TOWN OF MAHONE BAY

TOWN COUNCIL

SPECIAL MEETING AGENDA

November 26, 2019

At 9:00 a.m.

Call to Order

1 Approval of Agenda

2 YTD Review of 2019-20 Capital Projects: PCAP - WW Effluent

- **Wastewater Effluent Dechlorination Report and Letter**

3 Communication of 2019-20 Capital Projects

- **Staff Report re Communications Strategy**
- **Nov 26 Fire Station Open House**

4 Development of 2019-25 Capital Investment Plan

- **Draft 2019-25 Capital Investment Plan**

Adjournment

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Solving today's problems with tomorrow in mind

October 25, 2019

Derrick MacKenzie
Director of Operations & Recreation Facilities
Town of Mahone Bay
493 Main Street
Mahone Bay, NS, B0J 2E0

Dear Mr.MacKenzie:

RE: Town of Mahone Bay Dechlorination Options Review (Final)

Following is our report on the assessment of dechlorination and alternative disinfection options for the Town of Mahone Bay wastewater treatment plant (WWTP).

BACKGROUND

The Town of Mahone Bay WWTP was constructed in 1994 and consists of a bar screen, grit removal, aerated lagoons, gas chlorination and chlorine contact lagoon. The treated effluent is discharged by gravity through a 450 m long effluent pipe to the outfall located in Mahone Bay. The WWTP operates under the Nova Scotia Environment (NSE) Approval to Operate 2016-096100-00. The WWTP effluent complies with the current regulatory requirements and generally has very good effluent quality.

As of December 31, 2020, the WWTP will be required to meet a total residual chlorine (TRC) discharge requirement of 0.02 mg/L. As shown in Table 1, the WWTP currently exceeds the 0.02 mg/L limit in the effluent sampled. It should be noted that the samples are collected near the WWTP and that the effluent is travels through a 450 m long effluent pipe before being discharged. Because of the current exceedance of the future TRC regulation, the Town requested a review of potential dechlorination options that could be implemented at the WWTP to meet the new regulations. Dechlorination options along with alternative disinfectants are discussed below.

Table 1: 2017-2019 Town of Mahone Bay Total Residual Chlorine and Flow Data

Year	Quarter	Total Residual Chlorine (mg/L)	Flow (m^3/day)
2017	Q1	0.06	283
	Q2	0.06	220
	Q3	0.05	110
	Q4	0.08	301
2018	Q1	0.06	662
	Q2	0.04	733
	Q3	0.03	267
	Q4	0.03	973
2019	Q1	0.03	692
	Q2	0.03	1034

CANADA'S BEST MANAGED COMPANIES

DECHLORINATION

Dechlorination is the process of removing residual chlorine from disinfected wastewater prior to discharge. Elevated chlorine residuals in wastewater effluent can react with organic compounds in the effluent, forming toxic compounds that can be harmful to the receiving environment. To limit the formation of these compounds, regulatory bodies may enforce chlorine residual limits, resulting in the need for dechlorination.

The most common dechlorination chemicals are sulfur based, either sulfur dioxide gas or sulfite salt compounds. Hydrogen peroxide has also been used for dechlorination. The following text describes each dechlorination option along with the advantages and disadvantages of each.

Sulfur Dioxide

Sulfur Dioxide is commercially available as a liquefied gas which is stored in pressurized tanks. Handling sulfur dioxide and the associated equipment required is very similar to that of chlorine gas. The reaction between sulfur dioxide gas and chlorine happens almost instantaneously, meaning that is could be dosed as the effluent enters the weir chamber prior to entering the discharge pipe. However, in order to ensure proper dechlorination, rapid mixing at the point of injection may be required. In order for adequate dechlorination to take place when using sulfur dioxide, 85% of the residual chlorine must be free chlorine. Any percentage lower than this will result in interference during dechlorination. Sulfur dioxide dosing must also be monitored closely as excessive dosing can result in an increase in oxygen demand in the wastewater, subsequently increasing the measured BOD and COD. From a health and safety standpoint, sulfur dioxide gas presents more safety and handling problems than the other dechlorination options, similar to the gas chlorination currently used at the WWTP.

Sulfite Salts

Sulfite salts are very similar to sulfur dioxide gas when used for dechlorination. They work in the same manner as sulfur dioxide gas but are dissolved into solution and dosed as a liquid. Sulfite salts used for dechlorination include sodium sulfite, sodium bisulfite, sodium metabisulfite and sodium thiosulfate. The salts, particularly sodium bisulfite and sodium metabisulfite, are used as a dechlorination agent based on safety, as they do not pose the toxic concerns of sulfur dioxide. They can be easier to operate than a gas system, as it only requires a solution tank and metering pumps. However, during winter months, the solution tank may require heating to prevent freezing. As with sulfur dioxide, the sulfite salts could be dosed into the weir chamber prior to entering the discharge pipe.

Hydrogen Peroxide

Hydrogen peroxide has also been used for dechlorination in the past. It reacts with chlorine nearly instantaneously, similarly to sulfur dioxide gas. Due to hydrogen peroxide's ability to react with all forms of chlorine and how rapid the reaction happens, there are essentially no interferences present during the reaction. Similar to sulfite salts, hydrogen peroxide is in liquid form, and typically comes in 35% strength solutions, which can be dosed using chemical metering pumps. Hydrogen peroxide is however a corrosive chemical, making it hazardous to handle. Due to the safety concerns with handling, it is not frequently used.

ALTERNATIVE DISINFECTANTS

An alternative to using dechlorination to meet chlorine residual discharge regulations is to achieve disinfection without using chlorine. Alternative disinfection options include ultraviolet light, ozone and peracetic acid. The following text describes each alternative disinfection option along with advantages and disadvantages of each.

Ultraviolet Light (UV)

Ultraviolet light (UV) disinfection is unique as it is a physical disinfection process rather than a chemical process (as are most conventional disinfection methods). Being a physical process, UV disinfection eliminates handling and storage safety concerns of toxic chemicals. As a result of very minimal contact time required, UV units are very condensed resulting in a small footprint in the treatment plant, compared to a chlorine contact chamber/lagoon. Continuous maintenance must take place in order to ensure the unit is clean and to prevent fouling in order for an adequate dose to be delivered to the wastewater. UV disinfection also has higher costs associated with it relative to chlorination due to the lamps requiring high amounts of energy, but does not have chemical costs. UV disinfection is commonly used within Atlantic Canada for municipal wastewater systems.

Ozonation

Ozone for disinfection is generally more effective than chlorine and requires a relatively short contact time. It also decomposes rapidly reducing the toxicity it imposes on the receiving environment of the effluent. However, ozone is one of the most complex disinfection methods as it involves extensive maintenance. It is a very corrosive and very reactive substance so it must be properly contained in order to avoid equipment deterioration and harm to operators as it is also a strong irritant. Ozone is generally produced on site at the treatment plant which eliminates shipping and supplier costs. However, producing ozone is associated with very high costs as a result of requiring major upgrades to be done to the treatment plant and increased power costs. Ozone for municipal wastewater disinfection is not commonly used in Atlantic Canada and has much more handling demands compared to chlorination or UV.

Peracetic acid

Peracetic acid (PAA) is a relatively new method used for wastewater disinfection, however has been used in the food industry for many years. It is made up of hydrogen peroxide, acetic acid and water and is typically supplied as a 10-15% solution. The safety risks involved with the handling and storage of peracetic acid are much lower than that of chlorine gas and is proven to provide effective disinfection at lower doses and shorter contact times than chlorine. When discharged to the environment, peracetic acid residual decomposes quickly resulting in an effluent which is less toxic as compared to an effluent containing chlorine residual. The rapid decomposition of the residual can also be looked at as a disadvantage since a residual is not maintained throughout the outfall pipe. Compared to other disinfectants, peracetic acid may decompose in storage quicker, however suppliers typically add a stabilizer to the solution to prevent rapid decomposition. Addition of a stabilizer can extend the shelf life of peracetic acid up to a year if kept at a temperature below 28°C (84°F). It was estimated that the Mahone Bay WWTP would require 35L/d of 12% PAA solution (12.7 m^3/year), so shelf life is an important factor. Peracetic acid can be monitored using in-situ probes (eg Prominent Dulcotest PAA sensor), or using a colorimetric test (similar method to total chlorine using DPD powder packs and a spectrophotometer).

Peracetic acid is not commonly used in Atlantic Canada, however it has been listed by the USEPA as an alternative disinfection option and will likely gain popularity as effluent

discharge requirements become more stringent. There are several chemical vendors that supply PAA solutions (PeroxyChem- VigorOX WWT II, Solvay – Proxitane, EnviroTech- Peragreen WW).

OPTIONS FOR MAHONE BAY WWTP

Based on the dechlorination and alternative disinfection options that have been discussed, there are several options that could be implemented at the Mahone Bay WWTP. Table 2 outlines some of the criteria used to evaluate and determine options that could be carried forward for preliminary design.

Table 2: Evaluation of Dechlorination and Alternative Disinfection Options

	Frequency of Use in Atlantic Canada	Health and Safety Concerns	Ease of operability	Ease of integration into WWTP	Availability of Chemicals
Sulfur Dioxide	Medium	High	Medium	Medium	Medium
Sulfite salts	Medium	Medium	High	Medium	High
Hydrogen Peroxide	Low	High	Medium	Medium	High
UV Light	High	Medium	High	Low	N/A
Ozone	Low	High	Low	Low	Generated on site
Peracetic Acid	Low	Medium	High	Medium	Medium

For dechlorination options, sulfite salts (specifically sodium bisulfite) will be carried forward, due to the ease of operability and integration into the existing WWTP and the lower health and safety concerns for handling. Sulfur dioxide, while commonly used in the industry, was not carried forward based on the greater health and safety concerns. Hydrogen peroxide was not included as it is not commonly used and has higher health and safety concerns compared to sodium bisulfite.

UV disinfection is commonly used in Atlantic Canada and reduces the need of chemicals for disinfection. With reduced health and safety concerns for operators, UV will be carried forward as an alternative disinfectant. Ozone was not carried forward as it is not commonly used in Atlantic Canada and has much higher operation and health and safety requirements compared to the other options. While peracetic acid is a novel alternative disinfectant and has limited use in municipal wastewater, it was carried forward for consideration as it would be easy to integrate into the existing system and provides an alternative to chlorine and UV disinfection.

Dechlorination- Sodium Bisulfite

For this option, the existing gas chlorination system would be used for disinfection. In the existing chlorination room, a wall would be constructed to form a separate sodium bisulfite room, which would hold a sodium bisulfite solution tank and a duplex chemical metering pump skid. Sodium bisulfite would be pumped from the control building to the weir prior to discharge.

Alternative Disinfectant- UV Light

Implementing UV disinfection will require more substantial upgrades compared to the other two options. Two options for UV disinfection locations have been identified: within the existing control building and in a new, separate UV building.

A UV unit could be installed within the existing control building where the chlorination equipment is currently located. Due to the size of the UV equipment, the existing chlorination equipment and the wall separating the chlorine room from the process room would have to be removed. Yard piping would have to be rerouted from the weir chamber to the control building and would require the addition of a pump station. The effluent from the UV disinfection would then flow to the weir chamber and to the discharge pipe.

The second option would be to build a separate UV building prior to the weir chamber. The UV unit could be located in the basement of the building, at the grade of the existing yard piping, to allow the UV unit to be fed by gravity. This would eliminate the need for a pump station. The UV effluent would flow by gravity to the weir chamber and to the discharge pipe.

Peracetic Acid

Similar to the sodium bisulfite option, a chemical metering pump skid and solution tank would be installed within the current chlorine room. A wall could be constructed to separate the peracetic acid system from the existing chlorination equipment (if it stays in place as backup disinfection) or the existing chlorination equipment could be removed and the peracetic acid system be put in that location.

Preliminary sketches for each option have been developed and are provided in Appendix A.

OPINION OF PROBABLE COSTS

Preliminary capital costs estimates were prepared for each option identified. The total includes engineering and contingency but not including taxes. Costs are based on construction in 2019 and are not inflated for construction to occur several years in the future. The summarized capital costs can be seen in Table 3 and a breakdown of the costs can be found in Appendix B.

Table 3: Capital Cost Estimates (Class D)

Option	Cost Estimate (Class D)
Dechlorination (sodium bisulfite)	$85,100
UV (within existing process building)	$402,500
UV (with new UV building)	$533,000
Peracetic Acid	$85,100

Generalized operating costs were developed for the upgrade options based on the operation of similar facilities. Operating and maintenance costs include electrical, chemical and consumables. It was assumed that the labour requirements for the options would be carried by current WWTP staff. Annual O&M costs are summarized below in Table 4.

Table 4: Annual O&M Cost Estimates

	Dechlorination	UV (within existing process building)	UV (with new UV building)	Peracetic Acid
Electrical Consumption	$900	$2500	$2500	$350
Chemical Consumption	$2600	n/a	n/a	$3900
Replacement/Miscellaneous Costs	$150	$800	$800	$150
Annual Total	$3650	$3300	$3300	$4400

Life cycle cost analysis is a method of assessing the total cost of a system. It takes into account the costs of owning, operating, maintaining and eventual disposal and can be used to compare design options that are relatively similar to be implemented. A life cycle cost analysis was completed for each option over a 20 year period. The calculations in the report were carried out applying an assumed inflation rate of 3%. The real discount rate used in these calculations is 6%, and the time period over which it is calculated is 20 years, starting in 2019. The net present value summary is presented below in Table 5.

Table 5: Life Cycle Cost Analysis

	Dechlorination	UV (within existing control building)	UV (with new UV building)	Peracetic Acid
Annual Total O&M Costs	$3,650	$3,300	$3,300	$4,400
Operations Cost Present Value	$53,195	$48,094	$48,094	$64,131
Capital Costs	$85,100	$402,500	$533,000	$85,100
Net Present Value	$141,945	$453,894	$584,394	$153,631

RECOMMENDATIONS

Several options have been presented for consideration. In terms of user familiarity and health and safety, the analysis provided favours UV disinfection. However, more substantial upgrades would be required to integrate a UV system into the existing facilities compared to the other options considered, resulting in higher capital costs. Either chemical option (dechlorination or disinfection with peracetic acid) could be carried forward by the Town to the preliminary design phase if the funding is not available for UV disinfection.

If peracetic acid is carried forward as an upgrade option, it is likely that Nova Scotia Environment will require further research prior to granting approval, as it currently not used for municipal wastewater disinfection in the province. A pilot program could be completed to assist in the approval project prior to the design phase. Piloting has been completed previously in Canada by peracetic acid vendors and Mahone Bay would likely be a good candidate for a pilot program. This opportunity can be investigated further if there is interest from the Town.

CBCL LIMITED
Consulting Engineers

Please let us know if you have any questions or want to discuss any of the contents of this letter further.

Yours truly,

CBCL Limited

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E-Mail: mfraser@cbcl.ca

Reviewed by:
Mike Abbott, M.Eng, P.Eng
VP Water Treatment

Appendix A: Preliminary Sketches
Appendix B: Cost Estimates

Project No: 190830.00

Appendix A – Preliminary Sketches

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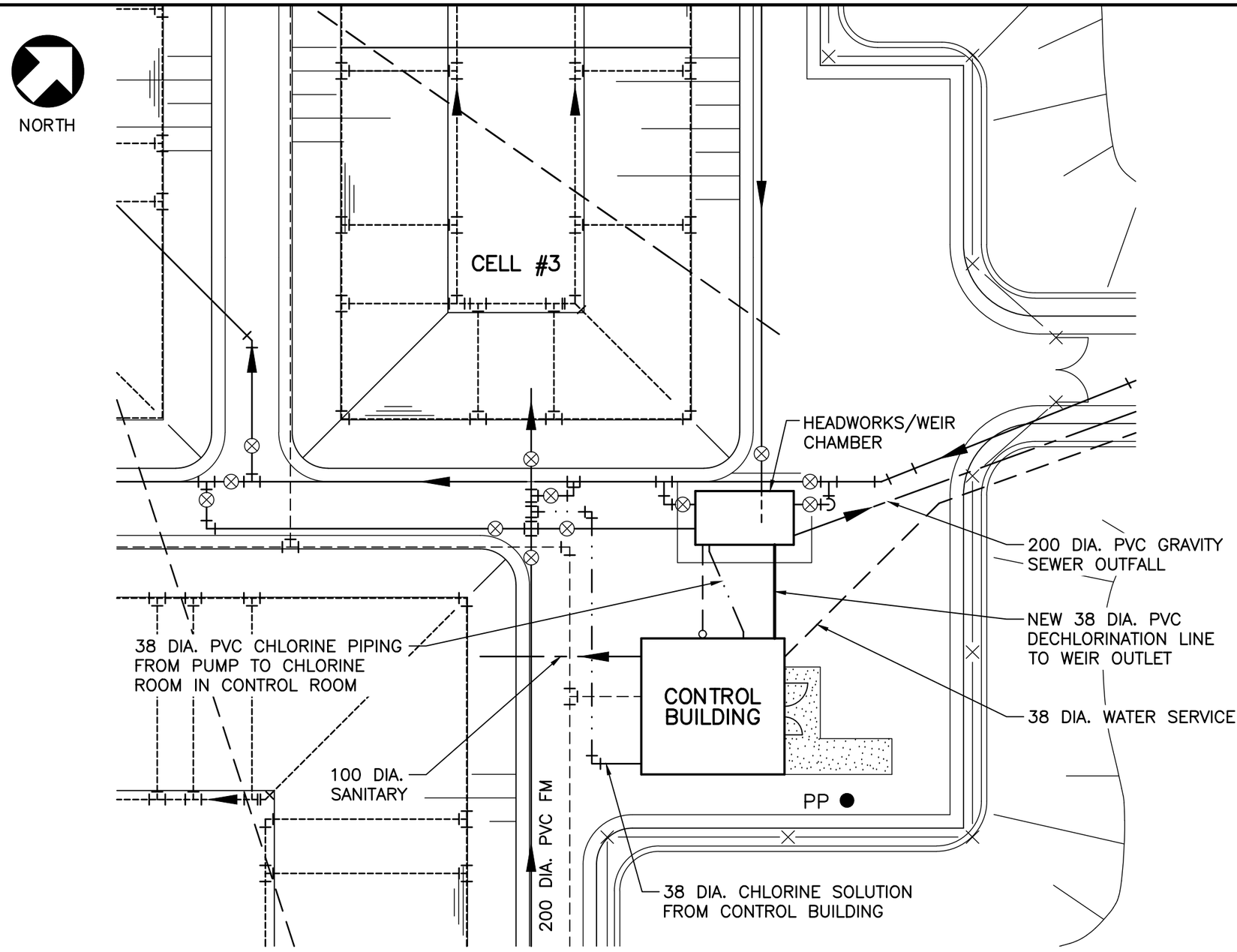


PLAN– PIPING LAYOUT

1:250

Date	Scale	Designed	Drawn	Checked	Approved	CBCL No.	Contract
JULY 24/19	AS NOTED	MF	NHM			190830.00	

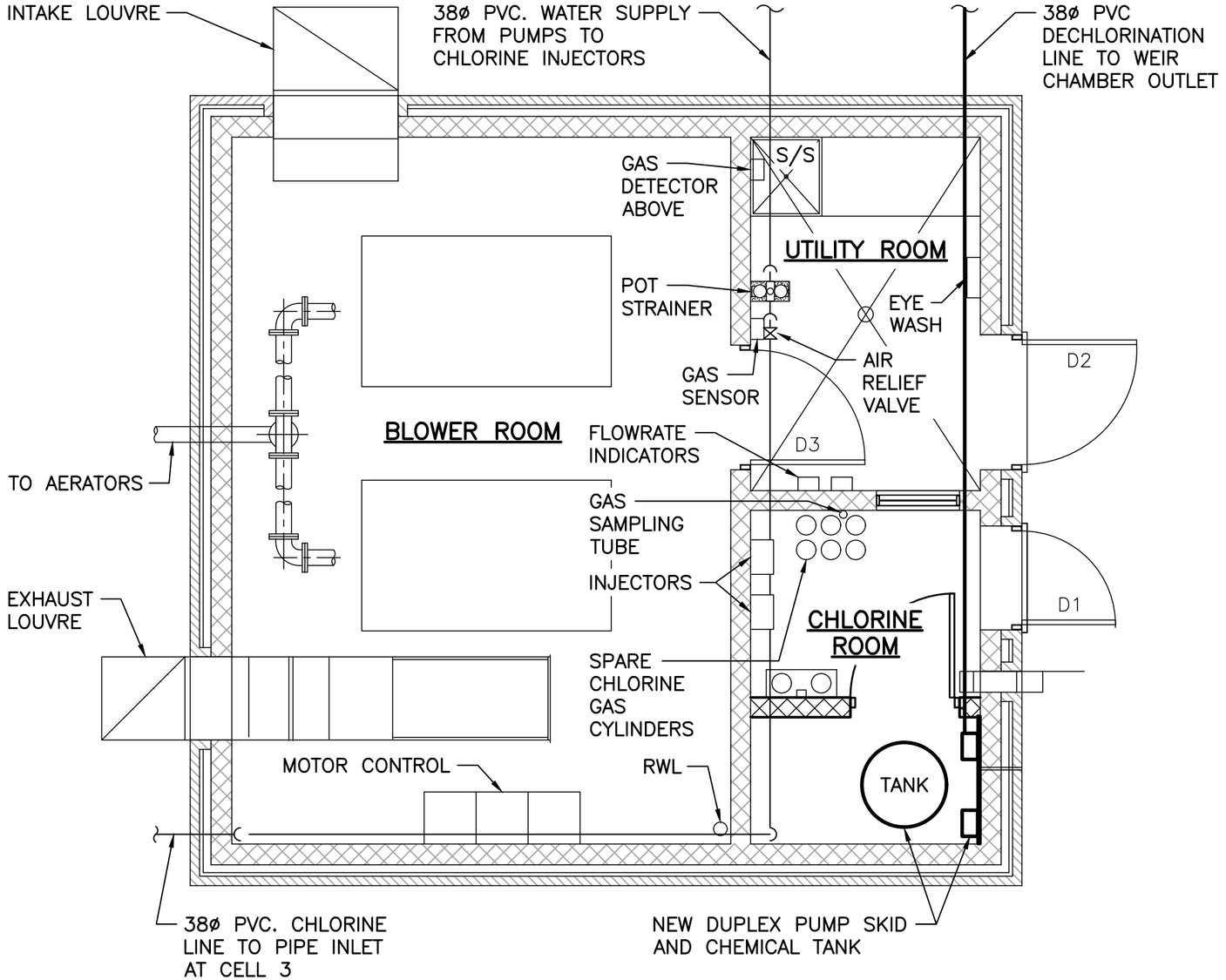
No.	Description

CBCL LIMITED
Consulting Engineers

TOWN OF MAHONE BAY
DECHLORINATION

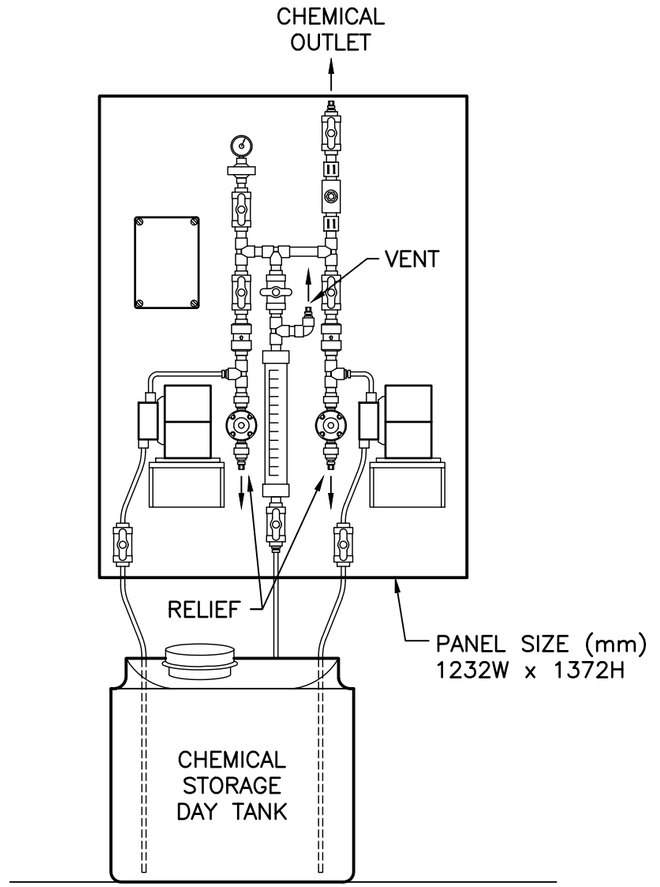
DECHLORINATION OPTION

Drawing
PSK01



FLOOR PLAN – CONTROL BUILDING

1:50



DETAIL – CHEMICAL FEED PANEL LAYOUT

N.T.S.

No.	Description

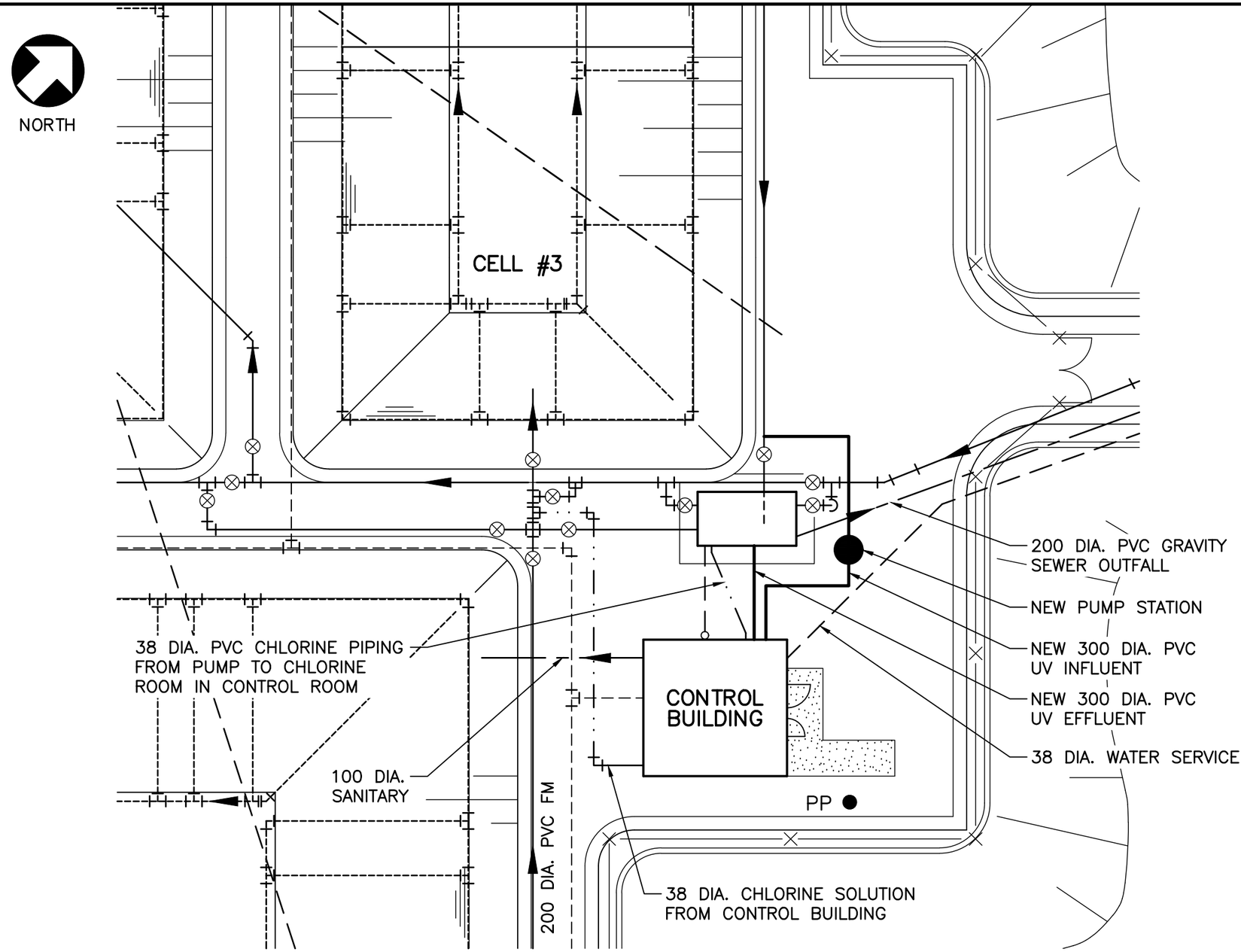
Date	Scale	Designed	Drawn	Checked	Approved	CBCL No.	Contract
JULY 24/19	AS NOTED	MF	NHM			190830.00	

CBCL LIMITED
Consulting Engineers

TOWN OF MAHONE BAY
DECHLORINATION

DECHLORINATION OPTION

Drawing
PSK02



PLAN– PIPING LAYOUT

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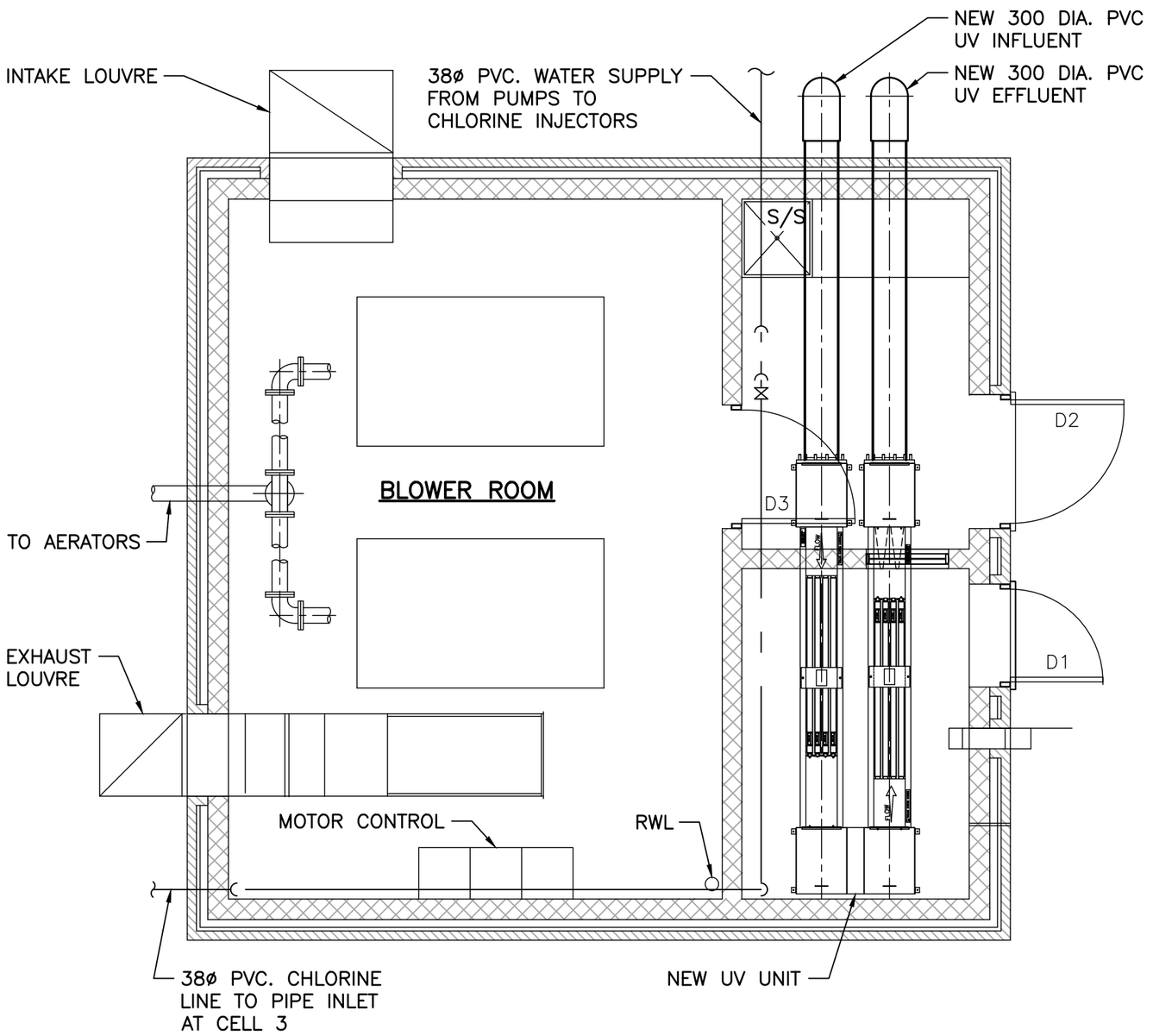
JULY 24/19	AS NOTED	MF	NHM			190830.00	

CBCL LIMITED
Consulting Engineers

TOWN OF MAHONE BAY
DECHLORINATION

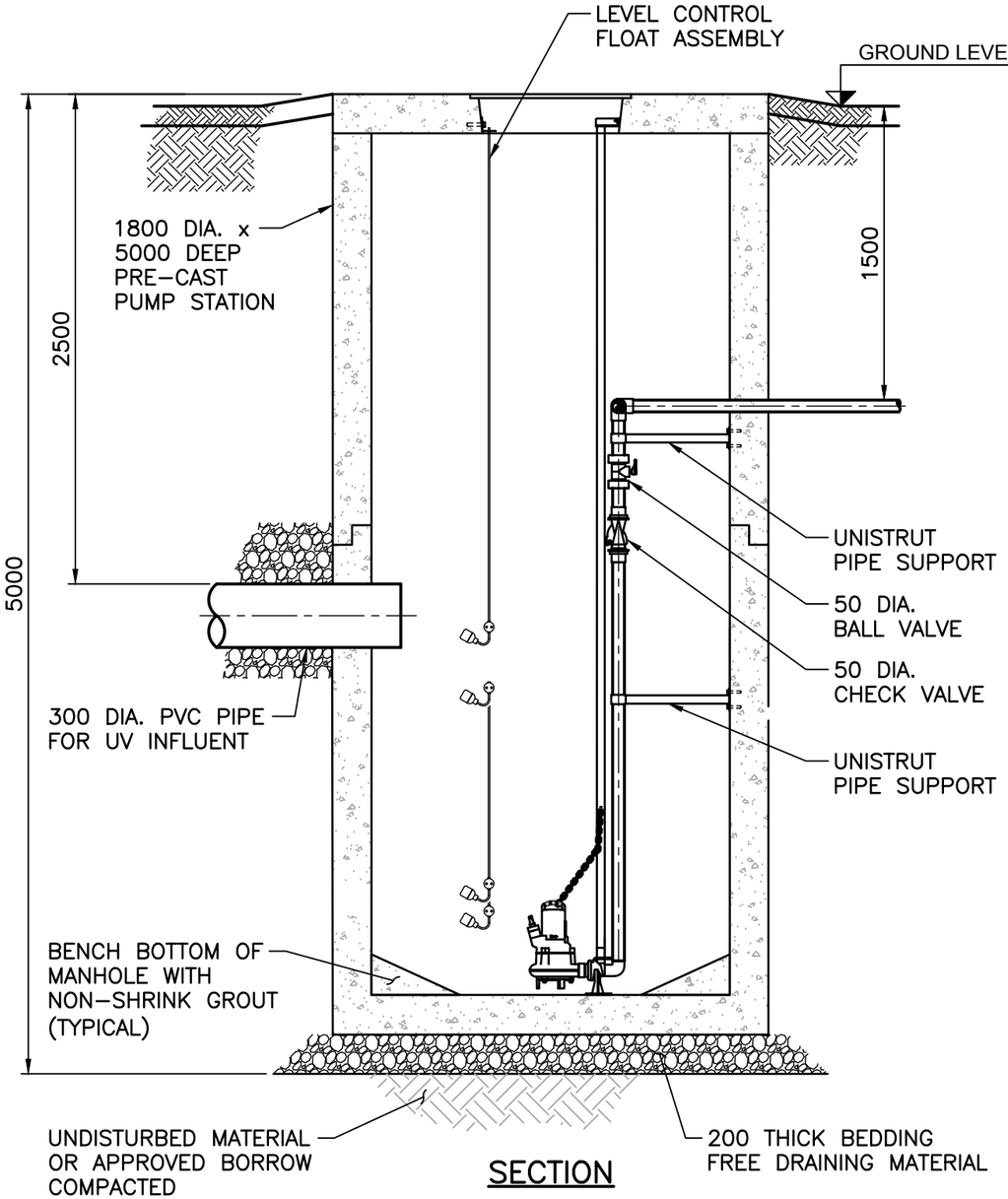
UV OPTION 1

Drawing
PSK03



FLOOR PLAN– CONTROL BUILDING

1:50



SECTION

DETAIL– PUMP STATION

1:30

No.	Description

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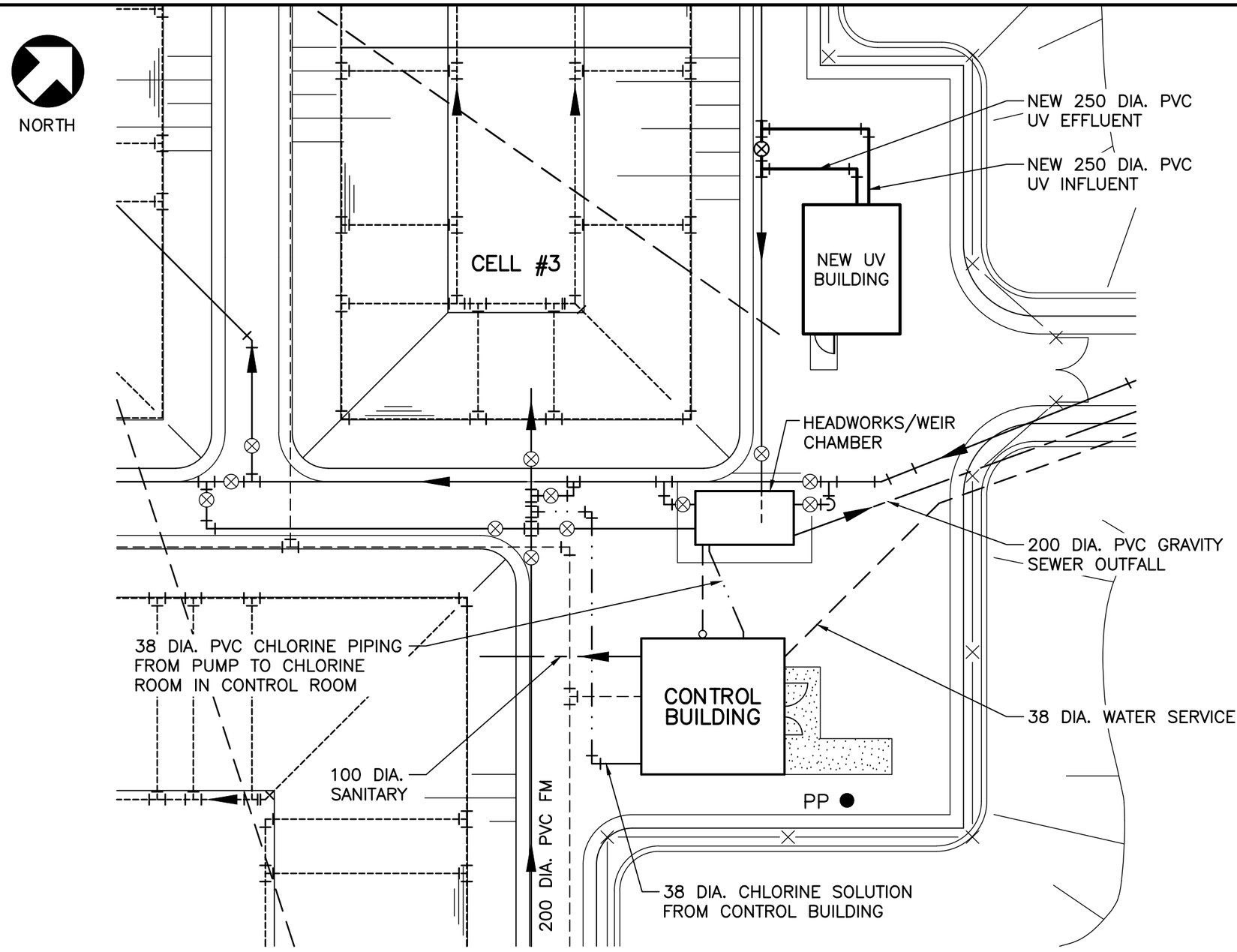
TOWN OF MAHONE BAY
DECHLORINATION

UV OPTION 1

Drawing
PSK04



PLAN– PIPING LAYOUT

1:250

Date	Scale	Designed	Drawn	Checked	Approved	CBCL No.	Contract
JULY 24/19	AS NOTED	MF	NHM			190830.00	

No.	Description

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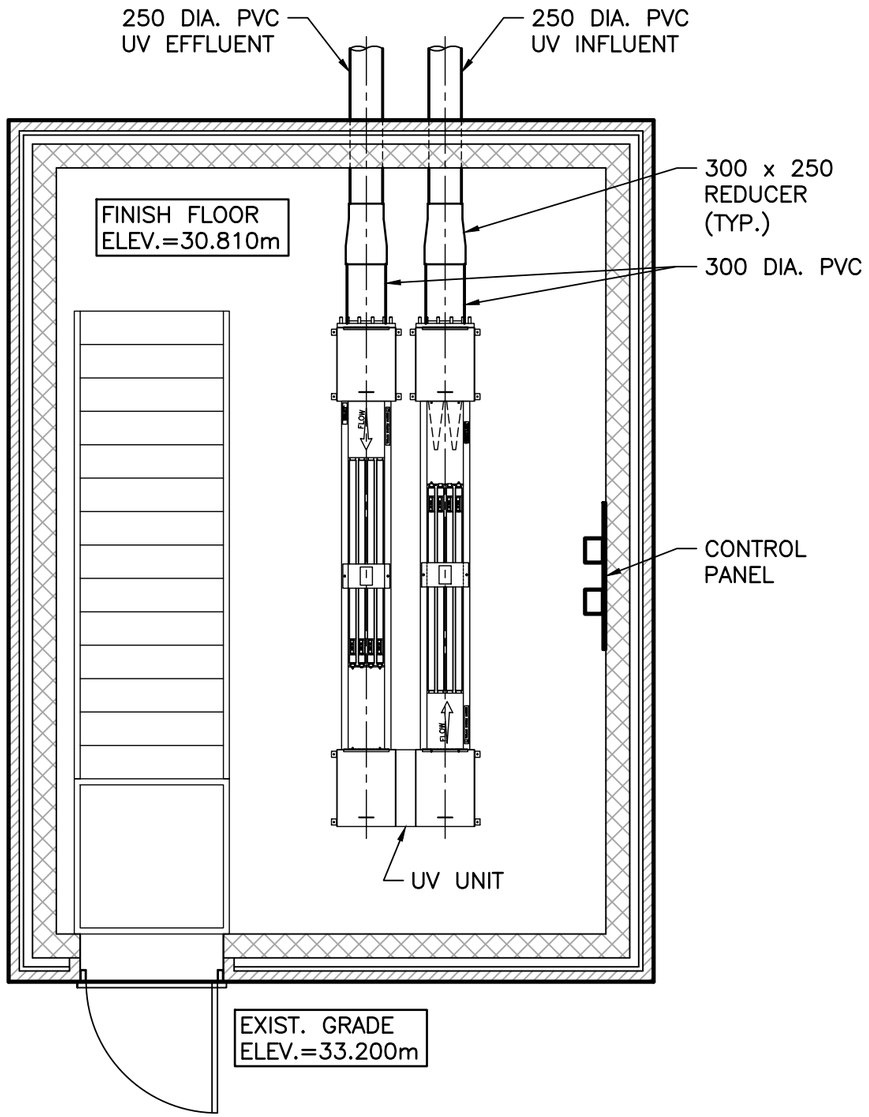
TOWN OF MAHONE BAY
DECHLORINATION

UV OPTION 2

Drawing
PSK05



FLOOR PLAN— NEW UV BUILDING

1:50

No.	Description

Date	Scale	Designed	Drawn	Checked	Approved	CBCL No.	Contract
JULY 24/19	AS NOTED	MF	NHM			190830.00	

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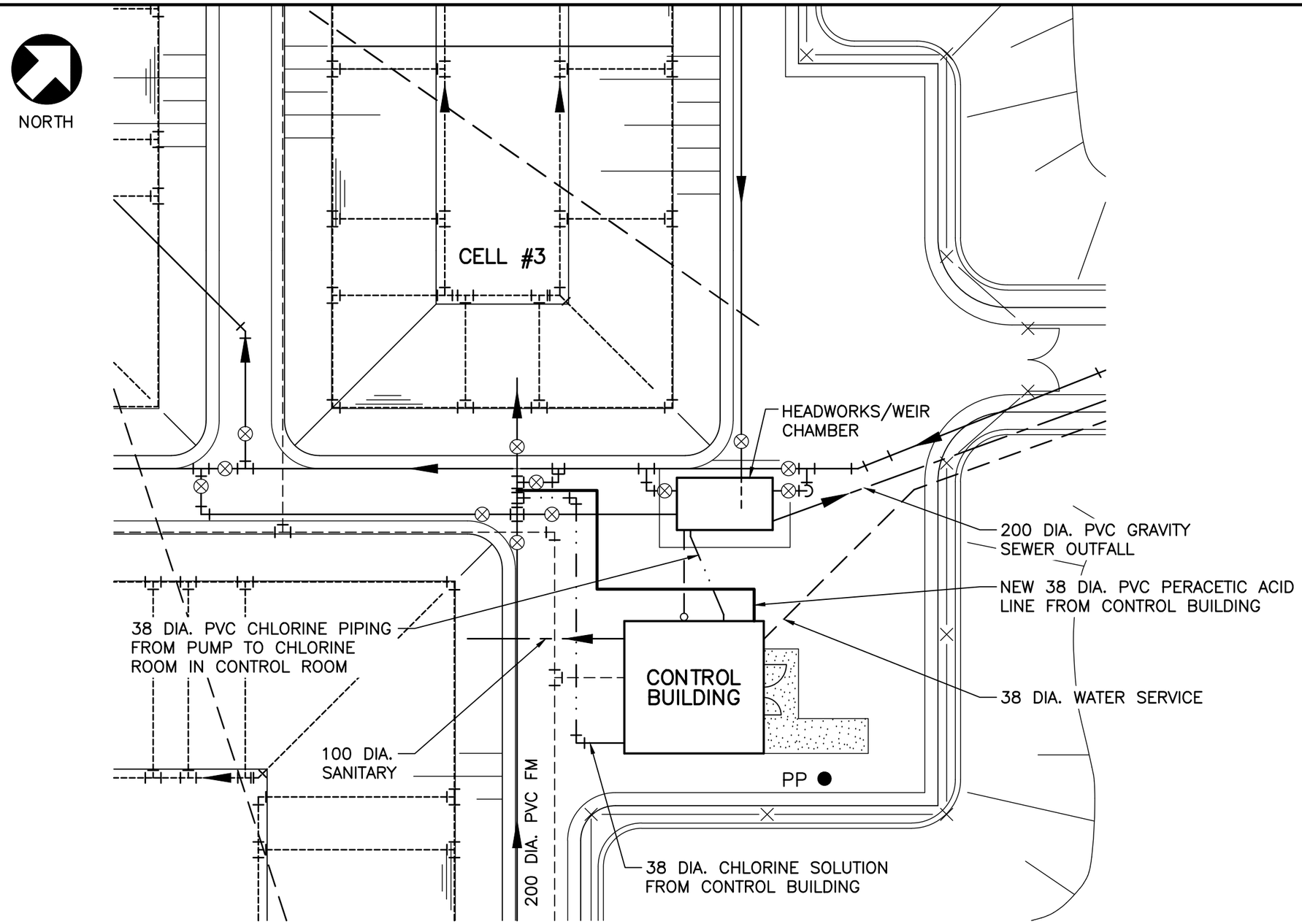
TOWN OF MAHONE BAY
DECHLORINATION

UV OPTION 2

Drawing
PSK06



PLAN– PIPING LAYOUT

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No.	Description

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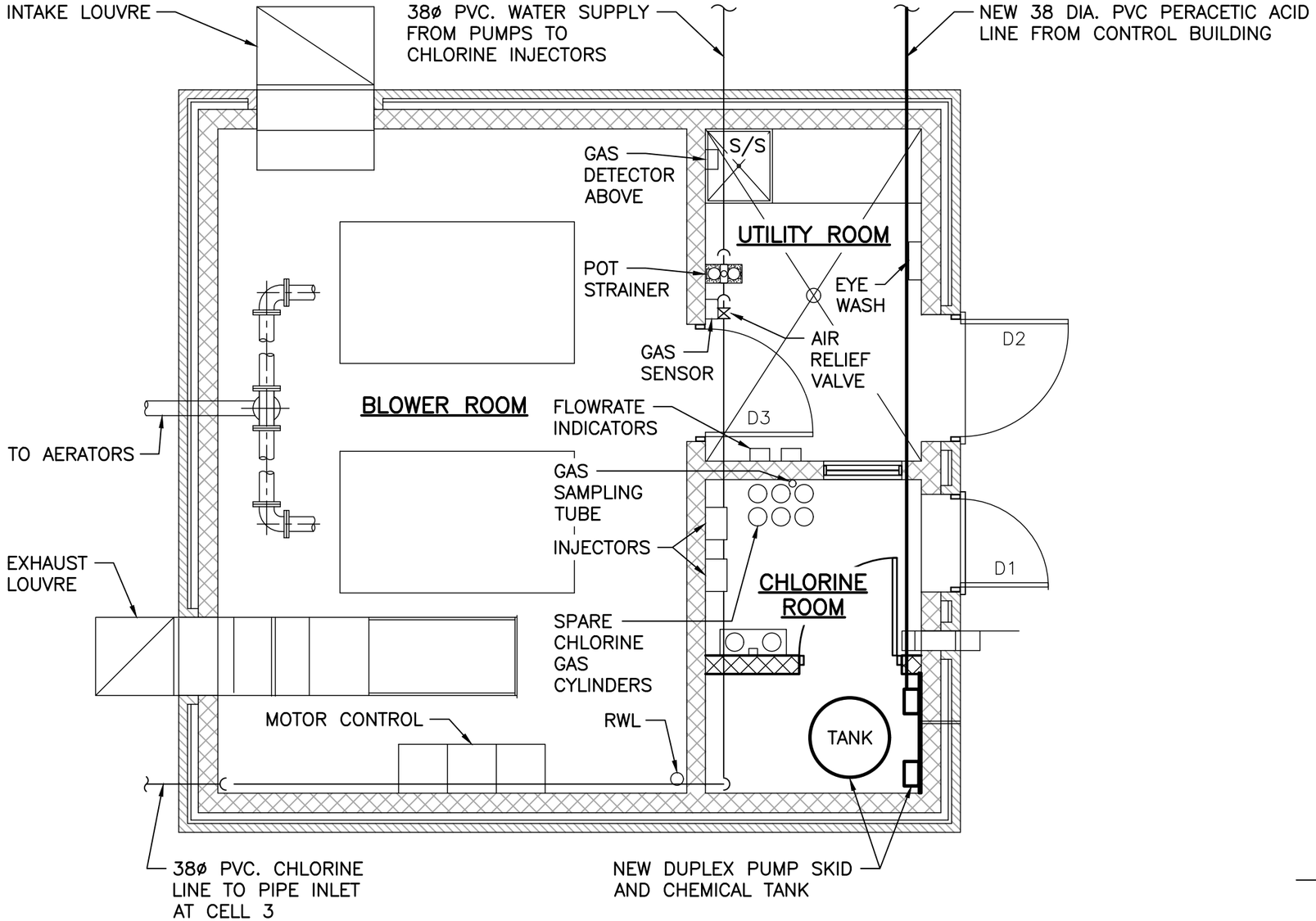
TOWN OF MAHONE BAY
DECHLORINATION

PERACETIC ACID OPTION

Drawing
PSK07



FLOOR PLAN – CONTROL BUILDING

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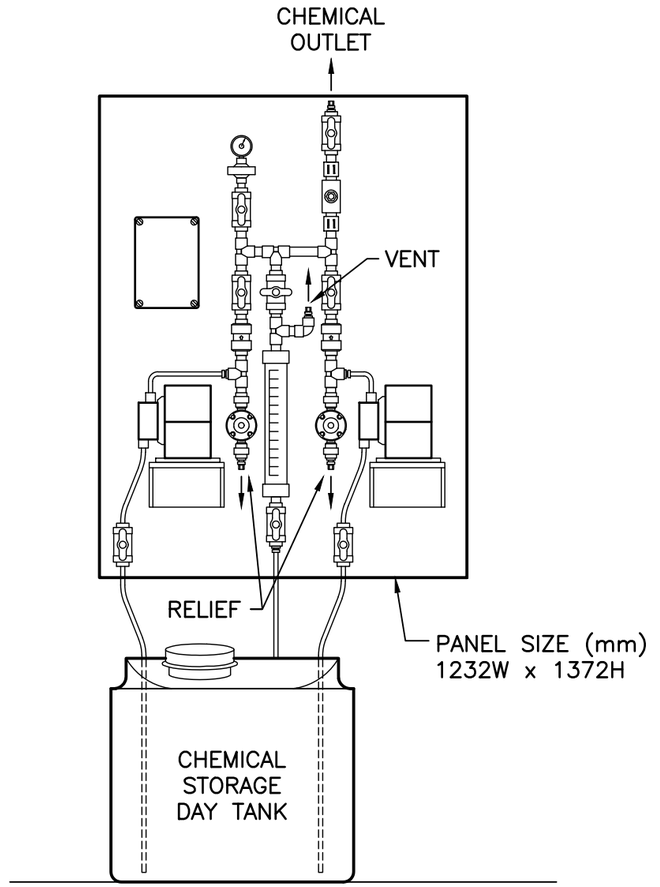

DETAIL – CHEMICAL FEED PANEL LAYOUT

N.T.S.

No.	Description

Date	Scale	Designed	Drawn	Checked	Approved	CBCL No.	Contract
JULY 24/19	AS NOTED	MF	NHM			190830.00	

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TOWN OF MAHONE BAY
DECHLORINATION

PERACETIC ACID OPTION

Drawing
PSK08

Appendix B – Cost Estimates

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Opinion of Probable Construction Cost

Town of Mahone Bay WWTP
Dechlorination Option
Class D Cost Estimate

DATE:	September 18, 2019
CBCL FILE No.:	190830.01
PREPARED BY:	MF/AT
EST. DESCRIPTION :	Class D Cost Estimate

No.	DESCRIPTION		AMOUNTS
	CONSTRUCTION COSTS		
1	Site Works		$ 9,000
2	Metals		$ 3,000
3	Finishes/Doors/Windows		$ 3,600
4	Process Equipment Supply		$ 17,600
5	Mechanical		$ 7,400
6	Electrical		$ 3,800
7	Prime Contractor Overhead/fees		$ 14,000
	SUB-TOTAL COSTS (Excluding below contingencies, allowance and factors)		**$ 57,800**
8	Design Development Contingency	15%	$ 8,700
9	Construction Contingency	10%	$ 6,700
10	Escalation / Inflation (Based on 2019 Dollars)		Not Included
11	Location Factor		Included
	CONSTRUCTION COSTS (A)		**$74,000**
	ENGINEERING and OTHER COSTS		
12	Engineering	15%	$ 11,100
13	Other	N/A	
	ENGINEERING and OTHER COSTS (B)		**$11,100**
	TOTAL PROJECT COST (A + B)		**$85,100**
	HST Taxes	15.0%	$ 12,765
	TOTAL ESTIMATE OF PROBABLE CONSTRUCTION COST		**$98,000**

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORESEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

Note 1	A Design Development Contingency is for growth of quanties, increase material costs and the like as the work is better defined in the future.
Note 2	A Construction Contingency is to allow for the cost of additional work that is over and above the original tendered construction contract price.
Note 3	The Escalation/Inflation allowance is for anticipated increases in construction costs from the time that the budget is prepared to time of Tender.
Note 4	The Location Factor is for anticipated variances between construction costs at the location of the project and historical construction data

Form CBCL 035.Rev 1

Opinion of Probable Construction Cost

Town of Mahone Bay WWTP
UV Option 1 (within existing building)
Class D Cost Estimate

DATE:	September 18, 2019
CBCL FILE No.:	190830.01
PREPARED BY:	MF/AT
EST. DESCRIPTION :	Class D Cost Estimate

No.	DESCRIPTION		AMOUNTS
	CONSTRUCTION COSTS		
1	Site Works		$ 36,000
2	Metals		$ 3,000
3	Pump Station		$ 60,000
4	Process Equipment Supply		$ 73,700
5	Mechanical		$ 24,200
6	Electrical		$ 33,600
7	Prime Contractor Overhead/fees		$ 46,100
	SUB-TOTAL COSTS (Excluding below contingencies, allowance and factors)		**$ 276,600**
8	Design Development Contingency	15%	$ 41,500
9	Construction Contingency	10%	$ 31,900
10	Escalation / Inflation (Based on 2019 Dollars)		Not Included
11	Location Factor		Included
		CONSTRUCTION COSTS (A)	**$350,000**
	ENGINEERING and OTHER COSTS		
12	Engineering	15%	$ 52,500
13	Other	N/A	
		ENGINEERING and OTHER COSTS (B)	**$52,500**
		TOTAL PROJECT COST (A + B)	**$402,500**
		HST 15.0%	$ 60,375
		TOTAL ESTIMATE OF PROBABLE CONSTRUCTION COST	**$462,875**

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORESEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

Opinion of Probable Construction Cost

Town of Mahone Bay WWTP
UV Option 2 (new building)
Class D Cost Estimate

DATE:	September 18, 2019
CBCL FILE No.:	190830.01
PREPARED BY:	MF/AT
EST. DESCRIPTION :	Class D Cost Estimate

No.	DESCRIPTION			AMOUNTS
	CONSTRUCTION COSTS			
1	Site Works			$ 48,000
2	Concrete			$ 46,000
3	Metals			$ 10,000
4	Finishes/Doors/Windows			$ 34,400
5	Process Equipment Supply			$ 73,700
6	Mechanical			$ 42,200
7	Electrical			$ 50,600
8	Prime Contractor Overhead/fees			$ 61,000
	SUB-TOTAL COSTS (Excluding below contingencies, allowance and factors)			**$ 365,900**
9	Design Development Contingency	15%		$ 54,900
10	Construction Contingency	10%		$ 42,100
11	Escalation / Inflation (Based on 2019 Dollars)			Not Included
12	Location Factor			Included
	CONSTRUCTION COSTS (A)			**$463,000**
	ENGINEERING and OTHER COSTS			
13	Engineering		15%	$ 69,500
14	Other		N/A	Separate Contract
	ENGINEERING and OTHER COSTS (B)			**$70,000**
	TOTAL PROJECT COST (A + B)			**$533,000**
	Taxes		15.0%	$ 79,950
	TOTAL ESTIMATE OF PROBABLE CONSTRUCTION COST			**$542,950**

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORESEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

CBCL LIMITED
Consulting Engineers

Opinion of Probable Construction Cost

Town of Mahone Bay WWTP
Peracetic Acid Option
Class D Cost Estimate

DATE:	September 18, 2019
CBCL FILE No.:	190830.01
PREPARED BY:	MF/AT
EST. DESCRIPTION :	Class D Cost Estimate

No.	DESCRIPTION		AMOUNTS
	CONSTRUCTION COSTS		
1	Site Works		$ 9,000
2	Metals		$ 3,000
3	Finishes/Doors/Windows		$ 3,600
4	Process Equipment Supply		$ 17,600
5	Mechanical		$ 7,400
6	Electrical		$ 3,800
7	Prime Contractor Overhead/fees		$ 14,000
	SUB-TOTAL COSTS (Excluding below contingencies, allowance and factors)		**$ 57,800**
8	Design Development Contingency	15%	$ 8,700
9	Construction Contingency	10%	$ 6,700
10	Escalation / Inflation (Based on 2019 Dollars)		Not Included
11	Location Factor		Included
	CONSTRUCTION COSTS (A)		**$74,000**
	ENGINEERING and OTHER COSTS		
12	Engineering	15%	$ 11,100
13	Other	N/A	
	ENGINEERING and OTHER COSTS (B)		**$11,100**
	TOTAL PROJECT COST (A + B)		**$85,100**
	HST Taxes	15.0%	$ 12,765
	TOTAL ESTIMATE OF PROBABLE CONSTRUCTION COST		**$98,000**

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORESEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

Note 1	A Design Development Contingency is for growth of quanties, increase material costs and the like as the work is better defined in the future.
Note 2	A Construction Contingency is to allow for the cost of additional work that is over and above the original tendered construction contract price.
Note 3	The Escalation/Inflation allowance is for anticipated increases in construction costs from the time that the budget is prepared to time of Tender.
Note 4	The Location Factor is for anticipated variances between construction costs at the location of the project and historical construction data

Form CBCL 035.Rev 1

November 12th, 2019

Barry Gillis, P.Eng
District Engineer
Nova Scotia Environment
Western Region, Bridgewater Office
60 Logan Road
Bridgewater, NS
B4V 3J8

Dear Mr. Gillis:

In accordance with Approval No. 2016-096100, section 7(f) Performance Limits, the Town of Mahone Bay Sewage Treatment Plant must meet a total chlorine residual (TCR) target of 0.02 mg/L in discharge effluent by December 31st, 2020. The April 2018 System Assessment Report (SAR) completed by CBCL Ltd. identified that current discharge effluent exceeds the proposed limit. In follow-up to the January 2019 memorandum issued from the Town to the Department regarding fulfillment of the 2018 SAR recommendations, the Town engaged CBCL Ltd. to conduct a De-chlorination Options Review for the facility. The Review was funded through the Provincial Capital Assistance Program. Attached please find the completed Review.

Based on the Review recommendations, the Town of Mahone Bay wishes to pursue the use of Peracetic Acid as an alternate disinfectant to the current practice of chlorination. Prior to initiating the complete design drawings and specifications phase of the proposed modification, as required for an application for Approval amendment, the Town requests that the Department advise if Peracetic Acid is an accepted alternate disinfectant in Nova Scotia. If so, please advise of the next steps in the process for amendment to the existing Approval.

Regards,

Meghan Rafferty, ODRC
Town of Mahone Bay
493 Main Street
Mahone Bay, NS B0J 2E0

Enclosures [22 pages].

Town of Mahone Bay
Staff Report
RE: Communications Strategy
November 26, 2019

General Overview:

The purpose of this report is to update Council and request input on the development of a communications strategy by Skysail Brand Marketing and Design.

Background:

The Town has contracted Skysail Brand Marketing and Design to provide communications services with respect to a number of Town projects and initiatives, particularly capital / asset management projects, over a twelve-month period beginning in late September 2019.

As a component of this contract Skysail has been asked to develop a communications strategy, incorporating the various communications services required by the Town. This strategy will ensure all communications materials / design have a common appearance and coordinate the timed development and release of communications materials over the term of the contract.

In development of this strategy Skysail proposed the Town standardize the logo used in communications, reports, business cards, the Town website, etc.. Two logo designs were presented to Council at the special meeting held October 29th, 2019. At the regular meeting of Council held November 12th, 2019 Council approved the logo attached as Appendix A to this report to be used in official Town of Mahone Bay materials/communications.

Analysis:

The communications strategy under development by Skysail will link together (and include a timeline for) the following, utilizing common messaging and visual elements:

- Asset Management Public Education & Awareness
- Climate and Energy Public Education & Awareness
- Infrastructure Projects Communications (planned water, wastewater, facilities projects)
- Climate Adaptation and Mitigation Projects Communications (planned shoreline adaptation, solar gardens, etc.)
- Municipal Planning Strategy and Land-Use By-law Review Communications
- Transit Plan Development Communications
- New Town Website

The communications strategy in intended to build on the logo approved by Council with associated guidelines for use (including potential modifications) and print and digital style guidelines (incorporating accessibility best practices).

Logo modifications might include:

- Logo variants/embellishments for utilities (water and electric), for vehicle decals, for heritage/ceremonial use, for special occasions/holidays, etc.
- Colour altered logos (black and white, inverted, etc.)
- Customized logo taglines for use in different contexts

Council's input is needed to ensure Skysail's communications strategy is aligned with Council's communications requirements.

Financial Analysis:

Costs associated with communications strategy development and the development of a new Town website are components of the Town's communications services contract with Skysail.

Links to Strategic Plan:

Key Strategic Initiatives and Core Activities

3.3 Governance and Public Engagement

- Improve communications and share information with the public in a manner consistent with their needs

Recommendation:

It is recommended:

THAT Council accept this report for information; and,

That Council provide input on the development of a communications strategy by Skysail.

Attached for Council Review:

- Appendix A – Approved Logo

Respectfully Submitted,

Dylan Heide
Town of Mahone Bay CAO

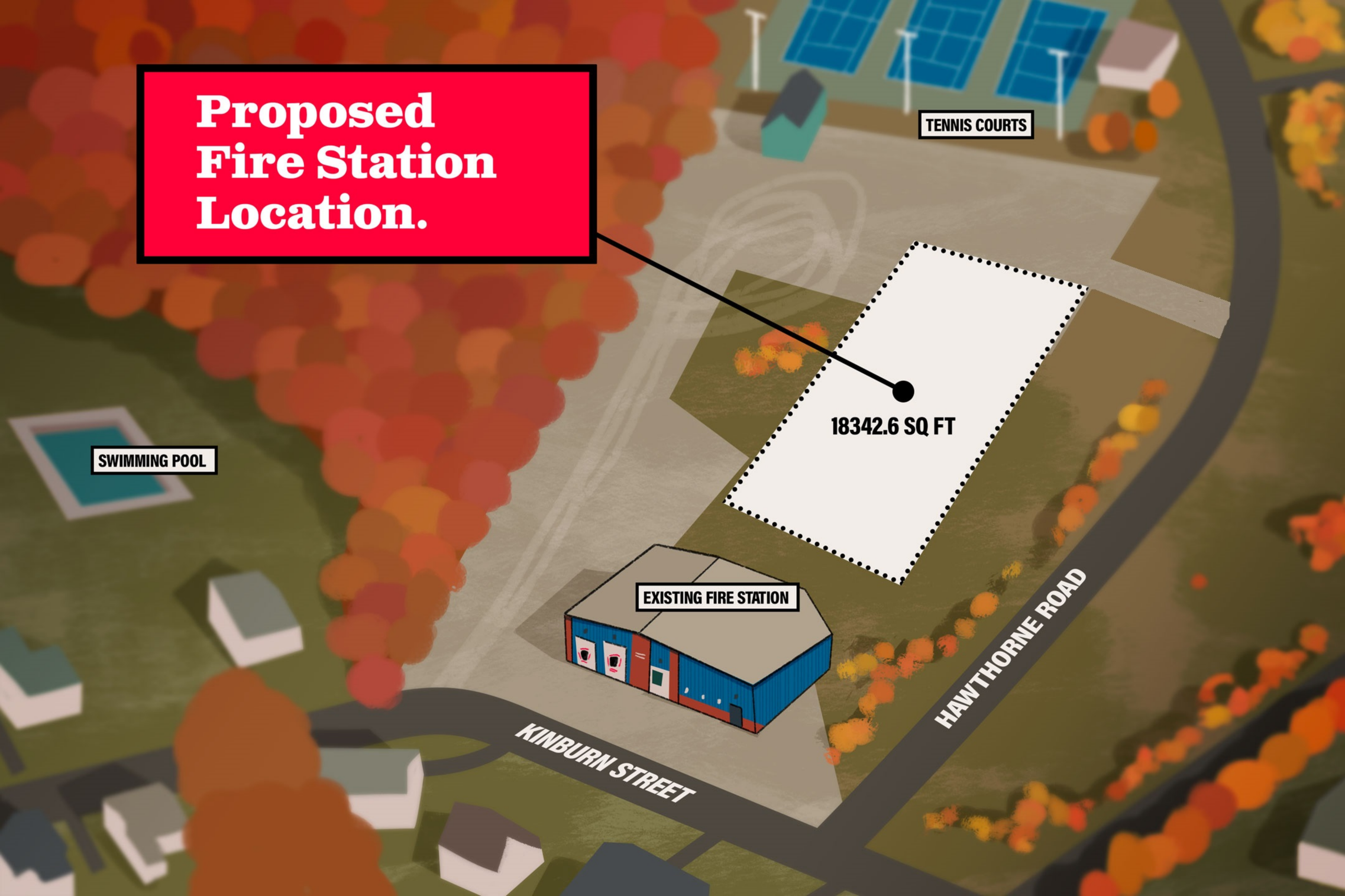
Appendix A

THE TOWN OF Mahone Bay

THE TOWN OF Mahone Bay

Mahone Bay

Proposed Fire Station Location.



Fire Station Project Timeline.

NOV 26 2019
Public Info Session & Open House at Fire Station

FEB 11 2020
Council Awards Design/Build Tender - Final Decision of Council on Options

DEC 10 2019
Council Opens Tender Process - Definition of Scope, Options for Quotation

2021
Deadline for Pumper Truck Replacement (Fire Underwriters)

AUGUST 2021
Opening of New Fire Station

TENDER PROCESS | DESIGN PHASE | CONSTRUCTION PHASE

NOV 2019 | DEC 2019 | JAN 2020 | FEB 2020 | MAR 2020 | APR 2020 | MAY 2020 | JUN 2020 | JUL 2020 | AUG 2020 | SEP 2020 | OCT 2020 | NOV 2020 | DEC 2020

2020

JAN 2021 | FEB 2021 | MAR 2021 | APR 2021 | MAY 2021 | JUN 2021 | JUL 2021 | AUG 2021

2021 MBVFD CENTENNIAL YEAR

Mahone Bay is building a new Fire Station!

IMPROVED RESPONSE TIMES

More square footage and vehicle bays will improve response times. No more Fire Truck Tetris while time ticks away!

FEWER HAZARDS

Our volunteers won't have to suit up inches from moving trucks or work in poor air quality. The new building will be safer for those who keep you safe!

FUTURE-PROOF

The changing needs of our town and insurance mean we need a modern pumper by 2021 and it won't fit in the current station.

EMERGENCY SHELTER

Our new Hall would have facilities that qualify it as a much-needed Emergency Shelter for Mahone Bay and the surrounding area.

FUNDRAISING OPTIONS

A flexible multi-purpose Hall and high-capactiy parking lot mean better Bingo and more social events. Better fundraising takes the burden off your tax bill!

Thanks for attending!

Thanks for attending the Open House. We hope it was informative and that you were able to share your thoughts and ideas with us as we continue through the process of building our new Fire Station. For information going forward, please feel free to attend a council meeting at Town Hall or keep an eye on the Mayor's Newsletter!

MBVFD SERVING MAHONE BAY - OAKLAND - CLEARLAND - MADER'S COVE

Fire Station Project Timeline.

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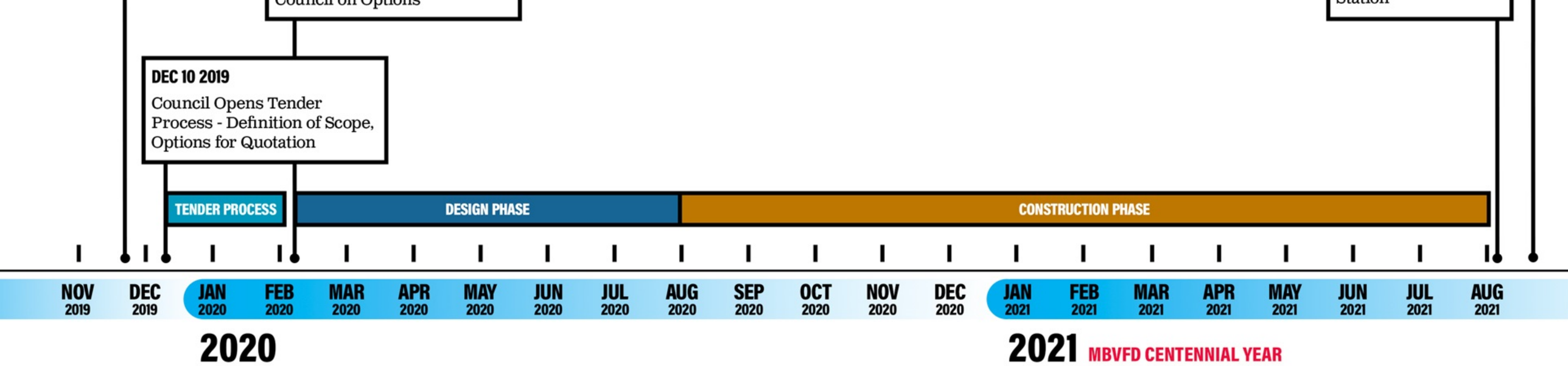

2020 **2021** MBVFD CENTENNIAL YEAR

We'd love to hear your ideas and suggestions!

Share your ideas and suggestions for the new Fire Station! If you're open to being contacted about your comment, include your name & phone number.

NAME: _____

PHONE: _____

COMMENT: _____

_____

_____

_____

_____

_____

draft TOWN OF MAHONE BAY CAPITAL INVESTMENT PLAN 2019-2025

#	Capital Project	Description	TOTAL 6 YR COST	2019	2020	2021	2022	2023	2024
			Public Works						
1	Public Works Garage/Office	Renovate Fire Hall	**$400,000**		$400,000				
2	New Sand Storage Shed	Winter Maintenance/Sand	**$100,000**			$100,000			
3	International Dump Truck with Plow	5 Ton Dump Truck with Plow	**$160,000**				$160,000		
4	New Van or Utility Truck	Water Utility Van	**$40,000**				$40,000		
5	Flail Mower	Flail Mower	**$6,000**	$6,000					
			Administration						
6	Town Hall Repairs	Town Office Repairs	**$100,000**	$100,000					
7	Town Hall	Long-term renovation or Replacement	**$500,000**			$500,000			
			Fire Service						
8	Fire Station Improvement	Replace or Improvements Fire Station	**$3,465,000**	$346,500	$3,118,500				
9	Parking Improvements Fire Hall	Parking Improvements Fire Hall	**$90,000**		$90,000				
10	Fire Vehicles	Capital Improvements - Vehicles	**$25,000**				$25,000		
11	New Fire Vehice	New Fire Vehice	**$1,200,000**		$1,200,000				
12	SCBA Packs / Tanks	SCBA Packs / Tanks	**$45,000**	$45,000					
			Transportation Infrastructure						
13	Double Chip Seal Clearland Rd	Double Chip Seal Clearland Rd	**$72,000**	$72,000					
14	Sidewalk - South Main to treatment plant	Replace existing and extend	**$100,000**			$100,000			
15	Sidewalk Fairmont Street	Repair / replace existing	**$40,000**					$40,000	
16	Sidewalk - Fauxburg Main to Pleasant	Sidewalk on Fauxburg Road	**$125,000**			$125,000			
17	Blue Route Community Hubs Recommendation	Kinburn/Clairmont	**$27,000**		$27,000				
18	Blue Route Community Hubs Recommendation	Kinburn/Main	**$92,000**		$92,000				

draft TOWN OF MAHONE BAY CAPITAL INVESTMENT PLAN 2019-2025

#	Capital Project	Description	TOTAL 6 YR COST	2019	2020	2021	2022	2023	2024
19	Blue Route Community Hubs Recommendation	Clearway/Main Intersection	**$148,000**		$148,000				
20	Blue Route Community Hubs Recommendation	Clearway Street	**$572,000**		$572,000				
21	Blue Route Community Hubs Recommendation	Pleasant Street and Fauxburg Road	**$66,000**		$66,000				
		Marina / Wharf							
22	Replace Floating Wharfs and Gangway	Replace Floating Wharfs and Gangway	**$30,000**		$30,000				
23	Wharf Repairs	Repair South-facing Cribwork	**$30,000**		$30,000				
24	Wharf Improvements	Replace South-facing Armour Rock with Cribwork	**$200,000**				$200,000		
		Water Utility							
25	New Water Services	New Water Services	**$30,000**	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
26	Cut Out Access to Water transmission Line	Cut Out Access to Water transmission Line	**$10,000**		$10,000				
27	Water-Transmission Line	Replace / twin Transmission Main - Lake to Treatment plant	**$2,000,000**					$2,000,000	
28	Clearwell Cleaning / Inspection	Clearwell Cleaning / Inspection	**$13,000**	$13,000					
29	Gate Valves	Gate Valve Replacement Program	**$36,000**	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000
30	Hydrant Replacements	Hydrant Replacements	**$15,000**		$5,000		$5,000		$5,000
31	New Water Meters	New Water Meters	**$6,000**	$3,000		$3,000			
32	Water Rate Study	Water Rate Study	**$8,000**	$8,000					
33	Water Pal System Replace Filter Modules	Water Pal System Replace Filter Modules	**$60,000**		$12,000	$12,000	$12,000	$12,000	$12,000
34	Corrosion Coating	Chemical Room Floor WTP	**$10,000**		$10,000				
35	Automatic Flushers	Deadend Flushing - System Extremities	**$30,000**		$15,000	$15,000			
36	Pumphouse	Replace Raw Pumps + Spare	**$8,000**	$8,000					
37	Pumphouse Upgrades	Replace door, window, wet well cover	**$5,000**		$5,000				
38	Air Conditioning Unit	WTP Production Floor	**$5,000**		$5,000				

draft TOWN OF MAHONE BAY CAPITAL INVESTMENT PLAN 2019-2025

#	Capital Project	Description	TOTAL 6 YR COST	2019	2020	2021	2022	2023	2024
39	Transition Radio Telemetry at WTP	Move antenna from metal tower to new pole and RTU from old WTP to current WTP	**$25,000**	$25,000					
40	W/WW/SW Line Replacement Main St. South	Fairmont to Wastewater Treatment Plant	**$896,700**	$896,700					
41	W/WW/SW Line Replacement Main St. North	Cherry Lane to Long Hill Road	**$2,625,000**	$2,625,000					
42	W/WW/SW Line Replacement Main St. North	Long Hill Road to Water Treatment Plant	**$1,512,000**	$1,512,000					
43	Main St. South Line Extension	To Town Boundary	**$249,200**	$249,200					
44	Main St. North Waterline Replacement	To Town Boundary	**$329,700**	$329,700					
45	Edgewater Street Service Extensions	Water, Wastewater and Electrical to Town Boundary	**$450,000**		$450,000				
		Wastewater & Stormwater							
46	New Sewer Services	New Sewer Services	**$60,000**	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
47	Sewer Lift Station	Replace Pumps Station #2	**$20,000**		$10,000		$10,000		
48	Sewer Lift Station	Replace Pumps Station #3	**$10,000**	$10,000					
49	Sewer Lift Station	Replace Pump Station#1	**$40,000**			$40,000			
50	Stormwater Drainage Fauxburg Road	Drainage Fauxburg Road (replace culvert)	**$50,000**				$50,000		
51	Stormwater Drainage RPS	Storm Water Drainage Main St. at RPS entrance	**$20,000**			$20,000			
52	Stormwater Separation	Fairmont Street	**$200,000**			$100,000		$100,000	
		Electric Utility							
53	Electric Line Replacements	Pole, Line Replacements	**$120,000**	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000
54	Line Truck (small)	Line Truck (small)	**$270,000**	$270,000					
55	New Electric Meters (Digital)	New Electric Meters (Digital)	**$39,000**	$6,500	$6,500	$6,500	$6,500	$6,500	$6,500
56	New Street Lights	New Street Lights	**$10,000**	$5,000			$5,000		
57	Replace Reclosurers-Substation	Replace Re-closers Substation	**$12,000**			$12,000			
58	Transformers	Transformers	**$15,000**		$5,000		$5,000		$5,000

draft TOWN OF MAHONE BAY CAPITAL INVESTMENT PLAN 2019-2025

#	Capital Project	Description	TOTAL 6 YR COST	2019	2020	2021	2022	2023	2024
59	Wood Chipper - Electric Utility	Wood Chipper - Electric Utility (50% shared with riverport)	**$40,000**		$40,000				
		Climate Adaptation							
60	Breakwater Repairs	Breakwater Repairs	**$8,500**		$8,500				
61	Shoreline Edgewater Sea Level Rise Protection	Shoreline Edgewater Sea Level Rise Protection	**$3,498,000**	$349,800	$3,148,200				
		Climate Mitigation							
62	Solar Gardens	Community Solar Gardens	**$703,000**		$703,000				
63	Public EV Chargers	EV Chargers at public locations	**$60,000**		$60,000				
64	EV Purchase	Purchase used EV for Council/staff use and demonstration	**$30,000**		$30,000				
65	Heat Pump Rentals Capital	Capital costs for rentals installations	**$600,000**		$150,000	$150,000	$150,000	$75,000	$75,000
		Other							
66	Bandstand Repair	Capital Improvement - Bandstand	**$60,000**	$60,000					
67	Winterize Comfort Stations	Improvements to comfort stations to support year-round use	**$60,000**			$30,000	$30,000		
68	Enlarge Comfort Station (Wharf)	Additional toilets, additional shower; laundry facilities	**$100,000**			$100,000			
69	Ballfield Backstop	Replace Ballfield Backstop	**$25,000**		$25,000				
70	Seniors Agility Park	Seniors Agility Park	**$50,000**		$50,000				
71	Splash Pad	Splash Pad	**$100,000**		$100,000				
			$20,851,100	**$6,981,400**	**$10,662,700**	**$1,354,500**	**$739,500**	**$2,274,500**	**$144,500**