MBR FEED CHANNEL

INSTALL CONCRETE PARTITION IN EQUALIZATION TANK

CONNECT SECOND SIDE OF EQUALIZATION TANK DIRECTLY TO OVERFLOW BOX

BLOWERS ON UPPER LEVEL, PROCESS PUMPS ON LOWER LEVEL

DRUM SCREENING (2mm FINE SCREEN)

RETURN ACTIVATED SLUDGE PIPE

REMOVE PLASTIC MEDIA FROM ALL BIOLOGICAL PROCESS TANKS

DIVERT DEGRITTED INFLUENT TO DRUM SCREENING

REPLACE HEADERS, AERATORS, AND AIR PIPEWORK WITH NEW IN PROCESS TANKS 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B AND THE EQUALIZATION TANK. ALL METAL COMPONENTS TO BE 316L STAINLESS STEEL OR BETTER

INSTALL 500KW PAD MOUNTED EMERGENCY GENSET

MODIFY INSTRUMENTATION TO PICK UP AIRFLOWS ON SCADA SYSTEM

REMOVE EXISTING DAFS, PUMPS AND SLUDGE PUMPS

MONITOR SALINITY ON SCADA SYSTEM

MODIFY GRIT PIPEWORK TO REDUCE BLOCKAGES

REPLACE SCREEN WITH 6mm PERFORATED FINE SCREEN, REPLACE SCREENINGS HANDLING SYSTEM

EXTEND ELECTRICAL ROOM AND INSTALL TRANSFER SWITCH AND MAIN BREAKER SWITCH BOARD

REMOVE POLYMER TANKS AND DOSING EQUIPMENT

ADD SECOND BANK OF UV DISINFECTION LAMPS AND POWER DISTRIBUTION CENTRE

MONITOR SUSPENDED SOLIDS ON SCADA SYSTEM

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Revision or Issue

TOWN OF LUNENBURG

LUNENBURG WASTEWATER TREATMENT PLANT

PROCESS

PRELIMINARY LAYOUT OPTION 3

MEMBRANE BIOREACTOR

CBCL LIMITED
Consulting Engineers

CBCL No	Contract No	Date	Scale
180823.01	–	JAN 2019	1"=10'-0"

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Sheet No 3 of 3

Drawing No **SKP03**

Schedule "A"

Wastewater Treatment Plant Options Assessment – Peer Review

Town of Lunenburg

17 December 2019

DILLON CONSULTING

Introduction

- Presenters:
  - Dave McKenna, M.Eng., P.Eng. – Technical Service Lead, Water/Wastewater Engineering
  - Kyle MacIntyre, P.Eng. – Process Engineer, Water/Wastewater Engineering
- Goal:
  - Provide a peer technical review of CBCL's Wastewater Treatment Plant (WWTP) March 2019 Evaluation Report
  - Comment on their assumptions, findings, cost estimates and recommendations

Background

- Plant built in 2003
- Historical effluent quality issues
- Public concern over discharges to the harbour
- Odour complaints (largely addressed)
- Corrosion in plant
- CBCL Limited completed a report in 2019, Dillon was hired to complete a peer technical review

1 Headworks

First point where waste water enters the plant and solids are separated from the waste water.

2 Aeration Building

Air is added to the waste water to stimulate biological growth.

3 Blower Room

Air needed for the different stages of the treatment process is generated in this room.

4 Chemical Room

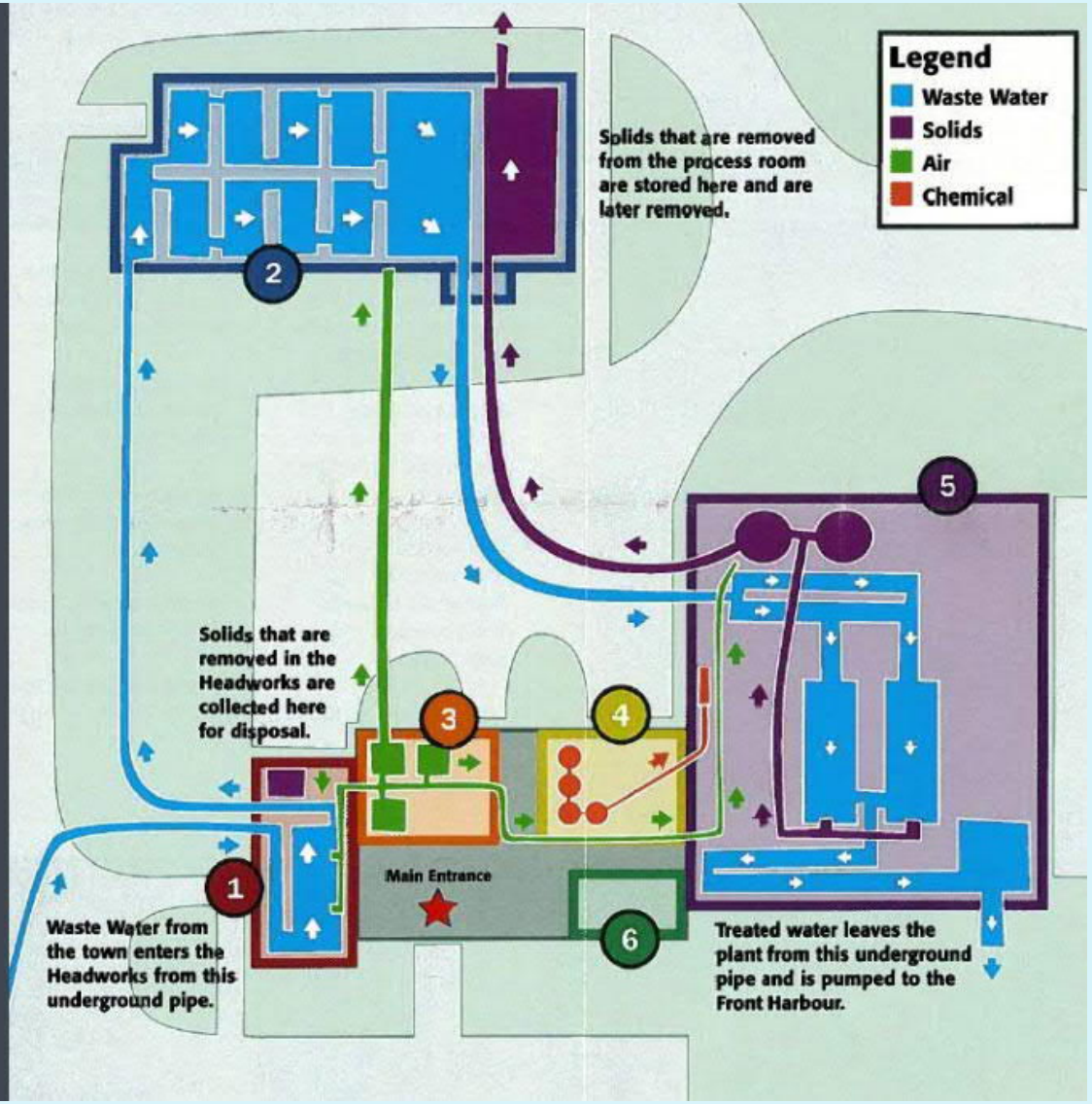
Chemicals are mixed here and added to the process when necessary.

5 Process Room

The final stages where the remaining solids are removed and the waste water is disinfected before exiting the plant.

6 Laboratory

Water is tested at various stages during the treatment process and before it is released to the environment.



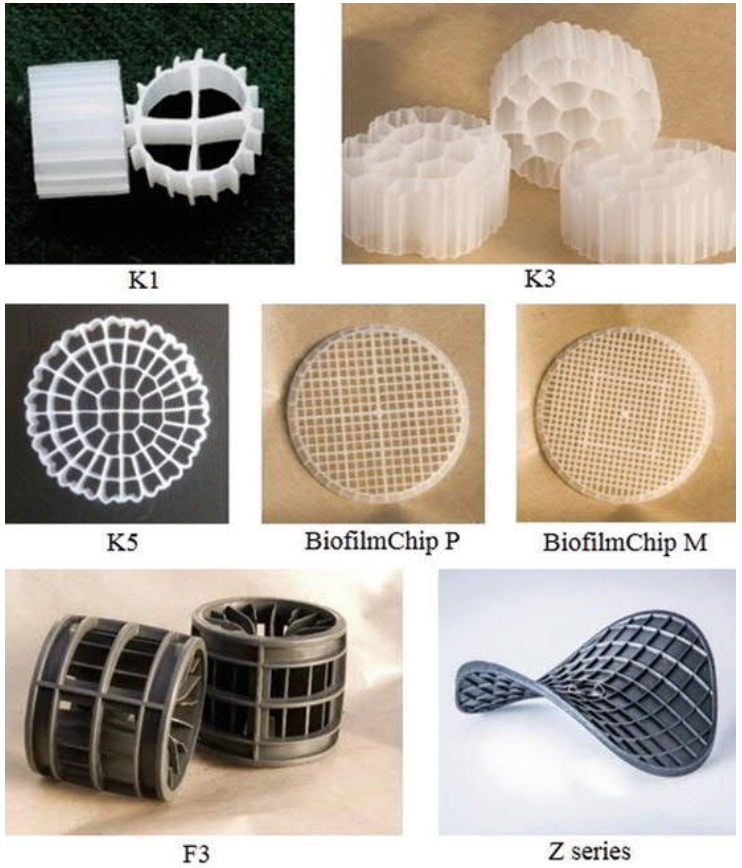
Main Treatment Processes

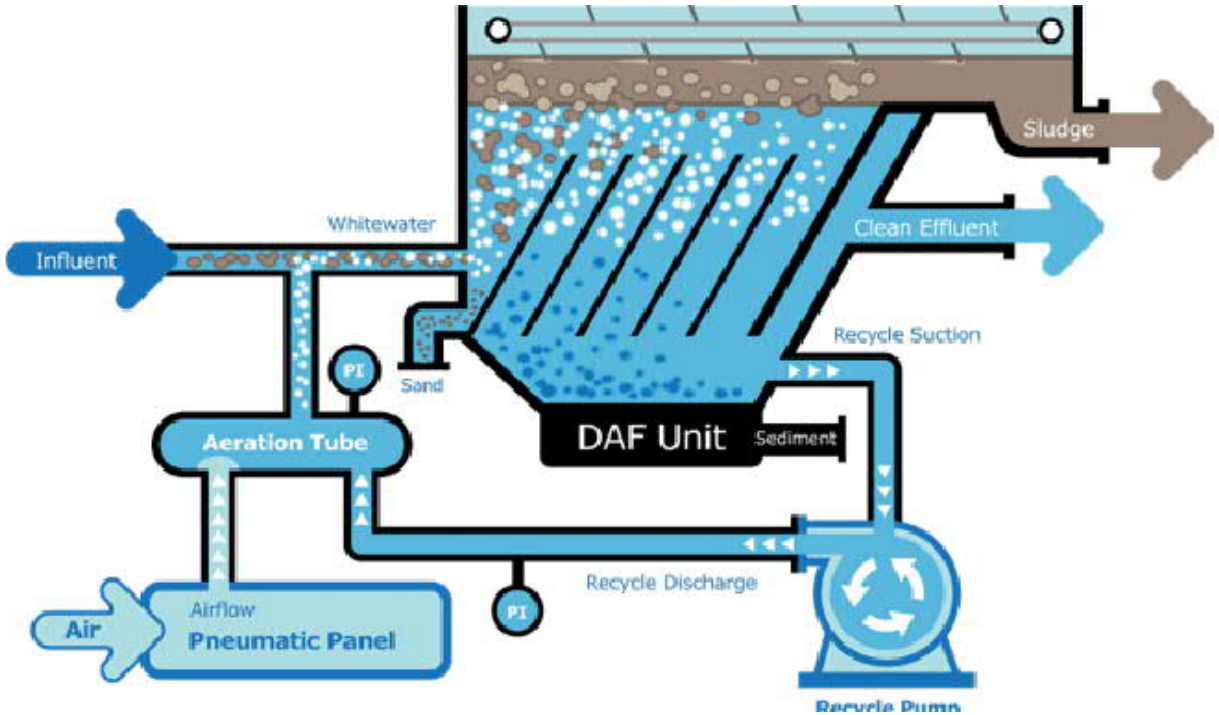
- "Moving Bed Biofilm Reactor" (MBBR)
  - Very low footprint
  - Floating "discs" provide a surface for attached bacteria (biofilm)
  - Air from the blowers keep the media "floating" in the tanks and satisfy biological demand
  - Typically provides a high degree of treatment, including nitrification

- "Dissolved Air Flotation" (DAF)
  - Process to remove particles from the treated wastewater
  - Particles mix with chemicals to form flocs before the DAF
  - Micro bubbles are created in the DAF that stick to the flocs and float them to the surface where they are skimmed. Heavier/larger particles sink to the bottom and are collected
  - Typical operation vs. Town's operation

DILLON CONSULTING

Town MBBR Media (Left) vs. Newer Media (Right)



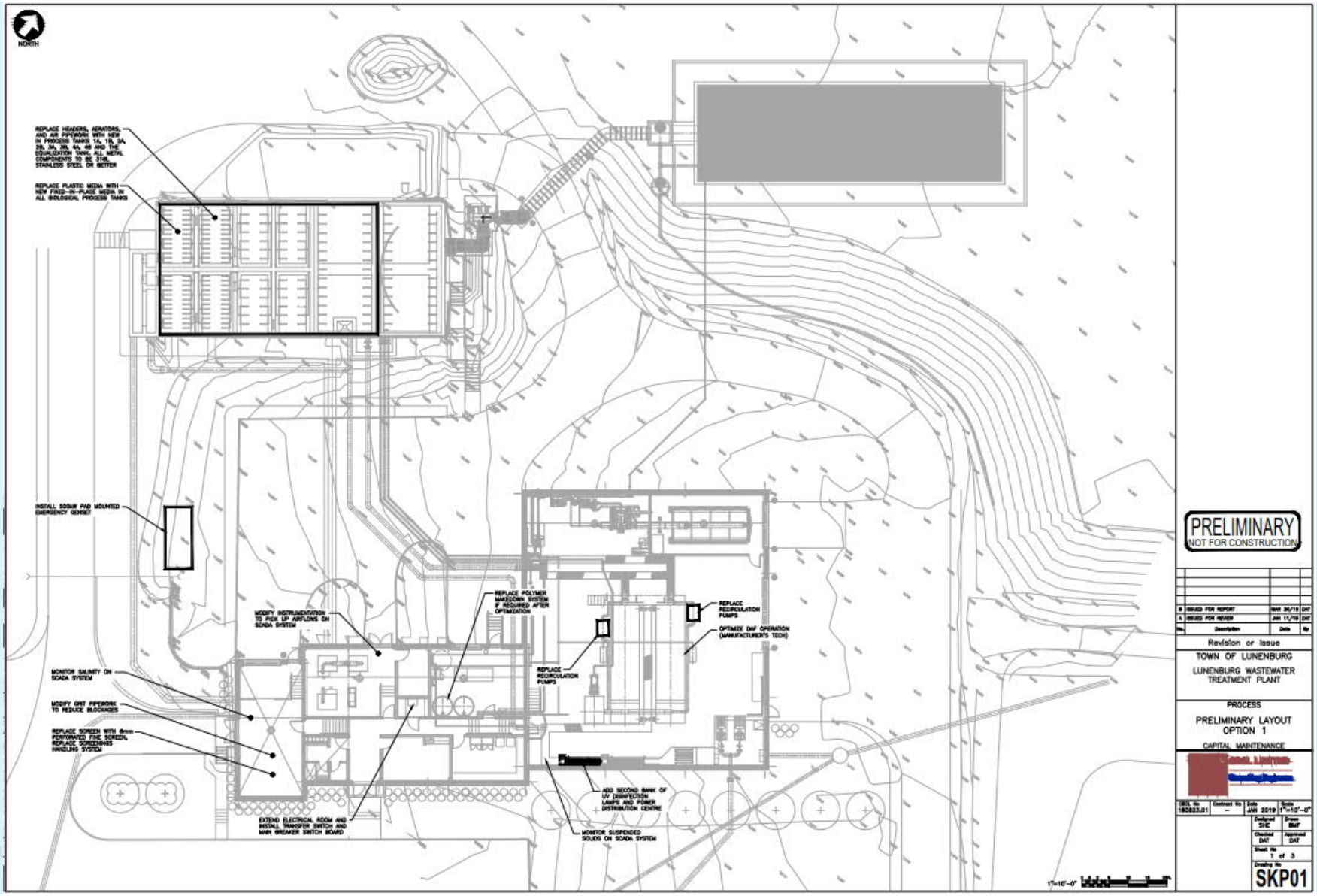


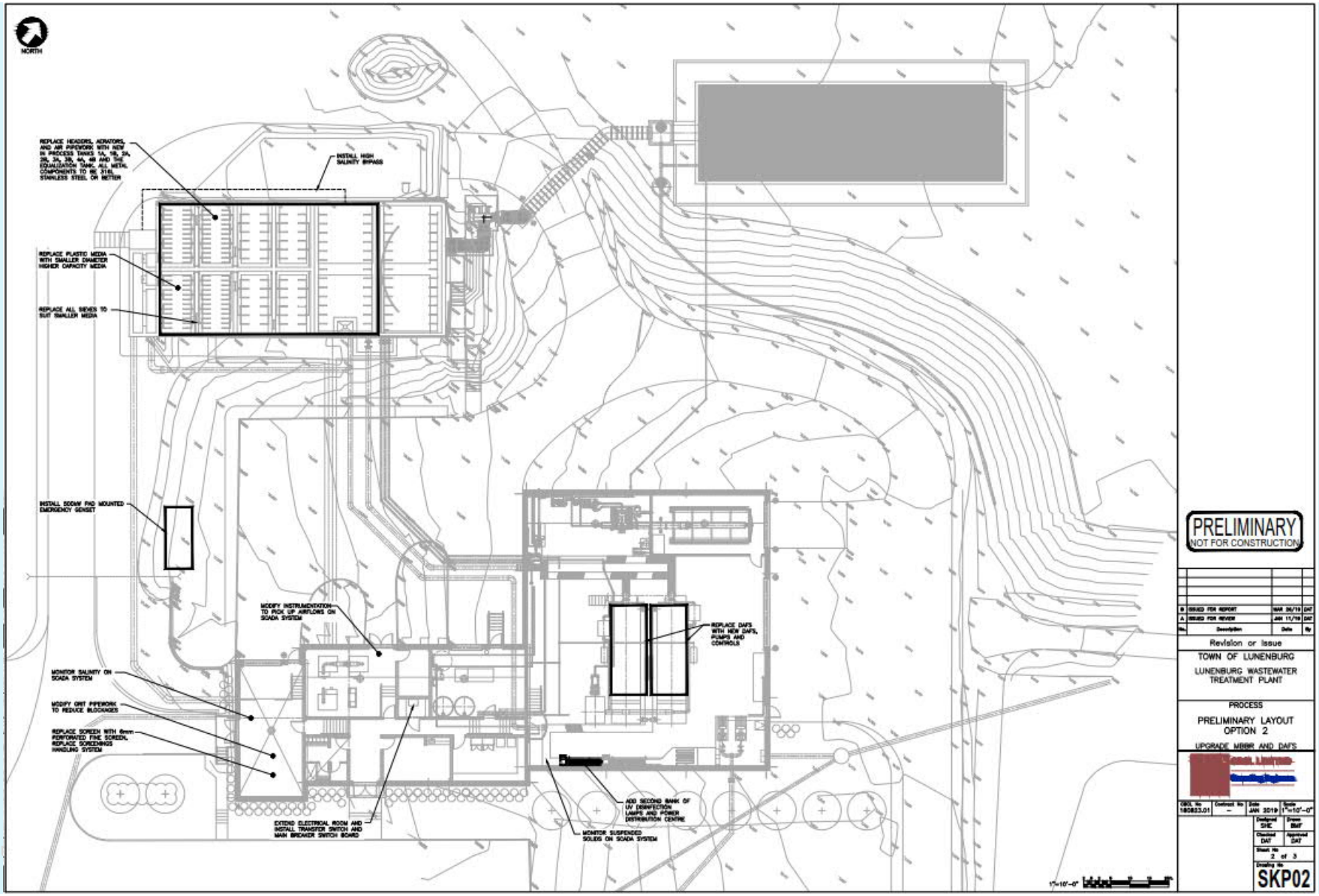
Typical DAF Process

Options Considered

CBCL Option 1:	CBCL Option 2:	CBCL Option 3:	Dillon Option 4:
Replace MBBR Media with Fixed-in-Place Media Optimize DAF Operation New screen, aeration $3.63M Capital	New MBBR media Replace DAF Units New screen, aeration $7.33M Capital	Replace MBBR & DAF with MBR Process ("Cadillac") New screen, aeration, drum screen $9.84M Capital	"Top up" existing MBBR, New aeration DAF Assessment/optimiz'n Outfall Extension Screen maintenance Estimated $5M Capital

Note: Option 1 – 3 Cost Estimates are typically in the +/- 30% range





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Revision or Issue

TOWN OF LUNENBURG

LUNENBURG WASTEWATER TREATMENT PLANT

PROCESS

PRELIMINARY LAYOUT OPTION 2

UPGRADE MBBR AND DAFS

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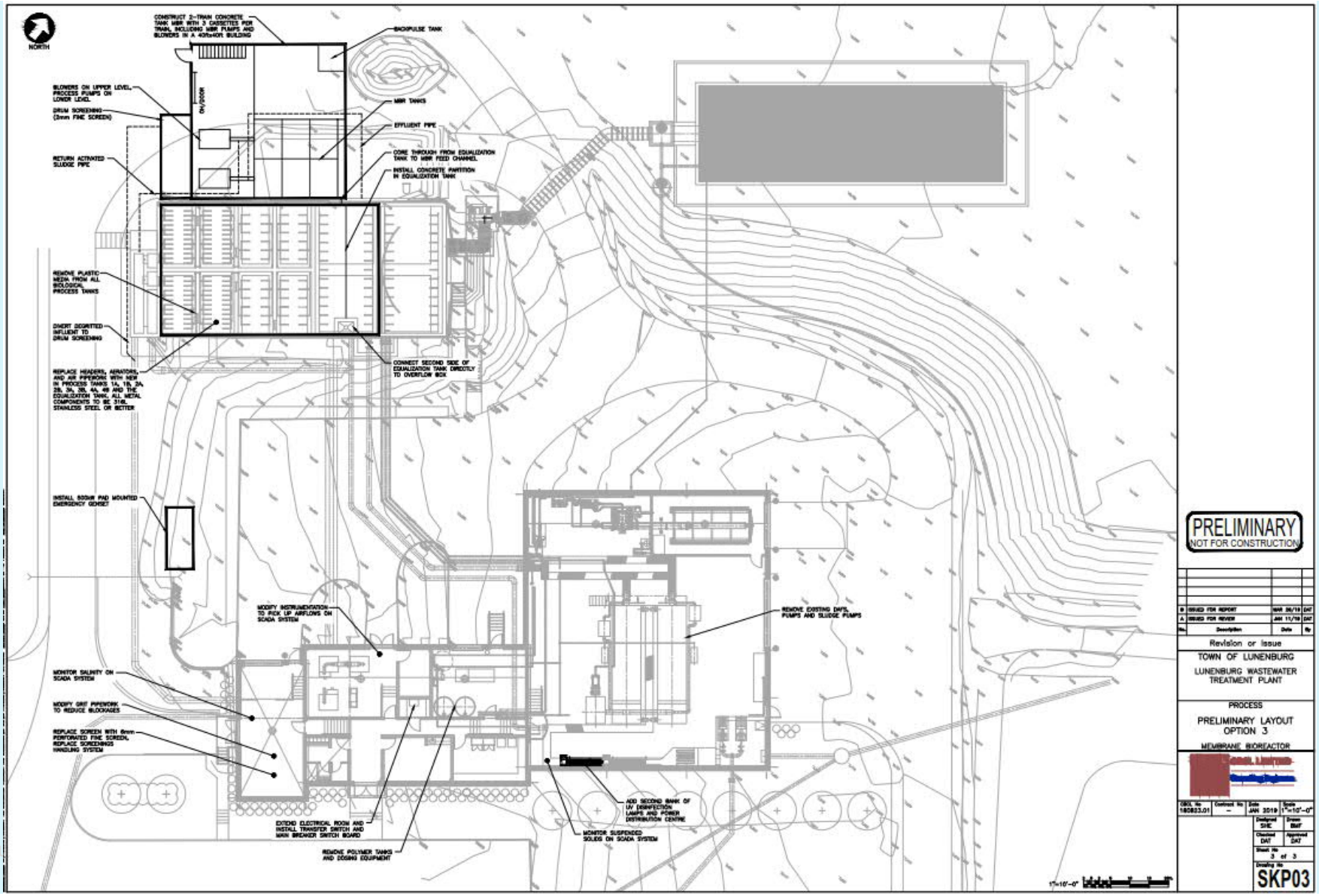

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TOWN OF LUNENBURG

LUNENBURG WASTEWATER TREATMENT PLANT

PROCESS

PRELIMINARY LAYOUT OPTION 3

MEMBRANE BIOREACTOR

CEGL No. 182823.01	Contract No. –	Date JAN 2019	Scale 1"=10'-0"
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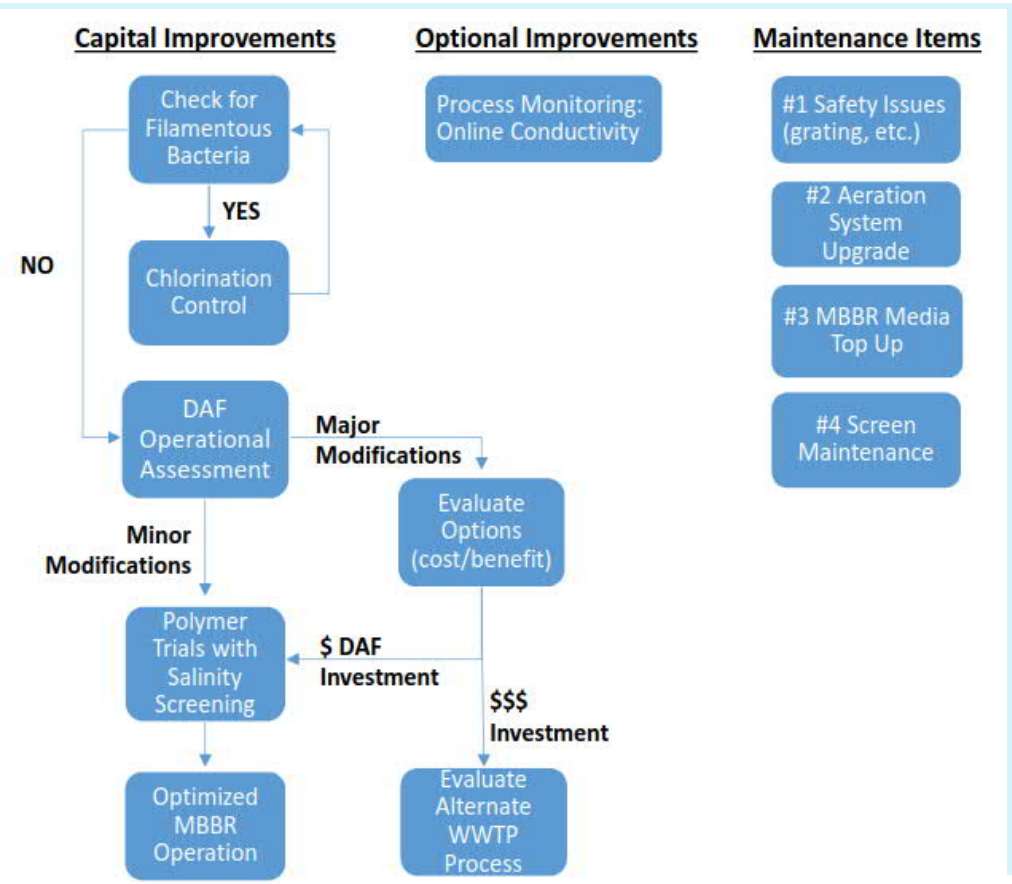
Drawing No. SKP03			

Discussion & Recommendations



- Cost vs Benefit
- Availability of funding
- Worker safety #1 priority in upgrades
- Outfall extension a priority regardless of the path forward
- DAF assessment and improvements are critical for existing MBBR
- If DAF issues are resolved:
  - Operational & maintenance upgrades (aeration system corrosion, screen repairs)
  - New CAPEX is reduced to outfall extension

Thank You

Questions?

December 11, 2019

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ATTENTION: Bea Renton
Chief Administrative Officer

Lunenburg Wastewater Treatment Plant Report – Peer Review

Dillon Consulting Limited (Dillon) is pleased to submit this report summarizing the findings of our peer technical review of the Town of Lunenburg Wastewater Treatment Plant – Evaluation and Options Identification, Final Report, March 27, 2019 prepared by CBCL Limited.

Background & Introduction

The Town operates a WWTP that was built in 2003 and utilizes the moving bed biofilm reactor (MMBR) and dissolved air flotation (DAF) process. The plant has been experiencing issues with meeting Provincial regulatory effluent requirements, generally as follows:

- 2017 BOD: average of quarterly samples met the federal criterion (25 mg/L), but failed the provincial criterion because one sample exceeded the Federal limit by a factor greater than 2.0;
- 2017 Fecal Coliforms: only 74% of samples met the 1000 MPN/100 mL criterion, versus a provincial minimum of 80%;
- 2017 Fecal Coliforms: Multiple samples exceeded the provincial limit of 2000 MPN/100 mL;
- 2018 BOD: One sample exceeded the federal limit by a factor greater than 2.0, which failed the provincial criterion;
- 2018 TSS: One sample exceeded the federal limit by a factor greater than 2.0, which failed the provincial criterion;
- 2018 Fecal Coliforms: Multiple samples exceeded the provincial limit of 2000 MPN/100 mL;
- 2019 Results (January – August Data): With the exception of some of the BOD and TSS results in January 2019, the plant was generally in compliance until June where there was one exceedance of fecal coliforms, which Town staff believed was due

to an illegal substance entering the sewer system. Over half of the July and August sampling showed exceedances above provincial/federal guidelines, however a "milky-greyish" substance was observed throughout the plant and is suspected of causing process upsets. Town staff believed they have identified the source of the unknown sewer discharge, and it has not occurred since.

Sampling of the plant effluent for reporting purposes is performed by weekly grab samples analyzed at the plant's lab and independently verified by accredited external laboratories. In addition to the above permit compliance exceedances, the Town is also challenged with respect to periodic visible wastewater characteristics at the effluent discharge point in the Town harbor, which is easily observed from the commercial wharf by residents and tourists. The cause of the visible plume is discussed by CBCL as resulting from excess polymer and TSS carryover from the DAF unit. This visible plume causes public outcry and poses a reputational risk to the Town.

CBCL Limited was retained in 2018 to complete an assessment report and identified three potential options for the Town to consider to improve their WWTP performance:

1. Replace the existing MBBR media with fixed-in-place media;
2. Upgrade the existing MBBR process and replace the DAF units; and
3. Replace the MBBR and DAF process with a new membrane bioreactor (MBR) process.

Dillon was retained to provide commentary on CBCL's assessment of the existing treatment system, review assumptions, general assessment, cost estimates and recommendations.

Peer Review Methodology

Process engineers from Dillon met with Town staff in October 2019. Following a meeting with the Town's Interim Engineer, CAO and Director of Public works, Dillon met with one of the plant operators and was given a detailed walkthrough of the plant's main processes, and discussed the operational challenges that the plant has been experiencing. These generally focused on:

- Inert solids (i.e. rocks) depositing in front of the influent screen with some passing the screen and plugging downstream processes;
- Severe corrosion of the aeration system piping inside the MBBR building;
- Work MBBR media;

- Solids carry over through the DAF to the treated effluent;
- Low treated effluent ultraviolet light transmittance (UVT) below the UV disinfection system design value, resulting in inefficient disinfection
- Odours throughout plant process areas (largely improved through the addition of a biofilter in 2019);
- Residual polymer levels in the plant effluent discharged to the harbour; and
- Aeration issues and low dissolved oxygen levels in the MBBR tanks.

At the time of the Dillon facility visit, the plant was restarting full operations after completing repairs associated with flooding damage caused by Hurricane Dorian in September 2019.

The following sections provide Dillon's peer review comments on the CBCL report. For organizational purposes, the chapter headings in this report reference the corresponding chapter numbers in the CBCL report.

Report Discussion & Peer Technical Review

Chapter 1: Introduction

No Dillon comments.

Chapter 2: Wastewater Treatment Plant

2.4.2: Bioreactor Tanks

The report comments that wear of the MBBR media in the bioreactor indicates that the media may not be suitable for this application. However, the bioreactor appears to be meeting the BOD reduction targets after 15 years of operation, and MBBR treatment performance is typically associated with a minimum media surface area in the treatment tank. In Dillon's opinion, media attrition over a 15 year period is acceptable based on life cycle cost, and annual replacement of a portion of the media as an operation expense to maintain treatment performance is a reasonable investment. Condition of the media and replacement media costs should be explored with the media supplier.

Dillon has assumed that the existing MBBR has adequate remaining media surface area to support biological treatment. Periodic microscopic examination of the MBBR reactor should be performed to determine if suspended filamentous bacteria are present in the MBBR tanks. Regular sludge volume index (SVI) testing of the DAF feed using an Imhoff Cone is a recommended approach to monitor biological solids; increasing SVI may suggest filamentous bacteria are present. If filamentous bacteria

are observed in the system, they may have an adverse effect on downstream DAF performance. Chlorine dosing of the MBBR would be required to control filamentous bacteria.

2.4.4: Dissolved Air Flotation Units

It is stated that the DAF recirculation pumps are causing turbulent conditions in the DAF, and potentially discharging poor quality micro bubbles. However, the DAF is currently operating using an on/off operation, where batches of wastewater are periodically released by gravity from the equalization tank (similar to the analogy of flushing a toilet). While Dillon observed similar turbulent DAF conditions, it cannot be concluded that this is caused by DAF recirculation pumping and/or periodic batch operation. Dillon observed ongoing release of micro bubbles at the channel surface (UV channel) downstream of the DAF unit, suggesting that micro bubbles are being successfully generated by the DAF system, but turbulent conditions in the DAF are affecting their ability to properly separate with attached suspended solids within the DAF tank.

The report comments that foam observed downstream of the DAF is caused by excess polymer and the weir drop inside the effluent box. While this may be a contribution to the foam, carryover of micro bubbles from the DAF to the effluent channel is likely also contributing to the observed foam.

Chapter 3: Wastewater Treatment Options

3.1: Design Criteria

In general, the design average and peak daily flow presented by CBCL are appropriate for the level of study completed. However, as the project proceeds through preliminary and detailed design, the average and peak daily flows should be based on a more rigorous statistical analysis of flow data, and compared to per capita loadings recommended by the Atlantic Canada Guidelines. Based on our analysis of CBCL's graphical data, this may result in a minor reduction in design flow, but is considered conservative for this stage.

The data in Table 3.1 represents a snapshot of the August – September 2018 operational period, and the title should be modified to reflect this limitation. Design flows and loads should be established at the following stages of engineering based on multiple years' worth of data.

The design basis for the original 2003 construction have been referenced by CBCL, but not included in the report. These 2003 design values should be included in Table 3.1 for comparative purposes.

Earlier in the report it is stated that carbonaceous biochemical oxygen demand (cBOD) was measured during the 2018 sampling events; however Table 3.1 reports the organic loading in terms of BOD. cBOD excludes oxygen consumption attributed to nitrification activity, while BOD considers all biochemical oxygen requirements; BOD is a five-day test, where a portion of the ammonia is typically nitrified. Using BOD and Ammonia (NH_3) loading for biological treatment design, versus cBOD and ammonia, is potentially double accounting for a portion of the oxygen consumption associated with nitrification. It is recommended that when biological treatment upgrades are being designed, a consistent approach to organics is used.

In the discussion regarding salinity effects on bacteria, a distinction should be made regarding the type of treatment and negative effects (inactivation) on bacteria due to salinity changes. The inactivation versus salinity change data presented is related to observations from activated sludge (suspended bacteria) systems, including MBR; however, biofilm based treatment systems (MBBR and fixed film processes) may have a much higher tolerance to salinity changes, based on observations made with oxidizing chemicals (disinfectants). This should be investigated, because it may suggest that biofilms have an advantage over activated sludge systems (Option 3) in this instance. This can be validated by observing any step changes in effluent cBOD following peak salinity events, and the durations of subsequent recovery periods. It should be noted that routine WWTP performance does not appear to be impacted at the average 3,000 mg/L salinity level. We agree that the Town should investigate areas of the collection system where significant inflow of seawater may be occurring at high tide events.

We are in agreement that salinity will have an effect on polymer performance; however, it is not quantitatively established what the performance impacts are relative to the salinity peaks observed at the WWTP. As part of the DAF assessment process, polymer trials should be conducted to identify salinity threshold levels for DAF performance, and/or alternative polymers that perform better in higher salinity wastewaters.

Low ultraviolet transmittance (UVT) is discussed briefly and the impact of potential industrial discharges. While the data suggests that the typical effluent UVT is well below the existing UV system design value, there appears to be only a limited number (five) of data points taken over a relatively short time span. The Town should monitor UVT on a regular basis to trend how it fluctuates seasonally. It is our understanding that the Town is planning to install additional UV equipment under a separate project; this seasonal data would be beneficial in identifying times where the second bank could be turned off to reduce operational (power) costs. A UVT analyzer can be considered with the procurement of additional UV equipment.

The driver for expansion of the UV disinfection system may be premature, pending potential performance improvements in the operation of the DAF process. Dillon recommends that UV expansion not occur until a new baseline for DAF operation is established following optimization efforts.

In addition to the potential plant upgrades, conformance to applicable Town wastewater bylaws should be strictly enforced going forward. This could include WWTP influent composite (24 hours) or grab samples. During Dillon's site visit surface residue from an unknown substance that was released to the sewer in the summer of 2019 was still visible in some areas of the plant, along with a high level of oil and grease deposits. This further supports the need for a rigorous bylaw enforcement and public awareness.

3.2: Upgrade Options

Elevated corrosion is apparent through a review of the plant's visual physical condition that may be the result of elevated salinity in the wastewater based on the community's proximity to the ocean and salinity data. The corrosion may also be related to historic sulfide levels in the headworks and MBBR buildings that may now be mitigated with enhanced ventilation rates. As instantaneous salinity is difficult/impractical to measure directly, the plant could consider installing a conductivity meter. Conductivity levels can be correlated to salinity concentrations, and if an analyzer is installed it could trend data on how salinity is related to tidal and storm events, and impacting the treatment process. High grade steel, such as 316L, or fiberglass reinforced plastic (FRP) where appropriate could extend equipment lifespans and reduce the impacts of salinity. Materials selection for the Headworks and MBBR areas should be carefully considered for upgrade projects.

Elevated salinity in wastewater is not feasible to treat at the municipal level, and involves either membrane treatment (e.g. reverse osmosis) or evaporation; both of these technologies generate high salinity waste streams, and are not recommended for small communities such as Lunenburg. Unfortunately, salinity can also inhibit biological activity and aeration efficiency, and therefore biological treatment performance, so unless significant improvements in the collection system are planned in the near term (e.g. 5 years), the design basis for treatment plant modifications should reflect this parameter. Based on anticipated climate change patterns, the risk of seawater inflow to the collection system will not go away without sewer upgrades to identify and repair leaks.

It is not known if the materials selected for the original aeration system in 2003 were based on a value engineering approach, with less costly but less corrosion resistant materials selected. If this was the case, then the aeration system piping materials have now reached the end of their normal life expectancy and require replacement.

This situation would have been the same regardless of the treatment process. Typical material selection for the aeration system piping is stainless steel; it appears that a galvanized steel was used for original construction.

CBCL recommends that the plant upgrades/replacement be completed under one project, rather than piecemealing together or completing in phases. While generally accurate and preferred from an overall engineering/life cycle cost approach, this execution is not always feasible for a small municipal entity to undertake without significant provincial/federal funding, which can be intermittent and hard to predict based on elections and political focuses. Furthermore, it is not recommended in situations where one or more components in a system are not performing to expectations and requires a systematic evaluation to determine the prioritization of upgrades; replacement of multiple system components at the same time can result in unnecessary spending.

Option 1: Capital Maintenance of Existing Process

This option includes replacing the floating MBBR media with a Fixed Activated Sludge (FAS) process, and retaining the existing DAF process. Dillon assumes this technology option is IFAS (Integrated fixed film activated sludge process). Additional components of option 1 include:

- Replace the existing influent screen;
- Instrumentation upgrades (air flows, influent salinity, effluent TSS);
- New DAF recirculation pumps;
- DAF optimization by the manufacturer;
- Replace polymer system;
- Add additional UV capacity; and
- New emergency generator.

Based on the ability of the existing MBBR system to meet regulatory limits even with deteriorated media (except for occasional exceedances of cBOD that may be related to operational upsets and/or poor DAF performance), Dillon does not support changing to a new IFAS process, which includes new media modules, aeration piping, valves and diffusers. The IFAS process is a relatively new process that combines aspects of activated sludge and biofilm (fixed film) treatment. The IFAS process can use either fixed-in-place media, or dispersed media (same as MBBR process). The important aspect of the media is to provide adequate surface area for growth of bacteria biofilm; this is the same principle as the existing MBBR process. The IFAS process has been used to increase treatment capacity at existing conventional activated sludge (CAS) plants, but less commonly used for new-build facilities. IFAS conversions also allow increased nitrification/denitrification performance when existing plants have effluent ammonia or total nitrogen limitations.

The existing MBBR floating media is still achieving performance targets, and supports the same biofilm as a new IFAS process would. Although worn media may be a concern aesthetically, treatment performance should be the primary performance indicator. We feel it is much less costly to replace a portion of the MBBR media annually in order to maintain a target biofilm surface area. Essentially, media attrition becomes an operational cost. If the existing 15 year old media still provides adequate biofilm surface area for treatment purposes in its 'worn' state, we disagree that the MBBR process should be replaced with the IFAS process, which is operationally more complex compared to the MBBR process.

A new IFAS process will have similar operational issues as the existing MBBR process, particularly with respect to the DAF process. If the DAF process is not upgraded as a component of this FAS option, then it is not considered feasible. Therefore, improving DAF performance should be the priority activity related to this option. If DAF operation cannot be improved, then this option should not be considered further.

An alternative to this option is to consider upgrading the existing MBBR media to one that is more commonly used in the wastewater industry currently. At the time when the Lunenburg WWTP was designed, the original Kaldnes MBBR system, including their media, was likely still under patent protection. Variants of the Kaldnes media, which is much smaller and has a higher surface area to volume ratio compared to the media used at Lunenburg, is now widely available in the marketplace. Conversion to the smaller Kaldnes-type media would require replacement of the media retention screens with smaller openings; however, it may be possible to achieve MMBR treatment in only one of the two MBBR trains at Lunenburg due to the increased media surface area. This cost for this option may be offset by reduced operational costs. The Kaldnes media is also more robust than the media currently used in Lunenburg; original MBBR plants are still operational after 30 years using the original media. This topic will be discussed further under 'Option 2'.

Replacement of the existing influent screen at this time should be considered on its own merits, and not included in any of the upgrade options. Capital versus operational costs should be considered relative to screen improvements. We also recommend that the screen manufacturer be brought to site to inspect the unit, and provide recommendations for maintenance repairs or upgrades that may extend life expectancy. The screen has a life expectancy of 20+ years depending on maintenance, so planned replacement around 2023 is not unrealistic based on an asset management planning approach. If government funding is available on a cost-sharing basis, then screen replacement or upgrade may be justified based on remaining life expectancy.

Dillon agrees with the recommended instrumentation upgrades. However, consideration should be made to exclude the air flow measurements, and instead use daily dissolved oxygen readings for process control.

We recommend that the replacement of the DAF recirculation pumps and polymer system be considered as part of the overall DAF performance assessment by the manufacturer.

Installation of additional UV disinfection capacity should be deferred until DAF performance is optimized. If effluent UVT improves, then the need for additional UV capacity may go away.

Addition of a new emergency generator should first be discussed with the Province, to determine if this will be a regulatory requirement. This decision should be based on the reliability of the electrical grid feeding the WWTP, frequency and duration of outages, regulatory drivers, and cost-benefit.

Option 2: Improve the Existing (MBBR/DAF) System

This option includes upgrading the existing MBBR system with new compact Kaldnes-type media, and replacement of the DAF units. Additional components of option 2 include:

- Replace the existing influent screen;
- Instrumentation upgrades (air flows, influent salinity, effluent TSS);
- Add additional UV capacity; and
- New emergency generator.

This option will require a similar upgrade of the deteriorating aeration system piping, valves, and diffusers as compared to Option 1. An additional required modification will be the replacement of media retaining screens in the MBBR tanks with smaller screen openings to retain the new smaller MBBR media. This option also includes an outright replacement of the DAF units, without additional investigation into the costs to improve the performance similar to Option 1.

Dillon does not support replacing the existing MBBR media with the smaller Kaldnes-type media. The existing MBBR system and media appears to be routinely meeting effluent performance with respect to organics removal, and does not justify a wholesale media change. However, as discussed in the last section, there may be a cost-benefit to media change if one of the two existing MBBR treatment trains can be eliminated. This would mean the aeration system in only one train requires replacement, which represents a potential cost savings. This could also provide operating cost savings.

Dillon does not recommend the replacement of the existing DAF units without first determining whether or not it is feasible for modifications to improve their performance. Investigating the performance issues with the DAF process and

potential solutions should be the number one priority to realize maximum benefit of this existing asset.

In Dillon's opinion and experience with the MBBR process, the DAF performance in Lunenburg is questionable and should be further investigated. Successful operation of the DAF unit is critical to overall MBBR system operations. Batch operation and associated high flows to the DAF may be creating disruptive flow patterns that cause turbulence and short-circuiting, which impact DAF separation performance. This issue potentially correlates to the observation of micro bubble, suspended solids and polymer carryover in the DAF effluent. We understand that batch operation and the associated high flow rate was established to maintain a target operating level in the DAF for operational reasons; however, DAF modifications to allow continuous operation under variable flow conditions should be investigated with the manufacturer. It is likely that modifications to the existing units will increase their performance, and overall reliability of the WWTP effluent quality.

On the day of the Dillon site visit, we observed that only one DAF units was operating, with significant turbulence. It is not known if there is a reason for running the DAFs as alternating duty/standby service, but these units should be operating in parallel if possible to reduce the hydraulic loading rate to any one unit. We also noted that there is a 'Continuous – Operation' selector in the plant PLC for the DAF; however, this mode is likely not used based on the above discussion regarding maintaining an optimal high flow in the DAF for operational purposes. Ideal operating conditions for the DAF units include continuous flow, with both units operating in parallel to maximize residence time for separation efficiency.

Inadequate mixing of the polymer prior to entering the DAF could also be contributing to performance issues. An inline mixer, pipe flocculator or mixing tank immediately upstream of the DAF could improve performance at relatively minimal capital cost. Options for integrated upstream polymer mixing can be discussed with the DAF manufacturer.

During our site visit the plant's operator indicated that polymer jar testing for the DAF had recently been completed by a third party. As the polymer dosage is primarily based on flow to the DAF, the impacts of solids loading should also be considered. At a plant this size, jar testing should be completed by operators at a minimum of once per month, ideally weekly. Some industrial plants perform jar tests multiple times a week to optimize polymer dose and reduce operational costs. Dillon recommends that additional polymer trials be conducted, that include salinity as a variable. Seawater can be added to the secondary effluent samples to simulate varying degrees of seawater intrusion that is being observed in the collection system. This testing will allow the operating team to make informed decisions regarding polymer selection and dose versus salinity level. This testing may also identify alternate polymer products that offer improved performance over a broader salinity range. This work is

strongly recommended to improve DAF performance, particularly with the increased risk that climate change will increase the frequency of seawater intrusion events in the collection system.

Replacement of the existing influent screen at this time should be considered on its own merits, and not necessarily included in any of the upgrade options. Capital versus operational costs should be considered relative to screen improvements. We also recommend that the screen manufacturer be brought to site to inspect the unit, and provide recommendations for maintenance repairs or upgrades that may extend life expectancy. The screen has a life expectancy of 20+ years depending on maintenance, so planned replacement around 2023 is not unrealistic based on an asset management planning approach. If government funding is available on a cost-sharing basis, then screen replacement or upgrade may be justified based on remaining life expectancy, which will be discussed in a later section of this report.

As stated above, Dillon agrees with the recommended instrumentation upgrades. However, consideration should be made to exclude the air flow measurements, and instead use daily dissolved oxygen readings for process control.

Installation of additional UV disinfection capacity should be deferred until DAF performance is optimized. If effluent UVT improves, then the need for additional UV capacity may go away. However, if government funding is available on a cost-sharing basis, then this upgrade may be justified from an economic perspective. The presence of residual bubbles from the poorly-functioning DAF may also be contributing to UVT issues; the presence of these bubbles can scatter light, reducing disinfection efficacy.

Similar to option 1, the addition of a new emergency generator should first be discussed with the Province, to determine if this will be a regulatory requirement. This decision should be based on the reliability of the electrical grid feeding the WWTP, frequency and duration of outages, regulatory drivers, and cost-benefit.

Option 3: Replace with MBR Process

This option includes replacing the existing MBBR system with a new membrane bioreactor (MBR) treatment system. This process would reuse the existing MBBR tankage in addition to new tankage to house the MBR equipment. We agree that this option will provide a high quality effluent that will reliably meet all regulatory limits, and reduce the risk of outfall episodes. With the MBR system, the existing DAF system would no longer be required. Additional components of option 3 include:

- Replace the existing influent screen;
- Instrumentation upgrades (air flows, influent salinity, effluent TSS);
- New drum screen for the MBR system;
- Add additional UV capacity; and
- New emergency generator.

MBR is a proven process with high quality effluent results, and is typically used for water re-use applications (e.g. irrigation water). The membranes provide very fine filtration of the effluent, effectively removing most suspended solids. However, MBRs have a high lifecycle cost relative to other options and requires a higher level of operator attention compared to the existing plant process. In addition, the membranes can be susceptible to foulants in the wastewater that can damage the membrane material. The operations staff noted an event in 2019 where an unknown paint-like substance passed through the WWTP, coating surfaces. An event like this could severely upset an MBR system, with potential costly replacement of the membranes required.

In addition, Dillon observed significant oil and grease through the WWTP, which can result in increased operational costs associated with chemical cleaning frequency of the membranes. If this option is selected, the Town will need to evaluate sewer bylaw enforcement and community outreach so risks of illegal dumping and oil and grease trap maintenance are well understood.

The MBR building will require dedicated air handling systems and odour control; it may be possible to connect this to the existing biofiliter, but it is unclear if it has capacity.

Dillon does not recommend proceeding with this option at this time, until effort has been made to optimize the existing MBBR and DAF systems, as discussed in the previous sections. This option represents a high capital and operating cost scenario, which may be difficult for the Town to accommodate.

Replacement of the existing influent screen at this time should be considered on its own merits, and not necessarily included in any of the upgrade options. Capital versus operational costs should be considered relative to screen improvements. We also recommend that the screen manufacturer be brought to site to inspect the unit, and provide recommendations for maintenance repairs or upgrades that may extend life expectancy. The screen has a life expectancy of 20+ years depending on maintenance, so planned replacement around 2023 is not unrealistic based on an asset management planning approach. If government funding is available on a cost-sharing basis, then screen replacement or upgrade may be justified based on remaining life expectancy, which will be discussed in a later section of this report.

Dillon agrees with the recommended instrumentation upgrades. However, consideration should be made to exclude the air flow measurements, and instead use daily dissolved oxygen readings for process control.

Installation of additional UV disinfection capacity should be deferred until DAF performance is optimized. If effluent UVT improves, then the need for additional UV capacity may go away. However, if government funding is available on a cost-sharing basis, then this upgrade may be justified from an economic perspective. Additional

UV disinfection capacity should be deferred until new DAF unit performance is validated, or existing DAF system performance is optimized. If effluent UVT improves, then the need for additional UV capacity may go away. The presence of residual bubbles from the poorly-functioning DAF may also be contributing to UVT issues; the presence of these bubbles can scatter light, reducing disinfection efficacy.

Addition of a new emergency generator should first be discussed with the Province, to determine if this will be a regulatory requirement. This decision should be based on the reliability of the electrical grid feeding the WWTP, frequency and duration of outages, regulatory drivers, and cost-benefit.

Supplemental Option A: Extend Existing Outfall

The existing outfall location under Fisherman's Wharf is a non-ideal location given the plant's history with process upsets, poor apparent mixing, proximity to public use and media coverage. Extending the outfall beyond public view will also improve mixing and reduce the public health risk associated with effluent contact.

Dillon views this option as one of the highest priorities for the Town. All WWTPs have upsets from time-to-time, and having the effluent discharge in clear view of the public with minimal mixing is not ideal. The current situation with polymer carryover is an example where the public can observe visual clues and assume a worst case scenario. The media is typically very quick to report on issues and perceptions, which generates mistrust of the Town's operations, which is not desirable. Even if the Town can successfully optimize the existing MBBR process and reliability to improve effluent quality, we still recommend relocating the outfall to a more suitable location in the harbor.

Chapter 4: Cost Estimates

In making capital decisions, the Town should be fully aware of the level of estimate completed. CBCL refers to their estimate as "Class D", which appears appropriate given the level of engineering described in their report. However, this level of estimate is, by definition, at best accurate to ±30% for complex engineering projects such as retrofits like this, depending on the level of engineering design completed. When evaluating and making decisions at the conceptual stage, the upper range of the estimate accuracy should be used for whichever option is selected to avoid project funding issues during implementation.

Background information/details related to the development of CBCL's cost estimates were not provided, so our commentary focuses around our professional judgement, capital work on previous plants and the cost presented in 4.1, 4.2 and 4.33.

The three contingencies (design development, construction and engineering) presented are appropriate for this stage of engineering. In some cases for more

complex projects the construction contingency may be increased to 15%; likewise for the engineering allowance, especially if in-depth background studies or full-time construction inspection are required.

Installation costs appear to be based as a percentage of equipment costs, which is standard practice for this level of project. The general mechanical & electrical allowances appear suitable for new construction, however retrofits are typically more expensive. The percentage factors for these items should be reviewed and possibly increased by 5-15%.

CAPITAL COST ESTIMATES

Option 1: Capital Maintenance of Existing Process

It is unclear from the report what the $69,000 Site Works cost is for. All of the work, with the exception of the new generator, appear to be inside the existing plant.

As discussed in this report, we do not feel that replacing the MBBR media with a fixed in place media is warranted, and the associated cost should be utilized towards MBBR media top-up instead.

Option 2: Improve the Existing System

It is unclear from the report what the $177,000 Site Works cost is for, since the work will be contained within the existing plant building and tanks. The equipment costs and associated M&E allowances appear suitable for a full MBBR media and DAF replacement. However as discussed previously, a full DAF replacement may not be required.

Option 3: Replace with MBR Process

Due to the high quality effluent produced by an MBR, the additional UV bank may not be required under this option. However, it is understood that the UV upgrade may proceed ahead of any major plant project, and hence why it was considered under this option as well.

MBR equipment costs can vary dramatically based on the supplier, quality and type (flat plate versus hollow fibre). Acknowledging the legacy issues surrounding the topic of wastewater treatment in the Town, we would recommend that if Option 3 is pursued, a high quality product be purchased. Based on our historical work, the equipment costs for such an MBR product this scale may be as much as double the $2M allowance currently budgeted. This will have a trickledown effect and increase the subsequent construction and design related costs. However, if the Town is willing

to procure a system from a smaller manufacturer, and CBCL has based their estimates on vendor quotations, the estimated process equipment costs are reasonable.

Supplemental Option A: Extend Existing Outfall

No drawing was provided by CBCL as part of this option, however ABL Environmental completed a study in 2014 that considered outfall extension options. This section of the CBCL report seems to build on the ABL work, and notes that it is based on 920 m of 400 mm ⌀ HDPE pipe placed along the bottom of the harbor. This equates to approximately $1,200/m for installed outfall piping. CBCL acknowledges that this option was only evaluated at a high level, so it is recommended that this estimate not be considered a "Class D" level of estimate and carry an even higher cost safety factor. For outfall installation, especially in populated waters such as Lunenburg's, it can often be as high as $2,500 – $5,000/m.

As noted in the CBCL report, the outfall cost estimate does not include pumping upgrades that may be required to manage the additional headloss associated with the outfall extension, or what onshore outfall piping modifications may be required.

Regulatory assistance requirements with in-water work are often extensive, and may require an updated Environmental Risk Assessment.

Under the assumption of ABL's Option 3 (longest extension) and our previous experience, Dillon recommends that a minimum of $3,000,000 plus HST should be budgeted for design, permitting and construction of an outfall extension at this stage until detailed engineering and more accurate cost estimates can be completed.

OPERATIONAL COST ESTIMATES

Background information from current operations (e.g. chemicals, labour, parts and equipment, and power) was not presented in the CBCL report, so each option in Table 4.2 was reviewed for general accuracy based on the breakdown provided. The total current annual operational costs is understood to be $438,000. Options 1 and 2 appear adequately costed at this preliminary stage.

The operational cost for Option 3 appears low in our opinion. Additional chemicals to clean and maintain the MBR will be required, and the $3,000 current allowance is too low. We assume that the power consumption was based on a calculation of motor sizes and run times, however we would expect for an MBR plant of this size with new air scour blowers and membrane feed/vacuum pumps that costs will exceed the $241,000 allowance for power (increase of $42K over current operations). It is not clear how the operating costs cover membrane replacement, which is expected approximately once every 7 years.

Dillon recommends an annual allowance be included under each item for routine capital investment. This is typically 1% of the major equipment capital cost. It is not clear if this has been included under the category 'Supplies/Equipment/Parts'.

LIFECYCLE COST ESTIMATES

The approach used by CBCL for lifecycle costs is consistent with industry standards. The dollar values that input into the calculation could be modified as discussed previously, which would impact the LCC per option. This has the possibility of increasing the overall Net Present Value (NPV) of Option 3 above the $16M presented.

The report suggests that the capital costs be inflated 3% per annum for each year the project is delayed beyond 2019. This is representative of typical increases in construction costs year-year, but does not account for the larger price increase in construction projects associated with government funding cycles. Due to the amount of capital projects during these years, contractor resources become limited and tendered bids can increase significantly as a result. If the majority of this project is to be federally funded, the capital estimates should be increased, or a contingency added, to reflect this potential market risks.

An allowance should also be included for major capital overhaul under each option. This depends on the type of equipment, but typically occurs around years 10-15. Typically this value is 20% of the major equipment capital cost. The MBR option (#3) will require complete replacement of membranes, typically every 7 years, depending on how they are maintained. The CBCL report does not specifically identify this cost in Table 4.2. However, over a 25-year life cycle analysis, 3 membrane replacement events should be considered at years 7, 14 and 21.

Chapter 5: Scoring of Options

The method utilized by CBCL is a common way of evaluating non-financial factors. It can be somewhat subjective, and as such is best used to eliminate options to create a shortlist rather than identify the preferred path, unless the rating discrepancy is significant. Dillon normally recommends that clients participate directly in the development of scoring methodology, including topics and their weighting.

Table 5-1 Scoring of Options

When using this method of scoring, it is also typical to have a "Very Poor" (1) and "Excellent" (5) rating for each factor, unless it is qualitative. "Operation's Cost" factor is a quantitative attribute, of which Option 3 should be a 1. Option 3 also received a very high rating for ease of operations, however MBRs can be quite complex to operate and require increased maintenance associated with chemical cleaning.

Option 3 also scored higher than Option 2 on Ease of Implementation, presumably because of the ability to operate the existing process while the new MBR building is built. However, if Option 2 is selected it could also be completed in a similar fashion as each of the main processes have two trains. There would be a risk to effluent quality should this main train experience issues during construction, but if Option 2 is selected it would be a relatively short duration upset.

Process performance is critical to wastewater operations; however, this table does not directly take into account risk to the public. Under an outfall extension scenario, any process performance upsets with visible aesthetic changes will be largely mitigated by distance from the outfall to public receptors, and improved mixing/dilution. There would still be a need to maintain effluent quality with respect to Provincial requirements, but this would be regulatory driven rather than publically perception.

Table 5-2 Weighted Scoring of Options

The weighting related to Operations Cost and Capital Cost should be reviewed against the funding method for the project. Under federal programs where the municipality pays a relatively small (e.g. 30%) portion of the capital cost, it may be in the Town's interest to select an option that has a lower operational cost but carries a higher capital cost. These scenarios could be explored further by incorporating a capital discount value to each option.

General Discussion

The CBCL report provides three potential options for the Town of Lunenburg related to improving operations at the WWTP. These options include a mix of comprehensive upgrades, with associated capital expenditures, that may not be prioritized to meet the Town's economic situation. The approach of comparing three options is commonly applied by engineering consultants to compare technology alternatives; however, it is not always the best approach where an existing process has operational challenges, which could be resolved/improved by more aggressive operational troubleshooting and relatively low cost modifications.

Options 1 and 2 in the CBCL both include variants on improving the existing MBBR system, including replacement of the current MBBR media with either fixed media or new smaller MBBR media, and either optimizing or replacing the existing DAF process. Rather than have only two options to assess, Dillon recommends that the Town implement a decision-making tool that can be used to guide the Town through the process of upgrades to improve plant operations.

Dillon has identified the DAF process as the key priority for improving performance of the existing MBBR plant, and recommends that troubleshooting efforts initially focus on DAF improvements through operational changes and/or modification coordinated with the DAF manufacturer. In this case, a progressive approach to WWTP evaluation and modifications may provide best value for the Town, and maximize reuse of existing assets.

Dillon has prepared an example of a decision-making flow chart in Figure 1 to show how engineering activities can be prioritized in a plan to realize improved treatment performance. We feel that the current MBBR/DAF process, which is approximately 15 years old, still has significant residual asset value for the Town; replacing the MBBR with a new and expensive process (Option 3) should be deferred until improvements to the DAF system are fully explored. If upgrades to the existing DAF units is not feasible, then Option 3 should be compared to DAF replacement with new units capable of operation under continuous flow conditions, which should still be a lower-cost alternative. Since the MBBR process still appears to achieve performance objectives, we do not feel that changing to a different media type (IFAS or smaller MBBR media) should be considered unless there are clear financial drivers. An annual addition of MBBR media to account for media wear and attrition should be considered.

Dillon also recommends that the Town prioritize the extension of the existing outfall from the current location, as previously explored by the Town. The WWTP plant will at risk of occasional performance upsets regardless of the treatment process, and the residents and media now have a heightened awareness of the outfall location.

The Town should also monitor any potential regulatory changes (such as more stringent nutrient limits). MBBR technology can be adjusted through the addition of more air, media and (if necessary) reactor tanks to reduce TKN, and TP through the addition of chemical precipitation. Dillon noted that the amount of media in the existing MBBR reactor appears to be relatively low; additional treatment capacity, including nitrification, could be achieved with increased media content.

If there is concern at the political level that the MBBR process has an associated high risk to the Town in the future, then we suggest that Town representatives visit one or more municipalities where MBBR is used successfully, to evaluate if an upgraded and well-run MBBR process will meet Town expectations.

Additional upgrades have been included in all CBCL Options, which Dillon has separated in Figure 1 under the title: 'Maintenance' and 'Optional'. Maintenance-related activities are considered to be required if the WWTP system was operating as expected and had a long remaining life. This includes safety related upgrades, aeration system piping upgrades, MBBR media top-up, and influent screen maintenance. These maintenance items should be planned as an operational cost.

However, depending on funding opportunities, it may be worthwhile for the Town to perform these upgrades with a capital project.

If the Town wishes to develop costs that reflect Dillon commentary in this report, it would be a modification of Option 1; This Option will be referred to as Option 4. This option would involve the following key components related to plant operation:

- Retaining and topping up the existing MBBR media;
- Replacing the aeration system piping;
- DAF operational assessment, including polymer salinity trials;
- DAF upgrades, or new DAF units;
- UV upgrade if required following DAF upgrades; and
- Outfall extension.

Under Option 4, the influent screen replacement is a decision that the Town must make based on economics, including an assessment of operational costs, existing condition and remaining life expectancy. Similarly, including the emergency generator and enhanced instrumentation should be decided on a cost benefit approach. If funding is available to the Town, procurement of additional spare MBBR media can be considered for future years.

The costs presented are generally appropriate for this conceptual stage of engineering; however, Dillon recommends increasing several of the operational and capital costs. We have also provided estimating qualifications so that the Town fully understands the level of accuracy and upper ranges of the current estimates. Full project endorsement should not be given to a large capital investment until a more refined estimate and associated design is completed, in order to help the Town best execute a project. In our opinion, there is still significant asset value in the existing plant systems and the Town's objectives can be met following a more phased approach to system evaluation and decision making rather than complete plant overhaul as a single project scope.

Dillon Recommendations and Next Steps

The following course of action is recommended for consideration by the Town:

1. Identify WWTP upgrades that are associated with worker safety (e.g. grating, handrails, air quality). Consider a H_2S sensor/alarm in the headworks building;
2. Proceed with next engineering steps and initiate regulatory discussion for outfall extension;
3. Perform microscopic examination of MBBR reactors to determine if filamentous bacteria are present;
4. Replace MBBR aeration system. Consideration should be given to material selection, life expectancy, and life cycle cost. Estimate media volume when tanks are drained;
5. Top up MBBR media;

6. Engage Suez (DAF manufacturer) to explore options to improve DAF performance. This will include costing of modifications as well as the cost of new DAF units;
7. Perform regular polymer trials as part of DAF optimization. Testing should include an evaluation of salinity effects and limitations for different chemical products;
8. Based on DAF study, proceed with DAF modifications, or consider new DAF units;
9. Evaluate adding capacity of UV disinfection following DAF optimization, when a new baseline for plant UVT is established;
10. Assess optional instrumentation upgrades using a cost-benefit approach. Consider the likelihood of whether the operations' team will use the additional data for operational optimization, operational cost savings, or risk reduction;
11. Rigorous testing and enforcement of sewer bylaw, coupled with a public awareness program;
12. Continue to collect influent, effluent and flow data to better support future operations and design effort; and
13. Implement or increase annual capital maintenance budgeting to account for more routine "wear and tear" upkeep.

The Town can add an additional option (Option 4) for cost estimating. Option 4, as discussed in this report, represents the low cost alternative to improving WWTP performance with maximum reuse of existing plant assets. Option 4 includes extension of the outfall, which is not included in the CBCL options; however, Dillon recommends outfall extension for all upgrade options.

Closing

We trust this information meets your requirements. If you have any questions regarding this report, please contact the undersigned at your convenience.

Yours truly,

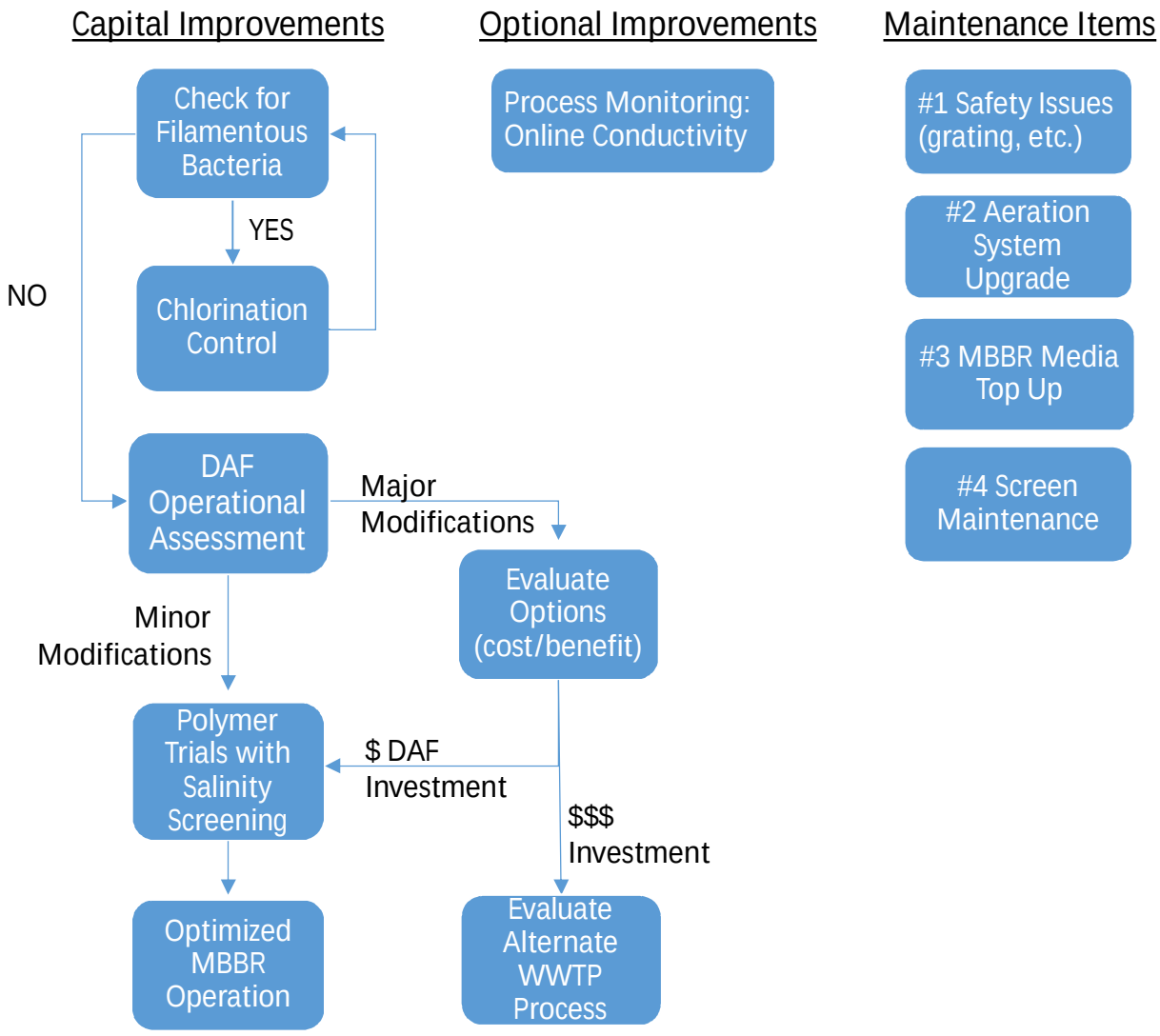
DILLON CONSULTING LIMITED

Dave McKenna, M.Eng., P.Eng.
Wastewater Engineering Technical Lead

Kyle MacIntyre, P.Eng.
Water/Wastewater Engineer

KRM:jes
Our File: 19-1650-1000

Figure 1: Decision Flow Chart



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MEMORANDUM

DATE: 24-FEB-2020

PROJECT NO: 190805.04

MEMO TO	Bea Renton, CAO
SUBJECT	Response to Lunenburg Wastewater Treatment Plant Report - Peer Review
FROM	Mike Abbott, Vice President, Water Treatment
COPIES TO	Ian Tillard, P.Eng.; Sarah Ensslin, P.Eng.

At the request of the Town of Lunenburg, Dillon Consulting Limited submitted a report on December 11, 2019, containing their findings on the Lunenburg Wastewater Treatment Plant Report. We have reviewed the response and offer the following to summarize the current project status.

- We see no fundamental difference to our report recommendations based on the comments provided in the Dillon report. Both reports identify utilizing the MBBR process as the preferred long term process solution. The Dillon report did provide a revised course of action based on a revised objective that included prioritizing options that minimize capital spending in the short term due to a belief that multiple small increments of funding would be easier to secure than those required for larger capital projects. This approach would see an incremental improvement at the plant, project by project, as various sources of funding were applied for, approved, and then implemented.

- The CBCL report did not consider an incremental approach as it was required to compare various options that would address all concerns such that the path forward could be identified. The objective of the report was to provide capital estimates that the Town could utilize to secure project funding under an infrastructure program that is designed for large capital projects. We understand that the Town did not submit an application under the infrastructure program.

- Phased implementation is always a fall back option when funding for the entire project cannot be secured and there are high priority items that must be addressed in the short term. In fact, we are currently implementing bioreactor aeration upgrades which is a good example of the type of project that would result from the incremental approach.

- We understand that the current status of the project is that the Town has applied for and received PCAP funding of $135,000 based on a total preliminary design project budget of $270,000. Therefore, we offer the following as our recommended path forward:

- *Move forward with the preliminary design of CBCL Option 2, Upgrade Existing Process (as recommended in the original CBCL study). Include the following scope items as part of the preliminary design study:*
  - *Identification of sources of sea water into the wastewater collection system and the preliminary design of solutions to reduce seawater inflow;*
  - *Update/Confirm that the existing preliminary design of the outfall is suitable for implementation. Revise details and costs as necessary to prepare for detailed design;*
  - *Include specific process recommendations from suppliers of MBBR/DAF equipment within the preliminary design. Secure budget quotations that include process upgrades that will result in a single supplier accepting responsibility for the performance of the MBBR/Clarification process.*
  - *Identify budgets for implementing the project all at once or incrementally.*
- *Advance the detailed design/implementation of the seawater inflow solutions as soon as projects are identified.*
- *Advance the detailed design/implementation of the outfall extension following confirmation of the preliminary design and budgets.*
- *Apply for funding for the treatment plant upgrade. Make decisions based on implementation after funding amounts are identified.*

Please call me if you wish to discuss the above. We would be pleased to provide additional details and/or budgets to pursue the recommended approach, at your request. We are keenly aware of the Town's efforts in improving plant performance on an accelerated timeline to address regulator concerns. Therefore, in addition to the general comments provided above, we have also included an appendix where some more specific responses to the Dillon comments are provided, organized by unit process. These are provided to help the Town deal with areas where the Dillon plan may appear to diverge from the current approach.

Regards,

Mike

Appendix

Headworks
The Peer Review states that the screen replacement should "be considered on its own merits". The screen performance is currently poor and causes expensive maintenance issues in the grit tank. I believe that replacement could be easily justified at this time, even in the absence of a change in plant process.

Surface Area of Media in Moving Bed Bioreactor (MBBR)
The Peer Review states that "Dillon has assumed that existing MBBR has adequate remaining media surface area to support biological treatment". We agree that the media surface area is adequate in autumn, winter and spring, but we believe that it is not adequate in summer, because it does not consistently meet effluent criteria at this time of year. During the summer, the plant performance often struggles and we believe this is likely due to elevated biological load which the plant does not have sufficient capacity to treat. This apparent shortfall in biological treatment capacity is why it is so important to replace the aeration and add media, in order to increase the actual capacity of the biological treatment process. The illegal discharge experienced in summer 2019 may contribute to this but it is unlikely to be the only factor. The plant was also non-compliant in 2018 for BOD.

Reuse of Existing Media
The Peer Review states that adding to the existing media can be reasonably viewed as an operating expense. From an economic perspective, this is likely true, but from an environmental perspective, it would be preferable not to be continuously sloughing small pieces of plastic into the effluent, and to use media which does not require frequent replacement. The Peer Review questioned whether it would be possible to use just one train of the MBBR if the media was changed to Kaldnes-type media. The Kaldnes media supplier (Veolia) did not recommend this, and it would give no redundancy.

DAF Units
The recirculation pumps were replaced following Dorian, so the bubble quality may have already improved. We agree that there appears to be ongoing bubble release in the UV channel, and that this may indicate that there is not enough residence time in the DAFs. We agree that polymer trials with different salinity would be useful, even in the short term, and that improving DAF performance is a priority activity, again, even in the short term. We recommend tresting continuous operation of the DAFs to see if performance can be improved in this way. We discussed this option with the DAF supplier (Poseidon/Suez) and they said that this would be more typical than batch operation. Suez could make a site visit to check into the performance and settings, and we have a budget quote for this.

The Peer Review recommended doing more frequent jar tests of polymer performance, which we support, but this requires SCADA modifications to allow the actual dose to be adjusted based on the test results. We are currently looking into how to do these modifications.

UV Performance
We agree with the recommendation of purchasing a UVT analyzer. The Peer Review assessment that the UVT may improve with the improvement in biological and DAF performance is possible, but if it does not improve enough, then the additional UV treatment capacity will still be required.

Outfall Extension
The Peer Review recommends outfall extension as the first priority. The outfall is in a very poor position, and in general, it should be moved. However, we would suggest that removal of salt

water from the collection system be considered as a higher priority than the outfall extension st this time.

Safety Improvements

We agree with these recommendations, though the purpose of our report in the RFP was to identify ways to improve effluent quality. Gratings and handrails in a number of places in the plant are in poor condition. Corrosion-resistant replacements should be considered where appropriate. We also agree with more H2S monitoring as a priority upgrade.

Document No: 7
Meeting: December 1, 2020
Council
Circulate: Council,
File: Wastewater Plant

M E M O R A N D U M

TO: **TOWN COUNCIL**

FROM: **IAN TILLARD, ENGINEERING CONSULTANT**

DATE: **DECEMBER 1, 2020**

RE: **SUPPLEMENTAL REPORT TO COUNCIL - WASTEWATER TREATMENT PLANT AND OUTFALL EXTENSION PROJECT UPDATE**

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1. SUPPLEMENTAL REPORT

Subsequent to the discussion at the council meeting of 24 November 2020, this Supplemental Report provides a revised recommendation with the intent of providing council with the information to enable passing of a proposed revised motion.

There are a number of outstanding questions and the best way to deal with the questions is to have more detailed information. We are proposing to revise the RFP scope of work to include the MBR technology which will enable this technology to be included in the final decision making process at the end of the pre-design phase.. This will enable better decision making and a higher level of confidence in the final selection. To support this, the RFP will provide have the following terms of reference;

a. Preliminary design of repairs and upgrades which need to be done to the existing plant for the short term to ensure continued reliable operation that meets regulatory requirements
b. Predesign of the outfall extension, considering two routing options.
c. Predesign of expanded WWTP to treat 50% additional load, considering a minimum of two options, one of which must be a Membrane Bioreactor.
d. Provide information on the scope, cost and impact of each option to enable an informed decision on which option to pursue for the long term solution.
e. Provide information on disruption for the operations such as bypass frequency, duration and construction schedule.
f. Provide detailed information on impacts on operations.

2. SCOPE OF THE REVISED RFP

Short term and Long Term Description

The Preliminary Design will address both short term and long term goals. The short term is identified as the time that the existing plant needs to be operated reliable up to the point of a major plant upgrade. We have selected a time frame of 5 plus years.

Also note that a significant portion of this short term work would be part of a WWTP upgraded plant using the existing process design and less so for a change to an MBR process.

Scope for Short Term Work

- Replace headworks screen and compactor; replace grit and water supply pipework in headworks; and resolve grating and hatch issues.
- Replace Aeration Blowers, and separate air header into two zones.
- Investigate and repair/replace compressor pipework.
- Add online instrumentation and service water supply in Bioreactor building.
- Investigate DAF polymer makedown equipment options to improve polymer handling and dosing control and replace equipment and controls as required.
- Testing results will determine if there are minor upgrades for the DAF units possible or needed
- Testing results will determine if there are upgrades required for the UV disinfection system possible or needed
- Consider a standby generator which may end up as a long term item
- Condition assessment Work required to maintain the facility infrastructure for the next 25 years for all of the facility elements:
    - Structural
    - Civil including flood control
    - Architectural
    - Electrical
    - Mechanical

Scope for Long Term Work

- Expansion plans for future growth of the town. The will include the “permanent” solution for the DAF, bioreactor and UV disinfection system upgrade and associated systems.
- Condition assessment upgrades. Some of the work that is identified in the condition assessment will be short term and some will be long term.
- As some of the long term work would cause significant disruption, the

Scope for the Outfall Extension

The outfall extension has both technical and public acceptance elements. The decision to undertake the extension could be driven by either element. For the technical scope:

- Identify and investigate a minimum of two options for outfall extension, each to a minimum of 1m submergence below LLWLT, and 100 m from shoreline at LLWLT:
    - Extending outfall from its current outfall location.
    - Building new outfall around the Front Harbour by land to a more suitable location.

- Prepare a conceptual dispersion model of the inner Lunenburg Front Harbour to do scenario analysis of the options and the impacts on the Harbour.
- Open preliminary discussions with all relevant regulators to understand what the permitting process involves, and whether one of the possible routes is more straightforward.

Deliverables

The deliverables of the preliminary design process with address the short and long term work and options for the WWTP plant and the outfall extension. The deliverables will have

- Technical descriptions
- Design basis for the short term WWTP work including process and mechanical layouts and sections of all major equipment and all pipework above 50 mm diameter, and revised single line diagram.
- Conceptual level drawings for the long term WWTP options
- Outfall design report including plan and profile drawings of the recommended option.
- Class D probable cost estimates for the short term work and outfall.
- Class E indicative estimates for the long term options
- Conceptual construction schedule
- Description of disruption impact, anticipated bypass requirements and possible mitigation measures.

3. RELATED ACTIVITES

There are a couple of ongoing activities which will have a direct bearing on the predesign work. These are mentioned as a reminder.

- Mitigation measure for salt water intrusion. This is subject to a study which will provide recommendations separate to the main study.
- Storm and sewer separation. There are a few elements to this which are subject to other initiatives.

4. TIMELINES AND CRITICAL PATH

It is our recommendation to keep within the original timeframe that was laid out in our Provincial Capital Asset Program (PCAP) application to engage an engineering firm to develop the predesign for the plant and outfall upgrades. These funds were to be expended by March 31, 2020. In March 2020, the Town requested and was approved for an extension to March 31, 2021. We are seeking an additional extension to June 30, 2021 given this ongoing options review, however, the approval of same has not yet been received from the province.

To support the proposed timeframe, the remaining investigative work which is the salt water intrusion study and the Dalhousie testing will be completed within the proposed schedule and the results will be incorporated in the preliminary design work.

This proposed includes short term measures which are required plant repair/upgrades that will have to be done regardless of how the larger project unfolds. There are systems that are at the end of their design life and hence subject to unexpected failure.

5. FINANCIAL IMPACT

In September 2019 the Town received notification that our Provincial Capital Asset Program (PCAP) application to engage an engineering firm to develop the predesign for the Waste Water Treatment Plant (WWTP) upgrades was successful. The application approval included predesign work for outfall upgrades as well, if required, based on the various WWTP upgrade options being considered by Council. These funds were to be expended by March 31, 2020. In March 2020, the Town requested and was approved for an extension to March 31, 2021. We are seeking an additional extension to June 30, 2021 given this ongoing options review, however, the approval of same has not yet been received from the province.

The total budget for the predesign work is $270,000, funded 50% from PCAP and 50% from the Town's Gas Tax Fund allocation. A portion of these funds were allocated for the background studies described above, preparation of the RFP document and contingency funds. There is an upset limit for the RFP award of $200,000 plus HST.

6. STRATEGIC PLAN RELEVANCE

The Wastewater Treatment Plant predesign engineering work outlined in this report addresses a central component of the Town's Comprehensive Community Plan Strategic Direction Goals – 3. Servicing and Facilities.

7. PROPOSED PATH FORWARD AND MOTION

Proceed with the preliminary design. At the end of this process the technical, costing and information about plant operation disruptions will be developed to enable informed decisions.

It is recommended that Council approve the following draft motion:

Motion: moved by _____, seconded by _____ that Public Works issue an RFP for the Preliminary Design of the WWTP and sewer outfall upgrades based on the scope and timelines as outlined in the report to Council for the 24 November Council meeting (Schedule "E") and updated in this Supplemental Report (Schedule xx??), to be tendered and awarded by Council in 2020 or early 2021 if possible.

Schedule "D"

Revised December 2, 2020

TOWN OF LUNENBURG PROCEDURAL POLICY

SALE, REPRODUCTION AND USE OF THE TOWN'S FLAG AND LOGO

PURPOSE

The purpose of this Policy is to establish terms and conditions for the reproduction, use and sale of the Town of Lunenburg's ("Town") flag and logo. Both the Town's flag and logo have copyright and trademark protection.

PROCEDURE

1. The official flag and logo of the Town are depicted in Schedules "A" and "B" attached.

2. The Town flag and logo shall be made available to the public for sale, reproduction or use at such price and other conditions as the Town's CAO and Finance Director determine are in the best interest of and payable to the Town.

3. An application for reproduction of the Town flag and/or logo is attached as Schedule "C". It may be updated by the CAO and Finance Director as required from time to time. Completed applications shall be submitted to and considered by the CAO and Finance Director for approval as set out herein. The applicant shall be notified of their decision with reasons therefor.

4. If the CAO and Finance Director do not approve a Town flag and/or logo use request because it is not considered to be in the Town's best interest, e.g., discriminatory or offensive in nature, the request may be appealed with reasons to the Town Council for reconsideration.

Attachments - Schedules "A", "B" and "C"

Clerk's Annotation For Official Policy Book

Date of notice to Council members of intent to consider Policy amendments: December 8, 2020 _____, 2021 (TBA)

Date of passage of Policy amendments: _____, 2021 (TBA)

I certify that this Policy amendment was adopted by Council as indicated above:

_____ _____

Municipal Clerk Date

Schedule "E"

Document No: 9 c. i.
Meeting: Council Dec 08 20
Circulate To: Council
File:

M E M O R A N D U M

TO: **TOWN COUNCIL**

FROM: **KELLY CUNNINGHAM, RECREATION DIRECTOR**

DATE: **NOVEMBER 26, 2020**

RE: **LUNENBURG ARENA FREE SKATE FOR FOODBANK FUNDRAISER ORGANIZED BY RISSER DESIGN BUILD**

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1. FACTS

Risser Design Build has organized a foodbank fundraiser at the Lighting of the Vessels event in previous years; however, the lighting event has been cancelled this year. The company is looking to use the Lunenburg Arena to host this year's fundraiser through offering a free family skate in exchange for each person bringing a foodbank donation on Saturday, December 12, 2020. Risser Design Build is requesting a free one hour ice rental for this fundraiser.

2. ISSUES AND OPTIONS

The approved rate in the fee schedule set out by Council annually for a youth ice rental is $151/hr., tax included. A foodbank fundraiser would provide food to our local foodbank in Lunenburg, benefiting our community members during these critical times in a pandemic and the holiday season. Risser Design Build delivers the donations the evening of the event to the Lunenburg foodbank on Lincoln Street. The company will also give the Town sponsorship recognition if the donation is approved.

OPTION 1 (recommended): Approve a one hour free ice rental to Risser Design Build for a foodbank fundraiser on December 12, 2020 in the amount of $151.00.

OPTION 2: Do not provide an ice rental free of charge.

3. FINANCIAL IMPACT

There is $385 remaining in the grants budget for the 2020/21 fiscal year.

4. STRATEGIC PLAN RELEVANCE

Culture and Recreation: Direction to support community life and assets in Lunenburg, including cultural identity, heritage interpretation, and the arts sector, as well as parks, open spaces, sports, and other activities.

5. RECOMMENDATION

It is recommended that Council approve a one hour free ice rental to Risser Design Build for a foodbank fundraiser on December 12, 2020 in the amount of $151.00.

Motion: moved and seconded approval of a free one hour ice rental in the amount of $151 for Risser Design Build to hold a Lunenburg Food Bank fundraiser on December 12, 2020.

Acknowledged only by:

Bea Renton
Town Manager/Clerk

Ann Covey

Subject: Request of Melissa Risser, Risser Design Build, for donated use of the Lunenburg Arena on December 12 for a Food Bank donation event

Good morning Kelly!!

I am writing to you on Saturday, with the understanding that you won't get this until you are back in your office Monday morning...I hope you had a great weekend!

I was speaking with Bobbie at the rink yesterday afternoon about an idea I had. Risser Design Build (our family business) usually set-up our work trailer at The Lighting of the Vessels and collect foodbank donations, and then our crew helps to unload them at the foodbank later that evening. Of course, we can't do that this year because the lighting has been cancelled.

I was wracking my brain trying to figure out how we could attempt to help the foodbank, especially this year given that they are being utilized now more than ever. I thought maybe we would be able to rent the arena and sponsor a 'free' family skate...asking that each person bring a donation to the foodbank in lieu of paying to get in. Bobbi mentioned that you may be able to work in collaboration with us, taking the idea to town council to see if this is a possibility. We would limit numbers as per Covid requirements. I was looking at a Saturday evening, maybe December 12th, late afternoon or early evening. Let me know what you think. I did tell Bobbi that we are happy to pay for the rental, but he mentioned you may be able to get it free of charge, and if that's the case we would love to be able to offer a cup of hot chocolate to anyone who participates, if this would be acceptable.

One other thought I had (I don't want to push it too far with Council though....so let me know what you think about this). Every year at the town's tree lighting, the Gerhardt's donate small Christmas trees for the children who attend, to take home. I am friends with Sally Gerhardt and this sort of thing would be right up her alley (unless maybe she already has another plan in mind to distribute them). I could ask if they would donate some of the small trees to have outside the arena for any families who would like to take one as they are leaving the free skate!

I would LOVE to see this come to light....something fun for the kids in town....and a great way to support the foodbank while we are at it! I would also challenge other businesses to do the same, and maybe host one of these each weekend leading up to Christmas or over the school's Christmas Break! Again, I don't want to push too hard and scare Council away from agreeing to it...but if there is even a small possibility, I will take what I can get! :-) Thanks for your help, let me know if there's anything more I can do.

Kind regards,
Melissa

Melissa S. Risser, C. Tech
Risser Design Build
risser.ca
902-527-7260