Appendix B

MINUTES OF STEERING COMMITTEE MEETINGS

Ainley GROUP CONSULTING ENGINEERS PLANNERS

MINUTES

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STEERING COMMITTEE MEETING #1

PROJECT: Town of Collingwood
Class EA Amendment for the R. A. Barker Water Treatment Plant Expansion
Ainley Job No. 119013

DATE: July 4, 2019

LOCATION: 43 Stewart Road, Collingwood (Boardroom)

TIME: 1:15 pm to 4:20 pm

PRESENT: Peggy Slama, Town of Collingwood
Ken Kaden, Town of Collingwood
Brian Sahely, AECOM
Mike Ainley, Ainley Group
Reid Mitchell, Ainley Group
Victoria Perejmybida, Ainley Group

DISTRIBUTION: All Present

1. Call to Order

The meeting commenced at 1:15pm.

2. Introductions
    a. Primary Contact Information

The primary contact information for the Town of Collingwood (Town), Ainley and AECOM is outlined below:

Peggy Slama
- Email: pslama@collingwood.ca
- Phone: 705-445-1581, Ext. 3301

Ken Kaden
- Email: kkaden@collingwood.ca
- Phone: 705-445-1581 Ext. 3303
- Mobile: 705-351-2133

Brian Sahely
- Email: brian.sahely@aecom.com
- Phone: 1-905-747-7445
- Mobile: 1-416-716-6750

Mike Ainley
- Email: ainley.m@ainleygroup.com
- Phone: 705-445-3451 Ext. 136
- Mobile: 705-444-4466

Reid Mitchell
- Email: mitchell@ainleygroup.com
- Phone: 705-445-3451 Ext. 135

Tori Perejmybida
- Email: perejmybida@ainleygroup.com
- Phone: 705-445-3451 Ext. 119
- Mobile: 705-539-0149

b. Reporting Structure and Protocol

The Town's primary contact is Ken Kaden. Peggy Slama is to be copied on all required correspondence.

Brian Sahely is the primary contact for AECOM and will only require correspondence on technical aspects of the project. AECOM will provide all correspondence through Ainley.

Mike Ainley is the main contact for Ainley. Reid Mitchell and Tori Perejmybida are to be copied on all correspondence.

The project schedule identifies a number of teleconferences. The intention of the teleconferences is to allow for short discussions to advance the project. Ainley can meet with the Town in person however AECOM will use teleconference to reduce travel time.

3. Contract Documents
   a. Status of Engineering Agreement

The engineering agreement has been executed.

4. Project Overview

The scope review list outlined below was discussed during the meeting.

- Collection and review of background information
- Existing plant performance/capacity review
  - The capacity review will determine the existing capacity of the plant through a desktop analysis. Collingwood just completed a report that will provide AECOM with the required information to complete the capacity analysis.

ACTION BY: Town of Collingwood / AECOM

  - The Town needs to provide AECOM with the cleaning frequency of the plant filters.

ACTION BY: Town of Collingwood

- Archaeological review of the site
  - To commence as soon as possible.

ACTION BY: AECOM

- Natural environmental review of the site
  - To commence as soon as possible.

ACTION BY: AECOM

- Class EA Phase 1 & 2 public consultation
  - The notice of commencement is intended to be the only public consultation during Phase 1 and 2.
  - The Master Servicing Plan (MSP) is expected to provide the Phase 1 and 2 information required for this Class Environmental Assessment (Class EA).
  - Ainley and AECOM expect all planning information to come from the MSP. The Town will provide a copy of the MSP as soon as possible.

ACTION BY: Town of Collingwood

- Identification and evaluation of alternative design solutions
  - An initial list has been developed which was further discussed during the meeting. It was agreed that further discussion is required in order to finalize the lists of design solutions for both the Ultrafiltration system and the disinfection system.

ACTION BY: All

- Workshop with Town staff to confirm and short-list alternative design concepts
- Development of draft recommended alternative design solution(s)
- Class EA Phase 3 consultation (including PIC)
  - The Public Information Centre (PIC) will take place on the 3rd floor of the public library. The room will be booked by the Town once a date for the PIC is determined.

ACTION BY: Town of Collingwood

- Finalization and refinement of recommended alternative design solution(s)
- Preparation of Amendment to 2004 Environmental Study Report
  - The Town questioned whether an Amendment or Addendum to the 2004 Environmental Study Report (ESR) is required. An Amendment is required for any changes to the ESR to clarify ambiguities, streamlining the planning process where problems have arisen and where projects or activities were not previously included. An Addendum is required as a result of a time lapse of an ESR or where it is not feasible to implement the project in the manner outlined in the ESR. The preliminary classification is an Amendment but this will be confirmed as part of pre-consultation with MECP.

ACTION BY: Ainley Group

- Class EA Phase 4 consultation (Notice of Completion; 30-day public review)
- Issuance of final Amendment to the ESR

The following optional additional scope item was also discussed during the meeting.

- Provisional full condition assessment of the existing plant's structural, mechanical and electrical systems
  - AECOM identified that they require a scope of work to properly prepare a price for a condition assessment as assessment can vary significantly in price depending on the level of detail.
  - The Town's goal of a condition assessment is to determine if there are any major pieces of equipment that are worth saving for the plant upgrade/expansion as well as the structural/architectural suitability of the plant to support modifications and loads of potential new replacement process equipment.

- Based on the discussion it was determined that a condition assessment is an important factor in evaluating alternative plant expansion solutions, including price, and therefore should be completed early in the Class EA process.
- AECOM will provide an initial scope of work and price for the condition assessment.
- Additional scope can be determined during the initial assessment from a quick overview of the entire plant and through additional information from Town Operators at the plant. The need for additional condition assessments will be determined later in the project.

ACTION BY: AECOM

5. Required Project Information from Town and Third Parties
    a. Master Servicing Plan

A draft of the MSP was submitted by Cole to the Town for review and the Town's review comments have been provided back to the consultant. It is expected that the MSP report will not be finalized for several weeks. The Town will provide Ainley and AECOM with the relevant information from the draft report to allow the Class EA to proceed.

ACTION BY: Town of Collingwood

    b. Design Constraints

AECOM inquired about the temperature of water that should be used to complete calculations for the Class EA. The filter efficiency is dependent upon the raw water temperature and decreases as the temperature decreases. Collingwood identified that they would like to proceed using the worst-case scenario of 0.5°C.

    c. Existing and Ultimate Build-Out Demands

The Town provided Ainley with a breakdown of the required demands prior to the meeting. The Town confirmed that the built boundary numbers are the required demands at full build-out and include the maximum supply requests from Township of Clearview, Town of New Tecumseth and Town of the Blue Mountains (TOTBM). The breakdown does not include the non-potable water currently received by the east industries. Future industry potable water demand based on Ministry guidelines are included in the breakdown.

The Town will provide Ainley and AECOM with the existing records of maximum non-potable water demand to industries. The current demands are lower than historic demands, however there is a potential for it to increase.

ACTION BY: Town of Collingwood

In addition to providing the non-potable water demand records, the Town will provide an updated table identifying the breakdown of potable water demands (existing, 2032, 2044 and built boundary) including updated demands to TOTBM, Clearview and New Tecumseth to properly reflect their phased supply requests. The table will also show the proportion of water going through the Regional pipeline for each phase.

ACTION BY: Town of Collingwood

The breakdown showed a 50% split of water going through the Regional pipeline and the remainder being delivered directly into the Town's system at the WTP1. The Town identified that this split is based

on analysis completed during the MSP and is not an arbitrary assumption. The Town will confirm.

ACTION BY: Town of Collingwood

The membrane concentrate is currently discharged back to the bay instead of going to the east industries for their non-potable demands as it is not satisfactory for the required industrial process uses and meets the Ministry's quality requirements for discharge to the bay.

It was noted that the industrial water supply is hooked up to fire suppression at some of the industries. If a fire occurs there is a potential for the pumps to operate at 100% causing a significant increase in water going to industries. This would result in a decrease in output of treated water possibly resulting in the use of emergency storage to meet system needs similar to a fire being suppressed with treated water.

The supply commitment for Clearview is for a possible future servicing of Nottawa.

The TOTBM has requested up to 16,400 m^3/day to satisfy potential future needs. Collingwood's response was that it will only provide the amount of water that can be delivered without having to complete upgrades to its distribution system.

d. Existing Plant Information Including Permit and Licenses

The Town will provide the most up to date PTTW, DWWP and all applicable licenses and permits (April 2019 DWWP provided at meeting).

ACTION BY: Town of Collingwood

The previous PTTW identified the potential to increase water taking however this was removed from the most recent PTTW. When an increase in water taking is required the Town will follow the required process including the completion of additional studies.

It was noted that a limitation on the existing site could be the size of the intake. The maximum instantaneous -capacity was previously established as 125,000 m^3/day.

AECOM will review the changes to the DWWP to determine the plant upgrades that have occurred since the most up to date set of drawings were produced.

ACTION BY: AECOM

The Town confirmed that they are still experiencing issues with zebra mussels at the water intake. An investigation and report were competed to identify any issues. A chlorine line is in place to help rectify the zebra mussel issue. The Town identified that quagga mussels are not of concern, however the report should be reviewed to determine if any were present during the investigation. AECOM identified that the issue with quagga mussels is that chlorine needs to be utilized year-round instead of just in warmer months.

The Town identified that frazil ice is a concern when water levels are low. Water has not been low for several years and therefore this issue has not been experienced recently. The Town intends to look into the feasibility of using the chlorine line to pump air in the winter to help with removal of frazil ice. AECOM suggested that due to pressures in the line that it may not be feasible to use the existing chlorine duct, however AECOM will look into it as an option. The Town identified that either way they want to deal with the ice issues. Town Operation's may be able to provide water elevations that result in frazil ice.

ACTION BY: AECOM

e) Stakeholder List

Ainley reviewed the consultation records from the 2004 Class EA and asked about the extent of public consultation. The Town advised that the consultation records provided were from the immediately available files however they will review additional files to determine if more information is available. Ainley identified that a resident's concern with regards to sight lines may have only arisen during the design phase.

ACTION BY: Town of Collingwood

Ainley has updated the contact list based on the consultation records from the 2004 Class EA. The Town identified that they will provide a list of developers and surrounding properties that they want added to the agency contact list. Ainley presented a map of potential consultation areas surrounding the plant. The Town identified they would like to include properties within a 100 metre consultation area which encompasses the block around the water treatment plant. Once the agency consultation list has been updated it will be provided to the Town for final review.

ACTION BY: Town of Collingwood and Ainley Group

Ainley has contacted the MECP to obtain a list of indigenous communities that should be contacted during the Class EA. The Town will also determine if any additional communities should be contacted as part of the Class EA.

ACTION BY: Town of Collingwood

6. Review and Finalization of Draft Problem Statement

The problem statement is:

The current rated capacity of the Raymond A. Barker Water Treatment Plant is insufficient to accommodate the future water demands of the Town of Collingwood and its contractual commitments to supply treated water to other municipalities.

The statement will continue to be developed throughout the project and will be included in the ESR.

7. Review and Finalization of Draft Notice of Commencement and Letter

The notice of study commencement was reviewed during the meeting. The Town provided Ainley with comments. Ainley will update the notice and provide it to the Town for final review. The Town had no comments regarding the agency cover letter. The Town noted that the map (included in the Notice) will need to be "cleaned up" for publication in the newspaper.

ACTION BY: Ainley Group

The Town identified that the advertisement only needs to be posted in the Collingwood newspaper. The advertisement needs to be submitted on Thursday, a week before the it is in the paper. The advertisement is tentatively scheduled for publication on July 18, 2019, dependent on updating the required information on time.

8. Review of Preliminary Alternative Design Concepts

The Town would like the Class EA to identify the following staging:

- Stage1 – Expand Water Treatment Plant to meet existing PTTW maximum limit.
- Stage 2 – Expand WTP to meet Full-Build predicted water demand (requiring an amendment to the existing PTTW).

The Town identified that the alternatives should proceed with less limitations as this is the beginning of the evaluation stage. Throughout the consultation process, evaluation constraints will be determined and allow for the preferred alternative to be identified.

The Town identified that they would like to keep the existing membrane building. The old plant can be repurposed or demolished as a majority of the building is currently empty.

AECOM identified that pressure filtration takes up more space then submersible filters and therefore if Collingwood wanted to use the existing building, submersible filters are the only option. The supplier (manufacturer) of the filters is a design issue and therefore does not need to be identified in the ESR.

The options identified in the proposal were reviewed. The following items were discussed:

Options 1 and 2 will be switched so that the 2004 preferred alternative is Option 1.

Ultrafiltration System Expansion Design Alternatives

Option 1 – 2004 Preferred Alternative

- AECOM will look at the current technology to determine the rated capacity of this option.
- The following disadvantage "much less potential capacity than required for development" will be updated to identify the reasons including guideline and regulation changes.

Option 2 – 2007 Design

- The reference to manufacturers will be removed from this alternative. The alternative will only make mention to the use of submersible membranes.
- The following advantage "meets Stage 1 and Stage 2 capacity requirements" is referring to the Stages identified in the proposal. Once the stages are determined for this Class EA this item will be updated.

Option 3 – New Plant on-site and repurposing the existing building

- This item was reviewed and no comments were made.

Option 4 – New Plant on-site and maintain existing filtration

- This item was reviewed and no comments were made.

Disinfection System and High-Lift Pumping Storage Expansion Design Alternatives

Option 1 – UV disinfection

Options 2- 4 – All options include disinfection using chlorine

- The Town identified that they want to reduce the current chlorine residual which will require additional chlorine contact volume for all these options.

Option 5 – Rapid acting disinfection products

- no comments were made during the meeting about this item.

The Town inquired about reviewing liquid chlorine versus chlorine gas alternatives. AECOM noted that the existing chlorine gas system is appropriate for the facility and does not require upgrades (other than a scrubber) to meet current standards and therefore it was agreed that there is no need to further consider changing the existing system.

9. Schedule of Major Deliverable

The following preliminary schedule of major deliverables was included in the meeting agenda however it was not discussed during the meeting due to time contracts.

1.	Existing and ultimate build-out planning information (from Town)	Jul 9, 2019
2.	Notice of Commencement (tentative publication date)	Jul 11, 2019
3.	Existing Plant Performance/Capacity Review	Aug 2, 2019
4.	Archaeological and natural features reviews of site	Aug 16, 2019
5.	Final Phase 1 & 2 documentation (Technical Memorandum #1)	Sep 11, 2019
6.	Development of design alternatives and workshop with Town	Sep 25, 2019
7.	Draft Phase 3 documentation (draft Technical Memorandum #2)	Oct 16, 2019
8.	Public Information Centre material	Nov 15, 2019
9.	First Notice of PIC (tentative publication date)	Nov 28, 2019
10.	Second Notice of PIC (tentative publication date)	Dec 5, 2019
11.	Final Phase 3 documentation (Technical Memorandum #2)	Jan 29, 2020
12.	Phase 4 documentation (Amendment to the ESR)	Feb 26, 2020
13.	First Notice of Completion (tentative publication date)	Feb 27, 2020
14.	Second Notice of Completion (tentative publication date)	Mar 5, 2020
15.	Final Phase 4 documentation (Amendment to the ESR)	Jun 12, 2020

10. Other Business

The Town would like a boardroom (with washrooms and additional vehicle parking spaces) incorporated into the new design of the treatment plant.

The Town stated that the ESR will need to identify why the original project was put on hold and why it is now being re-examined. Ainley has started to prepare a history of the project that will be included as part of the ESR.

Multiple jurisdictional requirements for extra security and rapid response as well as the Provincial regulatory change from 0.1 NTU 95% of the time to 99% of the time resulted in all membrane manufacturers incorporating strainers upstream of the membranes for additional protection and direct integrity testing for more rapid response in the event of a membrane breach.

MECP continues to approve membrane replacements at existing plants utilizing older technology that does not incorporate strainers or direct integrity testing (including recent replacements of ZW500a&b membranes at the Collingwood plant with ZW500d membranes). It is not known if MECP has approved a corresponding increase in rated capacity in any of these plants (since the new ZW500 membranes have greater capacity than the older ones), nor is it known if MECP has approved major plant expansions or new plants using the old technology since the standards and regulations have changed. It was agreed that AECOM will contact the MECP to determine if ZW500 membranes can be used for an

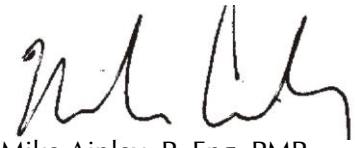
expansion within the existing membrane building or if the plant would be subject to the new standards with respect to direct integrity testing. It was agreed that all new treatment outside of the existing plant footprint will meet the updated regulation and will include direct integrity testing.

ACTION BY: AECOM

A future meeting will be scheduled to discuss design options.

Any errors and/or omissions from these Minutes should be reported to the undersigned as soon as possible.

Minutes prepared by V. Perejmybida and finalized by:



Mike Ainley, P. Eng, PMP
Ainley & Associates Limited

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MEETING MINUTES
Revised November 14, 2019

STEERING COMMITTEE MEETING #2

PROJECT:	The Town of Collingwood Updated Class EA for the R. A. Barker Water Treatment Plant Expansion Ainley Job No. 119013	
DATE:	October 18th, 2019	
LOCATION:	43 Stewart Road, Collingwood (Boardroom)	
TIME:	10:30 a.m. – 3:15 p.m.	
PRESENT:	Peggy Slama, Town of Collingwood Ken Kaden, Town of Collingwood Marie Richardson, Town of Collingwood John Vail, Town of Collingwood	Mike Ainley, Ainley Group Reid Mitchell, Ainley Group Jody Marks, Ainley Group Brian Sahely, AECOM
DISTRIBUTION:	All Present	

1. Call to Order

The meeting was called to order at 10:30 a.m.

2. Purpose of Meeting

The purpose of the meeting was to discuss the updated scope and schedule, field and performance assessments, and preliminary Phase 3 ESR documentation working draft.

3. Updated Scope

A condition assessment of the existing water treatment plant was added to the scope of the assignment.

It was agreed that the 2004 ESR is no longer valid due to significant updates in planning, technology and consultation requirements. Therefore, it was determined that instead of an Amendment/Addendum to the 2004 ESR an Updated Phase 3 & 4 ESR will be prepared, referencing the Master Servicing Plan (including March 2019 PIC) to satisfy Phases 1 & 2.

4. Updated Schedule

An updated schedule/workplan was provided through updates to the Responsibility Matrix highlighting milestone submissions and events. Imminent milestones include:

- Incorporation of comments from this meeting into Phase 3 documentation (on-going).
  Action Item: Ainley

- Finalization of field study reports with the feedback/comments from this meeting by end of October.
  Action Item: AECOM

- November 19th workshop (Meeting #3) to present preliminary evaluation criteria with weighted values along with alternative design solutions.

Action Item: All

- December 13th submission of updated Phase 3 documentation incorporating alternative design solutions including preliminary recommended solution.

Action Item: Ainley/AECOM

- January 6th submission of Phase 3 PIC materials including draft Notice of PIC & Letter to Contact Agencies. (Additional detail on design solutions may also be submitted at this time).

Action Item: Ainley/AECOM

- January 10th meeting (Meeting #4) to discuss updated draft Phase 3 documentation, PIC material and detailed design solutions.

Action Item: All

- Finalization of draft notices and letters as well as draft Phase 3 documentation and other materials to be presented at the PIC by January 15th (Notice of PIC to be published January 16th and 23rd).

Action Item: All

- Phase 3 PIC to be held January 30th.

Action Item: All

The Town advised that a firm date for the finalization and publication of the MSP (needed to satisfy the Phase 1 & 2 requirements for the plant expansion) is not available at this time. However, a Notice of Completion in December is considered the earliest possible publication date. It was agreed that the Notice of Completion for the MSP must be published, the mandatory 30-day review period concluded and the MSP finalized prior to publication of the Notice of the Phase 3 PIC. The Town will advise Ainley of the progress of the MSP.

Action Item: Town

5. Field and Performance Reviews/Assessments

Natural Environment Review

The conclusions from this study are to implement mitigation measures specific to construction activities. There were no concerns or comments from the Town regarding the Natural Heritage Assessment.

Stage 1 Archaeological Assessment

The Stage 1 report identifies no further archaeological investigation is required. The Town noted that they have not received a formal letter from the Ministry of Tourism, Culture and Sport (MTCS) accepting the Stage 1 report and conclusions. AECOM will confirm with archaeologist that the Stage 1 report has been submitted to the MTCS and that when the letter is received it be forwarded to the Town.

Action Item: AECOM

Existing Plant Performance/Capacity Assessment

AECOM highlighted sections in the draft report submitted to the Town with the intention of going through each highlighted item to discuss and confirm with the Town. The following is a summary of the edits and decisions:

- Section 2.1 Permit to Take Water: The relevancy of including the details of the older permit was questioned, but it was decided to keep the information as it provides a bit of history and it will help the Town when the current permit needs to be amended in January of 2021. The Town will not request an increase in the permitted taking at that time. The Application will simply be a renewal.

- Section 2.1 Permit to Take Water: Correction to the last sentence of the last paragraph to read “100.1 ML/d”

- Section 2.3 Water Demand: Last paragraph on page 2 add the stipulation of assuming linear growth.

- Section 2.3 Water Demand, Table 4: The Town reviewed the values in Table 4 and they seem to be accurate, but noted that the source of where the factors came from should be added to the Notes section of the table.

- Section 2.3 Water Demand, Table 4: Change Poplar Road reservoir to Davey reservoir.

- Section 2.3 Water Demand. Table 4: The MSP shows no specifics for short-term flows into Davey reservoir (currently approximately 10 L/s) and it may be necessary to revise both the MSP and Table 4 from the Performance/Capacity assessment for consistency regarding Phase 1 flows.

  Action By: Town/AECOM

- Section 2.4 Storage Projections, Table 5: Add the Davey reservoir storage (2565 m^3).

- Section 2.4 Storage Projections: It was agreed that 15 minutes equalization volume is acceptable for the high-lift pump equalization.

- Section 2.5 Water Quality Treatment Criteria, Table 6: Table 6 shows a disinfection target that meets the minimum Provincial requirement. There was discussion to show a more stringent target of at least 0.5-log Cryptosporidium, but this would exclude chlorination as a stand-alone disinfection option (UV can provide this level of disinfection). It was thus agreed that the target would remain as is and explained more fully in the evaluation of disinfection options.

- Section 2.5 Water Quality Treatment Criteria, Table 6: The Town advised that the Ministry of Environment, Conservation and Parks (MECP) will be putting an HAA requirement of 80 (µg/L) in place as of January 2020 and that this requirement should be added to Table 6.

- Section 2.5 Water Quality Treatment Criteria, Table 6: The Town confirmed that there have been no public complaints about taste and odour of the Town water, separate from chlorine. Due to this the rows for Geosmin (ng/L) and MIB (ng/L) can be removed from Table 6.

- Section 4.0 Capacity Review: Add a statement that indicates that adding upstream protection for membranes is considered a best practice. Further identify that there is a risk of loss of capacity if fibre breakages occur in membrane and therefore, strainers should be considered as part of the design.

- Section 4.1.1 Description, Dimension, Sizes: The Town confirmed that the statement regarding details of the pre chlorination system (last bullet point of section) is correct.

- Section 4.3.1 Description, Dimension, Sizes: The values presented in the first and sixth bullet points are correct.

- Section 4.3.1 Description, Dimension, Sizes, page 10: The tank size of 1,400 L day is correct. The citric acid tank size is to be corrected to 200L.

- Section 4.3.2 Capacity Assessment, Table 14: It was noted that design fluxes carried by Suez for new ZW500 membranes are lower than carried in earlier designs, resulting in lower design capacities for the same membranes. There are numerous factors affecting flux performance including quality of raw water, accepted life expectancy, and frequency of cleaning and frequency of exceeding optimal flux rates (e.g. lack of membrane redundancy). On this basis, the plant can be operated at the original design capacity; however, all expansion options (including replacement of existing membranes) will carry current recommended design fluxes as shown in the table. A comment explaining this will be added at the end of paragraph 4.3.2.

- Section 4.5.1 Description, Dimension, Sizes: Values of last sentence are correct.

- Section 4.5.2 Capacity Assessment: Duplicate bullet point “ZW1OOO Membranes...” Delete duplicate.

- Section 4.5.2 Capacity Assessment: The cited Procedure for Disinfection of Drinking Water in Ontario has been updated in April 2019. Replace the cited statement to align with updated procedure.

- Section 4.5.2 Capacity Assessment, Table 16: It was noted that the disinfection capacity is currently managed using SCADA to adjust chlorine dosage to flow and that a comment explaining this will be added at the end of the paragraph immediately preceding Table 16.

- Section 4.6 High Lift Pumping, Table 17: Values in the table are correct.

- Section 4.6.2 Capacity Assessment Table 18: The Town questioned why the calculations were done using the high-water line when it would never be operated at that level. AECOM will review and recalculate using a more appropriate number.

- ***REVISED.*** Section 4.7 Chemicals (Excluding Membrane System) Table 19 and 20: Change the V-notch value for post-chlorination chlorinators #2 and #3 to 96kg/day.

- Section 4.7 Chemicals (Excluding Membrane System) Table 21: Change the total average design dosage (mg/L) to 2.3 and reference data with a date range of January – August 2019. The Town will provide AECOM the chlorine dosage trends.

  Action Item: Town

- Section 4.7 Chemicals (Excluding Membrane System): Discussion on the Town’s practices of ordering and surplus holdings of chemicals resulted in the recommendation that the Town increase the amount of chlorine tanks in rotation and increase the size of the chemical storage area.

- Section 4.9.1 Description, Dimensions, Sizes – Standby Power: Remove last sentence referencing diesel generator being used to shave peak power demands as the Town does not practice this.

- Section 5.0 Capacity Assessment of Existing WTP Table 23: Add to membrane system comments ‘based on current flux standards and can increase if needed’.

- Section 5.0 Capacity Assessment of Existing WTP Table 23: Add to disinfection system comments ‘Free chlorine residual can increase if needed’.

- Section 6.1 Membrane Filtration: Statement in Option 1 – leave as it is written.

- Section 6.2 Disinfection: The Town noted that they do not have a specific agreement with the MECP. This section should be revised to indicate that the Town is addressing this issue by adjusting the dosage as necessary to achieve the required CT and MECP has not commented on the current management of the system.

  AECOM will update the Existing Plant Performance/Capacity Assessment report with of the points summarized above and the report will be considered final. In addition to the summarized edits, the title and introduction section of the report will be updated to remove any reference of ‘amendment’.

  Action Item: AECOM

WTP Condition Assessment

Discussions started with the future use/need for the industrial building on site. It was agreed that the industrial building will be demolished under all alternative design solutions.

The summary table within the report was discussed line by line to confirm designation and review details of scope of work. The following is a summary of the edits and decisions:

- Reference #1C: change designation of upgrades to ‘future’ stating that staff will follow standard health and safety (H&S) procedures when working around surge chamber.

- Reference #4E: Add statement that staff will follow standard H&S procedures.

- Reference #5D: Designation to remain as ‘immediate’ as the hand railing does not meet current code.

- Reference #5F: Change ‘undergoing’ to ‘considered’. AECOM will add a cost.

- Reference #6B: Update costing to include a cost for coating of the membrane train walls because using the existing membrane trains is part of all alternative solutions going forward.

AECOM will update the WTP Condition Assessment report with of the points summarized above and the report will be considered final. In addition to the summarized edits, the covering letter within the document will be updated to remove any reference of ‘amendment’.

Action Item: AECOM

The report provides a list of recommended studies to be completed including a comprehensive electrical load list to be used as a basis for determining the future total duty electrical loads for the Phase 1 and ultimate plant expansions. The Town will provide rough information on current electrical load demands but due to its age the Town does not intend to continue to use the existing generator moving to Phase 1 of the expansion. The Town indicated that for the purposes of identifying the alternative design solutions that it be assumed new generator(s) will be purchased.

Action By: Town

6. Preliminary Phase 3 ESR Documentation Working Draft

The Town provided their written comments to Ainley. There were no areas of concern and the Town clarified the following:

- Existing and Future Demands, Town of New Tecumseth: In the second paragraph remove two sentences starting from “In June 2016…”

- Existing and Future Demands, Town of Blue Mountains: There are two, not one, connections. They are located at Osler Bluff Road (active) and Grand Cypress Lane (closed).

- Existing and Future Demands, Township of Clearview: In first paragraph, first sentence – change ‘identified’ to ‘requested’.

Ainley will update the Draft Phase 3 ESR based on the points summarized above and on hard copy comments provided by the Town.

Action item: Ainley Group

7. Additional Information

The Town requested that AECOM provide details of the suggested repairs to the flat roofing of the main plant building so that they can be added to the specifications for roofing repairs currently being undertaken by the Town. The Town would like the details of the roof conditions to compare with secondary quote/assessment.

Action By: AECOM

8. Other Business

REVISED. AECOM will provide a “wish list” of plant upgrades that are not related to the proposed increase in plant capacity (separate from and for the most part not included in the ESR), some of which have been identified in the AECOM Condition Assessment. However, elements relating to best practices with respect to design alternatives may be extracted from this list and included in the ESR.

Action Item: AECOM

9. Next Meeting

The next meeting (Workshop to Review Design Options) is scheduled for November 19th, 2019 at 43 Stewart Road, Collingwood (Boardroom). *Location subsequently changed to Ainley Boardroom at 280 Pretty River Parkway, Collingwood.*

10. Adjournment

The meeting was adjourned at 3:15 p.m.

Any errors and/or omissions from these Minutes should be reported to the undersigned as soon as possible.

Minutes prepared by J. Marks and finalized by:

M.W. Ainley, P. Eng, PMP
Ainley & Associates Limited

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MEETING MINUTES

STEERING COMMITTEE MEETING #3

PROJECT:	The Town of Collingwood Updated Class EA for the R. A. Barker Water Treatment Plant Expansion Ainley Job No. 119013	
DATE:	November 19th, 2019	
LOCATION:	280 Pretty River Parkway, Collingwood (Boardroom)	
TIME:	10:35 a.m. – 4:45 p.m.	
PRESENT:	Peggy Slama, Town of Collingwood Ken Kaden, Town of Collingwood Marie Richardson, Town of Collingwood John Vail, Town of Collingwood Brian MacDonald, Town of Collingwood	Mike Ainley, Ainley Group Reid Mitchell, Ainley Group Jody Marks, Ainley Group Brian Sahely, AECOM
DISTRIBUTION:	All Present	

1. Call to Order

The meeting was called to order at 10:35 a.m.

2. Purpose of Meeting

The purpose of the meeting was to discuss identification of alternative design concepts for implementing the Phase 1 & 2 (per MSP) recommended general solution of expanding the existing WTP.

3. Phase 1 and Phase 2 Water Demands

The project will be phased, with Phase 1 focused on expansion to the current limit of the Permit to Take Water (PTTW). At this time the demands have been confirmed for Collingwood and New Tecumseth water needs. The Town of Blue Mountains and Township of Clearview required water demands are preliminary and will be finalized during Phase 2 of the expansion.

4. Schedule

- The Town is tentatively scheduled to make a presentation to Council on the Master Servicing Plan (MSP) early December. The Town estimates the earliest timeline to be end of January for the close of the 30-day period of the Notice of Completion for the MSP but will confirm once there is more certainty.

- The Town noted that there must be flexibility to prequalify multiple membrane suppliers and not sole-source SUEZ. There was a discussion of the need for pilot testing to prequalify suppliers during the Class EA phase and it was agreed that pilot testing could be deferred to the design

phase – the Class EA conceptual drawings for the alternative designs will show building "boxes" as large as possible to accommodate multiple potential suppliers.

- For the purposes of the Class EA, pricing will be based on SUEZ membranes for all design alternatives, recognizing that a different supplier(s) may be pre-selected during the design phase. AECOM will remind SUEZ that additional information is required from them in order to price the design alternatives.

ACTION ITEM: AECOM

- The project team has received comments in response to the Notice of Commencement from the Ministry of Environment, Conservation and Parks (MECP) and the Nottawasaga Valley Conservation Authority (NVCA). It was agreed it would be beneficial to have a meeting with Ms. Lee Bull from the NVCA to discuss the Source Water Protection comments provided. Ainley will arrange a meeting with NVCA, Ainley and Town staff.

ACTION ITEM: AINLEY

- Ainley had previously issued a WTP Class EA Schedule which showed the Public Information Centre (PIC) to be held at the end of January 2020 but the PIC cannot be held before the MSP is finalized. It is now anticipated that the earliest date the PIC could be held is the last week of March 2020. Ainley will re-issue an updated schedule once the Town provides an update of the estimated completion of the MSP; however the interim schedule update based on an end of March PIC is as follows:

    - Workshop for detailed review of short-listed design concepts by mid-January
    - Submit final draft Alternatives Technical Memorandum (TM) by mid-February
    - Workshop to review Alternatives TM and PIC material by end of February
    - Advertise PIC by mid-March
    - Hold PIC end of March
    - Receive comments until mid-April and incorporate into ESR
    - Submit ESR for 30-day review by end of April

ACTION ITEM: AINLEY/TOWN

5. <u>Preliminary identification of Design Alternatives</u>

AECOM highlighted sections in the working draft Alternative Selection Technical Memorandum submitted to the Town with the intention of going through each highlighted item to discuss and confirm with the Town.

As a general comment, the Town requested that the report and tables be revised to remove specific references to ZW500 or ZW1000 models except where referring to the current membranes.

The following is a summary of other edits and decisions that will be reflected in the final Technical Memo provided by AECOM:

- <u>Section 2.2 Evaluation Process</u>: Adjust the technical versus cost scoring to 70% technical and 30% cost.

ACTION ITEM: TOWN

- <u>Section 2.2 Evaluation Process</u>: Adjust the scoring range from 1-100 to be 1-10 with increments of 0.5. There will be no minimum threshold and scoring due to the alternatives being pre-screened.

- Table 3, row 'Distribution Free Chlorine Residual' column 'Proposed Performance Target': Change value range from 4.0 mg/L to be 3.0 mg/L. Add 'leaving the plant' to the line that reads '(target of 1.66 mg/L average)'.

- Table 3, row 'HAAs(µg/L)' column 'Ontario Requirement': Add the following statement 'based on a running annual average of quarterly samples measured at a point that is likely to have an elevated potential for formation of HAAs'.

- Table 3, row 'Turbidity (NTU)' column 'Ontario Requirement': The Town inquired about the source for the '<0.3 NTU, 100% of time' requirement and it was noted that it was typical practice. It was agreed that the value be removed from this column of the table as it is not an Ontario Requirement.

- Table 4, Notes #2: The Town will need to have an internal discussion on the demands and the year of commitment recorded for the Town of Blue Mountain. The Town also suggested revising the statement to make it clear that the total is 16,400m^3/d not 16,400m^3/d plus 6,000m^3/d.
  ACTION ITEM: TOWN

- Table 4, Notes #5: Add the following to the end of the note, 'If higher capacity is needed then this may come from the treated water supply given the restrictions of the PTTW.'

- Table 6, row 'Intake, Ultimate' column 'Recommended Upgrades': In the bottom paragraph referring to frazil ice, adjust the year from 2005 to 2009, '…has not occurred since before 2009.'

- Table 7 row 'Micro screening': AECOM clarified that the gravity by-pass around the new screening equipment can be provided.

- Table 8: Add installation of strainers on the industrial pump discharges as preferred by the Town.

- Options Concept Drawings: AECOM clarified that although the separate concept drawings for the various processes illustrate possible conflicts/overlaps when taken together, the individual building "box" locations are just initial estimates for the individual processes and that the preferred "total solution" design layout would show no conflicts/overlaps.

- Section 5.5.1 Current Capacity, third bullet point: The Town noted that membrane integrity test is done annually, not every two weeks and that the particle counter is not online.

- Section 5.5.1 Current Capacity, fifth bullet point – The Town noted that since they do not practice pre-chlorination year round, they are concerned with feeding the backpulse/CIP tanks with low pressure permeate water only (to reduce the loud noise when filling these tanks) and not the treated high pressure water that is currently used and that has a free chlorine residual.
  ACTION ITEM: AECOM

- Section 5.5.1 Current Capacity, ninth and tenth bullet points: There was discussion about redundant versus standby trains and whether or not either should be considered in the expansion (there are currently no redundant or standby trains in the existing plant). It was agreed that redundant trains should be provided for all expansion design alternatives considered in the Class EA as this would maintain the plant capacity if one train was out-of-service for maintenance, membrane repairs and the monthly CIP process. If it is determined during detailed design that the capital cost of providing this redundancy is too high it can be removed.
  ACTION ITEM: AINLEY

- Section 5.5.2.1 Maximum Capacity Capable from the Existing ZW500 Membrane Tanks: The Town questioned why these three options for membranes are a separate section of the report

that implies they would have insufficient capacity for the expansion requirements, since they can potentially be combined with other options to be part of an overall expansion solution. AECOM will review or rephrase this section.

ACTION ITEM: AECOM

- Section 5.5.2.2 Alternatives to Achieving Phase 1 and Ultimate Flows (third bullet, third sub-bullet): It is stated that 'any new membrane building is shown to be located east of the existing raw water building'. The Town noted that for this option there may be a need to infringe on the park/parking lot land and therefore the placement of a building within waterfront sightlines may be necessary. Ideally the waterfront should not have multiple buildings placed within sightlines for park users and residents and Ainley noted that the PIC material can identify that disrupting sightlines is not preferred.

ACTION ITEM: AINLEY

- Figure 6: The Town questioned the feasibility of constructing a new membrane building as close as shown to the shoreline, given their experience with erosion and issues with wave uprush. Due to the high risk this option may require construction of a seawall. AECOM stated that the existing plant and any new buildings will have the same risk from waves and so this issue will be consistent with any alternative being considered.

- Table 10, column 1 'Title' and column 2 'Option': Through discussion of the options (1-4) for membranes the development of a 5th and 6th option emerged:
    - Option 5 is described as the reverse of Option 2 (which is to increase the existing ZW500 membrane building capacity with some retrofit to achieve Phase 1 capacity and later construct a new membrane building), i.e. build a new plant first and then retrofit the old plant. This would eliminate the need for having the temporary trailers. Membranes in this option would be the short or tall ZW500d membranes in the old building and ZW1000s (or equal) in the new building. **Post meeting note:** This option was presented in the updated Technical Memorandum but not short-listed as explained in the updated TM.
    - Option 6 is described as designing the new plant for expansion to ultimate capacity, while continuing to use the existing membrane building until the current membranes for the remainder of their life only and then repurposing that area of the building. **Post meeting note:** This option was presented in the updated TM but not short-listed as explained in the updated TM. It was noted that the Town has the flexibility to implement this option as part of Option 3 (revised – previously Option 4) but it doesn't need to be its own option.

- Table 10, row '1A (Phase 1) column 'Retrofit of Existing ZW500 Building', 6th bullet': Keep this bullet, i.e. all ancillary pieces are to be updated in this option. For the EA, all options are to have equal state of the art upgrades including the existing ZW500 membrane system to allow for "apples to apples" comparison. This will allow a 70% Technical and 30% Cost comparison be equal for all options.

- Table 10, column 4 'Use/Removal of Existing ZW500 Membrane Building': The existing ZW1000 building is to be removed for all options.

- Filtration Technologies: The Town requested that other filtration technologies (e.g., conventional filtration) be mentioned in the TM and be eliminated as required.

ACTION ITEM: AECOM

- Section 5.6.2.1 Minimum Free Chlorine Residual Required for Primary Disinfection: It was agreed that the value of 1.5 will be the target average and that 1.0 will be the value for low-low alarm shut down.

- Table 8, high lift pump equalization: The Town confirmed 15 minutes.

- Figure 8: Move the CT chamber (green box) further to the left on the drawing and remove reference to alternate locations in the description (red font).

- Section 5.8.2 Upgrade Requirements: AECOM noted that hydraulic modeling and transient modeling should be completed in advance of detailed design. The Town will confirm/complete these models to ensure that by adding pumps the system will operate.

  ACTION ITEM: TOWN

- Table 13: The Town noted that the jockey pump is not used; AECOM to update table accordingly.

- Table 18, row 'Phase 1' column 'Recommended Upgrades' 1st bullet: The Town noted that there is only one feed and therefore having two transformers does not seem appropriate. Remove last two sentences of bullet.

- Figure 12: Show only one proposed transformer.

- Table 18, row 'Phase 1' column 'Recommended Upgrades' 5th bullet: Add "for the process mechanical equipment" to the end of the sentence.

- Figure 13: Ainley noted that for the Class EA it will state that the option of having an external generator has been eliminated. There was also discussion on standards for placing diesel storage tanks within a short distance of a waterbody – this will be revealed through consultation with the MECP and NVCA.

  ACTION ITEM: AINLEY

- Table 20, row 'Phase 1' column 'Recommended Upgrades': Change to read 'Replace PLCs and control wiring'.

- Table 21, row 'Phase 1' column 'Recommended Upgrades': Delete the first bullet since the Town replaced their HVAC system 6 years ago. Replace the bullet with 'install dehumidification in existing building.'

- Table 21, row 'Phase 1' column 'Recommended Upgrades, 3rd bullet: Change to 'Provide administrative staff facilities'. The Town will provide a formal list of requirements to ensure an 'apples to apples' comparison of space requirements for all design alternatives.

  ACTION ITEM: TOWN

- Section 7 Technical Evaluation of Short-Listed Alternatives: AECOM requested from the Town information on floodplain area, maximum lake levels data and wave uprush to facilitate the technical evaluation.

  ACTION ITEM: TOWN

- Section 7.2 Evaluation Criteria and Weights: Delete the last bullet referencing sole-source selection.

- Table 24 Evaluation Criteria and Rating, column 3: It was agreed that the secondary criteria will be:

  - Pathogen control (disinfection alternatives only)
  - Operation and maintenance requirements, including process complexity

- Ease of implementation (construction schedule)
- Process robustness (multi-barrier treatment)
- Minimize footprint and site impacts/architectural aesthetics

Post meeting note: The secondary criteria *Minimize truck traffic (during construction and operation)* under social considerations were then added back given that the various alternatives have varying amount of excavation and off-shore disposal of soils/rocks, as well as larger buildings, all of which impact truck traffic.

- Table 24 Evaluation Criteria and Rating, column 3: It was agreed that the PIC presentation material will include a board describing the evaluation criteria and weighting, along with explanations why certain secondary criteria typically listed are not included in the table, for example:

  - Minimizing disinfection by-products
  - Flexibility for future objectives including taste & odour control and potential emerging contaminants
  - Compatibility with existing systems and site
  - Flexibility for expansion (future phases)
  - Proven track record
  - Safety requirements
  - Minimizing noise
  - Minimizing odour
  - Minimizing air emissions
  - Minimizing residual impacts

  ACTION ITEM: AINLEY

- Table 24 Evaluation Criteria and Rating, column 2: It was agreed that the primary criteria weight allocation will be:

  - Water Quality = 30
  - Technical considerations = 50
  - Social Considerations = 20

Above criteria would apply for Disinfection alternatives. Regarding Membrane alternatives, Water Quality will be removed given similar performances for all alternatives.

Post meeting note: With Water Quality primary criteria removed, the scoring of the remaining primary criteria will be as follows:

  - Technical considerations = 80
  - Social Considerations = 20

- Section 8.1 Cost Assumptions: The Town will confirm the values of chlorine gas costs and power costs and also provide AECOM with the citric acid and sodium chlorite costs.

  ACTION ITEM: TOWN

- Section 8.1 Cost Assumptions: It was agreed that an inflation rate of 3.0%, an interest rate of 5.5%, a market discount of 2.5% and a 20 year amortization period would be carried in the cost analysis. **Post meeting note:** Subsequent to the meeting the amortization period was revised to 30 years.

For the purposes of the cost analysis the Town will provide the estimated year they anticipate the Phase 2 (ultimate) start-up. **Post meeting note:** Subsequent to the meeting this was determined to be 2044, recognizing this may be more realistic than the conservative growth projections in the MSP.

- Section 10 Sensitivity Analysis: There will be a sensitivity analysis completed on the evaluation criteria, with detailed scoring to be finalized during the next project workshop.

6. Other Business

Ainley requested a financial statement from the Town stating how the project will be financed. This information is needed for the PIC.

ACTION ITEM: TOWN

7. Next Meeting

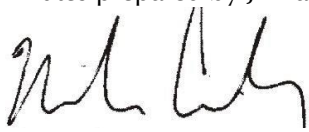
The next meeting (Workshop for Detailed Review of Short-Listed Design Concepts) is tentatively scheduled for January 10th, 2020 at 43 Stewart Road, Collingwood (Boardroom).

8. Adjournment

The meeting was adjourned at 4:45 p.m.

Any errors and/or omissions from these Minutes should be reported to the undersigned as soon as possible.

Minutes prepared by J. Marks and finalized by:



M.W. Ainley, P. Eng, PMP
Ainley & Associates Limited

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MEETING MINUTES

STEERING COMMITTEE MEETING #4

PROJECT:	The Town of Collingwood Updated Class EA for the R. A. Barker Water Treatment Plant (WTP) Expansion Ainley Job No. 119013	
DATE:	January 27, 2020	
LOCATION:	43 Stewart Road, Collingwood (Boardroom)	
TIME:	11:15 a.m. – 3:40 p.m.	
PRESENT:	Peggy Slama, Town of Collingwood Ken Kaden, Town of Collingwood Marie Richardson, Town of Collingwood John Vail, Town of Collingwood	Mike Ainley, Ainley Group Reid Mitchell, Ainley Group Jody Marks, Ainley Group Brian Sahely, AECOM Laura Alvarez, AECOM
DISTRIBUTION:	All Present	

1. Call to Order

The meeting was called to order at 11:15 a.m.

2. Purpose of Meeting

The purpose of the meeting was to discuss more fully developed short-listed alternative design concepts for implementing the Phase 1 & 2 (per MSP) recommended general solution of expanding the existing WTP, including technical and costing evaluation and scoring.

3. Updated Schedule:

The Town published the Notice of Completion for the Master Servicing Plan (MSP) on December 19, 2019 with the 30-day review period closing on January 20, 2020. No Part II Orders were received. The MSP will be presented to Council at the upcoming Council Meeting for endorsement. The Town will forward copies of the comments received during the MSP 30-day review period to Ainley. Ainley is to ensure that those respondents are added to the contact list for consultation during the WTP Class EA.

ACTION ITEM: AINLEY/TOWN

The Public Information Centre (PIC) for the WTP Class ESR is tentatively scheduled to be held during the week of either March 23rd or March 30th. The optimal days for the PIC are Tuesday or Thursday from 4:00 – 8:00 p.m. The Town will check the availability at the Town library during those dates and confirm with Ainley.

ACTION ITEM: TOWN

An approximate timeline for the Environmental Study Report (ESR) completion based on the PIC being held in early April was estimated as follows:

- 2-week comment period during and immediately following in which the ESR will be finalized.

- First publishing of the Notice of Completion of the ESR in early May to kick off the mandatory 30-day review period, with closing of the review period in early June.
- 4 weeks to finalize the ESR assuming no comments or bump up requests are received during the 30-day period review period.
- Filing of the ESR with the Ministry in early July.

4. Review of Evaluation and Scoring of Alternatives and Preliminary Identification of Recommended Design Alternative(s):

AECOM focused on the evaluation and scoring criteria in Tables A2 (disinfection alternatives) and A1 (membrane alternatives) of the *Alternatives Selection Technical Memorandum-Rev.2* in order to discuss and confirm the final evaluation and scoring with the Town. The following is a summary of the decisions made at the meeting that will be reflected in the final Technical Memo provided by AECOM:

- **Table A2 – Detailed Technical Evaluation Scoring and Results for *Disinfection* Alternatives**
  - Pathogen Control: Option 4 rationale modified to more directly compare against Option 5; scoring unchanged.
  - Operation and Maintenance: Option 5 scoring (out of 10) set to = 4.
  - Ease of Implementation: Option 4 scoring set to = 4 and Option 5 scoring set to = 7
  - Process Robustness: Option 4 scoring set to = 4 and Option 5 scoring set to = 9
  - Minimize Footprint: Option 4 scoring set to = 8 and Option 5 scoring set to = 6
  - Minimize Truck Traffic: No changes to the scoring

- **Table A1 – Detailed Technical Evaluation Scoring and Results for *Membrane* Alternatives**
  - Option Description: Option 3 wording revised from 'abandoned' to 'repurpose'
  - Operational and Maintenance: No changes to scoring
  - Ease of Implementation: Scoring (out of 10) confirmed as Option 1 = 7, Option 2.1 = 3, Option 2.2 = 4, and Option 3 = 8
  - Process Robustness: 'multi-barrier treatment' deleted from the title. No changes to scoring.
  - Minimize Footprint: Option 3 scoring set to = 6.
  - Minimize Truck Traffic: Correction to the rationale for Option 2.2 and 3 to identify Option 2.2 as having more excavation than Option 3. Scoring set to Option 1 = 4, Option 2.1 = 8, Option 2.2 = 9, and Option 3 = 7

- The weightings of criteria for each set of alternatives were also reviewed as part of a sensitivity analysis. The analysis considers the impact on the scoring by giving greater priority to factors such as minimizing the expansion footprint and temporary construction disruption at the expense of factors such as water quality and process robustness. The following adjustments for the purpose of the sensitivity analysis were confirmed:

	Membrane Options		**Disinfection Options**	
	Base Weight	**Adjusted Weight**	**Base Weight**	**Adjusted Weight**
Pathogen Control	N/A (all equal)	N/A (all equal)	35	25
Operational & Maintenance	40	35	25	30
Ease of Implementation	24	25	15	10
Process Robustness	16	5	10	5
Minimize Footprint	14	25	10	20
Minimize Truck Traffic	6	10	5	10

From the results of the sensitivity analysis exercise, the following alternatives had the highest cost-benefit analysis scores:

- **Membrane Alternative:** Repurpose Existing ZW500 Membrane Building and Construct New Membrane Building
- **Disinfection Alternative:** Practice UV Disinfection and Chlorinate in New CT Chambers.

In addition to finalizing the evaluation and scoring criteria for all membrane and disinfection alternatives, including adjusted weightings for sensitivity analysis, it was agreed that the following additional revisions will be reflected in the final Technical Memorandum:

- The drawing in the report illustrating Option 3 (Figure 14 page 27) will be adjusted so that the proposed membrane/administration building footprint is shown further north, further away from the shoreline area.

- The removal of the existing generator tanks within the existing generator building will be performed in the Ultimate Phase, instead of Phase 1 of the project

- Text and tables throughout the report will be checked to ensure that all references to membranes are generic unless describing existing equipment.

- With reference to an integrated drawing combining all recommended solutions presented at the meeting:

    - Due to vehicle accessibility concerns the Town requested that the proposed diesel and fuel tanks be shown on the north end of the property.
    - Existing pipes in the area where the proposed new membrane building will be constructed could be re-routed. This should be discussed during staging.
    - At this point, boxes will be used to represent the proposed recommended solutions in the conceptual drawings.
    - All proposed infrastructure must be contained within existing fence lines.

- The Town requested that a profile drawing of the buildings be created to enhance visualization of the buildings. The drawing should illustrate the perspective of pedestrians from the trail along the shoreline of the property as well as the view from the road.

- For budget planning purposes the Town requested that separate construction and engineering opinion of cost tables be prepared. Budget is based on 2024 cost.

5. Next Meeting

The next meeting (Workshop to Finalize the Alternatives Selection Technical Memorandum and Review PIC Material) is scheduled for February 27th, 2020 at 43 Stewart Road, Collingwood (Boardroom).

6. Other Business

Ainley noted that they will require the final drawings from AECOM at least 1 week prior to the PIC date, to incorporate into the presentation material.

6. Adjournment

This meeting was adjourned at 3:40pm.

Any errors and/or omissions from these Minutes should be reported to the undersigned as soon as possible.

Minutes prepared by J. Marks and finalized by:

M.W. Ainley, P. Eng, PMP
Ainley & Associates Limited

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MEETING MINUTES

STEERING COMMITTEE MEETING #5

PROJECT: The Town of Collingwood
Updated Class EA for the R. A. Barker Water Treatment Plant (WTP) Expansion
Ainley Job No. 119013

DATE: February 27, 2020

LOCATION: 43 Stewart Road, Collingwood (Boardroom)

TIME: 11:00 a.m. – 1:30 p.m.

PRESENT: Peggy Slama, Town of Collingwood
Ken Kaden, Town of Collingwood
Marie Richardson, Town of Collingwood
John Vail, Town of Collingwood
Mike Ainley, Ainley Group
Reid Mitchell, Ainley Group
Jody Marks, Ainley Group (via videoconference)
Brian Sahely, AECOM (via videoconference)
Laura Alvarez, AECOM (via videoconference)

DISTRIBUTION: All Present

1. Call to Order

The meeting was called to order at 11:10 a.m.

2. Purpose of Meeting

The purpose of the meeting was to review the final draft Design Alternatives TM and draft PIC material, which included the Notice of PIC as well as the presentation material.

3. Updated Schedule

Since the last meeting the MSP has been endorsed by Council, the Town has forwarded copies of the comments received during the MSP 30-day review period to Ainley, and Ainley has added those respondents the contact list for consultation during the WTP Class EA. Scheduling of the Public Information Centre (PIC) for the WTP Class ESR has been confirmed for Tuesday, March 24th from 4:00 – 8:00 p.m. at the Town library.

An approximate timeline for the Environmental Study Report (ESR) completion following the PIC being remains as follows:

- 2-week comment period during and immediately following in which the ESR will be finalized.

- First publishing of the Notice of Completion of the ESR in early May to kick off the mandatory 30-day review period, with closing of the review period in early June.
- 4 weeks to finalize the ESR assuming no comments or Part II Orders are received during the 30-day period review period.
- Filing of the ESR with the Ministry in early July.

4. Review of Opinion of Costs

The opinion of costs provided in the draft TM were discussed. AECOM noted that the opinions of cost were consistent with the 2012 costs previously provided by AECOM, taking into account inflation and the increase in project scope as a result of additional replacements required due to aging of the existing facilities.

The opinion of costs incorporates contingencies and level of accuracy allowances and once the magnitudes of these allowances were agreed the opinion of costs for the Phase 1 and ultimate expansions (in 2020 dollars) were determined to be $65 million and $19 million respectively.

5. Review of Draft PIC Material

The draft Notice of PIC was approved subject to minor edits. A cover letter will be provided with Notices of PIC sent to contacts via mail. Email notification will include an attachment of the Notice of PIC.

The Notice of PIC will be issued in the March 12th and 19th editions of the Collingwood Connection newspaper. The Town will require the final version of the Notice of PIC by March 6th to submit to the newspaper. The Notice of PIC will also be uploaded to the Town's website for March 12th.

The draft PIC boards were reviewed and shall be revised as follows:

- For presentation purposes the boards will be revised to visually summarize as much information as possible, with more graphs and tables and fewer detailed technical and cost breakdowns and descriptions.

- The 'Welcome' and 'Comments' boards will note that all PIC material is available on the Town's web page.

- The PIC boards are to note that sensitivity analyses of the design alternatives were conducted which confirmed the recommending solutions and ranking of all alternatives.

The Design Alternatives and other technical reports will be available for viewing at the PIC and online for visitors wanting more details.

All comments provided on the PIC material will be updated and resubmitted to the Town prior to March 6, 2020.

ACTION ITEM: AINLEY/TOWN

6. Other Business

The Town will review and direct Ainley's response to an Agreement proposed by Saugeen Ojibway Nation (SON) for SON's third-party review of the project.

ACTION ITEM: TOWN

There was discussion of the potential need to complete a noise assessment as part of the Class EA since MECP has been requiring this on several recent projects. It was determined that a noise assessment could be deferred to the detailed design phase in this case because of the nature of the project, i.e. a water project in which all major equipment would located inside buildings where noise levels can be well controlled, and also because it can be assumed with reasonable certainty that the new equipment would have lower noise levels than the existing equipment it would replace.

7. Next Meeting

The next meeting (to review the draft Environmental Study Report and draft Notice of Completion following the March 24, 2020 Public Information Centre) is scheduled for April 14th, 2020 at 43 Stewart Road, Collingwood (Boardroom).

8. Adjournment

This meeting was adjourned at 1:30pm.

Any errors and/or omissions from these Minutes should be reported to the undersigned as soon as possible.

Minutes prepared by J. Marks and finalized by:

M.W. Ainley, P. Eng, PMP
Ainley & Associates Limited

MEETING MINUTES

STEERING COMMITTEE MEETING #6

PROJECT:	The Town of Collingwood Updated Class EA for the R. A. Barker Water Treatment Plant Expansion Ainley Job No. 119013
DATE:	**June 24, 2020**
LOCATION:	Teams Meeting (Videoconference)
TIME:	10:00 a.m. – 12:00 Noon
ATTENDEES:	Ken Kaden, Town of Collingwood Heather McGinnity, Town of Collingwood Mike Ainley, Ainley Group Reid Mitchell, Ainley Group Jody Marks, Ainley Group
DISTRIBUTION:	All present

1. Call to Order

The meeting was called to order at 10:00am.

2. Purpose of Meeting

The purpose of the meeting was to review of Comments and Responses from the PIC, Draft ESR and Draft Notice of Completion Including Cover Letter

3. Review of Comments and Responses from PIC

Two letters were drafted by Ainley in response to the comments received during the Public Information Centre period. The team reviewed each letter and the following comments were noted:

- Response letter to New Tecumseth – The Town confirmed that the wording of the response was satisfactory with no revisions required.
- Conservation Authority (NVCA Response letter to Nottawasaga Valley) – The Town requested minor edits to the response with respect to commitments.

ACTION: AINLEY

4. Review of Draft ESR

Prior to this meeting an updated Draft Environmental Study Report (ESR) was circulated to the project team incorporating the Town's first round of comments. The edits incorporating the Town's comments were approved. Additional comments discussed at this meeting are listed below:

- General Comment – References to the Phase 3 'preferred solution' should be changed to 'preferred design' throughout the document.
- General Comment – Be more specific throughout the document with phase references (e.g. Phase 1 expansion and/or Ultimate phase expansion), including Class EA 'phase' references (e.g. 'Phase 3 of the Class EA process' as opposed to 'this phase').
- Executive Summary – Revise the executive summary to state that no disruption to the shoreline is anticipated from the work in either expansion phase. Ensure that this revision is reflected in the other areas of the ESR.
- Section 3.2 Planning Context – Additional subheadings and details are required to clarify the information as it pertains to the *Clean Water Act* and the *Conservation Authorities Act*.
- Section 6.2 Intake – Revise the terminology regarding the capacity of the intake.
- Section 6.2 Intake and Low Lift Pumping Station – Revise these bullets to be consistent with each other.

- Section 12.3 Potential for Climate Change to Impact this Project – Provide further information on stormwater control measures being considered (i.e. pre to post development recharge mitigation, Low Impact Development features, etc.).

Ainley will revise the Draft ESR to incorporate the noted comments.

ACTION: AINLEY

5. Review of Draft Notice of Completion Including Cover Letter

The team reviewed the draft Notice of Completion of and covering letter. There were no comments from the Town on the covering letter. With respect to the Notice of Completion the Town asked Ainley to confirm that there have been no recent amendments to the MEA Municipal Class EA document referenced in the Notice of Completion. Ainley responded that there have been clarifications but no formalized amendments since 2015. Prior to advertising the Notice of Completion Ainley will confirm that no amendments have been subsequently published.

A discussion ensured regarding the level of details the Notice should provide. It was agreed that the Notice should provide a general overview, with specific details provided in the ESR.

ACTION: AINLEY

6. Other Business

Ainley noted that the current process for consultation during COVID-19 stipulates that posting electronic copies is acceptable. It is not necessary to provide a hard copy for viewing in a public venue, however every effort should be made to accommodate viewing of a hard copy if requested.

7. Next Steps/Schedule

Ainley will revise the documents as agreed and re-submit to the Town for review. The target of mid-July to publish the Notice of Completion remains unchanged.

8. Next Meeting

The date and time of the next meeting is to be determined.

9. Adjournment

The meeting was adjourned at 12:00pm.

Any errors and/or omissions from these Minutes should be reported to the undersigned as soon as possible.

Minutes prepared by J. Marks and finalized by:

M.W. Ainley, P. Eng, PMP
Ainley & Associates Limited

Appendix C

Town of Collingwood

Raymond A. Barker Water Treatment Plant

EXISTING PLANT PERFORMANCE/CAPACITY ASSESSMENT

AECOM Canada Ltd.

November 4, 2019

Water AECOM

Town of Collingwood

Raymond A. Barker Water Treatment Plant

Existing Plant Performance/ Capacity Assessment

Prepared by:

AECOM
105 Commerce Valley Drive West, Floor 7 905 886 7022 tel
Markham, ON, Canada L3T 7W3 905 886 9494 fax
www.aecom.com

Project No.: 60609900

Date:

November 4, 2019

Statement of Qualifications and Limitations

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- may be based on information provided to AECOM which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
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AECOM: 2012-01-06

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June 29, 2020

Mr. Ken Kaden
Project Coordinator Environmental Services
Town of Collingwood
43 Stewart Road
Collingwood, ON, L9Y4M7

Dear Mr. Kaden:

Project No: 60609900

RE: Raymond A. Barker WTP - Existing Plant Performance/Capacity Assessment

We are pleased to submit the *Existing Plant Performance/Capacity Assessment Technical Memorandum for the Raymond A. Barker WTP*.

Should you have any comments, please do not hesitate to contact the undersigned.

Sincerely,
AECOM Canada Ltd.

Brian Sahely, M.A.Sc., P.Eng.
Senior Process Engineer/Project Manager
brian.sahely@aecom.com

Distribution List

# of Hard Copies	PDF Required	Association / Company Name
0	1	Town of Collingwood Ainley & Associates

Revision Log

Draft #	Revised By	Date	Issue / Revision Description
1	BS	November 4, 2019	Issued for Review

AECOM Signatures

Report Prepared By:

Brian Sahely, M.A.Sc., P.Eng.
Senior Process Engineer/Project Manager

Report Reviewed By:

Martin Gravel, P.Eng.
Senior Process Engineer/Project Manager

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Not applicable

1. Introduction

1.1 Background

The Town of Collingwood Master Servicing Plan (MSP) has identified the need to expand the existing 31.14 ML/d Raymond A. Barker Water Treatment Plant which currently has insufficient capacity to accommodate future water demands for the Town of Collingwood and its contractual commitments to supply treated water to other municipalities.

A Class Environmental Assessment (EA) previously filed in September 2004 has now expired. It is no longer valid due to significant updates in planning, technology and consultation requirements. Therefore, instead of an Amendment/Addendum to the 2004 Environmental Study Report (ESR), an Updated Phase 3 & 4 ESR will be prepared, referencing the MSP (including March 2019 PIC) to satisfy Phases 1 & 2.

The MSP determined the need to increase the ultimate plant capacity identified in the 2004 Class EA (75 MLD) to 101 MLD for current full build-out projections and commitments to other municipalities. Prior to determining alternatives to achieve the ultimate capacity, an assessment of the existing plant needs to first be conducted.

1.2 Objectives of this Memorandum

The objective of this memorandum is to review the performance and capacity of the Raymond A. Barker WTP.

1.3 Memorandum Outline

The outline of this memorandum is shown in Table 1.

Table 1 Memorandum Outline

Section No.	Description
1	Presents the project background, objectives and provides an outline of this report.
2	Presents the design criteria for the plant.
3	Discusses historical water quality data.
4	Reviews the various plant unit processes as well as their capacities.
5	Presents a capacity assessment of the existing WTP.
6	Discusses alternatives to immediately achieve the plant rated capacity per the latest Municipal Drinking Water License.
7	Discusses the plan for reviewing alternatives to achieve future plant capacities.

2. Design Criteria

2.1 Permit to Take Water

There is a Permit to Take Water (PTTW) No. 3451-8CZMJC which authorizes the withdrawal of water up to 68.25 ML/d (47,400 L/min). This PTTW is dated as January 28, 2011 and is valid until January 31, 2021.

The previous PTTW 91-P-3037, dated January 15, 2001, had authorized the withdrawal of water per Taking Rate 1 as shown in Table 2. As stated in this PTTW, Taking Rate 2 does not become effective until the OWRA Section 52 approval for the water works at the higher rate has been issued. This Taking Rate 2 of 100.1 ML/d was removed from the recent PTTW mentioned above.

Table 2 Permit to Take Water Data for Nottawasaga Bay

Parameter	Taking Rate 1		Taking Rate 2	
Maximum Amount Taken Per Minute	45,500 L/min	65,520 m^3/d	69,510 L/min	100,094 m^3/d
Maximum Amount Taken Per Day	68,250,000 L/d	68,250 m^3/d	100,100,000 L/d	100,100 m^3/d
Maximum Number of Hours of Taking Per Day	24		24	
Average Number of Hours of Taking Per Day	24		24	
Maximum Number of Days of Taking Per Year	365		365	

2.2 Plant Rated Capacity in MDWL

The original Certificate of Approval (CofA) rated the plant for 27,355 m^3/d, given the capacity of the ZW500 membrane system. This rating was then revised in a CofA amendment to incorporate the 3,785 m^3/d ZW1000 ultrafiltration mobile package unit, for a total plant rated capacity of 31,140 m^3/d, which has since been carried forward to the current Municipal Drinking Water License (MDWL) no. 100-101, Issue no. 3.

2.3 Water Demand

Monthly treated water flowrates for 2017 and 2018 can be found in Table 3. As shown, the maximum daily treated water flowrate for 2017 (21,143 m^3/d) and 2018 (24,277 m^3/d) reached 68% and 78%, respectively, of the plant rated capacity of 31,140 m^3/d.

Table 3 Daily Treated Water Flowrates (2017 to 2018)

Month	2017 Flowrates (m^3/d)			2018 Flowrates (m^3/d)		
	Minimum	Average	Maximum	Minimum	Average	Maximum
January	16,125	17,562	19,059	15,929	17,868	19,073
February	15,361	16,952	18,305	16,188	18,317	20,713
March	14,662	17,048	18,509	15,248	18,149	19,269
April	13,709	16,235	17,914	15,824	17,302	18,908
May	15,311	17,498	19,752	12,649	18,067	20,099
June	16,717	18,998	20,529	17,728	20,997	23,231
July	9,528	17,718	20,482	18,082	22,032	24,277
August	15,925	19,045	21,143	14,873	19,985	23,839
September	16,368	19,104	20,892	17,852	20,061	21,491
October	15,223	17,787	19,738	15,691	18,600	20,401
November	15,493	17,251	18,493	14,642	17,660	19,061
December	8,614	16,699	18,486	13,446	16,851	18,927
Minimum	**8,614**	**16,235**	**17,914**	**12,649**	**16,851**	**18,908**
Average	**14,420**	**17,658**	**19,442**	**15,679**	**18,824**	**20,774**
Maximum	**16,717**	**19,104**	**21,143**	**18,082**	**22,032**	**24,277**
% Max./ Rated Capacity	**-**	**-**	**68%**	**-**	**-**	**78%**

The Town of Collingwood Master Servicing Plan (MSP) provided water demand projections with a summary of the demands during key periods provided in Table 4. The year for Phase 1 (i.e., 2038) was chosen based on limiting the required intake raw water instantaneous flows to below the current PTTW of 68.25 ML/D. The flows for 2038 were calculated by averaging the flows for 2032 and 2044 as provided in the MSP and assuming a linear growth.

Table 4 Water Demand Projections for the Raymond A. Barker WTP

Phase #	Intake	Industrial Well	WTP			
	Intake Raw Water Inst.[6] Flows (m^3/d)	Industrial Flows[5] (m^3/d)	CT Chambers Inst. Flows[4] (m^3/d)	Total Net Treated Water Flows[3] (m^3/d)	Municipal Pipeline Flows[2] (m^3/d)	Regional Pipeline Flows[1] (m^3/d)
1 (approx. Year 2038)	65,222	2,000	56,900	51,871	32,757	19,114
Ultimate	125,186	2,000	110,867	101,069	51,483	49,586

Notes:

1. Includes approximately 18,250 m^3/d (Phase 1) and 33,500 m^3/d (Ultimate) for the Town of New Tecumseth; and, 0 m^3/d (Phase 1) and 4,854 m^3/d (Ultimate) for the Township of Clearview (Nottawa). 864 m^3/d (Phase 1) and 11,232 m^3/d (Ultimate) of Collingwood water goes through the Regional pipeline to the Davey reservoir/pumphouse to service Zone 2.
2. Includes approximately 27,621 m^3/d minus 864 m^3/d (Phase 1) and 46,315 m^3/d minus 11,232 m^3/d (Ultimate) for the Town of Collingwood; and, approximately 6,000 m^3/d (Phase 1) and 16,400 m^3/d (Ultimate) for the Town of Blue Mountains.
3. Sum of Municipal and Regional pipeline flows.
4. Given approximate membrane permeate factor of 1.10 to account for membrane downtime, backwash wastewater volume, but excluding the constant bleeding of water for ZW500d membranes that do not impact the flowrate to the CT chambers (information obtained from SUEZ).
5. Even though the original required industrial demand was 16,418 m^3/d, industrial flows since 2017 never exceeded 2,000 m^3/d, so this number was used as agreed by the Town.
6. Multiplication of CT chambers instantaneous flows by an approximate raw water factor of 1.11 to account for constant bleeding of water for ZW500d membranes, and then summation of the industrial flows (information obtained from SUEZ).

The MSP also provided average day demands of approximately 40,179 m^3/d (2038 flows) for Phase 1 and 81,244 m^3/d for ultimate flow. This equates to a MDD/ADD ratio of 1.291 for Phase 1 and 1.244 for the ultimate flow.

2.4 Storage Projections

Table 5 shows the existing water storage tanks in the Town of Collingwood to provide a total storage capacity of 9,073 m^3, which excludes the storage provided by the on-site clearwell (high lift wet well) and the chlorine contact (CT) tanks located at the WTP.

Table 5 Existing Water Storage Tanks in the Town of Collingwood

Tank	Location	Volume (m^3)
Chlorine contact (CT) tanks	WTP (assuming H.W.L. of 178.5 m)	856
Clearwell (high lift wet well)	WTP (assuming H.W.L. of 178.1 m and 1.5 m submergence for high lift pumps)	555
Reservoir	Ted Carmichael West End Booster Pumping Station	6,800
Elevated tank	Hume Street, Central Park	2,273
Davey reservoir	Poplar Sideroad	2,565
Total		**13,049**
Total (excluding storage at WTP)		**11,638**

To provide operational flexibility of the high lift pumps, the high lift wet well at the WTP will be excluded from system storage calculations. All future on-site storage will be designed to provide the following:

- Adequate disinfection of the plant water (based on MECP disinfection requirements)

- On-site usage, including cleaning of the membranes (included in the high lift pump equalization volume requirement), and,
- High lift pump equalization (maximizing the hydraulic retention time of the high lift pumps combined). A target of 15 minute equalization volume is assumed for the purpose of this technical memorandum.

All future off-site storage will be provided per the MSP.

2.5 Water Quality Treatment Criteria

Table 6 presents the Ontario water quality treatment criteria for selected water quality parameters and the proposed performance targets for the Raymond A. Barker WTP.

Table 6 Water Quality Treatment Criteria for the Raymond A. Barker WTP

Parameter	Ontario Requirement	Proposed Performance Target
Ontario Drinking Water Quality Standards (ODWQS)		
Cryptosporidium	2-log reduction	4-log reduction
Giardia	3-log reduction (incl. 0.5-log inactivation from disinfection)	4-log reduction (incl. 0.5-log inactivation from disinfection)
Viruses	4-log reduction (incl. 2-log inactivation from disinfection)	4-log reduction (incl. 2-log inactivation from disinfection)
HAAs (µg/L)	80	60 LRAA
Total THMs (µg/L)	100 based on a running annual average of quarterly samples measured at a point reflecting the maximum residence time in the distribution system (LRAA)	80 LRAA
Turbidity (NTU)	< 0.1 NTU, 99% of time < 0.3 NTU, 100% of time	< 0.1 NTU, 99% of time < 0.3 NTU, 100% of time
Distribution Free Chlorine Residual (mg/L)	0.05 to 4.0 mg/L free chlorine residual	0.05 to 4.0 mg/L free chlorine residual (target of 1.66 mg/L average)
Ontario Drinking Water Quality Objectives and Guidelines (ODWQOG)		
Corrosive/water stability	-	Non-corrosive and stable water
Taste & Odour	Inoffensive	Inoffensive

3. Historical Water Quality Data

3.1 Raw Water Data

3.1.1 Raw Water Source

The raw water source for the WTP is Georgian Bay of Lake Huron.

3.1.2 Raw Water Turbidity

Between 2017 and 2018, raw water turbidity ranged between 0.09 and 15.5 NTU with an average of 0.91 NTU (Figure 1 and Table 7). Only 24% of the samples exceeded 1.0 NTU and 0.1% of the samples exceeded 10 NTU.

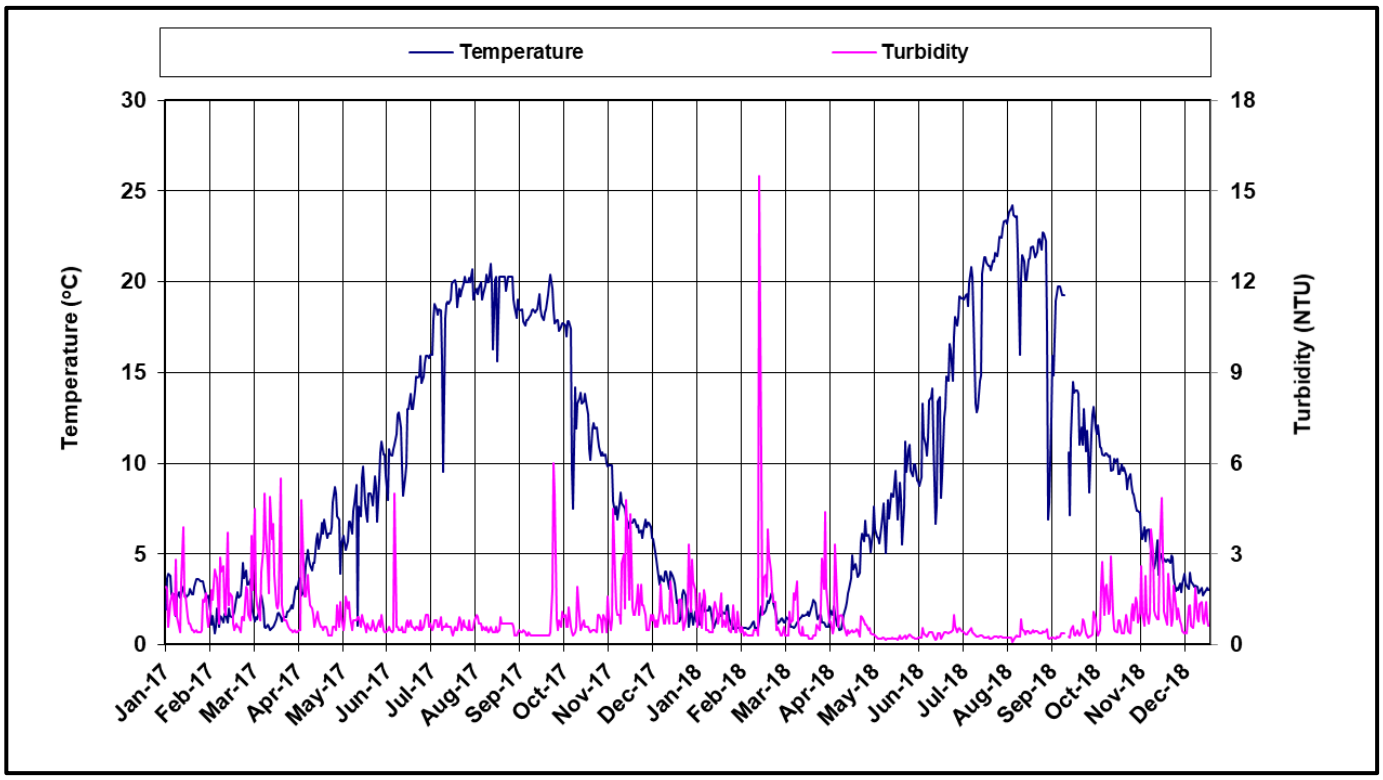

Figure 1 Plot of Raw Water Temperature and Turbidity (2017 to 2018)

Table 7 Raw Water Turbidity (NTU) Data (2017 to 2018)

Source	SC	Min.	Avg.	Max.	% Samples > 0.3 NTU	% Samples > 1.0 NTU	% Samples > 10 NTU
Daily Data	728	0.09	0.91	15.50	82.3%	23.6%	0.1%

3.1.3 Raw Water Temperature

Between 2017 and 2018, raw water temperature ranged between 0.6 and 24.2°C with an average value of 9.0°C (Figure 1 and Table 8). 80% of the samples exceeded 2°C and 38% of the samples exceeded 10°C.

Table 8 Raw Water Temperature (°C) Data (2017 to 2018)

Source	SC	Min.	Avg.	Max.	% Samples > 2°C	% Samples > 10°C	% Samples > 20°C
Daily Data	728	0.60	9.00	24.22	80%	38%	9%

3.1.4 Taste and Odour

Taste and odour can be experienced in the treated water during the warmer months. The major cause of this taste and odour is most likely due to the presence of 2-methylisoborneol (MIB) and geosmin, which are algae metabolites. The threshold number for MIB is 4.0 ng/L, while that for geosmin is 8.5 ng/L.

Geosmin and MIB data (from July 26, 2005) were less than the threshold numbers. Given that there tends to be no public complaints regarding taste and odour, geosmin and MIB tend not to be measured to know whether there has actually been any occurrences in the raw or treated water.

3.2 Treated Water Quality Data

3.2.1 Treated Water Turbidity

Between 2017 and 2018, treated water turbidity ranged between 0.03 and 0.07 NTU with an average of 0.034 NTU (Table 9). The maximum treated water turbidity meets the proposed performance target in Table 6. In fact, 91% of the samples remained below 0.05NTU, with 100% of the samples remaining below 0.1 NTU.

Table 9 Treated Water Turbidity (NTU) Data (2017 to 2018)

Source	SC	Min.	Avg.	Max.	% Samples < 0.05 NTU	% Samples <0.1 NTU	% Samples <0.3 NTU
Daily Data	728	0.030	0.034	0.070	91%	100%	100%

3.2.2 Ontario Drinking Water Quality Standards

A review of the treated water quality data between 2017 and 2018 from the 2017 and 2018 Annual Compliance Reports showed the following:

- None of the measured health related parameters in the Ontario Drinking Water Quality Standards (ODWQS) exceeded the maximum acceptable concentrations (MAC).
- None of the measured non-health related parameters exceeded the aesthetic objectives (AO) or operational guidelines (OG).

3.2.3 Potential for Formation of Disinfection By-Products (DBPs)

Table 10 shows a summary of the trihalomethane (THM) and haloacetic acid (HAA) data in the distribution system between 2017 and 2018. THMs and HAAs have never exceeded the performance targets in Table 6, whether calculated as the running annual average of quarterly samples or even a single data/measurement occurrence.

Table 10 Disinfection By-Products (µg/L) Data (2017 to 2018)

Source	SC	Min.	Avg.	Max.
THM Quarterly Data	8	15	38	59
HAA Quarterly Data	5	17	21	27

3.2.4 Membrane Permeate Water Ultraviolet Transmittance (UVT)

In March 2019, The UVT in the membrane permeate water ranged between 94 and 97%, with an average of 96% (Table 11).

Table 11 Membrane Permeate Water UVT (%) Data (March 2019)

Source	SC	Min.	Avg.	Max.
Data on Various Days	27	94%	96%	97%

3.2.5 Treated Water Free Chlorine Residual

Between 2017 and 2018, the treated water free chlorine residual ranged between 0.90 and 1.99 mg/L with an average of 1.66 mg/L (Table 12).

Table 12 Treated Water Free Chlorine Residual (mg/L) Data (2017 to 2018)

Source	SC	Min.	Avg.	Max.
Daily Data	728	0.90	1.66	1.99

3.3 Summary

Given the water quality data presented in this section, there are no new treatment processes that need to be added to the Raymond A. Barker WTP to improve the treated water quality to meet the proposed performance targets in Table 6 and the parameters of the ODWQS/ODWQOG not included in Table 5. This means that expansion of the plant needs to focus on capacity limitations which will be discussed in the next section.

4. Capacity Review

4.1 Raw Water Intake Facilities

4.1.1 Description, Dimensions, Sizes

The raw water intake facilities consist of the following:

- A raw water intake concrete pipe between the intake crib in the Nottawasaga Bay of Georgian Bay and a surge relief chamber with the intake length being 765 m and diameter of 1067 mm, with flared elbow intake inside a crib structure
- A 24 m long, 1067 mm diameter pipe between the surge relief chamber and the raw water wet wells
- Two (2) inlet channels, also known as raw water wet well 1, used to convey water to a raw water wet well 2 with dimensions 2.14 m W x 10.44 m L x 4.93 m SWD to give a total effective volume of 110 m^3 of raw water wet well 2
- A 15 kW (20 hp) mixer in the inlet channel 1 in the raw water wet well 1 used to increase the hydraulic grade line of the water in the raw water wet well 2
- A 750 mm diameter raw water supply ductile iron pipe, extending from the raw water wet well 2 to the membrane feed chamber

- A 600 mm diameter raw water bypass ductile iron pipe extending from the surge relief chamber to the membrane feed chamber
- A pre-chlorination system consisting of one (1) 50 mm diameter pipe to the surge chamber reduced to one (1) 25 mm diameter pipe to dose chlorine at the intake crib and intake exit at the beginning of the inlet wells in raw water wet well 1

4.1.2 Capacity Assessment

Given the following factors:

- a low water level (LWL) of Nottawasaga Bay to be 175.6 m (occurred in 1964 for Lake Huron)
- the obvert of the intake pipe to be at an elevation of 172.95 m
- submergence of the intake pipe in the raw water well to be 100 mm, and
- a C factor of 110,

the instantaneous capacity of the intake pipe is calculated to be approximately **125,000 m^3/d**, which is similar to the intake ultimate raw water instantaneous flow projections (Table 4). This instantaneous flowrate equates to a velocity of 1.62 m/s.

The intake net capacity is thus calculated to be **100,917 m^3/d** (i.e., 125,000 m^3/d instantaneous flowrate subtracting 2,000 m^3/d for industrial flows and then dividing by 1.11 raw water factor, followed by dividing by a membrane permeate factor of 1.10). Note that a higher Nottawasaga Lake level than 175.6m and a higher intake C factor than 110 will result in a higher intake net capacity.

4.2 Industrial (Unfiltered) Water Supply Plant

4.2.1 Description, Dimensions, Sizes

There is a separate industrial water supply plant to serve a separated unfiltered water distribution system with industries at the east end of the Town of Collingwood. This industrial water supply plant consists of the following:

- One (1) wet well
- Two (2) vertical turbine pumps and one (1) horizontal split case pump (characteristics shown in Table 13) that operate 24 hours per day based on the pressure at the industries
- One (1) 600 mm inlet pipe from the raw water wet well
- One (1) 250 mm inlet pipe from the membrane concentrate pumps
- Backflow preventors at the industries at the cross connection between the municipal and industrial water supply pipes to allow for provision of emergency supply of municipal water for process water requirements, each backflow preventer comprising two independent check valves with intermediate relief valves, shutoff valves and test cocks
- Instruments as follows:
    - One (1) turbidity meter (AIT-08) to monitor raw water turbidity in 600 mm inlet pipe from raw water wet well
    - One (1) level transmitter (LIT-08) to monitor water level in industrial wet well
    - One (1) turbidity meter (AIT-07) to monitor turbidity on the pump header
    - One (1) pressure indicating transmitter (PIT-02) to monitor pressure on the pump header
    - One (1) flowmeter (FIT-03) to monitor flowrate on the pump header

Table 13 Description of Industrial Pumps

Pump No.	Flowrate (L/s)	TDH (m)	Type	Motor (kW)	RPM	Soft Start?	VFDs?	Duty/ Standby
1	50.5	71.0	Vertical turbine	45	1770	Yes	Yes	Duty
2	126.2	71.0	Vertical turbine	112	1770	Yes	Yes	Duty
3	119.9	66.4	Horizontal split case pumps	112	1785	Yes	No	Duty

4.2.2 Capacity Assessment

Table 13 shows the capacity of the industrial pumps, with the firm capacity being 170.4 L/s (14,723 m^3/d). Even though the firm capacity is slightly less than the original desired maximum day flowrate of 16,418 m^3/d, Table 4 shows the target flowrate required from the industrial pumping station to be reduced considerably to 23 L/s (2,000 m^3/d).

4.3 ZW500 Membrane System

4.3.1 Description, Dimensions, Sizes

There is a ZW500 membrane system located inside the plant and consisting of the following:

- A membrane feed chamber with dimensions 1.00 m W x 17.97 m L x 3.15 m SWD with an effective volume of 56.6 m^3
- Five (5) membrane trains, consisting of ZW500 membranes as summarized in Table 14. As shown, the membrane trains consist of three generations of membranes: original 1998 ZW500a membranes, and ZW500b and ZW500d membranes installed between 2005 and 2018.
- Five (5) concrete tanks to house the submerged membranes, with each tank having dimensions 3.05 m W x 15.25 m L x 2.45 m SWD to give an effective volume of 114.0 m^3 per tank and a sump with dimensions 1.40 m W x 3.05 m L x 1.30 m SWD to give an effective volume of 5.6 m^3 per sump, to give a total effective volume in each tank of 119.6 m^3
- Six (6) variable speed permeate/backpulse pumps (5 duty, 1 shelf standby), each pump rated at 126 L/s at a TDH of 15.24 m with a 37 kW (50 hp) motor
- Six (6) positive displacement air blowers (5 duty, 1 standby) for air scouring the membranes as well as keeping the solids in suspension, with each blower rated at 680 L/s at a backpressure of 36 kPa with a 37 kW (50 hp) motor
- Six (6) concentrate pumps (5 duty, 1 shelf standby) to pump membrane concentrate from the membrane tanks to the industrial well, with each pump rated at 39 L/s at a TDH of 16.76 m with a 7.5 kW (10 hp) motor
- An air extraction system consisting of six (6) air removal vacuum pumps (5 duty, 1 shelf standby) to extract air from the membrane permeate headers, with each pump rated at 48 m^3/h at 41 kPa with a 1.5 kW (2.0 hp) motor and five (5) air separation columns, with a column on each membrane permeate header
- A clean-in-place (CIP) system for chemical cleaning of the membranes, consisting of one (1) 12.3 m^3 CIP concrete tank (2.40 m W x 2.84 m L x 1.80 m SWD), with piping manifolded to the five membrane trains
- A backpulse system for backwashing the membranes, consisting of one (1) 23.8 m^3 backpulse concrete tank (2.84 m W x 4.66 m L x 1.80 m SWD) with piping manifolded to the five membrane trains to the permeate/backpulse pump for each train
- Two (2) air compressors and air dryers (1 duty, 1 standby) for membrane integrity testing and valve actuation, each compressor with a 11.1 kW (15 hp) motor
- One (1) turbidity meter on each membrane permeate pipe to monitor turbidity in the membrane permeate

- One (1) flowmeter on each membrane permeate pipe to measure membrane permeate and backpulse flows
- One (1) flowmeter on each membrane concentrate pipe to measure concentrate flows
- Chemical feed systems for dosing chemicals required for membrane filtration system including:
  - 12% sodium hypochlorite for organic cleaning during the CIP process, consisting of two (2) 1,400 L day tanks (one located in the chlorine gas cylinder storage room and the other located in the chlorinator room) and one (1) chemical metering pump
  - 50% citric acid for inorganic cleaning during the CIP process, consisting of one (1) 200 L day tank in the blower room and one (1) chemical metering pump

4.3.2 Capacity Assessment

Table 14 shows the net capacity of each ZW500 membrane train at a design temperature of 2^{o}C and a CIP frequency greater than 30 days. As shown, the total net capacity of the ZW500 system given the amount/type of cassettes/modules currently installed and the fluxes shown is **23,113 m^3/d**, which is lower than the desired net capacity of 27,355 m^3/d.

It should be noted that the original design fluxes at the time of plant construction were approximately 25% more than that shown in Table 14 which would produce a net capacity of 28,975 m^3/d, exceeding the desired net capacity. This means that if the membranes are operated at the original design fluxes, then the desired net capacity can be achieved.

For the purpose of this report, the fluxes in Table 14 will be used given the quality of raw water, accepted life expectancy, frequency of cleaning, etc. Future plant expansion options (including replacement of existing membranes) will also carry the design fluxes in this table.

It should also be noted that the ZW500 membrane system is not fed by micro-strainers to remove fine particles that could otherwise damage the membranes. There is thus the potential for a reduction in plant capacity if membrane modules are isolated from operation given major fibre breakages from fine particles. Future plant expansion options will consider the installation of micro-strainers ahead of the membrane system(s), whether the existing or new membrane systems.

Table 14 ZW500 System Design Data

Train	Membrane Type	Installation Date	# of cassettes/ train[1]	# of modules/ cassette[2]	Area per module (m^2)	Total Area (m^2)	Inst. Flux (Lmh)[3]	Net Flux (Lmh)[3]	Net Capacity (m^3/d)
A	ZW500b	2014	15	8	60.39	7,246	27.6	25.16	4,376
B	ZW500d	2018	15	20	32.52	9,755	27.6	25.16	5,890
C	ZW500b ZW500a	2005 1998	10 4	8 8	60.39 46.45	6,317	27.6	25.16	3,815
D	ZW500b ZW500a	2012 1998	10 1	8 8	60.39 46.45	5,203	27.6	25.16	3,142
E	ZW500d	2017	15	20	32.52	9,755	27.6	25.16	5,890
Total			**68**	**-**	**-**	**38,276**	**-**	**-**	**23,113**

Notes:

1. Each train can hold a maximum of 15 cassettes. Previously, there weren't enough ZW500a/b modules that did not reach their end of life that would have allowed trains C or D to house 15 cassettes, hence the lesser amount of cassettes in these trains.
2. Each ZW500a/b cassette can hold a maximum of 8 modules; while, each ZW500d cassette can hold a maximum of 20 modules.
3. Obtained from SUEZ on September 11, 2019. These fluxes are consistent with the current fluxes (that were de-rated about 10 years ago due to TMP limitations) and based on backwashing every 30 minutes with a 30 second backpulse (plus valve actuation duration).

4.4 ZW1000 Membrane System

4.4.1 Description, Dimensions, Sizes

There is a ZW1000 membrane system located outside the plant and consisting of the following:

- One (1) mobile package unit in two (2) temporary timber structures with dimensions 4.72 m W x 9.60 m L and 3.35 m W x 12.19 m L
- One (1) membrane train, consisting of ZW1000 membranes as summarized in Table 15
- One (1) 35 m^3 steel tank to house the submerged membranes and backwash/CEB/CIP storage tank (~ 16 m3)
- One (1) raw water vertical turbine feed pump, installed in the membrane feed chamber in the WTP, and rated at 73.8 L/s at a TDH of 10.6 m
- One (1) 0.5 mm S.P. Kinney Model "AP" 200 mm automatic strainer to remove fine debris from the raw water supply to prevent damage to the membranes
- One (1) variable speed multi-purpose permeate/backpulse/CEB/CIP pump rated at 36.6 to 75.7 L/s at a TDH of 13.7 m with a 37 kW (50 hp) motor
- One (1) drain pump rated at 54 to 82 L/s at a TDH of 7.6 m with a 18.6 kW (25 hp) motor to drain the water in the steel membrane tank
- One (1) vacuum pump rated at 39 m^3/h at 68 kPa to remove air released from the solution under vacuum that occurs as the water passes through the membrane to the permeate collection piping
- One (1) air blower for air scouring the membranes and rated at 30 L/s at a backpressure of 31 kPa with a 0.19 kW (0.25 hp) motor
- One (1) air compressor, air receiver and air dryer for membrane integrity testing and valve actuation
- One (1) particle counter and turbidity meter on the membrane permeate pipe to monitor particle counts and turbidity in the membrane permeate

- One (1) flowmeter on the membrane permeate pipe to measure membrane permeate and backpulse flows
- Chemical feed systems for dosing chemicals required for membrane filtration system including:
  - 12% sodium hypochlorite for organic cleaning during the CIP process and chemical cleaning during the CEB process, consisting of one (1) 200 L day tank and one (1) 178 L/min air diaphragm chemical metering pump for the CIP process and one (1) 108 L/h motor driven pump for the CEB process
  - 50% citric acid for inorganic cleaning during the CIP process, consisting of one (1) 200 L day tank and one (1) 178 L/min air diaphragm chemical metering pump

4.4.2 Capacity Assessment

Table 15 shows the net capacity of the ZW1000 membrane system at a design temperature of 2°C and a CIP frequency greater than 30 days to be **4,543 m^3/d**, which is higher than the desired net capacity of 3,785 m^3/d.

Table 15 ZW1000 System Design Data

Train	Membrane Type (ZW)	Installation Date	# of cassettes/ train	# of modules/ cassette	Area per module (m^2)	Total Area (m^2)	Inst. Flux (Lmh)[1]	Net Flux (Lmh)[1]	Net Capacity (m^3/d)
Mobile Unit	ZW1000V3	2017 2012	1 3	48 48	41.81 41.81	8,027	26.85	23.58	4,543

Notes:
1. Obtained from SUEZ on September 23, 2019.

4.5 Disinfection

4.5.1 Description, Dimensions, Sizes

Disinfection for the WTP is provided by dosing chlorine (using chlorine gas) to the common membrane permeate pipe which conveys water into a feed channel which splits the water to two (2) chlorine contact (CT) chambers for disinfection before the water overflows a weir into the clearwell.

The dimensions of each chamber is 7.73 m W x 18.78 m L x 2.95 m SWD, to give a total effective volume of 816 m^3.

4.5.2 Capacity Assessment

The existing chlorine contact (CT) chambers were originally designed to provide sufficient contact time for 3-log inactivation of viruses, given a total requirement of 4-log inactivation of viruses and 1-log credit provided to the membranes by the Ministry of the Environment (MOE) at that time. However, the following changes have occurred since the design of the plant:

- **Removal of Virus Removal Credits from the Membranes**: The latest MDWL has provided no credits to the membranes for virus removal. This is consistent with other membrane plants in Ontario even though the following December 2010 MWH reports showed the following:
  - **ZW500 Membranes:** Challenge experiments with MS2 virus have shown that the log removal achieved by the membrane is in the range of 2.0- to 4.7-logs. MS2 virus removal was greater than 2.2-log, 95% of the time.

- **ZW1000 Membranes:** Challenge experiments with MS2 virus have shown that the log removal achieved by the membrane is in the range of 2.6- to 5.8-log. MS2 virus removal was greater than 2.5-log, 95% of the time.

  In terms of guarantee, membrane suppliers typically don't guarantee virus removal because there is no means of confirming the virus removal in the field, and the membrane integrity test (MIT) doesn't have the required resolution for viruses since they are so small.

- *Procedure for Disinfection of Drinking Water in Ontario (MOE, 2006)* states that 0.5-log inactivation of *Giardia* cysts shall be provided regardless of the treatment technology provided. This is part of the multi-barrier approach for disinfection.

Table 16 shows the net capacity of the CT chambers to achieve 0.5-log *Giardia* inactivation to be **21,423 m^3/d** at 0.5°C and 41,399 m^3/d at 10°C. Operations have stated that the chlorine dosage (and thus free chlorine residual) is modified depending on the water temperature and plant flowrate, so as to ensure adequate disinfection at all times.

Table 16 Disinfection Calculations in Existing CT Chambers Using Chlorine

Parameter	Value	
Disinfection required	0.5-log *Giardia*	
Infrastructure providing disinfection	Two chlorine contact (CT) chambers	
Net volume of above infrastructure (m^3)	816 (at H.W.L. of 178.50 m and effective footprint of 138.25 m^2)	
Minimum free chlorine residual to be maintained at end of above infrastructure (mg/L	1.66 (2017 to 2018 average free chlorine residual)	
T_{10}/T (superior baffling conditions)	0.7	
Lowest design water temperature (°C)	0.5	10
Highest design treated water pH	8.1	
Instantaneous Capacity of CT chambers (m^3/d)	23,565	45,539
Membrane permeate (instantaneous) factor	1.10	
Net Capacity of CT chambers (m^3/d)	21,423	41,399

4.6 High Lift Pumping

4.6.1 Description, Dimensions, Sizes

Water from each CT chamber overflow separate weirs into the clearwell with dimensions 9.27 m W x 17.36 m L x 4.95m SWD to give a total effective volume of 797 m^3. Given a typical operating SWD of 4.45m (based on February to October 2019 data as stated by plant operations) and a maximum high lift pump suction pipe submergence of 1.5 m, a net operating volume of 475 m^3 can be achieved.

There are two sets of high lift pumps (HLPs) in this clearwell as listed below and described in Table 17:

- Four (4) pumps discharging water into a 400 mm 316SS high lift header inside the plant which conveys water through a 400 mm ductile iron pipe outside the plant to the Municipal WSS

- Three (3) pumps discharging water into a 316 SS high lift header inside the plant which conveys water to twin 400 mm and then one 600 mm concrete pressure pipe outside the plant and within the Collingwood boundary to the Regional Water Supply System (WSS) to supply water to the Town of New Tecumseth (total length of 600 mm pipe between the plant and the Town of New Tecumseth is 58 km)

The HLPs for the Municipal WSS are currently operated to maintain pre-set water levels in the elevated tank off-offsite, however, in the future they can also be operated to maintain system pressures.

The HLPs for the Regional WSS are operated to maintain water levels in the Parsons Road Reservoir in the Town of New Tecumseth; however, in the future they can also be operated to maintain system pressures.

Table 17 Description of High Lift Pumps

LLP No.	Flowrate (L/s)	TDH (m)	Type	Motor (kW)	RPM	Soft Start?	VFDs?	Duty/ Standby
Municipal WSS								
1	56.7	57	Vertical turbine	41	1800	Yes	Yes	Duty (Jockey)
2	138.6	55	Vertical turbine	112	1200	Yes	Yes	Duty
3	138.6	55	Vertical turbine	112	1200	Yes	Yes	Duty
4	138.6	55	Vertical turbine	112	1200	Yes	No	Standby
Regional WSS								
1	132.5	55	Vertical turbine	186	1800	Yes	Yes	Duty
2	132.5	55	Vertical turbine	186	1800	Yes	Yes	Duty
3	132.5	55	Vertical turbine	186	1800	Yes	Yes	Standby

4.6.2 Capacity Assessment

Table 17 showed the capacity of the Municipal and Regional HLPs, with the firm capacity being **334 L/s (28,850 m^3/d)** and **265 L/s (22,890 m^3/d),** respectively.

Given a net operating volume in the clearwell (high lift wet well) of 475 m^3, the hydraulic retention time (HRT) in the clearwell at different flowrates are presented in Table 18. As shown, the existing clearwell can provide 22 minutes HRT at the current plant rated capacity. The HRT reduces to 7 minutes at the plant's ultimate built-out capacity. If the plant staff will like to achieve a minimum of 15 minutes HRT, the net capacity of the clearwell is **45,600 m^3/d**.

Table 18 Hydraulic Retention Time (min) in the Clearwell at Varying Net Flowrates

Tank Location	High Lift Pumping Flowrate (m^3/d)		
	Current Rated Capacity	**Phase 1 (2038)**	**Ultimate**
	31,140	51,871	101,069
HRT (min)[1]	22	13	7

Notes:

1. Assume net HLWW/clearwell operating volume = 475 m^3 based on a typical operating SWD of 4.45m (based on February to October 2019 data as stated by plant operations) and a maximum high lift pump suction pipe submergence of 1.5 m.

4.7 Chemicals (Excluding Membrane System)

4.7.1 Description, Dimensions, Sizes

Chlorine gas is the only chemical used at the plant for providing disinfection. The chlorine gas system is located in its own rooms with the following:

- Five (5) one ton chlorine gas containers
- Two (2) weigh scales with a 4-20 mA output, each scale capable of holding one ton chlorine gas container
- One (1) vacuum regulator and two (2) vacuum switches to control from which container gas is being drawn and to switch automatically from the duty to the standby container, when the duty is empty, to ensure a continuous supply of chlorine gas
- One (1) chlorine gas detector
- Three (3) chlorinators (2 duty, 1 standby) located in a separate room to the chlorine gas containers with characteristics shown in Table 19

Table 19 Characteristics of Chlorinators

Chlorinator #	Process	Chlorinator Capacity (kg/d)	V-notch & Rotameter Capacity (kg/d)	Chlorine Dosage Location	Control
1	Pre-chlorination	226	34	Intake crib and intake exit at raw water wet well 1	Paced to combined readings of flowmeters on high lift header
2	Primary Disinfection	226	96	Membrane permeate header upstream of chlorine contact chamber	Paced to common membrane permeate header flowmeter and free chlorine residual analyzer (i.e., compound loop)
3	Standby to above	226	96	-	-

There is no chlorine gas scrubber at the plant.

4.7.2 Capacity Assessment

Table 20 shows the instantaneous capacity of the chlorinators and existing rotameters. As shown the chlorinators net capacity is **103,013 m^3/d**; while, the v-notch and rotameter net capacity is **43,758 m^3/d** (excluding the standby chlorinator).

Table 20 Capacity of Chlorinators

Chlorinator #	Peak Design Dosage (mg/L)	Chlorinator Capacity (kg/d)	V-notch & Rotameter Capacity (kg/d)	Chlorinator Capacity (m^3/d)		V-notch & Rotameter Capacity (m^3/d)	
				Instantaneous	Net[1,2]	Instantaneous	Net[1,2]
1	1.0	226	34	226,000	183,783	34,000	26,255
2	2.0	226	96	113,000	103,013	48,000	43,758
3	2.0	226	96	113,000	103,013	48,000	43,758

Notes:
1. Based on subtracting 2,000 m^3/d and dividing by 1.22 (i.e., 1/1.11/1.10) for chlorinator 1.
2. Based on an instantaneous factor of 1.10 for chlorinators 2 and 3.

Table 21 shows the storage capacity of the chlorine gas containers given various design dosages. As shown, five (5) chlorine gas containers can provide over 30 days of chlorine gas storage given a net *average* day design flow of 59,916 m^3/d and a total average design dosage of 2.3 mg/L. This equates to a net *rated (maximum day)* capacity of 74,537 m^3/d given a MDD/ADD ratio of 1.244 (Section 2.3).

Typically, plant operations order containers once two of them are empty. By the time that the containers arrive on-site, three containers may be empty. For future plant expansions, the storage capability of containers should be provided based on N-3 containers. If this policy is followed now, a net *average* day design flow of 23,966 m^3/d can be achieved, which equates to a net *rated (maximum day)* capacity of 30,941 m^3/d. A higher capacity can be achieved by ordering containers more frequently.

Table 21 Storage Capacity of Chlorine Gas Containers

# of Chlorine Gas Containers	Total Average Design Dosage (mg/L)[2]	*Average* Day Net Design Flow Given # Days Storage (m^3/d)[1]			
		7 days	30 days	60 days	90 days
1	2.3	51,357	11,983	5,992	3,994
2	2.3	102,713	23,966	11,983	7,989
3	2.3	154,070	35,950	17,975	11,983
4	2.3	205,427	47,933	23,966	15,978
5	2.3	256,783	59,916	29,958	19,972

Notes:
1. Based on an instantaneous factor of 1.10 assuming that the majority of the chlorination will be practiced within the CT chambers.
2. **Based on** SCADA data between January and August 2019.

4.8 Residue Management

4.8.1 Description, Dimensions, Sizes

There are three (3) types of wastewater generated at the WTP:

- **Sanitary sewage generated from toilets and drains** - This wastewater flows by gravity to the nearby sanitary sewer.

- **Membrane backwash wastewater** – The membrane concentrate pumps continuously discharge this wastewater to the industrial well, after which this wastewater then gets pumped to the industries. There is also a 250 mm diameter bypass outfall to the Bay.
- **Membrane CIP wastewater with high or low pH** – The membrane concentrate pumps discharge this wastewater to the nearby sanitary sewer.

Regarding the discharge of wastewater to the Bay, the existing Municipal Drinking Water License (MDWL) 100-101 (Issue No. 3) mandates that the total suspended solids shall not exceed an annual average concentration of 25 mg/L.

4.8.2 Capacity Assessment

Not applicable.

4.9 Building Services

4.9.1 Description, Dimensions, Sizes

Standby Power

There is one (1) standby generator with characteristics presented in Table 22. This generator was originally sized to provide standby power to all electrically driven units, such that 100% of the plant rated capacity can be provided during power outages under normal operating conditions.

Table 22 Characteristics of Standby Generator

Parameter	Value
Standby Generator	
No. of generators provided	1
Location of generator	Separate building
Type	Diesel
Prime rating	1,000 kW
Standby rating	1150 kW
Electrical rating	600 V, 3 pH, 60 Hz, 0.8 PF
Type of cooling	Radiator
Fuel Storage	
No. of tanks for fuel storage	4
Type of fuel tank	Double wall steel
Capacity per fuel tank	2,270 L
Location of fuel tank	Standby generator room
kW, fuel usage, operating hrs @ 100% Load	600 kW, 245 LPH fuel usage, 37 operating hours
kW, fuel usage, operating hrs @ 50% Load	300 kW, 123 LPH fuel usage, 19 operating hours

Electrical

A 44 kV primary cable runs from the terminal hydro pole to a 2000kVA pad mounted transformer, which is wound to transform 44kV to 600/347V. A single cable carries 600V power from the substation to the switchgear and motor control centre (MCC) in the diesel generator building. Electric wires then stem from this MCC to the other MCCs listed below:

- MCC at the industrial building to house mainly the starters for the industrial feed pumps
- MCC in the control room in the WTP to house the starters for most of the ZW500 system equipment except the blowers and compressors
- MCC in the blower room in the WTP to house mainly the starters for the blowers and compressors
- MCC in the control room in the WTP to house the starters for the high lift pumps for the Municipal Pipeline
- MCC in the Workshop in the WTP to house the starters for the high lift pumps for the Regional Pipeline
- MCC in the temporary building to house the starters for the ZW1000 system equipment

Heating and Ventilation

Generator Building

The generator building is electrically heated by a series of unit and wall style electric heaters. All ventilation in the generator building is provided by a series of exhaust fans and motorised dampers. Exhausts from the diesel generator are vented directly to the roof, through a series of silencers and on to a short stack to the outside. The heat produced from the diesel generator is passed through a heat exchanger to a radiator located on the roof. The radiator is a 50% blend of ethylene glycol.

WTP

Heating and cooling for the three offices, the electrical room and the corridor are provided by a HVAC system located on the roof. The remainder of the plant is heated with unit heaters with built-in or wall mounted thermostats that can be set on a room to room basis.

The washrooms and the storage room have a separate ventilation system which is exhausted to the roof. Every other room in the plant has its own intake and exhaust either to the roof or the side of the building.

Due to the increased humidity in the membrane and pump room, dehumidifiers have been installed to remove excess moisture from the air. These are activated by humidistat controllers located within the given rooms.

Overall SCADA and Communication

There are six (6) Allen Bradley programmable logic controls (PLCs) located at the plant to control the following processes:

- Generator
- Industrial feed pumps
- ZW500 membrane system

- ZW1000 membrane system
- Plant processes
- Regional high lift pumps

All of the PLCs have a human manual interface (HMI), except those for the industrial and Regional pumps, allowing the operator to check the status of the equipment specific to the PLC.

System monitoring and data collection is done by SCADA (RSView) with one computer located in the chief operator's office at the WTP and another computer located in the industrial building.

There is also a PLC located at the Ted A Charmichael reservoir which is connected to the main plant PLC at the WTP via a leased line from Bell Canada. Additionally, there is a remote terminal unit (RTU) at the elevated storage tank with radio communication between this RTU and the PLC for the plant processes. Finally, there are PLCs located at the Georgian Meadows Booster Pumping Station and the Osler Booster Pumping Station, which are all connected to the PLC for the Municipal high lift pumps via a leases line from Bell Canada.

System alarms that are generated are dispatched to the local Fire Department by the electronic dialling system. The Fire Department then dispatches the on call personal.

4.9.2 Capacity Assessment

There is a preference by the Town for the standby generator to provide sufficient power for 100% plant firm capacity and for the diesel storage system to provide 24 hours storage at this firm capacity. This is currently being achieved at the plant current rated capacity.

5. Capacity Assessment of Existing WTP

Table 23 shows the equivalent net plant capacity assessment of existing unit processes, while Figure 2 plots this data.

Table 23 Equivalent Net Plant Capacity Assessment of Existing Unit Processes

Process	Equivalent Net Plant Capacity (m^3/d)	Comments
Intake	125,000	Note that a higher Nottawasaga Lake level than 175.6m and a higher intake C factor than 110 will result in a higher intake net capacity. This capacity accounts for in-plant water recycling and industrial pumping resulting in 100,917m^3/d available for potable water delivery.
Membrane System	27,656	Sum of 23,113 m^3/d (ZW500 system) and 4,543 m^3/d (ZW1000 system) at 2^{o}C and 30 days CIP frequency and design fluxes as shown in this report. This is based on current flux standards and can be increased if needed. This capacity assumes no substantial fibre breakages that will require membrane modules to be isolated, resulting in a reduction of plant capacity.
Chlorine Contact Chambers	21,423	Based on providing 0.5-log inactivation of *Giardia* cysts at 0.5^{o}C, pH of 8.1 and 1.66 mg/L average free chlorine residual. The free chlorine residual can be increased as needed to achieve sufficient disinfection.
Clearwell	45,600	Based on providing 15 minutes high lift equalization volume.
Municipal HLPs	28,850	Firm capacity of pumps shown. Note that the Municipal HLPs cannot be reviewed on their own given that the plant feeds both the Municipal HLPs and the Regional HLPs.
Regional HLPs	22,890	Firm capacity of pumps shown. Note that the Regional HLPs cannot be reviewed on their own given that the plant feeds both the Municipal HLPs and the Regional HLPs.
Chlorinator	103,013	Limited by CT chamber chlorinator.
V-notch & Rotameter	43,758	For chlorination in the CT chamber.
Chlorine Gas Storage	30,941	Based on 2 chlorine gas containers providing 30 days average day design flow and dosage.

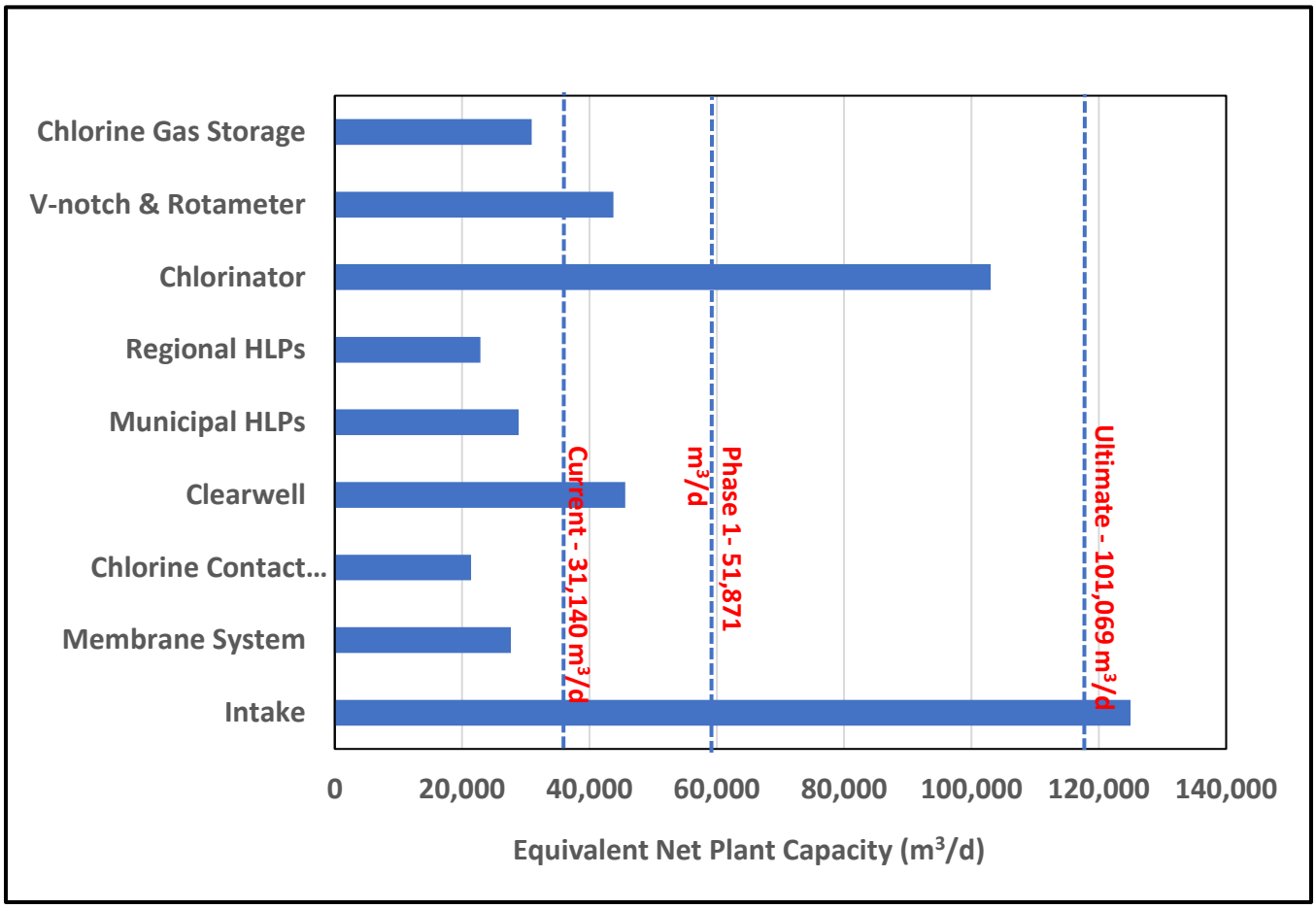

Figure 2 Equivalent Net Plant Capacity of Unit Processes

6. Achieving Plant Rated Capacity Immediately per MDWL

6.1 Membrane Filtration

Table 23 showed that the plant currently cannot achieve adequate membrane filtration capacity given the plant net rated capacity of 31,140 m^3/d per the MDWL. However, the plant can achieve adequate membrane filtration capacity given the 2017 and 2018 maximum day flowrates of 21,143 and 24,277 m^3/d, respectively (Table 3).

To achieve the MDWL plant net rated capacity, the following options can be considered by plant staff as an interim measure:

- **Option 1:** Operate the membrane systems at an additional 13% instantaneous flux. This may increase the clean-in-place (CIP) frequency, which may be manageable by plant staff.
- **Option 2:** Replace the ZW500a/b membranes in trains C and D with ZW500d membranes (populating the entire tanks) similar to trains B and E.

6.2 Disinfection

Table 23 showed that the plant cannot achieve adequate disinfection for either the plant rated capacity in the MDWL or the 2017/2018 maximum day flowrates. This issue has already been addressed in a report by GHD entitled *Evaluation of Alternatives* and dated July 19, 2019.

Operations have stated that the chlorine dosage (and thus free chlorine residual) is modified depending on the water temperature and plant flowrate, so as to ensure adequate disinfection at all times.

7. Achieving Future Plant Capacities

A subsequent technical memorandum will be prepared to review alternatives for the various unit treatment processes to achieve the future plant capacities listed in Table 4. This new technical memorandum will also screen the alternatives and then provide a cost-benefit analysis to determine the preferred alternatives.

Appendix D

Town of Collingwood

Raymond A. Barker Water Treatment Plant

CONDITION ASSESSMENT

AECOM Canada Ltd.

November, 2019

Water AECOM

Town of Collingwood

Raymond A. Barker Water Treatment Plant

Condition Assessment Technical Memorandum

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Date:

November 4, 2019

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September 27, 2019

Mr. Ken Kaden
Project Coordinator Environmental Services
Town of Collingwood
43 Stewart Road
Collingwood, ON, L9Y4M7

Dear Mr. Kaden:

Project No: 60609900

RE: Raymond A. Barker WTP - Condition Assessment Technical Memorandum

We are pleased to submit the *Condition Assessment Technical Memorandum for the Raymond A. Barker Ultrafiltration WTP* for the Collingwood WTP Class EA Project.

Should you have any comments, please do not hesitate to contact the undersigned.

Sincerely,
AECOM Canada Ltd.

Brian Sahely, M.A.Sc., P.Eng.
Senior Process Engineer/Project Manager
brian.sahely@aecom.com

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1. Introduction

1.1 Background

The Town of Collingwood has requested that an architectural and structural condition assessment be conducted for the Raymond A. Barker Water Treatment Plant (WTP) – select reference drawings included in **Appendix A**. This will assist the Town with budgeting future works and in determining feasible options and associated capital costs for expansion options under the EA process.

1.2 Objectives of this Memorandum

The objective of this memorandum is to provide the results of the condition assessment of the Raymond A. Barker WTP along with recommendations for improvements and associated costs with the understanding that any improvements would be deferred until the expansion project.

1.3 Memorandum Outline

The outline of this memorandum is shown in Table 1.

Table 1 Memorandum Outline

Section No.	Description
1	Presents the project background, objectives and provides an outline of this report.
2	Presents the procedure for the condition assessment.
3	Presents the observations from the condition assessment.
4	Presents recommendations along with an opinion of costs for immediate and future recommended upgrades.

2. Procedure

On August 29, 2019, the following individuals visited the Raymond A. Barker WTP to conduct a condition assessment:

- Brian Sahely – Project Manager
- Xuedong Liu – Structural Lead
- Kris Dray – Architectural Lead

The condition survey methodology was limited to visual inspection of exposed components from ground level and excluded: binocular inspection; close-up inspection via lift access; destructive investigation; test pits; removal of finishes to expose structure; delamination survey; concrete coring investigation/testing; corrosion potential survey; materials testing; and, related destructive investigation/testing. Further, AECOM did not enter any liquid containing tanks or confined spaces. Therefore, this assessment is a preliminary condition survey, not a detailed condition survey.

Each process area was toured along with Town and plant staff. These areas included the 80 year old structures of the raw water and industrial raw water supply buildings, and the remaining 21 year old structures. Pictures were taken of observations of concern with associated notes documented. Observations that were found to be in fair-to-good condition were not documented, nor presented within this report.

This report summarizes pictures and notes into process areas, reviewing the structural observations followed by the architectural observations. It should be noted that some observations were noted by both disciplines, but primarily documented under one discipline.

Recommendations of immediate upgrades and future upgrades are then provided along with an opinion of cost. Recommendations for additional studies are also provided.

3. Observations

3.1 Surge Chamber

3.1.1 Structural

Below is a summary of the observations for the surge chamber:

- The surge chamber tank structure is in fair condition (Figure 1).
- Ponding water was noted at the ground level in the trough.
- Ground level steel covers show light to medium corrosion (Figure 2).
- There were two 1.5m long cracks observed in the concrete side wall (south), each crack ranging from 5mm to 8mm wide (Figure 3).

Figure 1 Surge Chamber

Figure 2 Surge Chamber - Trough

Figure 3 Surge Chamber - Walls

3.1.2 Architectural

Below is a summary of the observations for the surge chamber:

- The surge chamber could use grating to cover the pit so operators do not need to step over to access the hatches. This is considered a health and safety related issue (Figure 1).
- Consideration for stairs would also be beneficial from a health and safety aspect or partial regrading to eliminate the high step 600mm +/- to the top of the chamber.

3.2 Raw Water Building or Old Water Supply Plant (North)

3.2.1 Structural

Below is a summary of the observations for the raw water building:

- From visual inspection, it appears that the roof openings were installed in a later phase of construction, such that four additional steel columns were installed to support the existing roof structure (Figure 4).
- Local roof underside stain is a sign of leakage through a crack (Figure 5).

Figure 4 Raw Water Building - Additional Steel Columns

Figure 5 Raw Water Building - Local Roof

3.2.2 Architectural

Below is a summary of the observations for the raw water building:

- The structure of the building appears to be in a relative good state of repair but the building is in poor condition requiring a complete shell refurbishment including items such as, but not limited to, windows, doors, roofing, louvres, precast panels, checker plates and hatches (Figure 6 and Figure 7).
- In the current state with the floor checker plate hatches failing and marked off with pylons, it is recommended a more permanent barrier to protect from the hazard is installed if the building is maintained (Figure 4).

Figure 6 Raw Water Building – External Structure

Figure 7 Raw Water Building – Internal Window Frame

3.3 Industrial Building or Old Pumping Station (South)

3.3.1 Structural

Below is a summary of the observations for the industrial building:

- A basement with access at the NE corner was noted (Figure 8).
- Abandoned pump bases were observed on the ground floor (Figure 9).
- Deteriorated concrete floor (combination of scaling and erosion in medium range) with significant cracks were noted (Figure 10, Figure 11 and Figure 12).

Figure 8 Industrial Building – Basement

Figure 9 Industrial Building - Abandoned Pump Bases

Figure 10 Industrial Building - Deteriorated Ground Floor

Figure 11 Industrial Building - Deteriorated Ground Floor

Figure 12 Industrial Building - Deteriorated Ground Floor

3.3.2 Architectural

Below is a summary of the observations for the industrial building:

- The building superstructure appears to be in a reasonably good state of repair with no significant leaks other than into the basement (crawl space.) The building has been re-cladded with metal siding, but the old single pane windows require replacement (Figure 13 and Figure 14).
- The epoxy flooring is worn and pealing and requires refinishing (Figure 10, Figure 11 and Figure 12).
- The hollow metal doors and frames are beginning to rust and will require replacement (Figure 15).

Figure 13 Industrial Building - Structure

Figure 14 Industrial Building - Window

Figure 15 Industrial Building - Hollow Metal Doors

3.4 Diesel Generator Building

3.4.1 Structural

Below is a summary of the observations for the Diesel Generator Building:

- The generator building structure is in good condition (Figure 16 and Figure 17).

Figure 16 Diesel Generator Building - Exterior

Figure 17 Diesel Generator Building - Interior

3.4.2 Architectural

Below is a summary of the observations for the Diesel Generator Building:

- The generator building is in good condition (Figure 16).
- The epoxy floor coating is delaminating from the wall and there is evidence of a leak (Figure 18).
- The front steps of the building require some resurfacing and asphalt repair as it presents a trip hazard (Figure 19).
- The fuel fill station steps are constructed of wood and show signs of age and are recommended for replacement with an open grating type frame to allow snow and ice to shed in the winter which would mitigate health and safety concerns (Figure 20).
- A substantial amount of fuel is stored in the generator building and it is recommended the applicable codes be reviewed to determine if the generator room meets the current codes and allowable volumes indoors.
- The exterior access ladder to the roof requires a safety cage as per Section 18 of the regulations for industrial establishments.

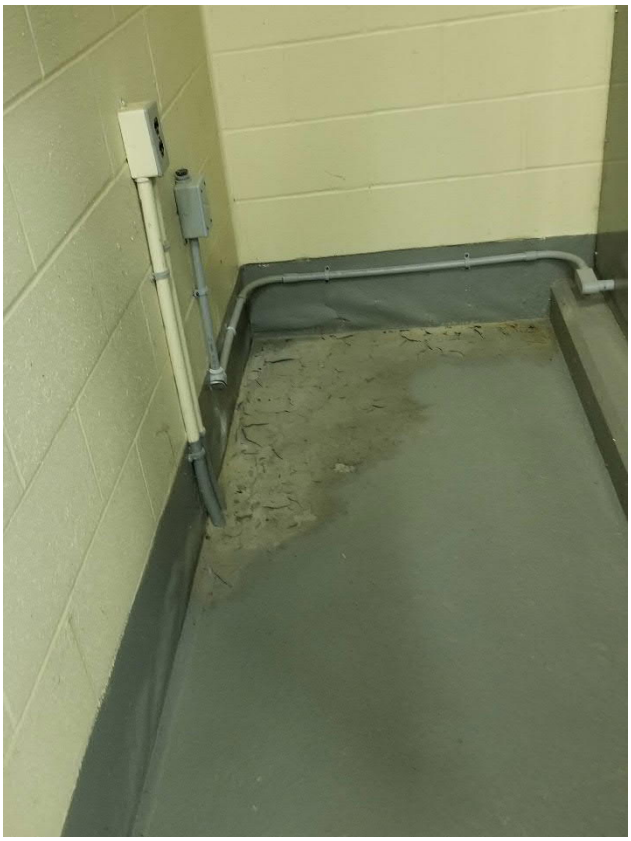


Figure 18 Diesel Generator Building - Epoxy Floor Coating

Figure 19 Diesel Generator Building - Front Steps

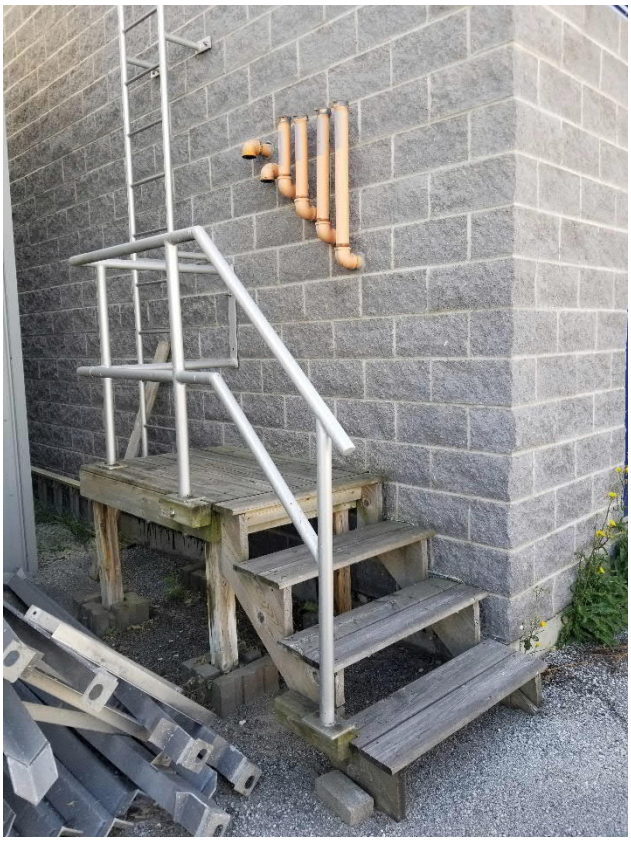


Figure 20 Diesel Generator Building - Fuel Fill Station Steps

3.5 Main Plant Building – Exterior

3.5.1 Structural

Below is a summary of the observations for the Main Plant Building - Exterior:

- One cold joint above grade was observed in the east wall exterior face, which is at the interface between the Permeate/Concentrate Pump Room/Tank and the Chlorine Contact Chamber Tank #1 (Figure 21).
- At the SW corner of the main building, a diagonal step crack in the mortar joints of the concrete block wall was noted. At the bottom of the façade wall crack, a concrete crack continued into the basement wall (Figure 22 and Figure 23).
- The south elevation pipe box cover has a top concrete slab that is severely cracked and masonry walls that are cracking and deteriorating. The slab and the walls require extensive repairs (Figure 24).

Figure 21 Main Plant Building – Exterior - Interface between Permeate/Concentrate Pump Room/Tank and Chlorine Contact Chamber Tank #1

Figure 22 Main Plant Building – Exterior - SW Corner

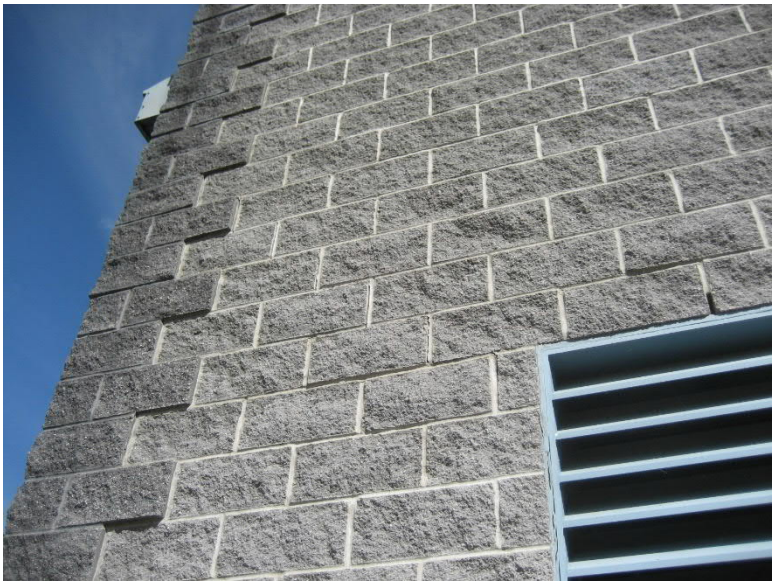


Figure 23 Main Plant Building – Exterior - SW Corner

Figure 24 Main Plant Building – Exterior - South Elevation Pipe Box Cover

3.5.2 Architectural

Below is a summary of the observations for the Main Plant Building - Exterior:

- The loading dock stairs are overgrown at the bottom and needs to be clean up for health and safety (Figure 25).
- The loading dock stair handrail is too large in diameter and does not meet code for a graspable handrail (Figure 26). Moreover, the guard rail is damaged and broken.
- The exterior hollow metal doors and frames throughout are aging and have varying level of rusting most notable at the door and frame bottoms. Weather stripping on several doors is missing or damaged (Figure 27).
- On the east exterior wall, there is a settlement crack next to the overhead door to the membrane room that requires repointing (Figure 28).
- The exterior windows are showing significant signs of corrosion and most notably on the inside which is a result of using hollow metal and non-thermally broken aluminum. All exterior windows require replacement with new aluminum windows (Figure 29).
- The north elevation parapet wall extending above the roof line is discolored which is evidence of leaking along with the signs of leaking on the inside of the building in the membrane room. This is a result of the back side of the parapet wall above the roof line not cladded and waterproofed. This waterproofing should tie in with the roofing membrane and wrapped over the stone caps and flashed with prefinished metal (Figure 30 and Figure 31).
- The exterior architectural block is cracked vertically on the north-east corner, likely as a result of control joint placement (Figure 32).
- The exterior masonry control joints and other caulked joint locations such as around louvres and windows have dried out and require re-caulking (Figure 33).
- The south elevation parapet wall is experiencing the same issues as the north elevation parapet wall and leaking.

Figure 25 Main Plant Building – Exterior - Loading Dock Stairs

Figure 26 Main Plant Building – Exterior - Loading Dock Stair Handrail

Figure 27 Main Plant Building – Exterior - Hollow Metal Doors

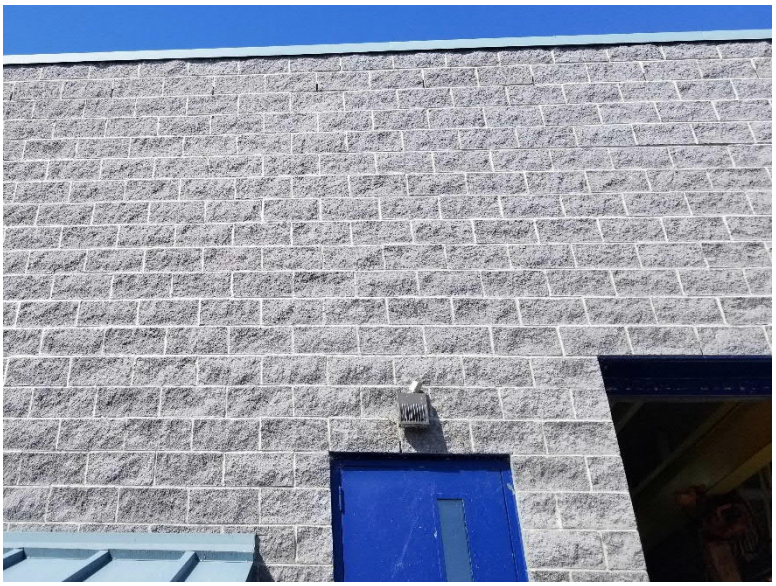


Figure 28 Main Plant Building – Exterior - East Wall

Figure 29 Main Plant Building – Exterior - Windows

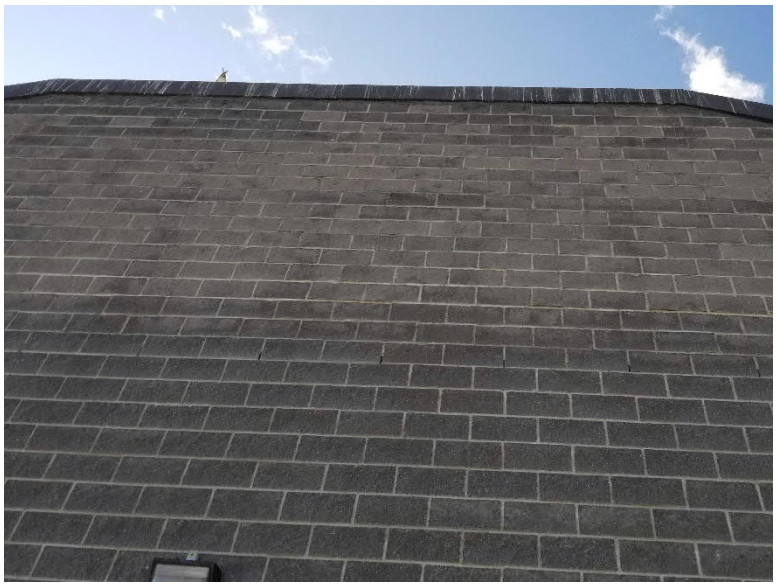


Figure 30 Main Plant Building – Exterior - North Elevation Parapet Wall

Figure 31 Main Plant Building – Interior - North Elevation

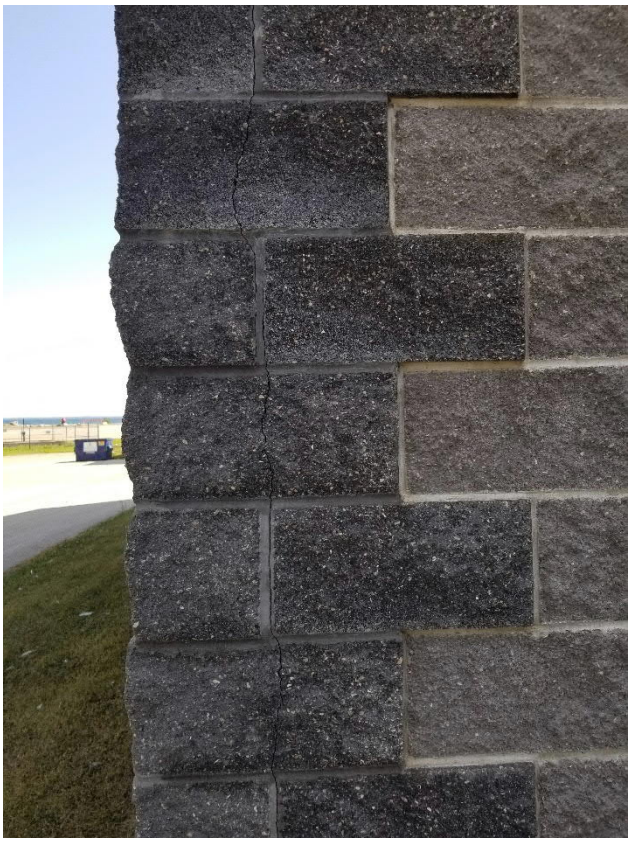


Figure 32 Main Plant Building – Exterior - Architectural Block

Figure 33 Main Plant Building – Exterior - Masonry Control Joints

3.6 Main Plant Building – Vestibule/Foyer

3.6.1 Structural

Below is a summary of the observations for the Main Plant Building – Vestibule/Foyer:

- Within the ground floor foyer area, wide cracks were observed in the floor slab and walls (Figure 34 and Figure 35).

Figure 34 Main Plant Building – Vestibule/Foyer - Ground Floor

Figure 35 Main Plant Building – Vestibule/Foyer - Wall

3.6.2 Architectural

Below is a summary of the observations for the Main Plant Building – Vestibule/Foyer:

- There is minor staining in the ceiling tiles from a source above the ceiling.

3.7 Main Plant Building – Stair Second Floor

3.7.1 Structural

No structural observations were made.

3.7.2 Architectural

Below is a summary of the observations for the Main Plant Building – Stair/Second Floor:

- The guard rail in the stair is not compliant with the Ontario Building Code (OBC) in terms of graspable diameter, top and bottom terminations. The stair run also appears not to meet the required depth of the OBC (Figure 36).
- The stair is required to exit directly to the outside and not through the ground floor.
- The travel distance of a maximum 15m for one exit has been exceeded.
- The second floor ceiling in many areas needs to be replaced and repaired due to removals and repairs from roof leaks (Figure 37).

- There are numerous items stored in the stairwell and this is not permitted by code as it is an exit.

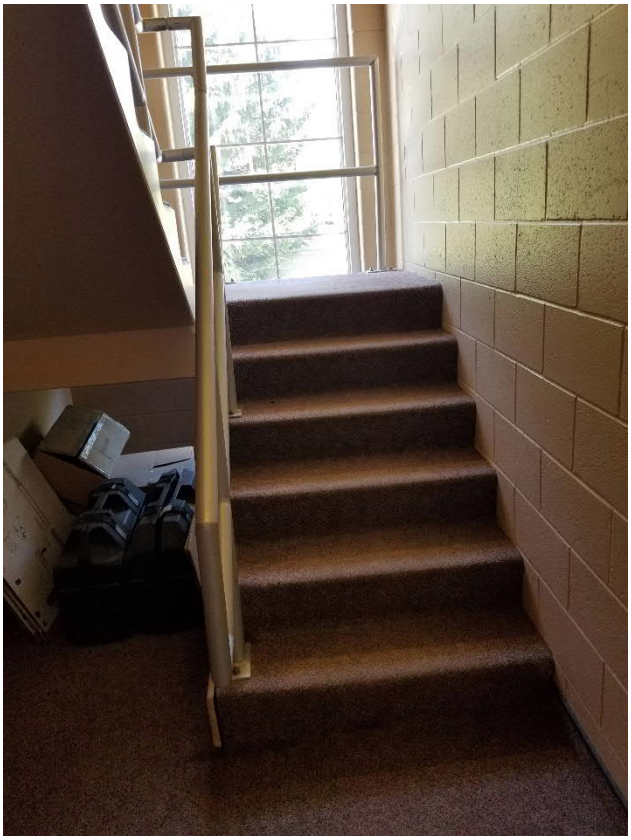


Figure 36 Main Plant Building – Stair Second Floor - Guardrail

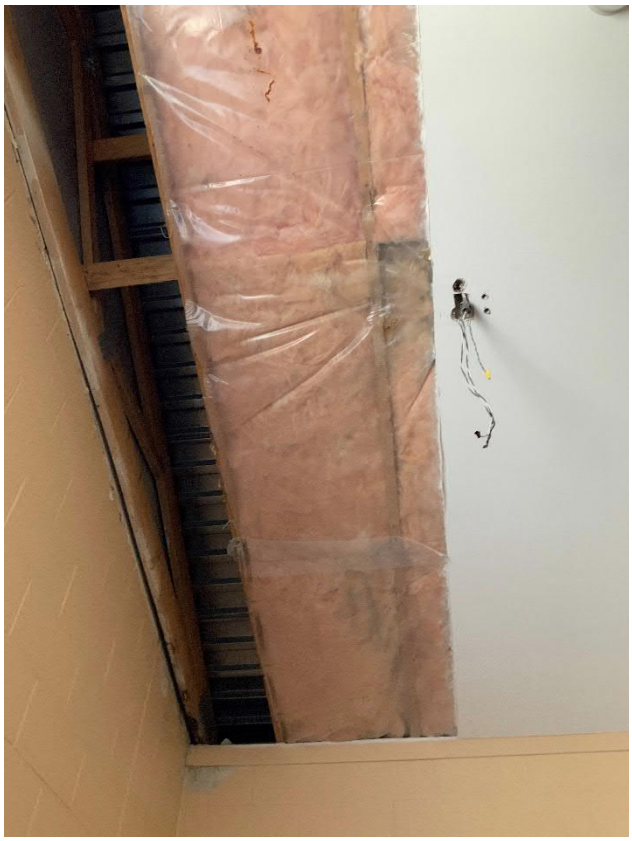


Figure 37 Main Plant Building – Stair Second Floor – Ceiling

3.8 Main Plant Building – Control Room/Office

3.8.1 Structural

No structural observations were made.

3.8.2 Architectural

Below is a summary of the observations for the Main Plant Building – Control Room/Office:

- There are missing, broken and damaged ceiling tiles some with evidence of water staining (Figure 38).

Figure 38 Main Plant Building – Control Room/Office - Ceiling Tiles

3.9 Main Plant Building – Office

3.9.1 Structural

Below is a summary of the observations for the Main Plant Building – Office:

- There are significant floor and wall cracks that are evident in all rooms running parallel to the west exterior wall caused by floor settlement. It is noted that AECOM were told by operations staff that noises of settlement can still be heard at times (Figure 39).

Figure 39 Main Plant Building – Office - Floor

3.9.2 Architectural

NA

3.10 Main Plant Building – Lunch Room

3.10.1 Structural

Below is a summary of the observations for the Main Plant Building – Lunch Room:

- There are significant floor and wall cracks, likely due to the settlement issue (Figure 40).

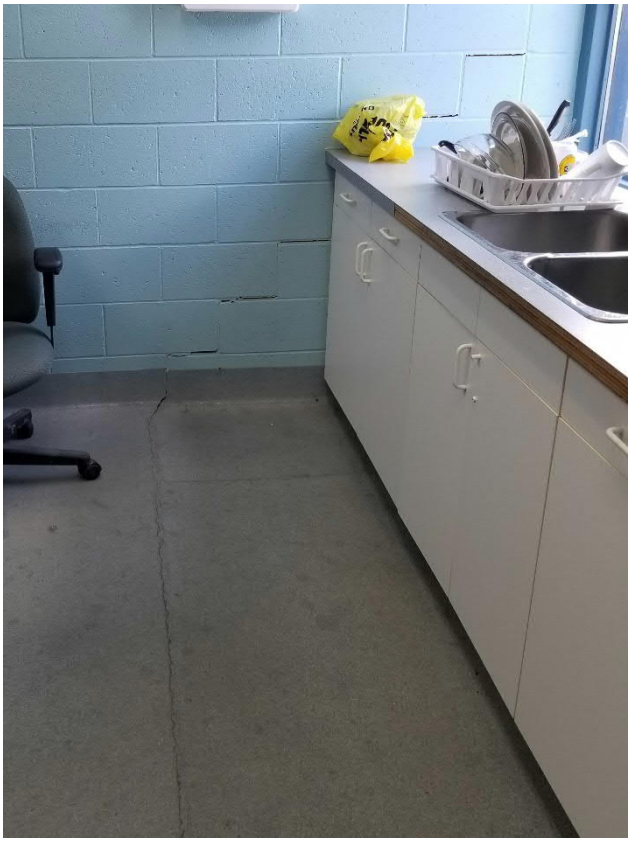


Figure 40 Main Plant Building – Lunch Room - Floor

3.10.2 Architectural

Below is a summary of the observations for the Main Plant Building – Lunch Room:

- The counter tops are worn and damaged (Figure 41).

Figure 41 Main Plant Building – Lunch Room - Counter Tops

3.11 Main Plant Building – Laboratory

3.11.1 Structural

Below is a summary of the observations for the Main Plant Building – Laboratory:

- There are significant floor and wall cracks due to the settlement issues (Figure 42).

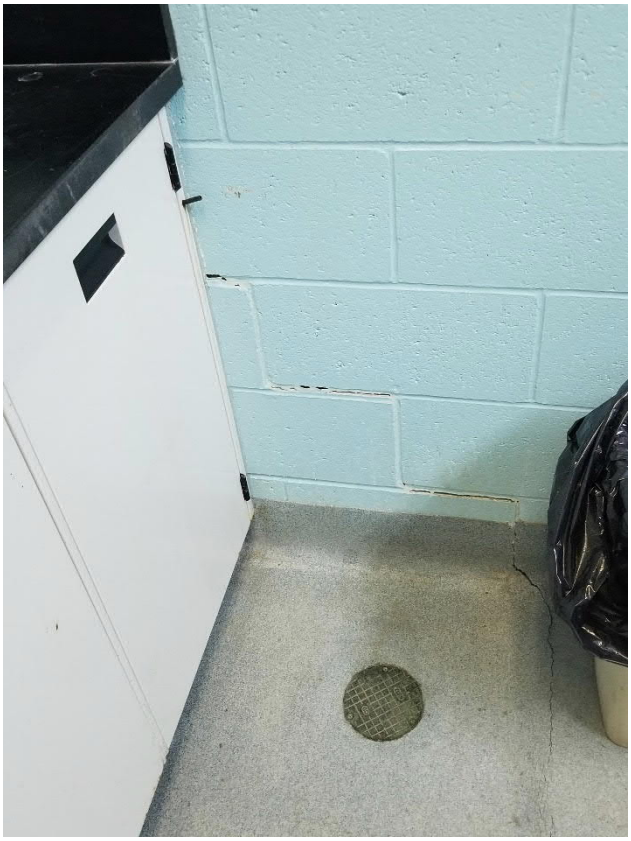


Figure 42 Main Plant Building – Laboratory - Floor

3.11.2 Architectural

NA

3.12 Main Plant Building – Washroom

3.12.1 Structural

Below is a summary of the observations for the Main Plant Building – Washroom:

- There are significant floor and wall cracks due to the settlement issues (Figure 43).

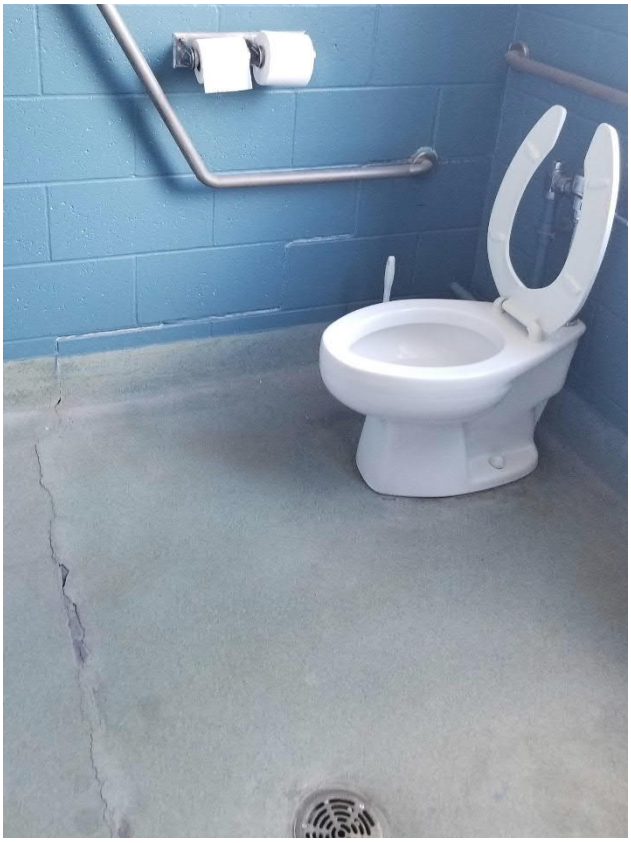


Figure 43 Main Plant Building – Washroom - Floor

3.12.2 Architectural

NA

3.13 Main Plant Building – Shower/Changeroom

3.13.1 Structural

Below is a summary of the observations for the Main Plant Building – Shower Changeroom:

- There are significant floor and wall cracks due to the settlement issues (Figure 44).
- There is shower tile cracking due to the settlement issues (Figure 45).

Figure 44 Main Plant Building – Shower/Changeroom – Floor

Figure 45 Main Plant Building – Shower/Changeroom – Tiles

3.13.2 Architectural

NA

3.14 Main Plant Building – High Lift Pump Room

3.14.1 Structural

Below is a summary of the observations for the Main Plant Building – High Lift Pump Room:

- There are significant floor and wall cracks due to the settlement issues (Figure 46).

Figure 46 Main Plant Building – High Lift Pump Room - Floor

3.14.2 Architectural

Below is a summary of the observations for the Main Plant Building – High Lift Pump Room:

- The floor epoxy finish is peeling and damaged in areas (Figure 47).
- There are wall and ceiling finish damages on the south wall due to parapet leaking (Figure 48).

Figure 47 Main Plant Building – High Lift Pump Room - Floor Epoxy

Figure 48 Main Plant Building – High Lift Pump Room - Wall and Ceiling

3.15 Main Plant Building – Membrane Room

3.15.1 Structural

Below is a summary of the observations for the Main Plant Building – Membrane Room:

- Floor cracks or deteriorations (totaling approximately 4.0 m^2) were observed in the walkway slabs of the Membrane Room (Figure 49, Figure 50, Figure 51 and Figure 52).
- Concrete spalling (totaling approximately 1.0 m^2) was observed at the bottom of the tank walls in the Membrane Room (Figure 53).
- Surface coat peeling (totaling approximately 4.0 m length), which is caused by concrete crack, insufficient surface preparation, mixing or application of coating, was observed at the tank walls in the Membrane Room (Figure 54). Regarding whether an improper HVAC system could be the cause for this crack, it should be noted that a specific crack may contribute to coating release by creating vapour drive behind the coating. If the coating system has been applied correctly with the appropriate system being used, the HVAC system should not influence the coating. However, a proper HVAC system will enhance the space and help alleviate peeling by providing drier conditions within the rooms.
- One wall crack (approximately 2.0m long) was observed in the south wall of the Clean-in-Place (CIP) Tank (Figure 55).
- In the corridor area outside (west) of the CIP Tank and Backpulse Tank, one crack (approximately 1.0m long) was found on the ground floor which is also the roof of the Chlorine Contact Chamber #2 (Figure 56).

Figure 49 Main Plant Building – Membrane Room - Walkway Slabs

Figure 50 Main Plant Building – Membrane Room - Walkway Slabs

Figure 51 Main Plant Building – Membrane Room - Walkway Slabs

Figure 52 Main Plant Building – Membrane Room - Walkway Slabs

Figure 53 Main Plant Building – Membrane Room - Wall Spalling

Figure 54 Main Plant Building – Membrane Room - Walls

Figure 55 Main Plant Building – Membrane Room - South Wall of Clean-in-Place (CIP) Tank

Figure 56 Main Plant Building – Membrane Room - Corridor Area Outside (West) of the CIP Tank and Backpulse Tank

3.15.2 Architectural

Below is a summary of the observations for the Main Plant Building – Membrane Room:

- The floor epoxy finish is peeling and damaged in areas as a result of equipment removals (Figure 57).
- Paint delamination issues can be found throughout the room including some ceiling areas (Figure 58).
- Damage to the wall and ceiling finishes observed at the corner of the Control Room/Membrane Room appears to be a possible roof leak (Figure 59).
- The overhead door frames were severely corroded and need to be replaced (Figure 60). Regarding whether an improper HVAC system could be the cause for this corrosion, the corrosion is more related to the use of salting the slabs around the entrance. However, HVAC and proper venting of the space to remove humidity and chlorine would also help alleviate concerns related to corrosion.
- All of the stairs in the Membrane Room have guardrail/railings too large in diameter to meet code (Figure 61). This could be resolved with the inclusion of a handrail mounted to the wall face.
- In the north east corner of the room, there is a ladder to the upper feed chamber which leads to a door which has since been removed for a pipe and no longer acts as an exit in which it was originally designed for including an exit sign. Further code review is required (Figure 62).
- In the north west corner, the ladder access has also been blocked off due to the installation of a platform.
- The ceiling tiles in the corridor in front of the Control Room are corroded and require replacement.

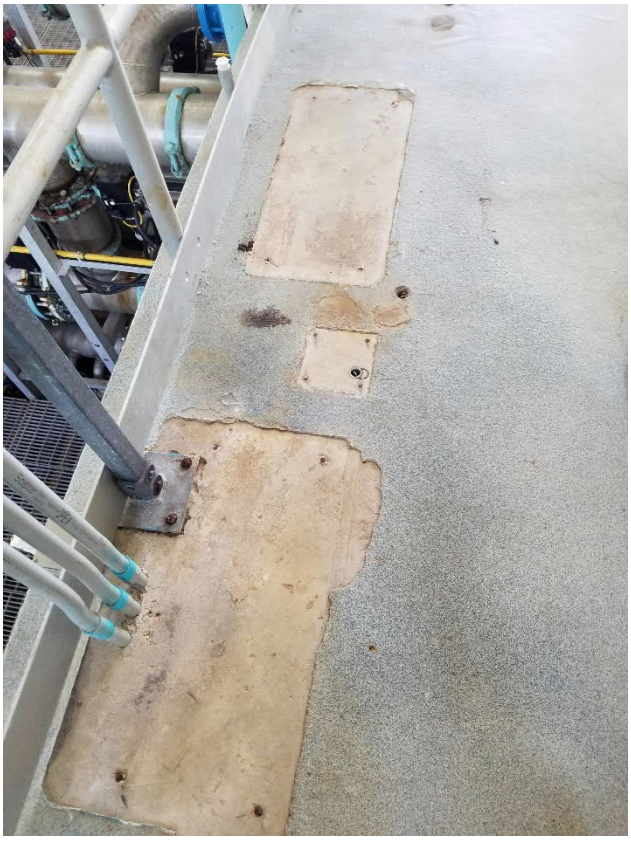


Figure 57 Main Plant Building – Membrane Room - Floor Epoxy

Figure 58 Main Plant Building – Membrane Room - Walls and Ceiling

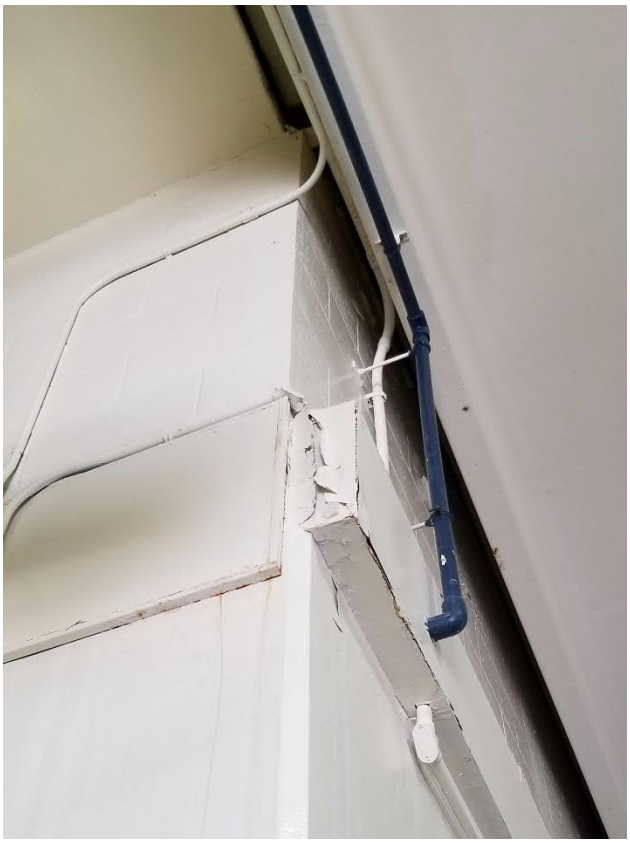


Figure 59 Main Plant Building – Membrane Room - Control Room/Membrane Room Wall and Ceiling

Figure 60 Main Plant Building – Membrane Room - Overhead Door Frames

Figure 61 Main Plant Building – Membrane Room - Stairs

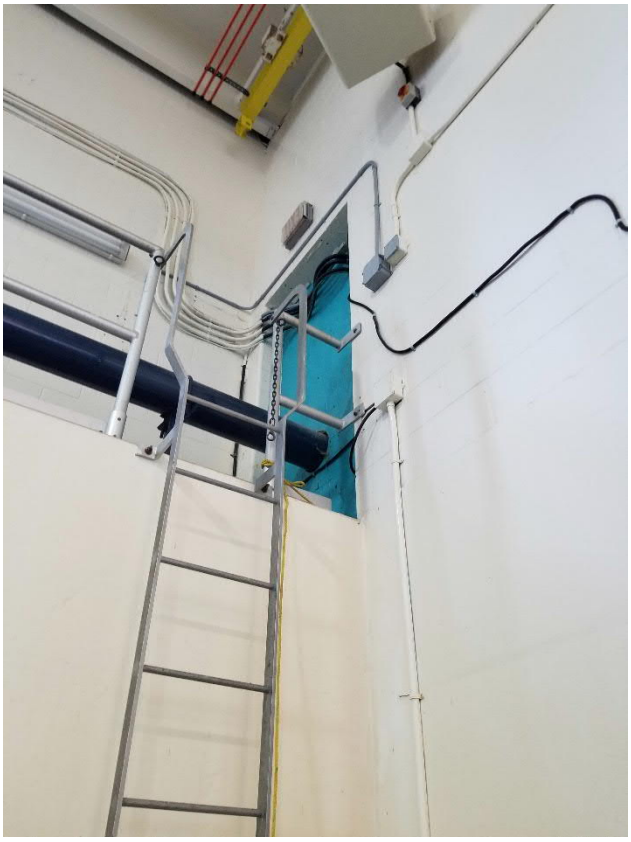


Figure 62 Main Plant Building – Membrane Room - Ladder in NE Corner

3.16 Main Plant Building – Membrane Piping Gallery

3.16.1 Structural

Below is a summary of the observations for the Main Plant Building – Membrane Piping Gallery:

- Wall cracks, one in the horizontal and the rest in the vertical or diagonal directions for a total of approximately 22m length, were observed in the Membrane Piping Gallery (Figure 63, Figure 64 and Figure 65).
- One 15m long longitudinal floor crack along the columns and several other floor cracks totaling approximately 22m in length, were found in the base slab of the Membrane Piping Gallery (Figure 66 and Figure 67).

Figure 63 Main Plant Building – Membrane Piping Gallery – Walls

Figure 64 Main Plant Building – Membrane Piping Gallery – Walls

Figure 65 Main Plant Building – Membrane Piping Gallery – Walls

Figure 66 Main Plant Building – Membrane Piping Gallery – Base Slab

Figure 67 Main Plant Building – Membrane Piping Gallery – Base Slab

3.16.2 Architectural

Below is a summary of the observations for the Main Plant Building – Membrane Piping Gallery:

- Paint finishes on the walls and ceiling are damaged with peeling observed in various locations.
- The epoxy floor finishes are in poor condition (Figure 68).
- The guard rail on the stair is not compliant with the OBC in terms of graspable diameter, top and bottom terminations.

Figure 68 Main Plant Building – Membrane Piping Gallery – Epoxy Floor

3.17 Main Plant Building – Blower Room

3.17.1 Structural

Below is a summary of the observations for the Main Plant Building – Blower Room:

- Several cracks, some of which had been injection-repaired before with injection ports left in place, were noted in west wall of Blower Room which shares a wall with the CIP Tank (Figure 69). Other leaking cracks were observed resulting in damaged paint finishes.
- There are cracks in the walls and floor through the Blower room running in a north-south direction close to the east wall. This is caused likely by combination of building foundation systems and earth settlement (Figure 70).

Figure 69 Main Plant Building – Blower Room – West Wall

Figure 70 Main Plant Building – Blower Room – Floor

3.17.2 Architectural

Below is a summary of the observations for the Main Plant Building – Blower Room:

- It is noted that the door leading into the Membrane Room is leaking oil and requires replacement.

3.18 Main Plant Building – Workshop/Maintenance Room

3.18.1 Structural

Below is a summary of the observations for the Main Plant Building – Workshop/Maintenance Room:

- The north wall of the workshop room exhibited leaking cracks resulting in damaged paint finishes (Figure 71).

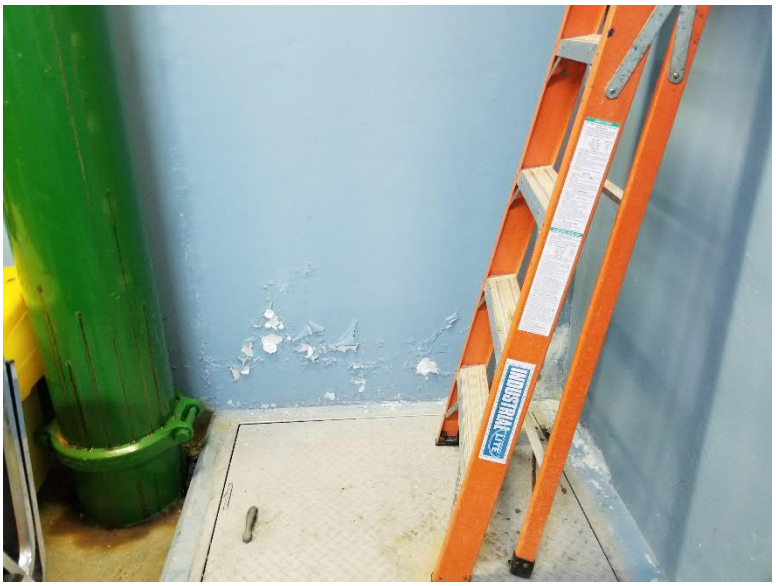


Figure 71 Main Plant Building – Workshop/Maintenance Room - North Wall

3.18.2 Architectural

Below is a summary of the observations for the Main Plant Building – Workshop/Maintenance Room:

- Floor staining was evident with the cause appearing to be from roof leak (unrelated to ventilation).

3.19 Main Plant Building – Chlorination Control Room

3.19.1 Structural

No structural observations were made.

3.19.2 Architectural

Below is a summary of the observations for the Main Plant Building – Chlorination Control Room:

- The hollow metal door and frame are severely corroded and require replacement (Figure 72).
- Epoxy floor finishes are heavily damaged along with wall paint around the base of the walls due to chemical exposure.

Figure 72 Main Plant Building – Chlorination Control Room - Metal Door and Frame

3.20 Main Plant Building – Chlorination Room

3.20.1 Structural

Below is a summary of the observations for the Main Plant Building – Chlorination Room:

- There are cracks in the walls and floor through the Chlorination Room running in a north-south direction close to the east wall (Figure 73). It is noted from the record drawings that this crack is along the boundary of a suspended slab and slab-on-grade. This crack is caused likely by a combination of building foundation systems and earth settlement.
- A 2m long and 3m long wall crack (each greater than 1.0mm in width) were noted in the south wall in the Chlorination Room. (Figure 74).

Figure 73 Main Plant Building – Chlorination Room - Chlorination Room

Figure 74 Main Plant Building – Chlorination Room – Wall

3.20.2 Architectural

No architectural observations were made.

3.21 Main Plant Building – Roof

3.21.1 Structural

NA

3.21.2 Architectural

Below is a summary of the observations for the Main Plant Building – Roof:

- The flat roof with membrane system has reached the end of its service life and is actively leaking and is currently scheduled for replacement (Figure 75).
- The north and south elevation parapet wall extending above the roof line is discolored which is evidence of leaking. This evidence is also seen given leaking on the inside of the building in the membrane room. This is a result of the back side of the parapet wall above the roof line not being cladded and waterproofed. This waterproofing should tie in with the roofing membrane and wrap over the stone caps and flashed with prefinished metal (Figure 76).
- The metal roofing has exhibited some leaking which is currently under repair. There are also some loose fasteners, some corroded screws and washers and finish deterioration (Figure 77).

Figure 75 Main Plant Building - Roof

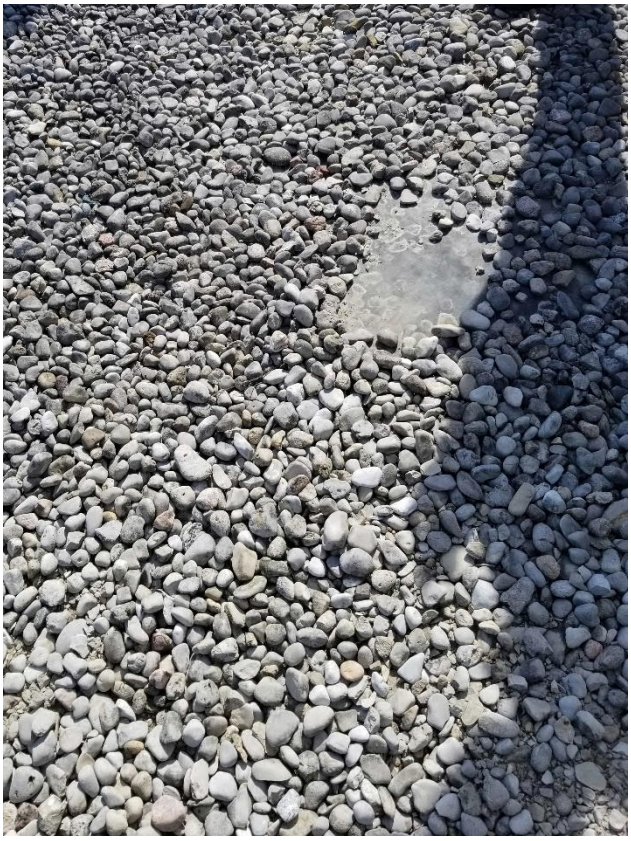


Figure 76 Main Plant Building - Roof

Figure 77 Main Plant Building - Roof - Metal Roofing

4. Recommendations

4.1 Recommended Upgrades along with Opinion of Costs

Table 2 provides a summary of the recommendations for immediate and future upgrades understanding the following guidelines:

- The Reference # (Ref. #) follows the subsection # under Section 3. For example, Ref. #3 is shown in the table for Industrial Building which was discussed in Section 3.3.
- Where no costs are shown for an item, it means that this item will be part of a separate project.
- Where TBD is shown, it means that further studies need to be conducted to better define the scope and thus the cost estimate. This is discussed further in Section 4.2.
- Items that have similar scope within a process area were combined. For example, for the Main Plant Building, Ref. #6A, the fixing of cracks/settlements in the floor slabs and walls were combined for all of the rooms that required this scope.
- Items categorized into "Immediate Upgrades" are health and safety related, with all other items categorized under "Future Upgrades", assumed to be part of the future major capital expansion project.
- Costs are opinion of costs assumed to be combined into a single project: one for Immediate Upgrades and the other for Future Upgrades. No factors (nor HST and engineering) have been applied to these costs.
- Table 3 provides the factored costs (excluding HST and engineering) showing a total opinion of cost of approximately **$873k** excluding the TBD items, on-going projects (e.g., roofing) and future projects that should incorporate the item (e.g., demolishing of the raw water building and industrial building).

Table 2 Recommendations for Immediate and Future Upgrades along with Costs (without Factors)

Ref. #	Plant Area	Discipline	Scope of Work	Opinion of Cost for Immediate Upgrades	Opinion of Cost for Future Upgrades
1A	Surge Chamber	Structural	Replace the corroded ground level steel covers.	-	$2,000
1B	Surge Chamber	Structural	Repair the two 1.5m long cracks in the south concrete side wall, each crack ranging from 5mm to 8mm wide	-	$1,500
1C	Surge Chamber	Architectural	Install stairs to the top of the surge chamber along with grating at the pits for operator access and safety. *Until this scope is completed, plant operations should follow standard Health & Safety procedures when working around the area.*	-	$8,000
2	Raw Water Building	All	Given the building age and the number of repairs required, but more importantly the need for a new low lift pumping station at this area, it is recommended that this building be demolished. *Cost will be part of the future low lift pumping station construction cost.*	-	-

Ref. #	Plant Area	Discipline	Scope of Work	Opinion of Cost for Immediate Upgrades	Opinion of Cost for Future Upgrades
3	Industrial Building	All	Due to the building age, the assortment of additions over the years, various small rooms and spaces along with upgrades required to the building shell and finishes, it is recommended that the industrial building be demolished with industrial pumps installed in the new low lift pumping station. The industrial building area can then become the site for a new building whether administration, workshop, new generator equipment, storage, etc. *Cost will be part of the future low lift pumping station construction cost.*	-	-
4A	Generator Building	Architectural	Fix the delaminated epoxy floor coating and leaks.	-	$4,000
4B	Generator Building	Architectural	Resurface the front steps of the building and repair the asphalt prior to the steps.	-	$3,000
4C	Generator Building	Architectural	Replace the fuel fill station steps with an open grating type frame (if the building is to be maintained as a generator building).	-	$5,000
4D	Generator Building	HVAC/ Mechanical	Make modifications to fuel storage system (if the building is to be maintained as a generator building and the existing fuel storage system does not meet code).	TBD	TBD
4E	Generator Building	Architectural	Add a safety cage for the fixed access ladder. *Until this scope is completed, plant operations should follow standard Health & Safety procedures when working around the area.*	-	$1,000
5A	Main Plant Building – Exterior	Structural	Repair the cold joint in the east wall exterior face between the Permeate/Concentrate Pump Room/Tank and the Chlorine Contact Chamber Tank #1.	-	$500
5B	Main Plant Building – Exterior	Structural/ Architectural	Repair all cracks on the main building façade wall and the south elevation pipe box cover.	-	$10,000
5C	Main Plant Building – Exterior	Architectural	Remove the overgrown at the bottom of the loading dock stairs.	$0	-
5D	Main Plant Building – Exterior	Architectural	Replace the large diameter loading dock stair handrail to meet OBC.	$2,000	-
5E	Main Plant Building – Exterior	Architectural	Replace all of the exterior hollow metal doors and frames.	-	$16,000
5F	Main Plant Building – Exterior	Architectural	Replace exterior windows with aluminum windows.	-	$70,000
5G	Main Plant Building – Exterior	Architectural	When the roof waterproofing is to be replaced *under a separate project* (see below), ensure that the waterproofing is tied in with the roofing membrane and wrapped over the stone caps and flashed with prefinished metal.	-	-
5H	Main Plant Building – Exterior	Architectural	Re-caulk the exterior masonry control joints and other caulked joint locations such as around louvres and windows.	-	$3,000

Ref. #	Plant Area	Discipline	Scope of Work	Opinion of Cost for Immediate Upgrades	Opinion of Cost for Future Upgrades
6A	Main Plant Building - Vestibule/Foyer - Office - Lunch Room - Laboratory - Washroom - Shower/Changeroom - High Lift Pump Room - Blower Room - Workshop/ Maintenance Room - Chlorination Room	Structural/ Architectural	Repair the cracks in the floor slabs and walls at numerous locations in the rooms listed on the left and paint the areas once done. The floors can be levelled with topping and finishes installed to match existing. The wall cracks can be repaired and walls painted. However, over time settlement may be repeated, which could cause cracks again in the floor and walls. For the Shower/Changeroom, this includes the tiles in the shower.	-	$200,000
6B	Main Plant Building - Membrane Room - Membrane Piping Gallery - Blower Room (separate to above)	Structural	Repair the cracks in the walls and floor. Also, replace the membrane tank wall coatings.	-	$427,000
6C	Main Plant Building - Vestibule/Foyer - Stair Second Floor - Control Room/Office - Membrane Room (by Control Room)	Architectural	Replace the stained tiles in the ceilings.	-	$2,000
7A	Main Plant Building – Stair Second Floor	Architectural	Replace the guard rail in the stair with an OBC compliant one.	$5,000	-
7B	Main Plant Building – Stair Second Floor	Architectural	Provide a safe exit to the ground floor from the second floor that meets OBC.	TBD	-
7C	Main Plant Building – Stair Second Floor	Architectural	Remove the items stored in the stairwell.	$0	
10	Main Plant Building – Lunch Room	Architectural	Replace the counter tops.	-	$3,000
14A	Main Plant Building - High Lift Pump Room - Membrane Room - Membrane Piping Gallery - Workshop/ Maintenance Room - Chlorination Control Room	Architectural	Repair the peeling and damaged epoxy floor areas.	-	$30,000
14B	Main Plant Building - High Lift Pump Room - Membrane Room	Architectural	Repair the walls and ceiling damage and paint them (where ceiling tiles do not exist).	-	$15,000
15A	Main Plant Building – Membrane Room	Structural	Repair the concrete spalling at the bottom of the membrane tanks walls.	-	$13,000

Ref. #	Plant Area	Discipline	Scope of Work	Opinion of Cost for Immediate Upgrades	Opinion of Cost for Future Upgrades
15B	Main Plant Building - Membrane Room	Architectural	Replace the overhead door frames.	-	$4,000
15C	Main Plant Building - Membrane Room	Architectural	Modify the guardrail/railings on the stairs to meet OBC.	$5,000	-
15D	Main Plant Building - Membrane Room	Architectural	Provide a safe exit from the north platform to meet OBC.	TBD	-
16	Main Plant Building - Membrane Piping Gallery	Architectural	Replace the guard rail in the stair with an OBC compliant one.	$2,500	-
17	Main Plant Building - Blower Room	Architectural	Replace the door leading into the membrane room.	-	$2,000
18	Main Plant Building – Chlorination Control Room	Architectural	Replace the hollow metal door and frame	-	$2,000
21A	Main Plant Building – Roof	Architectural	Replace the roof with membrane system (*understood to be undergoing as part of a separate project*). This waterproofing should tie in with the roofing membrane and wrap over the stone caps and flashed with prefinished metal.	-	-
21B	Main Plant Building – Roof	Architectural	Repair the metal roofing including loose fasteners, corroded screws and washers, and finish deterioration (cost shown is for repair only and not to replace with new roof or to address finish fading)..	-	$10,000
Total (excluding Factors, Taxes and Engineering)				**$14,500**	**$832,000**

Table 3 Opinion of Costs for Immediate and Future Upgrades along with Factors (without HST)

Parameter	Opinion of Cost for Immediate Upgrades	Opinion of Cost for Future Upgrades
Total from Table 2 (A)	**$14,500**	**$832,000**
Division 1 - General Requirements (10%)	$1,450	$83,200
Contractor Profit (10%)	$1,450	$83,200
Sub-total (B)	**$17,400**	**$998,400**
Provisional and Cash Allowances (5%)	$870	$49,920
Construction Contingency (15%)	$2,610	$149,760
Sub-total (C)	**$20,880**	**$1,198,080**
Inflation to Construction in 4 Years (3%/yr)	$2,621	$150,370
Sub-total (D)	**$23,501**	**$1,348,450**
Overall Level of Accuracy (30%)	$7,050	$404,535
Total Excluding HST and Engineering (E)	**$30,551**	**$1,752,984**
Total Excluding HST and Engineering (F)	**$1,783,535**	

4.2 Recommended Studies

4.2.1 Diesel Generator System

It is recommended that the following be studied further to determine the need for a new generator and/or fuel storage/transfer system:

- A review of the fuel storage system to determine whether it meets the current codes and allowable volumes indoors.
- An investigation and preparation of a comprehensive load list to determine the actual total duty loads at the plant and thus, the current standby power capacity requirement. Then, two more comprehensive load lists should be conducted to determine the future total duty loads for the Phase 1 and ultimate expansion understanding that the Town will like to always have sufficient standby power for the entire plant duty loads with a minimum of 24 hours fuel storage.

From above studies, it can then be determined whether the existing generator building can be modified to meet current codes and/or store a future larger generator and fuel systems, or whether a new generator and fuel storage system need to be installed.

During a workshop on October 18th with the Town, above was discussed with the conclusion being to assume as part of this EA a new generator and fuel system to be installed within a new generator building to be constructed in the current location of the industrial building (after its demolition). This will allow the existing (aged) generator and fuel system to be removed with a new generator and fuel system (if not outdoors) installed back into this building in the future as additional loads are needed.

4.2.2 Main Plant Building - Second Floor Access

It is recommended that concepts be reviewed to determine how to provide a safe exit to the ground floor from the second floor to meet OBC.

4.2.3 Main Plant Building – Membrane Room – North Platform Access

It is recommended that concepts be reviewed to determine how to provide a safe exit to the outside from the north platform to meet OBC.

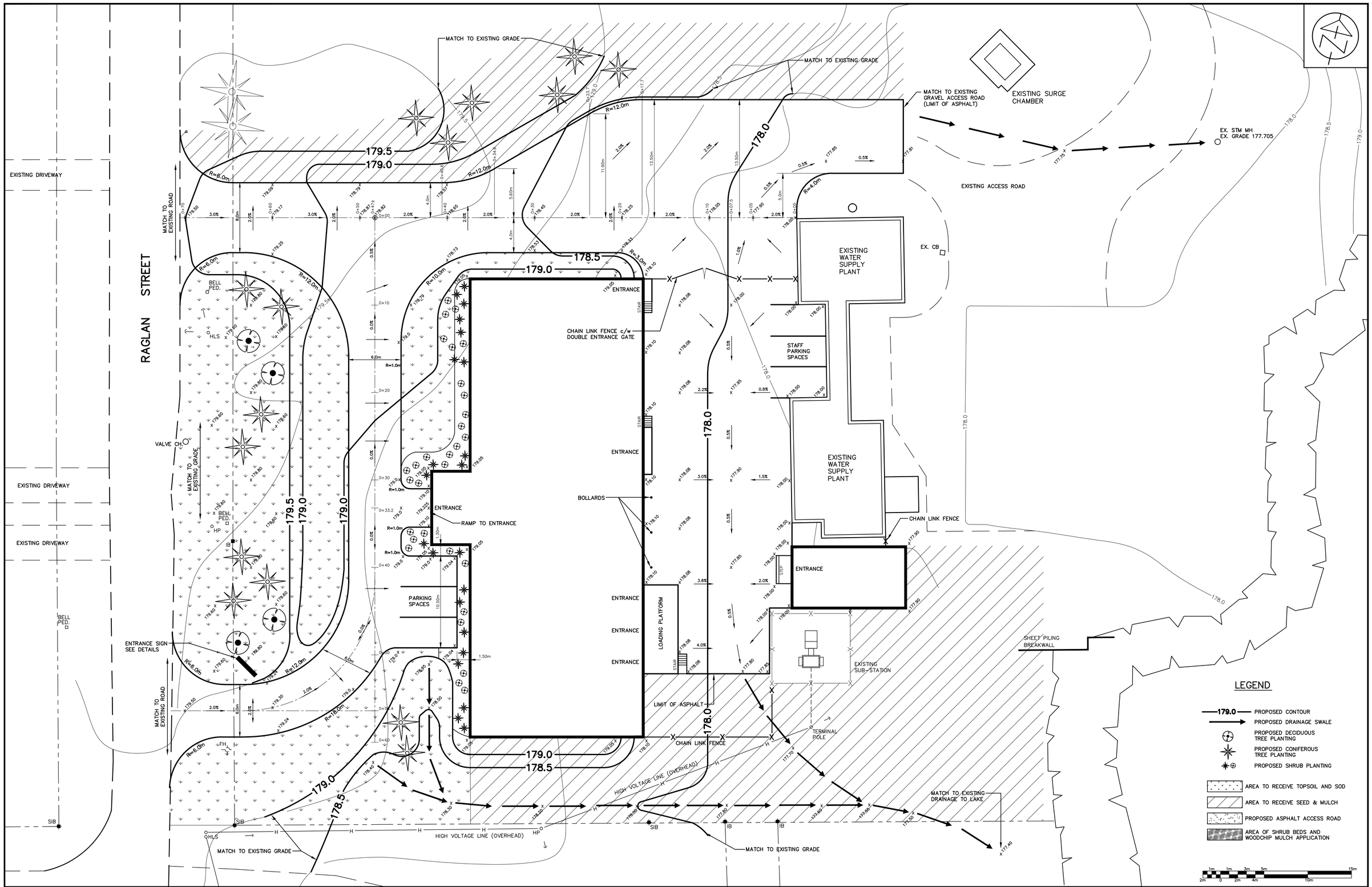
4.2.4 Main Plant Building – Settlement Issues

It is recommended that select cracks be monitored to determine if cracks/settlement are active or passive in order to determine the most suitable repair strategy.

If settlement is still on-going, sealing active cracks with rigid materials such as epoxy would most likely fail.

Consideration can be given to strengthen the foundations to mitigate settlement; however, the costs would most likely be high.

Appendix A
Select Reference Drawings



LEGEND

- PROPERTY LINE
- 179.0 EXISTING CONTOUR (0.5m CONTOUR INTERVAL)
- EXISTING DITCH
- LIMIT OF VEGETATION

PLOT 1=0.2

RECORD DRAWING

COMPILED BY:	P.DOY	DATE:	DEC. 1998
CHECKED BY:	P.G.S.	DATE:	JAN. 1999
DRAWN BY:	P.C.S.	DATE:	JAN. 1999
CHECKED BY:	M.W.A.	DATE:	MAR. 1999

NO.	REVISIONS	DATE	INITIAL
	REVISED RECORD DRAWING	JAN. 1999	M.W.A.

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COLLINGWOOD PUBLIC UTILITIES COMMISSION
NEW RAGLAN STREET
WATER FILTRATION PLANT

SITE ACCESS ROAD/GRADING/ LANDSCAPING PLAN

Ainley & Associates Limited
Consulting Engineers and Planners
Collingwood – Barrie – Belleville – Ottawa

SCALE:	1:200	CONTRACT No. 3	
DESIGN:	M.P.F.	CHECKED:	M.W.A.
DRAWN:	D.E.	DATE:	FEB. 1997

DWG. 195269-RG1RD

RAGLAN STREET

HOUSE # 3
EXISTING CONCRETE DRIVEWAY

HOUSE # 5
EXISTING ASPHALT DRIVEWAY

HOUSE # 9
EXISTING ASPHALT DRIVEWAY

HOUSE # 11
EXISTING GRAVEL DRIVEWAY

EX. TOP OF MANHOLE @ EL. 179.49
EX. 200mmø SAN. SEWER @ S. INV. ELEV. 178.31

EX. MH

EX. 200mmø SAN. SEWER

BELL PED.

HLS

EX. ?? mmø WATER SERVICE TO (2) HOUSES

WATER SERVICE RELOCATED TO EX. SERVICE

PLUGGED

EX. WV MH

EX. SAN. FORCEMAIN (EX. BLDG. SERVICE)
NOTE: LOCATION APPROXIMATE

EX. 150mmø W/M (ABANDONED)

EX. 400mmø HYPRESION WATER MAIN

EX. ?? mmø WATER SERVICE

BELL PED.

HP

IB

EX. SERVICE CONNECTION

WV

EX. 350mmø C.I. W/M

PLUGGED

200mmø 45° ELBOW
INV. EL. 177.565

200mmø F/M (CONCENTRATE DRAW)

TOP OF MANHOLE @ EL. 179.00 ±
200mmø SAN. @ SW. INV. ELEV. 177.959
200mmø SAN. @ N. INV. ELEV. 178.129
150mmø SAN. @ E. INV. ELEV. 177.974
100mmø SAN. @ E. INV. ELEV. 177.974

CONNECTED NEW MH. TO EX. SEWER
TOP OF MANHOLE @ EL. 179.500 ±
EX. N. INV. ELEV. 178.014
200mmø SAN. @ S. INV. ELEV. 177.800
200mmø SAN. @ E. INV. ELEV. 177.816

200mmø SAN. SEWER

MH-A (1200ø)

MH-O (1200ø)

14.6m – 150mmø SAN. SERVICE FOR WATER DRAIN

14.6m – 100mmø SAN. SERVICE FOR SAN. DRAINAGE

EX. 250mmø WATER MAIN

EX. 200mmø SAN. SEWER

CONNECTED 300mmø VALVE TO EX. W/M

CONNECTED 300x250mmø TEE TO EX. PIPE

PLUGGED

EX. ?? mmø WATER SERVICE

EX. 300mmø W/M

300mmø W/M

LIVE TAPPED EX. 400mmø W/M c/w 300mmø TAPPING VALVE

EX. TOP OF 250mmø WATER MAIN @ EL. 177.88 ±

EX. 250mmø WATER MAIN

EX. W

GR.

D/W

EX. 400mmø D.I. W/M

EX. 500mmø SAN. SEWER

EX. MH

EX. TOP OF MANHOLE @ EL. 179.266
EX. 200mmø SAN. SEWER @ N. INV. ELEV. 177.45
EX. 500mmø SAN. SEWER @ W. & S. INV. ELEV. 177.20 ±
EX. 200mmø SAN. STUB @ E. INV. ELEV. 177.25
EX. 150mmø FORCE MAIN @ N.E. INV. ELEV. 177.72

PLOT 1=0.2

DEWATERING WELL IN 600mmø D.I. PIPE

INV. EL. 173.413

INV. EL. 173.418

600mmø 45° ELBOW

600mmø 45° ELBOW @ INV. EL. 173.425

NEW VALVE CHAMBER (1800ø)

1.8m

5.0m

4.0m

INV. EL. 173.428

EXISTING SURGE RELIEF CHAMBER
(SEE DWG. P5.1RD FOR DETAILS)

600mmø 90° ELBOW

600mmø RAW WATER INTAKE BYPASS

50mmø P.E. CHLORINE LINE

EX. 400mmø FLUSHING MAIN

1067mmø RAW WATER INTAKE

EX. 600mmø CONC. RAW WATER INTAKE BYPASS

EX. VALVE CHAMBER

STM MH

EXISTING ACCESS ROAD

600mmø 45° ELBOW @ INV. EL. 173.390

23.2m

25.72m

15.3m

12.2m

WV

EX. 600mmø CONC. WATER MAIN

EX. TOP OF PIPE EL. 176.436 ±

EX. TOP OF PIPE EL. 176.163 ±

NEW ISOLATION GATE IN EXISTING BUILDING

CB

750x750x600mmø TEE

DEWATERING WELL IN 600mmø D.I. PIPE

EXISTING WATER SUPPLY PLANT

750mmø RAW WATER SUPPLY

INV. EL. 173.358 @ BUILDING (ISOLATION GATE IN EX. BUILDING)

5.4m

INV. EL. 175.600 @ BUILDING

INV. EL. 173.363 @ BUILDING

4.0m

4.5m

EX. VALVE CHAMBER

25mmø P.E. CHLORINE LINE

1.6m

EX. BURIED 4 kV CABLE

600mmø 90° ELBOW

750mmø TEE

TWO CHLORINE INSULATED LINES TOP @ EL. 176.850

EX. BURIED 4 kV CABLE

EX. 400mmø C.I. WATER MAIN

HT

1.5m

EX. TOP OF PIPE EL. 177.047 ±

EX. 600mmø C.I. WATER MAIN

EX. METER CHAMBER

EX. VALVE CHAMBER No.2

EX. BURIED 4 kV & SIGNAL CABLES

12.0m

25mmø CHLORINE INV. EL. 177.000 @ BUILDING

200mmø 45° ELBOW
INV. EL. 176.690

INV. EL. 176.640 @ BUILDING

2.3m

4.4m

250mmø CONCENTRATE REJECT PIPE TO EX. WETWELL
INV. EL. 176.265 @ BUILDING

25mmø & 50mmø CHLORINE LINES
INV. EL. 176.800 @ BUILDING

℄ SINGLE DOOR

5.1m

50mmø SAN. FORCE MAIN
INV. EL. 176.750 @ BUILDING

ELECTRICAL MAINTENANCE SEE ELECTRICAL DWGS.

250mmø 45° ELBOW TOP @ EL. 177.125

250mmø 90° ELBOW TOP @ EL. 177.030

9 x 100ø & 2 x 50ø CONCRETE ENCASED SEE ELECTRICAL DWGS.

1.9m

TOP DUCTS @ ELEV. 176.833

EX. TOP OF PIPE EL. 176.166 ±

EX. VALVE CHAMBER No.1

EX. TOP OF PIPE EL. 176.980 ±

(SEE DWG. P1.1RD & SP3RD FOR SEQUENCE OF WORK)

EXISTING WATER SUPPLY PLANT

50mmø F.M. INSULATED

EX. INDUSTRIAL WETWELL

INV. EL. 177.330 CROSSING OVER CONCRETE DUCT BANK

WV

PLUGGED

11.6m

EX. 350mmø & 500mmø INTAKES (ABANDONED)

250mmø OUTFALL TO BAY

INSULATED

EX. VALVE CHAMBER

DIESEL GENERATOR BUILDING

TOP DUCTS @ ELEV. 176.833

9.8m

9.2m

1.5m

TOP DUCTS @ ELEV. 177.193

EX. 450mmø HYPRESION W/M (TOWN SUPPLY) ABANDONED

EXISTING SUB-STATION

SHEET PILING BREAKWALL

NOTE:
SEE MEASUREMENT LAYOUT ON DWG. YP2RD

TERMINAL POLE

EX. HIGH VOLTAGE LINE (OVERHEAD)

9.2m

BURIED HYDRO DUCTS SEE ELECTRICAL DWGS.

TOP PIPE @ EL. 175.900

CONNECTED 150x50mmø TEE c/w 50mmø CHECK VALVE PLUGGED TO EX. PIPE

600mmø OVERFLOW PIPE

INV. EL. 175.635 @ BUILDING

600x300mmø TEE

WATER SUPPLY PLANT

INV. EL. 178.065 @ BUILDING (TYP. 2)

14.53m ±

20.5m

600mmø 90° ELBOW

400mmø PLUGGED FOR FUTURE CONNECTION @ INV. EL. 175.925

400mmø VALVE INSTALLED FOR FUTURE CONNECTION

INV. EL. 175.450 @ BUILDING

INV. EL. 175.875 @ BUILDING

5.9m

LIVE TAPPED EX. 450mmø W/M c/w 300mmø TAPPING VALVE

400mmø VALVE

600x400mmø REDUCING TEE

600mmø D.I. WATER MAIN (TOWN SUPPLY)

5.0m

FH c/w 150mmø WATER VALVE (NEW B.M.)

600x300mmø REDUCER

EX. 400mmø D.I. WATER MAIN (INDUSTRIAL PROCESS)

EX. 150mmø PVC FORCE MAIN

600x300mmø REDUCER

RECORD DRAWING

COMPILED BY: P.DOY	DATE: DEC. 1998
CHECKED BY: P.G.S.	DATE: JAN. 1999
DRAWN BY: P.C.S.	DATE: JAN. 1999
CHECKED BY: M.W.A.	DATE: MAR. 1999

1m 1m 3m 5m 15m
2m 0 2m 4m 10m

NO.	REVISIONS	DATE	INITIAL
	REVISED RECORD DRAWING	JAN. 1999	M.W.A.

RECORD DRAWING

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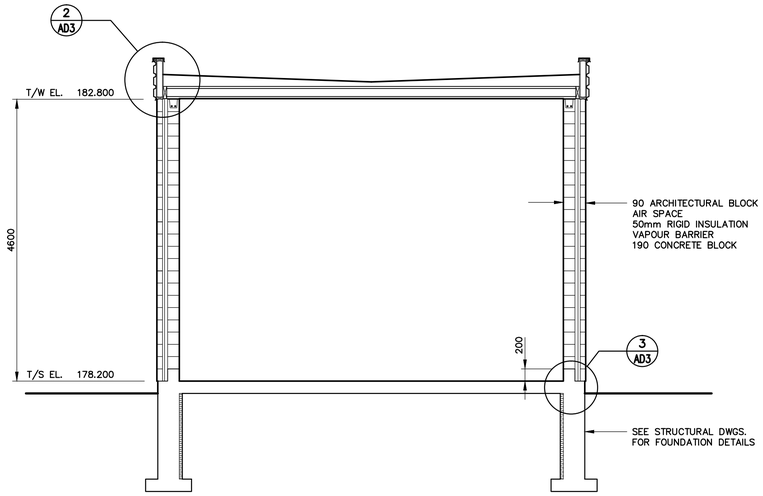
COLLINGWOOD PUBLIC UTILITIES COMMISSION
NEW RAGLAN STREET
WATER FILTRATION PLANT

SITE PLAN
YARD PIPING

Ainley & Associates Limited
Consulting Engineers and Planners
Collingwood – Barrie – Belleville – Ottawa

SCALE: 1:200	CONTRACT No. 3
DESIGN: M.P.F.	CHECKED: M.W.A.
DRAWN: D.E./P.C.S.	DATE: FEB. 1997

DWG. 195269-YP1RD



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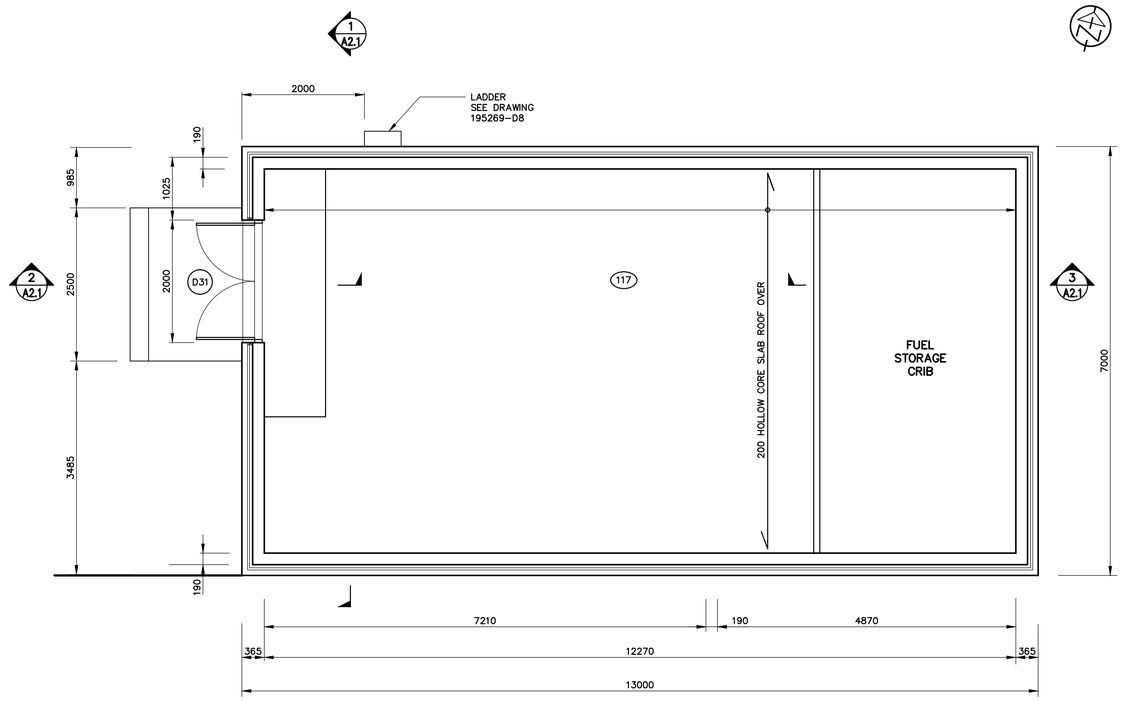

FLOOR PLAN
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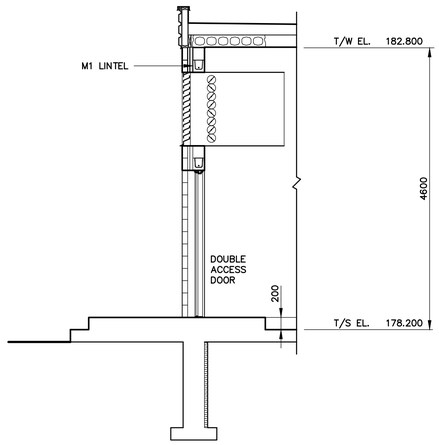
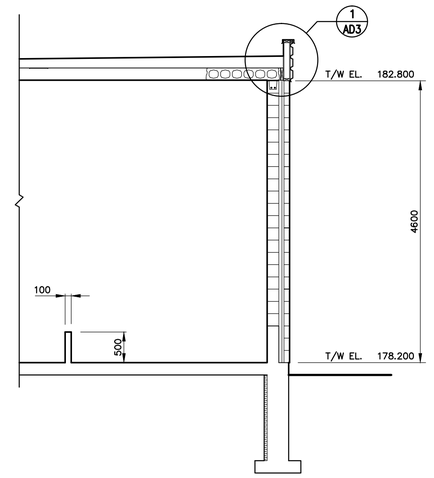


2 A2.1 **SECTION**
SCALE: 1 : 50



3 A2.1 **SECTION**
SCALE: 1 : 50

NOTES 1. REFER TO PROCESS AND MECHANICAL DRAWINGS FOR LOCATION AND SIZES OF EQUIPMENT PADS. SEE STRUCTURAL DRAWINGS FOR CONSTRUCTION DETAILS.

2. ROOF DESIGN LIVE LOAD = 2.4 KPa. (COMPOSITE SNOW LOAD)
SUPERIMPOSED DEAD LOAD = 1.0 KPa.

PLOT: 1=50

RECORD DRAWING

COMPILED BY:	P.DOY	DATE:	DEC. 1998
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	REVISED RECORD DRAWING	JAN. 1999	T.J.S.

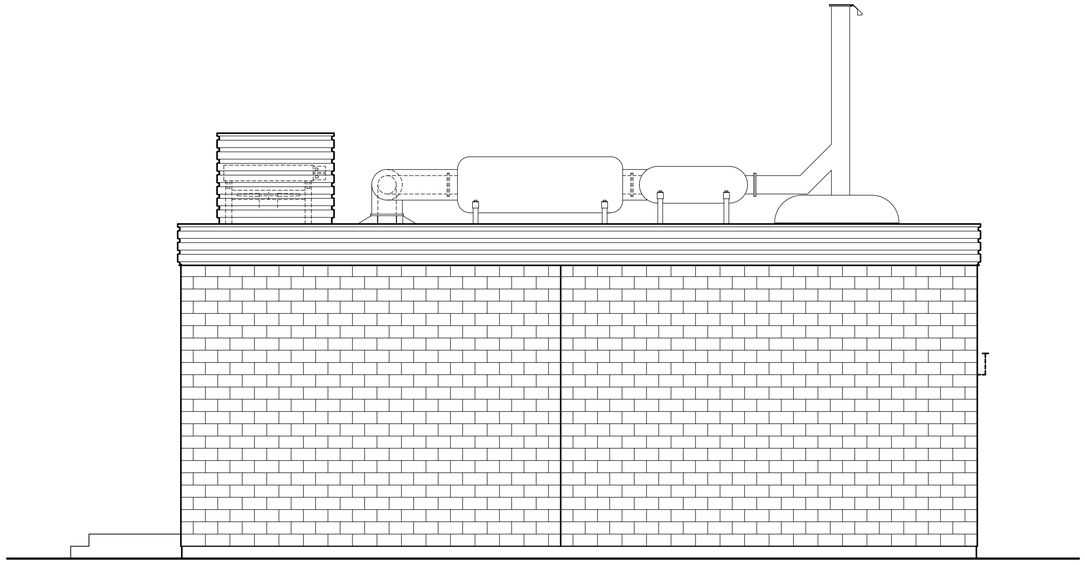
COLLINGWOOD PUBLIC UTILITIES COMMISSION
NEW RAGLAN STREET
WATER FILTRATION PLANT

DIESEL GENERATOR BUILDING
PLAN AND SECTIONS

Ainley & Associates Limited
Consulting Engineers and Planners
Collingwood – Barrie – Belleville – Ottawa

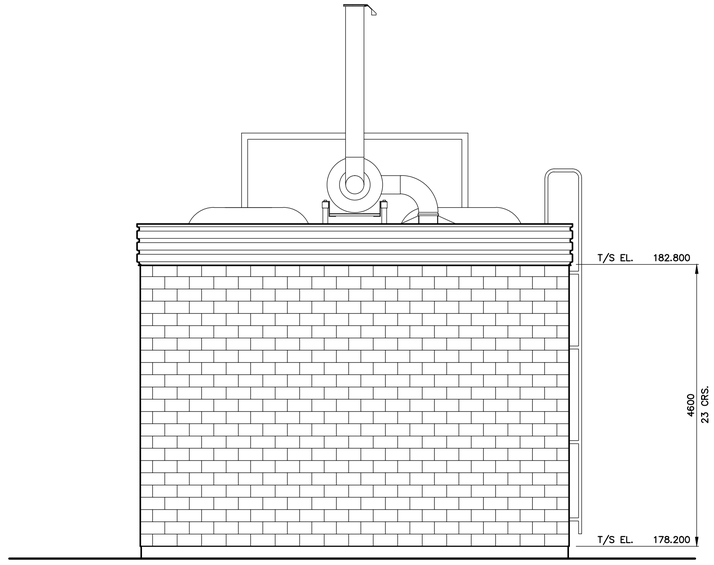
SCALE:	1:50		CONTRACT No. 3
DESIGN:	T.J.S.	CHECKED:	T.J.S.
DRAWN:	R.F.N.	DATE:	JUNE 1997

DWG. 195269-A2.1RD



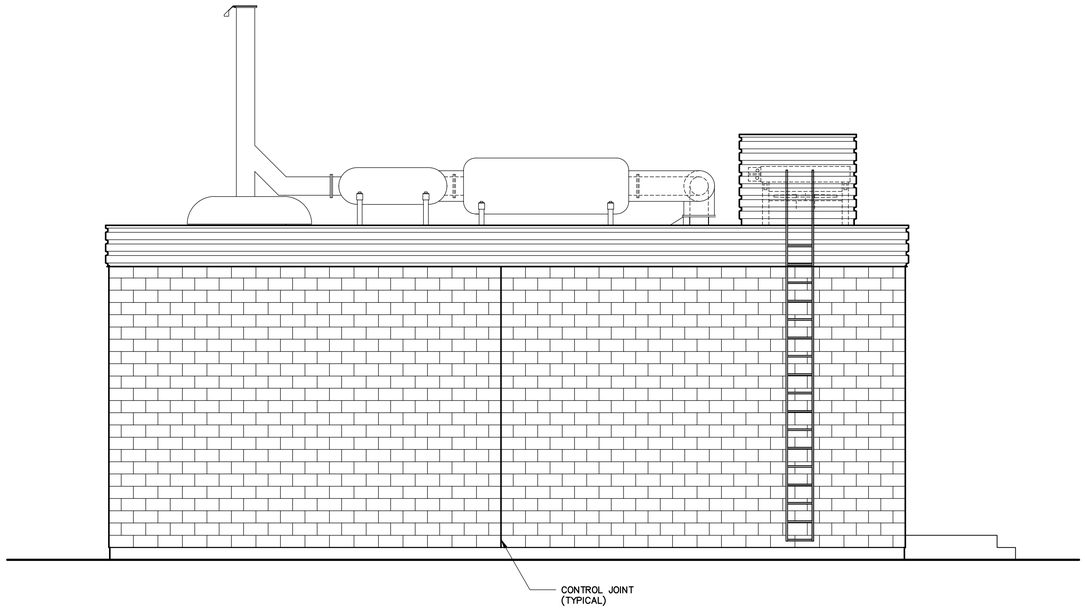
SOUTH ELEVATION

SCALE: 1 : 50



EAST ELEVATION

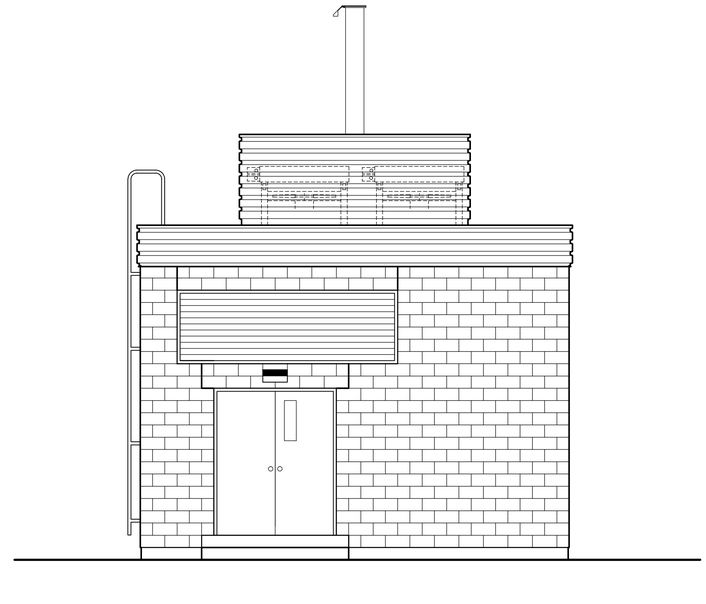
SCALE: 1 : 50



NORTH ELEVATION

SCALE: 1 : 50

(OIL FILLER PIPES NOT SHOWN)



WEST ELEVATION

SCALE: 1 : 50

NOTES

PLOT: 1=50

RECORD DRAWING

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CHECKED BY: T.J.S.	DATE: JAN. 1999
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NO.	REVISIONS	DATE	INITIAL
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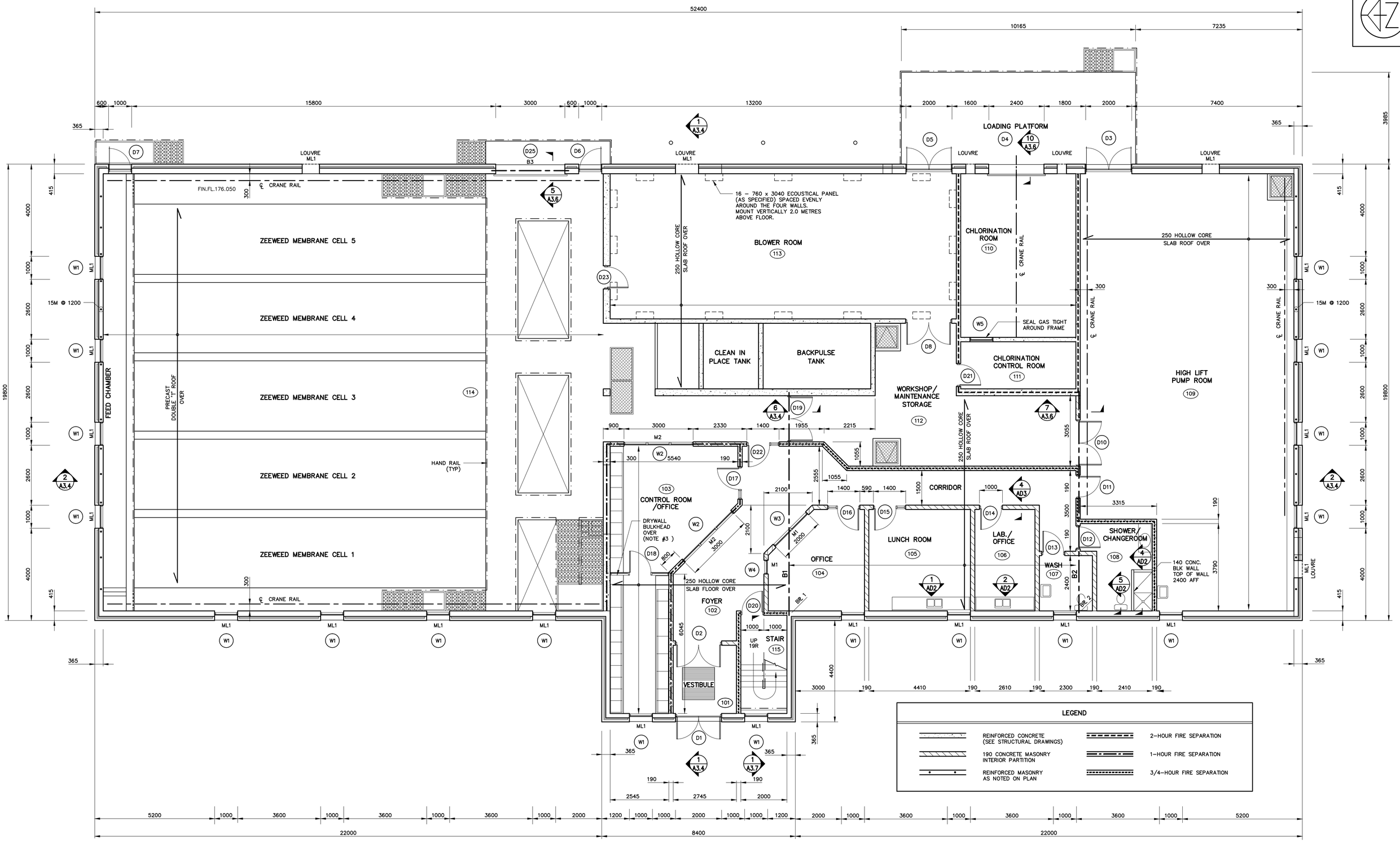
COLLINGWOOD PUBLIC UTILITIES COMMISSION
NEW RAGLAN STREET
WATER FILTRATION PLANT

DIESEL GENERATOR BUILDING
ELEVATIONS

Ainley & Associates Limited
Consulting Engineers and Planners
Collingwood – Barrie – Belleville – Ottawa

SCALE:	1:50	CONTRACT No. 3	
DESIGN:	V.W.S.	CHECKED: T.J.S.	DWG. 195269–A2.2RD
DRAWN:	R.F.N.	DATE: JUNE 1997	



NOTES

1. REFER TO MECHANICAL AND PROCESS DRAWINGS FOR LOCATION AND SIZES OF EQUIPMENT PADS. SEE STRUCTURAL DRAWINGS FOR CONSTRUCTION DETAILS.
2. REFER TO PROCESS AND DETAIL DRAWINGS FOR HAND RAIL DETAILS.
3. DRYWALL BULKHEAD TO CONSIST OF 20 GA., 100mm STEEL STUDS @ 400 o.c. WITH 16mm DRYWALL BOTH SIDES.
4. REFER TO PROCESS DRAWINGS FOR ALUMINUM STAIR, GRATING AND CHECKER PLATE SIZES AND DETAILS.
5. PL. 1 = 12x200x600 LONG W/2 - 10m x 300 (W/100 HOOK) ANCHORS IN SOUTH FILLED MASONRY.
   PL. 2 = 12x200x450 LONG W/2 - 10m x 300 (W/100 HOOK) ANCHORS IN SOUTH FILLED MASONRY.

PLOT 1 : 75

RECORD DRAWING

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CHECKED BY:	T.J.S	DATE:	MAR. 1999

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COLLINGWOOD PUBLIC UTILITIES COMMISSION
NEW RAGLAN STREET
WATER FILTRATION PLANT

PROPOSED WATER SUPPLY PLANT
MAIN FLOOR PLAN

Ainley & Associates Limited
Consulting Engineers and Planners
Collingwood - Barrie - Belleville - Ottawa

SCALE:	1:75	CONTRACT No. 3	
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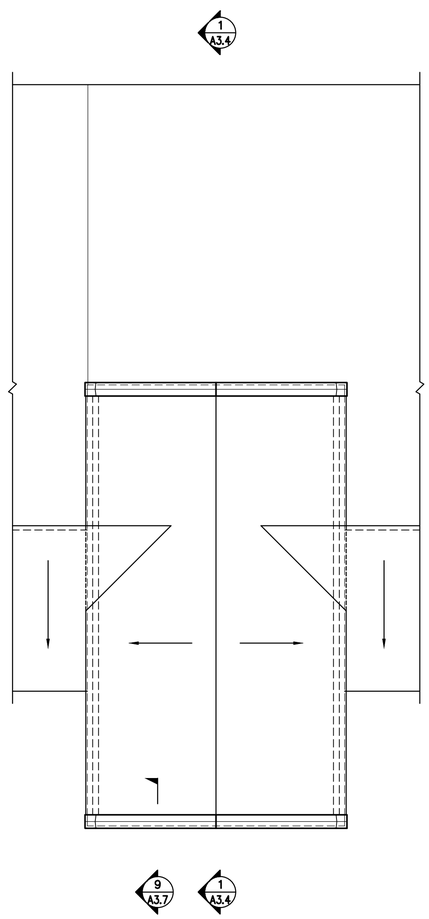
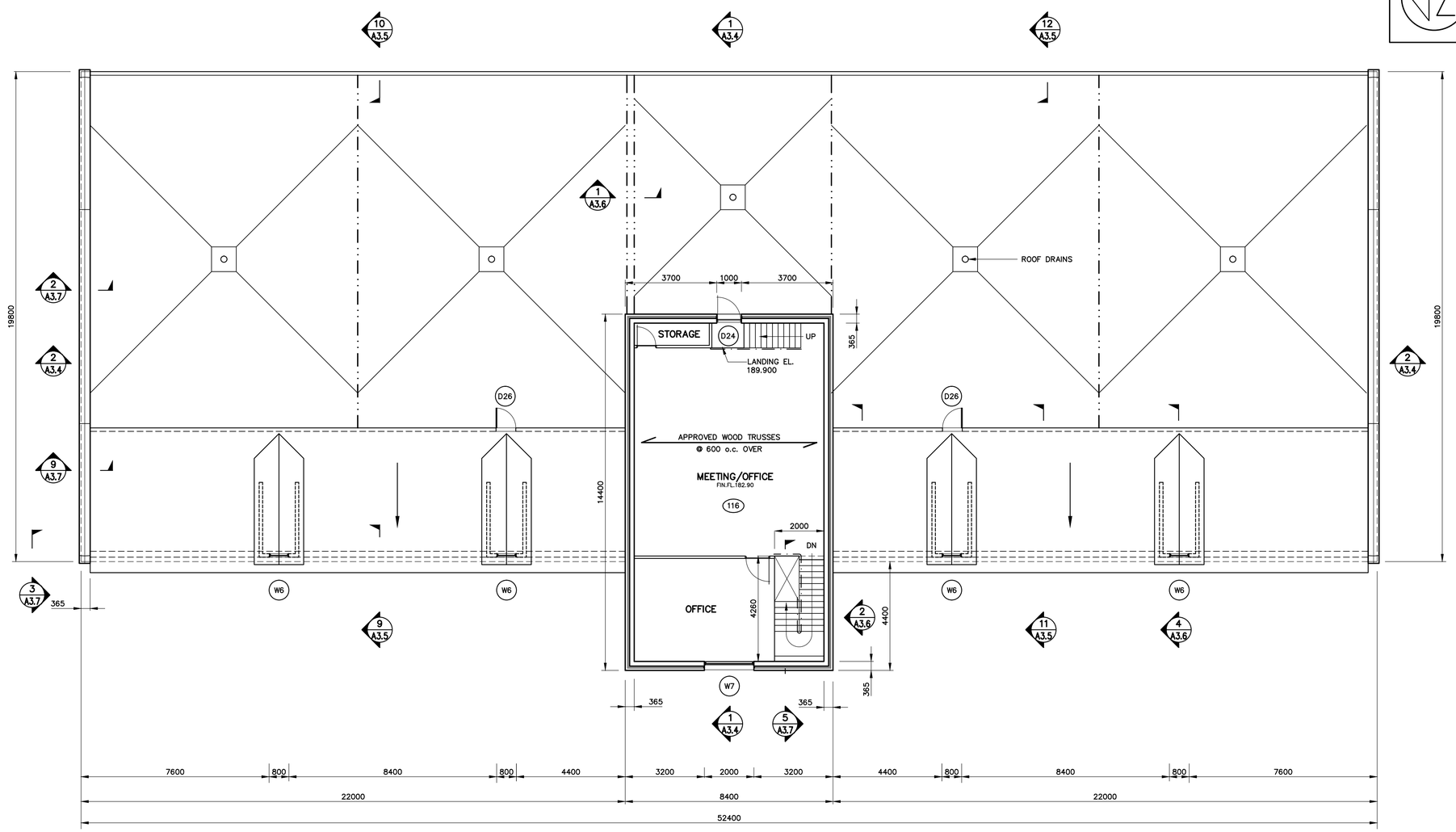
DRAWN:	R.F.N.	DATE: JUNE 1997	



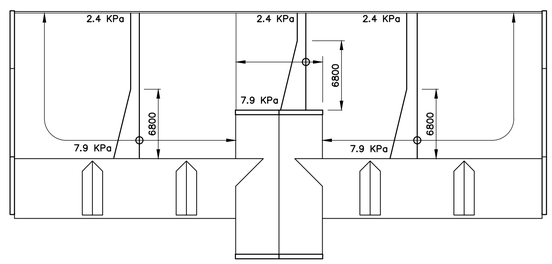
MEETING / OFFICE ROOF PLAN

SCALE: 1 : 100



MEETING / OFFICE AND MAIN ROOF PLAN

SCALE: 1 : 100



KEY PLAN (SNOW BUILD UP ON FLAT ROOF)

SCALE: 1 : 300

ROOF PLAN LEGEND:

1. ○ = ROOF DRAIN IN LEVEL AREA (1000 x 1000)
   - — · — · — · — = LEVEL LINE INTERSECTION BETWEEN TWO SURFACES
   - – – – – – – – = SLOPING LINE INTERSECTION BETWEEN TWO SURFACES
   - ——→ = DIRECTION OF SURFACE FLOW (MIN. SLOPE 1:100)
2. ABOVE ROOF PLANS INDICATE GENERAL SCHEME FOR DRAINAGE. ROOF INSULATION SHOP DRAWINGS TO SHOW DRAINAGE IN MORE DETAIL INCLUDING METHOD FOR PROVIDING DRAINAGE AROUND ROOF MOUNTED EQUIPMENT WHICH MAY REQUIRE ADDITIONAL INSULATION.
3. SEE MECHANICAL DRAWINGS FOR ROOF PENETRATIONS AND ROOF MOUNTED EQUIPMENT.
4. MINIMUM THICKNESS OF ROOF INSULATION (NOT INCLUDING FIBREBOARD TOPPING) AT DRAINS TO BE 50mm. SLOPE UP TO MAXIMUM THICKNESS OF 100mm.

NOTES

1.0 ROOF DESIGN LOADS:
LIVE LOAD = 2.4 KPa (COMPOSITE SNOW LOAD)
PLUS SNOW BUILD UP SHOWN IN KEY PLAN AND UNBALANCED LOADING PER OBC PART 4.
SUPERIMPOSED DEAD LOAD = 1.0 KPa
WIND LOAD BASED ON q1/30 = .34 KPa.

PLOT 1=100

RECORD DRAWING

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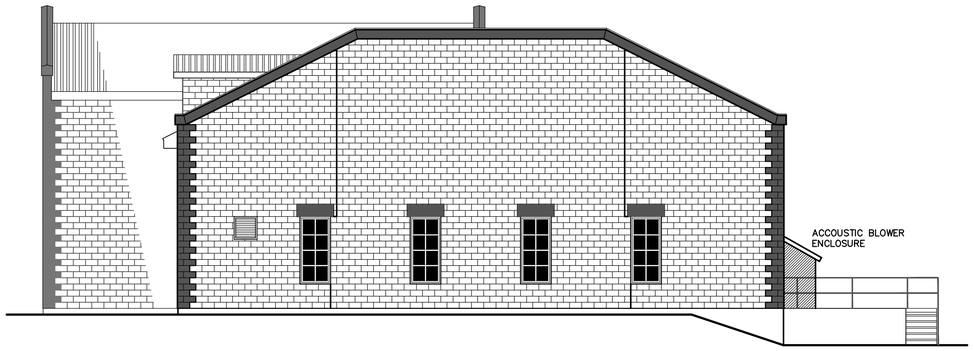
COLLINGWOOD PUBLIC UTILITIES COMMISSION
NEW RAGLAN STREET
WATER FILTRATION PLANT

PROPOSED WATER SUPPLY PLANT
2nd FLOOR AND ROOF PLAN

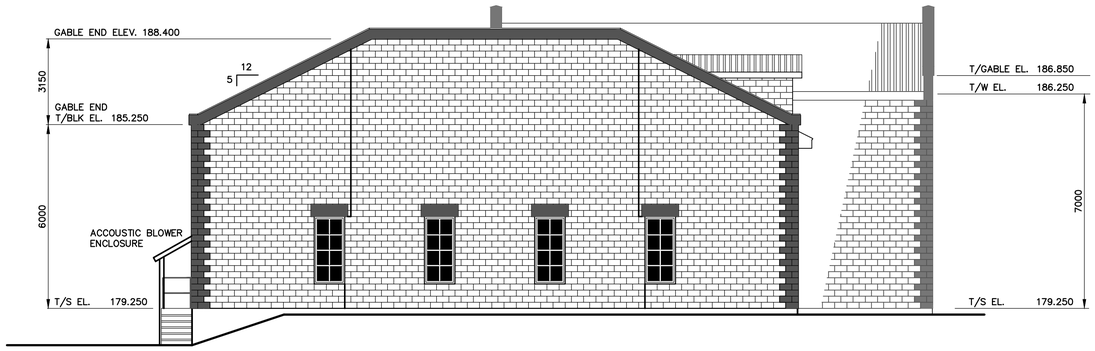
Ainley & Associates Limited
Consulting Engineers and Planners
Collingwood – Barrie – Belleville – Ottawa

SCALE:	1:100	CONTRACT No. 3	
DESIGN:	T.J.S.	CHECKED:	T.J.S.
DRAWN:	R.F.N.	DATE:	JUNE 1997

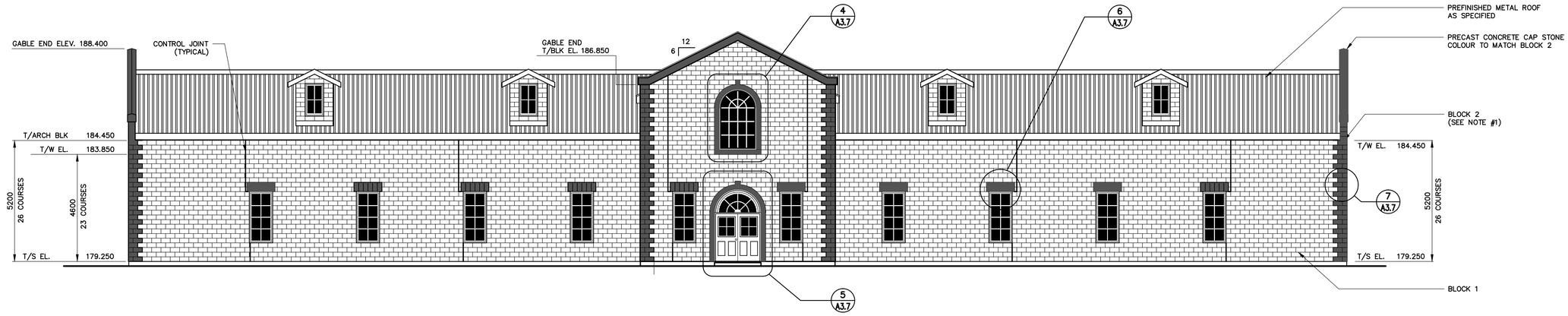
DWG. 195269–A3.2RD



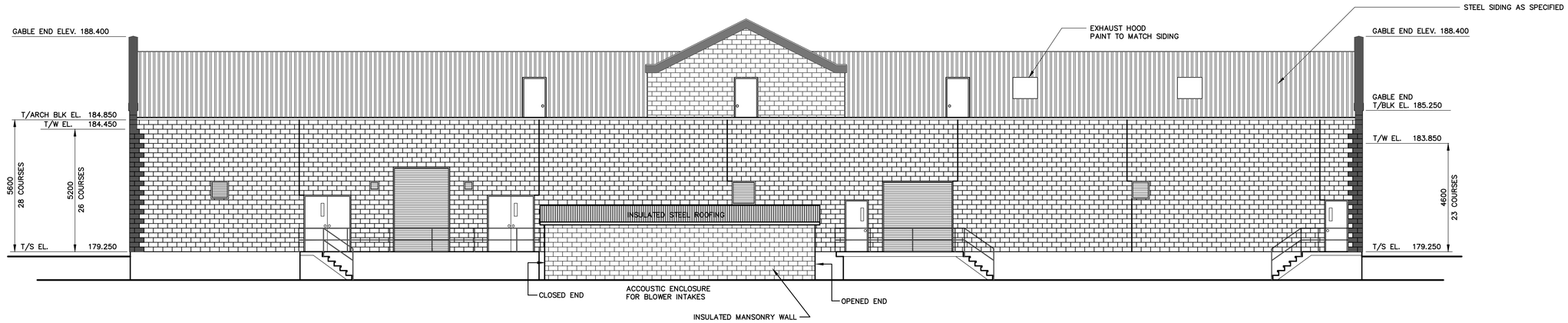
SOUTH ELEVATION



NORTH ELEVATION



WEST ELEVATION



EAST ELEVATION

NOTES 1. ALL BLOCK 2 TO BE CORBELLED OUT 15mm BEYOND BLOCK 1.

PLOT 1=100

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NO.	REVISIONS	DATE	INITIAL
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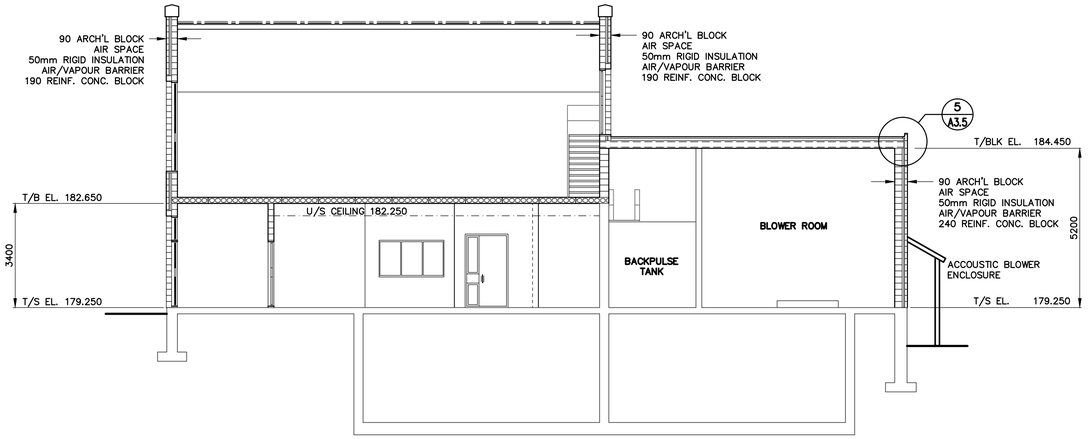
COLLINGWOOD PUBLIC
UTILITIES COMMISSION
NEW RAGLAN STREET
WATER FILTRATION PLANT

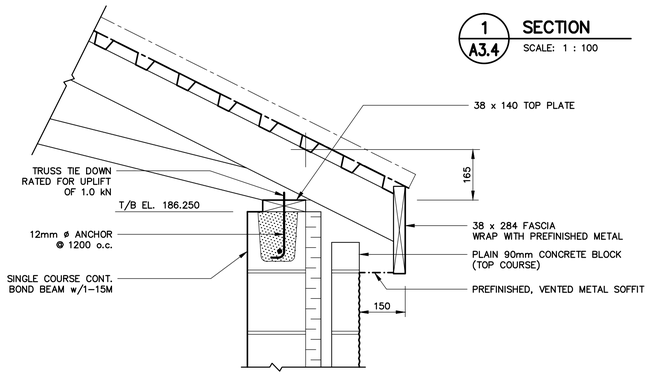
PROPOSED WATER SUPPLY PLANT
ELEVATIONS

Ainley & Associates Limited
Consulting Engineers and Planners
Collingwood – Barrie – Belleville – Ottawa

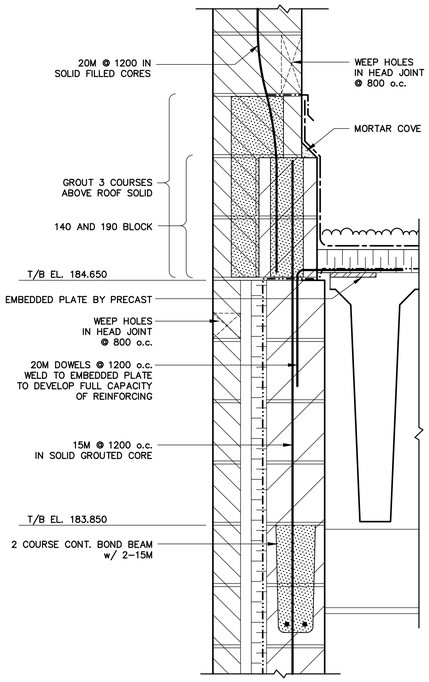
SCALE:	1:100	CONTRACT No. 3	
DESIGN:	T.J.S.	CHECKED: T.J.S.	DWG. 195269–A3.3RD
DRAWN:	R.F.N.	DATE: JUNE 1997	



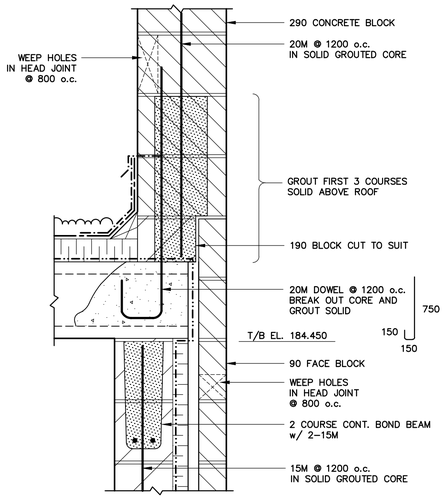
1 A3.4 **SECTION**
SCALE: 1 : 100



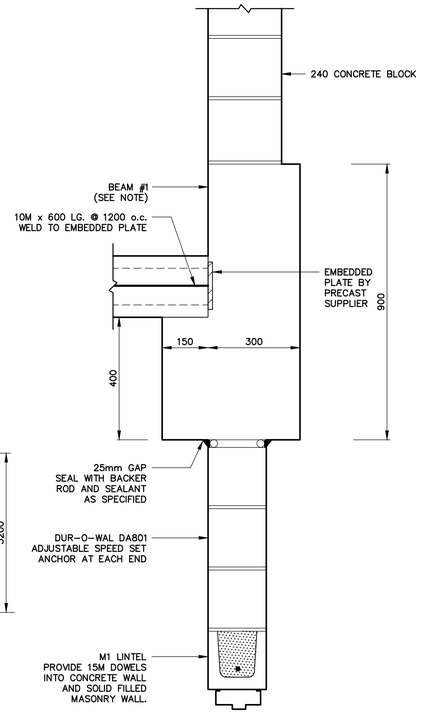
3 A3.4 **SECTION**
SCALE: 1 : 10



4 A3.4 **DETAIL**
SCALE: 1 : 10

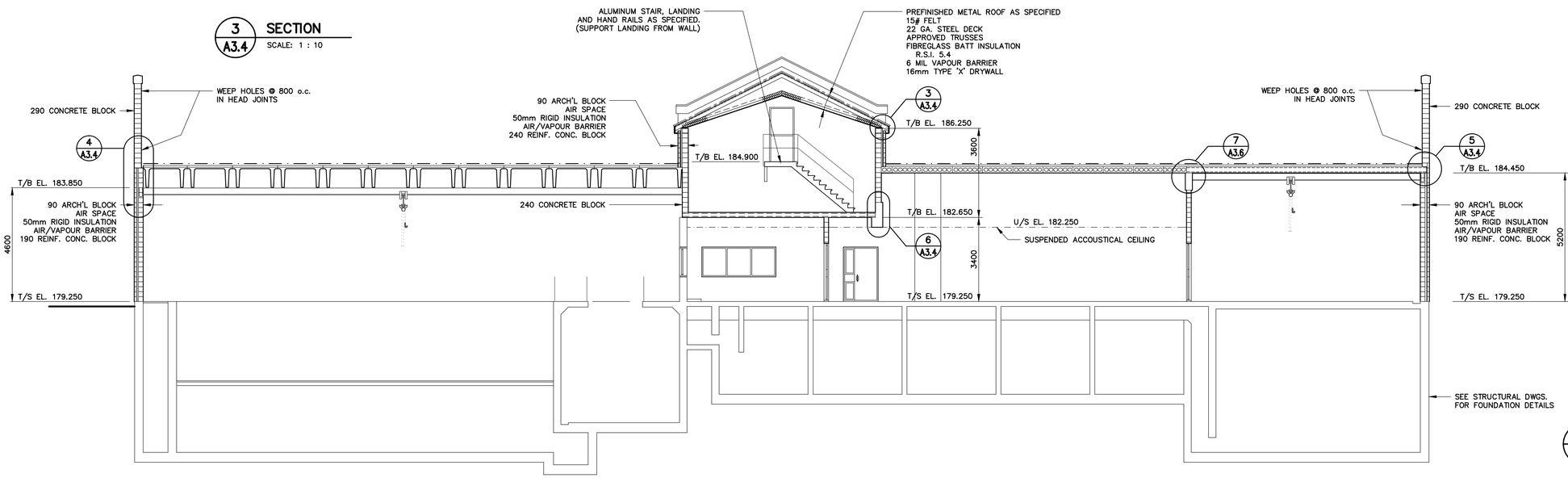


5 A3.4 **DETAIL**
SCALE: 1 : 10



6 A3.4 **SECTION THRU B1 AND DOOR D19 HEAD**
SCALE: 1 : 10

NOTE: DESIGN OF BEAM B1 BY PRECAST SUPPLIER FOR A UNIFORM (UNFACTORED) LIVE LOAD = 20.5 KN/m AND SUPERIMPOSED (UNFACTORED) DEAD LOAD = 32 KN/m



2 A3.4 **SECTION**
SCALE: 1 : 100

NOTES

PLOT 1=100

RECORD DRAWING

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COLLINGWOOD PUBLIC
UTILITIES COMMISSION
NEW RAGLAN STREET
WATER FILTRATION PLANT

PROPOSED WATER SUPPLY PLANT
SECTIONS AND DETAILS

Ainley & Associates Limited
Consulting Engineers and Planners
Collingwood – Barrie – Belleville – Ottawa

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