LIQUID WASTE MANAGEMENT PLAN (LWMP)
for the
COMOX VALLEY SEWERAGE SYSTEM (CVSS)

Joint Technical Advisory Committee and Public Advisory Committee (TACPAC)

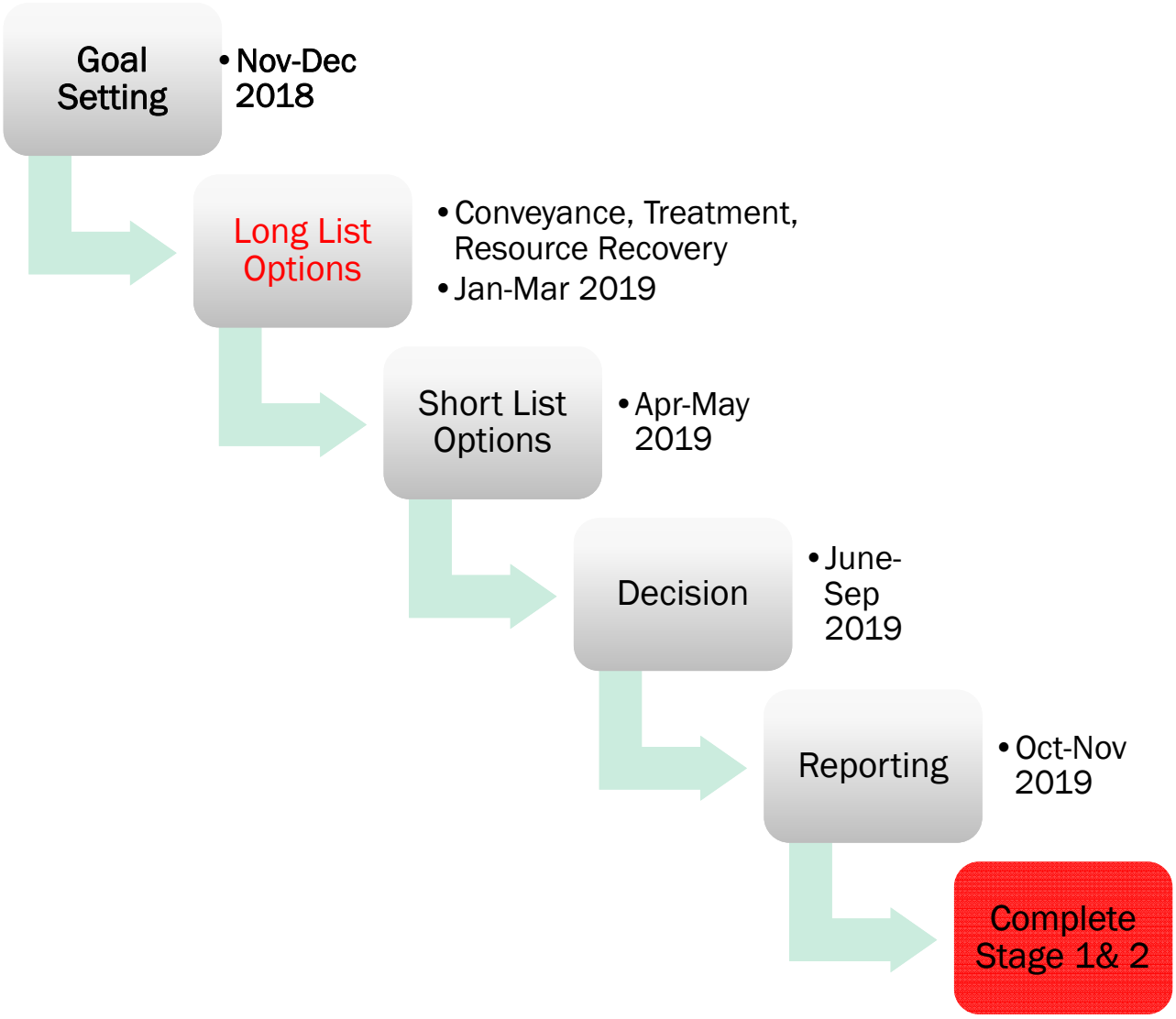
Meeting #4

January 24, 2019

- Evaluation System for Treatment and Resource Recovery
- Developing Long List Options

Comox Valley REGIONAL DISTRICT

LWMP Road Map – CVSS Stage 1 & 2



Today's Agenda

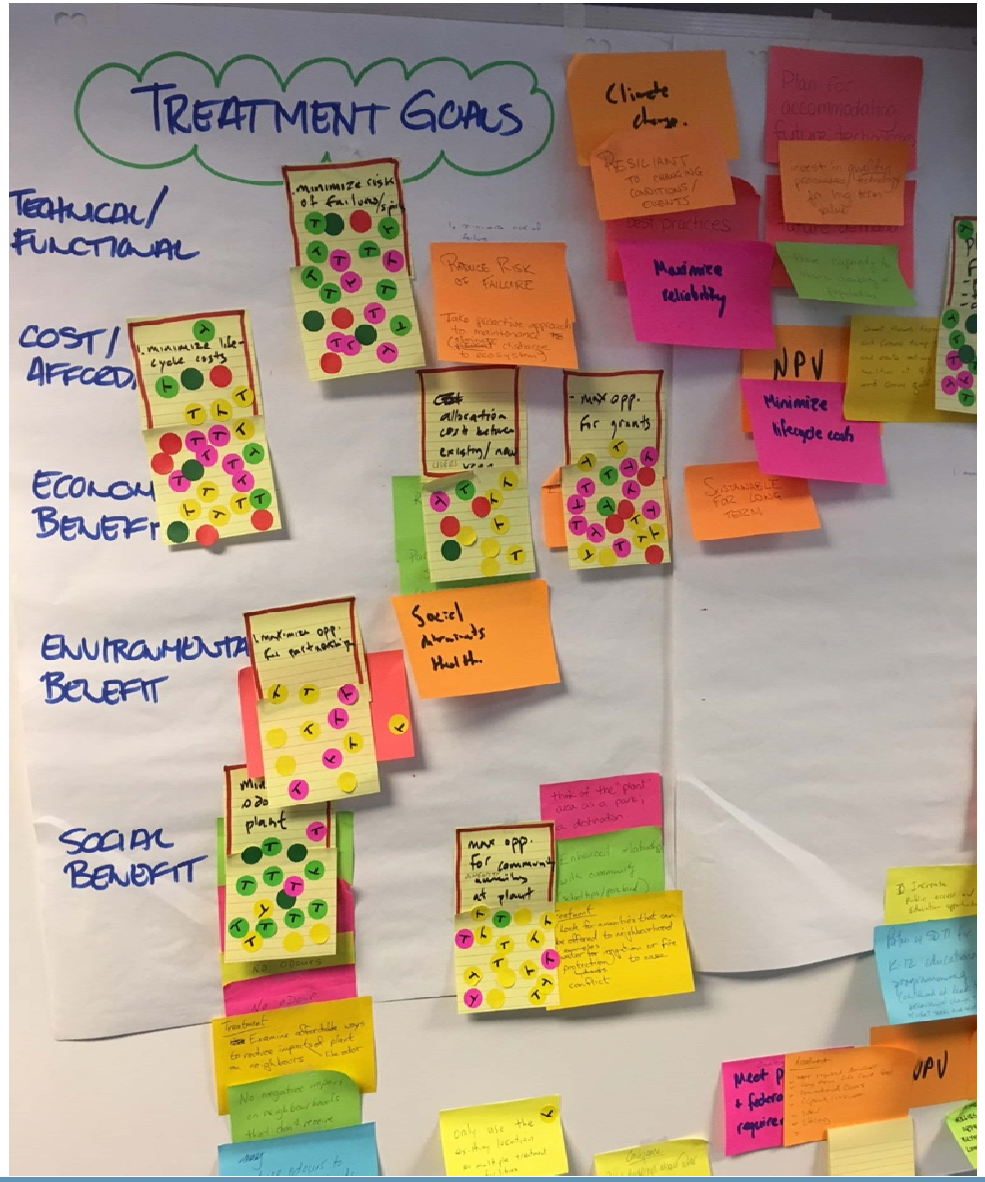
- Finalise Goals and Evaluation for;
  - Treatment
  - Resource Recovery
- Operational Update – Wet weather Flows
- Technical Update – Understanding wet weatehr flows
- Long List Options
  - Treatment
  - Resource Recovery
  - Conveyance

Finalise Goals and Evaluation for Treatment and Resource Recovery

[Paul]

What we did

- Explanation of terminology – Options, Goals, Actions,
- “brainstorming exercise” to develop ideas for each of the three components
- Group the ideas
- Score (vote) on the ideas



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Treatment – Initial Results

Category	Grouping as written	PAC %	TAC %
Technical	Minimize risk of failures/spills	15	14
	Meet regulatory standards, but don't go much higher	0	0
	Plan for future - population, technology, climate	17	16
	Treatment relies on an eco-asset approach to achieve better treatment at a lower cost with env benefits.	0	0
Technical Total		*32*	*30*
Affordability	Minimize lifecycle costs	11	17
	Asset management	0	10
	Allocation of costs between existing and new users	3	8
	Maximize opportunity for grants	11	8
Affordability Total		*26*	*43*
Economic Benefits		0	0
Economic Total		*0*	*0*
Environmental Benefits	Public awareness about what" not to flush"	0	0
	Maximize opportunity for partnership	4	2
	Maximize effluent quality	19	13
Environmental Total		*24*	*15*
Social Benefit	Reduce odour from plant	12	10
	Only use existing location - no multiple treatment facilities	1	0
	Maximise opportunity for community amenity at plant	6	2
Social Total		*19*	*12*
Grand total		*100*	*100*

Summary of Category Scoring, Treatment

	Conveyance		Treatment		Resource Recovery	
Category	PAC	TAC	PAC	TAC	PAC	TAC
Technical	*38*	*61*	*32*	30		
Affordability	17	10	26	*43*		
Economic B.	3	1	0	0		
Environment B.	19	16	24	15		
Social B.	23	13	19	12		
Total	100	100	100	100		

Red = Highest value, Blue = Lowest (other than Economic Benefit)

Resource Recovery – Initial Results

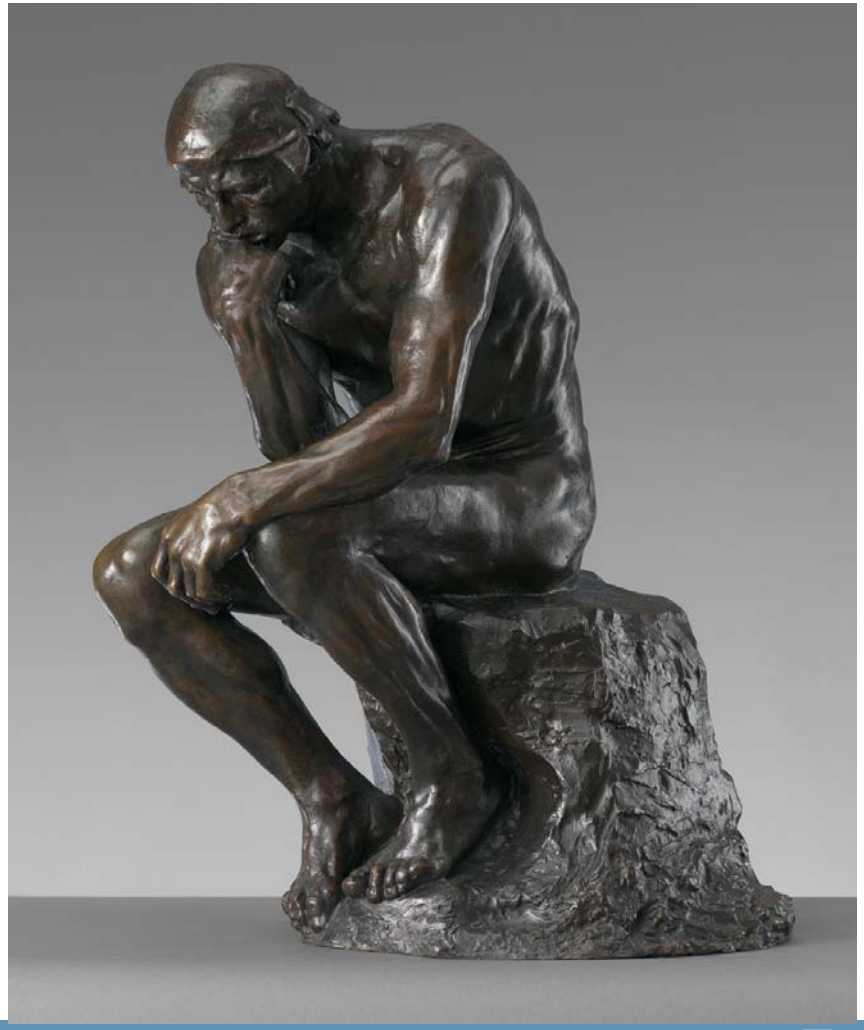
Category	Grouping as written	PAC	TAC
Technical	Like Cranbrook, focus on technologies that are reliable	4	2
	meet provincial regulatory requirements	1	9
	Anticipate future demand for recovered resources	1	1
	Ostara (struvite) nutrient recovery	1	0
	Build capacity for options and partnerships to recover in future	5	0
	Invite medical cannabis greenhouses on-site public-private-partnership	1	2
	Microbial lab that could conduct research (research centre)	3	0
Technical Total		16	14
Affordability	To be cost neutral as a minimum	1	7
	Use life cycle costs/NPV	10	19
	Energy/Heat recovery	22	11
	Economically productive use of reclaimed water	21	10
	Reduce costs, efficiency in operations, reuse resources at plant	2	0
	Grant Funding eligibility	9	9
Affordability Total		64	56
Economic Benefits		0	0
Economic Total		0	0
Environmental Benefits	Reduce GHG/carbon neutrality	6	6
	Incorporate plans that work in our climate (for storage)	0	0
	Recovery for bio-plastics and resins	2	2
	Third party utilization (EOI requests)	2	7
Environmental Total		10	14
Social Benefit	Public health issues considered for any reclaimed water	0	8
	Partnership with university for research recovery	7	4

Summary of Category Scoring, Resource Recovery

	Conveyance		Treatment		Resource Recovery	
Category	PAC	TAC	PAC	TAC	PAC	TAC
Technical	*38*	*61*	*32*	30	16	15
Affordability	17	10	26	*43*	*64*	*56*
Economic B.	3	1	0	0	0	0
Environment B.	19	16	24	15	10	14
Social B.	23	13	19	12	9	15
Total	100	100	100	100	100	100

Red = Highest value, Blue = Lowest (other than Economic Benefit)

Consolidating the Goals



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OCP, RGS and CVSS Plans

Category	Goal	
Technical	• Alternate Trunk Sewer Networks • Treatment to tertiary or reuse level (by 2050) • Waste to resources	
Affordability	• Reduce capital cost • Low Operating Costs • Funding Through DCC's	

OCP, RGS and CVSS Plans

Category	Goal
Economic Benefit	• Vibrant Local Economy • Increased Agriculture
Environmental Benefit	• Reduce GHG's • Renewable Energy, Energy from Waste • Energy Conservation • Protect, conserve and restore Ecosystems • Green Buildings
Social Benefit	• Public Health Needs • Recreation Trails as part of new developments

How do we use the Goals?

- Weight the Goals according to importance
- Create an evaluation system based on the Goals
- Knowing what the Goals are, tweak the Options to try and achieve more Goals
- Evaluate each Option to see what Goals it achieves

Evaluation system

Two stage process

1. Mandatory pre-requisites, with pass/fail scoring.
   - Fail on any one and the Option is ruled out
2. Numerical evaluation by weighted Goals
   - Highest scoring options are preferred.

Stage 1- Screening

Mandatory pre-requisites for screening potential Long List options	Determined by:
Meet **Basic Objectives** for the Component	Technical Consultants and Staff
Meet minimum planning horizon	Technical consultants and TACPAC
Meet Min. of Env. standards	As set by MoE in regulations
Meet public health protection standards	As set by MoE (and MoH) in existing regulations
Technically feasible	Technical Consultants
Follows good engineering practice	Technical Consultants
Is not astronomical cost	Technical Consultants

Stage 2 Weighted Evaluation

Numerical evaluation by weighted Goals

- Evaluate each goal the same way for each option
- Affordability goals by best cost/revenue estimates
- Highest scoring options are preferred.

Who Evaluates What?

Category	Evaluated By
Technical	TAC (incl Tech. consultants)
Affordability	Objective (Staff & Tech. consultants)
Economic Benefit	PAC
Environment Benefit	PAC and TAC
Social Benefit	PAC

Consolidated Scoring, Treatment

Category	PAC	TAC	Public	Online	Proposed
Technical	*32*	30	*41*	*40*	*30*
Affordability	25	*43*	14	17	35
Economic B.	0	0	0	0	0
Environment B.	19	13	27	25	20
Social B.	22	13	22	18	15
Total	100	100	104	100	100

Red = Highest value, Blue = Lowest (other than Economic Benefit)

Initial Conclusions –Treatment

Observations

- Technical & Affordability about equally important
- Environmental protection higher than for other components (Conv. and RR)

Conclusion

- Strike a balance of treatment quality and cost

Resource Recovery – Consolidated Results

Category	Proposed Revised Goals	%	Description, Comment
Technical	Commercially available technology	10	Want to avoid "inventing" something, but some RR technologies may still require pilot testing
	Resiliency to internal factors	5	Operational simplicity and reliability, minimise risk of failure/spills
	Anticipate future demand of resource	5	Part of the "market study" for the RR opportunities
	Improve performance of treatment plant	5	Some reclaimed water treatment processes may help achieve other performance goals
Technical Total		25	
Affordability	Maximise revenue	10	Dependent upon future demand - may not exist at present
	Minimize life cycle cost	20	Net present value of capital, operational and replacement cost, period is to the planning horizon
	Potential for Grant Funding	10	Will require a detailed assessment of current and likely grant opportunities, to then assess Options
	Potential for external partnerships	10	The partner is more than just a pay-for product customer, they contribute to the capital cost of the project
Affordability Tot.		50	
Economic B.	Grow the local economy	5	Potential for new or increased local economy
Economic Tot.		5	
Environment Benefits	Energy efficiency and GHG reductions	5	Most energy reductions reduce GHG's, but not all GHG reductions reduce energy.
	Habitat restoration or enhancement	5	Use of reclaimed water for this purpose
	Displacement of potable water	5	By the use of reclaimed water
Environment Tot.		15	
Social Benefit	Ability to maintain irrigation of public parks during water restrictions	5	By the use of reclaimed water
Social Total		5	
Grand Total		100	*Total is 80 for non-reclaimed water projects*

Consolidated Scoring, Resource Recovery

Category	PAC	TAC	Public	Online	Proposed, Water	Proposed, Non-water
Technical	14	17	31	30	25	25
Affordability	*72*	*46*	20	22	*50*	*62.5*
Economic B.	0	0	8	11	5	6.25
Environment B.	14	8	22	22	20	6.25
Social B.	0	11	20	26	5	0
Total	100	100	100	100	100	100

Red = Highest value, Blue = Lowest (other than Economic Benefit)

Initial Conclusions –Resource Recovery

Observations

- LOTS of ideas on what to do with water and heat! (these are Options, not Goals)
- Affordability more important than everything else combined

Conclusion

- Optimize for Affordability
- It is only worth doing, if it is worth doing.

Consolidated Scoring, Overall Scoring

Category	Conveyance	Treatment	Proposed, Water	Proposed, Non-water
Technical	*45*	30	25	25
Affordability	20	30	*50*	*62.5*
Economic B.	0	0	5	6.25
Environment B.	15	20	20	6.25
Social B.	20	20	5	0
Total	100	100	100	100

Red = Highest value, Blue = Lowest (other than Economic Benefit)

Initial Conclusions –Overall

- Technical focus greatest for conveyance, least for RR
- Affordability focus least for conveyance, greatest for RR
- PAC is more community focused, TAC is more technical focused

Example Conveyance Option

Trucked Wastewater

- Replace pump stations and pipelines with a fleet of tanker trucks
- Trucks are electric powered and self driving
- Major benefits;
  - *Decommission entire forcemain and both pump stations*
  - *Zero disruption to anywhere during construction*
- Real World Examples
  - Yellowknife, NWT
  - Dubai (outer areas)

Example Conveyance Option

Trucked Wastewater

- Major drawbacks
  - Uses more energy overall
  - ~300 trucks/day = slight increase in traffic on Dike Road
  - Double/Tripling of traffic in wet weather

Trucked Wastewater - Screening

Mandatory pre-requisites for screening potential Long List options	Pass/Fail
Meet **Basic Objectives** for the Component	Pass
Meet minimum planning horizon	Pass
Meet Min. of Env. standards	Pass
Meet public health protection standards	Pass
Technically feasible	Pass
Follows good engineering practice	*Fail*
Is not astronomical cost	TBD

Example Scoring – Trucked Wastewater

Category	Proposed Revised Goals	Proposed %	score 1-5	%
Technical	Resilience to External Factors	15	1	3
	Resilience to Internal Factors	15	1	3
	Long term solution	10	5	10
	Flexibility to accommodate future changes	5	5	5
Tech. Total		**45**		**21**
Affordability	Minimize Lifecycle Cost	15	1	3
	Long term Value	5	1	1
	Attract Grant funding	0	1	0
Afford. Tot.		**20**		**4**
Environment Benefits	Minimize risk of impacts to sensitive environment	10	1	2
	Mitigate climate change impacts (Energy, and GHG's)	5	1	1
Env. Total		**15**		**3**
Social Benefit	Minimize noise, odour and visual impacts in operation	10	1	2
	Minimize community disruption during construction	*5*	*5*	*5*
	Maximize community and recreational amenity value	5	1	1
Social Total		**20**		**8**
Grand Total		**100%**		**36**

End Result

- Did we capture the TAC and PAC's intentions for goals evaluation?
- What categories do we want to change?
- Are we ready to recommend to Comox Valley Sewerage Commission?

Operational Update – wet weather Flows

[CVRD Staff]

Technical Update – Understanding Wet Weather Flows

[WSP]

Comox Valley Regional District

Long List Options

[WSP]

For meeting # 5…

Date Change
Friday Feb 8, 9-12

- Review public feedback on proposed Long List
- Settle on the final Long List for conceptual study

Round Table

[Allison]

Thank You!

Inflow and Infiltration

Discussion Points for Inflow and Infiltration

- Inflow – surface water that enters the sewer collection system (e.g., roof drains, manholes)
- Infiltration – groundwater that enters buried sewer pipes (e.g., through leaky joints, cracked pipes, root intrusion)
- Can substantially increase the volume of wastewater arriving at the treatment plant during wet weather
- Impacts the design of wastewater collection and treatment systems (hydraulic capacity)

Municipal Wastewater Regulation

(Part 3 Division 2 Section 44):

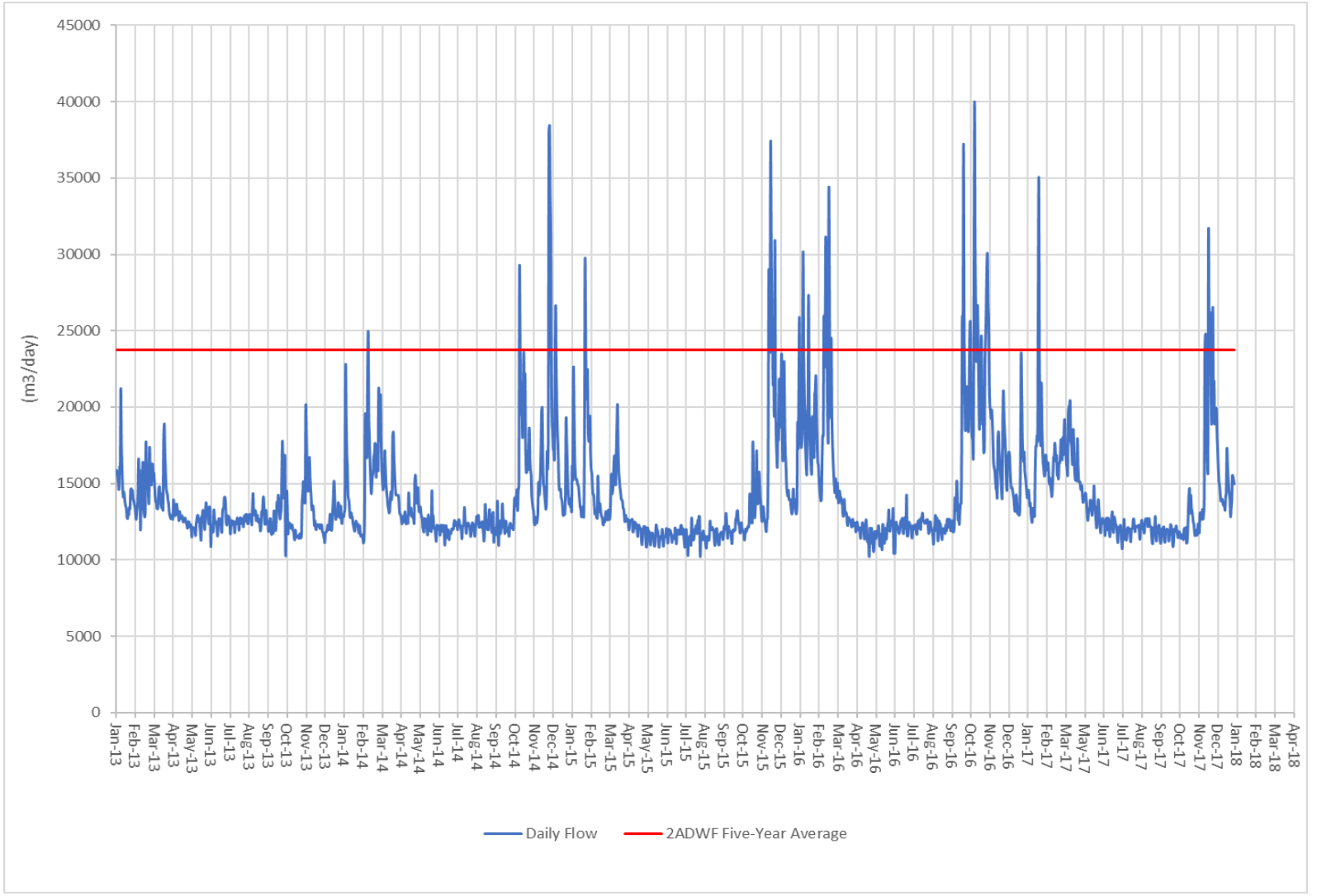
A discharger must ensure that inflow and infiltration does not occur such that the maximum daily flow exceeds 2 times the average dry weather flow (ADWF) at the treatment plant during storm or snowmelt events with less than 5-year return period, unless

for municipal wastewater collection systems for which the contributory population to the treatment plant is 10,000 persons or more, the person responsible for the municipal wastewater collection system addresses, as part of a liquid waste management plan, how inflow and infiltration can be reduced

Municipal Wastewater Regulation

- Average dry weather flow (ADWF) is the daily flow arriving at the treatment plant during extended periods without precipitation or snow melt (i.e., it represents the base sewage flow generated by residences and other system users)
- Requires secondary treatment for all flows up to 2xADWF
- Flows in excess of 2xADWF can receive only primary treatment
- Plan and schedule to achieve secondary treatment for all flows (ongoing reduction of I&I)
- The CVWPCC currently passes all flows through secondary treatment

Comox Valley WPCC Flows 2013 to 2017



Comox Valley WPCC Flows 2013 to 2017

Year	ADWF (m^3/d)	MDF Flow (m^3/d)	Ratio MDF:ADWF	No. of Days When Ratio MDF:ADWF > 2.0
2013	12,366	21,225	1.7	0
2014	11,954	38,462	3.2	8
2015	11,601	37,253	3.2	11
2016	11,669	39,998	3.4	31
2017	11,753	34,965	3	8

I&I Reduction

- An ongoing process (annual budget)
- Focus on collector sewers (municipal)
- Inspection, identification and elimination of sources of wet weather I&I
  - Flow monitoring in sewers to identify worst areas
  - Identify problem manholes (inflow)
  - Identify cross connections with storm drainage system (including roof drains)
  - Inspect piping systems (leaky joints, root intrusion, cracked and failing pipes)

Resource Recovery Options

Discussion Points for Resource Recovery

- Adds to the capital and operating costs of wastewater treatment
- Requires an identified market for the recovered resources
- Distance between the treatment plant and end user is a key issue (economics)
- Maximize onsite use of reclaimed water and heat at the WPCC when designing future upgrades
- Consider the potential for future resource recovery and use opportunities when designing upgrades at the WPCC

Resource Recovery Options

- Reclaimed water (e.g., for irrigation, non-potable use at WWTP)
- Recovery of heat from wastewater stream (e.g., for building heating and cooling at the WPCC – also possible at pump stations)
- Biogas production (requires anaerobic digestion of waste solids – economies of scale)
- Use of digested or composted waste solids as soil amendment (currently practiced by CVRD)
- Production of fertilizer pellets (struvite) for sale to market
- Hydroelectric turbines for generating electrical power (requires sufficient head)

Offsite Irrigation

In-plant Use

Effluent reclamation and reuse

Exported Offsite

In-plant Use

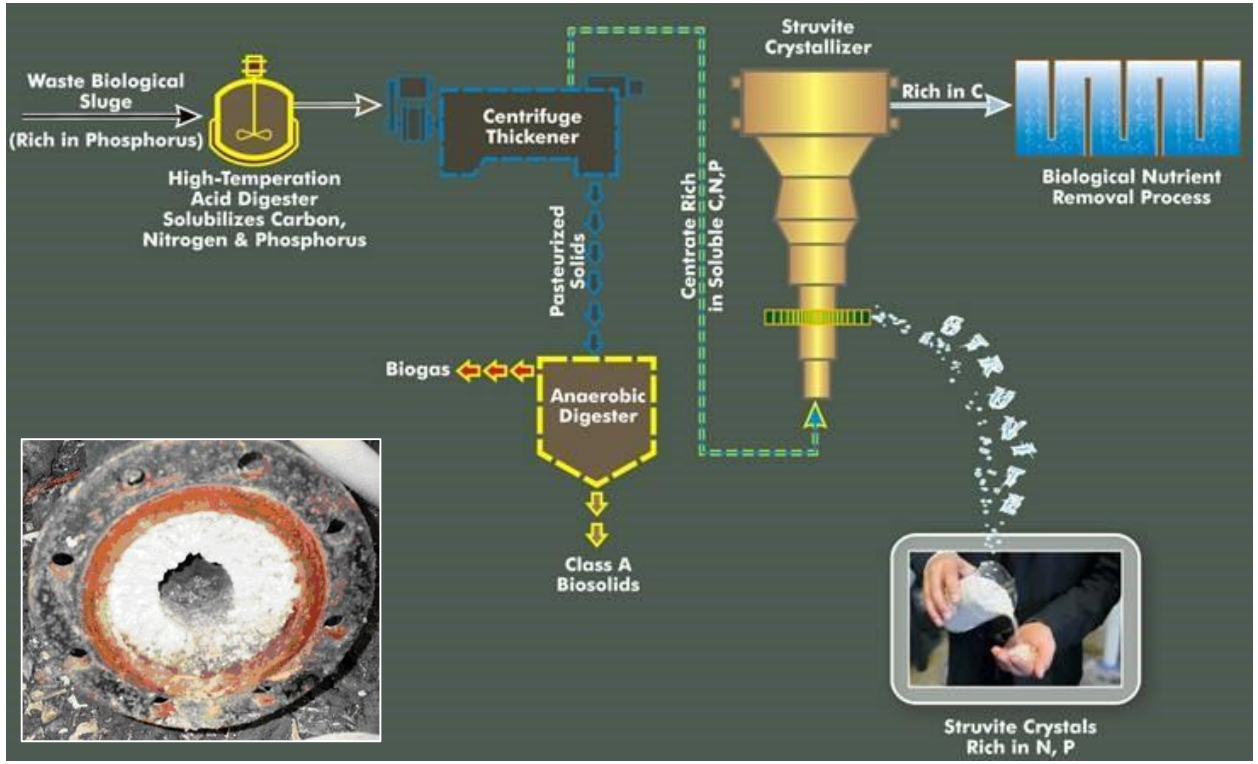
Heat Recovery

Biogas

Solar Power

Energy

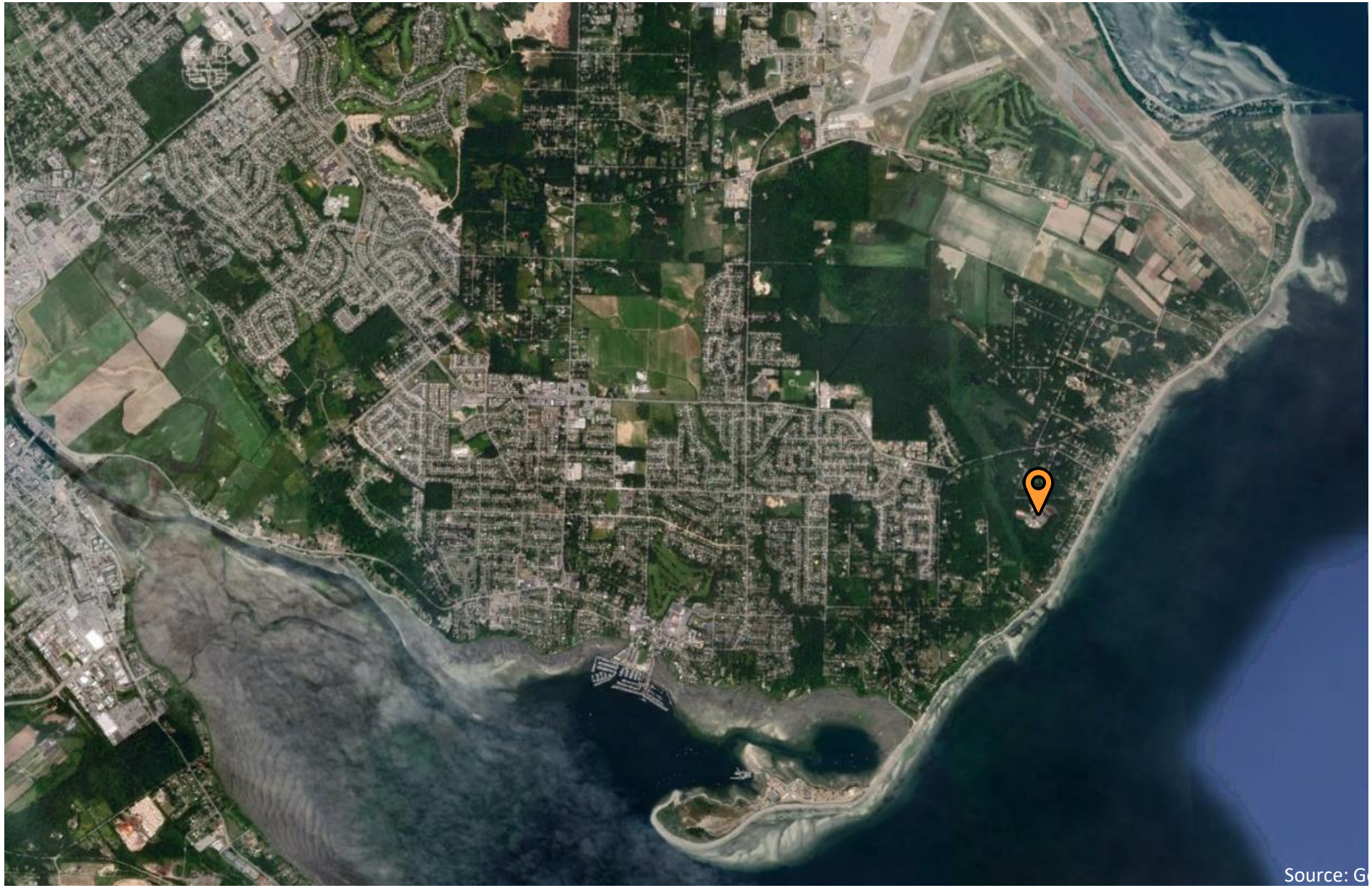
Biosolids and Compost



Struvite Pellets

Soil Amendment/Fertilizer

User Identification



Wastewater Treatment Options

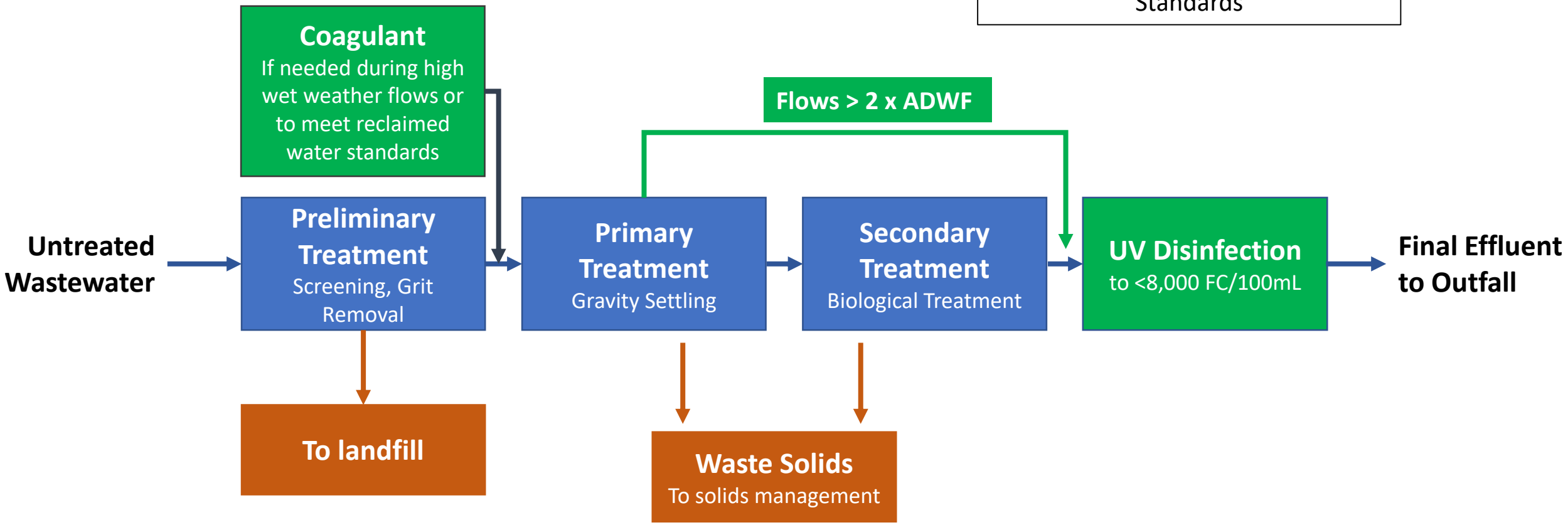
Discussion Points for Wastewater Treatment

- Higher effluent quality = higher cost
- Capital cost for treatment often supported by grants
- Operating costs entirely borne by local government
- Emerging contaminants – treatment processes are still in development
- Future proofing of facilities when designing upgrades and expansions recommended (i.e., allow for additional processes to be added later on when new technologies are proven)

Wastewater Treatment Options

- Options are based on achieving specific levels of effluent quality
- Regulatory standards must be achieved at a minimum
- Locating new treatment facilities and outfalls is a challenging undertaking
- Distributed treatment has been extensively evaluated elsewhere and has not been implemented
- Existing treatment plant has unused space for expansion well into the future

Option 1
Meet Regulatory Discharge Standards



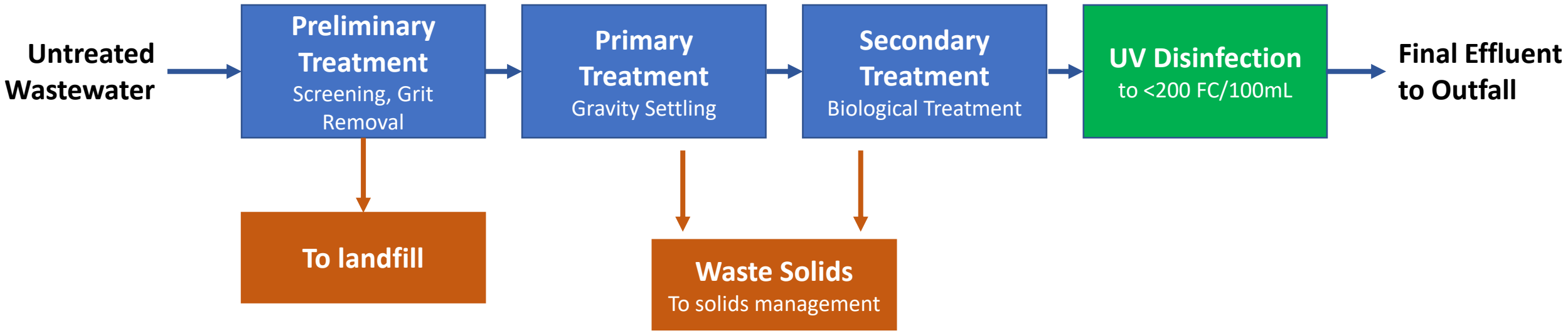
Note: new processes not currently in place at the CVWPCC are shown in green

Legend

- Liquid Flow
- Solids Flow
- Chemical Input

OPTION 1

Option 2
Provide Secondary Treatment for All Flows



Note: new processes not currently in place at the CVWPCC are shown in green

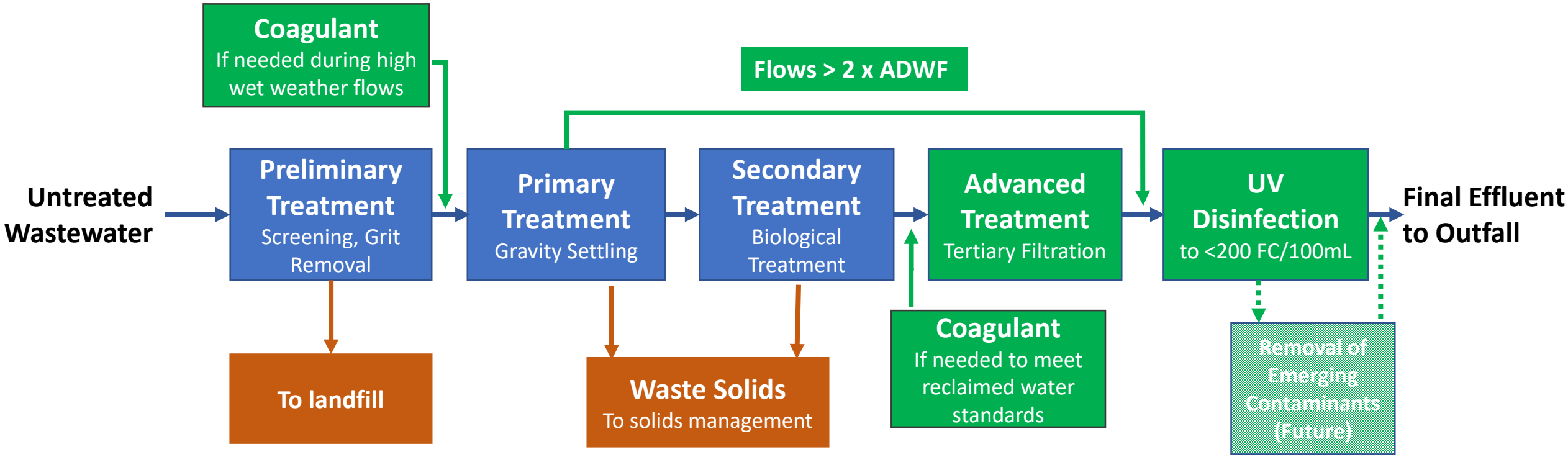
Legend

- Liquid Flow
- Solids Flow
- Chemical Input

OPTION 2

Option 3

Advanced ~~(Tertiary)~~ Treatment for up to 2 x ADWF



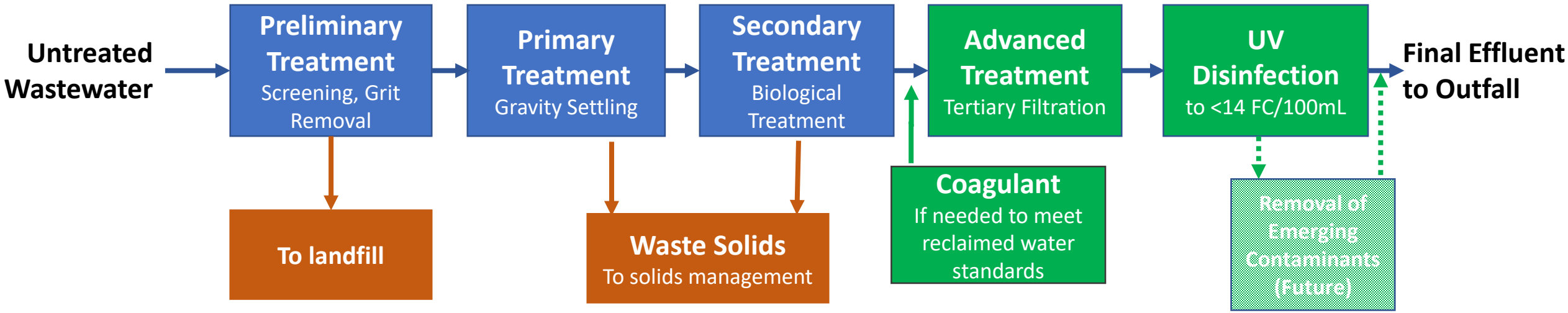
Note: new processes not currently in place at the CVWPCC are shown in green

Legend

- Liquid Flow
- Solids Flow
- Chemical Input

OPTION 3

Option 4
Advanced (Tertiary) Treatment for All Flows



Legend

- Liquid Flow
- Solids Flow
- Chemical Input

Note: new processes not currently in place at the CVWPCC are shown in green

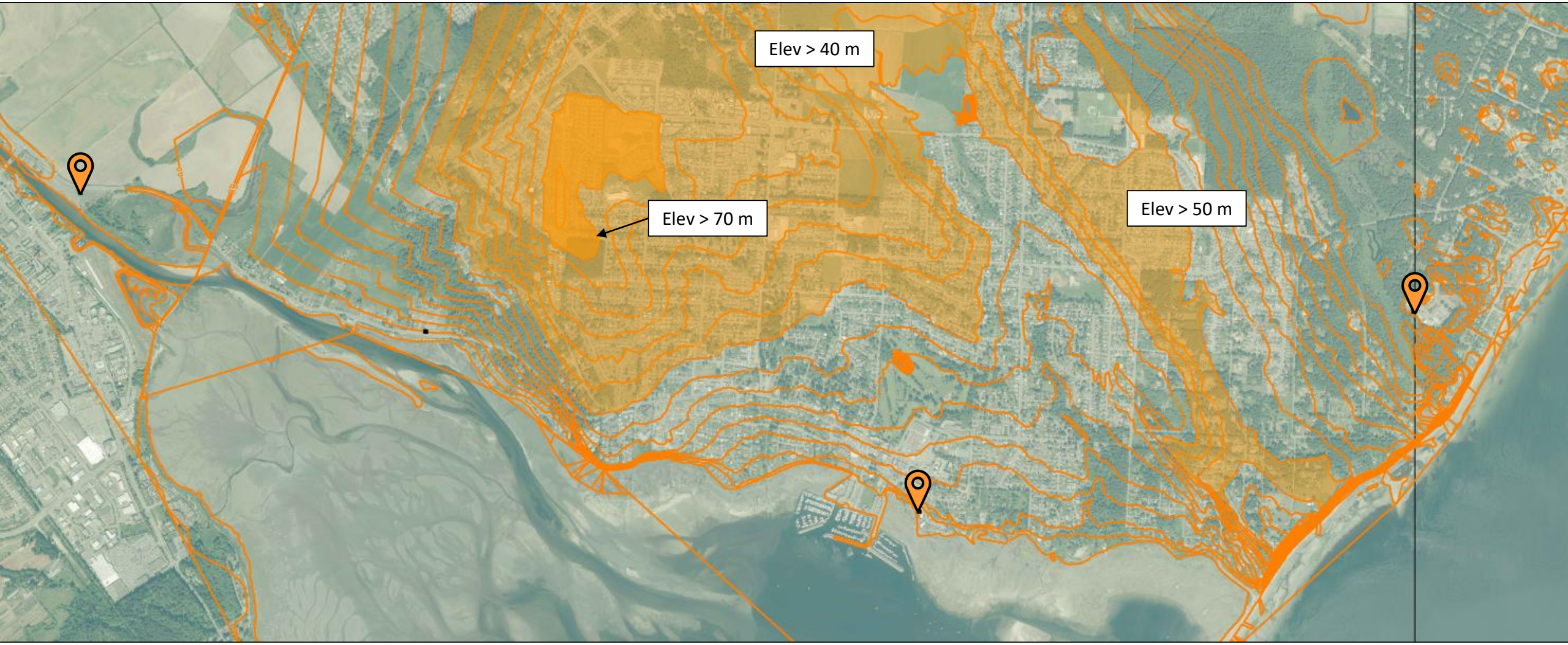
OPTION 4

Conveyance

Discussion Points for Conveyance

- Existing Courtenay and Jane Pump Stations are approaching hydraulic capacity and asset useful life and will require upgrades irrespective of alignment options
- Conveyance options are restricted by the following two factors:
  - Location of the wastewater treatment plant and outfall
  - Hydraulics of the system, limited by the topography of the service area, specifically at Comox Rd/Glacier View Dr and Lazo Rd High Points
- Existing collection systems and flow directions (ie. To low points)

Service Area Topography

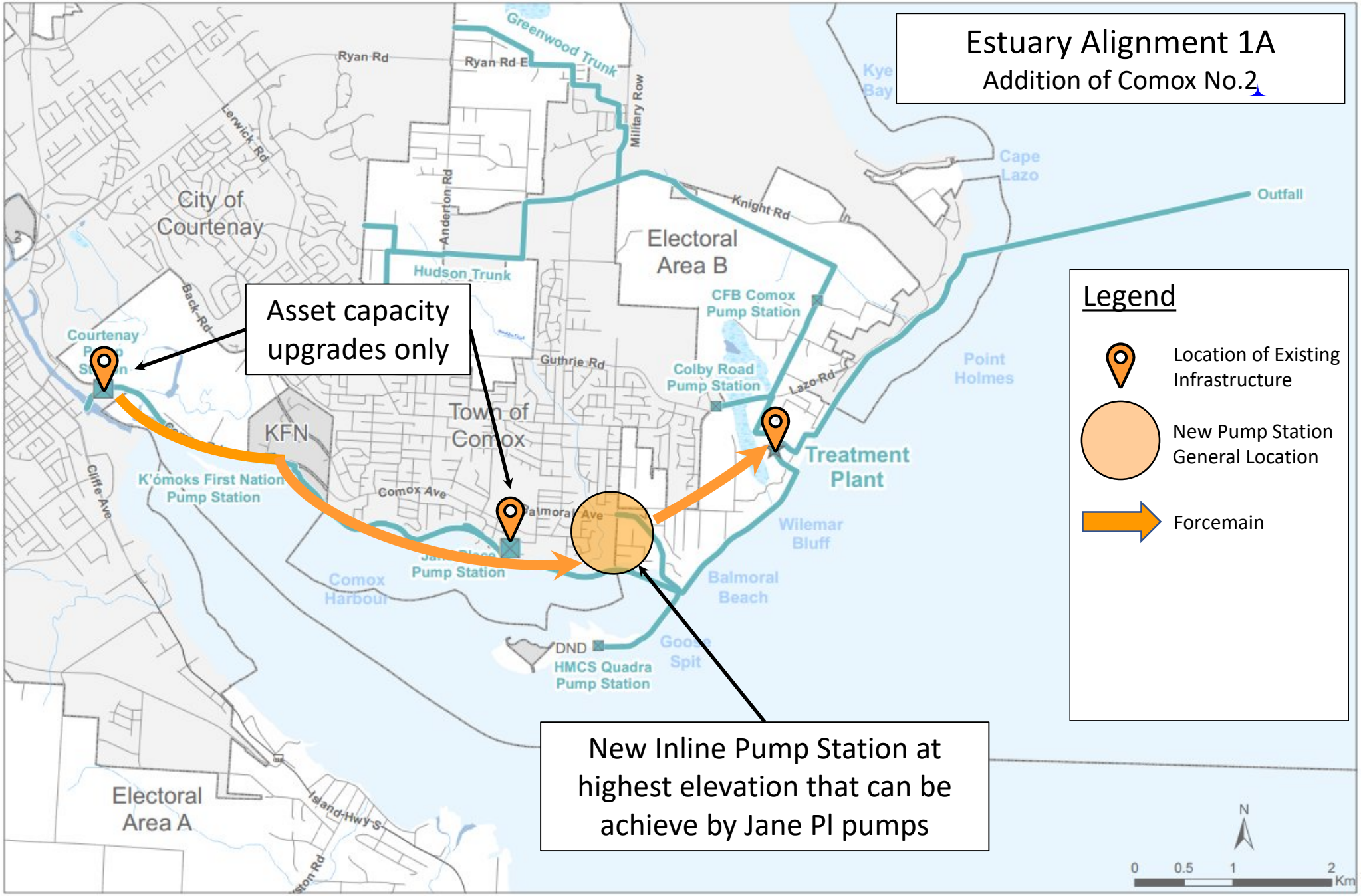


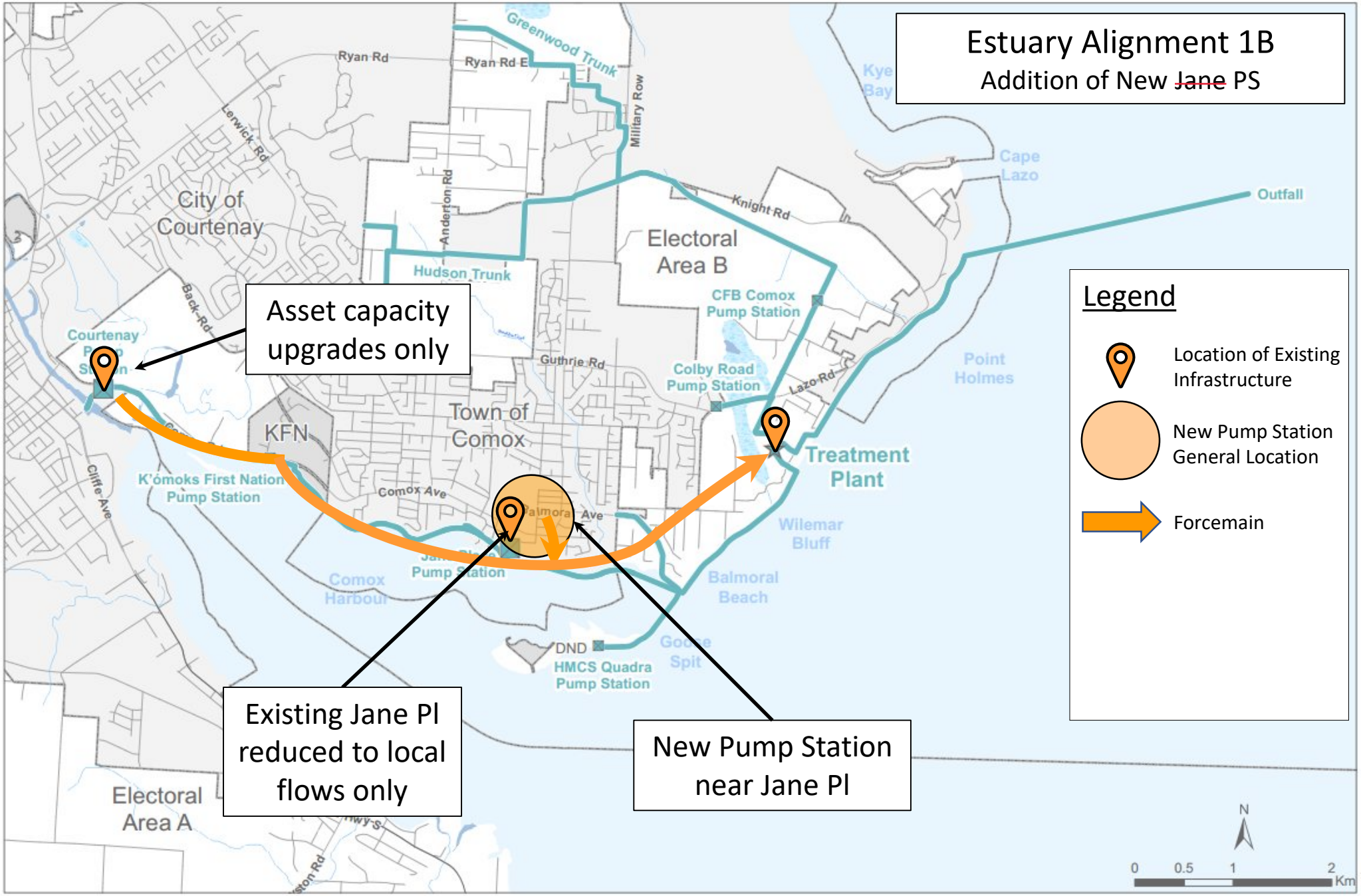
Conveyance Options

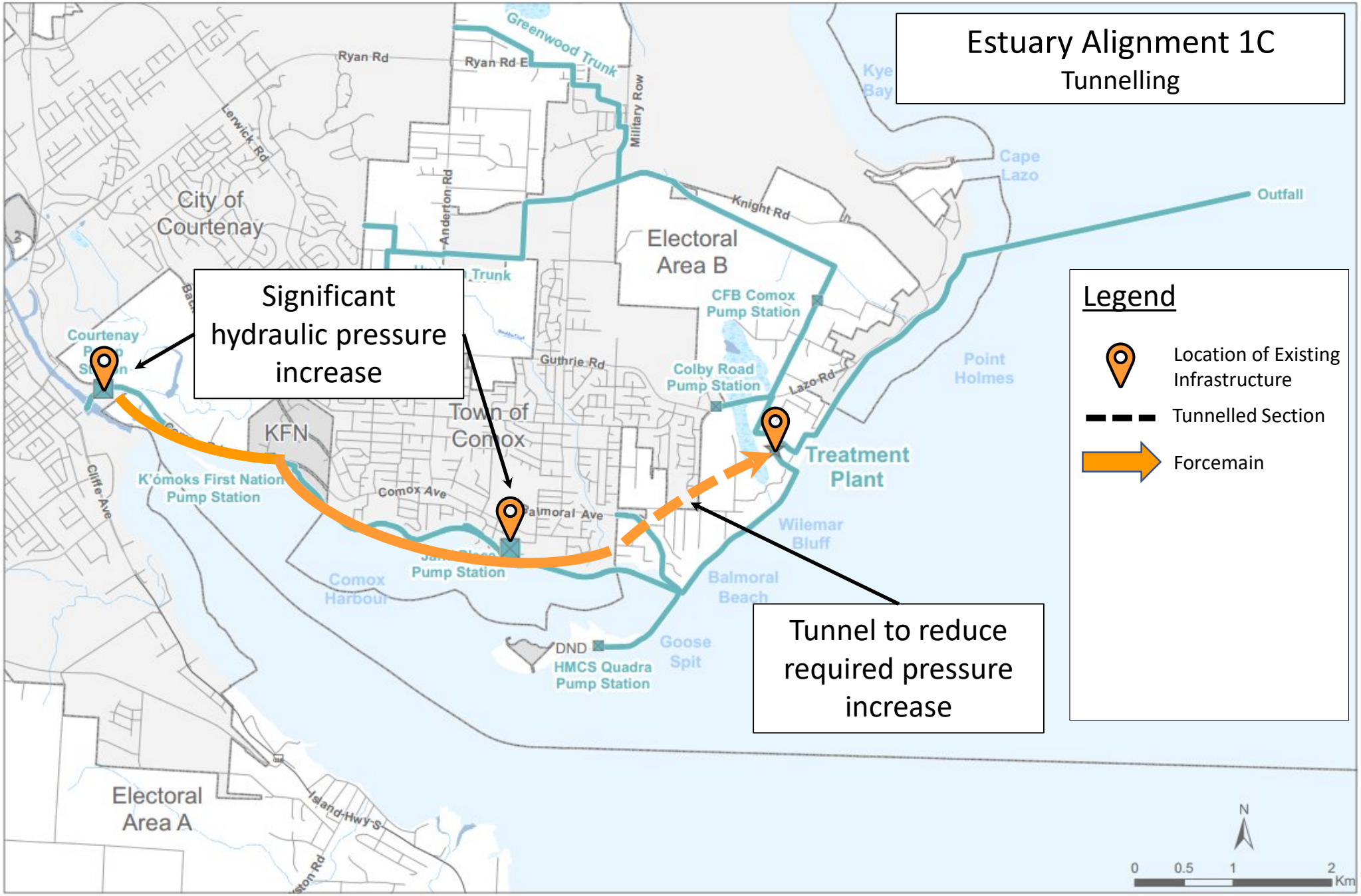
- Alignment Options
  - Estuary
  - Overland
  - Tunnels
- Conveyance Concepts
  - North Side
  - Decentralized
  - Marine

Alignment Alternatives
Option 1 – Estuary

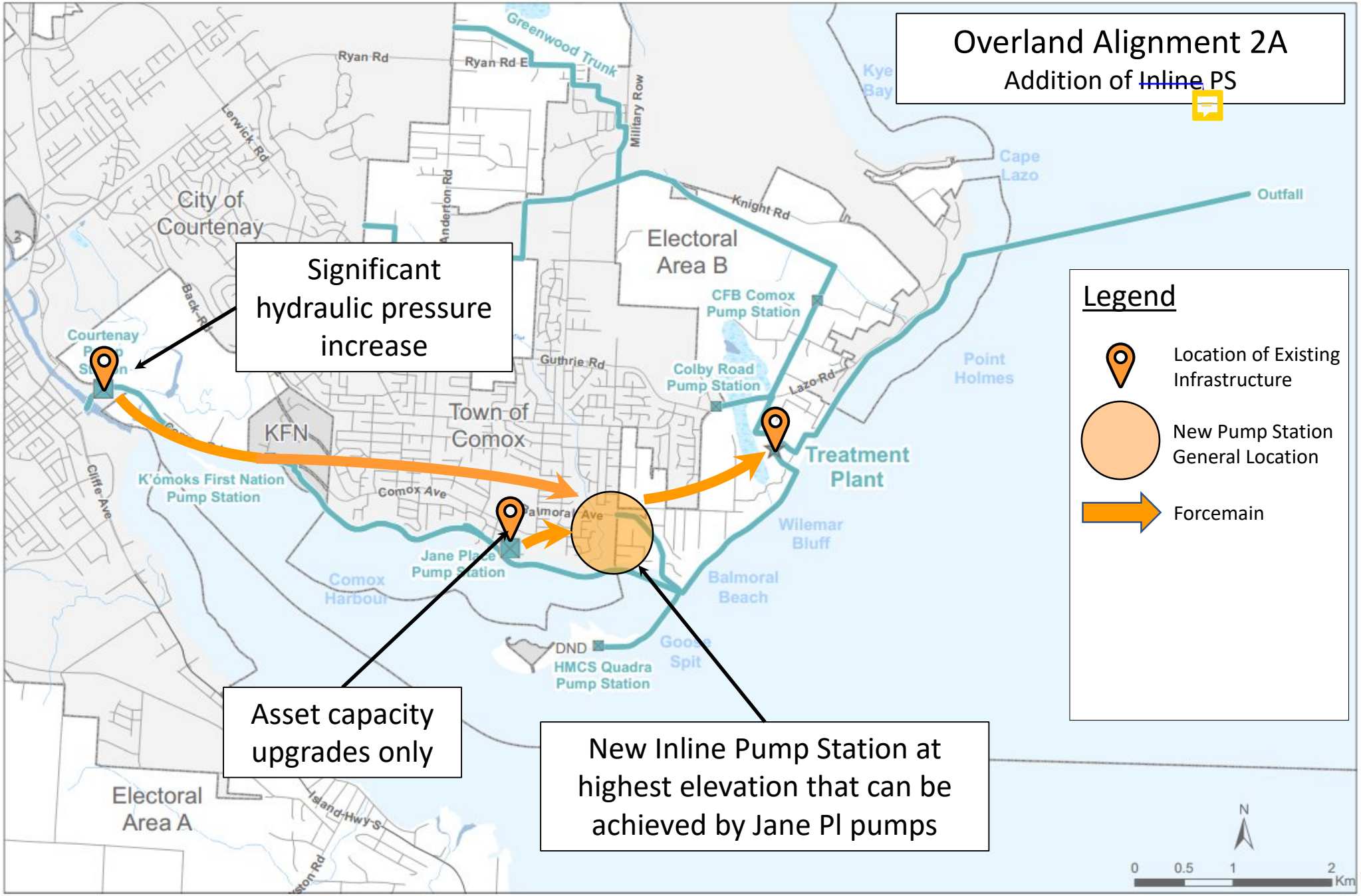
Estuary Alignment 1A
Addition of Comox No.2



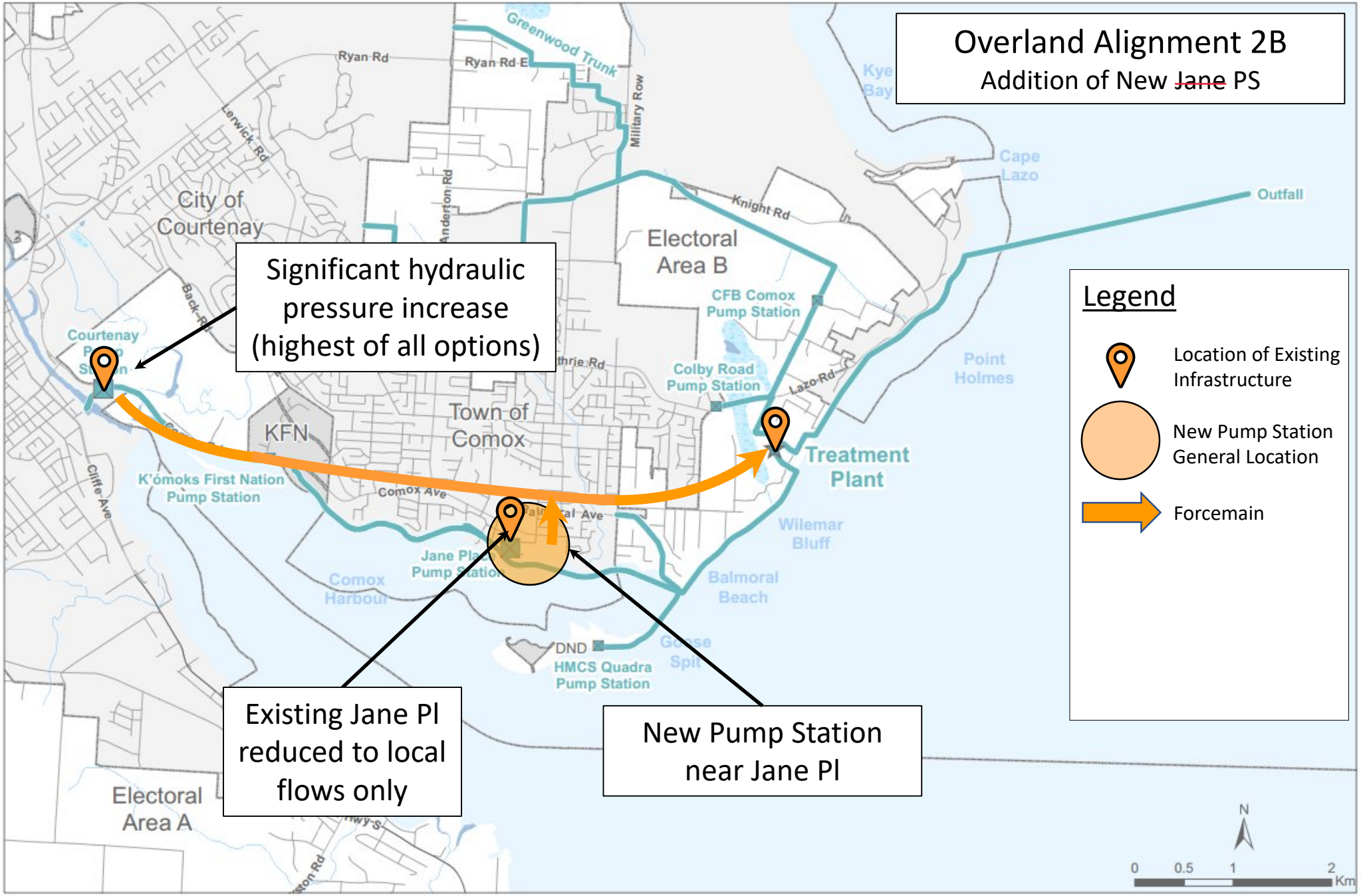

Estuary Alignment 1B
Addition of New ~~Jane~~ PS
Asset capacity upgrades only
Existing Jane Pl reduced to local flows only
New Pump Station near Jane Pl
Legend
Location of Existing Infrastructure
New Pump Station General Location
Forcemain
City of Courtenay
Electoral Area B
Electoral Area A
Town of Comox
KFN
Ryan Rd
Ryan Rd E
Greenwood Trunk
Military Row
Lerwick Rd
Anderton Rd
Knight Rd
Hudson Trunk
Back Rd
Guthrie Rd
CFB Comox Pump Station
Colby Road Pump Station
Lazo Rd
Outfall
Cape Lazo
Point Holmes
Kye Bay
Courtenay Pump Station
K'ómoks First Nation Pump Station
Cliffe Ave
Comox Ave
Balmoral Ave
Treatment Plant
Wilemar Bluff
Balmoral Beach
Comox Harbour
DND
HMCS Quadra Pump Station
Goose Spit
N
0 0.5 1 2 Km


Estuary Alignment 1C
Tunnelling
Significant hydraulic pressure increase
Tunnel to reduce required pressure increase
Legend
Location of Existing Infrastructure
Tunnelled Section
Forcemain
Ryan Rd
Ryan Rd E
Greenwood Trunk
Military Row
Lerwick Rd
Anderton Rd
City of Courtenay
Knight Rd
Kye Bay
Cape Lazo
Outfall
Electoral Area B
CFB Comox Pump Station
Courtenay Pump Station
Guthrie Rd
Colby Road Pump Station
Lazo Rd
Point Holmes
KFN
Town of Comox
Treatment Plant
K'ómoks First Nation Pump Station
Cliffe Ave
Comox Ave
Balmoral Ave
Wilemar Bluff
Comox Harbour
Pump Station
Balmoral Beach
DND
HMCS Quadra Pump Station
Goose Spit
Electoral Area A
Island Hwy S
N
0
0.5
1
2
Km

Alignment Alternatives
Option 2 – Overland


Overland Alignment 2A
Addition of ~~Inline~~ PS
Significant hydraulic pressure increase
Asset capacity upgrades only
New Inline Pump Station at highest elevation that can be achieved by Jane Pl pumps
Legend
Location of Existing Infrastructure
New Pump Station General Location
Forcemain
City of Courtenay
Electoral Area B
Electoral Area A
Town of Comox
KFN
Courtenay Pump Station
K'ómoks First Nation Pump Station
Jane Place Pump Station
CFB Comox Pump Station
Colby Road Pump Station
DND HMCS Quadra Pump Station
Treatment Plant
Outfall
Point Holmes
Wilemar Bluff
Balmoral Beach
Cape Lazo
Kye Bay
Comox Harbour
Goose Spit
Greenwood Trunk
Ryan Rd
Ryan Rd E
Lerwick Rd
Anderton Rd
Military Row
Knight Rd
Guthrie Rd
Lazo Rd
Comox Ave
Cliffe Ave
Back Rd
Island Hwy S
N
0 0.5 1 2 Km

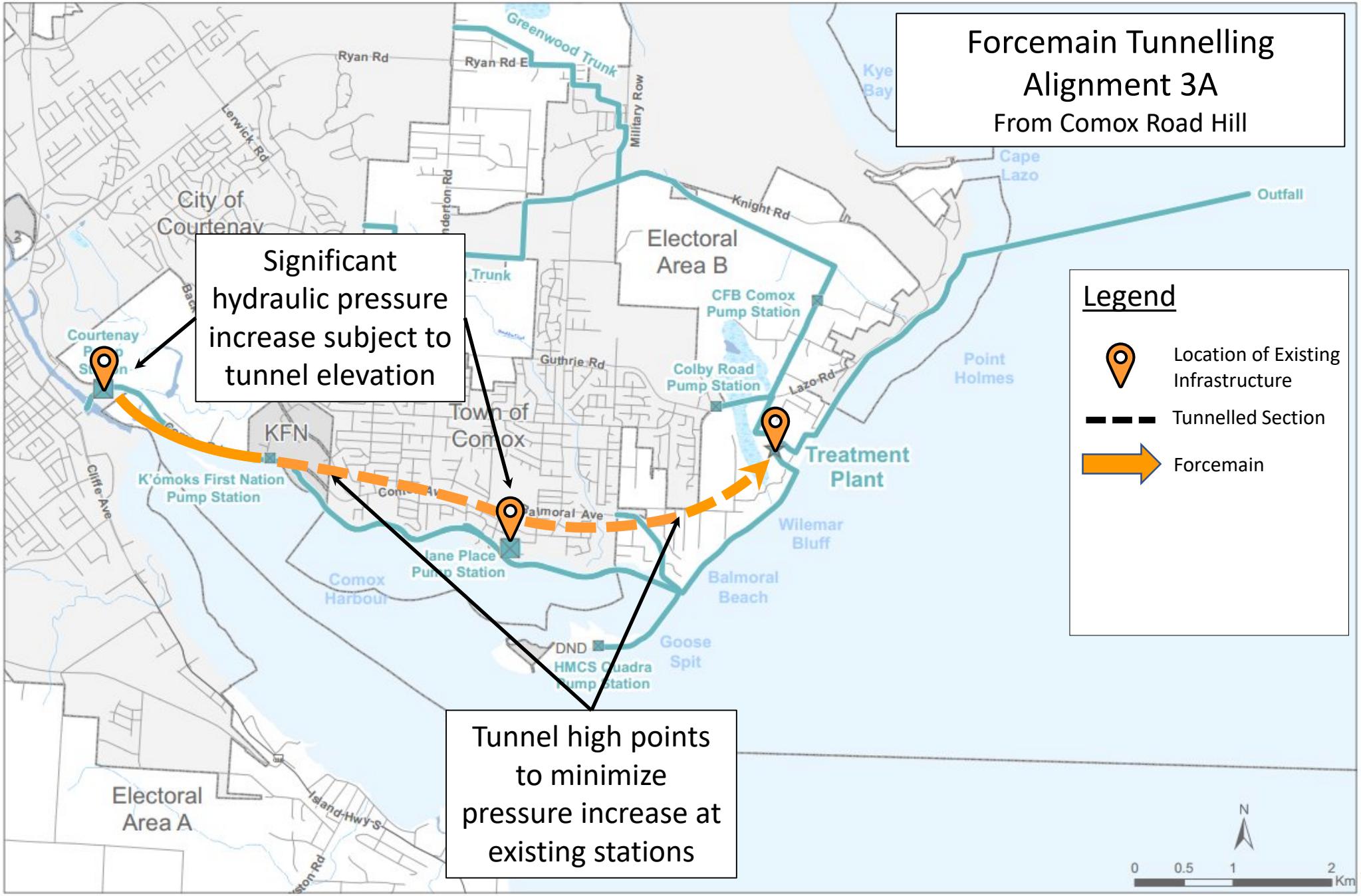
Overland Alignment 2B
Addition of New ~~Jane~~ PS

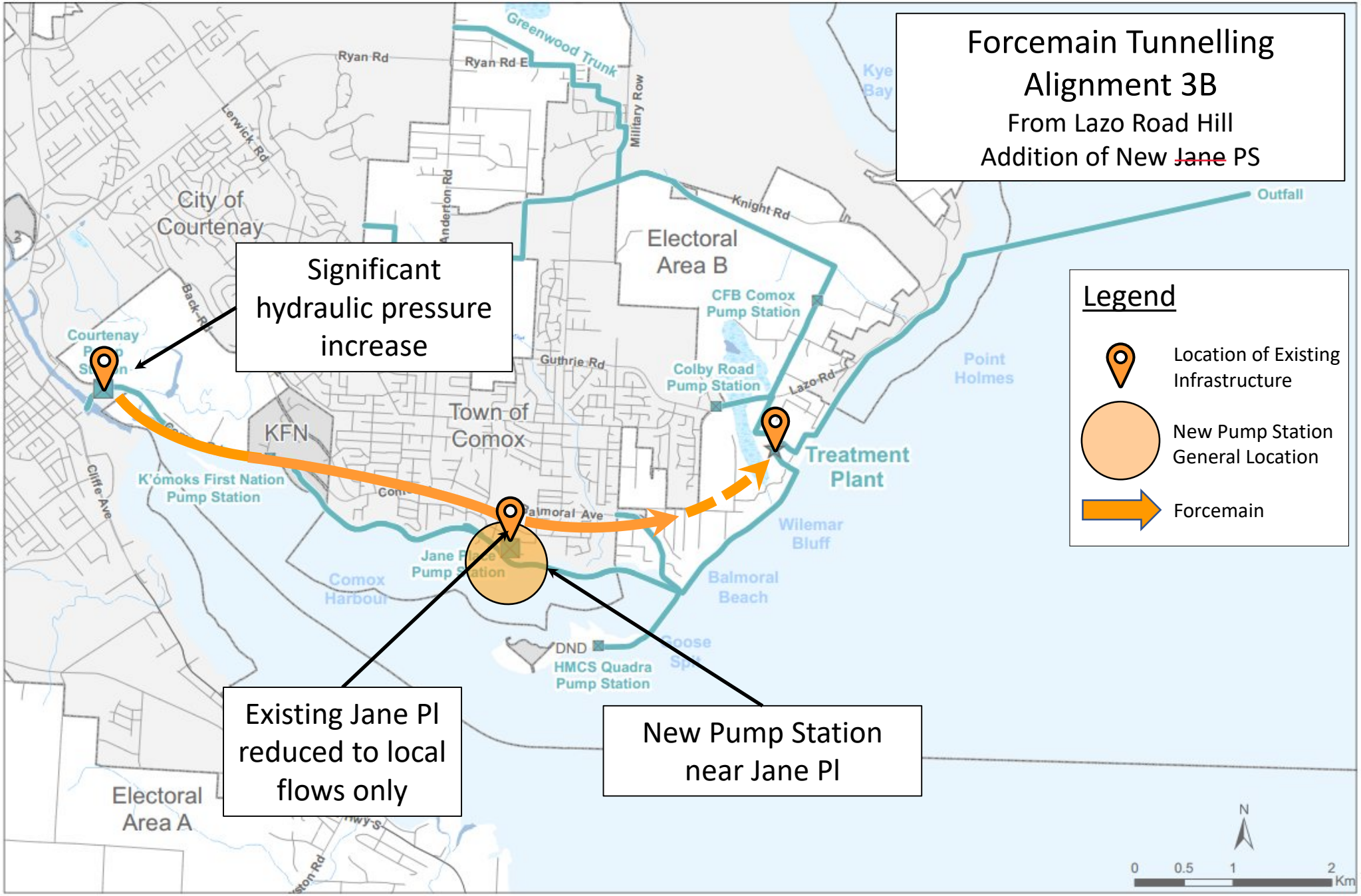


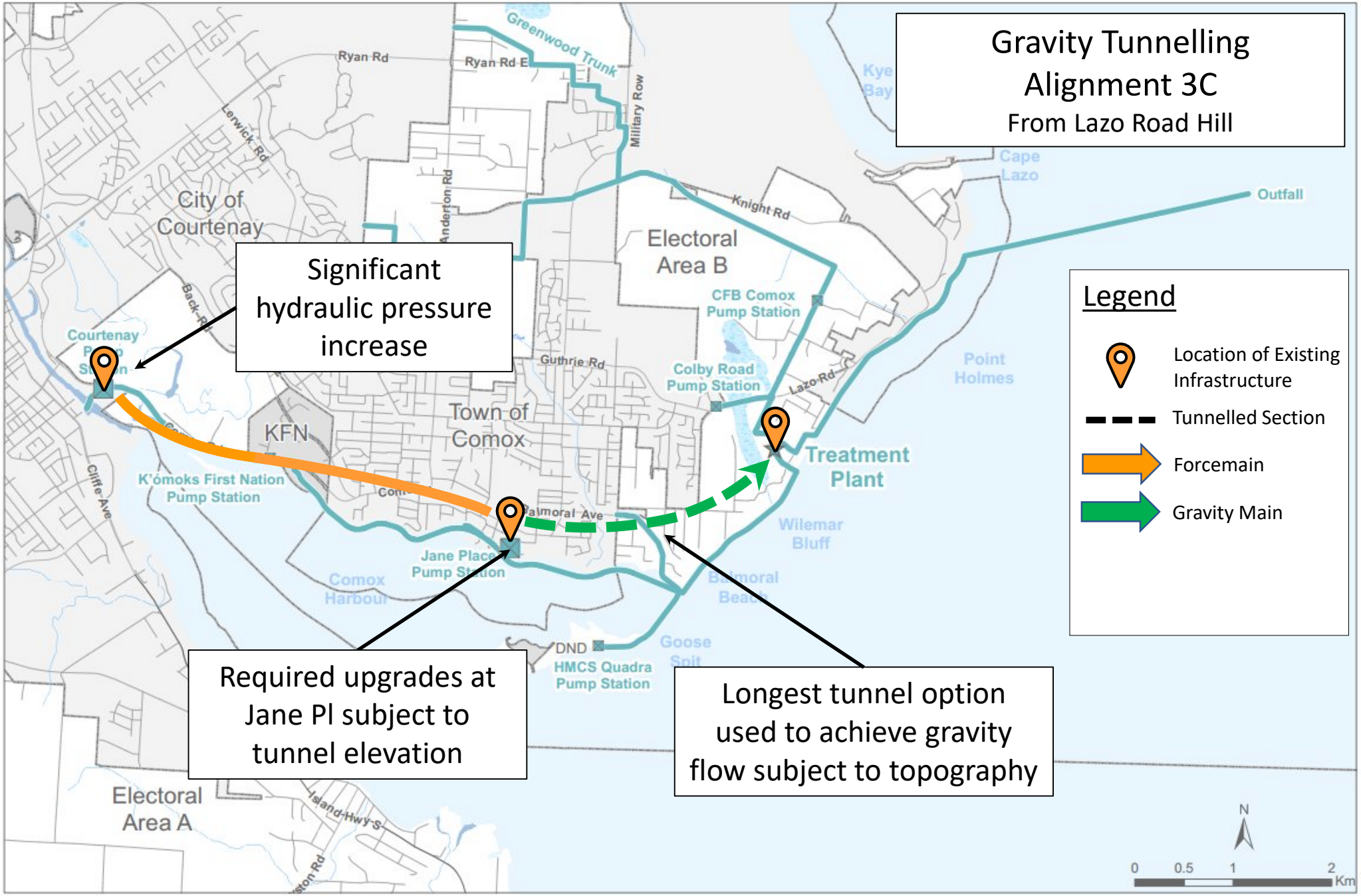
Alignment Alternatives
Option 3 – Tunnelling

Forcemain Tunnelling Alignment 3A

From Comox Road Hill

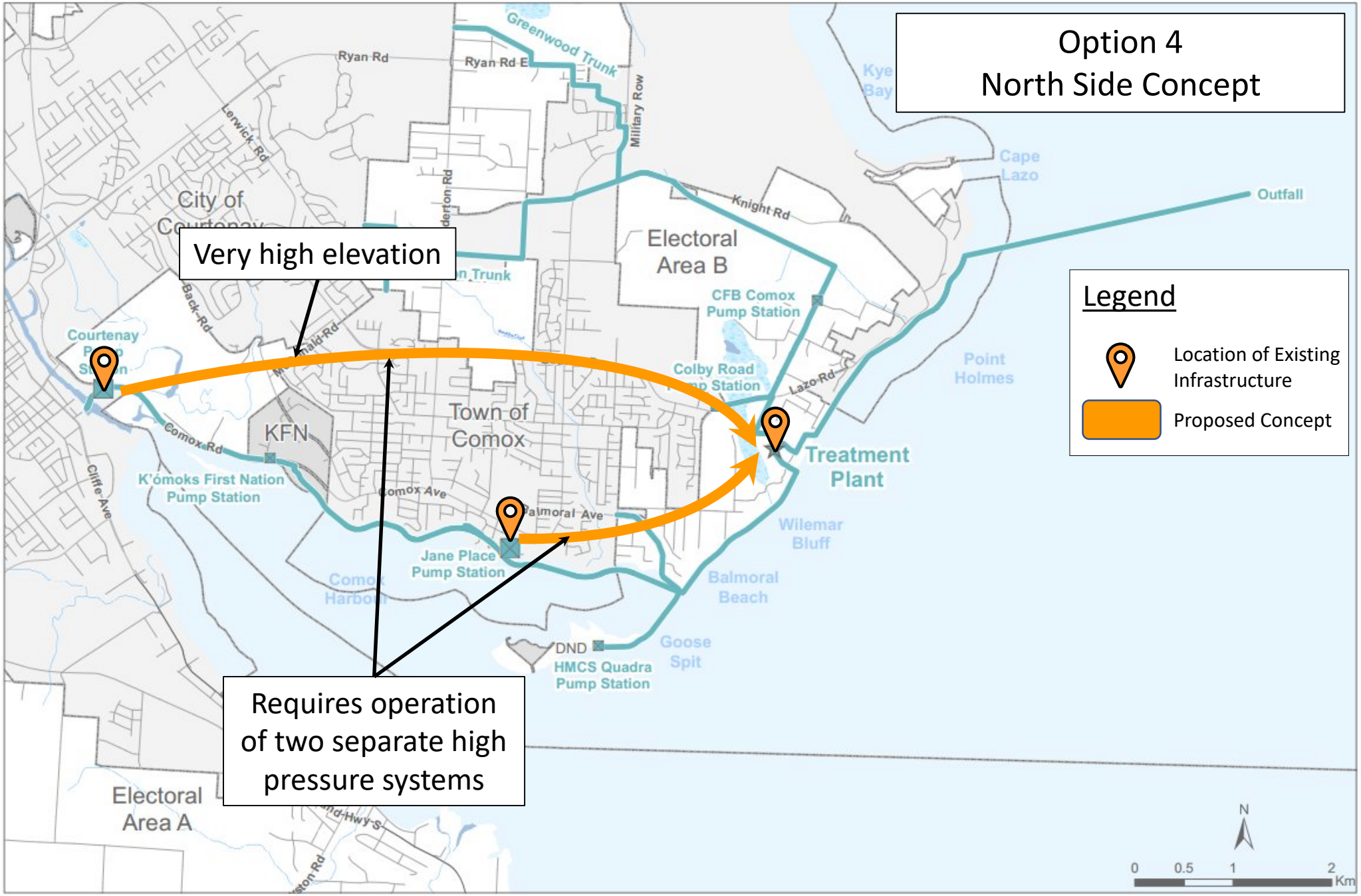


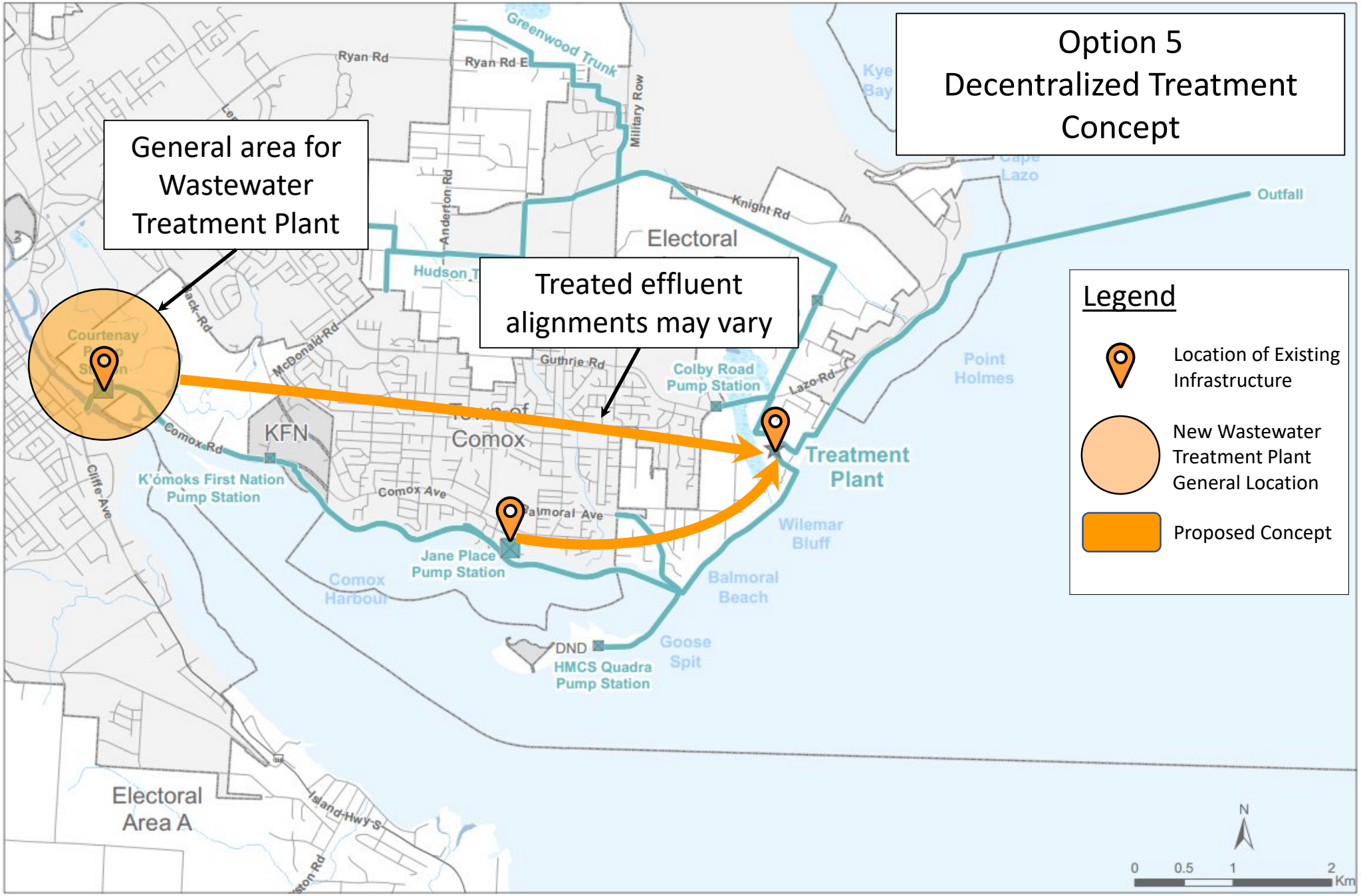

Forcemain Tunnelling Alignment 3B
From Lazo Road Hill
Addition of New ~~Jane~~ PS
Significant hydraulic pressure increase
Existing Jane Pl reduced to local flows only
New Pump Station near Jane Pl
Legend
Location of Existing Infrastructure
New Pump Station General Location
Forcemain
Outfall
Treatment Plant
CFB Comox Pump Station
Colby Road Pump Station
K'ómoks First Nation Pump Station
Courtenay Pump Station
Jane Place Pump Station
HMCS Quadra Pump Station
City of Courtenay
Town of Comox
Electoral Area A
Electoral Area B
KFN
Comox Harbour
Balmoral Beach
Wilemar Bluff
Point Holmes
Kye Bay
Ryan Rd
Ryan Rd E
Greenwood Trunk
Military Row
Knight Rd
Guthrie Rd
Lazo Rd
Balmoral Ave
Cliffe Ave
Lerwick Rd
Anderton Rd
DND
N
0 0.5 1 2 Km


Gravity Tunnelling
Alignment 3C
From Lazo Road Hill
Significant hydraulic pressure increase
Required upgrades at Jane Pl subject to tunnel elevation
Longest tunnel option used to achieve gravity flow subject to topography
Legend
Location of Existing Infrastructure
Tunnelled Section
Forcemain
Gravity Main
Greenwood Trunk
Ryan Rd
Ryan Rd E
Military Row
Lerwick Rd
Anderton Rd
City of Courtenay
Knight Rd
Outfall
Cape Lazo
Kye Bay
Electoral Area B
CFB Comox Pump Station
Colby Road Pump Station
Lazo Rd
Point Holmes
Guthrie Rd
Courtenay Pump Station
KFN
Town of Comox
K'ómoks First Nation Pump Station
Cliffe Ave
Treatment Plant
Wilemar Bluff
Jane Place Pump Station
Comox Harbour
Goose Spit
DND
HMCS Quadra Pump Station
Electoral Area A
Island Hwy S
N
0 0.5 1 2 Km

New Conveyance Concepts

Option 4
North Side Concept




Option 5
Decentralized Treatment Concept
General area for Wastewater Treatment Plant
Treated effluent alignments may vary
Legend
Location of Existing Infrastructure
New Wastewater Treatment Plant General Location
Proposed Concept
Outfall
Treatment Plant
Courtenay
KFN
Comox
Electoral Area A
Colby Road Pump Station
K'ómoks First Nation Pump Station
Jane Place Pump Station
HMCS Quadra Pump Station
Ryan Rd
Ryan Rd E
Greenwood Trunk
Military Row
Anderton Rd
Knight Rd
Guthrie Rd
McDonald Rd
Comox Rd
Comox Ave
Balmoral Ave
Cliffe Ave
Lazo Rd
Point Holmes
Wilemar Bluff
Balmoral Beach
Goose Spit
Comox Harbour
Island Hwy S
Kye Bay
Cape Lazo
Electoral
DND
N
0 0.5 1 2 Km


Option 6
Deep Marine Concept
Legend
Location of Existing Infrastructure
Proposed Concept
Greenwood Trunk
Ryan Rd
Ryan Rd E
Military Row
Lerwick Rd
Anderton Rd
City of Courtenay
Knight Rd
Kye Bay
Cape Lazo
Outfall
Electoral Area B
Hudson Trunk
CFB Comox Pump Station
Back Rd
McDonald Rd
Guthrie Rd
Colby Road Pump Station
Lazo Rd
Point Holmes
Courtenay Pump Station
Comox Rd
KFN
Town of Comox
Treatment Plant
K'ómoks First Nation Pump Station
Cliffe Ave
Comox Ave
Balmoral Ave
Wilema Bluff
Jane Place Pump Station
Comox Harbour
Balmoral Beach
DND
HMCS Quadra Pump Station
Goose Spit
Electoral Area A
Island Hwy S
N
0
0.5
1
2
Km

Marine Survey