



CRD INTEGRATED WATER SERVICES | MAGIC LAKE ESTATES WASTEWATER SYSTEM

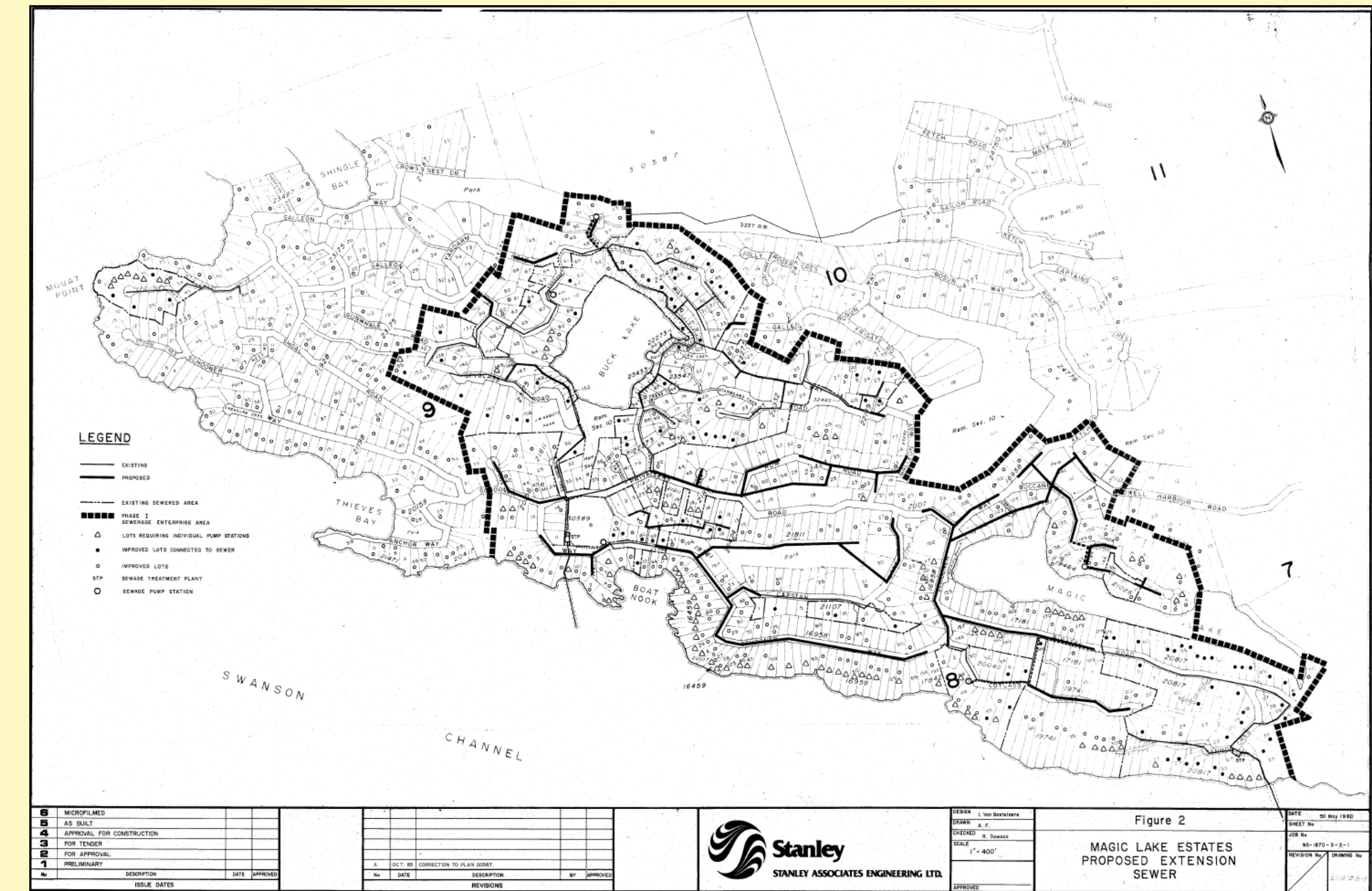
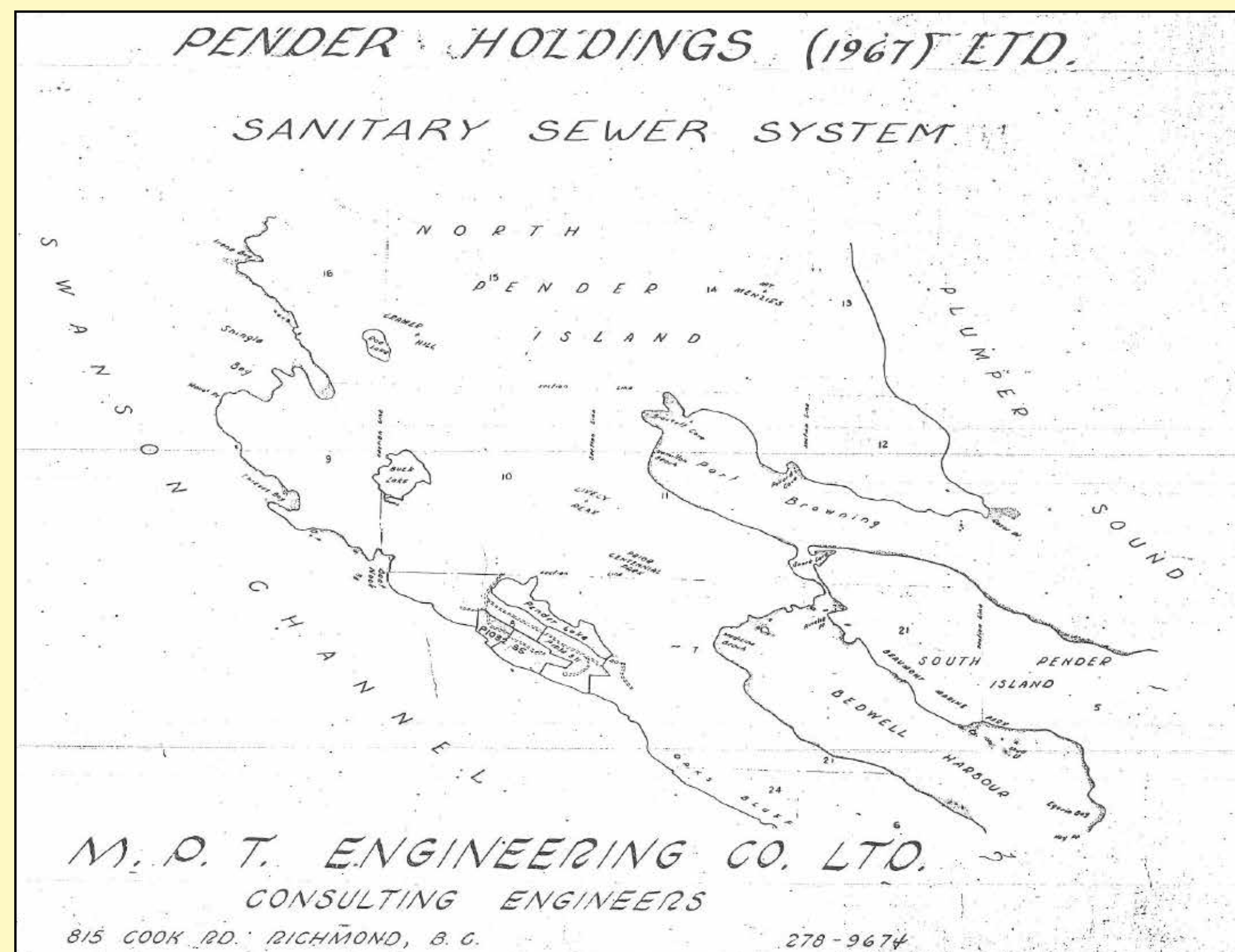
Welcome

Magic Lake Estates
Wastewater System Infrastructure
Renewal Project

Public Open House

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History



- 1967 - Sanitary Sewer System originally installed by developer
- Initially served approximately 320 properties primarily located around Buck Lake and Cannon Crescent
- The system included the following infrastructure:
 - 7.6 km of asbestos cement pipe
 - 2 Pump stations at Schooner and Galleon
 - Communal Septic Systems at Buccaneer, Capstan, Chart, and Cutlass
 - Buck (Schooner) Wastewater Treatment Plant, and Magic (Cannon) Wastewater Treatment Plant

- 1980 - Ratepayers voted by referendum to transfer the utility to the CRD
- 1981 - due to failing septic systems around Magic Lake, the CRD installed four pump stations and 7km of PVC pipe
- 1999 - minor upgrades were completed to Schooner WWTP
- 2002 - 2005 - minor upgrades were completed on manholes to help reduce Inflow and Infiltration
- 2016 - Chart Drive Pump Station was installed to replace the failed septic system
- 2018 - replaced 425m of failed pipe around the SE side of Buck Lake

Background



END OF LIFE



SEWAGE OVERFLOWS



RAGS CLOGGING TANK

Why upgrades to existing wastewater system infrastructure are required:

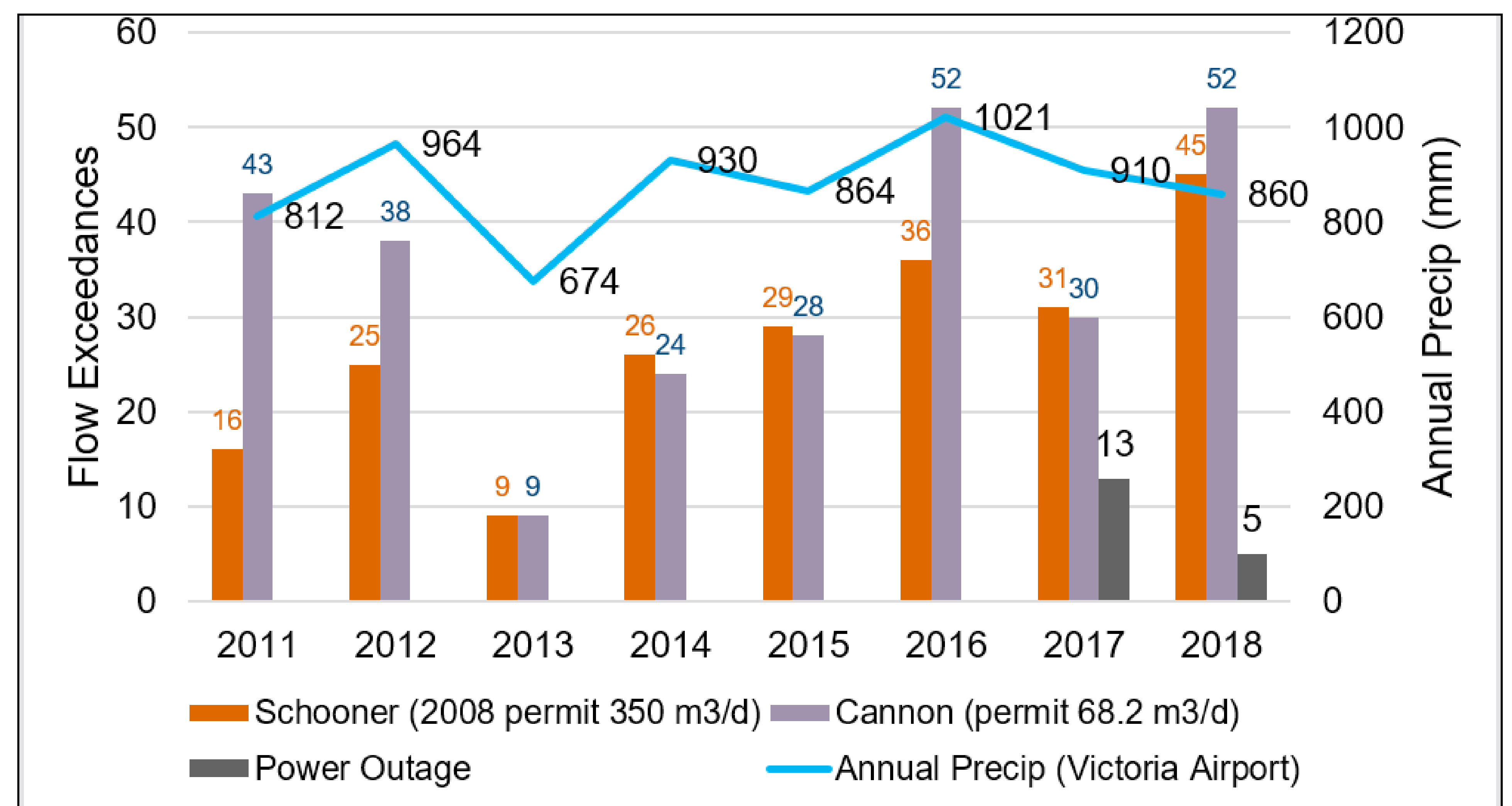
- Many facilities and the collection system are at or near end of life.
- Cannon and Schooner Wastewater Treatment Plants (WWTP) were constructed in the early 1970's with few upgrades since construction.
- Pump station mechanical and electrical equipment are 30-40 years old (end of life).
- Majority of original asbestos cement sewers have failed.

In 2011, Stantec Consulting completed a report confirming that much of the infrastructure was nearing end of life. Key recommendations from the report include:

- Upgrade or replacement of Schooner Wastewater Treatment Plant
- Replacement of the Chart Drive and Cannon Treatment Systems with pump stations and force mains
- Upgrade all six lift stations due to age and to increased capacity requirements
- Replace the failing sewers to prevent overflows and reduce inflow and infiltration


Schooner and Cannon Flow Exceedances

- Approximately 11 sewage overflows from the sewer system have been observed (a few of them into Buck Lake).
- Both wastewater treatment plants operate over their permitted and operational capacities during wet weather flow. This is due to inflow and infiltration as well as the lack of attenuation storage tanks at either plant.
- Four non-compliance letters have been received from the Ministry of Environment indicating that action is required.
- During power outages, pumps, blowers and treatment equipment shut down at both treatment plants affecting the ability to properly treat the sewage.



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Current Conditions - Cannon WWTP






Item	History / Age	Condition / Remarks	
Site Access	Installed in 1971	<ul style="list-style-type: none"> Poor site access poses difficulty for maintaining/removing equipment, cleaning tanks, off-loading supplies etc. Sludge removal pipe is not properly supported 	
Aeration Tank	Installed in 1971	<ul style="list-style-type: none"> Excessive corrosion on the tank - close to failing Air header is corroded Bubble diffuser is inefficient resulting in poor treatment 	
Site Layout	Installed in 1971	<ul style="list-style-type: none"> Tight spaces restrict safe movement of people, equipment and material Does not meet worksafe BC requirements 	
Clarifier	Installed in 1971	<ul style="list-style-type: none"> Extensive corrosion on tank and internal pipe, weirs etc. Tank is not bolted down (does not meet code) No weir control Effluent short-circuits and solids wash out during peak flows 	
Blower Shed Electrical Shed	Installed in 1971	<ul style="list-style-type: none"> Sheds are deteriorating and require new roofs Rat infestation (evident by droppings) No standby generator - equipment does not run during power outages 	

Currently Cannon WWTP has no headwork equipment or equalization storage which clogs downstream equipment with rags/solids and peak flows are not dampened causing capacity exceedances.








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Current Conditions - Schooner WWTP

Item	History / Age	Condition / Remarks	
Headworks	Inlet chamber and grinder installed in 1999	<ul style="list-style-type: none"> • No grit removal and grinder is ineffective • Grit and ground-up solids flow onto downstream tanks and equipment causing clogged pumps and increased wear • Removal is expensive 	
Equalization Tank	Does not exist	<ul style="list-style-type: none"> • No tank. Peak flows can not be attenuated which overwhelms the plant and washes out the solids 	
Aeration Tank	Installed in 1971	<ul style="list-style-type: none"> • Minor corrosion at waterline but otherwise in good condition • At least 15 years life remaining • Additional aeration is required to treat Cannon flows 	
Clarifiers	Installed in 1971	<ul style="list-style-type: none"> • Original tank emptied in 2008 with extensive corrosion noted • Internal components need to be replaced • Manual screen in splitter box, clogs with solids, unsafe to clean • No foundation, not level, short-circuits, solids wash out during peak flows 	
Return Activated Sludge Pumps	Installed in 1999	<ul style="list-style-type: none"> • Near end of life due to wear and grit • Only one pump transfers sludge to the sludge tank which is not optimal for sludge blanket and RAS concentrations • Pumps are hung without guide rails making them very difficult to remove and unclog 	

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Current Conditions - Schooner WWTP

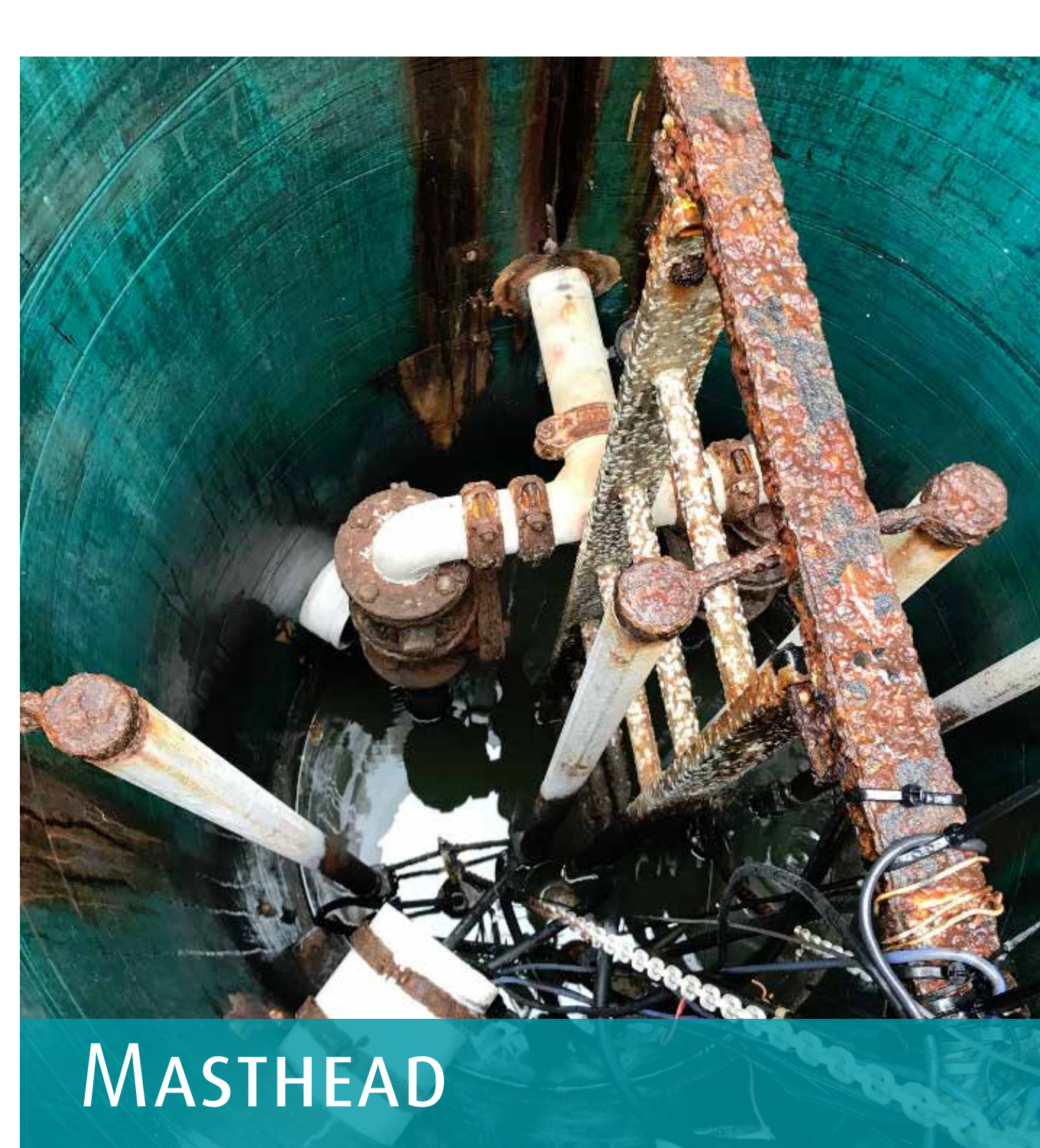
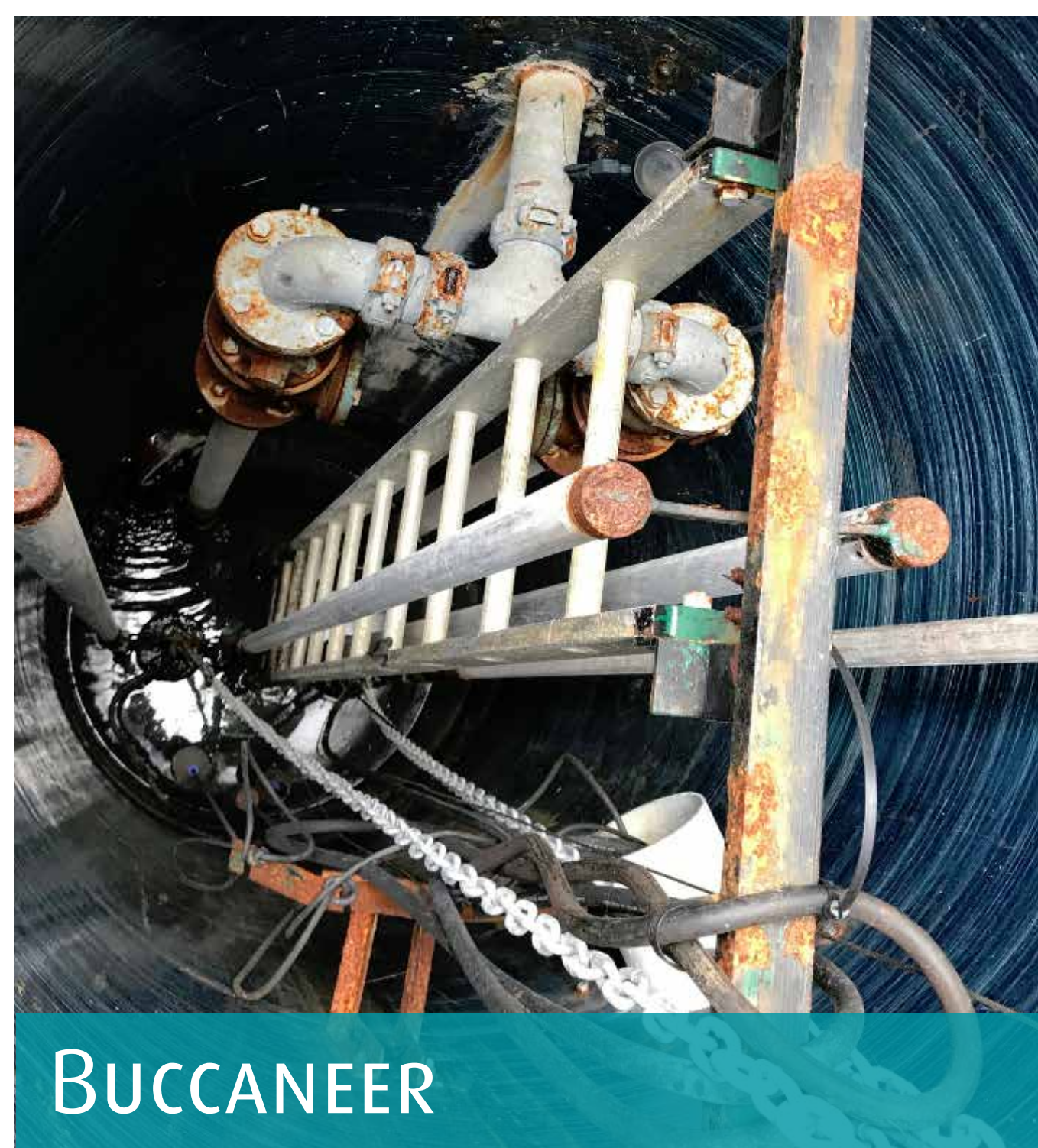
Item	History / Age	Condition / Remarks	
Sludge Tanks	Installed in 1999	<ul style="list-style-type: none"> • 3 small poly tanks (various height and diameter) with manual gas-pump transfer and multiple decant valves • Aerators hung by ropes broke and tangled in tank • Manual polymer dosing • Extremely labour intensive and in-efficient system with high trucking/disposal costs 	
Blowers	Installed in 1999	<ul style="list-style-type: none"> • One blower replaced in 2016, the other is at end of life (provide air to aeration tank and sludge tank) • Condition of piping and aerators unknown but likely at end of life • Additional blowers/air required to treat Cannon flows and sludge thickening system 	
UV Disinfection	Installed in 1999	<ul style="list-style-type: none"> • Recorded fouling with algae since DAF waste discharge from water treatment plant • Operators use a plastic snake to clean the discharge pipe/magmeter • Improved treatment may reduce algae growth • Upgrades to UV unit not required at this time 	
Electrical and Blower Buildings	Installed in 1971	<ul style="list-style-type: none"> • Two small wood-framed sheds are deteriorating, have groundwater issues, and poor access to maintain equipment • Require upgrades to meet current electrical and building codes • Electrical upgrade required to provide power for existing equipment • New electrical equipment required to improve treatment • No standby generator - pumps, blowers, UV, etc. shut down during a power outage 	
Site Access	Installed in 1971	<ul style="list-style-type: none"> • Poor access into the plant makes it difficult to maintain, remove equipment, off-load supplies, clean tanks, etc. 	

Current Conditions - Pump Stations



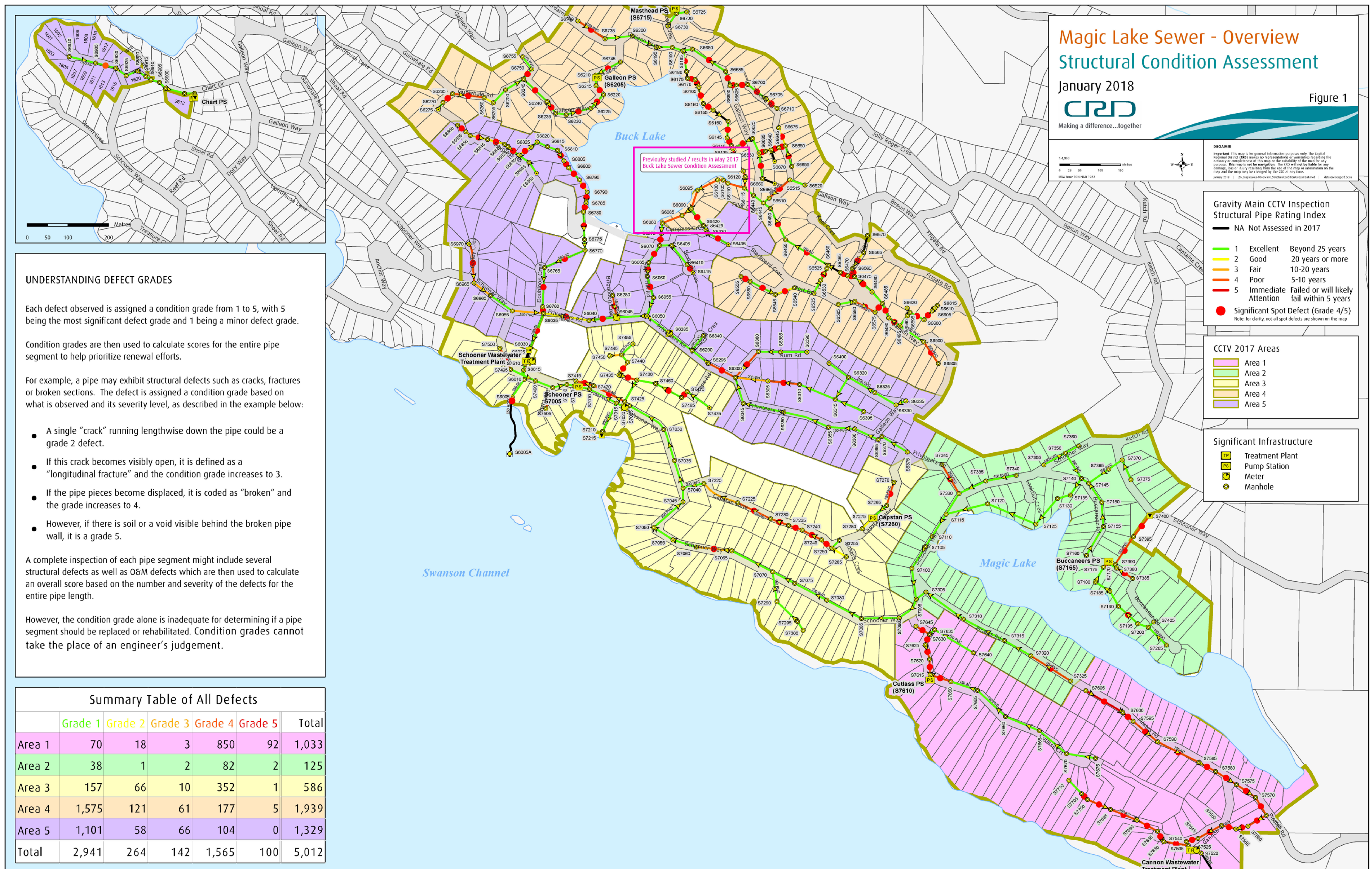
Items that are at the end of their life include:

- Pumps
- Valves
- Discharge Pipe
- Controls/Instruments
- Electrical Equipment
- Guide Rails and Supports



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Current Conditions - Sewers



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Current Conditions - Sewers



Defects identified include:

- Pipe collapse
- Holes in pipe
- Root intrusion
- Excessive pipe corrosion
- Joint displacement
- Obstructions in pipe
- Grease and solids build-up
- Insufficient capacity

Recommendation:

- Replace approximately 6.4km of the original (50-year-old), 7.6km asbestos cement pipe.

Summary of Proposed Phased Upgrades

Phase 1: Initial Upgrades

Improvements at Schooner WWTP:

- Sewage screen and grit removal
- New equalization tank
- Electrical upgrades (with temp seacan building)
- Standby generator

Renew 3 Pump Stations

(Buccaneer, Galleon and Schooner)

- Pumps
- Valves
- Piping
- Electrical kiosk

Pipe Replacement:

- Replace 4.6km of failing asbestos cement pipe
- Rehabilitate 84 manholes
- Install 0.75km of 100mm PVC forcemain (in common trench) for future Cannon Pump Station

Phase 2: Second Phase

Improvements at Schooner WWTP:

- Add second aeration tank
- Replace clarifiers
- Electrical upgrades in a permanent building

Replace Cannon WWTP:

- Install new pump station to divert flow to Schooner WWTP
- Decommission Cannon WWTP

Phase 3: Final Upgrades

Improvements at Schooner WWTP:

- Replace manual sludge thickening tanks with new thickening system

Renew 3 Remaining Pump Stations:

(Capstan, Cutlass and Masthead)

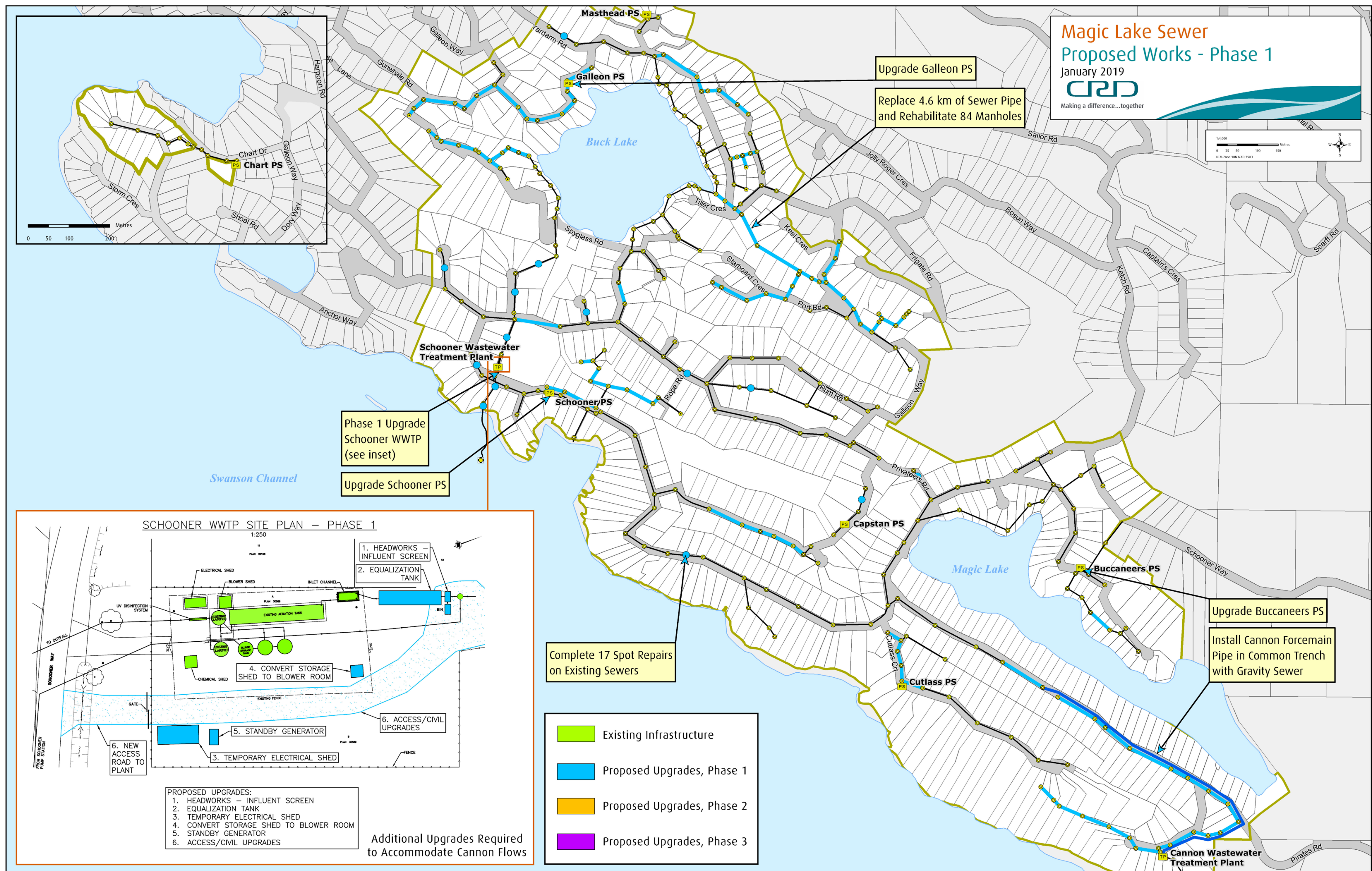
- Pumps
- Valves
- Piping
- Electrical Kiosk

Pipe Replacement:

- Replace 1.8km of failing asbestos cement pipe
- Rehabilitate 36 manholes

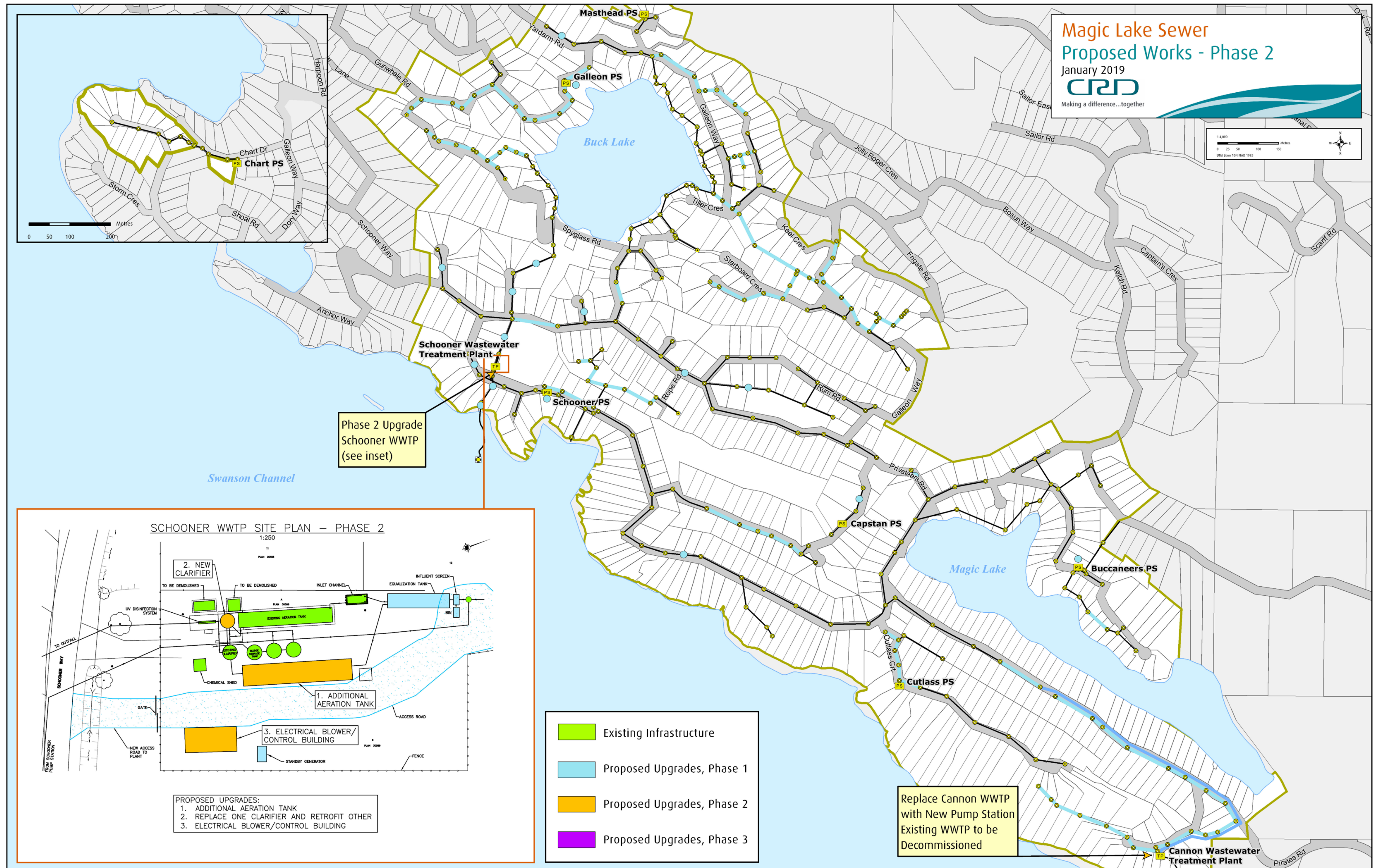
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Overview of Phase 1



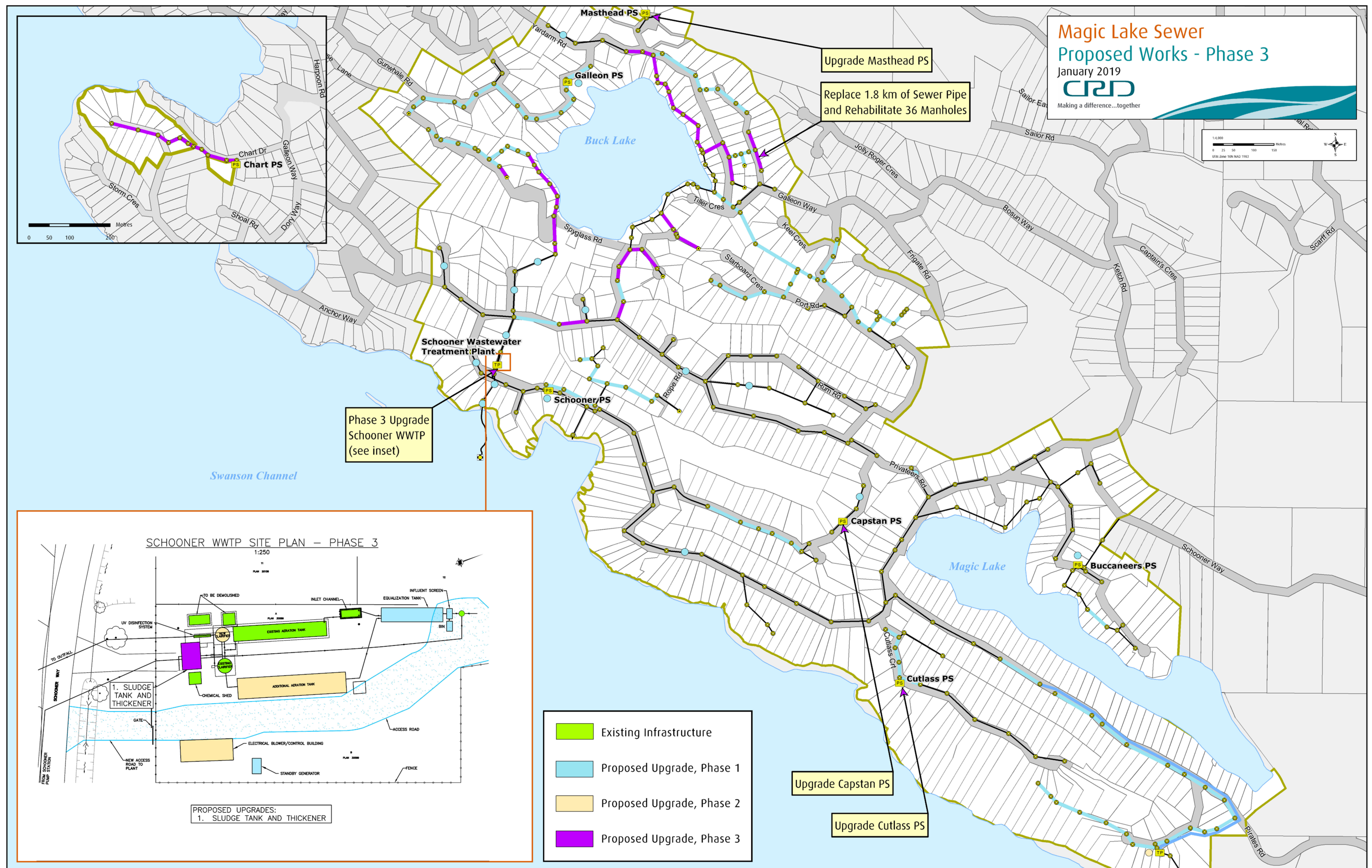
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Overview of Phase 2



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Overview of Phase 3



Proposed Phased Upgrades and Costs

Phase 1: Initial Upgrades

Proposed Upgrades	Cost Estimate (2019 \$)
Improvements at Schooner WWTP: <ul style="list-style-type: none"> • Sewage screen and grit removal • New equalization tank • Electrical upgrades (with temp seacan building) • Standby generator 	\$1.7M
Renew 3 Pump Stations (Buccaneer, Galleon and Schooner) <ul style="list-style-type: none"> • Pumps • Valves • Piping • Electrical kiosk 	\$1.1M
Pipe Replacement: <ul style="list-style-type: none"> • Replace 4.6km of failing asbestos cement pipe • Rehabilitate 84 manholes • Install 0.75km of 100mm PVC forcemain (in common trench) for future Cannon Pump Station 	\$3.2M
Total	\$6M

Phase 2: Second Phase

Proposed Upgrades	Cost Estimate (2019 \$)
Improvements at Schooner WWTP: <ul style="list-style-type: none"> • Add second aeration tank • Replace clarifiers • Electrical upgrades in a permanent building 	\$2.1M
Replace Cannon WWTP: <ul style="list-style-type: none"> • Install new pump station to divert flow to Schooner WWTP • Decommission Cannon WWTP 	\$0.9M
Total	\$3M

Phase 3: Final Upgrades

Proposed Upgrades	Cost Estimate (2019 \$)
Improvements at Schooner WWTP: <ul style="list-style-type: none"> • Replace manual sludge thickening tanks with new thickening system 	\$0.7M
Renew 3 Remaining Pump Stations: (Capstan, Cutlass and Masthead) <ul style="list-style-type: none"> • Pumps • Valves • Piping • Electrical Kiosk 	\$0.85M
Pipe Replacement: <ul style="list-style-type: none"> • Replace 1.8km of failing asbestos cement pipe • Rehabilitate 36 manholes 	\$1.6M
Total	\$3.15M

Annual Parcel Tax Implications

		Option 1	Option 2	Option 3
		Phase 1	Phase 1 & 2	Phase 1, 2 & 3
Total Estimated Capital Cost (2019 \$)		\$6M	\$9M	\$12.15M
New Additional Parcel Tax Based on Estimated Capital Cost				
Loan Amortization Period Options	20 Year	\$640	\$959	\$1,295
	25 Year	\$553	\$829	\$1,120
	30 Year	\$496	\$744	\$1,005
Existing Parcel Tax (2019)		\$777.60	\$777.60	\$777.60
Total Parcel Tax for Sewer (assuming a 30-year amortization)		\$1,273.60	\$1,521.60	\$1,782.60

- The above amounts do not include user fees and the annual parcel tax for the Water Service which is \$497.81 (2019).
- The additional parcel tax amounts are based on the total 713 taxable folios assuming an interest rate of 3.5% for the first 10 years of the loan and 5% on the remaining amortization period. Parcel taxes can vary over the years depending if there are changes to the interest rates or total number of folios.

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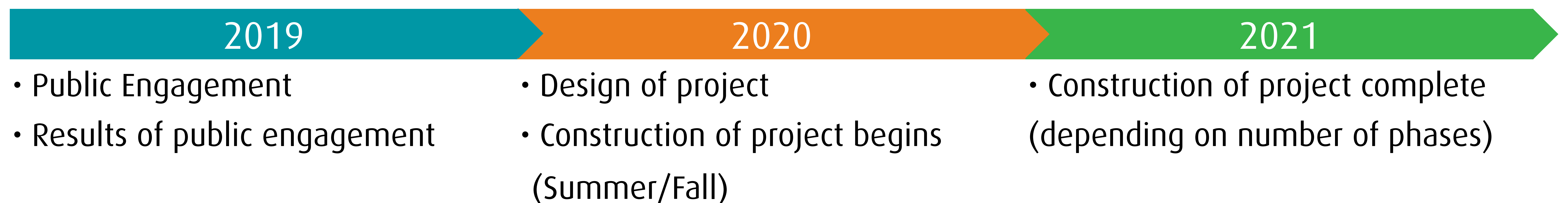
Summary of Considerations/Implications

	Option 1	Option 2	Option 3
Item of Consideration	Complete Phase 1 now and Phase 2&3 later	Complete Phase 1 & 2 now and Phase 3 later	Complete Phase 1, 2, and 3 now
Financial Implication	<ul style="list-style-type: none"> • Lowest Initial Cost (\$6M for Phase 1), but subsequent increases required to complete Phase 2 and 3 • Future phases may be eligible for future grants 	<ul style="list-style-type: none"> • Second Lowest Initial Cost (\$9M for Phase 1 and 2), but subsequent increase required to complete Phase 3 • Future phase 3 may be eligible for a future grant 	<ul style="list-style-type: none"> • Highest initial Cost (\$12.15M)
Regulatory Compliance	<ul style="list-style-type: none"> • Exceedances will be reduced at Cannon and Schooner • Standby power at Schooner will ensure compliance during BC hydro outages • Still no standby power at Cannon 	<ul style="list-style-type: none"> • Added capacity at Schooner and pumping Cannon flows to Schooner will bring both facilities into compliance 	<ul style="list-style-type: none"> • Upgrading of all pump stations and all old/leaky sewers will ensure compliance
Reliability/Level of Risk	<ul style="list-style-type: none"> • New Schooner Headworks will improve reliability at the front end of the WWTP • Cannon WWTP is still a risk • The three more important pump stations will be renewed (three still remain to be upgraded) • 70% of high priority sewer pipe will be renewed 	<ul style="list-style-type: none"> • Additional improvements and added redundancy at Schooner greatly improves reliability • Decommissioning Cannon greatly reduces risk 	<ul style="list-style-type: none"> • Once the whole system has been renewed, it will be much more reliable and level of risk will be greatly reduced
Operational	<ul style="list-style-type: none"> • New Schooner headworks will help to reduce solids/rags from clogging tanks and pumps in the plant (other operational issues still remain) • Cannon WWTP will still have many operational challenges • Upgraded pump stations and 4.6km of sewer will reduce call outs on those improvements 	<ul style="list-style-type: none"> • Decommissioning Cannon and centralizing treatment at Schooner significantly improves operations • Additional redundancy at Schooner will greatly improve the ability to operate and maintain the plant 	<ul style="list-style-type: none"> • Improving the solids handling at Schooner will greatly reduce labour and trucking costs for sludge disposal • Once the whole system has been renewed all health and safety issues will have been addressed and emergency call-outs will be minimized
Environmental	<ul style="list-style-type: none"> • Reducing inflow an infiltration and adding equalization storage at Schooner will improve treatment during peak flows • Peak flows should be reduced at Cannon but may still exceed the plant's capacity • Three renewed pump stations and replacing 4.6 km of leaky sewer pipe will reduce sewage releases/overflows 	<ul style="list-style-type: none"> • Additional improvements at Schooner will improve treatment and quality of effluent • Decommissioning Cannon and its outfall into Swanson Channel will greatly improve the marine environment 	<ul style="list-style-type: none"> • Once the whole wastewater system has been renewed and optimized this will provide the best long-term environmental outcomes

Next Steps

- Report results of public open house and survey feedback to Magic Lake Estates Sewer Committee
- Sewer Committee recommends which option to proceed to referendum
- Approval of referendum question
 - Electoral Area Services Committee
 - Approval from CRD Regional Board
 - Inspector of Municipalities
- Referendum in the Fall of 2019
- Design of project
- Construction of project

Conceptual Timeline of Project Implementation:





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Thank you for attending this Open House on the Magic Lake Estates Wastewater System Infrastructure Renewal Project. We look forward to receiving your questions and feedback. Please fill out a survey. They are available here at the open house or online at www.crd.bc.ca/magiclake-sewer.

We would be happy to collect your completed surveys in the submission box. Please have them returned by May 24, 2019 so the feedback can be included in the feedback compilation report and presented to the Magic Lake Estates Water and Sewer Local Services Committee.

Also if you would like to leave a quick comment, fill out a sticky note and post it in the box on the right.

YOUR COMMENTS AND FEEDBACK