Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Notice of Meeting and Meeting Agenda
Core Area Liquid Waste Management Committee

Wednesday, December 9, 2015 | **9:00 AM** | **6th Floor Boardroom**

L. Helps (Chair), S. Brice (Vice-Chair), M. Alto, R. Atwell, D. Blackwell, J. Brownoff, V. Derman, B. Desjardins, C. Hamilton, B. Isitt, N. Jensen (Board Chair), C. Plant, Chief R. Sam, D. Screech, L. Seaton, Chief A. Thomas, G. Young

1. Approval of Agenda

2. Chair's Remarks

3. Presentations/Delegations

3.1. **15-1320** Delegation: T. Benjamin re: Item 4.1) technical Oversight Panel Report #6

Attachments: 2015-12-09 CALWMC Delegation T. Benjamin

3.2. **15-1321** Delegation: Dr. S. Peck re Item: 4.1) Technical Oversight Panel Report #6 and 4.2) Draft Technical Memorandum #3 - Costing and Financial Analysis

Attachments: 2015-12-09 CALWMC Delegation Dr. S. Peck

3.3. **15-1330** Delegation: B. Grover re Items: 4.1) Technical Oversight Panel Report #6 and 4.2) Draft Technical Memorandum #3 - Costing and Financial Analysis

Attachments: 2015-12-09 CALWMC Delegation B. Grover

3.4. **15-1322** Delegation: B. Gilbert re: Item 4.2) Draft Technical Memorandum #3 - Costing and Financial Analysis

Attachments: 2015-12-09 CALWMC Delegation: B.Gilbert

3.5. **15-1323** Delegation: J. Farquharson re: item 4.1) Technical Oversight Panel (TOP) Report #6

Attachments: 2015-12-09 CALWMC Delegation: J. Farquharson

4. Committee Business

4.1. **15-1308** Technical Oversight Panel (TOP) Report #6

Recommendation: That TOP recommends:
1. That the Core Area Liquid Waste Management Committee receive the draft TM#3R1 for information and for use in the public consultation process.

2. That the Core Area Liquid Waste Management Committee direct TOP to work with Noram to determine the potential viability of the deep shaft small footprint solution at the existing outfall(s).

Attachments: Technical Oversight Panel Report #6

Technical Oversight Panel Report #6 (draft)

4.2. **15-1310** Draft Technical Memorandum #3 - Costing and Financial Analysis

Recommendation: That the Core Area Liquid Waste Management Committee recommend to the Board: That staff be directed to proceed with public consultation on the financial and environmental analysis of the five option sets as presented in Draft Technical Memo #3 - Costing and Feasibility Analysis by Urban Systems/Carollo Engineers.
(WP - Colwood, Esquimalt, Langford, Oak Bay, Saanich, Victoria, View Royal)

Attachments: 2015-12-09 CALWMC Urban Systems Presentation

2015-12-09 CALWMC Options Cost Share

Staff Report: Draft Technical Memo #3 - Costing & Financial Analysis

Appendix A: Draft Technical Memorandum #3

Appendices B-F - Financial Spreadsheets

Appendix F: COPY Annual Estimated Cost Per Household (at 2030)

4.3. **15-1314** Fairness and Transparency Advisory November 2015 Report

Recommendation: That the report be received for information.

Attachments: Monthly Report to the CRD from the Fairness and Transparency Advisor

4.4. **15-1312** Westside Wastewater Treatment and Resource Recovery Select Committee Agenda Package November 24, 2015 for information.

Recommendation: That the Westside Wastewater Treatment and Resource Recovery Select Committee agenda package of November 24, 2015 be received for information.

Attachments: 2015-11-24 Agenda Westside WTRRSC

5. Notice of Motion

5.1. **15-1315** Motion from Technical and Community Advisory Committee to Support Director Derman's Motion (for information)

Recommendation: That the Core Area Liquid Waste Management Committee receive the motion for information.

Attachments: Technical and Community Advisory Committee Motion to Support

5.2. **15-311** Motion for Which Notice Has Been Given: Options for Wastewater Treatment (Director Hamilton)

Recommendation: That the Core Area Liquid Waste Management Committee refer the Motion for Which Notice Has Been Given: Options for Wastewater Treatment (Director Hamilton) to the Westside Wastewater Treatment and Resource Recovery Select Committee.

Attachments: Notice of Motion: Options for Wastwater Treatment (Director Hamilton)

6. New Business

7. Motion to Close the Meeting

7.1. **15-1318** Motion to Close the Meeting

Recommendation: That the meeting be closed in accordance with the Community Charter Part 4, Division 3, 90 (1) (a) personal information about an identifiable individual who holds or is being considered for a position as an officer, employee or agent of the regional district or another position appointed by the regional district; and 90 (1) (i) the receipt of advice that is subject to solicitor-client privilege, including communications necessary for that purpose.

8. Adjournment

8.1. **15-1112** Reference: Core Area Liquid Waste Management Committee Project Charter

Attachments: Project Charter

Attachment 1: Planning Process - Roles, Input & Relationships

Attachment 2: Proposed Work Plan Overlay - 3P Canada

Attachment 3: Proposed Feasibility & Costing Analysis Schedule

Next Meeting: January, 2016 (TBA)

From: Legserv@crd.bc.ca
Sent: Friday, December 04, 2015 3:11 PM
To: Legserv
Subject: Addressing the Board - Submission

The following message was received through the form at 'https://www.crd.bc.ca/about/how-we-are-governed/addressing-the-board/addressing-the-crd-board-committees'. Neither the name nor the e-mail address can be confirmed as accurate.

••

Your name::
Tom Benjamin

I represent::
CUPE 1978

Telephone::

Fax::

Email address::

Street address (optional)::

Municipality/Electoral Area in which you reside::
Saanich

I wish to address::
Core Area Liquid Waste Management Committee

Meeting Date::
December 9, 2015

Agenda Item::
4.1 Technical Oversight Panel Report #6

My reason(s) for appearing (is/are) and the substance of my presentation is as follows::
I am appearing as vice-president of CUPE Local 1978 and will be talking about our commitment to a publicly owned and operated wastewater system.

I will have a PowerPoint or video presentation and will submit it at least 24 hours in advance of the meeting.:
No

The meeting and my presentation will be webstreamed live via the CRD website and recorded.:
I understand,

From: shspeck@gmail.com
Sent: Saturday, December 05, 2015 12:39 PM
To: Legserv
Subject: Addressing the Board - Submission

The following message was received through the form at 'https://www.crd.bc.ca/about/how-we-are-governed/addressing-the-board/addressing-the-crd-board-committees'. Neither the name nor the e-mail address can be confirmed as accurate.

••

Your name::
Dr Shaun Peck

I represent::
Public Health Consultant

Telephone::

Fax::

Email address::

Street address (optional)::

Municipality/Electoral Area in which you reside::
Victoria

I wish to address::
Core Area Liquid Waste Management Committee

Meeting Date::
December 9th

Agenda Item::
4.1 and 4.2

My reason(s) for appearing (is/are) and the substance of my presentation is as follows::
I will provide constructive critical analysis of reports before the committee

I will have a PowerPoint or video presentation and will submit it at least 24 hours in advance of the meeting.:
No

The meeting and my presentation will be webstreamed live via the CRD website and recorded.:
I understand,

Submitted at:12/5/2015 12:38:32 PM

From:
Sent: Monday, December 07, 2015 12:01 PM
To: Legserv
Subject: Addressing the Board - Submission

Categories: CALWMC

The following message was received through the form at 'https://www.crd.bc.ca/about/how-we-are-governed/addressing-the-board/addressing-the-crd-board-committees'. Neither the name nor the e-mail address can be confirmed as accurate.

••

Your name::
Brian Grover

I represent::
Myself, a Victoria resident and water resources engineer

Telephone::

Fax::

Email address::

Street address (optional)::

Municipality/Electoral Area in which you reside::
Victoria

I wish to address::
Core Area Liquid Waste Management Committee

Meeting Date::
Dec. 9, 2016

Agenda Item::
3. Presentations

My reason(s) for appearing (is/are) and the substance of my presentation is as follows::
Concerns about schedule and context for Eastside input on wastewater options, as outlined yesterday (Dec. 6) by consultant supporting Eastside public engagement.

I will have a PowerPoint or video presentation and will submit it at least 24 hours in advance of the meeting.:
No

The meeting and my presentation will be webstreamed live via the CRD website and recorded.:
I understand,

Submitted at:12/7/2015 12:01:09 PM
Submitted via:https://www.crd.bc.ca/about/how-we-are-governed/addressing-the-board/addressing-the-crd-board-committees
User Agent:Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/47.0.2526.73 Safari/537.36
User Host Address:

From:
Sent: Monday, December 07, 2015 1:24 PM
To: Legserv
Subject: Addressing the Board - Submission

Follow Up Flag: Follow up
Flag Status: Completed

Categories: CALWMC

The following message was received through the form at 'https://www.crd.bc.ca/about/how-we-are-governed/addressing-the-board/addressing-the-crd-board-committees'. Neither the name nor the e-mail address can be confirmed as accurate.

••

Your name::
Bryan Gilbert

I represent::

Telephone::

Fax::

Email address::

Street address (optional)::
Victoria

Municipality/Electoral Area in which you reside::
Victoria

I wish to address::
Core Area Liquid Waste Management Committee

Meeting Date::
Dec 9, 2015

Agenda Item::
4.2

My reason(s) for appearing (is/are) and the substance of my presentation is as follows::
The technical memo #3 fails to realize cost savings due to using a secondary treatment baseline. This failure has a potential $700m cost.

This is a comparison between two ways of thinking: secondary treatment as baseline versus 100% tertiary as baseline. Unlike of the rest of North America, in the core capital region we are starting from scratch. This is a green field project and this allows us to explore cost saving ideas that are not typical because most jurisdictions already have secondary treatment facilities in place.

If we start with the assumption secondary treatment is the baseline we have this sequence of consequences.

—> Secondary treatment produces effluent *

—> which requires deep ocean outfalls

—> which needs a centralized site

—> which means it is best to size for long term growth

Implications

to create a central site a project needs new pipes and pumping infrastructure

want to over estimate flows to be conservative

project capital costs in excess of $800 million (current estimate 1 billion)

distributed sites will cost more to build infrastructure

tertiary treatment is a cost adder. Yet, if you add 100% tertiary then you can remove need for deep ocean outfall

—> which removes the primary reason secondary needs to be centralized.

If we instead start from a 100% tertiary treatment baseline we have this sequence of consequences.

—> Tertiary produces reclaimed water suitable for: reuse, constructed wetlands and local discharge **

—> local discharge removes the need for deep ocean outfalls ***

—> which means smaller plants can be considered in locations that can environmentally and/or economically benefit from the extra water or just reduce infrastructure costs.

—> smaller facilities removes need for expensive new pipes and pumping infrastructure

—> which removes need to size for long term growth

Implications

modular approach means you can size system for today's needs and avoid over building for long term needs

can adapt to changing flows so can consider actual current needs rather than projected (enlarged to be conservative) needs

money saved can be put into repairing I&I reducing sewage flows and avoiding long term sewage treatment expansions

project capital costs in $250 to $400 million range. ****

The tertiary thinking leads to a savings of about 700 million dollars. *****

http://bit.ly/2015-11-23-Oscar-to-CRD-TOP

Check out section 5.7 of the guidelines ...

http://www2.gov.bc.ca/assets/gov/environment/waste-management/sewage/guide_to_preparing_liquid_waste_mgmt_ plans.pdf

When developing a LWMP consider reclaimed water to reduce infrastructure costs. Sounds like a RITE plan

requirement! What do you think? Have the current options optimized the use of reclaimed water to reduce costs? The answer needs to refer to the $250m system.****

* Effluent is stil polluted water and not safe for contact with humans. It must be diluted in a manner that minimizes the risk of contact. Inland jurisdictions discharge effluent into large lakes or rivers. On the coast the rules say we must discharge effluent into a deep ocean outfall.

** Note that local discharge is what happens for all inland jurisdictions. In most cases, that discharge is only secondary level.

*** Use existing deep ocean outfalls for required fallback systems. Local discharge is well established practice and is already part of CRD's LWMP (i.e. Dockside)

**** June 9th, 2015. Presentation from world leading wastewater technology company presented system to treat whole region for $250m. http://crd.ca.granicus.com/MediaPlayer.php?view_id=1&clip_id=409

***** Secondary cost estimates also include anaerobic digestion as baseline. Tertiary estimates use advanced gasification and integrated resource management as baseline. See CALWMC meeting of June 9th 2015.

I will have a PowerPoint or video presentation and will submit it at least 24 hours in advance of the meeting.:
Yes

The meeting and my presentation will be webstreamed live via the CRD website and recorded.:
I understand,

Submitted at:12/7/2015 1:23:51 PM
Submitted via:https://www.crd.bc.ca/about/how-we-are-governed/addressing-the-board/addressing-the-crd-board-committees
User Agent:Mozilla/5.0 (iPad; CPU OS 8_4_1 like Mac OS X) AppleWebKit/600.1.4 (KHTML, like Gecko) CriOS/47.0.2526.70 Mobile/12H321 Safari/600.1.4
User Host Address:

From:
Sent: Monday, December 07, 2015 2:26 PM
To: Legserv
Subject: Addressing the Board - Submission

Follow Up Flag: Follow up
Flag Status: Completed

Categories: CALWMC

The following message was received through the form at 'https://www.crd.bc.ca/about/how-we-are-governed/addressing-the-board/addressing-the-crd-board-committees'. Neither the name nor the e-mail address can be confirmed as accurate.

••

Your name::
john farquharson

I represent::
Sewage Treatment action group

Telephone::

Fax::

Email address::
johnfarquharson@shaw.ca

Street address (optional)::

Municipality/Electoral Area in which you reside::
Victoria

I wish to address::
Core Area Liquid Waste Management Committee

Meeting Date::
Dec 9th

Agenda Item::
4.1

My reason(s) for appearing (is/are) and the substance of my presentation is as follows::
Review impact of TOP report re: site selection

I will have a PowerPoint or video presentation and will submit it at least 24 hours in advance of the meeting.:

The meeting and my presentation will be webstreamed live via the CRD website and recorded.:
I understand,

Submitted at:12/7/2015 2:26:06 PM
Submitted via:https://www.crd.bc.ca/about/how-we-are-governed/addressing-the-board/addressing-the-crd-board-committees
User Agent:Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/47.0.2526.73 Safari/537.36
User Host Address

Making a difference...together

REPORT TO CORE AREA LIQUID WASTE MANAGEMENT COMMITTEE
MEETING OF WEDNESDAY, DECEMBER 9, 2015

SUBJECT **Technical Oversight Panel (TOP) Report #6**

ISSUE

TOP summary of recent period to December 1, 2015

BACKGROUND

Technical Memo #2R2 was issued to the Core Area Liquid Waste Management Committee (CALWMC) by the consultants previously. TOP has a series of notes that are to be addressed for the official record. The consultant advises that they will be submitting these notes as a document attached to their submission of TM#3.

Draft Technical Memo #3R1 is issued to the CALWMC by the consultants December 4, 2015. TOP has competed a detailed review of items that are to be addressed in TM#3R1 and incorporated into the final TM#3 when it is submitted January 12, 2015. TOP has discussed draft TM#3 comments with the consultants and the consultants have agreed to changes to be included in TM#3R1. Subject to these TOP recommended changes being reflected by the consultants in TM#3R1, TOP recommends acceptance of draft TM#3R1 by the CALWMC to be used as a basis for public consultation beginning December 9, 2015.

Draft Technical Memo #4 will be issued to the CALWMC by the consultants February 10, 2015. TOP has recommended, and the CALWMC has passed a motion to require, the provision of the details of the preferred TM#4 content requirements to support funding requirements. At this time, the information is not clear and the consultants and TOP need to agree with CRD on the final table of content requirements and metrics for TM#4.

The critical path schedule has been developed by the team for the planning phase. The CALWMC passed a motion November 25, 2015 for the CRD to develop a schedule for the project out to 2020. Work should begin on this in the new-year with TOP support.

The organization chart for the team has not been resolved and an overarching project delivery organization chart is needed. The CALWMC passed a motion November 25, 2015 for the CRD to develop this organization chart out to 2020. Work should begin on this in the new-year with TOP support.

TOP arranged to meet with an additional 8 private vendors November 23, 2015. **Organica** presented a 'living machine' type of system now common in Europe and Asia. Sechelt is a working example of their technology. **Kore** presented their resource recovery solution to biosolids management. Kore finances, designs, builds, owns and operates the facility under long-term performance-based contracts. **Ostara** presented a phosphorous recovery for fertilizer pellet type of system now common worldwide. Ostara is a UBC tech with 8 working and 8 pending facilities. **IWS** did not present, no reason given. **Catawater** presented a bio-bacteria process of a type now common worldwide, with no examples, yet, in Canada of their product. **Noram** presented a unique, proprietary deep shaft system with a vertical treatment plant taking the place of a horizontal layout, vastly reducing the area and impact of the plant on the site. Burnaby Chevron is an example of a local deep shaft facility (7MLD). **Matrix** presented a proprietary pyrolysis

system with a $4M feasibility study cost up front and no details on technology and no working examples at a comparative scale. **Shewla** presented again but continued to have technology issues with the presentation out of Brazil. They propose off shore barge treatment with no working examples at a comparative scale. Generic versions of the Ostara and Catawater products, and the Organica and Kore systems may be incorporated into some of the option sets as appropriate. Matrix and Shewla are proprietary treatment systems (not generic types) with no track record at the scale required for CRD and will not be reflected in the options. Noram is a proprietary deep shaft small footprint WWTP tertiary system that *might* possibly solve alternative site issues (saving hundreds of millions of dollars and eliminating kilometers of infrastructure now in the proposed options). TOP and consultant team will visit the existing deep shaft Chevron site in Vancouver to gain a better understanding of the performance and appearance. TOP team believes it is worth TOP further investigating the viability of a small footprint WWTP solution with Noram to determine if this should become an additional option to be addressed later in the implementation phase. This dialogue will not require the consultants in the initial stages and accordingly will not delay either TM#3 or #4.

The bid process is not defined and the funding parameters are not defined. As work progresses on the technical memos, it is becoming apparent that the WWTP side is traditional and the bio-solid treatment side is innovative. Current funding is structured for traditional bio-solid treatment. Once the details of the TM#3R1 cost charts are finalized, discussions should be held with TOP support to resolve the bid process and the funding application parameters to support innovation on the bio-solid treatment side as appropriate.

TOP arranged to meet with various Citizen Groups to begin to address some of their very technical concerns with the project. Presentations were made by Brian Grover, Bryan Gilbert, Soren Henrich, Carole Witter, John Farquharson and Oscar Regier. Bryan Gilbert addressed process issues including the clarification of objectives and the establishment of a viable delivery team structure with appropriate capacity, and the establishment of financial QA protocols. TOP is aware of these protocols and is diligently working with the consultant team and the CALWMC and the CRD to ensure these protocols are established. Soren Henrich reported on concerns raised in draft TM#2 regarding biochar and biosolids treatment and lifting the ban on land application of sewage sludge. John Farquharson explained how TOP's role as outlined in its terms of reference and the Phase 2 project charter was expanded based on input provided by various citizen groups. Mr. Farquharson suggested new federal government direction has eliminated the PPP Canada (P3) screening requirement for federally funded infrastructure projects, which provides an opportunity for TOP to request a timeline extension. Carole Witter addressed issues around contaminants of concern and making sure there is room in the option sets for real distributed options with resource recovery and the tertiary treatment of effluent. TOP shares these concerns and is working with the consultant team to address these issues. Brian Grover and Oscar Regier identified specific cost saving options. Mr. Grover asked for TOP's help to achieve the desirable outcome at the lowest possible cost, and addressed six points of concerns (i.e., project preparation process, public participation, cost estimates, roles for consultants and contractors, managing project implementation, and timing of next steps). Mr. Regier spoke in favour of distributed tertiary treatment using membrane reactor technology with optimized resource recovery and existing conveyance infrastructure, and using site specific information to make costing decisions. Oscar reviewed capacity, flow data and redundancy of existing trunk mains, outfalls, inflow and infiltration, and overflow points. Mr. Regier provided diagrams which the consultant team agreed to review and respond to. This response is from the consultant team and TOP is pending.

TOP also met with Amanda Gibbs to begin to understand the format of the public engagement process scheduled for December. It became apparent that she did not have content for the initial proposed public engagement eastside start date of December 2, 2015, and that the timing of the review of TM#3 would not allow the vetting of the financial info before the public materials were scheduled to be issued. For this reason, the TOP previously requested a one week delay in the public process to December 9, 2015 to align with the delivery of TOP's first review of TM#3 to facilitate better financial information for the public process. TOP understands from Amanda that the Eastside and Westside public outreach efforts will be coordinated and that all communities will receive the same survey content to respond to

ALTERNATIVES

That TOP recommends that:

Alternative 1
That the Core Area Liquid Waste Management Committee receive this document for information and accept the recommendations.

Alternative 2
That the Core Area Liquid Waste Management Committee receive this document for information, and revise and accept the recommendations.

Alternative 3
That the Core Area Liquid Waste Management Committee receive this document for information and not accept the recommendations.

IMPLICATIONS

SOCIAL IMPLICATIONS
Draft TM#3R1 will form the basis of the public consultation process to begin in December 2015 and to complete in January 2016.
Some private vendor innovations support social desire for resource recovery and distributed plants and their involvement will improve the project outcomes.
Options as developed in TM#2R2 and TM3#R1 support social desire for resource recovery and distributed plants.

ENVIRONMENTAL IMPLICATIONS
Some of TOP's comments on the draft TM#3R1 relate to environmental impact.
Most private vendor innovations support higher environmental performance in terms of lower energy, reduced carbon, and improved effluent quality and reduced contaminants of concern.
Options as developed in TM3#R1 support higher environmental performance in terms of lower energy, reduced carbon, and improved effluent quality and reduced contaminants of concern.

ECONOMIC IMPLICATIONS
Some of TOP's comments on the draft TM#3R1 relate to cost issues. TOP and the consultant team are evaluating costs in TM#3R1. The costs now have a wide margin of error on the capital side. Examining the life cycle cost is important for decision making.
Some private vendor innovations save costs and should be examined further.

INTERGOVERNMENTAL IMPLICATIONS
Some of TOP's comments on the draft TM#3R1 relate to funding issues.
It may be more appropriate to fund the WWTP through P3 Canada and to fund the bio-solid

treatment through agencies that support innovative technologies. The cost sensitivity charts in TM#3R1 are being developed to confirm the best route to take.
TM#4 will support the intergovernmental funding applications and will need to be structured accordingly.

GROWTH MANAGEMENT IMPLICATIONS
Some of TOP's comments on the draft TM#3R1 relate to growth assumptions.
Some private vendor innovations address incremental growth.
Options as developed in TM#3R1 address incremental growth.

CONCLUSION

Notes referring to TOP comments on TM#2 are required as part of TM#3 and are being provided by the consultants.
Revisions to TM#3 are required and are ongoing by the consultants.
TM#4 content parameters are required and should be discussed at the meeting in January with CRD.
Private vendors should continue to be encouraged to come forward with ideas, and the team should develop methods to encourage innovation in treatment options in the bids.
TOP should follow up with Noram to determine if their technology is viable as small footprint WWTP(s) close to the outfall(s).
TOP supports the community involvement at this technical level and is aligned with the apparent goals of the eastside community.
Amanda Gibbs' work will be supported by the revised schedule.

RECOMMENDATION

That TOP recommends:

1. That the Core Area Liquid Waste Management Committee receive the draft TM#3R1 for information and for use in the public consultation process.

2. That the Core Area Liquid Waste Management Committee direct TOP to work with Noram to determine the potential viability of the deep shaft small footprint solution at the existing outfall(s).

Submitted by:	Teresa Coady, Chair, Technical Oversight Panel

TC:ll

Making a difference...together

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MEETING OF WEDNESDAY, DECEMBER 9, 2015

SUBJECT **Technical Oversight Panel (TOP) Report #6**

ISSUE

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proprietary pyrolysis system with a $4M feasibility study cost up front and no details on technology and no working examples at a comparative scale. **Shewla** presented again but continued to have technology issues with the presentation out of Brazil. They propose off shore barge treatment with no working examples at a comparative scale. Generic versions of the Ostara and Catawater products, and the Organica and Kore systems may be incorporated into some of the option sets as appropriate. Matrix and Shewla are proprietary treatment systems (not generic types) with no track record at the scale required for CRD and will not be reflected in the options. Noram is a proprietary deep shaft small footprint WWTP tertiary system that *might* possibly solve alternative site issues (saving hundreds of millions of dollars and eliminating kilometers of infrastructure now in the proposed options). TOP and consultant team will visit the existing deep shaft Chevron site in Vancouver to gain a better understanding of the performance and appearance. TOP team believes it is worth TOP further investigating the viability of a small footprint WWTP solution with Noram to determine if this should become an additional option to be addressed later in the implementation phase. This dialogue will not require the consultants in the initial stages and accordingly will not delay either TM#3 or #4.

The bid process is not defined and the funding parameters are not defined. As work progresses on the technical memos, it is becoming apparent that the WWTP side is traditional and the bio-solid treatment side is innovative. Current funding is structured for traditional bio-solid treatment. Once the details of the TM#3R1 cost charts are finalized, discussions should be held with TOP support to resolve the bid process and the funding application parameters to support innovation on the bio-solid treatment side as appropriate.

TOP arranged to meet with various Citizen Groups to begin to address some of their very technical concerns with the project. Presentations were made by Brian Grover, Bryan Gilbert, Soren Henrich, Carole Witter, John Farquharson and Oscar Regier. Bryan Gilbert addressed process issues including the clarification of objectives and the establishment of a viable delivery team structure with appropriate capacity, and the establishment of financial QA protocols. TOP is aware of these protocols and is diligently working with the consultant team and the CALWMC and the CRD to ensure these protocols are established. Soren Henrich reported on concerns raised in draft TM#2 regarding biochar and biosolids treatment and lifting the ban on land application of sewage sludge. John Farquharson explained how TOP's role as outlined in its terms of reference and the Phase 2 project charter was expanded based on input provided by various citizen groups. Mr. Farquharson suggested new federal government direction has eliminated the PPP Canada (P3) screening requirement for federally funded infrastructure projects, which provides an opportunity for TOP to request a timeline extension. Carole Witter addressed issues around contaminants of concern and making sure there is room in the option sets for real distributed options with resource recovery and the tertiary treatment of effluent. TOP shares these concerns and is working with the consultant team to address these issues. Brian Grover and Oscar Regier identified specific cost saving options. Mr. Grover asked for TOP's help to achieve the desirable outcome at the lowest possible cost, and addressed six points of concerns (i.e., project preparation process, public participation, cost estimates, roles for consultants and contractors, managing project implementation, and timing of next steps). Mr. Regier spoke in favour of distributed tertiary treatment using membrane reactor technology with optimized resource recovery and existing conveyance infrastructure, and using site specific information to make costing decisions. Oscar reviewed capacity, flow data and redundancy of existing trunk mains, outfalls, inflow and infiltration, and overflow points. Mr. Regier provided diagrams which the consultant team agreed to review and respond to. This response is from the consultant team and TOP is pending.

TOP also met with Amanda Gibbs to begin to understand the format of the public engagement process scheduled for December. It became apparent that she did not have content for the initial proposed public engagement eastside start date of December 2, 2015, and that the timing of the review of TM#3 would not allow the vetting of the financial info before the public materials were scheduled to be issued. For this reason, the TOP previously requested a one week delay in the public process to December 9, 2015 to align with the delivery of TOP's first review of TM#3 to facilitate better financial information for the public process. TOP understands from Amanda that the Eastside and Westside public outreach efforts will be coordinated and that all communities will receive the same survey content to respond to

ALTERNATIVES

That TOP recommends that:

Alternative 1
That the Core Area Liquid Waste Management Committee receive this document for information and accept the recommendations.

Alternative 2
That the Core Area Liquid Waste Management Committee receive this document for information, and revise and accept the recommendations.

Alternative 3
That the Core Area Liquid Waste Management Committee receive this document for information and not accept the recommendations.

IMPLICATIONS

SOCIAL IMPLICATIONS
Draft TM#3R1 will form the basis of the public consultation process to begin in December 2015 and to complete in January 2016.
Some private vendor innovations support social desire for resource recovery and distributed plants and their involvement will improve the project outcomes.
Options as developed in TM#2R2 and TM3#R1 support social desire for resource recovery and distributed plants.

ENVIRONMENTAL IMPLICATIONS
Some of TOP's comments on the draft TM#3R1 relate to environmental impact.
Most private vendor innovations support higher environmental performance in terms of lower energy, reduced carbon, and improved effluent quality and reduced contaminants of concern.
Options as developed in TM3#R1 support higher environmental performance in terms of lower energy, reduced carbon, and improved effluent quality and reduced contaminants of concern.

ECONOMIC IMPLICATIONS
Some of TOP's comments on the draft TM#3R1 relate to cost issues. TOP and the consultant team are evaluating costs in TM#3R1. The costs now have a wide margin of error on the capital side. Examining the life cycle cost is important for decision making.
Some private vendor innovations save costs and should be examined further.

INTERGOVERNMENTAL IMPLICATIONS
Some of TOP's comments on the draft TM#3R1 relate to funding issues.
It may be more appropriate to fund the WWTP through P3 Canada and to fund the bio-solid

treatment through agencies that support innovative technologies. The cost sensitivity charts in TM#3R1 are being developed to confirm the best route to take.
TM#4 will support the intergovernmental funding applications and will need to be structured accordingly.

GROWTH MANAGEMENT IMPLICATIONS
Some of TOP's comments on the draft TM#3R1 relate to growth assumptions.
Some private vendor innovations address incremental growth.
Options as developed in TM#3R1 address incremental growth.

CONCLUSION

Notes referring to TOP comments on TM#2 are required as part of TM#3 and are being provided by the consultants.
Revisions to TM#3 are required and are ongoing by the consultants.
TM#4 content parameters are required and should be discussed at the meeting in January with CRD.
Private vendors should continue to be encouraged to come forward with ideas, and the team should develop methods to encourage innovation in treatment options in the bids.
TOP should follow up with Noram to determine if their technology is viable as small footprint WWTP(s) close to the outfall(s).
TOP supports the community involvement at this technical level and is aligned with the apparent goals of the eastside community.
Amanda Gibbs' work will be supported by the revised schedule.

RECOMMENDATION

That TOP recommends:

1. That the Core Area Liquid Waste Management Committee receive the draft TM#3R1 for information and for use in the public consultation process.

2. That the Core Area Liquid Waste Management Committee direct TOP to work with Noram to determine the potential viability of the deep shaft small footprint solution at the existing outfall(s).

Submitted by:	Teresa Coady, Chair, Technical Oversight Panel

TC:ll

Core Area Committee – Phase 2

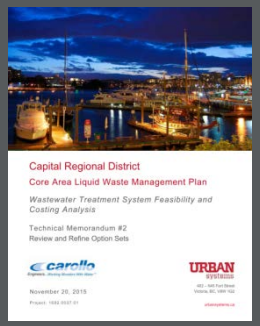
Core Area Liquid Waste Management

December 9, 2015

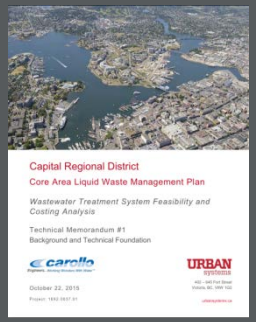
URBAN systems

Process Overview

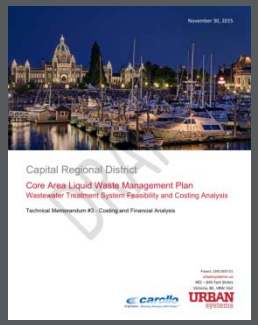
Technical Memo #1



Technical Memo #2



Technical Memo #3



PHASE 2

- *Method*
- ***System Scoping***
- ***Costing***

Sites, Values, Priorities

Engagement 2015

Public Consultation Process

December – January

URBAN systems

Background

- Core Committee directed 5 option sets for costing
  - *1a, 2, 4 and 7 plant as proposed*
  - *1b for ‘full tertiary at Rock Bay’*
- Technical Memo #3 summarizes the costing
  - *Capital and operating costs at 2030*
  - *Resource incomes and 30 year life cycle*
  - *Also includes characterization of criteria*

Key Policy Questions

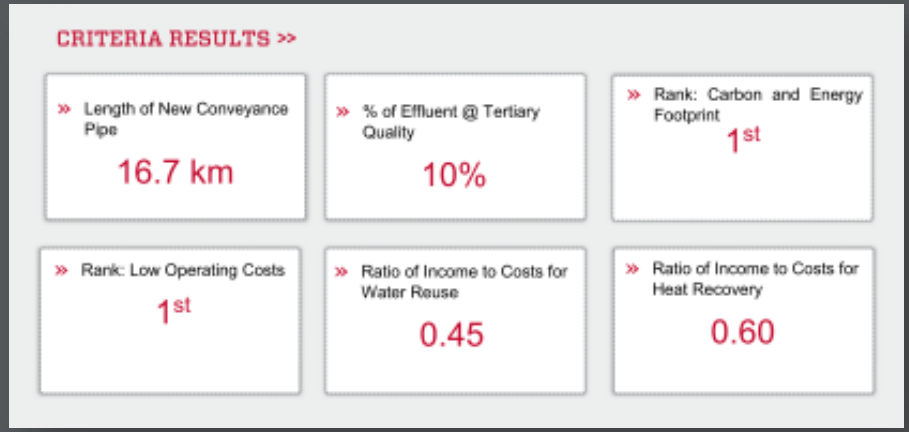
- Location and number of treatment facilities
  - *Hartland or Rock Bay*
- Level of treatment
  - *secondary and tertiary*
  - *RFSI → Anaerobic digestion, gasification, other*
- Public support for costs of higher service levels
  - *Heat recovery and water reuse feasibility*
  - *What could be phased-in? What is needed day 1?*

URBAN systems

Criteria Performance

Guiding Technical Criteria

- *Amount of new infrastructure*
- *Operating costs*
- *Resource demands/recovery*
- *Integrate waste streams*
- *Site, system and technology resiliency*
- *Carbon and energy footprint considerations*
- *Provide for positive and safe public interaction*



FACTOR	CONSIDERATION	PERFORMANCE
Extent of Construction	Scope of new infrastructure, total building footprint, redundant facilities.	1a 1b 2 Plant 4 Plant 7 Plant — Low — High
Energy use for treatment	Level of treatment	1a 2 Plant 4 Plant 1b 7 Plant — Low — High

URBAN systems

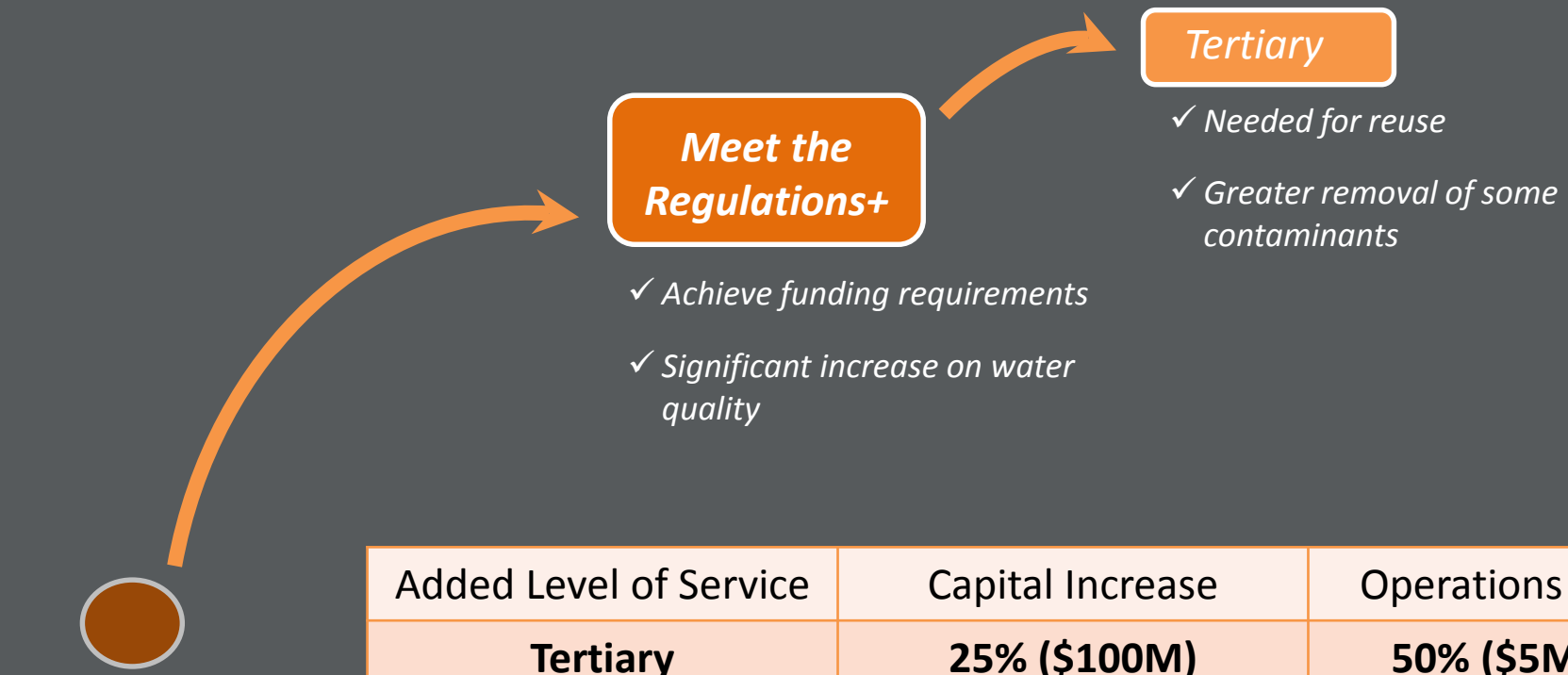
Costing Background

- Costs suit the terms and allow for screening choices
  - *Deliver on TM #1 and TM #2*
  - *Escalation affects all capital projects*
  - *New goals, criteria, sites and updated values*
  - *Contingencies account for uncertainties: price, size, site/environment*
  - *Conveyance system upsized for future flows*

URBAN systems

Effluent Quality

- Interest in appreciating cost and level of treatment



Added Level of Service	Capital Increase	Operations Increase
Tertiary	**25% ($100M)**	**50% ($5M/year)**

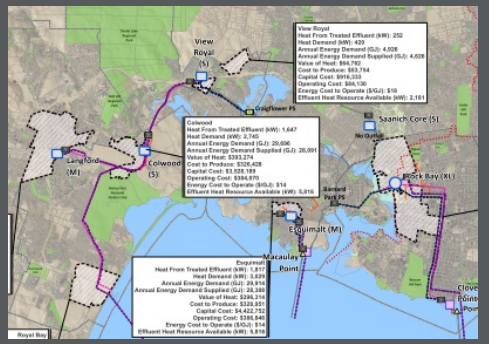
URBAN systems

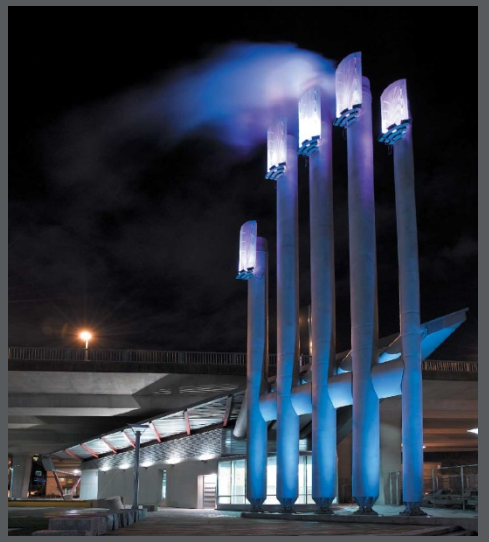
LoS: Water Reuse

- Driver is water innovation and water stewardship
- Match water supply to potential water demand
  - *Level of service options: 1 Plant to 7 Plant*
  - *May cover up to ~40% of operating + capital over 30 year life cycle*
  - *Can be phased-in + need for securing customers*
- Public input on water stewardship & reuse

Heat Recovery

- Assess feasibility for potential inclusion in costing
  - *Look at supply-demand in 5 locations*
  - *Look at value of heat offset*
  - *Electricity and natural gas pricing*
  - *May cover up to ~60% of op + capital over 30 year life cycle*
- Strategic heat recovery systems
  - *Ingredients for success*





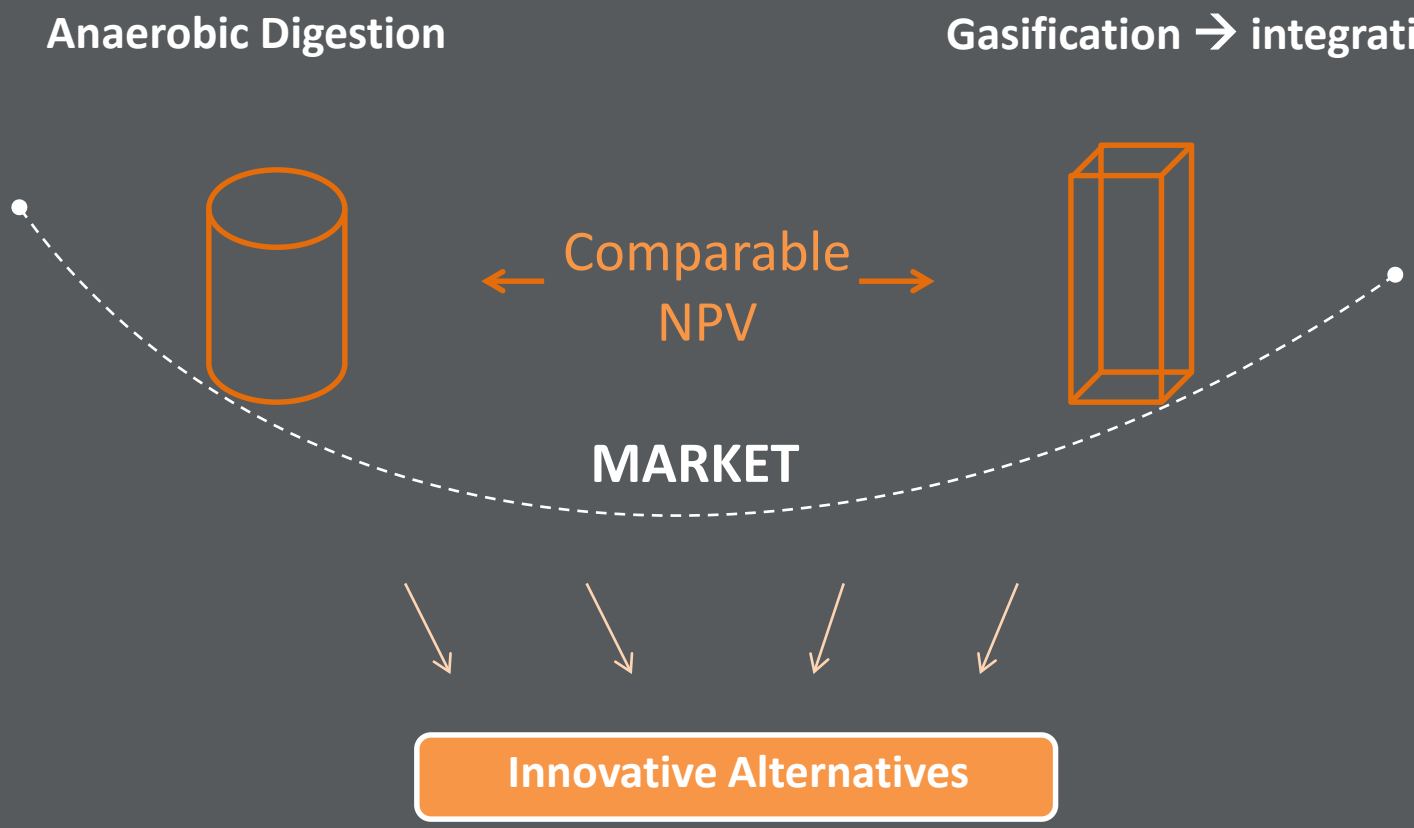
Heat Recovery

- Ingredients for success

Partnerships ready to pay for custom heating	*New development; public agencies*
Very low infrastructure systems	*New buildings on top of effluent main or adjacent WWTP*
Develop when price of natural gas >>> electricity	*Future? History says its possible*
Build incrementally	*Avoid big systems/costs with unknown payback*
Pursue cost-effective 'heat recovery' utilities	*Unlikely to pay for other wastewater assets*
Prepare Core Area for the concept and implement when case is solid	*Not included in base cost*

RFSI Objective

- 2 alternatives for the private sector to compete



URBAN systems

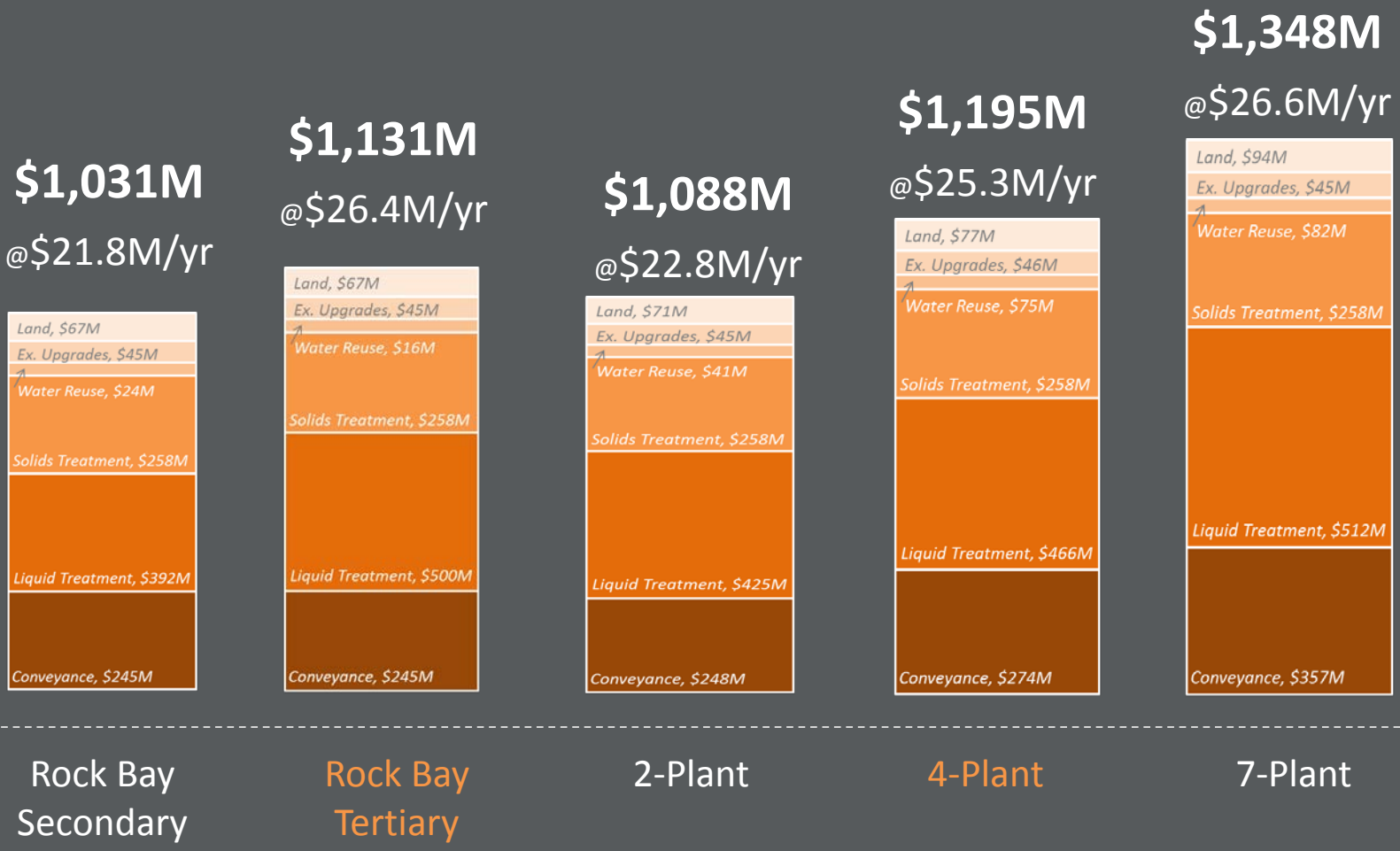
Hartland and Rock Bay

- Consider key factors for solids recovery siting
  - *Land value*
  - *Integration with wastes*
  - *Infrastructure cost*
  - *Land use and neighborhood*
  - *Residuals destination*

- Hartland offers more flexibility
  - *If integration to be pursued*
  - *Synergy with cogeneration*
  - *Space and time for market engagement*

Truck patterns and distances increase for the 4 and 7 plant options

URBAN systems



- NPV consistent with capital + operating rank
  - Except Rock Bay Tertiary which ranks 4th behind the 4-plant option

URBAN systems

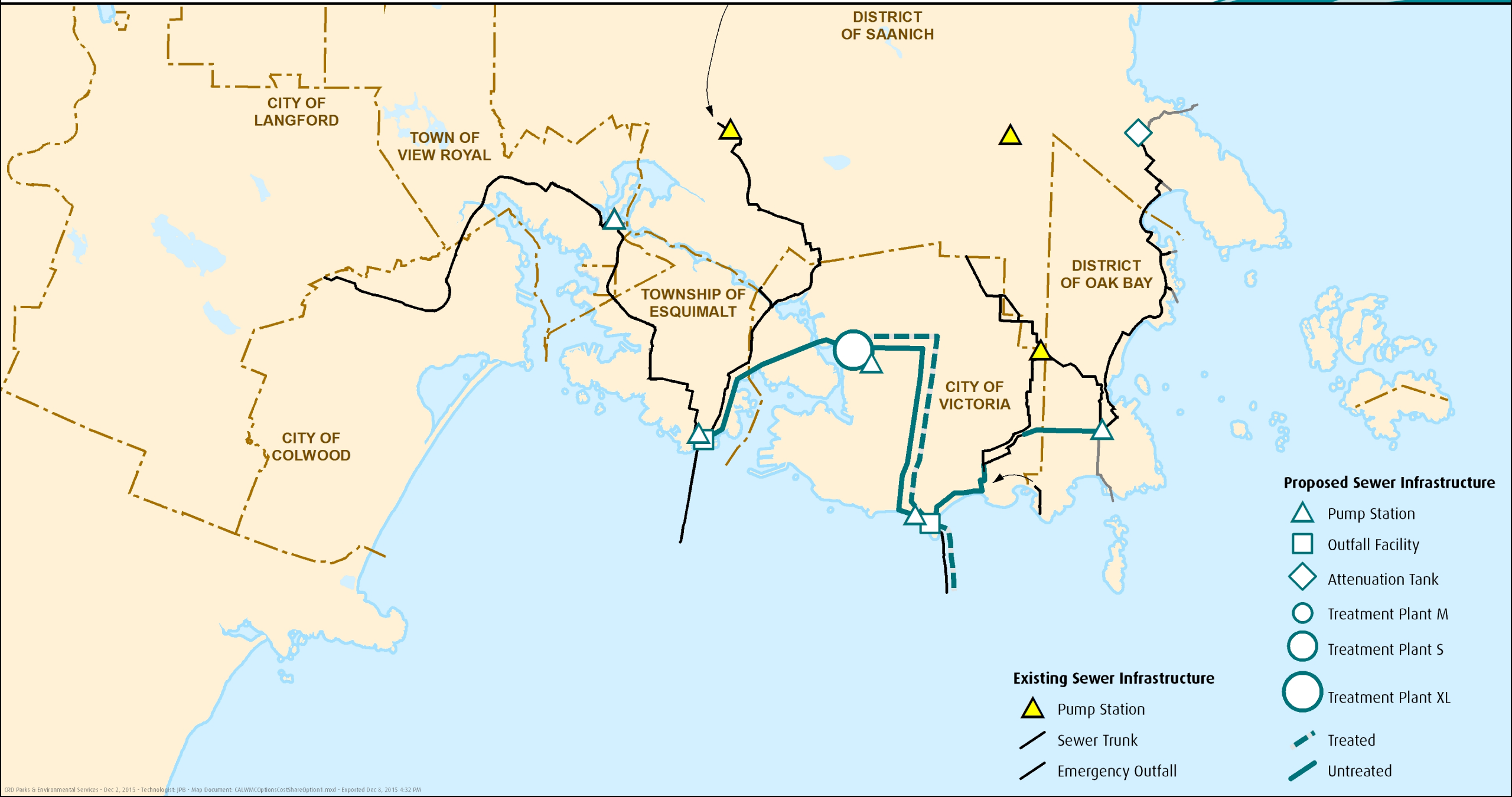
Considerations and Input

- Wastewater treatment levels of service & cost
  - *Secondary & tertiary*
  - *Water reuse*
- Solids Recovery → RFSI short-term
  - *Location either Rock Bay or Hartland*
    - *Add pumping/trucking costs if to Hartland*
    - *3P guidance on RFSI*
- Heat Recovery Feasibility

Thank You

URBAN systems

Option 1a & 1b



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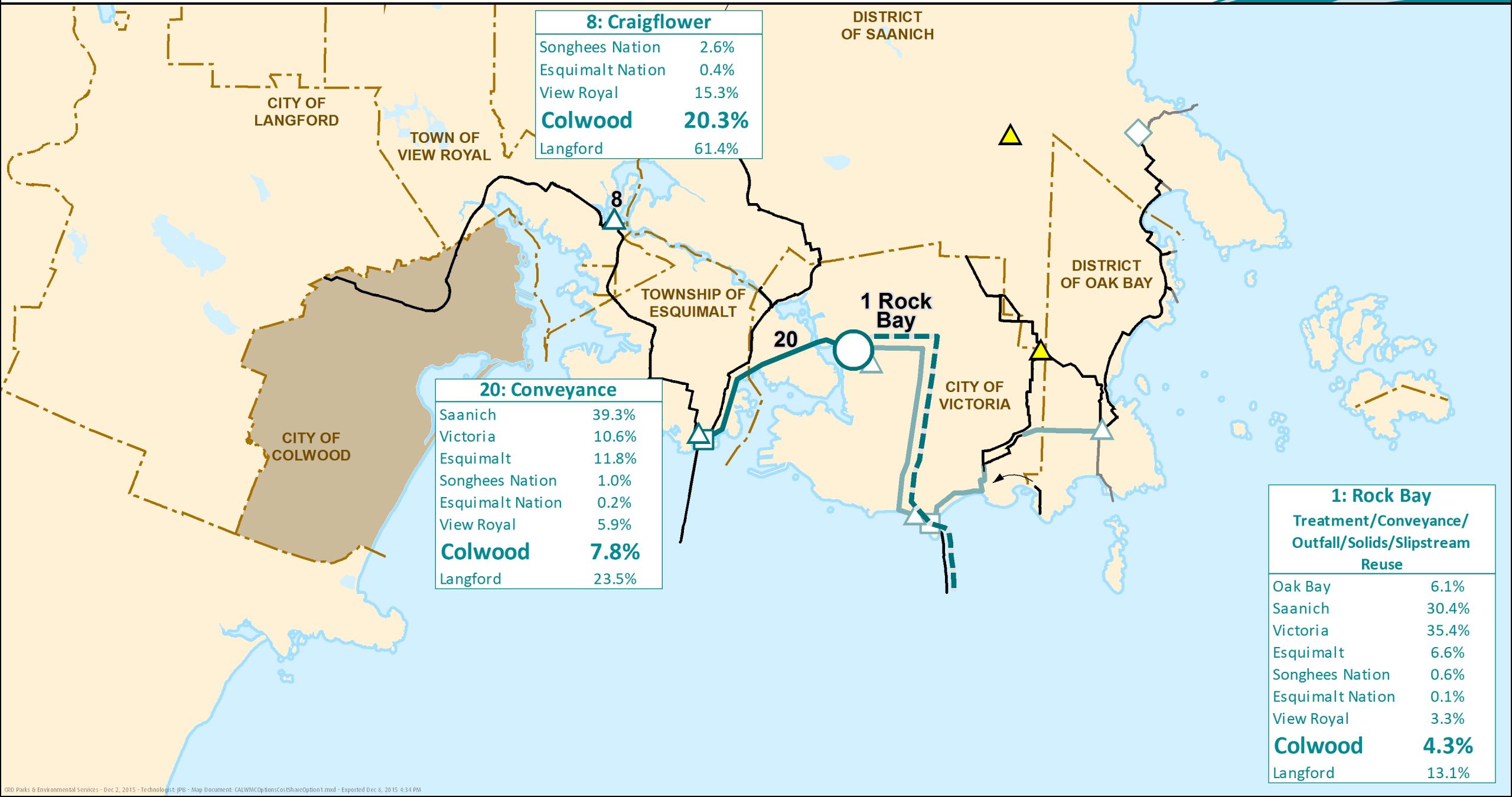
Option 1a & 1b

Colwood



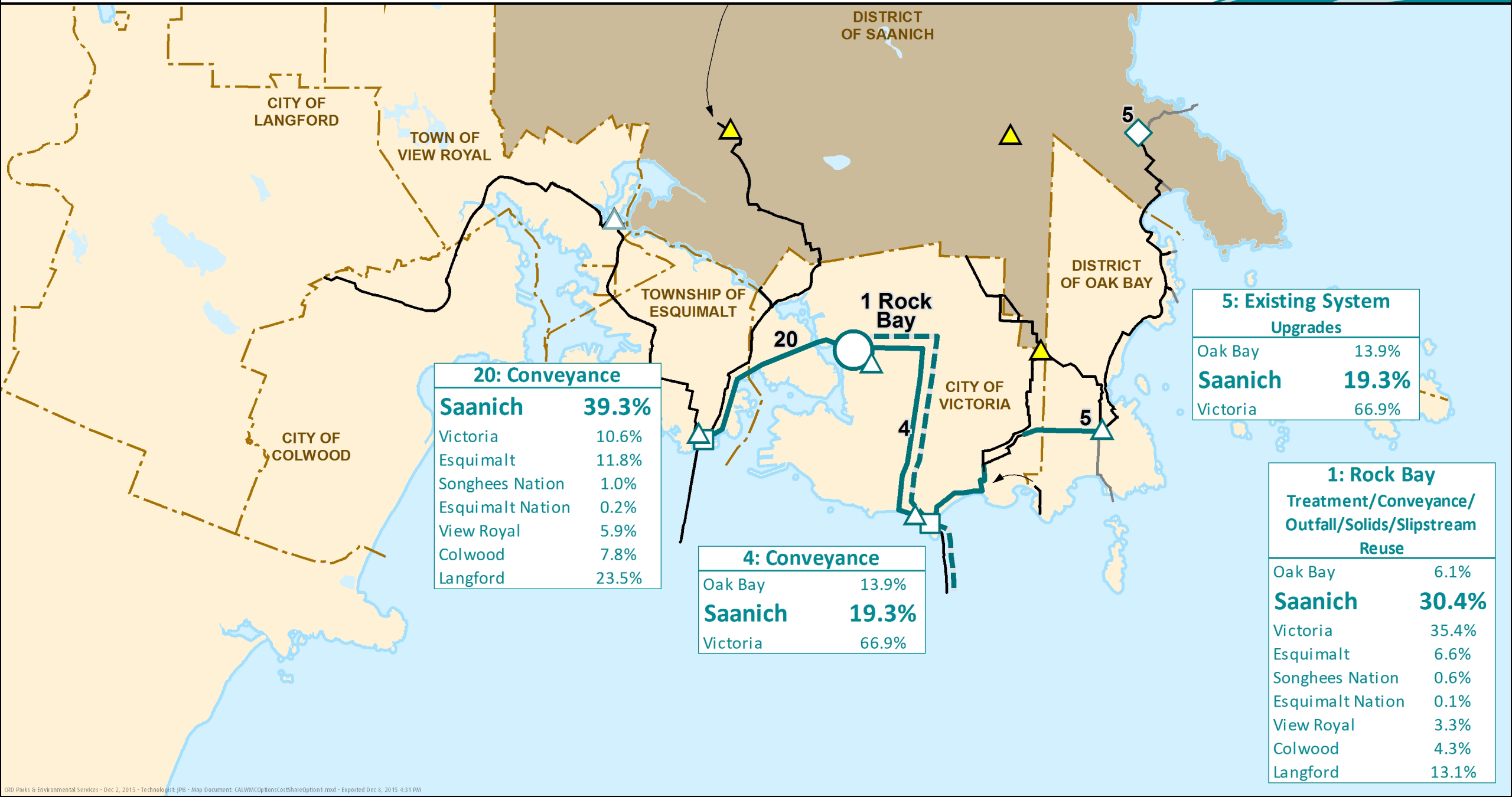
8: Craigflower	
Songhees Nation	2.6%
Esquimalt Nation	0.4%
View Royal	15.3%
Colwood	**20.3%**
Langford	61.4%

20: Conveyance	
Saanich	39.3%
Victoria	10.6%
Esquimalt	11.8%
Songhees Nation	1.0%
Esquimalt Nation	0.2%
View Royal	5.9%
Colwood	**7.8%**
Langford	23.5%

1: Rock Bay Treatment/Conveyance/ Outfall/Solids/Slipstream Reuse	
Oak Bay	6.1%
Saanich	30.4%
Victoria	35.4%
Esquimalt	6.6%
Songhees Nation	0.6%
Esquimalt Nation	0.1%
View Royal	3.3%
Colwood	**4.3%**
Langford	13.1%

Option 1a & 1b

Saanich



20: Conveyance	
Saanich	**39.3%**
Victoria	10.6%
Esquimalt	11.8%
Songhees Nation	1.0%
Esquimalt Nation	0.2%
View Royal	5.9%
Colwood	7.8%
Langford	23.5%

4: Conveyance	
Oak Bay	13.9%
Saanich	**19.3%**
Victoria	66.9%

5: Existing System Upgrades	
Oak Bay	13.9%
Saanich	**19.3%**
Victoria	66.9%

1: Rock Bay Treatment/Conveyance/ Outfall/Solids/Slipstream Reuse	
Oak Bay	6.1%
Saanich	**30.4%**
Victoria	35.4%
Esquimalt	6.6%
Songhees Nation	0.6%
Esquimalt Nation	0.1%
View Royal	3.3%
Colwood	4.3%
Langford	13.1%

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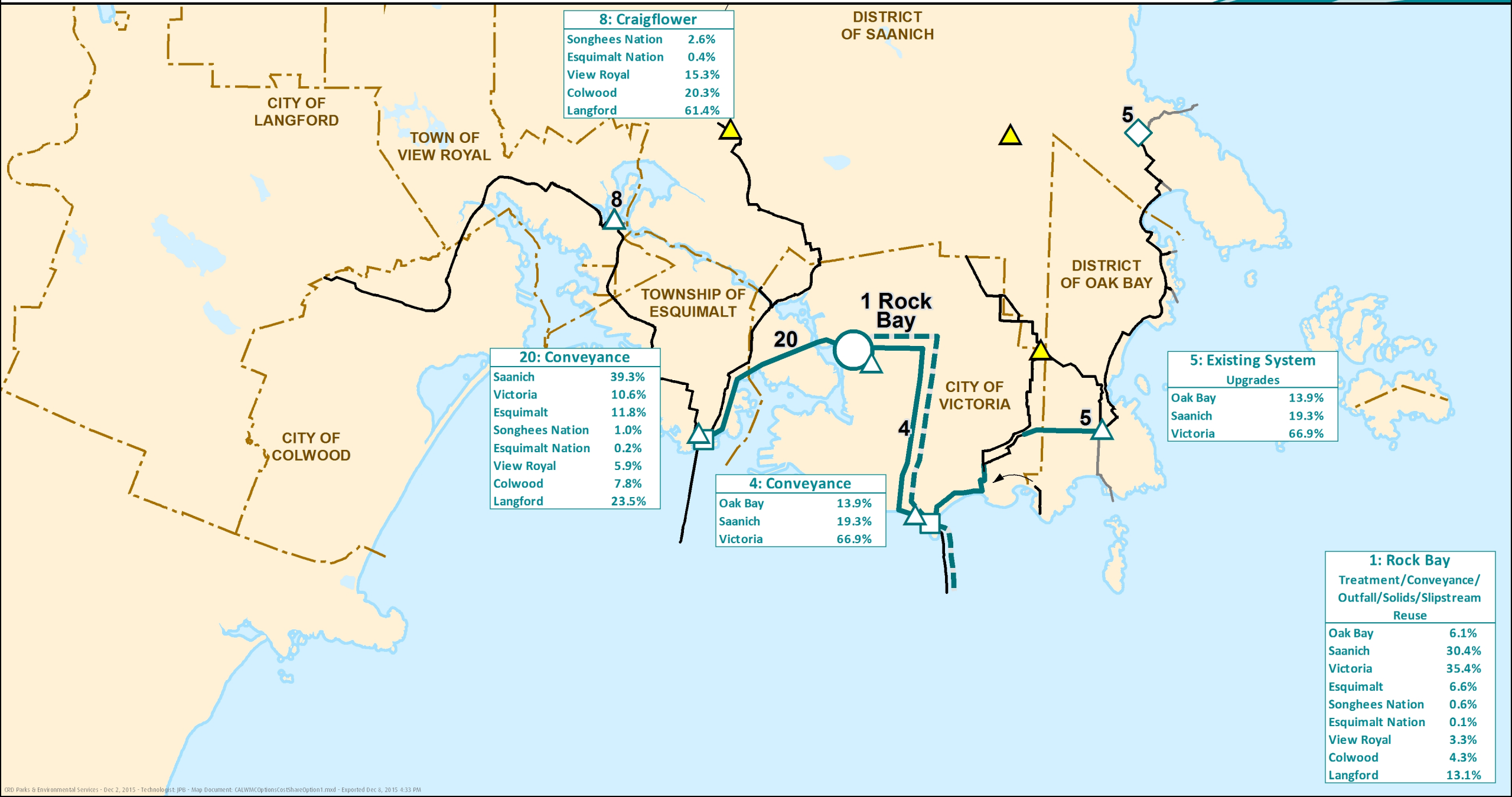
Option 1a & 1b



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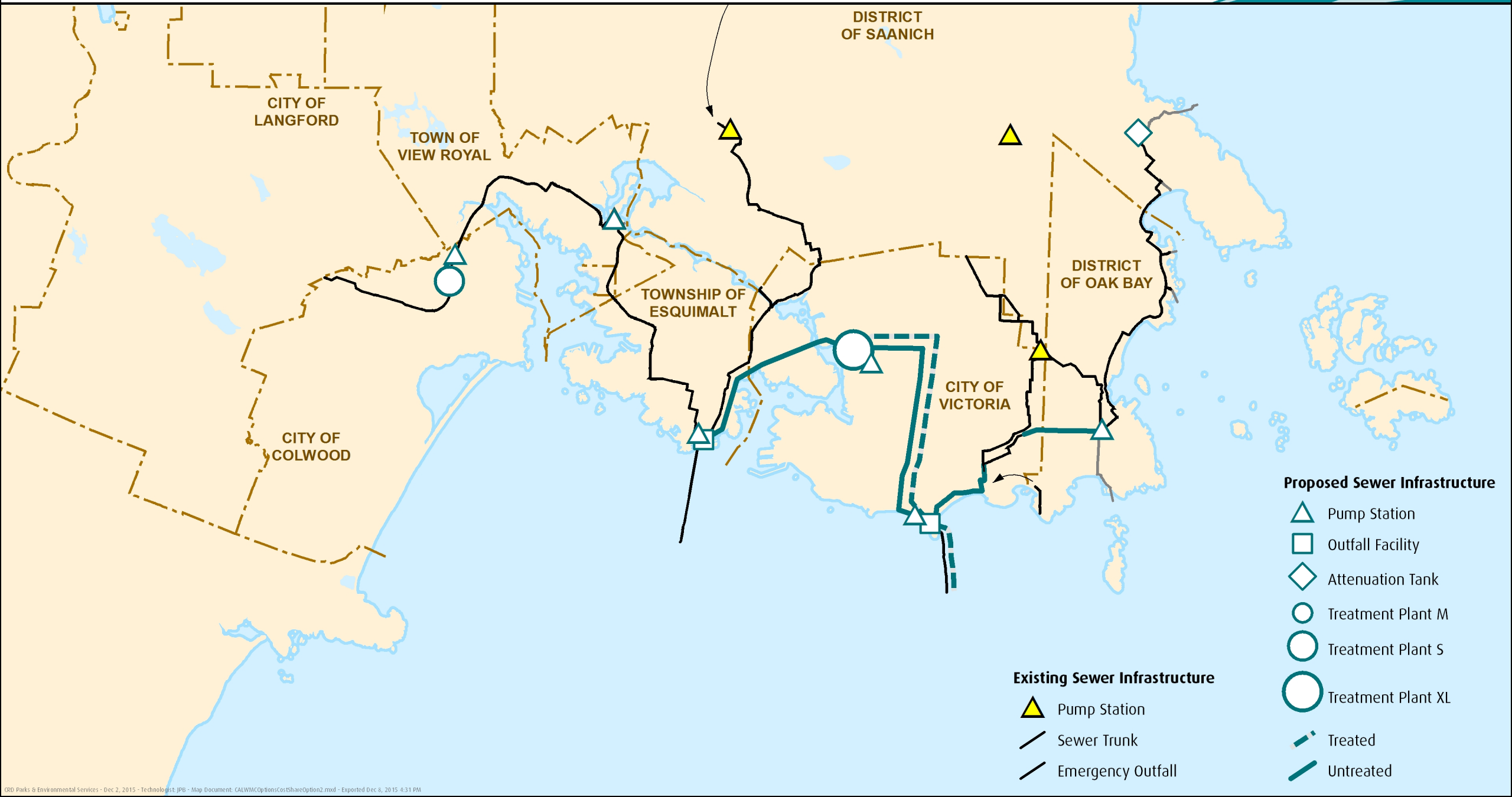
Option 2



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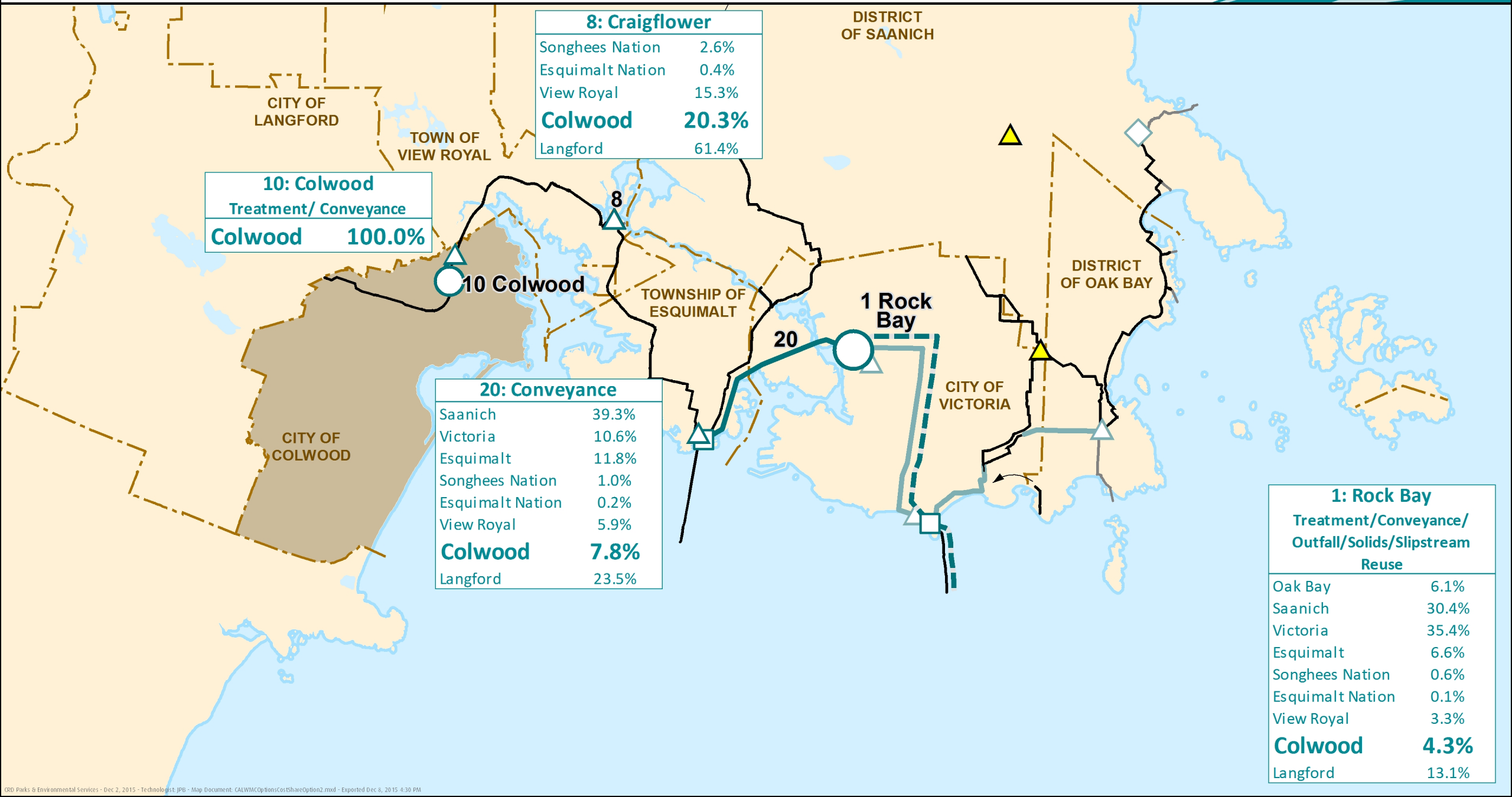
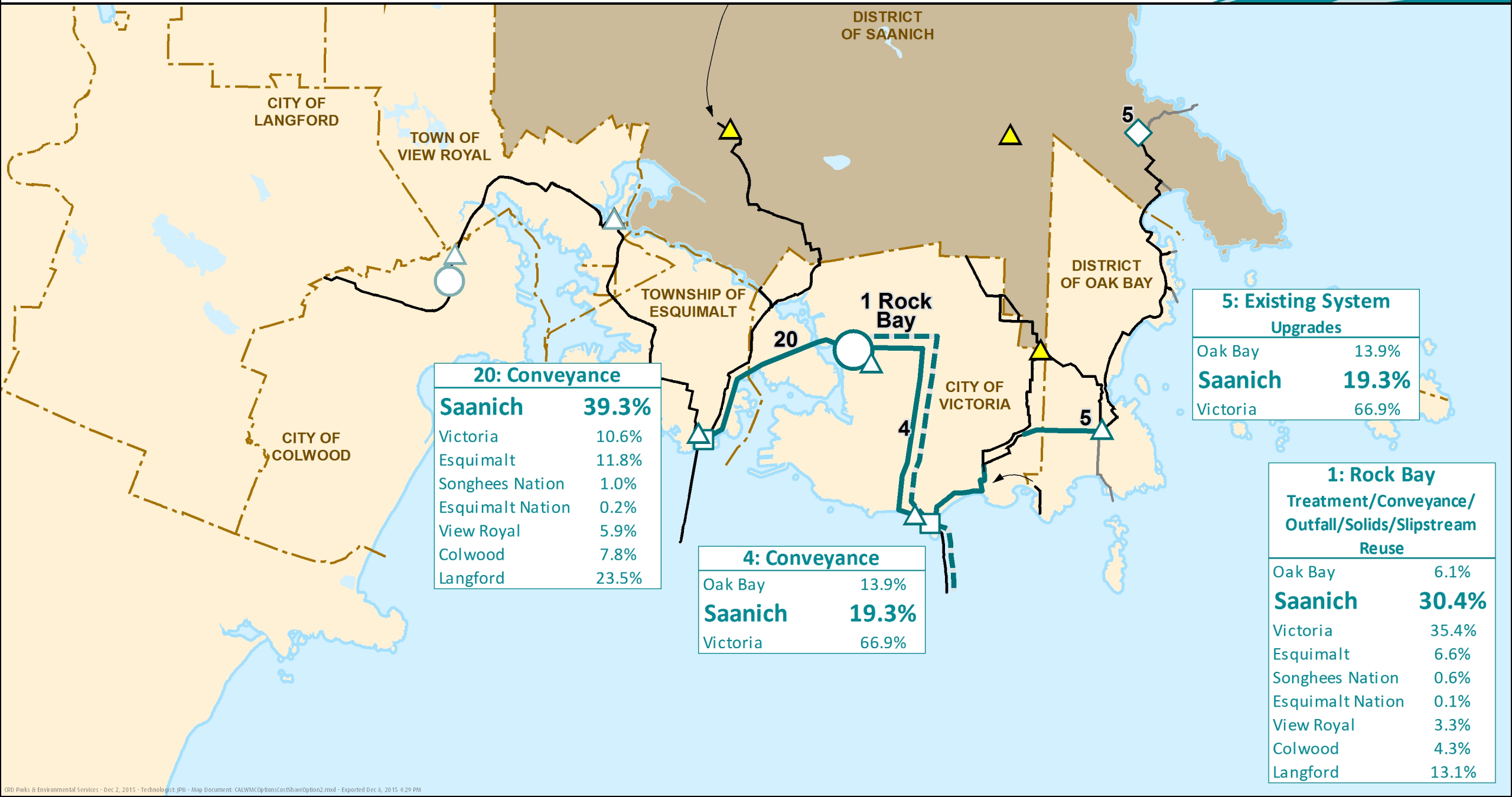
Option 2

Colwood



Option 2

Saanich



20: Conveyance	
Saanich	**39.3%**
Victoria	10.6%
Esquimalt	11.8%
Songhees Nation	1.0%
Esquimalt Nation	0.2%
View Royal	5.9%
Colwood	7.8%
Langford	23.5%

4: Conveyance	
Oak Bay	13.9%
Saanich	**19.3%**
Victoria	66.9%

5: Existing System Upgrades	
Oak Bay	13.9%
Saanich	**19.3%**
Victoria	66.9%

1: Rock Bay Treatment/Conveyance/ Outfall/Solids/Slipstream Reuse	
Oak Bay	6.1%
Saanich	**30.4%**
Victoria	35.4%
Esquimalt	6.6%
Songhees Nation	0.6%
Esquimalt Nation	0.1%
View Royal	3.3%
Colwood	4.3%
Langford	13.1%

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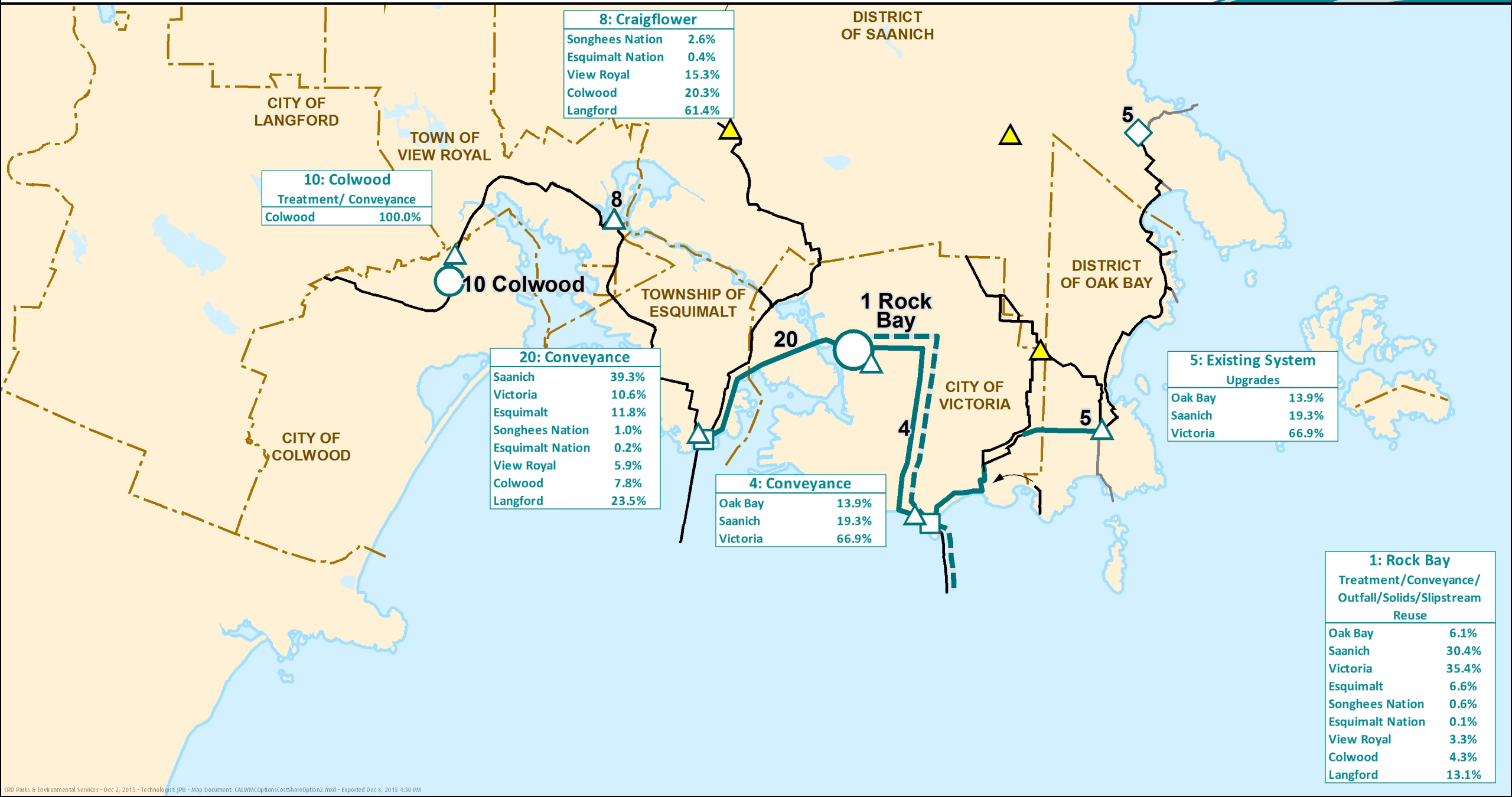
Option 2



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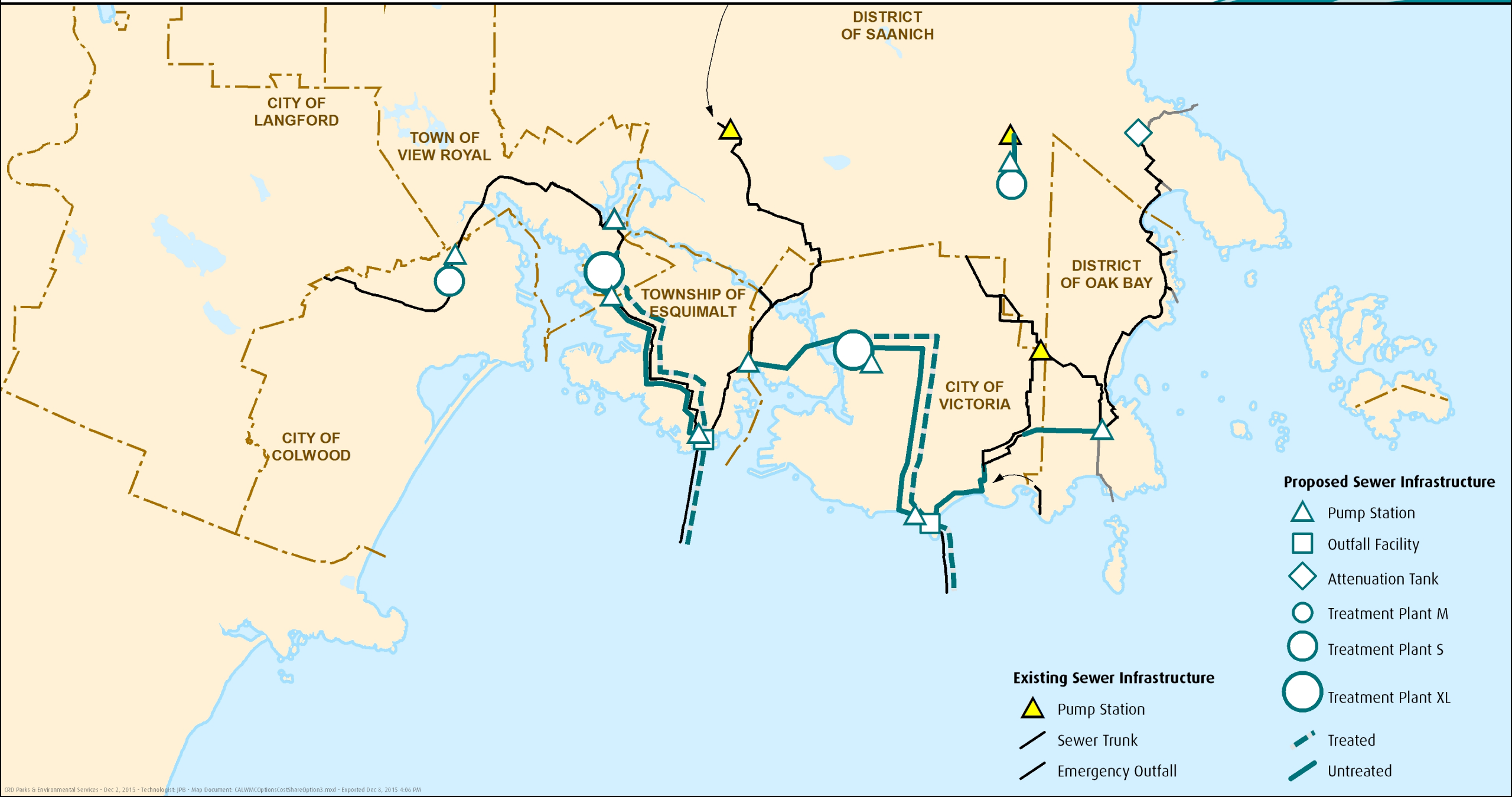
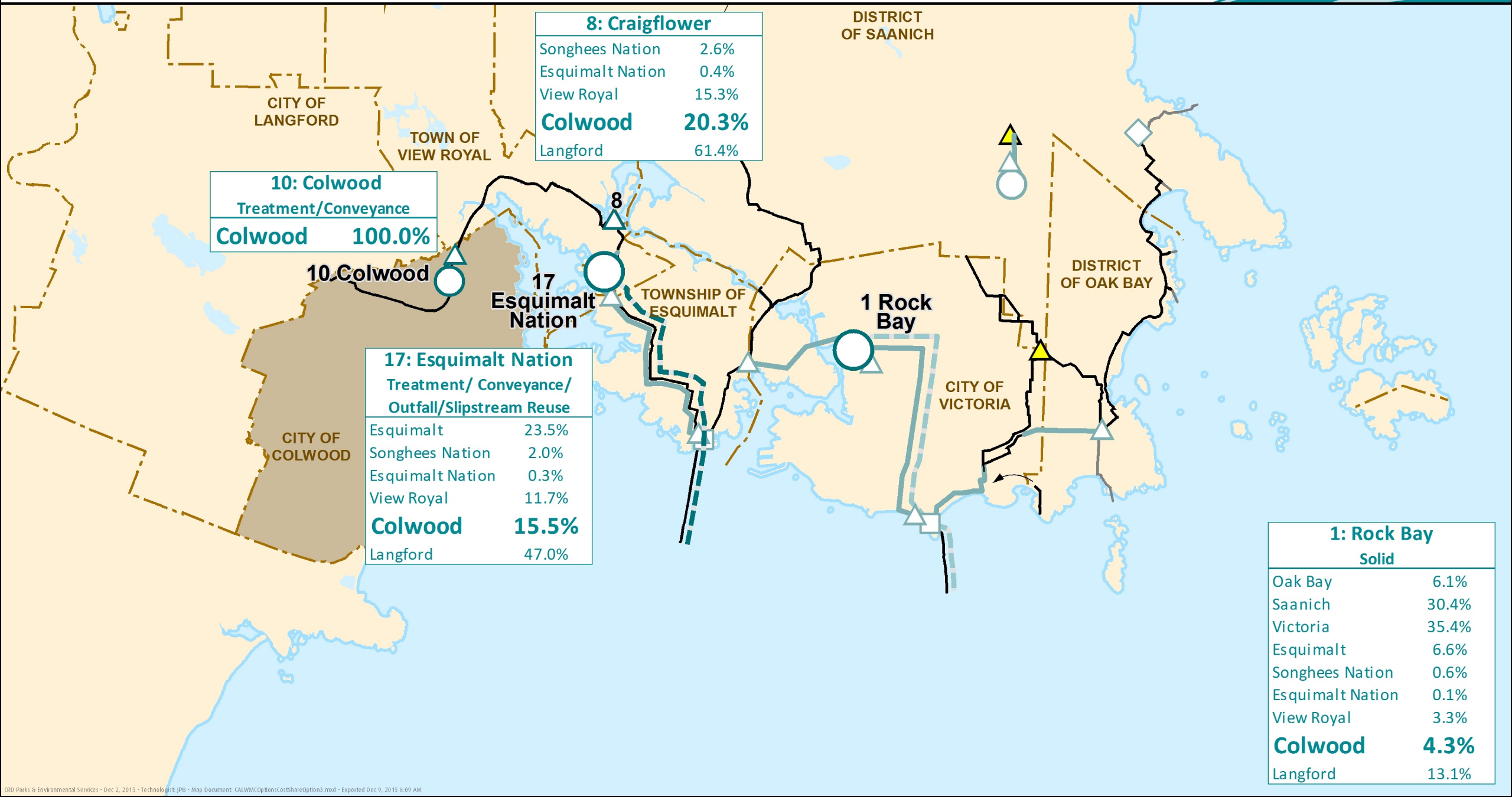


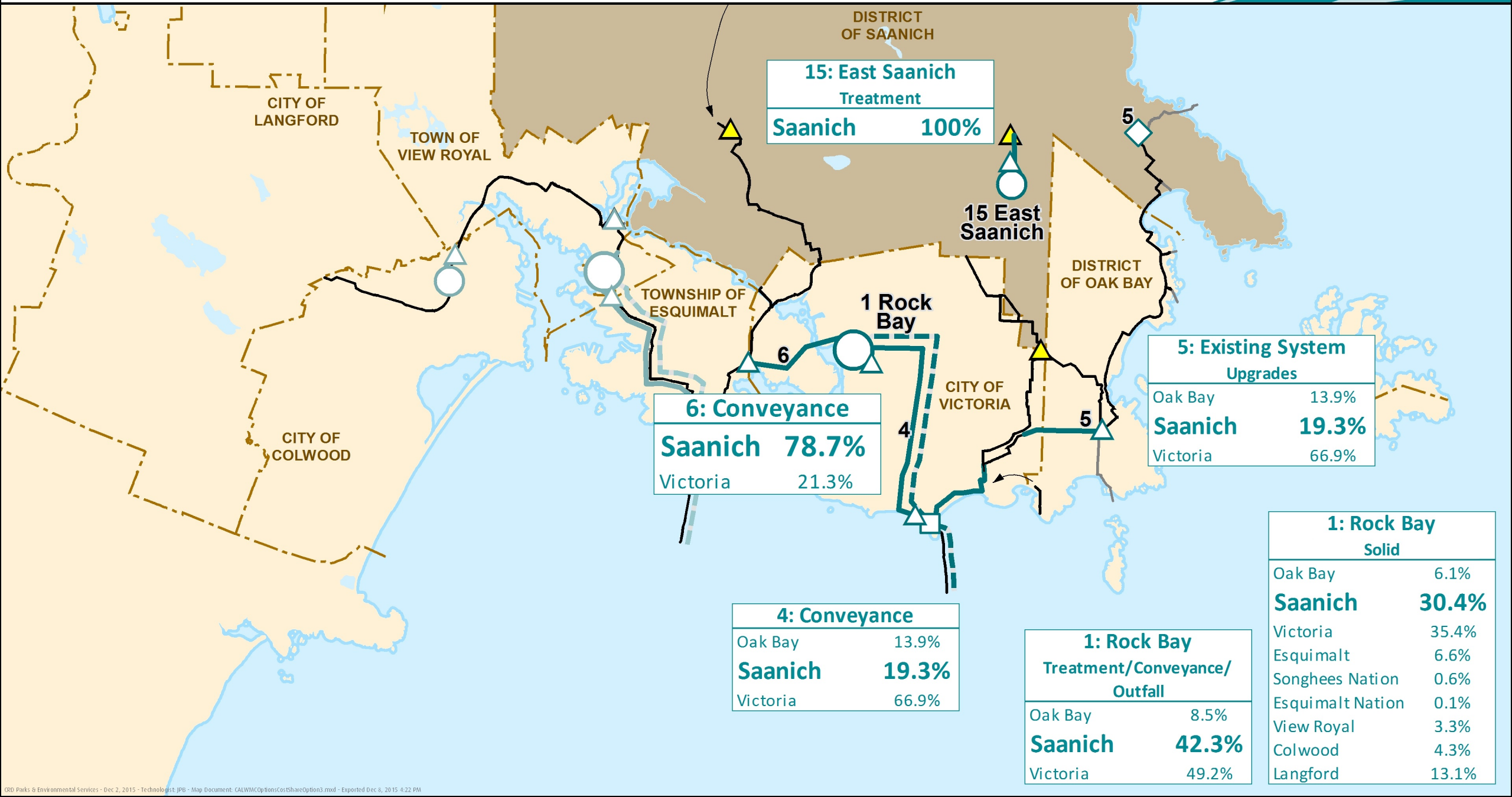
Option 3

Colwood



Option 3

Saanich



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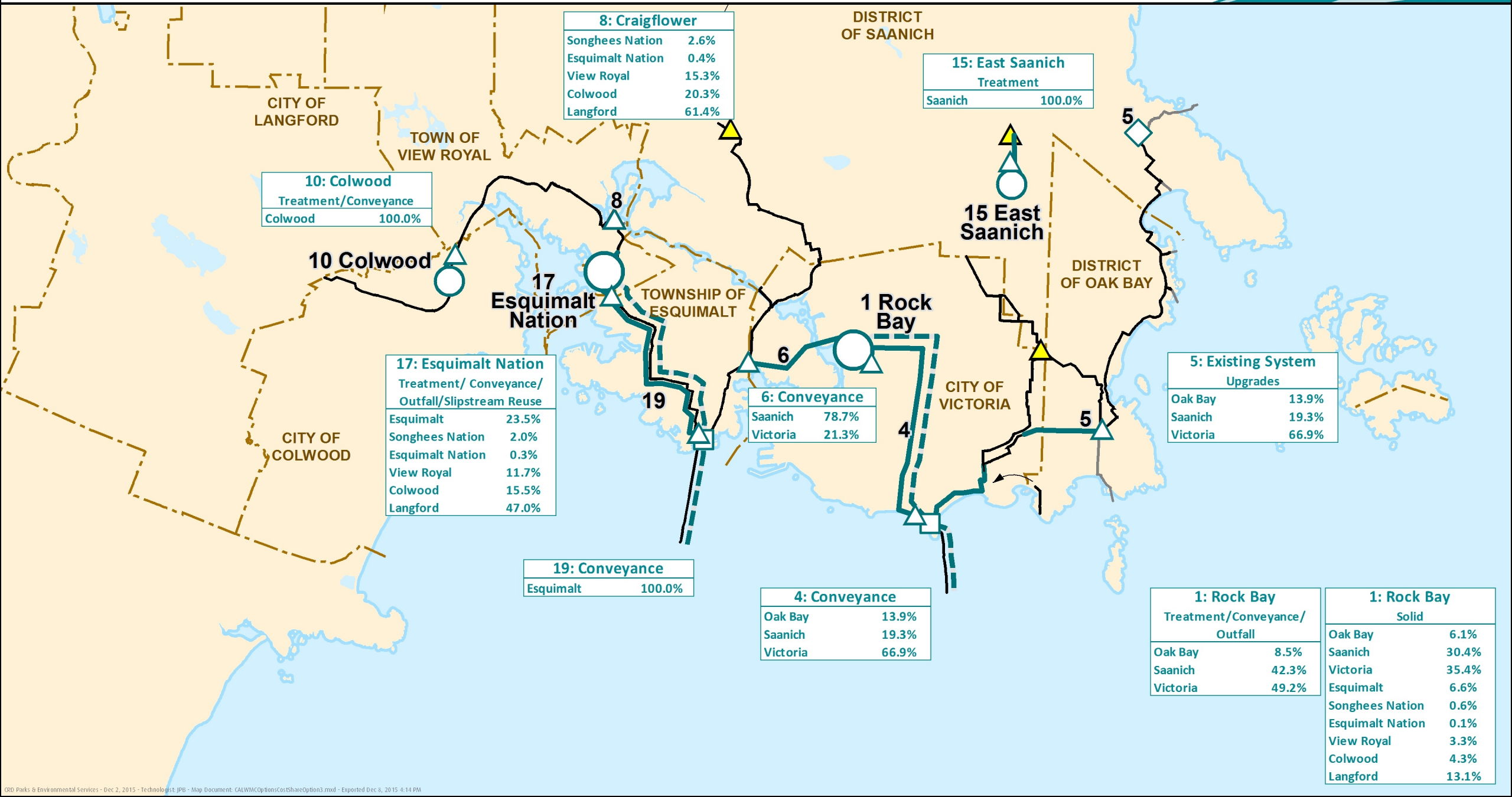

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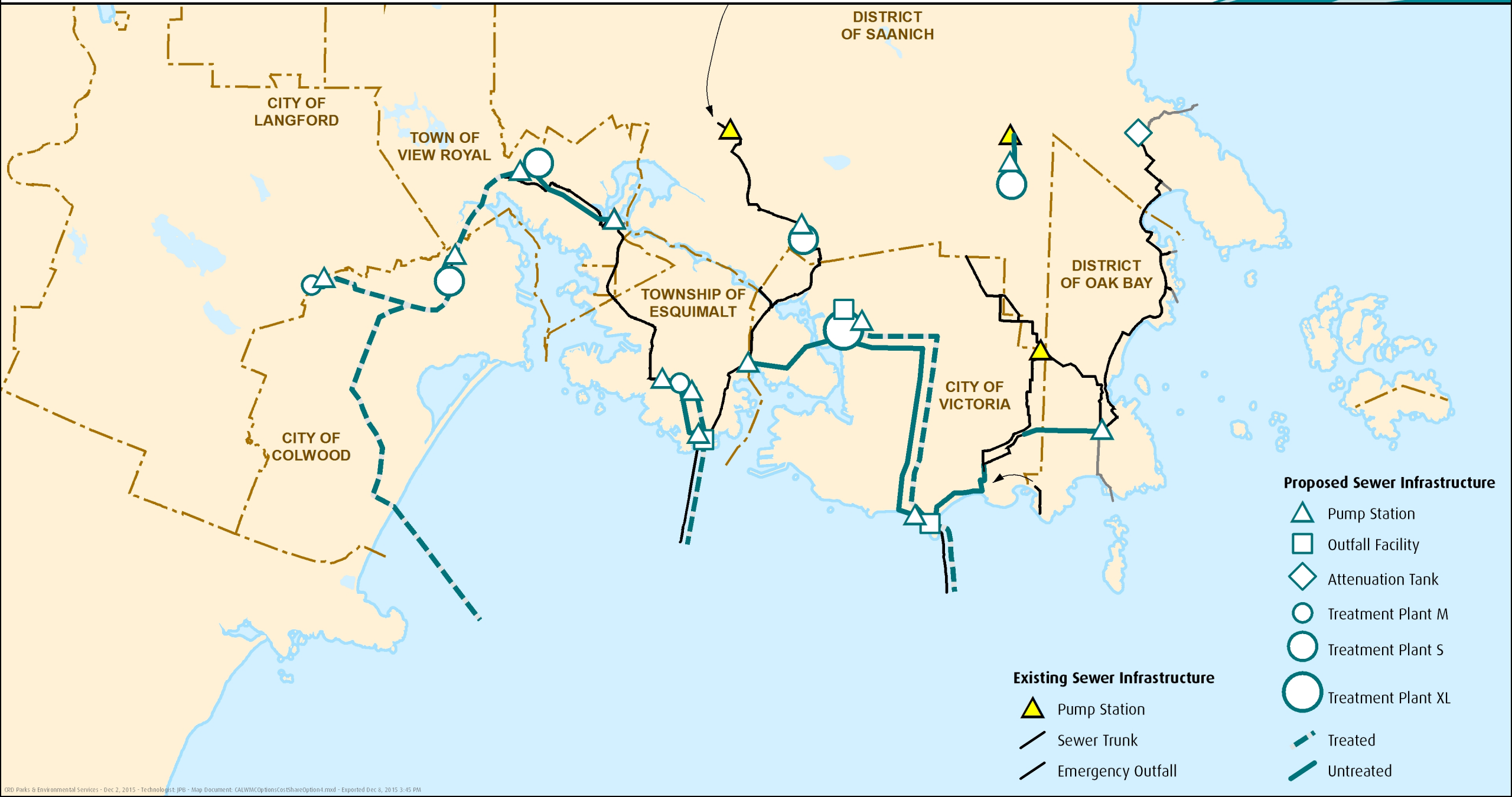
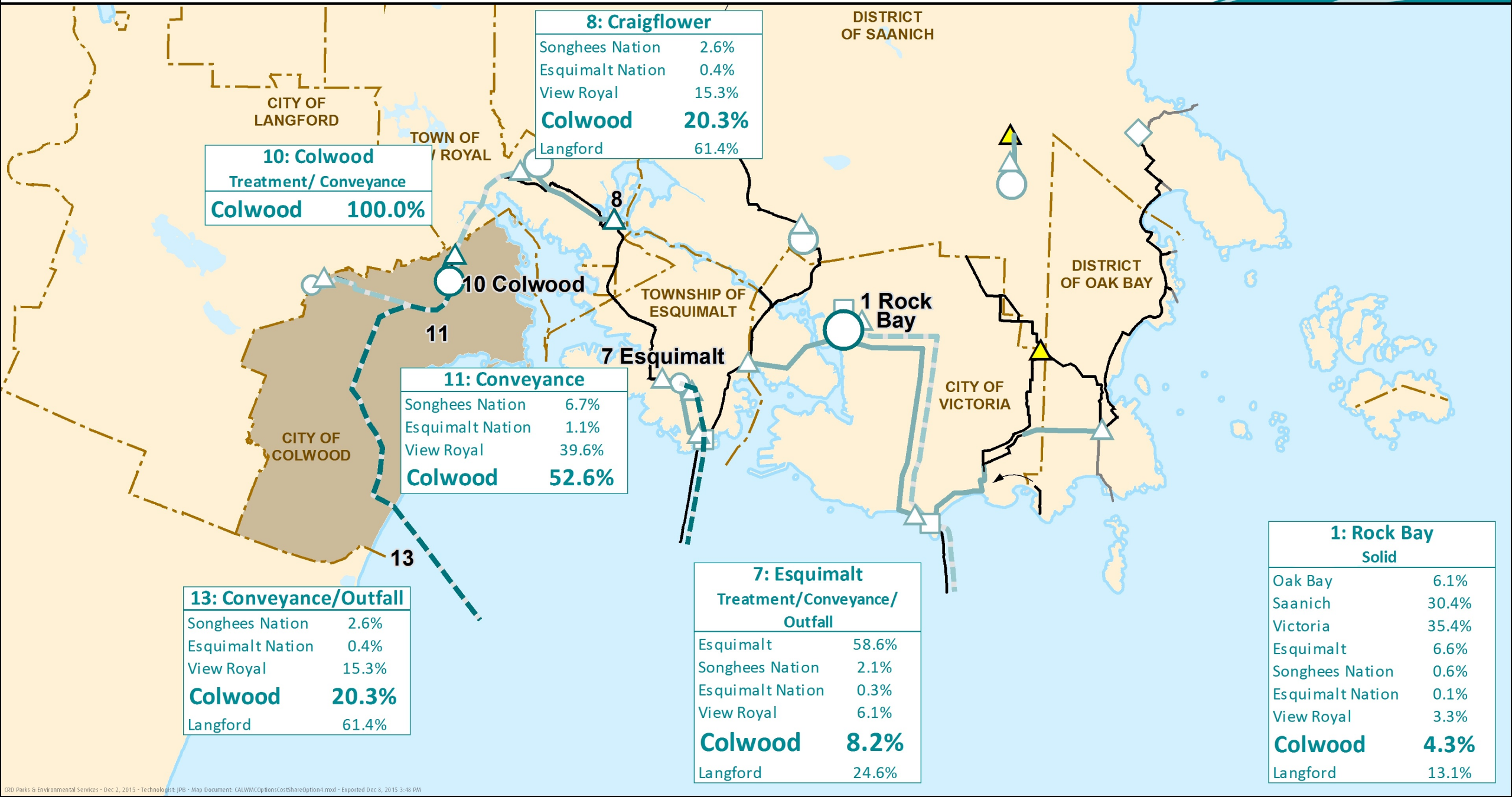
Option 4



Option 4

Colwood



8: Craigflower	
Songhees Nation	2.6%
Esquimalt Nation	0.4%
View Royal	15.3%
Colwood	**20.3%**
Langford	61.4%

10: Colwood Treatment/ Conveyance	
Colwood	**100.0%**

11: Conveyance	
Songhees Nation	6.7%
Esquimalt Nation	1.1%
View Royal	39.6%
Colwood	**52.6%**

13: Conveyance/Outfall	
Songhees Nation	2.6%
Esquimalt Nation	0.4%
View Royal	15.3%
Colwood	**20.3%**
Langford	61.4%

7: Esquimalt Treatment/Conveyance/ Outfall	
Esquimalt	58.6%
Songhees Nation	2.1%
Esquimalt Nation	0.3%
View Royal	6.1%
Colwood	**8.2%**
Langford	24.6%

1: Rock Bay Solid	
Oak Bay	6.1%
Saanich	30.4%
Victoria	35.4%
Esquimalt	6.6%
Songhees Nation	0.6%
Esquimalt Nation	0.1%
View Royal	3.3%
Colwood	**4.3%**
Langford	13.1%

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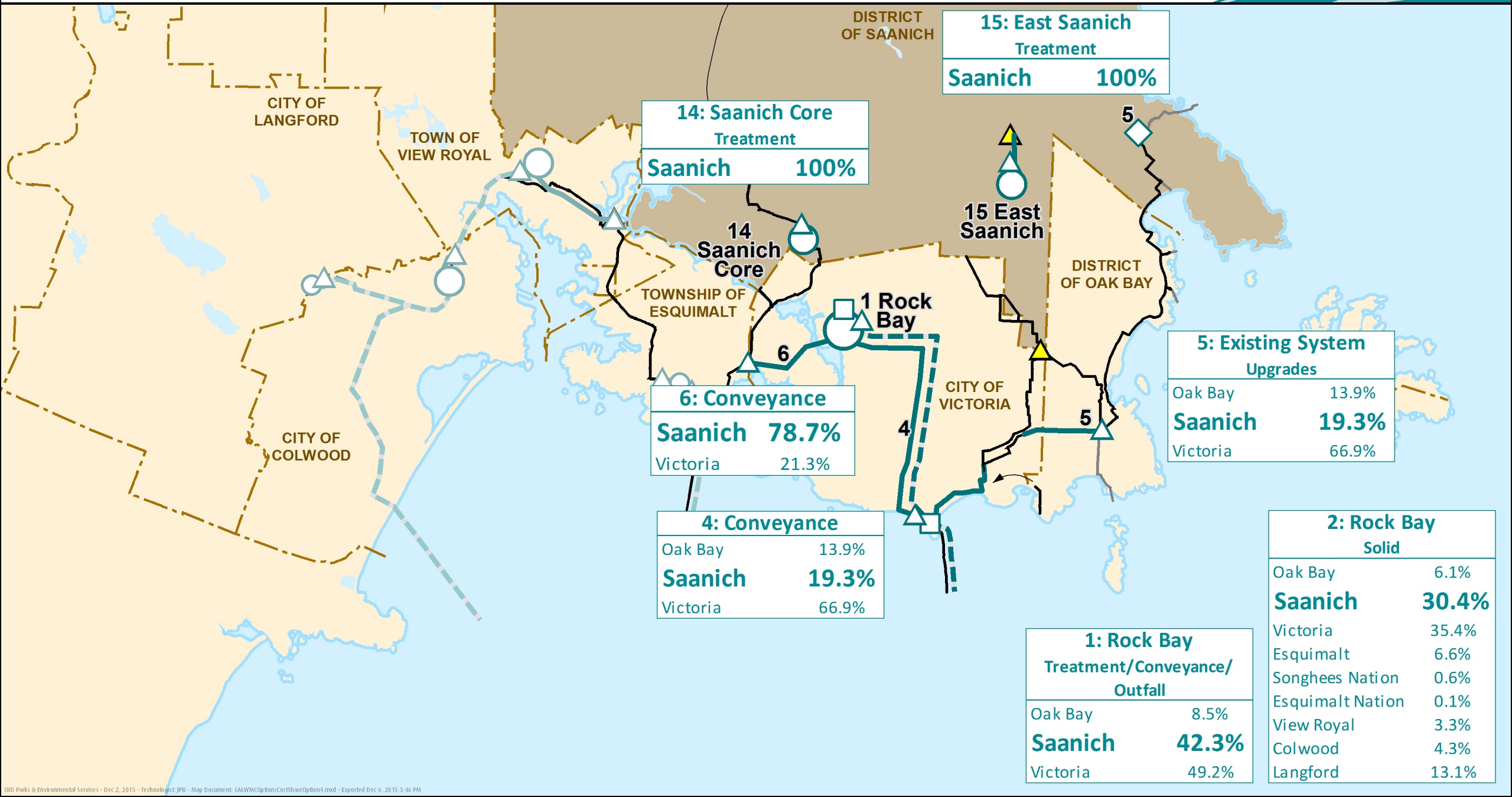
Option 4

Saanich



15: East Saanich
Treatment

Saanich	100%

14: Saanich Core
Treatment

Saanich	100%

5: Existing System
Upgrades

Oak Bay	13.9%
Saanich	**19.3%**
Victoria	66.9%

6: Conveyance

Saanich	**78.7%**
Victoria	21.3%

4: Conveyance

Oak Bay	13.9%
Saanich	**19.3%**
Victoria	66.9%

2: Rock Bay
Solid

Oak Bay	6.1%
Saanich	**30.4%**
Victoria	35.4%
Esquimalt	6.6%
Songhees Nation	0.6%
Esquimalt Nation	0.1%
View Royal	3.3%
Colwood	4.3%
Langford	13.1%

1: Rock Bay
Treatment/Conveyance/ Outfall

Oak Bay	8.5%
Saanich	**42.3%**
Victoria	49.2%

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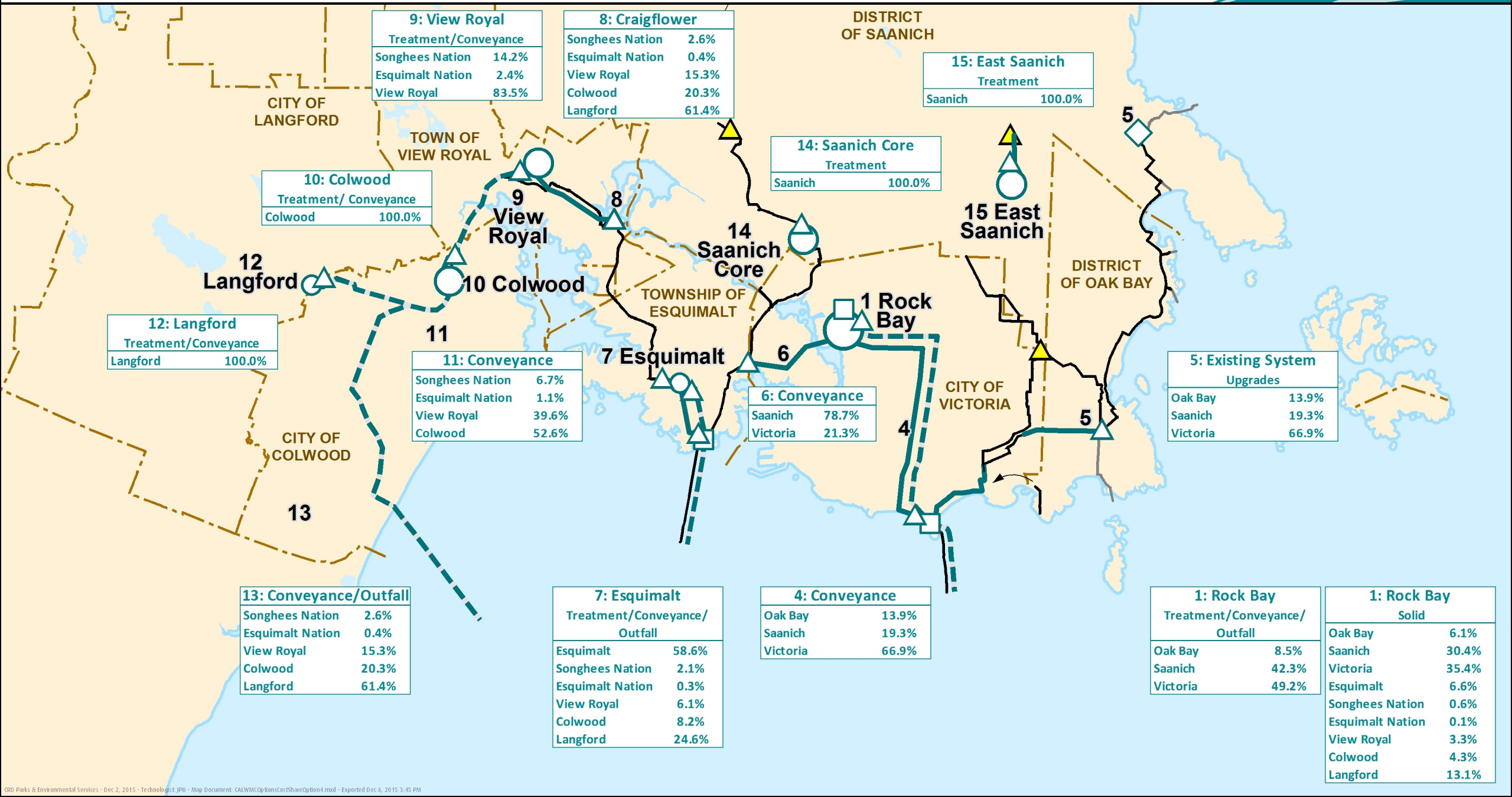
Option 4



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REPORT TO CORE AREA LIQUID WASTE MANAGEMENT COMMITTEE
MEETING OF WEDNESDAY, DECEMBER 9, 2015

SUBJECT **Draft Technical Memorandum #3 – Costing and Financial Analysis**

To provide the Core Area Liquid Waste Management Committee (CALWMC) with *Draft Technical Memorandum #3 – Costing and Financial Analysis*, as prepared by Urban Systems and Carollo Engineers, in addition to the cost allocations for each participant and estimated per household costs for each option set.

BACKGROUND

The Core Area Liquid Waste Management Committee, in collaboration with the Westside and Eastside Select committees, municipal and First Nations councils and staff, have been working through the Options Development Phase of the Core Area Sewage and Resource Recovery System 2.0 project.

The Capital Regional District (CRD) Board retained Urban Systems, partnered with Carollo Engineers, in August 2015 to conduct a costing and feasibility analysis of option sets for the conceptual configuration of sewage treatment and resource recovery for the Core Area. The Board also established a Technical Oversight Panel to provide independent oversight of the engineering and project analysis.

Urban Systems/Carollo submitted *Technical Memo #1 – Background and Technical Foundation*, providing project background, preliminary criteria, considerations for decision making and option set evaluation methodology for the Siting Options Development Phase of the project to the CALWMC committee in October, which was approved in final form at its meeting on November 4, 2015.

Technical Memo #2 (Final) – Review and Refine Option Sets, providing four siting option sets, along with preliminary site feasibility, technology needs and considerations, resource recovery opportunities and methodology for comprehensive costing and financial analysis, was initially submitted to the Committee in draft form on November 4, 2015. At that time, the CALWMC directed the consultants to include a fifth option, namely a full tertiary centralized option 1b, as recommended by the Technical and Community Advisory Committee.

Building on the work presented in the first two technical memos, *Draft Technical Memo #3 – Costing and Financial Analysis* is attached as Appendix A. The memo provides costing analysis, environmental impact and the resource recovery analysis for the five Option Sets 1a, 1b, 2, 3 and 4, as approved by the CALWMC above.

The estimated costs provided in *Draft Technical Memo #3* have been further analyzed by staff to apportion capital and operating costs to each participant in the service along with estimated annual costs per household (appendices B through F).

ALTERNATIVES

Alternative 1

That the Core Area Liquid Waste Management Committee direct staff to proceed with public consultation on the financial and environmental analysis of the five option sets as presented in *Draft Technical Memo #3 – Costing and Feasibility Analysis* by Urban Systems/Carollo Engineers.

Alternative 2

That the Core Area Liquid Waste Management Committee direct staff to proceed with public consultation based on the decisions of the Committee following the consideration of the option sets presented in *Draft Technical Memo #3 – Costing and Feasibility Analysis* by Urban Systems/Carollo Engineers and financial information provided by staff.

FINANCIAL IMPLICATIONS

Capital costs of the options as presented by Urban Systems/Carollo Engineers range from $1.031 billion to $1.348 billion, with operating costs ranging from $21.8 million to $26.6 million annually at 2030.

Appendix B provides the breakdown of annual flows by population equivalent and purchase capacity for each participant.

Apportionment of costs has been conducted on the principle of design capacity benefit, consistent with the establishment bylaw for the service and the principles laid out in the Project Charter. Major cost elements for each option, including conveyancing, land, liquid treatment, solids treatment and resource recovery, are apportioned to those participants, making use of each respective element based on a percentage of flow (provided in Appendix C-1 and C-2).

For example, for Option 1a and 1b, a centralized liquid and solids treatment facility, all participants in the service contribute to the land, liquid and solids treatment and reuse costs based on the overall distribution of design flows, but each may have different costs related to conveyancing, depending on whether new trunk mains or pump stations are needed to direct their flows to the facility.

Another example relates to redundancy. In Options 2, 3 and 4, the land, reuse and treatment costs for small tertiary plants constructed without an outfall, serving a single participant and intended for effluent reuse for irrigation or groundwater recharge, are allocated solely to the participant for which the plant serves, in addition to the participant's prorated capacity share in the wastewater treatment facility downstream. Under the *Municipal Sewage Regulation*, redundancy must be provided in the event the tertiary plant fails to meet effluent quality standards such that the effluent cannot be beneficially reused as intended.

A presentation will be made at committee that includes system configuration maps for each option with explanatory notes that detail what percentage will be paid by which participant for each element in the system. These maps will be made available as part of the public consultation materials.

Appendix D-1 and D-2 provide the breakdown of capital cost by participant for each option, including total capital cost and net capital cost after grant funding.

Significant changes to the grant components, (eg. more than 25% of the scope) will require a reconsideration by senior levels of government with regard to potentially revising the agreements. Application of existing grant funds to each option set, and a summary of existing grants, are notated in Appendix E. The PPP Canada grant for biosolids has been applied at the maximum 25% allowed, and since the current projected cost is lower than the original program, the CRD cost is reduced and the federal grant is reduced by $18.9 million.

Staff have commenced a review of new and existing grant opportunities to support the project up to a full two-thirds grantable share and report back to committee on opportunities. The CRD will be in a much better position to apply for additional grant funds once a preferred option has been selected by the CALWMC and the Board.

Appendix F provides the annual costs, debt servicing and operating costs, for each participant and estimated per household costs at 2030.

ENVIRONMENTAL IMPLICATIONS

The consultants have summarized the system configurations for each option in Section 4.0 of the draft memo. Included in the summaries is a ranking order of the options with regards to environmental impacts, including carbon footprint (accounting for multiple factors), percentage of effluent meeting tertiary effluent quality and ratios of income to costs for resource recovery opportunities. This information, along with the costs, will form the basis for the consultation materials.

CONCLUSION

Draft Technical Memo #3 – Costing and Feasibility Analysis by Urban Systems/Carollo has been prepared and reviewed in draft by the Technical Oversight Panel. The information is ready to be shared with the public for consultation to receive feedback on the costs and environmental
trade-offs between the options.

RECOMMENDATION

That the Core Area Liquid Waste Management Committee direct staff to proceed with public consultation on the financial and environmental analysis of the five option sets as presented in *Draft Technical Memo #3 – Costing and Feasibility Analysis* by Urban Systems/Carollo Engineers.

Submitted by:	Dan Telford, P.Eng., Project Manager, Core Area Wastewater and Resource Recovery Project
Concurrence:	Larisa Hutcheson, P.Eng., General Manager, Parks & Environmental Services
Concurrence:	Diana Lokken, CPA, CMA, General Manager, Finance and Technology
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

DT:mer

Attachments: Appendix A – Draft *Technical Memorandum #3 – Costing and Financial Analysis*
Appendix B – Annual Flows by Population Equivalent (at 2030)
Appendix C-1 and C-2 – Capital Allocations by Major Component Category
Appendix D-1 and D-2 – Project Capital Cost Breakdown by Major Component Category
Appendix E – Grant Application Summary
Appendix F – Annual Estimated Cost Per Household (at 2030)

APPENDIX A

December 4, 2015

Capital Regional District

Core Area Liquid Waste Management Plan

Phase 2: Wastewater Treatment System Feasibility and Costing Analysis

Technical Memorandum #3 - Costing and Financial Analysis

Project: 1692.0037.01
urbansystems.ca
402 – 645 Fort Street
Victoria, BC, V8W 1G2

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Appendices

1.0 REPORT SUMMARY & OVERVIEW

Life-cycle costing analysis provides the Core Area Liquid Waste Management Committee (Committee) with financial information on five wastewater option sets for treatment and resource recovery. Each option set provides notable differences with respect to locations of treatment, levels of service for treated effluent, new piping and conveyance infrastructure, and opportunities for water reuse and heat recovery at select locations across the Core Area. While the option sets adhere to engineering and regulatory standards, they are suited to the local context by way of design consideration to public consultation results, Committee resolutions and direct references to the Project Charter which guides, the Phase 2 work to date.

Technical Memorandum #3 presents the life cycle costing results and includes the relative performance of each option set against the Project Charter and Committee aspirations. While costing results frame part of the feasibility for a given option set, illustrating the performance of an option set in light of the project criteria supports the Committee's need to provide direction on a system of upgrades and services. Results of this memo are presented to the Committee for potential direction regarding public consultation for each option set and to uncover public sentiment for levels of service and cost. Input provided by the Technical and Community Advisory Committee, technical and administrative staff of each of the Core Area municipalities and First Nations frames the presentation to the Committee and continues to be an important resource for this evaluation and decision-making process.

Cost estimates for the five option sets are based on factors outlined in Technical Memorandum #1 and comply with the terms of reference. Cost estimates in Technical Memorandum #3 differ from the previous liquid waste management plan because the five proposed option sets reflect a markedly different suite of conditions and factors, such as:

- The terms of reference for Phase 2 clarify that the primary project objective is to characterize the performance of new option sets against revised goals and criteria;
- Cost estimate contingencies for Phase 2 (2015) are 35%, whereas previous liquid waste management plans included contingencies of 14% and 20% for treatment and conveyance, respectively;
- Phase 2 cost estimates include piping and pumping infrastructure (not treatment) sized for a potential 2045 flow scenario rather than the 2030 flow scenario (to avoid the unnecessary and costly impact of upgrading systems within 10 years after construction);
- Cost estimate unit rates for Phase 2 are derived from separate databases and project experiences and do not directly align with estimates of the previous plan; and
- Option sets reflect different sites which have been brought forward by member municipalities.

Cost estimates for Phase 2 reflect a new direction in liquid waste management as outlined in the five option sets. It is common for cost estimates to be conservative at the conceptual stage and they include multiple factors with varying levels of uncertainty. Indeed, it is common that cost estimates tend to improve and often decrease as more investigation and optimization is complete on the preferred option

set. Technical Memorandum #3 provides the results of life cycle costing analysis and includes criteria performance as it relates to the Project Charter.

1.1 Technical Process Update

Engineering and financial feasibility studies are iterative. Each issue or design element undergoes scoping, testing, refinement and costing. Typically, the iterative process repeats itself to stimulate ideas, strengthen the foundation of solutions and often to reduce project scope and cost. While most engineering and feasibility studies include iterative analysis, Phase 2 for the Core Area has been aided by multiple teams and committees, each looking to significantly contribute towards option sets: collaboration with the Technical Oversight Panel, Westside Technical Staff, Eastside Technical Committee and the Technical and Community Advisory Committee has improved the option sets. Key innovations and technical updates related to Phase 2 include:

- **Efficient Pumping:** Option set configurations in Technical Memorandum #2 included a pump station at Gorge Road to capitalize on redirecting flows to Rock Bay over a shorter distance and reduced pumping needs. Costing for TM#3 reveals that constructing one pump station at Macaulay Point to Rock Bay will be more efficient and as a result, reduces capital and operating costs.

- **Wet-Weather Treatment Facilities:** **O**ption set configurations in Technical Memorandum #2 identified the potential for a primary treatment facility at Clover Point for flows in excess of 2x average dry weather flow. The driver for this strategy was to reduce the size of pipes and pumps from/to Clover Point to Rock Bay. Costing for TM #3 reveals that centralizing wet-weather treatment at Rock Bay will reduce capital costs.

- **Sidestream Treatment and Water Reuse:** Each option set includes the provision for water reuse. Providing sidestream tertiary plants allows for reuse systems that treat only enough *supply* to meet potential *demands.* A facility in Colwood, if approved by the Ministry of Environment, would be a leading-edge water reuse system utilizing aquifer recharge and soil irrigation for up to 100% of flows. There are few facilities in Canada capable of achieving this standard and as a concept, provides for interesting public input on choices for water reuse. Overall, while treating to tertiary levels has some appeal, it does come with higher capital and operating costs. Pursuing sidestream water reuse at all facilities in the 1, 2, 4 and 7 plant option sets illustrates the relationship of increased levels of service for water and the associated cost.

- **Harbour Outfall Concept Check:** There is a significant cost to convey treated effluent from Rock Bay back to Clover Point Outfall such that some interest emerged into the feasibility of reducing the outfall and relocating it to the Harbour. An environmental impact study is ultimately needed to assess the potential for this approach; however costing for Technical Memorandum #3 reveals that the extra treatment costs would outweigh potential outfall cost savings by a factor of roughly 2 to 1.

- **Integration with Solid Waste for Expanded Resource Recovery:** Incorporating resource recovery for both wastewater solids and municipal solid waste is growing in feasibility and application. Phase 2 uncovers key tactics for integration and provides information to allow the CRD to build a road-map to consider integrated resource recovery.
- **Phasing-in Enhanced Treatment:** Making the jump from preliminary treatment (e.g. screens) to secondary treatment (and beyond) will mark a significant advancement in wastewater and environmental performance for the Core Area. Regardless of the level of treatment selected, the CRD will have ample opportunity to collect and report on real-time data for effluent and water quality, and quantity. This type of data can lead to local, real information regarding the need, if any, to phase-in enhanced treatment and increase levels of treatment over time.
- **Treatment Levels of Service:** Wastewater utilities typically design levels of service to meet the regulations. Implementing tertiary levels of treatment where it is not required would demonstrate environmental stewardship including additional removal of some emerging contaminants of concern.
- **Reduced Infrastructure:** Small-scale water reuse plants that *scalp* flows to suit supply-demand for reuse, reconfiguring existing pump stations, selecting sites adjacent to existing infrastructure and many other design elements have led to 5 option sets with a reduced amount of new infrastructure. Further innovation is needed to optimize pipe routing and disruption to local residents and businesses in the preferred option set.
- **Request for Statements of Interest (RFSI):** Based on the analysis of solids alternatives and option sets, there are two viable and comparable solids recovery options in anaerobic digestion and gasification. Each option is defined and costed for public input. There are however other technologies that may be more cost effective but have not been vetted as viable for the CRD. The CRD can use the RFSI approach to tell the market that it will either choose between its current choices, or, consider a more innovative or cost-effective market-based solution that out performs the defined choices based on suite of goals and criteria. Myriad solids recovery options and technologies provides for more innovation and market competitiveness: the RFSI positions the Core Area for maximizing what the market can do for solids recovery.
- **Technology Innovation:** Engineering feasibility and costing is based on representative design whereby select technologies are costed on a provisional basis to support the comparison of the option sets. Representative design gives the private sector ample opportunity to provide innovative solutions to meet the performance targets of the preferred option set because technologies have not been prescribed. Smaller footprint technologies may emerge through canvassing the private sector.

- **Regulatory Innovation:** Regulations often dictate the location and scope of infrastructure. Phase 2 discussions with the Ministry has opened the door to further innovations in technologies to meet the regulations, for example, by considering less expensive primary treatment options.
- **Construction Phasing:** The Core Area wastewater system will evolve due to dynamic conditions of flow quality and quantity. Incrementally upgrading the system over time will allow for the results of water conservation and inflow and infiltration management to offset the need to increase capacity.

Innovation will continue and the preferred option set(s) will evolve as needed during subsequent design phases to optimize the Charter goals and to meet local needs. Option set summaries illustrate their relative performance including costing, characterization and criteria results.

1.2 Charter Elements and Summary Outcomes

The Project Charter provides guidance to the technical analysis herein and was foundational to establishing the five option sets. Technical Memorandum #3 characterizes each option set in light of the Charter and provides key results and differentiators to enable all readers the opportunity to weigh the tradeoffs for service, benefits and costs. Project criteria stemming from the Charter were developed in Technical Memo #1 which is provided in Appendix A to this report. Section 4 summarizes the performance of each option set under a common framework including life-cycle costing results, criteria performance and overall characterization of each option. Table 1-1 below provides an executive summary of the option sets.

Table 1-1: Option Set Summary

OPTION SET	SUMMARY CHARACTERIZATION	2030 CAPITAL AND NET-OPERATING COST	
Rock Bay Central Secondary	The 1 Plant secondary treatment (1a) option set centralizes all flows at Rock Bay, including up to 10MLD for local reuse. This option set addresses the need to meet pending regulations and provides for the base level of service.	**Capital 2030** $1,031 M	
		2030 Operating $21.8 M	**Est. Resource Income** Up to $0.9 M
Rock Bay Central – Tertiary	The 1 Plant full tertiary treatment (1b) option set centralizes all flows at Rock Bay, including up to 10MLD for local reuse. This option set represents a clear sentiment towards water stewardship by raising levels of service for treated effluent quality.	**Capital 2030** $1,131 M	
		2030 Operating $26.4M	**Est. Resource Income** Up to $0.9 M
2 Plant: Rock Bay + Colwood	The 2 Plant option set treats over 80% of flows to secondary levels, on top of up to 20% tertiary quality effluent. This option set represents a notable increase in water reuse from the 1-plant option with minimal extra conveyance infrastructure.	**Capital 2030** $1,088 M	
		2030 Operating $22.8 M	**Est. Resource Income** Up to $2.4 M

OPTION SET	SUMMARY CHARACTERIZATION	2030 CAPITAL AND NET-OPERATING COST	
4 Plant: Rock Bay, Colwood, East Saanich and Esquimalt Nation	The 4 Plant option set is a sub-regional system treating over 75% of flows to secondary levels, on top of up to 25% tertiary quality effluent. This option set represents the middle ground for distributed facilities and includes water reuse systems in four major growth centers.	**Capital 2030** $1,195 M	
		2030 Operating $25.3 M	**Est. Resource Income** Up to $3.8M
7 Plant: Rock Bay, Colwood, East Saanich, Esquimalt Township, View Royal, Langford and Core Saanich	The 7 Plant option set is a sub-regional system treating up to 45% of flows to tertiary quality, including tertiary treatment for all flows on the Westside. This option set represents a distributed system which maximizes the potential for water reuse and situates facilities in 7 growth areas.	**Capital 2030** $1,348 M	
		2030 Operating $26.6 M	**Est. Resource Income** Up to $4 M

While resource recovery provides for some cost-offsets by way of new incomes, water and heat recovery systems demonstrate an overall increase in costs associated with higher levels of service. Risks related to securing customers and revenues warrants due diligence in expanding the scope of service. The drivers for resource recovery ultimately go beyond financial, in terms of environmental stewardship and water innovation: public sentiment for increased levels of service and their costs is an important outcome of upcoming public consultation. Further public input can shape the direction for services in the Core Area beyond the base expectations of meeting the regulations.

2.0 TECHNICAL CRITERIA OVERVIEW

The Project Charter outlines 10 goals and commitments for option set performance and overall system evaluation. Phase 2 includes technical criteria which relate directly to the goals and commitments. These criteria guide representative design elements, and shape the approach to option sets, technologies, levels of service and resource recovery approaches. These criteria also help to characterize the performance of each option set for further consideration by political and public audiences. Technical criteria within the Project Charter provide a robust framework consistent with a goal-oriented, evaluative process to effectively illustrate and screen multiple options.

Each option set provides various levels of performance: there is no perfect technical answer to a multiple-accounts characterization of the options. Each option set is a choice and the engineering feasibility and financial analysis provides figures and statistics to allow for informed input and decision-making based on best available information.

While Appendix B provides the full list of technical criteria and their direct relation to Charter goals and commitments, the following summary provides the framework for much of this memorandum. The criteria relate to these performance topics:

- Wastewater treated above regulations
- Ability to reduce operating costs
- Carbon footprint and energy balance
- Ability to enhance treatment levels over time
- Extent of new infrastructure
- Amount of income/cost-offsets through resource recovery
- Integration of other waste streams
- Facility location, land use and relative interruptions

Sections 3 and 4 provide for coverage of the performance of the technical criteria. Two specific technical criteria are not evaluated in detail in the memo due to their inability to provide for meaningful differentiation of the option sets. In the case of ‘extent of alternatives to bring in costs less than original estimate’, no option set can meet this goal in part due to cost escalations from the previous LWMP amendment, because cost contingencies are different than the previous option, but also due to changing conditions such as facility location and levels of service. The 1 plant option with secondary treatment presents the lowest option of the available sites. In the case of ‘ability of an alternative to meet the preliminary criteria’, all option sets meet this criterion in that all system configurations are guided by all criteria and perform to some degree against each commitment. All remaining criteria provide for a broad characterization of the performance of any option set. Section 4 provides for a dashboard type presentation of the option sets in light of their performance against technical criteria.

2.1 Key Areas for Policy Direction and Public Input

Key focus areas for future policy direction and public input provide a lens on the multiple-account nature of this assignment. Dialogue with public, political and technical stakeholders continues to reinforce the importance of the following focus areas:

- **Integration with Solid Waste and Location of Solids-Energy Recovery:** the reduction of landfill emissions appears to be the primary driver for integration with solid waste materials. Direction by the Committee to substantively integrate solid waste may lead to gasification of wastewater solids located at Hartland Landfill, as an alternative to anaerobic digestion. Public input on the integration of solid waste and their preferences on location can support the Committee's decision for solids-energy recovery.
- **Water Reuse:** water reuse requires increase in effluent quality (a form of environmental stewardship) and demonstrates water innovation, but it will also increase operating and capital costs. Committee direction to pursue higher levels of service to include water reuse can be achieved on every option set, to varying degrees. Water reuse feasibility may be presented in tandem with long-term potable supply plans to allow for a fulsome water security dialogue. Phasing-in water reuse can occur in all option sets. Public input on elevated levels of service and water stewardship is key.
- **Heat Recovery:** key conditions must be present for financially viable heat recovery systems. In particular, the small energy-price differential between electricity and natural gas at this time greatly reduces the financial viability of heat recovery from wastewater. All option sets provide for one or more heat recovery system opportunities. Committee direction for heat recovery may be to a) include the concept of heat recovery systems for future implementation (beyond 2030), or to b) include heat recovery costs in the option set summaries, or to c) not include heat recovery in the liquid waste management plan. Public input on the *concept* of heat recovery will be beneficial for future decisions.
- **Centralized or Distributed Facilities:** a key driver for distributed facilities is to recover resources in strategic locations and typically to recover resources where they are first generated. Distributed heat recovery, water reuse and solids-energy facilities all result in increased levels of service and costs (albeit some revenues emerge to offset a portion of the costs). Pursuing heat recovery and water reuse at this time would be driven by social, and partly environmental, outcomes. Public input on the benefits and drawbacks of centralized and distributed facilities can support Committee decision making.
- **Effluent quality:** meeting the regulations is a significant advancement in effluent quality from the current practice of preliminary treatment. Going further to achieve tertiary effluent quality allows for water reuse, may allow for reduced outfall lengths and could result in removal of greater emerging contaminants of concern (for some contaminants only, as secondary

treatment removes a large portion of many contaminants already). Committee direction to treat to tertiary levels beyond water reuse demands would demonstrate water stewardship.

- **Procurement and Ownership:** public interest in ownership, operation and liabilities can support the Committee in providing direction in subsequent design phases toward how to package option set for proposals and bids by capable firms.

3.0 RESOURCE RECOVERY FEASIBILITY ANALYSIS

3.1 Solids Management

The Project Charter indicates that any option set must incorporate sustainable practices into the design and consideration of the solids management alternatives. Anaerobic digestion and gasification provide two energy positive processes that strongly align with the terms of reference and the goals and commitments of Phase 2.

- **Anaerobic Digestion** is a process that maintains the wastewater solids at near body temperatures (35-39 degrees C) without the presence of air. Under these mesophilic[1] conditions the bacteria consume themselves and produce an energy rich material byproduct (methane). Typically, anaerobic digestion can reduce the organic content of the solids by 35-50% and the overall mass of the solids by 30%. Anaerobic digestion is the industry standard for stabilization and energy recovery in the wastewater industry. Anaerobic digestion produces a 'wet dirt' material at concentrations from 3% to 5% dry solids. The 'wet dirt' can be dewatered to produce a *cake* with a 20% to 25% dry solids concentration, which contains the residual nutrients and carbon. This material must then be managed or disposed of as the end product of anaerobic digestion. Anaerobic digestion typically produces 150 kg of wet cake at 20% dry solids per ML of treated wastewater.

- **Gasification** is a thermal process that converts the organic carbon in the wastewater solids into a synthetic gas that offers energy recovery potential but also may be processed into higher value items like plastics or as feedstock for biodiesel production. The process has a challenging requirement to maintain materials at elevated temperatures (>400 degrees) for a period of time. As this process is thermally based, it is critical that the energy content of the feed stocks be sufficient to maintain the high temperatures and derive energy out of the process. Gasification has been used in the municipal solid waste market as the energy content of these materials is typically sufficient for an efficient and energy positive operation. Gasification proponents claim to process 70% to 90% of the carbon content of the liquid waste solids feed; leaving mostly inorganic ash. The disposal or management of this material is significantly easier since there is only about 5% of the solids that remain as ash. Gasification will typically produce 14-30 kg of ash per ML of water treated.

Wastewater solids typically contain large amounts of energy in the form of reduced carbon. Through the two selected processes, part or all of the energy contained in the reduced carbon is extracted in the form of heat and syngas (low grade gasification gas) or methane (in the case of anaerobic digestion).

[1] Thermophillic digestion is an alternative to mesophilic which can reduce the time required for digestion but also requires greater heat/energy needs.

Energy extracted from the wastewater solids can be converted to electricity through steam turbines (preferred alternative for syngas) or through internal combustion engines to obtain both heat and power.

Figure 3-1 shows the energy content of the municipal solid waste and wastewater solids; Figure 3-2 shows the relative moisture content of Municipal Solid Waste and Wastewater Solids

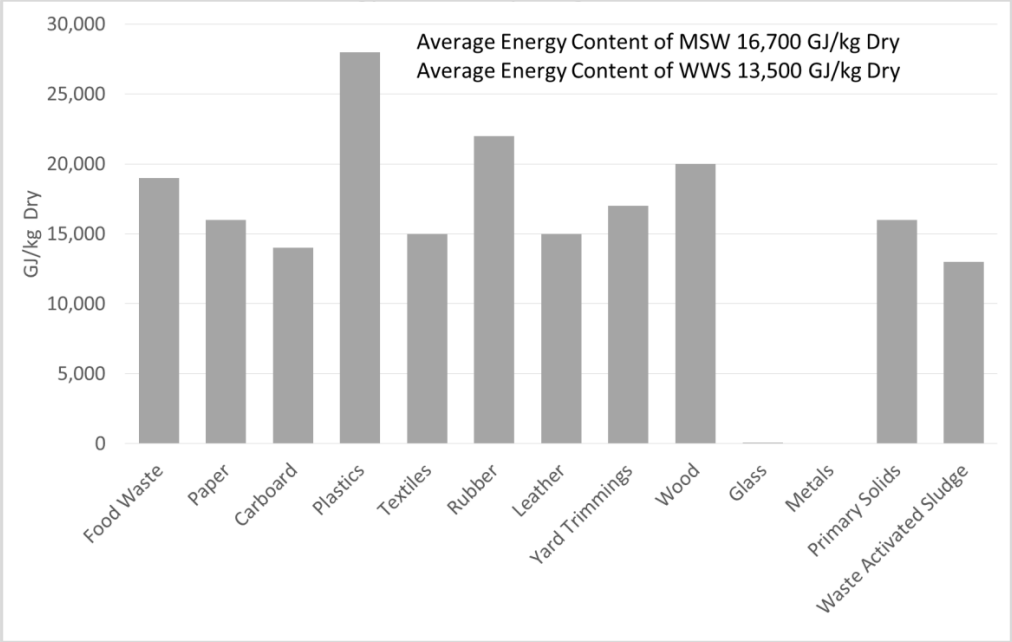


Figure 3-1: Energy Content by Weight Fraction

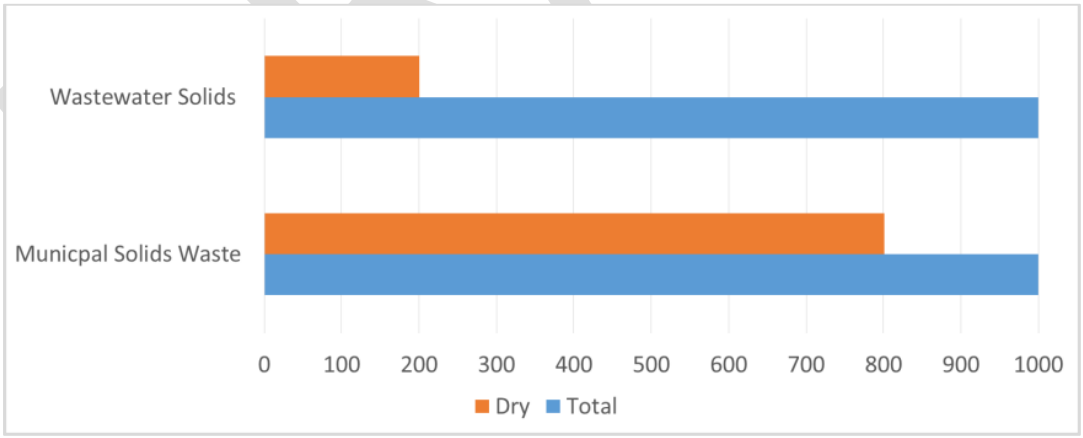


Figure 3-2: Moisture Content of MSW and WWS

Figures 3-1 and 3-2 illustrate that wastewater solids contain roughly the same amount of energy as the MSW, however the moisture content (water) in the solids limits the application of thermal technologies.

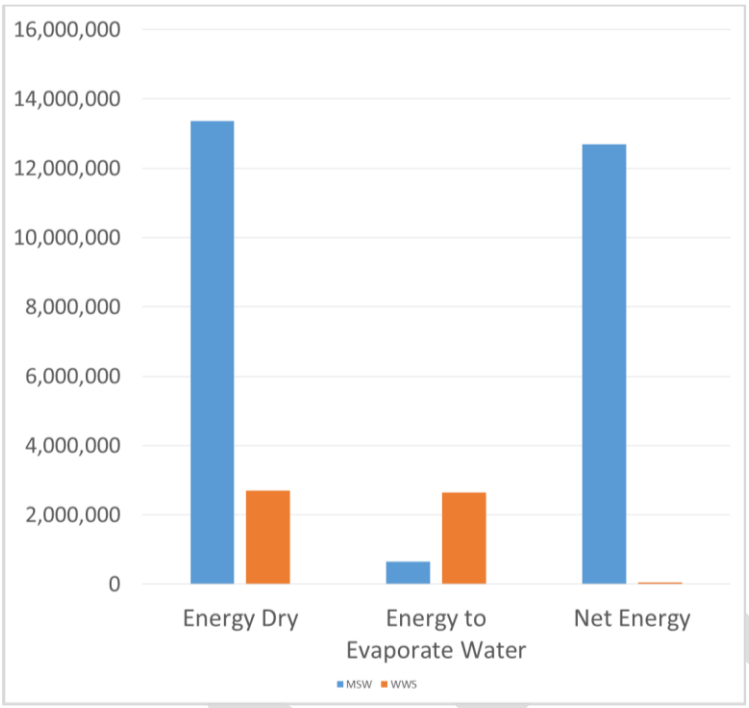


Figure 3-3: Available Energy from MSW and WWS

Figure 3-3 shows the Energy content of municipal solid waste (MSW) and wastewater solids (WWS) on a wet basis assuming the energy required to evaporate water is 3.3 GJ/ton of water evaporated.

Anaerobic Digestion: The solids produced from the wastewater treatment facilities will be trucked or piped (in the case of 4 or 7 plant option sets) to the solids processing site (either Rock bay or Harland; discussion to follow) and introduced into the stabilization process. The separated kitchen scraps (10,000 tons per year) could be received at this station[2], screened and pulped and then introduced into the digesters for conversion to energy. The solids receiving station will be enclosed and odour controlled to avoid any fugitive odours from escaping the site as well as to minimize the visual impact to the neighborhoods. The solids will then be introduced into the digesters and held in enclosed vessels for a period of no less than 18 days. Once the solids are stabilized, they will be conveyed through pumps to the dewatering operation. High speed centrifuges will dewater the solids to a moisture content of less than 80 percent. The solids will then be held in an enclosed cake storage facility to control any odours and then loaded into the disposal trucks under an enclosed environment to control odours.

The methane gas from the digestion process will be cleaned of hydrogen sulfide and siloxanes and diverted to the *combined heat and power* units for the generation of power and heat. The heat generated in the engines will be used to provide the necessary heat for the digestion process and the electricity used to offset the electrical use of the mechanical equipment at the plant.

[2] Costing in TM #3 focuses on solids-energy recovery of wastewater solids and does not present overall costs for inclusion of other solid wastes.

Given the policy which prevents land application of biosolids, an alternative to anaerobic digestion would be to dry wastewater sludge to create fuel pellets. These costs are not currently included in the option sets to allow the private sector to propose other alternatives and maintain an open, competitive process of beneficial reuse between the two technologies.

Daily truck traffic for dewatered, stabilized solids would amount to about five trucks per day in 2023.

Gasification: As part of the gasification alternative, the solids produced from the wastewater treatment facilities will be conveyed (in the case of 4 or 7 plant option sets) to the solids processing site (either Rock bay or Hartland; discussion to follow) and introduced into the gasification process. The separated kitchen scraps (10,000 tons per year) could also be received at this station, screened and pulped and then introduced into a holding vessel, the yard waste (1,000 tons per year) will be received and stored onsite and then dosed to the gasifier along with the kitchen waste pulp to the gasifier for energy. The wastewater solids will be sent from the holding tank to a solids dryer to reduce their moisture content and then into the gasifier. The solids receiving station will be enclosed and odour controlled to avoid any fugitive odours from escaping the site as well as to minimize the visual impact to the neighborhoods. Once the solids are gasified, the remaining ash will be collected as well along with the material from the exhaust odour control. The remaining solids will be loaded into a truck and sent for disposal to Hartland as inert materials. Daily truck traffic would be almost negligible aside from any additional feedstocks required to drive the gasification process. Consideration to service governance of solids waste (e.g. service boundaries for regional versus Core Area) and liquid wastes can further inform the feasibility of integration.

The syngas generated from the gasification process will be used as fuel on a steam boiler and the steam will power a steam turbine to generate power. It is expected that with the addition of municipal solid waste, the process will yield significant amounts of excess thermal energy.

Combined Heat and Power

The use of either gasification or anaerobic digestion will yield excess energy that can be converted to electricity or other form of usable energy. Currently the project as envisioned is to generate power to offset the mechanical equipment power use in the case of anaerobic digestion the selected technology is internal combustion engines. In the case of gasification, the selected technology is a steam turbine.

Costing Summary

The process descriptions above provide the overall scope of treatment, energy recovery and solids management that will be defined for the proposed Request for Statements of Interest. Overall, net present value analysis at this time strongly suggests that the overall capital and operating costs of anaerobic digestion and gasification can be considered comparable at a conceptual level of analysis. Key process components for solids recovery of either anaerobic digestion or gasification include:

- Control buildings
- Residuals storage/loadout
- Dewatering facilities
- Energy generation unit(s)
- Gas conditioning/upgrader
- Dryer units and controls
- Receiving stations
- Process units: either gasifier or digester

Operations costs include:

- Labour and waste processing
- Maintenance
- Solids disposal (landfill fees encourage market sector innovation)
- Gas conditioning media
- Revenues from landfill avoidance
- Natural gas
- Power
- Polymer

Key results of the capital, operating and life cycle costing analysis include:

- Capital costs for anaerobic digestion may be less than gasification by a notable margin however the limited number of successful gasification (of wastewater solids) facilities complicates reliable cost estimating therefore a range for gasification is shown

ANAEROBIC DIGESTION – CAPITAL 2030	GASIFICATION – CAPITAL 2030
$258M	$263M to $416M

- Operational costs for gasification may be less than anaerobic digestion by a notable margin; this is primarily related to the mass of solids still present in the digested sludge and the potential cost of its disposal/reuse; market innovation on the reuse of biochar and biosolids will have a significant effect on the operating costs for either technology
- Operational costs (including cost-offsets or revenues) for gasification could be up to 40% less than anaerobic digestion for the 2030 scenario
- Operational costs for gasification decrease further (relative to anaerobic digestion) because more energy offsets emerge, as other municipal solid waste materials are added

- Net present value results between anaerobic digestion and gasification can be considered roughly equal at this conceptual level (the capital cost uncertainty for gasification prevents a clear conclusion on net present value); statements of interest by the wastewater solids market will determine whether better net present value scenarios exist
- Capital costs for anaerobic digestion are included in the option set summaries because they are lower; presenting costs in this way will have little effect on public consultation because either process will require debt amortization coupled with operating costs which yield a comparable financial impact to residents on an annual basis
- Discussions with 3P Canada and senior government funding partners must occur to determine eligibility of gasification and the integration with municipal solid waste, recognizing that a key driver for eligibility is achieving *value for money*

Emissions avoidance and carbon credits are not considered in the financial analysis due to the uncertainty of eligibility of either wastewater process in BC (there is no wastewater protocol); including carbon credits from non-wastewater solids could be considered in future phases however the analysis would be highly speculative until substantive discussions can occur with the province.

Two financially comparable solids-energy recovery options positions the CRD to canvass the private sector to determine the most cost-effective and environmentally-beneficial alternative.

3.2 RFSI Considerations

A request for statements of interest (RFSI) details the aspirational and obligatory (e.g. risk management, financial assurance) objectives of the CRD in solids recovery, and also serves to identify and assess all of the potential market opportunities to improve upon the alternatives identified in Phase 2. The RFSI provides the CRD the option of evaluating the best technologies in a single, formal process and further provides guidance to the manufacturers on the goals of the CRD for the processing and disposal of the solids generated through the process.

The RFSI can identify goals like:

1. Proposed process must recover and export energy
2. Proposed process should integrate municipal solid waste and wastewater solids
3. Proposed Process must recover and export ammonia
4. Proposed process must minimize carbon emissions
5. Proposed process must not rely on land application or landfilling of solids processed

The comprehensive list of requirements would be detailed to suit political and technical needs, for alignment with senior government funding opportunities (committed or not) and reflect key input received by the public through upcoming public consultation.

3.3 Hartland Landfill and Rock Bay

Locating solids-energy treatment and recovery at either Hartland Landfill or Rock Bay is driven by five key factors as outlined in Table 3-1.

Table 3-1: Key Factors and Considerations

FACTOR	CONSIDERATIONS
1. Neighborhood interest in gasification or anaerobic digestion at Rock Bay or Hartland Landfill	» *Local industrial land uses presently experience noise, vibration, aesthetic, air and odour concerns* » *Solids-energy recovery would not significantly affect current conditions except if additional municipal solids are received, stockpiled and sorted at Rock Bay; odour management equipment is accounted for at all facilities* » *Neighborhood input (with consideration to the local context for land use) will further influence the suitability of siting solids-energy recovery in Rock Bay.*
2. Cost of land	» *Prime industrial land in Rock Bay is about five times more costly (per hectare) than land at Hartland Landfill.*
3. Costs of trucking and pumping wastewater solids to Hartland Landfill	» *Processing all solids at Rock Bay could eliminate most of the costs of trucking pumping" since there will be some residuals to convey off the site* » *Trucking solids (20% solids) or pumping solids (at 1 to 2% solids) from Rock Bay to Hartland present a similar net present value at approximately $35M+; trucking net present value includes a lower capital cost than pumping (a liquid return line to Rock Bay is still required for trucking) but the higher operational costs of trucking, including potential carbon taxes, results in a comparable net present value.*
4. Integration of solid waste	» *Hartland landfill already includes receiving and sorting of different solid wastes which provides distinct advantages. Duplicating this function in Rock Bay would increase costs, noise and traffic.* » *Integrating some of these solid wastes into the gasification or anaerobic digestion processes would be more efficient at Hartland (which also allows for greater expansion opportunities).* » *Excess heat from the landfill methane cogeneration facility would reduce the cost and emissions of drying wastewater solids for either anaerobic digestion or gasification.*
5. Final destination of residuals	» *The market response to residuals is unknown however the ability to provide excess land for temporary storage until suitable customers exist provides an advantage to Hartland.*

In summary, the cost of land at Rock Bay and the cost of transporting to Hartland (either trucking or pumping to Hartland) offset themselves yielding no clear advantage for two of the five factors. However, Hartland Landfill provides for the opportunity to more easily integrate solid waste, to utilize excess heat resources from the methane cogeneration facility, to provide greater flexibility for storage facilities and expansion. Overall, if integration with solid waste is pursued then Hartland Landfill provides distinct advantages including strong engineering and financial feasibility on top of improved resource recovery

considerations. Rock Bay is still a viable solids-energy recovery location but is not conducive to integration with municipal solids. Costs for transporting solids to Hartland can be added to the Option Sets on direction from the Committee.

3.4 Heat Recovery

Charter goals and commitments related to heat recovery comes from public interest in the economic and environmental feasibility of beneficial heating systems from wastewater throughout the Core Area. Analysis for Phase 2 is desktop oriented and spans methodology, supply and demand, heating economics, service infrastructure, costs and income possibilities.

Heat recovery typically occurs via district heating systems (DHS) in select locations which are highly suited for heat distribution. While heat can be extracted from raw wastewater throughout the conveyance system, the efficiencies of low-grade heat extraction are low and strongly encourage heat recovery from treated effluent (after the plant). Three primary factors influence the efficient distribution of excess heat energy from a wastewater facility:

- **Supply:** Heat pumps convert thermal heat in wastewater and concentrate the supply for extraction for use in nearby buildings. Heat availability is a function of the ability to extract heat from the wastewater by dropping the temperature.
- **Demand:** New developments provide for the lowest-barrier demands because it negates the retrofit costs of existing buildings and their current heating systems. Treatment plants situated adjacent growth centers allow for heat distribution systems to be incrementally installed to suit actual development. This approach eliminates the uncertainty of partnerships with existing/different heat strategies and allows for capital investments to occur when they're needed.
- **Infrastructure Requirements:** Heat distribution systems originate at or near the plant or any treated effluent conveyance line. The further the development is from the source, the higher the infrastructure costs and the lower the feasibility of heat recovery.

All option sets provide treatment facilities near growth centers. Typically, the most feasible scenario arises where infrastructure costs are lowest and amount of demand is greatest. Key economic factors that drive the financial viability of heat recovery include value of the heat supplied (e.g. $/GJ) relative to the cost of infrastructure and operations.

Cost-Income Analysis

Local and regional planning documents outline growth projections for use at the DHS conceptual stage. Growth rates, densities, timing and building heights can be adjusted to illustrate the demand potential across the Core Area. Planning figures are converted into heating demand estimates for 2030 and 2045

scenarios. Five locations demonstrate highest potential for heat recovery systems including Rock Bay, Langford, Esquimalt, Colwood and View Royal (in descending order of demand). Potential revenues relate to cost offsets from purchasing natural gas at a flat rate of $14.00 per gigajoule (GJ) which includes basic charges, delivery charges, carbon tax savings and storage and transport costs.

Current record lows in natural gas prices combined with increasing electricity prices is narrowing the economic advantage that heat pump technology offers. For example, one unit of natural gas heat currently has a value of $14 per GJ, while a unit of heat pump heat at current electricity prices has a value of $11.67 per GJ. When infrastructure and utility operations costs are included the price differential is largely eliminated which means district heating systems struggle to yield a positive return. If the price of natural gas were to increase by 50% to 100% (some historical evidence) then the feasibility would increase dramatically. Price negotiations, either reduced electricity rates or premium heating charges based on renewable sources, would also affect financial viability of DHS in the short term.

Capital and operations costs are critical to service financing. Operating costs require detailed analysis once the system configuration and the ownership / governance model are known. Table 3-2 outlines two capital and operating cost scenarios, as an example, for two heat recovery systems.

Table 3-2: Capital and Operating Cost Scenarios

SCENARIO	2030 CAPITAL COST	2030 OPERATING COST	2030 INCOME
Rock Bay DHS	$21.3M	$2.15M/year	$2.15M/year
6 DHS under 7 Plant Scenario	$71.3M	$5.15M/year	$5.875M/year

Current energy prices coupled with the cost of DHS infrastructures results in insufficient revenues that may cover operating investments but do not payback capital investments in a reasonable time period.

Ingredients for Successful Heat Recovery

Overall, while a significant heat resource exists in treated effluent, current energy pricing for both electricity and natural gas pose significant challenges to achieve a positive business case. Further, partnerships for DHS face multiple barriers and conditions, such as proximity-to-source needs and retrofit costs of existing buildings, which further encourages greater emphasis on heat recovery potential in the future. Yet, heat recovery from wastewater has serious potential in broader district heating systems when the ingredients in Table 3-3 are applied:

Table 3-3: Ingredients for Successful Heat Recovery

INGREDIENT	APPLICATION
Secure partnerships with reliable building owners who are ready to invest in heating system infrastructure	*New development; preference to single-owner buildings; public agencies*
Low-infrastructure district heating systems	*New buildings situated 'on top' of effluent pipes or adjacent treatment plants*

INGREDIENT	APPLICATION
Natural gas prices significantly exceed electricity pricing	*Future conditions may present this opportunity*
Lens on cost-effective heat recovery utilities	*Business cases based on reinvesting incomes into the utility; unlikely to offset other wastewater costs*
Public support inherent in triple-bottom line business case	*Seek out public input on the concept noting that implementation likely to occur when these ingredients for success can be met (likely in the future)*

Heat recovery from treated effluent is an attractive energy off-set strategy. Each option set provides for a DHS however current energy prices indicate the capital and operating costs will only increase with more, distributed systems. Heat recovery options should be pursued based on the preferred option set as wiling customers come forward and energy prices create a viable servicing strategy. Capital and operating costs for heat recovery are not included in base costs but would be added on direction by the Committee.

3.5 Water Recovery

When treated to a high enough standard, treated effluent can be reused instead of potable water. A target market framework helps to navigate the multiple possibilities for reuse to augment the potable water supply. Conceptual supply-demand estimates focus on water applications that require less than potable-quality water and also demands that are situated in clusters which can reduce the cost of additional pipes to convey flows. Water recovery target markets should deliver on the following key themes:

- Demonstrate reliable long-term demands and incomes
- Reduce the scope of infrastructure needs
- Service large tracts of irrigable land such as parks and green spaces
- Support community amenities including augmenting environmental flows
- Pursue future partnerships with industry
- Demonstrate synergy with conventional public utility services
- Service growth centers where new developments can be encouraged to include additional plumbing systems for toilet flushing or irrigation

A servicing approach that meets these themes typically presents the lowest capital cost for system set up, provides long-term demands, supports community amenities such as parks and growth and generally conforms to public utility service delivery. The cost of retrofitting (re-plumbing) existing buildings to allow for treated effluent reuse is prohibitive; it is more feasible to include non-potable

water lines in new construction and to phase in non-potable sources over time. Combined, land application and regional growth centers provide for lower-barrier methods for reuse.

Summary of Water Reuse across the Core Area

Technical Memorandum #2 outlines the land application (irrigation), toilet flushing and aquifer recharge possibilities across the Core Area based on the applied target-market framework. All reuse systems could be phased in, with the exception of Colwood which is presented as a full-time water reuse facility employing aquifer recharge until established potable-substitution customers are confirmed. Life cycle costing is based on reuse income for treated effluent phased-in over time: if aquifer recharge is the preferred reuse strategy then life cycle costing would notably change. Overall, establishing five reuse systems provides coverage of most of the major outdoor uses in the Core Area, including growth centers, without the need for extensive reuse infrastructure.

Treated effluent systems require their own, separate infrastructure for distribution. Each facility would include a pumping station which raises system pressures to cover the range of elevations and flows and also includes pipes based on conceptual routes. The capacity of each water reuse system is based on the 2030 flows with consideration to long-term flow increases.

- **Colwood-Langford**: approximately 19.5 km of reuse pipe and a pumping system equivalent to 10 MLD.
- **Esquimalt:** approximately 17 km of reuse pipe and pumping system equivalent to the proposed demand of roughly 5 MLD for irrigation and toilet flushing
- **East Saanich:** approximately 10 km of reuse pipe and pump system equivalent to the proposed demand, or roughly 3 MLD during peak demand periods
- **Core Saanich:** approximately 10 km of reuse pipe and pumping system equivalent to the proposed demand of roughly 5 MLD for irrigation and toilet flushing
- **Rock Bay:** approximately 18.5 km of reuse pipe and pump system equivalent to the proposed demand, or roughly 10 MLD during peak demand periods; additional water reuse may occur along the treated effluent line toward Clover Point however these estimates have not yet been included.

Life-cycle costing includes capital allowances for reuse systems including distribution pipes and pump facilities. Pricing for reclaimed water is proposed at 80% of potable water retail rates for toilet substitution and 80% of wholesale CRD potable rate for land application. Reuse by aquifer recharge will not result in revenue.

Cost-Income Summary

Table 3-4 outlines the capital and operating costs plus revenues for two reuse scenarios (however, life cycle costing for water reuse was conducted for all five option sets). Treatment capital and operating costs are included given the intention to achieve tertiary effluent for water reuse.

Table 3-4: Cost-Income Summary

SCENARIO	2030 CAPITAL COST	2030 OPERATING COST	2030 Revenues
1 Plant Sidestream Reuse	$24.2M	$300K to $400K/year	Up to $800K/year
7 Plant Option Set with 5 Water Reuse Systems	$205M[3]	$2.5M to $3.0M/year	Up to $4M+/year

Results of the cost-revenue and feasibility analysis for water reuse include five key outcomes:

- Revenues for water reuse are set to be phased in as customers confirm partnerships with CRD or the municipality for service, gradually over a 20 year period. Detailed studies must engage with the individual customer and determine their affordability limits for water service. Questions emerge, such as; *will municipalities pay for the additional cost of park irrigation? Can golf courses afford the proposed rates?*
- Water reclamation provides for innovative uses of treated effluent however it is unlikely to present a positive business case until (if) potable supplies become unreliable. Revenues from water re-use will be challenged to cover both the operating and capital financing costs of their delivery systems, and will likely create an overall operating deficit.
- Further study is needed to discern which revenues are actual new incomes that do not result in a loss in income to the potable water utility. Generally however, installing two sets of pipes providing a similar level of service in the same area can lead to some level of redundancy and added cost to be borne by the taxpayer.
- While the seven plant option set would provide a higher level of service and boost enhanced tertiary water quality, it may not provide greater reuse opportunities beyond the four plant option for a long time: this is because supply would likely exceed demand. Pursuing full tertiary treatment for all flows would be driven partly for water reuse but largely to achieve enhanced water quality that is ultimately returned to the environment.

3.6 Carbon and Energy Footprint Discussion

Carbon footprint and offset credits can be a powerful lens for evaluating the feasibility of projects that achieve significant reductions in greenhouse gas (GHG) emissions. The GHG profiles differ significantly between solids-energy recovery and wastewater (liquids) treatment, and therefore are discussed separately below.

[3] Includes the treatment capacity costs for exceeding secondary effluent.

Carbon Footprint and Offsets for Solids-Energy Recovery

Solids-energy recovery by either anaerobic digestion or gasification will both create and reduce GHG emissions. The relative performance between these two technologies from an emissions perspective, including the introduction of other wastes, provides helpful direction for the Committee and the region in pursuing either technology.

For context, electricity is considered carbon neutral in BC; therefore, its offset or increased use does not result in any change to the overall GHG footprint. If the business case for either technology is to consider carbon credits, then significantly more analysis is needed to complete the business case and make a fully informed investment decision. For example, there are limits to the amount and types of offsets that the province of BC will coordinate each year. At minimum, responses to the Request for Statements of Interest should dictate a regulatory compliant carbon footprint and offset scorecard.

At a conceptual level, considerations for either gasification or anaerobic digestion from a GHG emissions perspective include:

- Both anaerobic digestion and gasification create biogas (methane or syngas) which can be captured and reused to fuel/heat the treatment process. Being renewable fuels that are fully consumed, neither gas would be subject to the BC Carbon Tax, nor create significant liabilities under the Climate Action Charter.
- Anaerobic digestion of wastewater solids combined with land application of biosolids (if considered) likely presents the lowest overall carbon footprint strategy.
- Both anaerobic digestion (if solids drying were also included) and gasification require input gas to fuel the treatment operation. Gases created by both technologies lessen the amount of import carbon-based fuels (i.e. natural gas) for heating and drying. For solids-energy recovery of only wastewater solids, the amount of gas that is created and imported is likely to be similar between the two recovery processes.
- Gasification of dried wastewater solids (on their own) is not a notable energy generator therefore other feedstocks typically drive the gasification process. This introduces biomass-to-energy considerations which are essentially considered emissions neutral in BC, in that carbon penalties are not applied to renewable fuels.
- Hartland Landfill currently utilizes methane capture for decayed materials to generate electricity to sell to the grid, albeit landfill-methane capture still sees emissions of methane released as the gas capture rate is approximately 63% (with intentions to meet 75% in 2016). Yard, garden and kitchen organics are already diverted from the landfill and reportedly beneficially reused therefore there would be limited, if any at all, carbon emissions reductions in their gasification. Emissions reductions from gasification would likely come from other materials that produce elevated emissions, either by their decay or further processing activities, such as scrap wood.

- Importing materials (yard, garden and kitchen organics) that are currently managed by private sector solid waste management companies could reduce GHG emissions through the avoidance of unmanaged decomposing of organic material; however, the carbon footprint reduction would be limited to any inefficiencies of the activities of the private sector companies, which is likely marginal overall. While introducing materials not managed by CRD would increase biogas production (gasifier), it may not yield a positive net environmental benefit because these materials are already beneficially reused.

- Regulations limit the CRD's ability to control the flow of materials to Hartland Landfill for gasification. A comprehensive regional service led by CRD for municipal solid waste could increase the amount of material available for recovery, including the potential benefits and drawbacks of more material going to Hartland and the impacts to the existing management approach including private sector solid management companies.

- Utilizing paper, plastics and scrap wood (examples) already managed by CRD for use in the gasifier could be justified by the improved efficiency of gasification over the less efficient landfill-gas capture. Materials already recycled are unlikely to yield an improved carbon footprint.

- Food scraps are already sent from Hartland Landfill to Harvest Power in the Vancouver area for resource recovery via anaerobic digestion. The current carbon footprint would be reduced by eliminating the transport costs and their associated emissions; additional emissions reductions could occur if gasification is considered a more efficient process for resource recovery of yard and kitchen scraps. Unfortunately, the efficiency of gasifiers including wastewater solids and food scraps is difficult to determine due to the lack of operating facilities.

Takeaways from these considerations include:

- Anaerobic digestion of wastewater solids including drying the wet cake appears to show a similar carbon footprint to gasification of wastewater solids alone.

- Gasifying yard and garden waste would not likely present a strong carbon footprint reduction strategy because these materials are already diverted from the landfill and beneficially reused. Carbon footprint reductions at the landfill could focus on sending high-energy content materials that would otherwise decay as part of the less-efficient landfill methane capture into a gasifier, particularly for those materials that are difficult to divert (e.g. some paper, some plastics and scrap wood), because it is reported to be a more efficient recovery process.

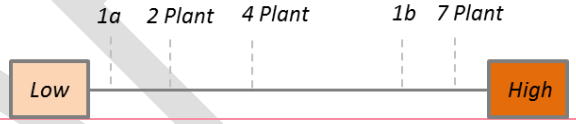
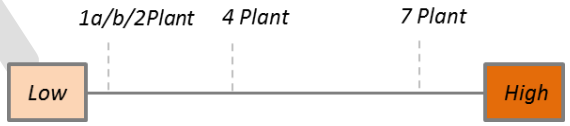
- Anaerobic digestion of wastewater solids and food scraps and gasification of dried wastewater sludge and food scraps likely presents a similar carbon footprint. Whichever process can reliably demonstrate greater efficiency over the other would likely yield a lower carbon footprint.

Direction by the Committee to fully integrate wastewater solids with municipal solids for gasification would likely yield an overall reduced carbon footprint, over anaerobic digestion and drying of wastewater solids on its own, because of the potential avoidance of emissions at the landfill, and not necessarily as a function of wastewater process emissions.

Carbon Footprint for Wastewater (Liquids) Treatment

Key factors for carbon and energy footprint in wastewater treatment and conveyance relate to extent of construction, energy use for treatment, energy use for conveyance and trucking to distribute solids to a solids-energy recovery facility. Table 3-5 outlines the factors and their considerations with respect to how the option sets qualitatively perform against each other for low to high carbon footprint.

Table 3-5: Carbon Footprint for Option Sets

FACTOR	CONSIDERATION	RELATIVE CARBON FOOTPRINT
Extent of Construction	Scope of new infrastructure, total building footprint, redundant facilities.	
Energy use for treatment	Level of treatment	
Energy use for conveyance	Pumping distance, pressure for raw, treated and reclaimed effluent; overall efficiency	
Trucking to distribute solids to a recovery facility	Distance for trucking and number of trips per day	

Qualitative performance of the criteria reveals the overall carbon and energy ranking of the option sets from a wastewater treatment (liquids) including, in order of smallest to largest footprint: Rock Bay – Secondary; 2 Plant, Rock Bay – Tertiary, 4 Plant, and 7 Plant.

OPTION SET >>
1A Rock Bay - Secondary

Description

- Rock Bay is a central facility for all flows up to 4xADWF including secondary and disinfection plus sidestream tertiary for local reuse in the Rock Bay-North Downtown areas.
- Solids-energy recovery can be centralized at Rock Bay or Hartland Landfill. Truck traffic is estimated at ~5 trucks per day in 2030.
- Macaulay catchment flows are directed to Rock Bay for treatment. Any flows not reused are routed through the Clover Point outfall. All flows meet or exceed the regulations.
- Heat recovery systems can be considered around Rock Bay and along the effluent line to Clover.
- Available site(s) are suitable from a technical perspective and align well with public input to date.
- Life cycle costs are reflective of the economies of scale made available by a central plant.

Scenario	2030 Capital	2030 Operating	Est. Resource Income
Rock Bay Secondary	$1,031 M	$21.8 M*	Up to $0.9 M

Total $1,031M -

Life Cycle Costing Analysis | Highlights

- A central plant at Rock Bay demonstrates the lowest capital, operating and life cycle costs
- Resource incomes at Rock Bay water reuse includes gradual, small-scale irrigation demands initially, with phased-in toilet flushing demands over 20+ years
- Sensitivity analysis related to resource incomes and discount rates had minimal effect on the net present value**.

**Operating costs account for asset depreciation as per factors outlined in TM #1 but should be refined to complete detailed cash flow analysis.*

***Sensitivity analysis related to energy and commodity prices would have a greater effect on net*

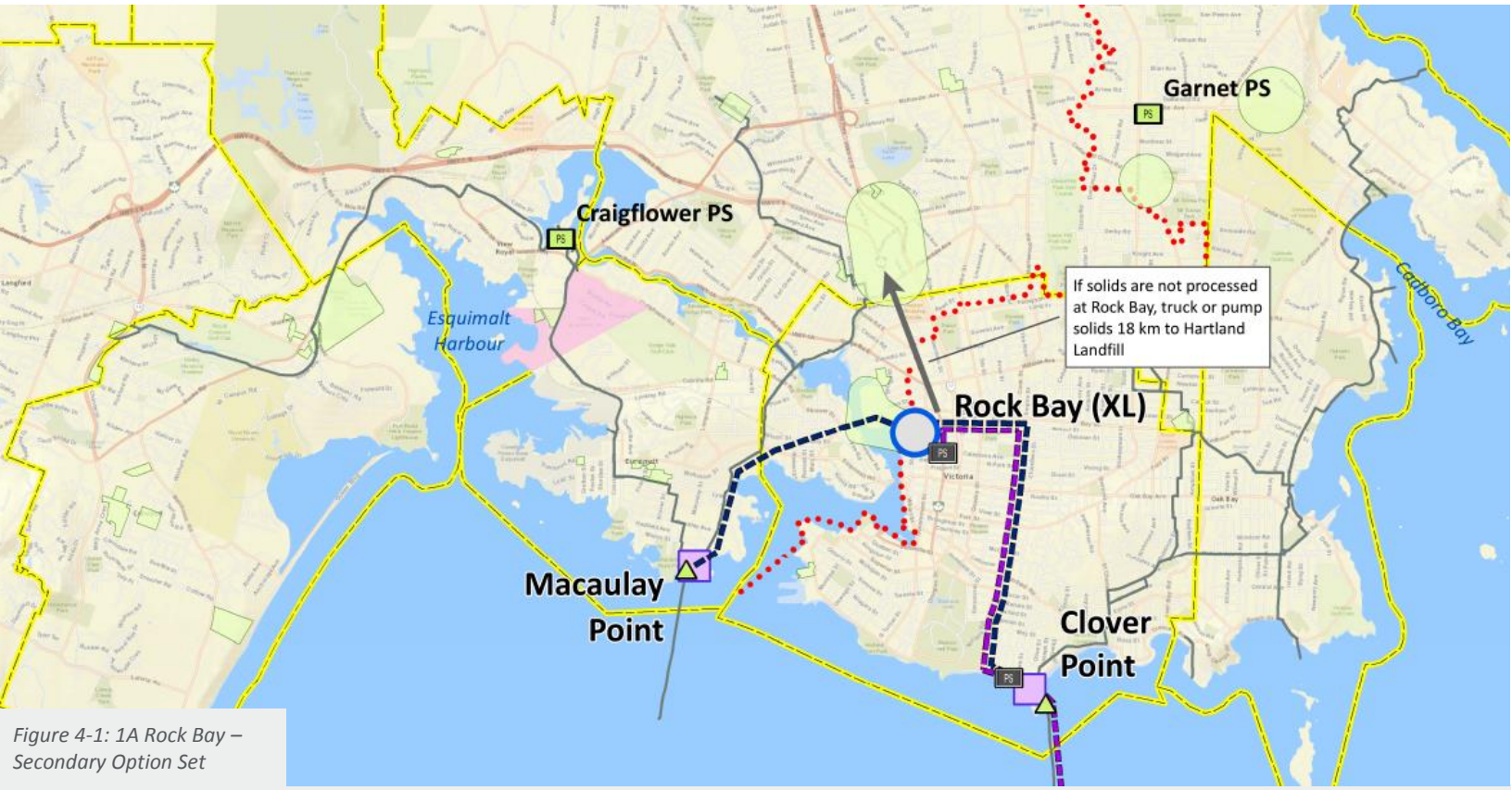


Figure 4-1: 1A Rock Bay – Secondary Option Set

CRITERIA RESULTS >>

» Length of New Conveyance Pipe 16.7 km	» % of Effluent @ Tertiary Quality 10%	» Rank: Carbon and Energy Footprint 1st
» Rank: Low Operating Costs 1st	» Ratio of Income to Costs for Water Reuse 0.45	» Ratio of Income to Costs for Heat Recovery 0.60

Option Set Characterization

- *Neighborhood-Land Use: A central plant at Rock Bay appears to align best of all locations given public sentiment to date. The industrial, mixed-use designation supports the site activities and other routine treatment processes. Capital works at Rock Bay should consider local planning objectives and provide for positive public interaction.*
- *Overall: The 1 Plant secondary treatment (1a) option set centralizes all flows at Rock Bay, including up to 10MLD for local reuse. This option set addresses the need to meet pending regulations and provides for the base level of service.*

Option set >>
1B Rock Bay -Tertiary

Description

- Rock Bay is a central facility for all flows up to 4xADWF including full tertiary treatment plus disinfection. Water reuse can be implemented in the Gorge-Rock Bay-North Downtown areas, or other areas as needed over time. Full tertiary treatment opens up the possibility of a harbour outfall.
- Solids-energy recovery can be centralized at Rock Bay or Hartland Landfill. Truck traffic is estimated at ~5 trucks per day in 2030.
- Macaulay catchment flows are directed to Rock Bay for treatment. Any flows not reused are routed through the Clover Point outfall. All flows will exceed the regulations.
- Heat recovery systems can be considered around Rock Bay and along the effluent line to Clover.
- Available site(s) are suitable from a technical perspective and align well with public input to date.
- Life cycle costs reflective of the economies of scale presented by a central plant however with the added cost of additional energy, operations and treatment processes for tertiary quality.

Scenario	2030 Capital	2030 Operating	Est. Resource Income
Rock Bay Tertiary	$1,131 M	$26.4M	Up to $0.9 M

Life Cycle Costing Analysis | Highlights

- A central plant at Rock Bay with tertiary treatment demonstrates the 4th highest capital costs and 3rd highest operating costs;
- Net present value for Option 1b is approximately 15% higher than for Option 1a
- Resource incomes reflect the proposed reuse system near Rock Bay as in Option 1a
- Sensitivity analysis related to resource incomes and discount rates did not change the relative financial performance of Option 1b

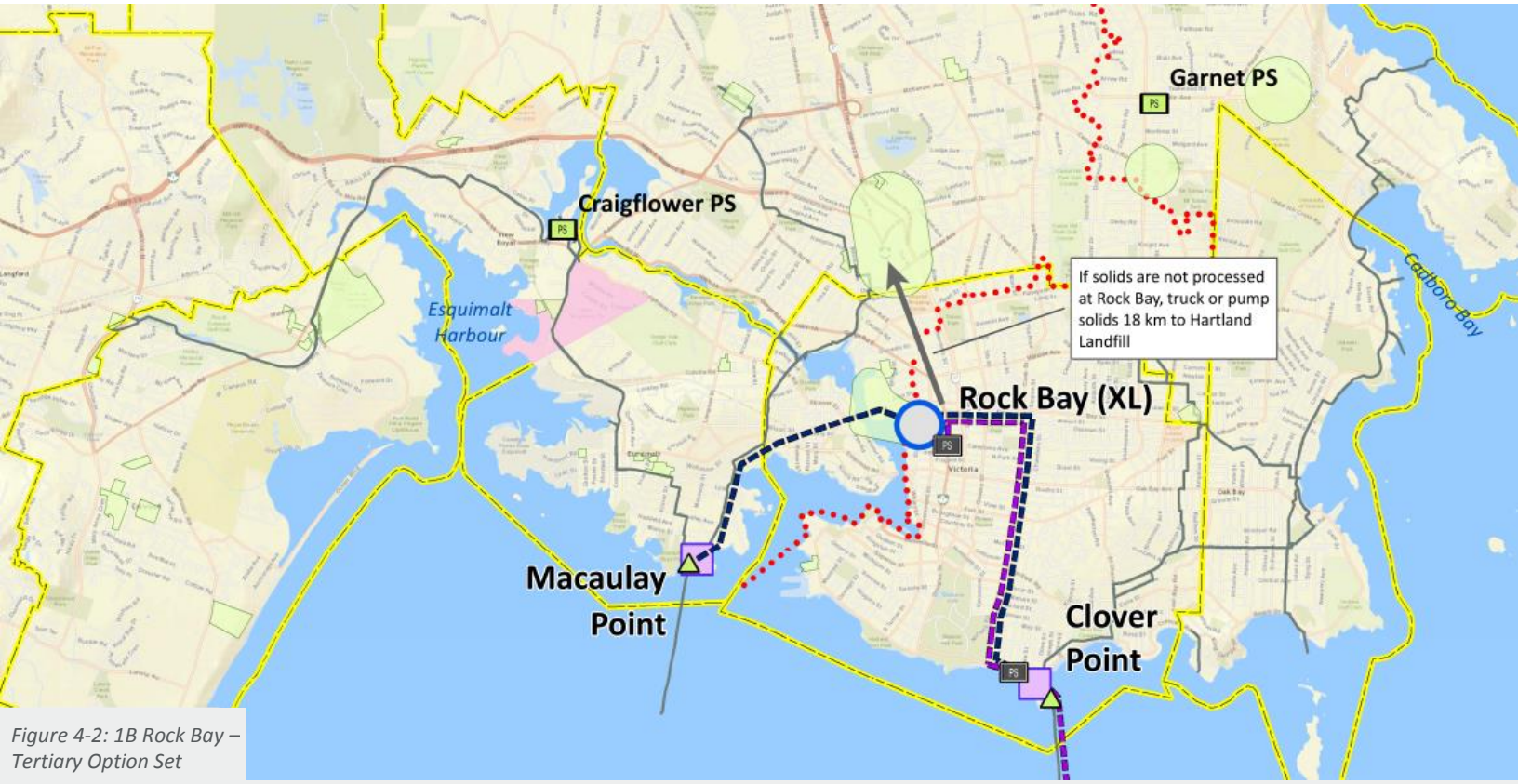


Figure 4-2: 1B Rock Bay – Tertiary Option Set

CRITERIA RESULTS >>

» Length of New Conveyance Pipe 16.7 km	» % of Effluent @ Tertiary Quality Up to 100%	» Rank: Carbon and Energy Footprint 3rd
» Rank: Low Operating Cost 3rd	» Ratio of Income to Costs for Water Reuse 0.45	» Ratio of Income to Costs for Heat Recovery 0.60

Option Set Characterization

» *Neighborhood-Land Use: A central plant at Rock Bay appears to align best of all locations given public sentiment to date. The industrial, mixed-use designation supports the site activities including and other routine treatment processes. Capital works at Rock Bay should consider local planning objectives and provide for positive public interaction.*

» *Overall: The 1 Plant full tertiary treatment (1b) option set centralizes all flows at Rock Bay, including up to 10MLD for local reuse. This option set represents a clear sentiment towards water stewardship by raising levels of service for treated effluent quality.*

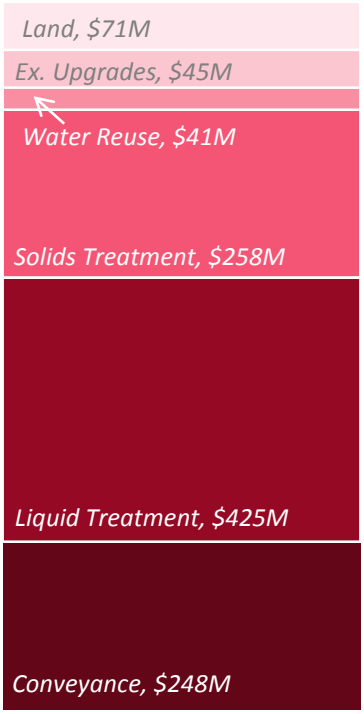
Option set >>
2-Plant Rock Bay and Colwood

Description

- Rock Bay provides treatment for up to 100% of all flows but accounts for additional capacity at Colwood to treat up to 10MLD at tertiary quality. Sidestream tertiary provided at Rock Bay for local reuse.
- The Colwood plant requires minimal new conveyance infrastructure but requires redundant capacity at Rock Bay to avoid a second outfall. Reuse systems provided at both Rock Bay and Colwood.
- Solids-energy recovery can be centralized at Rock Bay or Hartland Landfill. Truck traffic is estimated at ~5 trucks per day in 2030.
- Flows from the rest of Macaulay catchment (except Colwood) are directed to Rock Bay for treatment. Any flows not reused are routed through the Clover Point outfall.
- Heat recovery systems possible in Colwood (e.g. civic recreational facilities) and adjacent to the treated effluent outfall route from Rock Bay to Clover point.
- Available sites are suitable from a technical perspective and align well with public input to date.
- Life cycle costs illustrate the effect of increased levels of service for tertiary reuse at Colwood.

Scenario	2030 Capital	2030 Operating	Est. Resource Income
2 Plant	$1,088 M	$22.8 M	Up to $2.4 M

Total $1,088M -



Life Cycle Costing Analysis | Highlights

- A central plant at Rock plus tertiary plant in Colwood increases capital and operating costs for expanded water reuse; capital and operating costs both rank 2nd among the option sets
- Net present value for the 2 Plant option is approximately 4% higher than for Option 1a
- Resource incomes for the 2 plant option demonstrate the most cost-effective water reuse approach
- Sensitivity analysis related to discount rates did not change the relative financial performance of the 2 plant option

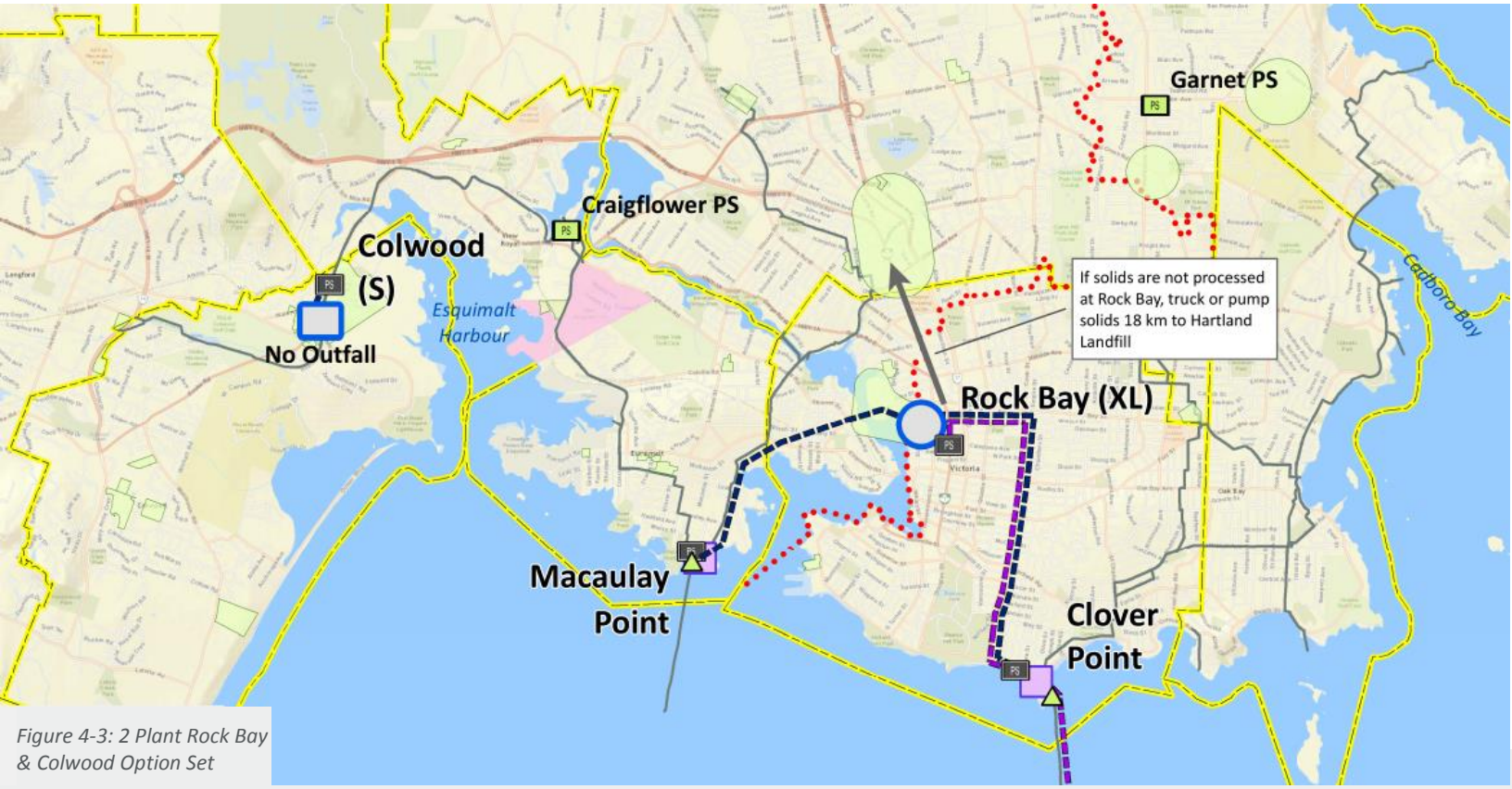


Figure 4-3: 2 Plant Rock Bay & Colwood Option Set

CRITERIA RESULTS >>

» Length of New Conveyance Pipe (incl. Colwood reuse)

36.2 km

» % Of Effluent @ Tertiary Quality

Up to 20%

» Rank: Low Operating Cost

2nd

» Rank: Carbon and Energy Footprint

2nd

» Ratio of Income to Costs for Water Reuse

0.40

» Ratio of Income to Costs for Heat Recovery

0.60

Option Set Characterization

» *Neighborhood-Land Use: Rock Bay and Colwood are both situated in growth centers, one mixed-use and the other primarily industrial. Odour will be minimized to unnoticeable levels; noise and trucking will be mitigated and not dissimilar from local land uses. Both facilities should include features that align with local planning objectives and provide for public interaction with the facility and neighboring features e.g. harborrfront, local parks.*

» *Overall: The 2 Plant option set treats over 80% of flows to secondary levels, on top of up to 20% tertiary quality effluent. This option set represents a notable increase in water reuse from the 1-plant option with minimal extra conveyance infrastructure.*

Option Set >>
4 Plant

Description

- Flows are collected, treated and recovered on a sub-regional basis. Flows from west Saanich and west Victoria are pumped to Rock Bay for all flows up to 2xADWF. Flows up to 4xADWF from the Westside are pumped from Macaulay back to Esquimalt Nation for advanced secondary (includes disinfection) plus sidestream tertiary for local reuse in both the Rock Bay and Esquimalt areas.
- The Colwood and East Saanich plants require minimal new conveyance infrastructure but require redundant capacity at Esquimalt Nation and Rock Bay (respectively) to avoid additional outfalls. Reuse systems at proposed for all four plants. The East Saanich facility may only be in use during the irrigation season (initially).
- Solids-energy recovery can be centralized at Rock Bay or Hartland Landfill. Truck traffic is estimated at ~5 trucks per day in 2030. Solids from Colwood are piped (uses regular collection trunk) to Esquimalt Nation where they are dewatered and combined for trucking to Rock Bay or Hartland (< 5 trucks per day).
- Any flows not reused by any of the four plants are routed through the Macaulay and Clover Point outfalls. All flows meet or exceed the regulations, including up to 25% reuse.
- Available sites are technically suitable to host a treatment facility.
- Life cycle costs are reflective of the infrastructure needs to accommodate sub-regional flows and increased treatment levels for reuse.

Scenario	2030 Capital	2030 Operating	Est. Resource Income
4 Plant	$1,195 M	$25.3 M	Up to $3.8M

Total: $1,195 M

Life Cycle Costing Analysis | Highlights

- Two secondary plants plus an additional two tertiary facilities reflects the 3rd highest capital and 4th highest operating costs;
- Net present value for the 4 plant option is approximately 12% higher than for Option 1a
- Resource incomes for the four plant option are second highest and demonstrate the 2nd most cost-effective water reuse approach
- Sensitivity analysis related to discount rates did not change the relative financial performance

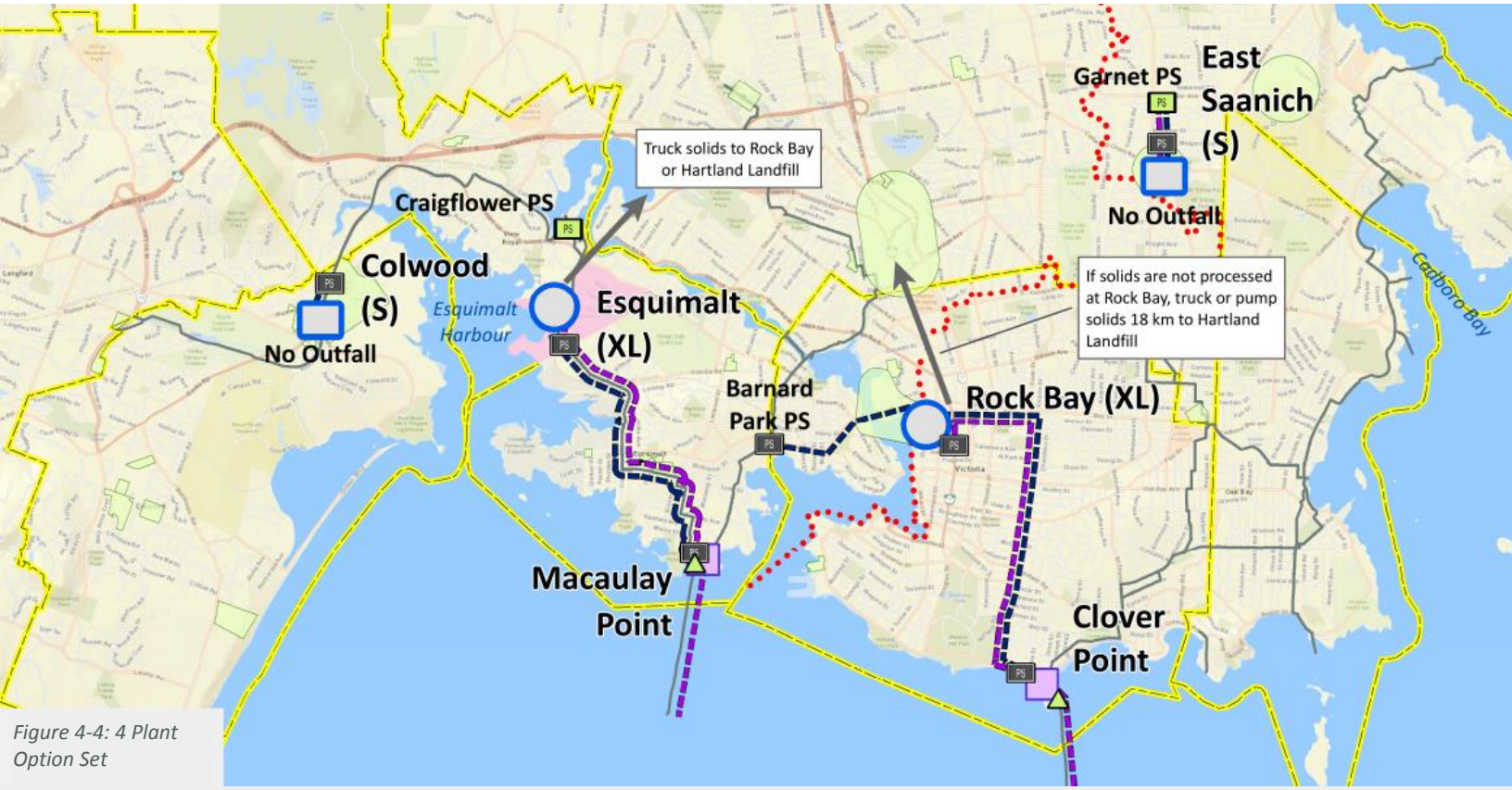


Figure 4-4: 4 Plant Option Set

CRITERIA RESULTS >>

» Length of New Conveyance Pipe

66.8 km

» % of Effluent @ Tertiary Quality

Up to 25%

» Rank: Low Operating Cost

4th

» Rank: Carbon and Energy Footprint

4th

» Ratio of Income to Costs for Water Reuse

0.39

» Ratio of Income to Costs for Heat Recovery

0.60

Option Set Characterization

» *Neighborhood-Land Use:* Rock Bay, Esquimalt Nation and Colwood are both situated in mixed-use, growth centers. Odour will be minimized to unnoticeable levels; noise and trucking will be mitigated and not dissimilar from local land uses. Both facilities should include features that align with local planning objectives and provide for public interaction with the facility and neighboring features e.g. harbor front.

» *Overall:* The 4 Plant option set is *a sub*-regional system treating over 75% of flows to secondary levels, on top of up to 25% tertiary quality effluent. This option set represents the middle ground for distributed facilities and includes water reuse systems in four major growth centers.

Option set >>
7 Plant

Description

- Flows are collected, treated and recovered on a sub-regional basis. Flows from west Saanich are partly directed to the Core Saanich Plant, while remaining flows combine with west Victoria flows for pumping to Rock Bay. Westside flows for 0-2x ADWF are treated on a municipal-by-municipal basis with interconnecting piping systems for outfall at either Royal Bay or Macaulay point.Wet-weather flows for the Westside are accommodated at Esquimalt (Town) plant. Almost all flows for Eastside are treated at Rock Bay, except reuse tertiary treatment at East and Core Saanich.
- The Core Saanich and East Saanich plants require minimal new conveyance infrastructure but require redundant capacity at Rock Bay to avoid additional outfalls.
- Solids-energy recovery can be centralized at Rock Bay or Hartland Landfill. Truck traffic is estimated at ~1 truck per day for Colwood and Langford, and ~2 trucks per day for Esquimalt in 2030, with solids heading to either Rock Bay or Hartland Landfill. Solids at East Saanich and Core Saanich are piped through existing sewers to Rock Bay.
- Any flows not reused by any of the seven plants are routed through the Macaulay, Clover Point or Royal Bay outfalls. All flows meet or exceed the regulations.
- Available sites are technically suitable to host a treatment facility.
- Life cycle costs are reflective of the infrastructure and capacity needs to treat flows to higher levels of service for the Westside as well as the costs related to additional conveyance, outfalls and water reuse systems.

Scenario	2030 Capital	2030 Operating	Est. Resource Income
7 Plant	$1,348 M	$26.6 M	Up to $4 M

Life Cycle Costing Analysis | Highlights

- 6 tertiary treatment plants coupled with a large secondary treatment plant at Rock Bay reflect the highest capital and operating costs
- Net present value for the 7 plant option is approximately 25% higher than for Option 1a
- Resource incomes are only slightly higher than the 4 plant due to lack of demand relative to supply;
- Sensitivity analysis related to discount rates did not change the relative financial performance

Figure 4-5: 7 Plant Option Set

CRITERIA RESULTS >>

» Length of New Conveyance Pipe 86.7 km	» % of Effluent @ Tertiary Quality Up to 45%
» Rank: Low Operating Costs 5th	
» Rank: Carbon and Energy Footprint 5th	» Ratio of Income to Costs for Water Reuse 0.35
» Ratio of Income to Costs for Heat Recovery 0.55	

Option Set Characterization

» *Neighborhood-Land Use: Rock Bay, Esquimalt Nation and Colwood are both situated in mixed-use, growth centers. Odour will be minimized to unnoticeable levels; noise and trucking will be mitigated and not dissimilar from local land uses. All facilities should include features that align with local planning objectives and provide for public interaction include contribute to local building form.*

» *Overall: The 7 Plant option set is a sub-regional system treating less than 60% of flows to secondary levels, on top of up to 45% tertiary quality effluent (including all flows on the Westside). This option set represents a fully distributed system which maximizes the potential for water reuse and situates facilities in 7 growth areas.*

4.6 Criteria Results: Remaining Focus Areas

Technical criteria stemming from the Project Charter frame the overall performance characteristics of each option set. Sections 3 and 4 of this memo have covered performance results of most of the technical criteria, except for the criteria outlined in Table 7. Performance considerations and results illustrate the application of the criteria to the five option sets and solids-energy technologies.

Table 4-1: Criteria Considerations and Results

Criteria	Performance Considerations	Result
Certainty of long-term demands and revenues (resource recovery)	*Heat recovery and water reuse customers likely to emerge over time based on need (for water) and energy pricing + new development (for heat)*	*Option set 1a and 2 demonstrate the highest income:cost ratios and likely warrant greatest attention*
Extent of support for community building	*Facilities that suit local land use and enhance the existing site use present the highest performance*	*All option sets include sites in growth nodes or industrial-commercial centers allowing for public investment to enhance community building; sites in Esquimalt (Town) and Core Saanich may pose slightly lower performance (Option Set 7) because these are located in parks;*
Ability to produce high-quality air-emissions	*Very little air quality concerns arise from liquid treatment (aside from odours and all option sets include provision of extensive odour control equipment) however emissions for solids-energy recovery are indicative of option set performance*	*Unlike anaerobic digestion, gasification facilities must undergo air quality permitting (Ministry of Environment), however, gasification can lead to reduced carbon emissions via integration with solid wastes which likely outweighs the air quality concerns*
Ability to improve effluent quality over the life of facility	*Changing regulations or environmental conditions may warrant increased levels of treatment; treatment technologies in the representative design allow for additional processes as required*	*This criteria is likely best suited to evaluating private sector proposals for meeting the performance criteria of the LWMP*
Extent to provide for positive public interaction	*Modern wastewater facilities should be designed and operated to suit local aspirations*	*This criteria is likely best suited to evaluating private sector proposals for meeting the performance criteria of the LWMP; public input can inform local objectives for public interaction*

Criteria	Performance Considerations	Result
Reduction of risk/interruption to neighborhoods from facility failure	*Wastewater facilities can experience unplanned maintenance; while typically rare, consideration should be given to the consequences of these events*	*Option set 1a/1b and perhaps 4 plant demonstrate lower interruption risks; Sites in industrial areas likely pose least risk; anaerobic digestion is considered a reliable technology; there are very limited gasifiers of wastewater solids and reliability performance is not well known* *Option set 1a/1b and 2 provide for lowest trucking configurations in particular if solids are pumped and processed at Hartland Landfill*
Site/design resiliency for seismic and sea level rise	*Reliable, ongoing operation of wastewater facilities post-disaster provides for public health and environmental protection*	*Seismic risks exist throughout the Core Area and no site is unexposed; sea level rise resiliency at Rock Bay and Esquimalt Nation can be accommodated site with site grading and strategic equipment placement*

4.7 Future Feasibility Considerations

Phase 2 analyses, including results presented in Technical Memorandum #3, outline the financial and engineering feasibility of the five proposed option sets. Preferred option set(s) will require additional engineering analysis typical of preliminary design phases, including:

- Pipe route optimization
- The cost benefit of phosphorous removal (treatment) and recovery if a harbour outall is pursued
- Site specific land improvement costs such as rock, dewatering, seismic design and other geotechnical considerations
- Site area and building footprint optimization
- Architectural requirements and off site development
- Additional procurements analysis, cost risks, liabilities and implementation planning (procurement considerations are located in Appendix E)

Considerations like these are best studied and refined in concept or preliminary design exercises once a preferred option has been selected.

APPENDIX A – TECHNICAL MEMORANDUM #1 (EXCERPT)

Capital Regional District

Core Area Liquid Waste Management Plan

Wastewater Treatment System Feasibility and Costing Analysis

Technical Memorandum #1

Background and Technical Foundation

carollo
Engineers...Working Wonders With Water™

URBAN systems

402 – 645 Fort Street
Victoria, BC, V8W 1G2

urbansystems.ca

October 22, 2015

Project: 1692.0037.01

Table of Contents

Appendices

1.0 Introduction and Methodology

1.1 Project Background

Phase 2 analysis is an important chapter in an ongoing decision making process. Phase 1 included a constructive engagement process to characterize sites and option sets and collect public input on their values for wastewater treatment. Future phases, Phase 3 and beyond, allow the Core Area Committee and the Regional Board to confirm detailed performance criteria that ultimately becomes an owners' statement of requirements, or similar, for responses by the treatment and resource recovery market(s) to price, build and commission and potentially operate a core area wastewater solution. It is critical that the Phase 2 methodology respect the multi-phase sequence of this project and deliver on specified milestones, such as to assess systems and technologies, however not to select ultimate products and or technologies but rather to help the Core Area Committee define the required characteristics of the future system and provide a characterization of the option sets. All option sets may proceed to Phase 3 or it may become apparent that a subset of the option sets achieve the desired objectives and move forward to subsequent phases. Overall, the three phase analysis is summarized below.

Process Summary	
Phase 1:	Identify Sites and Option Sets and Collect Public Input on Values
Phase 2:	Confirm Performance Criteria and Characterize Financial/Environmental/Social Aspects of Option Sets
Phase 3+:	Finalize/Narrow Options, Determine Preferred Method to Engage with Private Sector, Confirm Funding Approach, Amend LWMP, Select Partners, Deliver Project(s), Operate Systems

.

In effect, Phase 2 technical and costing analysis includes assessments and calculations that enable preliminary performance criteria to be tested and refined. The results of the process and analysis will enable the Committee to decide and direct on future performance criteria and infrastructure siting locations based in part on industry best practice, regional context and long-term service delivery excellence. Phase 2 significantly advances the Committee to confirming its requirements for a Core Area wastewater solution and serves to screen the options based on project criteria.

A process for establishing performance criteria typically involves key ingredients as outlined below.

- **Preliminary Design Criteria:** A project charter frames the project and provides guidance for analysis and outcomes. Preliminary criteria should be derived from the charter goals and commitments and later, the criteria can instruct the engineering and costing analysis.
- **Representative Design:** Employing the preliminary design criteria against technical options and technologies begins to frame up the market possibilities (e.g. technologies, resource recovery pathways, pipe alignments, etc.) for a Core Area system. Representative design includes provisionally selecting technologies and system configurations to characterize the relative value of available options and encourage deeper dialogue on the particulars of any commissioned facilities. While analysis and reporting will refer to specific solutions these are

not recommended outcomes; instead, the results of the representative design allow the criteria to come to life for a deeper understanding including life-cycle costing.

- **Life-Cycle Costing:** Potential ratepayer impacts based on proposed levels of service are crucial to performance criteria. Each option set will be assessed using capital, operating and revenue characteristics which will uncover the trade-offs in Core Area alternatives and likely lead to further iterations in future phases. For Phase 2, these costs are Class D only for the purpose of comparing options with significant contingencies due to the nature of the unknowns.
- **Presentation of Alternatives:** Option sets analysis will convey the ability of multiple solutions to meet the criteria and aspirations of the Core Area. While no single alternative will be able to fully address the criteria, it is the presentation of the alternatives and the ensuing debate that will help to clarify the refined set of technical criteria.
- **Refined Criteria:** Final reporting will center on the evolution and rationale for the stated, refined technical criteria. Future phases will test these criteria further so as to confirm the Committee's final statement of requirements (for one or more contracts) for responses by the wastewater treatment and resource recovery market.

Our work plan and methodology follow these ingredients explicitly. We endeavour to translate the project charter into preliminary design criteria, undertake technical analysis and present alternatives so as to provide information for direction by the Committee on their refined performance criteria. Technology and option set evaluations are provisional for deeper understanding of the criteria.

1.2 Preliminary Criteria

There is a need to focus the broad range of treatment and engineering solutions to arrive at a representative design that can be used to develop Class D life-cycle financial scenarios. While private sector submissions will help to finalize the ultimate system design based on prescribed owner's requirements, establishing criteria based on the Project Charter will guide representative design parameters. These parameters will become a key step in setting performance criteria for the project and ultimately guide the technical analysis through Fall 2015 to support Committee direction on preferred system configurations and outcomes.

These criteria are preliminary but suitable for carrying out Phase 2 and stem from the Committee's Charter. Input from the Technical Oversight Panel and direction by the Committee will enhance these criteria and ensure that design parameters align with Core Area expectations and public input to date. Criteria are used to assess alternatives and arrive at potential options that suit the multiple needs and goals of the project. The Charter's Goals and Commitments (left column) frame the criteria.

The preliminary criteria outlined in this Technical Memo provide the basis for detailed technical criteria to develop a representative design and also allow for a comprehensive presentation of the option sets toward the end of Phase 2. Direction from the Committee in December 2015 will allow the CRD to take further steps to refine the performance criteria for a market response to a Core Area solution.

Technical Memorandum #2 will apply the initial steps of our methodology and the preliminary criteria against the defined option sets for further analysis. Additional feedback from the Technical Oversight Panel and ultimately, direction by the Committee, will finalize the option set analysis through Fall 2015.

1.3 Proposed Option Sets Evaluation: Considerations for Decision Making

Phase 2 feasibility and technical analysis provides for an evaluation of 4 option sets across the Core Area. Each option set includes different extents of infrastructure, facilities, services, risks and operations. Life-cycle costing is a core element of the option set evaluation.

Committee direction from June 2015 centers on life-cycle costing analysis which includes design and construction contingencies, administration costs, escalation, inflation, environmental costs as well as capital, operating and maintenance costs. This type of analysis is consistent with comparisons of major capital projects to screen options and further, supports staff and consultants in determining potential allocations per municipality.

In addition to financial analysis, each option set will be further assessed based on its performance against the preliminary criteria stemming from the Charter and from public values from previous phases. While the assessment will be primarily qualitative in nature, the characterization of social benefits, environmental values, risks and service governance will be supportive for Committee direction. Neither the financial analysis nor the qualitative assessment are enough on their own to confirm direction, but instead, it's the balance of needs and aspirations reflected across the entire suite of criteria from which reasonable direction can be made.

1.4 Option Set Evaluation Methodology

Evaluating option sets is led by the Project Goals and Commitments and the established technical criteria. Whether centralized or distributed, it is the ability of any one option set to best meet the goals of the project that warrants even further optimization by the Committee in future phases. Designing the option sets must consider the evaluation method, hence why both methods are included.

Option Set Design Consideration

- Confirm flows by catchment area and site node.
- Inventory supply and demand projections for water and heat recovery reuse across site nodes in the Core Area. Locate potential customers and define their product needs including barriers and pricing considerations.
- Locate treatment facilities (liquids and or solids) among available sites with consideration to existing infrastructure, land uses, road access and synergies with neighboring site nodes.

- Apply regulatory requirements and overlay with existing infrastructure to meet reliability needs without excess infrastructure.
- Develop conceptual resource recovery infrastructure systems to convey resources to their demands. Look for synergies with neighboring site nodes to reduce unnecessary infrastructure.
- Incorporate various processes and technologies to meet the resource recovery, regulatory and neighborhood considerations. Each option set should look to address a different level of service (in line with the criteria) to allow for lateral comparison of all option sets.
- Optimize resource recovery infrastructure to suit the supply demand balance e.g. focus toward the size of treatment facility to suit actual reuse needs and look for phasing to support growth.
- Confirm regulatory and risk-management needs including ultimate disposal of water as required. Confirm limitations and service governance considerations for implementation and operation.
- Iterate design considerations for 2030 and 2045 scenarios.

Evaluation

- Summarize the technical and engineering elements and characterize their relative levels of service.
- Create aggregate resource recovery summary (qualitative and quantitative) for comparative and communication purposes including overall benefits to community, climate change considerations, others.
- Inventory life-cycle costing elements including construction, operation, maintenance and revenues.
- Present life-cycle costing results including sensitivity analysis for various risk, revenue and contingency factors.
- Characterize operations and service governance needs, risk considerations, preliminary economic factors (e.g. supply and demand, pricing), qualitative elements such as social-benefits stemming from the ability to deliver on community aspirations such as water reuse, advanced treatment and other returns on investment that aren't readily quantifiable.
- Assess distributed option sets against technical criteria (Section 1.2).
- Discuss option sets against all project goals of the Charter.
- Reflect on criteria, project goals, and financial results and develop balanced scorecard approach to presenting the option sets.
- Consider recommendations for Committee consideration which may include further refinements of the option sets to best suit the needs of the Core Area.

Technical Memorandum #2 will provide extensive inventories of the option set designs whereas Technical Memorandum #3 will present the evaluation of each option set.

2.0 Design Criteria

2.1 Design Horizon

Most of the work undertaken to date targets meeting the population/flow requirements to the year 2030, with preliminary consideration to flows in 2045 and 2065. These design horizons are consistent with funding applications and businesses cases and therefore could be adopted for Phase 2. Phase 2 feasibility and technical analysis will address infrastructure and life cycle costing for both the 2030 and 2045 design years.

2.2 Design Populations

Previous phases of analysis researched and collated residential populations in each of the seven (7) municipalities and two (2) First Nations, as well as developed equivalent populations for the industrial, commercial and institutional sectors within each area. Population and flow projections are a considerable resource for Phase 2 and we propose to utilize available information following a preliminary screening on their suitability at this time.

Growth rates have been estimated a low rate (at 1.3%/year) and a high rate (at 2.1%/year). Aggregate populations provide a scale of growth for the Core Area however Phase 2 design and analysis will consider municipal by municipal growth to account for locally-specific design capacities. Overall, growth rates to 2030 and 2045 are tabulated below and include population equivalent contributions from industrial, commercial, and institutional sources

	@ 1.3%/year growth	@ 2.1%/year growth
Core Area Population (eq.) 2030	436,000	494,000
Core Area Population (eq.) 2045	570,000 (1)	669,000

(1) Derived from Discussion Paper 033-DP-1

Actual flow projections are based on municipal expectations as communicated to the CRD which are outlined in the following section.

2.3 Flows

Table 2.3.1 summarizes the design flows for 2030 and 2045. While there are nuances and potential discrepancies for flow estimates, Table 2.3.1 appears to reflect the most current CRD estimates with general agreement by the municipalities. We intend to move forward for Phase 2 relying upon the flow estimates in column 1, which we note are different than the flow estimates as provided by the Westside Technical Committee.

The flows noted are based on average dry weather flows (ADWF which aligns directly with the regulatory requirements of the Municipal Wastewater Regulation, as outlined in Section 2.5.1.

Recent direction from the Westside Select Committee is that engineering analysis for Westside Option Sets should account for the flows from west Saanich and west Victoria currently destined for the Macaulay outfall. Flows from the Eastside that travel to the Macaulay outfall are represented in Table 2.3.1.

To account for ongoing water conservation programs and demand management initiatives, the projected per capita flow rates decrease around the Core area from 225 to 250 litres per capita per day now to 195 in 2030 and 2045. Flows are presented in megaliters per day (MLD) which is a summation of the population equivalents per catchment area based on the per capita estimates.

Table 2.3.1 - Core Area 2030 and 2045 Design Flow Allocations

Location		ADWF (MLD)		
		2030 (1)	2030 (2)	2045 (3)
A.	**Clover Outfall**			
	- Oak Bay	6.6	-	6.6
	- East Saanich	9.2	-	12.8
	- East Victoria	31.9	-	34.0
	Sub-Total	**47.7**	**-**	**53.4**
B.	**Macaulay Outfall**			
	- Langford	14.1	14.1	23.1
	- Colwood	4.7	4.7	13.1
	- View Royal	3.5	3.5	7.9
	- Esquimalt First Nation	0.3	0.7	0.4
	- Songhees First Nation	0.4	0.7	0.5
	- Esquimalt	7.1	6.2	7.9
	- West Victoria	6.4	1.0	6.8
	- West Saanich	23.7	16.5	32.9
	Sub-Total	**60.2**	**47.4**	**92.6**
	Totals	**107.9**		**146.0**

(1) Core Area LWMP Committee Presentation by CRD Staff, October 14, 2015

(2) Flows assumed by Westside

(3) Derived from CRD 2030 projections (first column). Refer to Appendix A for derivations

2.4 Influent Wastewater Quality and Loads

The CRD collects 24 hour composite samples and tests the influent effluent for numerous parameters. A summary of the 2014 data is included in Appendix B. The most relevant influent sewage concentration data from 2014 are summarized in Table 2.4.1. This data is consistent with historical reports prepared for the Core Area LWMP, the latest being the January 23, 2013 Technical Memo "Indicative/Detailed Design/Wastewater Characterization and Design Loads". Table 2.4.1 also includes a summary of the 2030 maximum month loads, which are used to size the biological components of the plants. To account for flow and load variability, design factors account for the maximum load that the facility will experience in any 30 consecutive days which typically represents the 92 percentile of the data set analyzed for 2014. The proposed flow-load variability factor is set at 1.25 times the average loading.

Table 2.4.1 – Average Influent Quality Concentrations and Maximum Month Loads for 2030 Flows (1)

Parameter	Macaulay		Clover	
	Average (mg/L)	Max Month (kg/d)	Average (mg/L)	Max Month (kg/d)
Carbonaceous BOD_5	226	17,010	192	11,450
Total BOD_5	275	20,700	238	14,190
Total Suspended Solids	270	20,320	238	14,190
Chemical Oxygen Demand (COD)	632	47,560	530	31,600
Ammonia	42	3,160	27	1,610
Alkalinity	217	16,330	168	10,020
Total Kjeldal Nitrogen	54	4,060	40	2,385

(1) Note influent pH ranges from 7.3 to 7.7 typically

2.5 Liquid Effluent Criteria

2.5.1 Introduction

Two regulations currently govern effluent discharges in BC – The Federal Wastewater Systems Effluent Regulation (WSER) and the BC Municipal Wastewater Regulation (MWR). The WSER deals only with discharges to surface waters and has marginally different criteria than the MWR. The MWR addresses discharges to surface water, ground, wet weather flows and for reclaimed water. Both provincial and federal governments intend to harmonize the regulations which will affect the effluent criteria.

There is a strong sentiment within the Core Area to reuse reclaimed water as much as possible. To facilitate this sentiment, it is proposed that effluent destined for reuse meet the *Greater Exposure Potential Category* for reclaimed water as defined in the BC Municipal Wastewater Regulation. This level of quality is similar to the

requirements of the Canadian Guidelines for Domestic Reclaimed Water for Use in Toilet and Urinal Flushing and the California Title 22 Regulation and would permit all reclaimed uses except indirect and direct potable reuse applications. It is our understanding that this would also be acceptable for aquifer recharge based on work currently being undertaken by the City of Colwood. If the CRD was to limit the reuse to irrigation on restricted public access sites only, then the standard of effluent quality could be reduced to *Moderate Exposure Potential Category* which is basically equivalent to secondary treatment as defined in Section 2.5.4. Also, secondary treatment is suitable for discharge to most marine environments but the outfall depth must be positioned at 30 m or more which effectively rules out any discharge to the inner harbour.

Stream augmentation is cited in the regulations whereby treatment must be greater than secondary (tertiary) with effluent criteria to suit the receiving environment. However, MWR requires an alternate disposal or storage for reclaimed water (stream augmentation or reuse) as follows:

"Alternate Disposal or Storage

114 (1) A person must not provide or use reclaimed water unless all of the following requirements are met:

(a) There is an alternate method of disposing of the reclaimed water that meets the requirements of this regulation or is authorized by a director.

(b) Treatment processes are built with the minimum number of components specified in the applicable reliability category for the alternate method of disposal, as described in section 35 *[general component and reliability requirements]*;

(c) If there is no immediate means of conveyance of the municipal effluent or reclaimed water to the alternate disposal method, the wastewater facility has 48 hours' emergency storage outside the treatment system.

(2) Despite subsection (1) (a), a director may waive the requirement for an alternate method of disposal for reclaimed water that is not generated from residential development or institutional settings if an alternate method is not required to protect public health or the receiving environment and the wastewater facility has

(a) 48 hours' emergency storage outside the treatment system and the ability to shut down generation of municipal wastewater within 24 hours, or

(b) A dedicated storage system that is designed to accommodate:

i. At least 20 days of design average daily municipal effluent flow at any time,

ii. The maximum anticipated volume of surplus reclaimed water, and

iii. Storm or snowmelt events with a less than 5-year return period.

(3) Despite subsections (1) (a) and (2), if reclaimed water is discharged from a wastewater facility directly into a wetland, a director may waive the requirement for an alternate method of disposal if an alternate method of disposal is not required to protect public health or the receiving environment.

Failure to meet municipal effluent quality requirements

115 (1) If municipal effluent does not meet municipal effluent quality requirements, a provider of reclaimed water must ensure that the municipal effluent is diverted immediately to

(a) An alternate method of disposal, as provided for in section 114 (1) (a) *[alternate disposal or storage]*, or

(b) Emergency storage or a dedicated storage system, as described in section 115 (1) (c) or (2),

Until municipal effluent quality requirements are met and reclaimed water uses may continue.**"**

These regulatory requirements strongly suggest that an alternate ocean outfall is required if stream augmentation is pursued.

A discharge to a wetland may be possible without requiring an alternate method of disposal, but this would require a specific environmental impact study and a waiver from the Director of the Ministry of Environment. A discharge to a wetland has not been considered in our analyses at this time however may be considered at the direction of the Committee.

The MWR and previous liquid waste management plan amendments further regulate the quality of effluent with respect to wet weather flows, as tabulated below:

Effluent Criteria	Macaulay Outfall	Clover Outfall
Secondary	0 – 2 x ADWF	0 – 2 x ADWF
Primary	2 – 4 x ADWF	2 – 3 x ADWF
Screening (6 mm Ø)	> 4 x ADWF	> 3 x ADWF

ADWF = Average Dry Weather Flow

2.5.2 Ammonia and Toxicity

Ammonia and toxicity in wastewater effluent is a complicated topic which is discussed in detail in Appendix C. In summary, the Federal and BC governments have criteria that regulate the amount of ammonia in the effluent, in particular to the un-ionized ammonia concentrations. Our research and analysis concludes (Appendix C) that it is not necessary to reduce ammonia in the wastewater treatment plants to comply with both the federal and provincial regulations before discharging out the Clover and Macaulay outfalls. Enhanced treatment would be required however for any option that contemplates stream augmentation and/or wetland discharges.

2.5.3 Primary Liquid Effluent

The MWR requires primary effluent to meet:

$CBOD_5$ ≤ 130 mg/L

TSS ≤ 130 mg/L

2.5.4 Secondary Liquid Effluent plus Disinfection

Ocean outfall effluent criteria should best address both the federal and provincial regulations, as proposed in the table below, and based on the requirement of outfall diffusers at a minimum depth of 30 m below the surface.

Parameter	Units	Average Concentration	Maximum Concentration
$CBOD_5$	mg/L	≤ 25	≤ 45
TSS	mg/L	≤ 25	≤ 45
Un-ionized Ammonia in Effluent	mg/L	NA	≤ 1.25 (1)
Un-Ionized Ammonia at End of Dilution Zone	mg/L	NA	≤ 0.016 (1)
Total Residual Chlorine	mg/L	NA	≤ 0.02
Faecal Coliforms	cfu/100 mL	NA	≤ 200 (2)

(1) Only one of these parameters need to be met.

(2) It is our understanding that disinfection will be required. This is the standard concentration for discharge to recreational waters.

The frequency of testing and the averaging period is dependent on flow rates as shown below for continuous flow systems.

Flow Range	Testing Frequency	Averaging Period
≤ 2,500 m^3/d	Monthly	Quarterly
> 2,500 but ≤ 17,500 m^3/d	Every 2 Weeks	Quarterly
> 17,500 but ≤ 50,000 m^3/d	Weekly	Monthly
> 50,000 m^3/d	3 Days/Week	Monthly

2.5.5 Enhanced Tertiary Liquid Effluent

In order to provide the ability for reuse we have identified enhanced tertiary treatment targets.

The proposed enhanced tertiary level of treatment is designed to satisfy most reclaimed water applications in the *Greater Exposure Potential* category as defined in the Municipal Wastewater Regulation. Colwood has noted that

the BC MoE has confirmed that Indirect Potable Reuse effluent is necessary for aquifer recharge in Colwood, as noted below:

Parameter	Greater Exposure Potential	Indirect Potable Reuse	Monitoring Requirements
pH	6.5 to 9	6.5 to 9	Weekly
$CBOD_5$	≤ 10 mg/L	≤ 5 mg/L	Weekly
TSS	≤ 10 mg/L	≤ 5 mg/L	Weekly
Turbidity	Average 2 NTU Maximum 5 NTU	Maximum 1 NTU	Continuous Monitoring
Faecal Coliform (1)	Median 1 cfu/100 mL Maximum 14 cfu/100 mL	Median 1 cfu/100 ml	Daily

(1) Median is based on the last 5 results.

2.5.6 Emerging Contaminants

In the terms of reference for Phase 2 the base case treatment standard is secondary treatment with advanced oxidation. Advanced oxidation is a chemical treatment process designed to remove organic and sometimes inorganic matter in waste water by oxidation with hydroxyl radicals. Practically in wastewater treatment this is achieved through the use of ozone, hydrogen peroxide and/or ultraviolet light.

Unfortunately, we have not been able to determine what parameters and effluent criteria this system was intended to meet. There are in the order of 1,700 pharmaceuticals and personal care products (PPCPs) alone. At the present time, there are no published standards in Canada for the discharge of emerging contaminants to marine waters. The CRD has prepared a fact sheet on emerging contaminants which can be found in Appendix D. From this fact sheet it is interesting to note the data collected by the CRD on their Ganges MBR plant and Saanich Peninsula secondary plant (conventional activated sludge) for removal efficiencies. Approximately 80% of the contaminants (211 of 266) had removal efficiencies > 90% for the MBR plant. Approximately 45% of the monitored contaminants (145 of 324) had removal efficiencies > 90% for the activated sludge plant.

Urban Systems and Carollo Engineers are of the opinion that treatment targets for emerging contaminants be approached in the following manner:

- That treatment processes and technologies for emerging contaminants be assessed in the future once effluent criteria for emerging contaminants of concern have been identified by the regulators; thorough analysis of options can be conducted for the addition of further treatment works at that time;
- That further monitoring and research be conducted in the early years of operation of the new Core Area system to assess the level of reduction of emerging contaminants already occurring in the effluent; and
- That future proposals by market proponents indicate the level of reduction of emerging contaminants in their proposed system and that proposals are evaluated, in part, by the level of reduction achieved.

Space could be left in the plant(s) if it was desired for emerging contaminant treatment in the future once the specific effluent criteria are known.

2.5.7 Liquid Treatment Summary

In summary it has been assumed for the remainder of Phase 2 that secondary treatment plus disinfection will be provided for all ocean discharges up to 2x ADWF with primary treatment to 3 x at the Clover Outfall and 4 x ADWF at the Macaulay Outfall and any other new outfalls. Water for reclaimed purposes will be treated to Greater Exposure Potential Tertiary Standards given the water quality requirements for anticipated uses. No specific treatment will be added at this time for additional treatment of emerging contaminants of concern beyond what the secondary or tertiary process will achieve.

2.6 Solids Criteria

Solids management is an integral component of wastewater treatment and the processing and disposal of the solids generated during the treatment of the wastewater must be addressed. Unlike the water, the solids management has additional requirements both from a public perception and the acceptability of the materials produced. As such, defining the goals and metrics that the solids management must achieve is critical for the technology evaluation.

Sludge is defined as untreated residual solids, whereas biosolids are treated to an extent defined in the BC Organic Matter Recycling Regulation.

Solids criteria are dependent on end uses, some of the typical criteria and end uses are summarized below:

Table 2.6.1 - Solids Criteria

Criteria	End Use	Comments
Class B Biosolids	Land Application	Stringent regulatory constraints
Class A Biosolids	Land Application	Option to donate or sell to public
Dewatered Sludge (12 – 20% dry solids)	Landfill	Could be quite odourous; occupies large volume
Dried Sludge (60 – 85% dry solids)	Landfill	Less concern with odours, occupies much less volume
Dried Sludge (60 – 85% dry solids)	Biofuel for Incinerators	Minor quantities of ash to dispose
Dried Sludge (60 – 85% dry solids)	Biofuel for Gasification	Biochar and ash to be disposed

In terms of the application of these criteria the following aspects will be considered:

- CRD has a current policy that does not allow the land application of biosolids, within its boundaries.
- CRD strongly discourages solids being discharged to their landfill e.g. residual solids disposal should be minimized.

2.7 Resource Recovery Markets: Design and Evaluation Methodology

Wastewater provides for multiple resources that can be recovered for a variety of beneficial uses. Previous studies served to narrow the broad list of possibilities toward a reasonable list of potential applications, including: water reclamation, heat recovery, solids recovery including potential energy conversion, and fertilizer supplements (i.e. struvite). While each application requires its own unique infrastructure and service-operation requirements, there are common attributes that apply universally to suit the charter and preliminary criteria. Throughout Phase 2, possibilities for resource recovery will be initially examined through a lens for:

- Long-term revenues and demands
- Minimized processing-technology footprint
- Cost of service
- Energy balance
- Complexity of customer agreements or partnerships
- Ability to support other community amenities
- Synergy with public utility services
- Regulatory feasibility

This list of attributes will frame the scan for market opportunities for resource recovery and help to identify target markets where there is greatest potential for applications to meet the project goals. Further, distributed option sets are designed to situate multiple plants throughout the Core Area to capitalize on resource recovery demands. Heat recovery and water reuse demands are distributed in particular and instruct the proposed methodology for identifying target markets, including:

- Review the broad inventory of water reuse and heat recovery possibilities including existing customers and future development.
- Inventory supply and demand projections for water and heat recovery reuse across site nodes in the Core Area. Locate potential customers and define their product needs including barriers and pricing considerations.
- Scan the broad list of recovery possibilities against the list of criteria above:
- Narrow the recovery options based on the results of the scan.
- Develop conceptual resource recovery infrastructure systems to convey resources to their demands. Look for synergies with neighboring site nodes to reduce unnecessary infrastructure.
- Optimize resource recovery infrastructure to suit the supply demand balance e.g. focus toward the size of treatment facility to suit actual reuse needs and look for phasing to support growth.
- Confirm regulatory and risk-management considerations. Confirm limitations and service governance considerations for risks and opportunities related to implementation and operation.

- Confirm cost and revenue projections for life cycle costing analysis.

Table 2.7.1 outlines the preliminary considerations for resource recovery target markets.

Table 2.7.1 Preliminary Resource Recovery Opportunities

Reclaimed Water	• Large parcels, clustered in areas within a few kilometres of site nodes, for irrigation supply at parks and local green spaces • Potable substitution for toilet flushing (only) in new (future flows) town center developments including commercial uses • Aquifer recharge
Heat Recovery	• Opportunities to support local development and sustainability goals by providing hydronic heat opportunities (e.g. low grade heat recovery systems) from pump stations or treatment facilities at various institutional and commercial buildings • Opportunities to integrate with any imminent district energy systems • Heat capture at major treatment facilities to offset heating costs and other fuel costs
Solids Recovery	• Market possibilities whereby treated biosolids are mixed into a beneficial topsoil product and sold for land application elsewhere • Market possibilities for biochar or dried solids which remain after energy recovery processes
Energy Recovery	• Recovery of methane gas from decomposed organic materials to produce electricity, natural gas, bioplastics, diesel fuels, others. • Thermal conversion opportunities of carbon via gasification, incineration or pyrolysis.
Struvite	• Recovery of ammonia and phosphorous as nutrients for use in fertilizers • Confirmation that market possibilities previously identified remain and that they are congruent with solids recovery processes

Each of these applications presents opportunities to recover resources from wastewater. Further consideration to service governance, responsibilities, risks, investment needs and long-term operation will be presented to the Committee and the public as part of the analysis results.

3.0 Facility Characterization Criteria

Technical criteria from Section 2 inform the facility design, or *facility characterization criteria*, which is a significant step toward establishing a representative design for each site (Section 4.0).

The following tables summarize the proposed Facility Characterization Criteria and how they align with the Preliminary Charter Criteria outlined in Section 1.0.

Table 3.1 - Liquid Discharge Requirements

Facility Characterization Criteria	Preliminary Charter Criteria	Comments
Flow Requirements	Meet Regulations (1a)	System must work as a whole but each site in a solution set may play a different part (i.e. Where we treat the flows over 2x average dry weather flow)
Receiving Environment – Regulatory Limits	Meet Regulations (1a)	Tied to discharge location
Receiving Environment – Emerging Contaminants	Improve Effluent Quality (4c)	As outlined earlier this one requires further dialogue and definition if it is to be included
Reuse Requirements	Support Resource Recovery (2c, 3c)	Highly tied to market demand

Table 3.2 - Solids Discharge Requirements

Facility Characterization Criteria	Preliminary Charter Criteria	Comments
Disposal/Reuse Requirements	Support Resource Recovery (2c, 3c)	Consider scale, synergies with energy and solids resource recovery and integration with other regional waste streams.

Table 3.3 - Site Constraints

Facility Characterization Criteria	Preliminary Charter Criteria	Comments
Adjacent Land Use	Safe Solutions (6b, 6c) Community Support (3b)	Certain technologies and solutions integrate better into residential settings than others.
Livability of Neighbourhood	Positive Public Interaction (6b) Community Support (3b) Reduction of Carbon Footprint (5a) Balance Energy Needs (5c)	Certain technologies and solutions integrate better into residential settings than others

Table 3.4 - Risks

Facility Characterization Criteria	Preliminary Charter Criteria	Comments
Certainty for Demand/Revenue	Certainty of Long-Term Demand and Revenue (3a) Ability to Phase with Growth (4a)	Certain technologies and solutions are more resilient to variations in demand/revenues.
Climate Variability Impacts	Site/Design Resiliency (4b)	Location specific
Seismic	Site/Design Resiliency (4b)	Location specific
Neighborhood Impacts	Reduction to Risks to Neighbourhoods from Facility Failure (6b) Reduction of Normal Interruption to Neighbourhood (6c) Ability to Produce High-Quality Air Emissions (5b)	Acceptable levels of risk beyond regulation vary by land use.
Process Risks – Liquids	Safe Solutions (6b, 6c) Reduction to Risks to Neighbourhoods from Facility Failure (6b)	Acceptable levels of risk beyond regulatory requirements vary by land use.
Process Risks – Solids	Safe Solutions (6b, 6c) Reduction to Risks to Neighbourhoods from Facility Failure (6b) Ability to Produce High-Quality Air Emissions (5b)	Acceptable levels of risk beyond regulatory requirements vary by land use.
Process Risks – Energy Recovery	Safe Solutions (6b, 6c) Reduction to Risks to Neighbourhoods from Facility Failure (6b) Ability to Produce High-Quality Air Emissions (5b)	Acceptable levels of risk beyond regulatory requirements vary by land use.

4.0 Methodology to Select Representative WWTP Technology

As outlined in Section 1, the criteria outlined in Section 2 and 3 will be used to arrive at representative designs for the various facility locations within the option sets. We have proposed that four sample site characterizations be used in order to inform the representative design process. These site characterizations will be used to consider facility design requirements, siting considerations and to review indicative technologies. Once the site locations and option sets are confirmed they can be refined prior to costing analysis. The proposed site characterizations are summarized in the table below:

Table 4.1 - Site Characterization Summary

Site Characterization	Neighbouring Land Use	Flow Range (Average Dry Weather Flow)	Anticipated Plant Purpose – Liquid Train
Small Distributed	Residential	< 5 ML/day	Tertiary treatment for local reuse
Medium Distributed	Residential	6-15 ML/day	Tertiary treatment for local reuse
Large Distributed	Residential	16 – 25 ML/day	Tertiary treatment for local reuse
Extra Large Distributed or Central	Non-Residential	26 + ML/day	Primary & Secondary treatment for outfall and tertiary treatment for local reuse

Representative design and analysis for solids treatment and recovery will adhere to the criteria outlined in section 3.0 and be considered in synergy with the liquid treatment and energy recovery needs/opportunities for the site.

5.0 Costing Factors

5.1 Introduction

As outlined in the Treasury Board guide on the Public Works and Government Services website cost estimates for projects fall into a number of defined categories. For this project the CRD terms of reference requested that costs be provided with the accuracy of -15% to +25%. This range is consistent with cost estimates which are suitable for budget planning purposes in the early stages of concept development of a project.

Costs will be presented in 2015 Canadian dollars. It is important to recognize that since 2010, and from 2015 until the systems are constructed, prices of all cost elements can be significantly affected by time and typically, cost escalations. For example, the Engineering News Record (ENR) is an industry guide to the construction industry. The ENR states that the construction cost index for Toronto (BC is currently not represented in the ENR) has increased from 9,434 (2010) to 10,515 (2015). This is equivalent to a construction cost increase of 11.5% over the 5 year period. A review of data available from Stats Canada for the Victoria area indicates that their construction price index has risen from 111.5 (2010) to 122.8 (2014; no 2015 data yet available), using a base index of 100 (2007). This is equivalent to a 10.1 % increase over this 4 year period. This would appear to correlate fairly closely with the 11.5 % increase over 5 years for the ENR index. We have used the Stats Canada index for the purposes of calculating all cost escalations.

The impact of the exchange rate between the Euro, the US and Canadian dollars is also relevant, since a portion of the equipment may be manufactured in the USA or Europe.

Some costing considerations are difficult to predict, like the supply and demand and productivity of skilled labour in the Greater Victoria area, especially if other large scale projects in the province were to occur, such as liquefied natural gas and the Metro Vancouver Lion's Gate WWTP. It is also widely known that construction on Vancouver Island carries a premium compared to the mainland.

We will be using all of the recent construction related projects that Urban Systems and Carollo have completed to inform the estimates we provide, including local estimate considerations provided by municipal staff. Previous cost estimating from other consultants on this project have also been reviewed and have been considered in our evaluations.

5.2 Capital Cost Breakdown

Capital cost estimates include multiple factors and contingencies. For Class D cost estimates we have included *general requirements*, *contractor profit and overhead*, *construction and project contingencies, engineering, administration, interim financing and escalation.* Table 5.1 illustrates these cost factors for an example project with a base construction cost estimate of $1,000,000. For comparative purposes the percentages used in this study are the same as those used in previous studies. We have assumed the mid-point of construction is four years or 2019.

Table 5.1 - Capital Cost Breakdown

Description	Total
Construction Cost	$ 1,000,000
General Requirements (Mobilization, Demobilization, Bonds, Insurance, etc.) – 10%	$ 100,000
Contractor Profit/Overhead – 10%	$ 100,000
Construction/Project Contingency – 35%	$ 350,000
Subtotal of Direct Costs	**$ 1,550,000**
Engineering – 15%	$ 233,000
CRD Administration and Project Management and Miscellaneous – 8%	$ 124,000
Interim Financing– 4%	$ 62,000
Escalation to Mid-Point of Construction – 2%/year (4 years)	$ 124,000
Total Capital Project Cost	**$ 2,093,000**

5.3 Pump Stations

The pump stations that will be used to pump effluent from the existing CRD collection system to the proposed treatment plants are typically designed to be low-lift, high-volume facilities. Because of the unique nature of each pump station (siting, access, pump capacity, proximity to major utilities and sensitive areas, geotechnical considerations, etc.), costs for such facilities can vary widely.

Class D cost estimates are commonly derived from cost curves which are based on extensive cost data gathered from the combination of a wide range of pump stations throughout the industry. These curves typically plot station costs against the size of the stations in L/s. Typical curves are shown in Appendix E.

These particular curves were developed by an extensive study undertaken 11 years ago for the Ministry of Public Infrastructure Renewal in Ontario. In conducting our estimates we assessed the application of estimates from Ontario against our experience in the BC market. The unit rates have been multiplied by 1.6 with consideration of the following:

a. 20% - for temporary and permanent site work.

b. 20% - for standby power and SCADA

c. 20% - inflation from 2004 to 2015.

Where possible, the unit rates have been compared to cost data available from recently designed and constructed projects, to confirm general data conformance. These facilities typically comprise a concrete below grade wet well,

in which the sewage is collected and from which the sewage is pumped using submersible pumps. An at-grade superstructure (usually concrete block or similar durable material) is located on top of the wet well (typically poured in place concrete), to house mechanical and electrical equipment, including MCCs, PLCs and standby power.

Where pump stations will be included in the design and construction of a wastewater treatment plant, i.e., are not stand alone facilities, experience informs that a 30% cost deduct should be applied to the unit costs rates to account for common infrastructure and other facility synergies.

Below is a summary of a few examples of anticipated pump station costs, based upon the curves in Appendix E and including the 1.6 multiplier. All rates are in 2015 dollars and pertain only to the Construction Cost portion as outlined in Section 5.2, which would be factored up as per Table 5.1.

Pump Station Size	Construction Cost (CDN$)
350 L/s	$ 3,400,000
750 L/s	$ 6,400,000
925 L/s	$ 8,000,000

Estimates and market pricing (historic) for the Craigflower Pump Station upgrade will be examined further in an effort to further refine these estimates, once the tender information is made available.

5.4 Piping

The piping systems that will be used to service the Core Area option sets will comprise PVC pipe installed in existing rights-of-ways, typically existing road allowances. As such, the unit cost rates allow for pavement and any existing surface improvement restoration. In addition, an allowance has been included for temporary site works, traffic control and associated above ground work.

In general, these pipes will provide the connectivity between the existing CRD sewer trunk mains, proposed pump stations, proposed wastewater treatment plants and proposed outfalls. Typically sanitary collection systems are designed for minimum flow velocities of 0.8 m/sec to ensure that material does not build up within the piping systems. From a capital cost and energy perspective, ideally flows should be near 2.5 m/sec. Given the wide range in flows within the CRD system (0 to 4 x ADWF), detailed analysis is required for any pumped and piped system to ensure that the optimum life cycle range of costs are achieved.

For the purposes of this costing exercise, we have sized our pipes such that the resultant velocities are in the 1.5 to 2.5 m/sec range, based upon 2 x ADWF.

The unit cost rates developed are based upon meeting or exceeding accepted industry design standards, such as those detailed by AWWA.

The following is a summary of the unit cost rates developed by Urban Systems as part of the ongoing work with the CRD. All rates are in 2015 CDN dollars and pertain only to the Construction Cost portion outlined in Section 5.2.

Pipe Diameter (mm)	Construction Unit Cost $/m
300	$ 700
350	$ 740
400	$ 780
450	$ 820
500	$ 870
600	$ 950
750	$ 1,130
900	$ 1,350
1050	$ 1,620
1200	$ 1,850
1350	$ 2,100
1575	$ 2,450

5.5 Outfalls

Developing unit cost rates for outfalls into a marine environment proved to be the most challenging task, given the wide range of unknowns and variabilities. Not too dissimilar from pump stations and their unique features, the unit cost rates for outfalls also vary widely. In particular, geotechnical considerations and seabed profiles will have significant impacts on these costs. However, unlike, pump stations, there is not a large data base on which to draw upon and develop cost curves.

Outfalls are anticipated using steel pipes, installed with concrete collars anchored to the sea floor. Based upon the data available, 2015 costs for these sizes were developed as summarized below and pertain only to the Construction Cost portion outlined in Section 5.2.

Pipe Diameter (mm)	Construction Unit Cost $/m
600	$ 6,150
750	$ 7,000
900	$ 7,800
1050	$ 8,600
1200	$ 9,600
1350	$ 10,800

5.6 Methodology to Provide WWTP Cost Estimates

For Wastewater Treatment Plants the costing methodology is more complicated since each plant includes both liquids and solids treatment processes and costs are largely dependent on the technology selected. For this project we will use the experience database developed by Carollo and Urban Systems in order to determine appropriate costs for the representative facilities. Only the representative technology will be costed in order to arrive at comparative cost estimates between the option sets.

5.7 Revenue Sources

Revenue sources will cover the range of incomes based on exchange of goods or services and also monies that offset costs including potential development contributions or potential partnerships which minimize the extent and impact of new works. Examples of revenues include:

- Utility billings, requisitions, transfers and interest gains
- Retail rates for resource recovery systems including water rates, gas/fuel rates (solids recovery) and incomes collected for any sales related to solids residuals
- Development cost charges and other potential private sector development contributions available to local governments
- Municipal cost-shares for example where infrastructure upgrades are needed for both local and regional benefit
- Grants in terms of secured monies available to CRD
- Other offsetting costs for example, homeowner cost savings that may arise through waste diversion as part of integrated solids recovery

This list of preliminary revenue resources will be refined through high-level feasibility analysis in collaboration with CRD and municipal staff.

5.8 Life Cycle Costing

Life-cycle costs will be prepared for each of the option sets, which will be detailed in Technical Memo #2. Life cycle costing includes capital, as well as operating costs and later, consideration to revenues as part of the aggregate financial scenarios. Operating costs will consider typical cost elements as well as revenue (outlined in Section 5.7) which can reasonably be assumed to accrue given the resource recovery opportunities available. The operating and life cycle costing will be completed in Technical Memo #3.

Below is a summary of the inputs into our life cycle costing model. As this is a constant dollar analysis, all costs will be in $2015. The only escalation that will be included will be 2% per year for initial capital projects for the time from today until midway through construction which is assumed to be 2019.

We propose to conduct sensitivity analysis on the discount rate, escalation factors and revenue projections to monetize the risks inherent in long-term capital financing and service delivery. As a base case, our life cycle analysis will be guided by previous analysis and in particular, will suit treasury board guidelines to suit the funding partners.

Life Cycle:	30 years (2015-2045)
Interest Rate:	to be confirmed with funding partners (as needed) e.g. 5%
Inflation Rate:	to confirmed with funding partners (as needed) e.g. 2%
Discount Rate:	to be confirmed with funding partners (as needed) e.g. 3%
Water Cost:	Distribution cost from distribution supplier (i.e., CRD for Westshore & Sooke) is $1.81/m^3
Electricity Cost:	Average rate $0.08/kwh
Chemical Costs;	Current market prices

Labour Rates:

Labour Type	2015 Annual Salary [(1)]
Plant Manager	$ 158,000
Chief Plant Operators	$ 135,000
Chief Area Operator	$ 113,000
Plant Operator	$ 90,000
Labourer	$ 56,000

[(1)] Refer to Appendix F for derivation

Vehicle Rates:	$40,000/yr./vehicle
Trucking Rates:	Current market prices
Disposal Rates:	Current tipping charges to CRD Landfill (i.e. $157 per tonne for screenings and pumpings from Sewage Treatment Plants)

Maintenance/Repairs Pump Stations:	1% of Capital/yr.
Equipment Replacement Reserve for Treatment Facilities:	2% of Capital
Operation & Maintenance Contingency:	15%

While there are multiple financial scenarios to consider, it is important that Phase 2 results remain consistent with previous analysis but also reflect a shift in project outcomes and criteria. Further, qualitative evaluation of various social and environmental factors will support the financial analysis and allow the Committee to review the merits of option sets across a balanced scorecard. Phase 2 evaluations should support the committee in screening away option sets that don't effectively meet the goals and commitments of the project in order to refine the project criteria for ultimate design parameters for a Core Area solution. Additional public investment analysis beyond Phase 2 may be needed (e.g. value for money) to suit the needs of the funding partners.

APPENDIX B – TECHNICAL CRITERIA AND PROJECT CHARTER

Charter Goal/Commitment	Preliminary Charter Criteria
1. Meet or exceed federal regulations for secondary treatment by December 31, 2020.	a. Refer to Section 2.5.4. b. Extent of liquids or solids produced in excess of regulations.
2. Minimize costs to residents and businesses (life cycle cost) and provide value for money.	a. Extent of leveraging of existing infrastructure assets; b. Reduction of consumable and operations costs; c. Extent of revenues from resource recovery;
3. Produce an innovative project that brings in costs at less than original estimates.	a. Extent of alternative to bring in costs less than original estimate.
4. Optimize opportunities for resource recovery to accomplish substantial net environmental benefit and reduce operating costs.	a. Certainty of long-term demand and revenue; b. Extent of support for community building; c. Extent of new infrastructure/services to support resource recovery; d. Extent of integration of other regional waste streams
5. Optimize greenhouse gas reduction through the development, construction and operation phases and ensure best practice for climate change mitigation.	a. Reduction of carbon footprint (buildings, treatment, transportation); b. Ability to produce high-quality air emissions; c. Ability to balance energy needs;
6. Develop and implement the project in a transparent manner and engage the public throughout the process.	a. Ability of an alternative to meet the preliminary criteria
7. Develop innovative solutions that account for and respond to future challenges, demands and opportunities, including being open to investigation integration of other parts of the waste stream if doing so offers the opportunities to optimize other goals and commitments in the future.	a. Ability to phase capacity/expansion with growth; b. Ability to improve effluent quality over life of facility; c. Extent of integration of other regional waste streams (above)
8. Optimize opportunities for climate change mitigation	a. Reduction of carbon footprint (buildings, treatment, transportation); b. Ability to produce high-quality air emissions; c. Ability to balance energy needs;
9. Deliver a solution that adds value to the surrounding community and enhances the livability of neighborhoods.	a. Extent to provide for positive public interaction; b. Reduction of risk to neighborhoods from facility failure; c. Reduction of interruption to neighborhood during normal operation;
10. Deliver solutions that are safe and resilient to earthquakes, tsunamis, sea level rise and storm surges.	a. Site/design resiliency for seismic and sea level rise;

CORE AREA SEWAGE AND RESOURCE RECOVERY SYSTEM 2.0

Phase 2: Analysis, Options Costing and Public Engagement

Project Charter - FINAL

October 2, 2015

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1. VISION

In partnership with the public, the Core Area Liquid Waste Management Committee (CALWMC) will deliver a sewage treatment and resource recovery system that is proven, innovative and maximizes the benefits for people and the planet – economic, social, and environmental – for the long term.

2. BACKGROUND

In 2006, an environmental report commissioned by the Ministry of Environment noted the contamination of seabed sites close to Capital Regional District (CRD) outfalls where the region's wastewater is discharged. As a result, the Province mandated that the CRD plan for and initiate secondary sewage treatment for the region.

In 2007, the CRD received a letter from the Ministry of Environment giving six directives for the Core Area Liquid Waste Management Plan (LWMP). These six directives continue to inform the goals and commitments of this project.

Minister's Requirements:

1. Meet the regulatory standard for liquid waste
2. Minimize total project cost to the taxpayer by maximizing economic and financial benefits, including beneficial reuse of resources and generation of offsetting revenue
3. Optimize the distribution of infrastructure based on number 2 above
4. Aggressively pursue opportunities to minimize and reduce greenhouse gas emissions (e.g., reduced requirement of energy for pumping purposes and beneficial reuse of energy)
5. Optimize 'smart growth' results (e.g., district services, density, Dockside Green-like innovation)
6. Examine the opportunity to save money, transfer risk and add value through a public private partnership

In 2012, the federal government passed a law requiring all high-risk Canadian cities to provide secondary sewage treatment by 2020 at the latest. The CRD's core area was considered to be in the high-risk category.

Between 2009 and 2014, the CALWMC, CRD staff and consultants, and the Core Area Wastewater Program Commission (the Commission) worked to create and implement a publicly acceptable sewage treatment and resource recovery system for the Core Area.

While the approved CALWMP continues to identify McLoughlin Point as the location for the wastewater treatment facility, in April 2014, the CRD's revised McLoughlin Point rezoning application did not meet the zoning requirements for Esquimalt. In June 2014, the plan to build one regional plant at McLoughlin Point was put on hold by the CRD Board, in response to public input.

In June 2014, Langford, Colwood, View Royal, Esquimalt and the Songhees Nation formed the Westside Select Committee to begin planning for a new project to treat sewage and recover resources in those municipalities and the Nation. In September 2015, Esquimalt Nation joined the Westside Select Committee. In January 2015, a similar body – the Eastside Select

Committee, comprised of Saanich, Oak Bay and Victoria – was formed to develop a similar plan for the Eastside municipalities.

Since June 2014 and January 2015, respectively, both Select Committees have been engaged in in-depth public engagement activities to share information with the public, build trust, and seek public input on a range of factors including, but not limited to, level of treatment, treatment technologies, siting of treatment plants, costs, risks and long-term social, economic and environmental benefits.

In July 2015, both select committees presented their work and recommendations to the CALWMC. The CALWMC approved the solution sets and recommendations from the Eastside Select Committee, including potential sites and direction with regard to investigating secondary and tertiary treatment, anaerobic digestion and gasification, and resource recovery and revenue generation. The CALWMC received a presentation from the Westside Select Committee outlining five technically preferred sites and two scenarios, detailing its technical work to date. The Committee accepted the Westside Select Committee's proposal to carry on with further public engagement and more detailed costing and engineering analysis as per its terms of reference to be presented to the CALWMC as more fully-developed solutions in fall 2015.

The work of the Eastside and Westside Select Committees, the CALWMC and the public between June 2014 and July 2015 lays the groundwork for the current project, *Core Area Sewage and Resource Recovery System 2.0.*

3. GOALS AND COMMITMENTS

The *Core Area Sewage and Resource Recovery System 2.0* project will deliver the following goals and meet the following commitments. *NB goals should be measurable. Each of these goals needs a corresponding metric so at project completion, the CALWMC can determine whether it achieved its goals.*

Goals

a) Meet or exceed federal regulations for secondary treatment by December 31, 2020

b) Minimize costs to residents and businesses (life cycle cost) and provide value for money

c) Produce an innovative project that brings in costs at less than original estimates

d) Optimize opportunities for resource recovery to accomplish substantial net environmental benefit and reduce operating costs

e) Optimize greenhouse gas reduction through the development, construction and operation phases and ensure best practice for climate change mitigation

Commitments

a) Develop and implement the project in a transparent manner and engage the public throughout the process

b) Deliver a solution that adds value to the surrounding community and enhances the livability of neighbourhoods

c) Deliver solutions that are safe and resilient to earthquakes, tsunamis, sea level rise and storm surges

d) Develop innovative solutions that account for and respond to future challenges, demands and opportunities, including being open to investigating integration of other parts of the waste stream if doing so offers the opportunities to optimize other goals and commitments in the future

e) Optimize greenhouse gas reduction through the development, construction and operation phases and ensure best practice for climate change mitigation

4. SCOPE

The scope of this phase of the *Core Area Sewage and Resource Recovery System 2.0* project, is to complete the Options Development Phase, by submitting an amendment to the Liquid Waste Management Plan and receiving conditional approval from the Minister of Environment of an Amendment for the Core Area. This Plan amendment will be approved by the provincial and federal funding agencies. Completion of this phase includes securing sites for all facilities (wastewater treatment and resource recovery).

The scope of this phase does not include detailed site assessments such as Environmental and Social Reviews, submission of detailed business cases (as may be required by funding agencies), indicative design, finalized cost sharing agreements or the procurement of infrastructure.

5. KEY STAKEHOLDERS

The graphic illustration (see Attachment 1) outlines all of the *Core Area Sewage and Resource Recovery 2.0* project stakeholders and displays the relationships between them. For a description of the roles and responsibilities of each stakeholder, please see Section 6.

6. ROLES AND RESPONSIBILITIES

Project Lead (TBD)

Federal Government – In 2012, the federal government passed a law requiring all high-risk Canadian cities to provide secondary sewage treatment by 2020 at the latest. The CRD's Core Area was considered to be in the high-risk category. The federal government agreed to contribute up to $253 million towards the project out of three different funding programs: Building Canada Fund ($120 million), Green Infrastructure Fund ($50 million) and 3P Canada ($83.4 million).

- Secondary treatment mandated by 2020
- Funding up to $253 million

Provincial Government – In 2006, an environmental report commissioned by the Ministry of Environment noted the contamination of seabed sites close to CRD outfalls where wastewater is discharged. As a result, the CRD was mandated by the province to plan for and initiate secondary wastewater treatment for the region. Provincial funding agreements provide a maximum of $248 million towards the project.

- Funding up to $248 million
- Approval of LWMP amendment and regulatory requirements

Capital Regional District Board (CRD Board) – The CRD Board is responsible for selecting final site locations and securing lands for wastewater treatment facilities, obtaining the rezoning of lands, approving the architectural design for facilities, and approving funding agreements and the budget. The CRD Board is responsible for delivering the project outlined in the Vision.

- Final approving body for funding, budget and major decisions
- Collect and disburse the local portion of the funding of $287 million

Core Area Liquid Waste Management Committee (CALWMC) – A standing committee of the CRD Board, the CALWMC consists of Directors from municipalities and First Nations participating in the Core Area Liquid Waste Management Plan (CALWMP). The committee is responsible for overseeing the CALWMP and making recommendations to the CRD Board about the CALWMP and certain aspects of the Core Area Wastewater Treatment Program.

- Standing Committee of CRD Board
- Responsible for overseeing CALWMP

Core Area Liquid Waste Management Committee (CALWMC) Chair – The CALWMC Chair is selected by the Chair of the CRD Board annually. The CALWMC Chair is responsible for participating in CALWMC agenda meetings and chairing CALWMC meetings. The Chair is also responsible for building and maintaining relationships, and liaising with the Chair of the Core Area Wastewater Program Commission and the Chair of the Technical Oversight Panel. The CALWMC Chair is the public face of the project and is responsible for communicating with other public bodies at the political level, as well as with the media.

Core Area Liquid Waste Management Committee (CALWMC) Vice Chair – The CALWMC Vice Chair is responsible for fulfilling the roles and responsibilities of the CALWMC Chair in the Chair's absence.

Westside Wastewater Treatment and Resource Recovery Select Committee – In June 2014, Westside participants (Colwood, Esquimalt, Langford, View Royal, and Songhees Nation) formed the Westside Wastewater and Resource Recovery Select Committee to evaluate Westside treatment options and develop a sub-regional wastewater treatment and resource recovery plan. The member municipalities' role is to provide political input and take feedback from the public and report to the Westside Select Committee. The participating municipalities also have zoning authority. In September 2015, the Esquimalt Nation joined the Westside Select Committee. The Songhees and Esquimalt Nation representatives provide political input to the Westside Select Committee. The Committee reports to the CALWMC and is supported by CRD staff, Westside staff, consultants and a technical working group.

The Westside Select Committee participants initiated the Westside Solutions Project as a way to engage residents to work collectively to identify solutions for wastewater treatment and resource recovery that meet the unique needs of the Westside communities. The Westside option sets consider flow scenarios that include Eastside flows from Vic West and Saanich West. This work, along with the work from the Eastside Select Committee, will inform the *Core Area Sewage and Resource Recovery 2.0* project and the amendment to the Liquid Waste Management Plan.

- Representatives from Colwood, Esquimalt, Langford, View Royal and Songhees Nation
- Reports to CALWMC
- Evaluates options to develop a sub-regional wastewater treatment plan
- Supported by CRD staff, Westside municipal staff, consultants and a technical working group

Eastside Wastewater Treatment and Resource Recovery Select Committee – In January 2015, Oak Bay, Saanich and Victoria formed the Eastside Wastewater and Resource Recovery Select Committee to engage with their communities and develop wastewater treatment options that meet the needs of the Eastside municipalities. The role of the participating municipalities is to provide political input and take feedback from the public and report to the Eastside Select Committee. The participating municipalities also have zoning authority. The Eastside Select Committee reports to the CALWMC and is supported by CRD staff, participating municipal staff and consultants.

The Eastside option sets consider a regional option, which includes all flows from Eastside and Westside, as well as a sub-regional and distributed option that includes flows from Eastside municipalities only and Eastside Clover Point outfall catchment flows. The Eastside Select Committee's plan, in combination with the work from the Westside Select Committee, will inform the *Core Area Sewage and Resource Recovery 2.0* project and could form the basis for an amendment to the CALWMP.

- Representatives from Oak Bay, Saanich and Victoria
- Reports to CALWMC
- Working to develop wastewater treatment options for Eastside municipalities
- Supported by CRD staff, participating municipal staff, and consultants

CRD Chief Administrative Officer – The CAO oversees all administrative operations and staff, ensures CRD Board policies are implemented, oversees the operations and functions of the CRD, and aligns the organization to achieve strategic priorities set by the Board. This includes working with federal and provincial staff to coordinate funding agreements and providing advice to the CRD Board regarding potential risks and opportunities for the CRD Board.

- Oversees CRD operations and staff
- Works with partners and stakeholders
- Provides advice to the CRD Board

General Manager of Parks & Environmental Services – The GM of Parks & Environmental Services provides general direction and leadership to CRD staff and advises the CALWMC and the Eastside and Westside Wastewater Treatment and Resource Recovery Select Committees regarding the technical and legal aspects of the CALWMP and the wastewater treatment

planning process. The General Manager's role is also to provide information to the Core Area Municipalities' CAOs and First Nations Administrators.

- Provides general direction and leadership to CRD staff
- Advises on technical and legal aspects of the CALWMP
- Informs Core Area Municipal CAOs and First Nation Administrators about the project

General Manager of Finance & Technology – The GM of Finance & Technology is the Chief Financial Officer for the CRD. The GM of Finance and Technology is responsible for the budget and all financial services, information technology and geographic information services (IT & GIS), property and real estate services, insurance and risk management, facilities management, and arts development for the Capital Region.

Corporate Officer – The CRD Corporate Officer provides support and procedural advice to the CRD Board and the CALWMC, and is responsible for maintaining the official records of these bodies. The officer also processes requests for records in accordance with the Freedom of Information and Protection of Privacy Act.

First Nations Liaison – The First Nations Liaison serves as a point of contact for First Nations communities involved with the project and provides departmental support and assistance in the areas of service delivery, referral processes, outreach, engagement and relationship building.

Manager, Corporate Communications – The Senior Manager of Corporate Communications provides professional expertise and leads the CRD Corporate Communications team, which works with the General Manager of Parks & Environmental Services and the CAO on overall communications for the CRD Board. There is a communications coordinator dedicated to working on the CALWMP.

Technical Oversight Panel (ToP) – The role of the Technical Oversight Panel is to review the costing and feasibility studies developed by the Engineering Team during the planning phase of the project and to ensure that the studies for the wastewater treatment options include the necessary due diligence. The Technical Oversight Panel will also advise on how to best engage the private sector in this phase of the project. Fundamental to providing independent technical oversight and confirming due diligence is to ensure that the engagement of the private sector in this phase of the project and the innovative solutions that may come forward is informed by, not necessarily bound by (as per the ToP Terms of Reference), decisions to date regarding sites, option sets, timelines, definitions of treatment and other potential limitations on analysis and costing.

The role of the ToP does not include public consultation, media interaction, land acquisition and rezoning, contract management or direction of the Engineering Team The ToP receives information from and liaises with the Engineering Team (Urban Systems and Carollo Associates), and provides feedback and recommendations to the CALWMC. The Chair of the ToP reports to the CALWMC biweekly. The ToP liaises with the Eastside and Westside Select Committee.

- Independent Technical Oversight Panel
- Reviews costing and feasibility studies

- Reports findings to the CALWMC

Independent Engineering Resources – The Independent Engineering Team's role is to conduct the Feasibility and Costing Analysis (Urban Systems partnered with Carollo) for the CALWMP Wastewater Treatment System. The Engineering Team is also working with the Westside Select Committee to do a more detailed analysis on the Westside flows. The team provides information to and liaises with the ToP, and reports to and receives direction from the CALWMC. Additional external resources may be required for staff to prepare the LWMP amendment. The team is assessing the feasibility of a regional and sub-regional system in the Core. The team is also looking at a distributed system option based on the potential sites put forward from the Eastside Select Committee and Westside Select Committee.

- Conducts feasibility and costing analysis
- Assesses feasibility of regional and sub-regional systems in the Core Area
- Assists with preparation of LWMP amendment

Fairness and Transparency Advisor (FTA) – The FTA's role is to act as a point of contact for the public to submit complaints regarding the process of costing the options, working with the host jurisdiction(s) and preparing an amendment to the LWMP and to ensure that the process is fair, transparent, impartial and objective. The FTA is independent of the CRD. The FTA's role is to investigate appropriate complaints and report to the Board, through the CALWMC, the results of an investigation, to help strengthen the fairness, transparency or objectiveness of the process followed. The FTA is to provide monthly status reports to the CALWMC. The role of the FTA does not restrict the public from going to other sources for complaints and requests to review processes, such as the office of the Ombudsperson.

- Independent of the CRD
- Investigates public complaints regarding process
- Ensures process is fair, transparent, impartial and objective

Core Area Wastewater Treatment Program Commission (the Commission) – As part of the funding negotiations with the Province, the CRD was required to establish an independent non-political governance body to manage, implement and commission the Core Area Wastewater Treatment Program. The Commission governs the implementation and operation of the Wastewater Treatment Program and oversees the procurement process for all components of the Program. The Commission operates autonomously of the CALWMC and Regional Board; however, the Commission is required to seek CRD Board and funder approval on predetermined items as detailed in the CRD Commission bylaw. Several steps have been taken to scale back operations and reduce costs as the CRD continues its planning work to find a new solution to wastewater treatment. The Commission remains in place waiting to implement whatever system of wastewater projects the CRD Board decides upon, and is approved by the Province.

- Independent Commission required by Province
- Manages implementation and operations of the Wastewater Treatment Program
- Oversees procurement process

Technical and Community Advisory Committee (TCAC) – The Technical and Community Advisory Committee is an LWMP requirement of the province, and provides technical and

community consultation advice and input to the CALWMC. The TCAC assists the CALWMC in making appropriate recommendations to the CRD Board in the following areas: (a) plant design criteria and treatment technology, including opportunities for resource recovery, sludge management, odour control and general plant design criteria, (b) number and location of treatment plants, and (c) timing/scheduling of treatment.

- Provides technical and community consultation advice
- Makes recommendations regarding design criteria, treatment technology, number and location of treatment plants, and schedule for treatment

Eastside Public Advisory Committee (EPAC) – The Eastside Public Advisory Committee takes input from the public and provides guidance to the Eastside Wastewater and Resource Recovery Select Committee on the public consultation process.

- Takes input from the public
- Provides Eastside Select Committee on the public consultation process

Core Area CAOs + First Nation Administrators – The Core Area CAOs and First Nations Administrators are the principle policy advisors to councils, and provide support to the Eastside and Westside Select Committees. The Core Area CAOs and First Nations Administrators receive project-specific information and updates from the CRD's General Manager of Parks & Environmental Services regarding the progress of the CALWMC and the Eastside and Westside Select Committees.

- Principle policy advisors
- Receive project information
- Provide recommendations from municipal staff perspective

Municipal Councils – The role of municipal councils is to make land-use decisions for facility siting and to negotiate development agreements with the CRD.

Westside Communications Team – The Westside Communications Team is made up of Communications Coordinators from Colwood, Esquimalt, CRD and Aurora Consultants. The Team provides communication and public consultation support to the Westside Select Committee.

Eastside Communications Team – The Eastside Communications Team consists of a consultant from Public Assembly and the CRD Communications Manager and CRD CALWMP Communications Coordinator. The Eastside Communications Team provides communication and public consultation support to the Eastside Select Committee.

Westside Technical Team – The Westside Technical Team consists of municipal staff, supported by Urban Systems. The technical team provides technical information and input to the Westside Select Committee.

- Comprised of municipal staff and supported by Urban Systems and Aurora Innovations for facilitation and coordination support
- Provides technical advice to the Westside Select Committee

Eastside Technical Team – The Eastside Technical Team is comprised of municipal staff and supported by Urban Systems and CRD Staff. The Technical Team provides support and input to the Eastside Select Committee.

- Comprised of municipal staff; provides support and information to the Eastside Select Committee

7. MILESTONES

The Proposed Work Plan Overlay, which was adopted and submitted to 3P Canada in March 2014, provides the overarching timelines and milestones through the completion of the project (Attachment 2). A draft schedule identifying key tasks and milestones of the feasibility and costing exercise to be achieved by the end of 2015 during Phase 2 of the Core Area Sewage and Resource Recovery System 2.0 project is included for discussion (Attachment 3). The scheduling and implementation of the public consultation on the preferred solution sets (after the costing analysis) is anticipated to occur in early December, but is dependent on all of the deadlines being met up until that point.

A detailed schedule is under development and will be circulated for comment.

8. BUDGET

Funding for the project will be drawn from the Core Area Liquid Waste Management Plan operating reserve, funded by all participants in the service based on projected design capacity for 2030. A total budget of $1,250,000 has been identified to support this phase of the project, including engineering and public consultation consulting fees, Technical Oversight Panel honorarium and disbursements, Fairness and Transparency Advisor, public consultation process delivery and CRD staff time.

Phase 2 Budget

Item	Cost
Project Oversight (FTA & ToP)	$280,000
Public Consultation	$240,000
Feasibility and Costing Analysis	$450,000
Property and Zoning	$75,000
LWMP Amendment No. 10	$75,000
Staff and Wages	$300,000
Miscellaneous and Legal	$30,000
TOTAL	$1,450,000

9. CONSTRAINTS, ASSUMPTIONS, RISKS AND DEPENDENCIES

a) Constraints

- The timelines for this phase of the project are extremely aggressive with no buffer
- The schedule is dependent on multiple parties and governance bodies meeting their sub-project schedules

b) Assumptions

- The Minister of Environment will provide direct *conditional* approval of the Liquid Waste Management Plan upon submission to the Province

c) Risks

- The costing analysis and public consultation processes will be subject to criticism due to time constraints
- The governance model of the project is complex, leading to miscommunication or contradictory decision making
- Municipal councils do not endorse siting preferences of the CRD Board
- Potential loss of senior government funding if timelines are not met

d) Risk Mitigation

- Ensure regular, open reporting of all parties to the Core Area Liquid Waste Management Committee to ensure "no surprises" when public consultation is formally conducted
- Engage in close municipal council and staff involvement as preferred sites emerge and municipal planning/siting processes are initiated
- Ensure ongoing and open discussions with the funding agencies to ensure "no surprises" when the LWMP amendment is submitted for approval and the project is submitted for funding
- Ensure transparent and deep engagement with the community
- Ensure there is enough time required to rezone and that there is public support for rezoning

Attachments:	Attachment 1:	Planning Process – Core Area Liquid Waste Management Plan – Roles, Input & Relationships
	Attachment 2:	Proposed Work Plan Overlay – 3P Canada Funding Considerations
	Attachment 3:	Proposed Feasibility and Costing Analysis Schedule (Urban Systems) – August 31, 2015

APPENDIX C – COST TABLES

Cost Components for Option 1a - One Secondary Plant (x 1,000)

Cost Component	Capital Cost Incurred [1]		Operating Cost [1]			Resource Income		Net Operating Cost	
	2015	2030	at 2015	at 2030	at 2045	2030	2045	2030	2045
1. Conveyance									
(a) Clover Pt PS and Forcemain to Rock Bay	$ 51,400	N/A	$ 540	$ 640	$ 730				
(b) Macaulay Pt PS and Forcemain to Rock Bay	$ 65,400	N/A	$ 620	$ 730	$ 840				
(c) Effluent PS and Forcemain to Clover Point	$ 83,900	N/A	$ 1,000	$ 1,190	$ 1,400				
(d) Replace Clover Outfall	$ 32,500	N/A	incl. in (c)		incl. in (c)				
(e) Reline Macaulay Outfall	$ 11,100	N/A	incl. in (b)		incl. in (b)				
Conveyance Subtotal:	$ 244,300	$ -	$ 2,160	$ 2,560	$ 2,970	$ -	$ -	$ -	$ -
2. Liquid Treatment (Secondary)	$ 392,000	$ 162,000	$ 7,000	$ 10,100	$ 12,650				
3. Solids Treatment - AD at Rock Bay	$ 258,000	$ 90,600	$ 5,000	$ 8,800	$ 10,300				
4. Reuse									
(a) Tertiary Slipstream	$ 8,100	N/A	$ 230	$ 230	$ 230				
(b) Effluent Pumping/Piping/Controls	$ 16,100	N/A	$ 70	$ 75	$ 80				
Reuse Subtotal:	$ 24,200	$ -	$ 300	$ 305	$ 310	$ -	$ -	$ -	$ -
5. Existing System Capacity Upgrades									
(a) Craigflower PS - Constructed	$ 12,100	N/A	N/A	N/A	N/A				
(b) Arbutus Attenuation Tank - incl land	$ 20,000	N/A	N/A	N/A	N/A				
(c) Siphon Extension (1600 m)	$ 7,500	N/A	N/A	N/A	N/A				
(d) Upgrade Currie St PS	$ 2,300	N/A	N/A	N/A	N/A				
(e) Upgrade East Coast Interceptor (1400 m)	$ 3,100	N/A	N/A	N/A	N/A				
Existing System Subtotal:	$ 45,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Land Costs	$ 67,200								
Total:	**$ 1,030,700**	**$ 252,600**	**$ 14,460**	**$ 21,765**	**$ 26,230**	**$ -**	**$ -**	**$ -**	**$ -**

[1] Includes all contingencies, engineering, etc. outlined in TM #1

Cost Components for Option 1b - One Tertiary Plant (x 1000)

Cost Component	Capital Cost Incurred [1]		Operating Cost [1]			Resource Income		Net Operating Cost	
	2015	2030	at 2015	at 2030	at 2045	2030	2045	2030	2045
1. Conveyance									
(a) Clover Pt PS and Forcemain to Rock Bay	$ 51,400	N/A	$ 540	$ 640	$ 730				
(b) Macaulay Pt PS and Forcemain to Rock Bay	$ 65,400	N/A	$ 620	$ 730	$ 840				
(c) Effluent PS and Forcemain to Clover Point	$ 83,900	N/A	$ 1,000	$ 1,190	$ 1,400				
(d) Replace Clover Outfall	$ 32,500	N/A	incl. in (c)		incl. in (c)				
(e) Reline Macaulay Outfall	$ 11,100	N/A	incl. in (b)		incl. in (b)				
Conveyance Subtotal:	$ 244,300	$ -	$ 2,160	$ 2,560	$ 2,970	$ -	$ -	$ -	$ -
2. Liquid Treatment (Tertiary)	$ 500,000	$ 220,000	$ 12,000	$ 15,000	$ 19,300				
3. Solids Treatment - AD at Rock Bay	$ 258,000	$ 90,600	$ 5,000	$ 8,800	$ 10,300				
4. Reuse									
(a) Effluent Pumping/Piping/Controls	$ 16,100	N/A	$ 70	$ 75	$ 80				
5. Existing System Capacity Upgrades									
(a) Craigflower PS - Constructed	$ 12,100	N/A	N/A	N/A	N/A				
(b) Arbutus Attenuation Tank- incl land	$ 20,000	N/A	N/A	N/A	N/A				
(c) Siphon Extension (1600 m)	$ 7,500	N/A	N/A	N/A	N/A				
(d) Upgrade Currie St PS	$ 2,300	N/A	N/A	N/A	N/A				
(f) Upgrade East Coast Interceptor (1400 m)	$ 3,100	N/A	N/A	N/A	N/A				
Existing System Subtotal:	$ 45,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Land Costs	$ 67,200								
Total:	**$ 1,130,600**	**$ 310,600**	**$ 19,230**	**$ 26,435**	**$ 32,650**	**$ -**	**$ -**	**$ -**	**$ -**

[1] Includes all contingencies, engineering, etc. outlined in TM #1

Cost Components for Option 2 - Two Plants (x 1000)

Cost Component	Capital Cost Incurred [1]		Operating Cost [1]			Resource Income		Net Operating Cost	
	2015	2030	at 2015	at 2030	at 2045	2030	2045	2030	2045
1. Conveyance - Rock Bay									
(a) Clover Pt PS and Forcemain to Rock Bay	$ 51,400	N/A	$ 540	$ 640	$ 730				
(b) Macaulay Pt PS and Forcemain to Rock Bay	$ 65,400	N/A	$ 620	$ 730	$ 840				
(c) Effluent PS and Forcemain to Clover Point	$ 83,900	N/A	$ 1,000	$ 1,190	$ 1,400				
(d) Replace Clover Outfall	$ 32,500	N/A	incl. in (c)		incl. in (c)				
(e) Reline Macaulay Outfall	$ 11,100	N/A	incl. in (b)		incl. in (b)				
Conveyance - Rock Bay Subtotal:	$ 244,300	$ -	$ 2,160	$ 2,560	$ 2,970	$ -	$ -	$ -	$ -
2. Liquid Treatment - Rock Bay - Secondary	$ 392,000	$ 162,000	$ 7,000	$ 10,100	$ 12,650				
3. Solids Treatment - AD at Rock Bay	$ 258,000	$ 90,600	$ 5,000	$ 8,800	$ 10,300				
4. Reuse - Rock Bay									
(a) Tertiary Slipstream	$ 8,100	N/A	$ 230	$ 230	$ 230				
(b) Effluent Pumping/Piping/Controls	$ 16,100	N/A	$ 70	$ 75	$ 80				
Reuse - Rock Bay Subtotal:	$ 24,200	$ -	$ 300	$ 305	$ 310	$ -	$ -	$ -	$ -
6. Existing System Capacity Upgrades									
(a) Craigflower PS - Constructed	$ 12,100	N/A	N/A	N/A	N/A				
(b) Arbutus Attenuation Tank - incl land	$ 20,000	N/A	N/A	N/A	N/A				
(c) Siphon Extension (1600 m)	$ 7,500	N/A	N/A	N/A	N/A				
(d) Upgrade Currie St PS	$ 2,300	N/A	N/A	N/A	N/A				
(f) Upgrade East Coast Interceptor (1400 m)	$ 3,100	N/A	N/A	N/A	N/A				
Existing System Subtotal:	$ 45,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Conveyance - Colwood									
(a) Galloping Goose Trail PS/Forcemain To/From	$ 4,400	N/A	$ 70	$ 70	$ 75				
8. Liquid Treatment - Colwood - Tertiary	$ 32,500	N/A	$ 600	$ 900	$ 900				
9. Reuse - Colwood									
(a) Effluent Pumping/Piping/Controls	$ 16,600	N/A	$ 70	$ 75	$ 80				
11. Land Costs	$ 71,000								
Total:	**$ 1,088,000**	**$ 252,600**	**$ 15,200**	**$ 22,810**	**$ 27,285**	**$ -**	**$ -**	**$ -**	**$ -**

[1] Includes all contingencies, engineering, etc. outlined in TM #1

Cost Components for Option 3 - Four Plants (x 1000)

Cost Component	Capital Cost Incurred [1]		Operating Cost [1]			Resource Income		Net Operating Cost	
	2015	2030	at 2015	at 2030	at 2045	2030	2045	2030	2045
1. Conveyance - Rock Bay									
(a) Clover Pt PS and Forcemain to Rock Bay	$ 51,400	N/A	$ 560	$ 650	$ 730				
(b) Barnhard Park PS and Forcemain to Rock Bay	$ 39,600	N/A	$ 320	$ 330	$ 340				
(c) Effluent PS and Forcemain to Clover Point	$ 53,700	N/A	$ 710	$ 760	$ 800				
(d) Replace Clover Outfall	$ 23,500	N/A	in ©		in ©				
Conveyance - Rock Bay Subtotal:	$ 168,200	$ -	$ 1,590	$ 1,740	$ 1,870	$ -	$ -	$ -	$ -
2. Liquid Treatment - Rock Bay (Secondary)	$ 282,000	$ 70,000	$ 5,000	$ 7,800	$ 9,900				
3. Solids Treatment - AD at Rock Bay	$ 258,000	$ 90,600	$ 5,000	$ 8,800	$ 10,300				
4. Reuse - Rock Bay									
(a) Tertiary Slipstream	$ 8,100	N/A	$ 230	$ 230	$ 230				
(b) Effluent Pumping/Piping/Controls	$ 16,100	N/A	$ 70	$ 75	$ 80				
Reuse - Rock Bay Subtotal:	$ 24,200	$ -	$ 300	$ 305	$ 310	$ -	$ -	$ -	$ -
5. Existing System Capacity Upgrades									
(a) Craigflower PS - Constructed	$ 12,100	N/A	N/A	N/A	N/A				
(b) Arbutus Attenuation Tank- incl land	$ 20,000	N/A	N/A	N/A	N/A				
(c) Siphon Extension (1600 m)	$ 7,500	N/A	N/A	N/A	N/A				
(d) Upgrade Currie St PS	$ 2,300	N/A	N/A	N/A	N/A				
(e) Upgrade East Coast Interceptor (1400 m)	$ 3,100	N/A	N/A	N/A	N/A				
Existing System Subtotal:	$ 45,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Conveyance - Colwood									
(a) Galloping Goose Trail PS/Forcemain To/From	$ 4,400	N/A	$ 70	$ 70	$ 75				
7. Liquid Treatment - Colwood (Tertiary)	$ 32,500	N/A	$ 600	$ 900	$ 900				
8. Reuse - Colwood									
(a) Effluent Pumping/Piping/Controls	$ 16,600	N/A	$ 70	$ 75	$ 80				
9. Conveyance - Esquimalt FN									
(a) Admirals Rd Trunk Tie-in and FM to Plant	$ 4,600	N/A	N/A		N/A				
(b) Macaulay Pt PS and Forcemain to WWTP	$ 16,600	N/A	$ 130	$ 140	$ 150				
(c) Effluent PS and Forcemain to Macaulay	$ 42,600	N/A	$ 320	$ 420	$ 530				

Cost Components for Option 3 - Four Plants (x 1000)

Cost Component	Capital Cost Incurred [1]		Operating Cost [1]			Resource Income		Net Operating Cost	
	2015	2030	at 2015	at 2030	at 2045	2030	2045	2030	2045
(d) Replace Macaulay Outfall	$ 34,200	N/A	in ©		in ©				
Conveyance - Esquimalt FN Subtotal:	$ 98,000	$ -	$ 450	$ 560	$ 680	$ -	$ -	$ -	$ -
10. Liquid Treatment - Esquimalt (Secondary)	$ 141,000	$ 87,000	$ 3,000	$ 4,500	$ 6,000				
11. Reuse - Esquimalt									
(a) Tertiary Slipstream	$ 4,100	N/A	$ 120	$ 120	$ 120				
(b) Effluent Pumping/Piping/Controls	$ 14,000	N/A	$ 50	$ 60	$ 70				
Reuse Esquimalt FN Subtotal:	$ 18,100	$ -	$ 170	$ 180	$ 190	$ -	$ -	$ -	$ -
12. Conveyance - East Saanich									
(a) Garnet PS Upgrade and Forcemain To/From	$ 4,000	N/A	$ 50	$ 60	$ 70				
13. Liquid Treatment - East Saanich (Tertiary)	$ 10,000	$ 6,500	$ 200	$ 300	$ 500				
14. Reuse - East Saanich									
(a) Effluent Pumping/Piping/Controls	$ 16,100	N/A	$ 50	$ 55	$ 60				
16. Land Costs	$ 77,200	N/A							
Total:	**$ 1,195,300**	**$ 254,100**	**$ 16,550**	**$ 25,345**	**$ 30,935**	**$ -**	**$ -**	**$ -**	**$ -**

[1] Includes all contingencies, engineering, etc. outlined in TM #1

Cost Components for Option 4 - Seven Plants (x 1000)

Cost Component	Capital Cost Incurred [1]		Operating Cost [1]			Resource Income		Net Operating Cost	
	2015	2030	at 2015	at 2030	at 2045	2030	2045	2030	2045
1. Conveyance - Rock Bay									
(a) Clover Pt PS and Forcemain to Rock Bay	$ 51,400	N/A	$ 560	$ 645	$ 730				
(b) Barnhard Pk PS and Forcemain to Rock Bay	$ 39,600	N/A	$ 320	$ 335	$ 350				
(c) Effluent PS and Forcemain to Clover	$ 53,700	N/A	$ 710	$ 755	$ 800				
(d) Replace Clover Outfall	$ 23,500	N/A	in ©		in ©				
Conveyance - Rock Bay Subtotal:	$ 168,200	$ -	$ 1,590	$ 1,735	$ 1,880	$ -	$ -	$ -	$ -
2. Liquid Treatment - Rock Bay (Secondary)	$ 282,000	$ 70,000	$ 5,000	$ 7,800	$ 9,900				
3. Solids Treatment - AD at Rock Bay	$ 258,000	$ 90,600	$ 5,000	$ 8,800	$ 10,300				
4. Reuse - Rock Bay									
(a) Tertiary Slipstream	$ 8,100	N/A	$ 230	$ 230	$ 230				
(b) Effluent Pumping/Piping/Controls	$ 16,100	N/A	$ 70	$ 75	$ 80				
Reuse - Rock Bay Subtotal:	$ 24,200	$ -	$ 300	$ 305	$ 310	$ -	$ -	$ -	$ -
5. Existing System Capacity Upgrades									
(a) Craigflower PS - Constructed	$ 12,100	N/A	N/A	N/A	N/A				
(b) Arbutus Attenuation Tank- incl land	$ 20,000	N/A	N/A	N/A	N/A				
(c) Siphon Extension (1600 m)	$ 7,500	N/A	N/A	N/A	N/A				
(d) Upgrade Currie St PS	$ 2,300	N/A	N/A	N/A	N/A				
(e) Upgrade East Coast Interceptor (1400 m)	$ 3,100	N/A	N/A	N/A	N/A				
Existing System Subtotal:	$ 45,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Conveyance - Esquimalt									
(a) Lyall St PS and Forcemain to WWTP	$ 24,100	N/A	$ 230	$ 235	$ 240				
(b) Macaulay Pt PS and Forcemain to WWTP	$ 10,100	N/A	$ 120	$ 120	$ 120				
(c) Effluent PS and Forcemain to Macaulay Point	$ 19,900	N/A	$ 230	$ 275	$ 320				
(d) Replace Macaulay Outfall	$ 34,200	N/A	in ©		in ©				
Conveyance - Esquimalt Subtotal:	$ 88,300	$ -	$ 580	$ 630	$ 680	$ -	$ -	$ -	$ -
7. Liquid Treatment - Esquimalt (Tertiary)	$ 67,000	$ 12,000	$ 1,200	$ 1,900	$ 2,200				
8. Reuse - Esquimalt									
(a) Effluent Pumping/Piping/Controls	$ 14,000	N/A	$ 50	$ 50	$ 50				
9. Conveyance - View Royal									
(a) Retrofit Craigflower PS and all conveyance to Colwood	$ 14,700	N/A	$ 130	$ 145	$ 160				

Cost Components for Option 4 - Seven Plants (x 1000)

Cost Component	Capital Cost Incurred [1]		Operating Cost [1]			Resource Income		Net Operating Cost	
	2015	2030	at 2015	at 2030	at 2045	2030	2045	2030	2045
10. Liquid Treatment - View Royal (Tertiary)	$ 23,000	$ 22,000	$ 400	$ 700	$ 1,300				
11. Conveyance - Colwood									
(a) PS at Colwood Border/Forcemain To WWTP	$ 9,900	N/A	$ 80	$ 95	$ 110				
(b) View Royal and Colwood Effluent to Junction with Langford	$ 1,100	N/A	$ 5	$ 5	$ 5				
Conveyance - Colwood Subtotal:	$ 11,000	$ -	$ 85	$ 100	$ 115	$ -	$ -	$ -	$ -
12. Liquid Treatment - Colwood (Tertiary)	$ 32,500	$ 42,000	$ 600	$ 900	$ 900				
13. Reuse - Colwood									
(a) Effluent Pumping/Piping/Controls (high peak flows)	$ 19,100	N/A	$ 70	$ 75	$ 80				
14. Conveyance - Langford									
(a) Raw Sewage PS and Forcemain to WWTP	$ 11,800	N/A	$ 130	$ 135	$ 140				
(b) Effluent Pumping and Forcemain to Junction with Colwood/Langford	$ 10,300	N/A	$ 80	$ 85	$ 90				
(c) Junction to Marine Shore	$ 12,000	N/A	$ 30	$ 45	$ 60				
(d) New Outfall	$ 33,800	N/A	in ©		in ©				
Conveyance - Langford Subtotal:	$ 67,900	$ -	$ 240	$ 265	$ 290	$ -	$ -	$ -	$ -
15. Liquid Treatment - Langford (Tertiary)	$ 82,000	$ 54,000	$ 1,500	$ 2,200	$ 3,700				
16. Conveyance - East Saanich									
(a) Garnet PS Upgrade and Forcemain To/From	$ 4,000	N/A	$ 50	$ 55	$ 60				
17. Liquid Treatment - East Saanich (Tertiary)	$ 10,000	$ 7,000	$ 200	$ 300	$ 500				
18. Reuse - East Saanich									
(a) Effluent Pumping/Piping/Controls	$ 16,100	N/A	$ 50	$ 55	$ 60				
19. Conveyance - Saanich Core									
(a) Galloping Goose Trail PS and Forcemain To/From	$ 3,100	N/A	$ 60	$ 65	$ 70				
20. Liquid Treatment - Saanich Core (Tertiary)	$ 16,000	N/A	$ 300	$ 500	$ 500				
21. Reuse - Saanich Core									
(a) Effluent Pumping/Piping/Controls	$ 8,800	N/A	$ 50	$ 50	$ 50				
23. Land Costs	$ 93,400	N/A							
Total:	**$ 1,348,300**	**$ 297,600**	**$ 17,455**	**$ 26,630**	**$ 33,105**	**$ -**	**$ -**	**$ -**	**$ -**

[1] Includes all contingencies, engineering, etc. outlined in TM #1

APPENDIX D - PROCUREMENT CONSIDERATIONS

PROCUREMENT CONSIDERATIONS

Each infrastructure project includes five elements: design, build, finance, operate and maintain. Different combinations of these elements are used to create the procurement models currently found. The two most common models used in Canada for municipal sewer infrastructure projects are Design-Bid-Build (DBB) and Design-Build (DB). Financing, operations and maintenance are typically provided by the local government. Public Private Partnerships (P3) are gaining popularity in Canada with additional funding support being provided by P3 Canada. Common P3 models include: Design-Build-Finance (DBF), Design-Build-Operate-Maintain (DBOM), Design-Build-Finance-Maintain (DBFM), and Design-Build-Finance-Operate-Maintain (DBFOM). There are many other models however for the purpose of this analysis we will focus on three potential options DBB, DBF, and DBFOM as they present the greatest range of options available. All of these models are eligible for current federal-provincial infrastructure funding programs with the exception of the P3 Canada funding which cannot be accessed for DBB and may or may not be available for DBF. It should be noted however that the maximum amount of funding from P3 Canada is capped at 25% of the project's direct construction costs including any other federal government assistance.

Table 1: Procurement Models Key Elements Summary (Typical)

	DBB	DBF	DBFOM
Project Management	By Owner	Contract with Consultant	Contract with Consultant
Design Lead	Contract with Consultant	Contract with Contractor	Contract with Contractor
Build Lead	Contract with Contractor	Contract with Contractor	
Operate/Maintain Lead	By Owner	By Owner	
Finance Lead	By Owner	Contract with Contractor	
Owner Risk Carried	High	Medium	Low
Contractor Innovation	Low - Limited to Interpretation of Design	Medium - Limited to Owners Statement of Requirements for Design and Construction	High - Limited to Owners Statement of Requirements for Design, Construction and Operation
Procurement Costs	Low	Medium	High

As illustrated the amount of risk that is transferred to the Contractor increases from DBB to DBF and further to DBFOM. With risk transfer comes a cost therefore the benefits associated with the risk transfer need to outweigh the additional costs.

The DBB model is most commonly used when the local government has the skills and resources to manage the project internally, operate the infrastructure after construction completion, and when innovation from the private sector will likely not produce significant benefits. The risk to the contractor

is limited to construction. The consultant and contractor capacity within BC for this model of procurement are greatest due to the extensive history of its use.

Movement to the DBF occurs typically when innovation from the private sector will produce significant benefit including project financing. The risk to the contractor now includes financing and design as well as construction. Consultant and contractor capacity within BC are not as great as the DBB model however there is still significant capacity and it can be supplemented by other North American companies.

Finally progression to DBFOM typically also occurs when the owner does not have the resources or desire to operate and maintain the infrastructure or wants to see greater innovation from the private sector to capture not only capital but operating and maintenance costs as well. The contractor risk is now expanded to include operations and maintenance and can also include revenue recovery. The greatest limitation to capacity for this model is the operations and maintenance skillset. There are only a few companies in Canada that are set up to provide long term operations and maintenance support.

P3 Canada in their P3 Screen Suitability Assessment use twelve criteria to determine if a public private partnership is worth considering as part of a procurement option analysis. The criteria are summarized in the table below:

Table 0-1: Criteria Summary

CRITERION	HIGH SCORE	LOW SCORE	COMMENTS
1. Asset Life	+ 25 Years	< 10 Years	Longer asset lives typically give greater flexibility for longer contract terms
2. Asset Complexity	3 or more asset classes	1 asset class	Complex projects generally perform better than simple projects as a P3
3. Output and Performance Specifications (Construction)	Construction specifications exist and are readily available	New specifications are required as this hasn't been delivered in a P3 model before	Choosing projects with a proven track record in P3 are best
4. Stability of Operations and Maintenance Requirements	Predicable and stable	Unpredictable and unstable	Predictable and stable O&M requirements are best for a P3

CRITERION	HIGH SCORE	LOW SCORE	COMMENTS
5. Performance Specifications and Indicators (Operations Period)	Specifications and indicators exist and are readily available	New specifications and indicators are required as this hasn't been delivered in a P3 model before	Choosing projects with a proven track record in P3 are best
6. Life Cycle Costs	Understood and accurate	Not well understood and not able to be accurately determined	Predictable life cycle costs are best for a P3
7. Revenue Generation	Revenues are certain and private sector willing to assume revenue risk	Revenues are unlikely	Certainty of revenue is key for private sector interest to assume risk
8. Private Sector Expertise	5 or more private firms who can lead a submission	Fewer than 3 private sector firms who can lead a submission	Lack of private sector expertise is a risk to a P3 project success
9. Market Precedents	Similar size and type of projects have been delivered in Canada	Similar size and type of projects have not been delivered as P3s anywhere in the world	Proven success generates private sector interest
10. Nature of Development Site	Undeveloped Site	Refurbishment of an existing facility	P3s are most successful on sites where the contractor has full flexibility and control
11. Scope of Private Sector Innovation Gains	Specifications are limited to outputs only	Specifications specify significant input requirements	Private sector innovation is greatest when the public sector does not prescribe inputs rather only outputs.
12. Potential for Contract Integration	All elements of P3 can be integrated into one contract.	Only two elements can be integrated into a single contract.	The greater the integration the greater the P3 value.

Each of the above criteria have a maximum score of 5 which totals 60 points. These are then weighted and normalized to provide a total score out of 100. P3 Canada only recommends moving forward with a procurement option analysis if 75% of the total maximum points are achieved in the evaluation. At 51-75% they recommend a conversation with P3 Canada before proceeding.

The following tables summarize the option set components and the potential procurement methods that are recommended to be reviewed and considered in subsequent phases. It is recommended that a

formal business case be prepared with the preferred option set to support the procurement method selection process.

Option Set Components

Criterion	Pipelines	Pump Stations	Outfalls	Liquid Treatment	Solids Treatment	Water Reuse Distribution	Energy Recovery Collection System
Potential Procurement Method	DBB, DBF	DBB, DBF	DBB, DBF	DBB, DBF, DBFOM	DBB, DBF, DBFOM	DBB, DBF, DBFOM	DBB, DBF, DBFOM
1. Asset Life	☑	☑	☑	☑	☑	☑	☑
2. Asset Complexity	☒		☒	☑	☑	☒	☑
3. Output and Performance Specifications (Construction)	☑	☑	☑	☑	☑	☑	
4. Stability of Operations and Maintenance Requirements	☑	☑	☑	☑			☒
5. Performance Specifications and Indicators (Operations Period)	☒	☒		☑	☒	☒	☒
6. Life Cycle Costs	☑	☑	☑	☑	☒	☒	☒
7. Revenue Generation	☑	☑	☑	☑	☒	☒	☒
8. Private Sector Expertise	☑	☑	☑	☑	☒	☑	☒
9. Market Precedents					☒	☒	☒
10. Nature of Development Site							
11. Scope of Private Sector Innovation Gains	☒	☒					
12. Potential for Contract Integration	☒	☒	☒	☑	☑	☑	☑

Conveyance Upgrades – Pipelines

Conveyance upgrades are most strongly suited to a design-bid-build approach or design-build-finance if rolled in with other works such as pump station upgrades. The CRD already operates the collection

system and so there is not likely any value in transferring the operating risks over to a contractor. Pipelines don't require the same level of attention and effort unless something goes wrong. They are ideal to be added to the responsibility for a crew that looks after other assets. The pipelines will require close collaboration with the communities where they are installed and so the communication and coordination element should be considered in the selection of the procurement method.

Conveyance Upgrades – Pump Stations

Pump station upgrades may be more attractive to consider for a design-build-finance approach or just a design-build approach. They involve multiple disciplines and the collaboration between the contractor and consulting engineering company can result in innovative designs that can increase value and potentially reduce cost.

Conveyance Upgrades – Outfalls

The outfalls are a specialized piece of work which rely very heavily on the construction method and result in a high level of risk. These are most strongly suited to a design-bid-build approach or design-build-finance if rolled in with other works such as a treatment plant or pump station upgrade. The only risk with rolling these into other projects is that the specialist contractor will become a subcontractor to the prime contractor.

Treatment Liquids

Treatment plants for the liquids could be delivered under any of the three models but likely will score the highest in the greatest number of P3 categories. They are complex facilities that can benefit from technology and design/construction innovation, have been delivered in these procurement methods in Canada (including Metro Vancouver who is in the process of delivering the Lions Gate plant this way), are able to be managed with output performance requirements, and have certainty of revenue and costs. The biggest risks are the preexisting site conditions. For the DBFOM model the greatest uncertainty is whether or not the public will support contracting out the operating role and if a contractor will be willing to set up an operational arm in Victoria. Given the location and proximity to other operations it would be idea that if multiple plants are considered that they be delivered as a single package so that the operational efficiencies can be realized. Even if DBFOM is not pursued the Design Build Finance or Design Build approach may allow for greater private sector innovation.

Treatment Solids

The solids treatment facilities may at first glance appear to be most attractive for P3 delivery: especially due to the desire to allow the private sector to propose innovative markets and technologies. However, based on P3 Canada's guide the limited number of similar operating facilities in Canada or the US coupled with the lack of a proven market for the product makes this a project that requires further consideration and review. The CRD did successfully obtain funding for the solids facility at Hartland previously and so the feedback from P3 Canada during that process will be valuable in confirming the similar approach moving forward. The CRD's current policy to ban land application of biosolids and also discourage the dumping of residual products at the landfill poses challenges for moving forward with

this under P3 model. If this is rolled into a broader solid waste management facility as was done previously then the chances for success under the P3 approach will likely increase.

Water Reuse Conveyance

Conveyance infrastructure for water reuse applications are likely best delivered by DBB or DBF. Operational efficiencies will be possible with current water supply and distribution system operations. Further, given the lack of certainty of market and revenue as well as a lack of similar operating facilities could prove this to be a challenge to deliver under P3 approaches.

Heat Recovery – Collection Systems

Heat recovery infrastructure for collection systems may also be considered to be attractive for procurement by P3. However, in order to improve the likelihood of revenue and market this may be best evaluated in conjunction with a district energy utility that is for areas beyond the locations of treatment facilities.

In summary the procurement options available to the CRD can provide for opportunities to engage with the private sector to achieve innovative and cost effective solutions. In our opinion the greatest opportunity for innovation exists within the liquids and solids treatment process and so these are two areas that should be considered further for some form of either design-build or public private partnership. It would be good to confirm with the public the level of support for various forms of procurement including public versus private asset ownership and operation and to what degree the private sector should be relied upon to absorb risks.

ANNUAL FLOWS BY POPULATION EQUIVALENT (at 2030)

The capacity is consistent with the previous project and populations are from the worksheets that were completed with each municipality under the previous project.
Population equivalent includes actual population projections and non-residential use converted to residential equivalents based on flows.

	Capacity - m3 (AAF)	Capacity - m3 (ADWF)	Capacity - ML/day (ADWF)	Population Equivalent	m3 by Population Equivalent (AAF)	m3 by Population Equivalent (ADWF)
Colwood	1,788,500	1,715,500	4.7	32,582	55	53
Esquimalt	2,993,000	2,591,500	7.1	26,857	111	96
Langford	5,219,500	5,183,000	14.2	59,562	88	87
Oak Bay	3,139,000	2,416,300	6.6	21,099	149	115
Saanich	13,578,000	12,004,850	32.9	156,223	87	77
Victoria	16,717,000	13,979,500	38.3	135,609	123	103
View Royal	1,314,000	1,292,100	3.5	14,367	91	90
Songhees*	219,000	219,000	0.6			
Esquimalt First Nations*	36,500	36,500	0.1			
Total	44,968,000	39,401,750	108.0	446,299	101	88

*The Songhees and Esquimalt Nations have put forward capacity requests based on future demand within their lands.

December 4, 2015

CAPITAL ALLOCATIONS BY MAJOR COMPONENT CATEGORY
(before grant)

The Design Capacity Benefit has been calculated for each segment within the component categories.
Costs have been totalled by component category, reflecting the various Design Capacity Benefits for each municipality in that category.

-Option Sets 1a and 1b have the same cost sharing for the infrastructure components and differ in total cost by the cost of tertiary treatment.

-Option Set 2 cost sharing reflects all jurisdictions sharing in the main plant, which has capacity for the entire system. The Design Capacity Benefit for the Colwood satelite plant is attributed to Colwood.

-Option Set 3 cost sharing reflects the westside participants sharing in the Esquimalt Nation treatment plant and the eastside participants sharing in the Rock Bay treatment plant, together both plants having capacity for the entire system. For each of the satellite plants, the Design Capacity Benefit is attributed to the respective municipality (Colwood and Saanich).

-Option Set 4 cost sharing reflects costs to municipalities for the Design Capacity Benefit that they have for each plant.

	OAK BAY	SAANICH	VICTORIA	ESQUIMALT	SONGHEES	ESQUIMALT NATION	VIEW ROYAL	COLWOOD	LANGFORD
Option 1a - 1 Site									
Conveyance	5.8%	30.9%	34.3%	6.8%	0.6%	0.1%	3.4%	4.5%	13.6%
Liquid Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Solids Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Existing System Capacity Upgrades	10.1%	14.1%	48.9%	0.0%	0.7%	0.1%	4.1%	5.5%	16.5%
Reuse	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Land	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Total Option 1a	**6.2%**	**29.8%**	**35.8%**	**6.3%**	**0.6%**	**0.1%**	**3.3%**	**4.4%**	**13.4%**
Option 1b - 1 Site (Tertiary)									
Conveyance	5.8%	30.9%	34.3%	6.8%	0.6%	0.1%	3.4%	4.5%	13.6%
Liquid Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Solids Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Existing System Capacity Upgrades	10.1%	14.1%	48.9%	0.0%	0.7%	0.1%	4.1%	5.5%	16.5%
Reuse	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Land	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Total Option 1b	**6.2%**	**29.9%**	**35.7%**	**6.4%**	**0.6%**	**0.1%**	**3.3%**	**4.4%**	**13.4%**
Option 2 - 2 Sites									
Conveyance	5.7%	30.3%	33.7%	6.7%	0.6%	0.1%	3.3%	6.2%	13.4%
Liquid Treatment	5.7%	28.1%	32.7%	6.1%	0.5%	0.1%	3.0%	11.7%	12.1%
Solids Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Existing System Capacity Upgrades	10.1%	14.1%	48.9%	0.0%	0.7%	0.1%	4.1%	5.5%	16.5%
Reuse	3.6%	18.1%	21.0%	3.9%	0.3%	0.1%	1.9%	43.3%	7.8%
Land	5.6%	28.1%	32.7%	6.1%	0.5%	0.1%	3.0%	11.8%	12.1%
Total Option 2	**5.9%**	**28.2%**	**33.8%**	**6.0%**	**0.5%**	**0.1%**	**3.2%**	**9.6%**	**12.7%**
Option 3 - 4 Sites									
Conveyance	5.0%	28.3%	29.4%	12.6%	0.6%	0.1%	3.5%	6.3%	14.2%
Liquid Treatment	5.2%	27.8%	29.8%	7.1%	0.6%	0.1%	3.5%	11.7%	14.2%
Solids Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Existing System Capacity Upgrades	10.1%	14.1%	48.9%	0.0%	0.7%	0.1%	4.1%	5.5%	16.5%
Reuse	2.0%	31.3%	11.4%	7.8%	0.7%	0.1%	3.9%	27.3%	15.6%
Land	5.1%	30.5%	29.4%	6.5%	0.6%	0.1%	3.3%	11.4%	13.1%
Total Option 3	**5.3%**	**28.3%**	**30.5%**	**8.0%**	**0.6%**	**0.1%**	**3.5%**	**9.6%**	**14.1%**
Option 4 - 7 Sites									
Conveyance	3.8%	22.6%	22.6%	10.2%	1.8%	0.2%	7.7%	8.4%	22.7%
Liquid Treatment	4.7%	28.3%	27.1%	10.9%	1.6%	0.2%	3.9%	6.6%	16.7%
Solids Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Existing System Capacity Upgrades	10.1%	14.1%	48.9%	0.0%	0.7%	0.1%	4.1%	5.5%	16.5%
Reuse	1.8%	39.3%	10.4%	19.0%	0.2%	0.0%	1.0%	24.5%	3.9%
Land	4.3%	33.1%	24.6%	8.4%	1.5%	0.2%	5.6%	6.4%	16.0%
Total Option 4	**4.7%**	**27.7%**	**27.0%**	**9.8%**	**1.3%**	**0.2%**	**4.7%**	**7.7%**	**16.8%**

December 4, 2015

CAPITAL ALLOCATIONS BY MAJOR COMPONENT CATEGORY
(after grant)

The Design Capacity Benefit has been calculated for each segment within the component categories.
Costs have been totalled by component category, reflecting the various Design Capacity Benefits for each municipality in that category.

-Option Sets 1a and 1b have the same cost sharing for the infrastructure components and differ in total cost by the cost of tertiary treatment.
-Option Set 2 cost sharing reflects all jurisdictions sharing in the main plant, which has capacity for the entire system. The Design Capacity Benefit for the Colwood satelite plant is attributed to Colwood.
-Option Set 3 cost sharing reflects the westside participants sharing in the Esquimalt Nation treatment plant and the eastside participants sharing in the Rock Bay treatment plant, together both plants having capacity for the entire system. For each of the satellite plants, the Design Capacity Benefit is attributed to the respective municipality (Colwood and Saanich).
-Option Set 4 cost sharing reflects costs to municipalities for the Design Capacity Benefit that they have for each plant.

	OAK BAY	SAANICH	VICTORIA	ESQUIMALT	SONGHEES	ESQUIMALT NATION	VIEW ROYAL	COLWOOD	LANGFORD
Option 1a - 1 Site									
Conveyance	5.7%	31.0%	33.7%	6.9%	0.6%	0.1%	3.5%	4.6%	13.9%
Liquid Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Solids Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Existing System Capacity Upgrades	10.1%	14.1%	48.9%	0.0%	0.7%	0.1%	4.1%	5.5%	16.5%
Reuse	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Land	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Total Option 1a	**6.1%**	**30.1%**	**35.4%**	**6.5%**	**0.6%**	**0.1%**	**3.4%**	**4.5%**	**13.5%**
Option 1b - 1 Site (Tertiary)									
Conveyance	5.7%	31.0%	33.8%	6.9%	0.6%	0.1%	3.4%	4.6%	13.8%
Liquid Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Solids Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Existing System Capacity Upgrades	10.1%	14.1%	48.9%	0.0%	0.7%	0.1%	4.1%	5.5%	16.5%
Reuse	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Land	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Total Option 1b	**6.1%**	**30.1%**	**35.4%**	**6.5%**	**0.6%**	**0.1%**	**3.3%**	**4.4%**	**13.4%**
Option 2 - 2 Sites									
Conveyance	5.6%	30.2%	32.8%	6.7%	0.6%	0.1%	3.4%	7.2%	13.5%
Liquid Treatment	5.1%	25.5%	29.7%	5.5%	0.5%	0.1%	2.7%	20.0%	11.0%
Solids Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Existing System Capacity Upgrades	10.1%	14.1%	48.9%	0.0%	0.7%	0.1%	4.1%	5.5%	16.5%
Reuse	3.6%	18.1%	21.0%	3.9%	0.3%	0.1%	1.9%	43.3%	7.8%
Land	5.6%	28.1%	32.7%	6.1%	0.5%	0.1%	3.0%	11.8%	12.1%
Total Option 2	**5.5%**	**27.1%**	**32.0%**	**5.8%**	**0.5%**	**0.1%**	**3.0%**	**13.8%**	**12.1%**
Option 3 - 4 Sites									
Conveyance	4.2%	29.9%	26.1%	9.7%	0.7%	0.1%	4.3%	7.7%	17.3%
Liquid Treatment	4.6%	27.3%	26.3%	6.3%	0.5%	0.1%	3.1%	19.3%	12.6%
Solids Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Existing System Capacity Upgrades	10.1%	14.1%	48.9%	0.0%	0.7%	0.1%	4.1%	5.5%	16.5%
Reuse	2.0%	31.3%	11.4%	7.8%	0.7%	0.1%	3.9%	27.3%	15.6%
Land	5.1%	30.5%	29.4%	6.5%	0.6%	0.1%	3.3%	11.4%	13.1%
Total Option 3	**4.5%**	**29.2%**	**26.8%**	**7.5%**	**0.6%**	**0.1%**	**3.6%**	**13.1%**	**14.6%**
Option 4 - 7 Sites									
Conveyance	3.0%	22.7%	18.7%	9.2%	2.0%	0.2%	8.7%	9.6%	25.9%
Liquid Treatment	4.4%	32.3%	25.6%	10.3%	1.5%	0.2%	3.7%	6.2%	15.8%
Solids Treatment	6.1%	30.4%	35.4%	6.6%	0.6%	0.1%	3.3%	4.3%	13.1%
Existing System Capacity Upgrades	10.1%	14.1%	48.9%	0.0%	0.7%	0.1%	4.1%	5.5%	16.5%
Reuse	1.8%	39.3%	10.4%	19.0%	0.2%	0.0%	1.0%	24.5%	3.9%
Land	4.3%	33.1%	24.6%	8.4%	1.5%	0.2%	5.6%	6.4%	16.0%
Total Option 4	**3.9%**	**29.1%**	**23.1%**	**9.9%**	**1.4%**	**0.2%**	**5.4%**	**8.9%**	**18.0%**

December 4, 2015

PROJECT CAPITAL COST BREAKDOWN BY MAJOR COMPONENT CATEGORY
(before grant)

	OAK BAY	SAANICH	VICTORIA	ESQUIMALT	SONGHEES	ESQUIMALT NATION	VIEW ROYAL	COLWOOD	LANGFORD	GROSS TOTAL COST
Option 1a - 1 Site										
Conveyance	14,263,593	75,379,715	83,741,026	16,650,173	1,407,057	234,509	8,301,635	11,021,945	33,300,345	244,300,000
Liquid Treatment	24,017,029	119,323,276	138,950,486	25,758,445	2,176,770	362,795	12,842,943	17,051,365	51,516,890	392,000,000
Solids Treatment	15,807,126	78,534,197	91,452,106	16,953,262	1,432,670	238,778	8,452,753	11,222,582	33,906,525	258,000,000
Existing System Capacity Upgrades	4,565,039	6,337,267	21,997,694	-	313,742	52,290	1,851,080	2,457,649	7,425,238	45,000,000
Resource Recovery	1,482,684	7,366,386	8,578,066	1,590,190	134,382	22,397	792,855	1,052,661	3,180,379	24,200,000
Land	4,117,205	20,455,419	23,820,083	4,415,733	373,161	62,193	2,201,647	2,923,091	8,831,467	67,200,000
Total Option 1a	**64,252,676**	**307,396,260**	**368,539,461**	**65,367,803**	**5,837,782**	**972,964**	**34,442,915**	**45,729,294**	**138,160,845**	**1,030,700,000**
Option 1b - 1 Site (Tertiary)										
Conveyance	14,263,593	75,379,715	83,741,026	16,650,173	1,407,057	234,509	8,301,635	11,021,945	33,300,345	244,300,000
Liquid Treatment	30,633,966	152,198,056	177,232,763	32,855,160	2,776,492	462,749	16,381,305	21,749,190	65,710,319	500,000,000
Solids Treatment	15,807,126	78,534,197	91,452,106	16,953,262	1,432,670	238,778	8,452,753	11,222,582	33,906,525	258,000,000
Existing System Capacity Upgrades	4,565,039	6,337,267	21,997,694	-	313,742	52,290	1,851,080	2,457,649	7,425,238	45,000,000
Resource Recovery	986,414	4,900,777	5,706,895	1,057,936	89,403	14,901	527,478	700,324	2,115,872	16,100,000
Land	4,117,205	20,455,419	23,820,083	4,415,733	373,161	62,193	2,201,647	2,923,091	8,831,467	67,200,000
Total Option 1b	**70,373,343**	**337,805,432**	**403,950,567**	**71,932,264**	**6,392,525**	**1,065,421**	**37,715,900**	**50,074,782**	**151,289,766**	**1,130,600,000**
Option 2 - 2 Sites										
Conveyance	14,263,593	75,379,715	83,741,026	16,650,173	1,407,057	234,509	8,301,635	15,421,945	33,300,345	248,700,000
Liquid Treatment	24,017,029	119,323,276	138,950,486	25,758,445	2,176,770	362,795	12,842,943	49,551,365	51,516,890	424,500,000
Solids Treatment	15,807,126	78,534,197	91,452,106	16,953,262	1,432,670	238,778	8,452,753	11,222,582	33,906,525	258,000,000
Existing System Capacity Upgrades	4,565,039	6,337,267	21,997,694	-	313,742	52,290	1,851,080	2,457,649	7,425,238	45,000,000
Resource Recovery	1,482,684	7,366,386	8,578,066	1,590,190	134,382	22,397	792,855	17,652,661	3,180,379	40,800,000
Land	4,010,975	19,927,641	23,205,492	4,301,801	363,533	60,589	2,144,842	8,381,524	8,603,603	71,000,000
Total Option 2	**64,146,447**	**306,868,482**	**367,924,870**	**65,253,871**	**5,828,154**	**971,359**	**34,386,109**	**104,687,727**	**137,932,980**	**1,088,000,000**
Option 3 - 4 Sites										
Conveyance	13,700,108	77,712,997	80,786,895	34,631,746	1,643,084	273,847	9,694,193	17,270,821	38,886,310	274,600,000
Liquid Treatment	23,992,289	129,200,360	138,807,351	33,105,159	2,797,619	466,270	16,505,952	54,414,683	66,210,317	465,500,000
Solids Treatment	15,807,126	78,534,197	91,452,106	16,953,262	1,432,670	238,778	8,452,753	11,222,582	33,906,525	258,000,000
Existing System Capacity Upgrades	4,565,039	6,337,267	21,997,694	-	313,742	52,290	1,851,080	2,457,649	7,425,238	45,000,000
Resource Recovery	1,482,684	23,466,386	8,578,066	5,839,859	493,509	82,252	2,911,704	20,465,822	11,679,718	75,000,000
Land	3,929,416	23,572,432	22,733,631	5,039,620	425,883	70,981	2,512,712	8,836,086	10,079,239	77,200,000
Total Option 3	**63,476,662**	**338,823,639**	**364,355,743**	**95,569,646**	**7,106,508**	**1,184,418**	**41,928,395**	**114,667,643**	**168,187,347**	**1,195,300,000**
Option 4 - 7 Sites										
Conveyance	13,700,108	80,812,997	80,786,895	36,564,641	6,354,007	600,587	27,355,495	30,040,561	80,984,709	357,200,000
Liquid Treatment	23,992,289	145,200,360	138,807,351	55,631,317	8,003,448	1,278,499	20,126,313	33,740,106	85,720,317	512,500,000
Solids Treatment	15,807,126	78,534,197	91,452,106	16,953,262	1,432,670	238,778	8,452,753	11,222,582	33,906,525	258,000,000
Existing System Capacity Upgrades	4,565,039	6,337,267	21,997,694	-	313,742	52,290	1,851,080	2,457,649	7,425,238	45,000,000
Resource Recovery	1,482,684	32,266,386	8,578,066	15,590,190	134,382	22,397	792,855	20,152,661	3,180,379	82,200,000
Land	3,973,320	30,940,559	22,987,638	7,803,842	1,379,241	223,878	5,205,708	5,965,172	14,920,642	93,400,000
Total Option 4	**63,520,566**	**374,091,766**	**364,609,750**	**132,543,253**	**17,617,491**	**2,416,429**	**63,784,205**	**103,578,730**	**226,137,810**	**1,348,300,000**

December 4, 2015

PROJECT CAPITAL COST BREAKDOWN BY MAJOR COMPONENT CATEGORY
(after grant)

	OAK BAY	SAANICH	VICTORIA	ESQUIMALT	SONGHEES	ESQUIMALT NATION	VIEW ROYAL	COLWOOD	LANGFORD	NET TOTAL COST
Option 1a - 1 Site										
Conveyance	8,820,244	47,966,607	52,148,881	10,701,584	904,359	150,727	5,335,720	7,084,147	21,403,169	154,515,437
Liquid Treatment	10,212,884	50,740,445	59,086,624	10,953,395	925,639	154,273	5,461,270	7,250,839	21,906,790	166,692,159
Solids Treatment	7,212,247	35,832,448	41,726,445	7,735,190	653,678	108,946	3,856,700	5,120,478	15,470,379	117,716,511
Existing System Capacity Upgrades	1,813,425	2,517,429	8,738,409	-	124,632	20,772	735,327	976,282	2,949,617	17,875,893
Resource Recovery	1,482,684	7,366,386	8,578,066	1,590,190	134,382	22,397	792,855	1,052,661	3,180,379	24,200,000
Land	4,117,205	20,455,419	23,820,083	4,415,733	373,161	62,193	2,201,647	2,923,091	8,831,467	67,200,000
Total Option 1a	**33,658,689**	**164,878,734**	**194,098,508**	**35,396,092**	**3,115,851**	**519,308**	**18,383,519**	**24,407,497**	**73,741,801**	**548,200,000**
Option 1b - 1 Site (Tertiary)										
Conveyance	9,237,123	50,098,630	54,577,168	11,166,920	943,683	157,281	5,567,732	7,392,187	22,333,840	161,474,565
Liquid Treatment	15,785,033	78,424,432	91,324,285	16,929,567	1,430,668	238,445	8,440,939	11,206,897	33,859,134	257,639,399
Solids Treatment	7,738,819	38,448,604	44,772,926	8,299,942	701,404	116,901	4,138,281	5,494,328	16,599,884	126,311,089
Existing System Capacity Upgrades	1,965,497	2,728,538	9,471,204	-	135,083	22,514	796,991	1,058,152	3,196,969	19,374,947
Resource Recovery	986,414	4,900,777	5,706,895	1,057,936	89,403	14,901	527,478	700,324	2,115,872	16,100,000
Land	4,117,205	20,455,419	23,820,083	4,415,733	373,161	62,193	2,201,647	2,923,091	8,831,467	67,200,000
Total Option 1b	**39,830,091**	**195,056,401**	**229,672,561**	**41,870,099**	**3,673,401**	**612,234**	**21,673,068**	**28,774,978**	**86,937,167**	**648,100,000**
Option 2 - 2 Sites										
Conveyance	8,820,244	47,966,607	52,148,881	10,701,584	904,359	150,727	5,335,720	11,484,147	21,403,169	158,915,437
Liquid Treatment	10,212,884	50,740,445	59,086,624	10,953,395	925,639	154,273	5,461,270	39,750,839	21,906,790	199,192,159
Solids Treatment	7,212,247	35,832,448	41,726,445	7,735,190	653,678	108,946	3,856,700	5,120,478	15,470,379	117,716,511
Existing System Capacity Upgrades	1,813,425	2,517,429	8,738,409	-	124,632	20,772	735,327	976,282	2,949,617	17,875,893
Resource Recovery	1,482,684	7,366,386	8,578,066	1,590,190	134,382	22,397	792,855	17,652,661	3,180,379	40,800,000
Land	4,010,975	19,927,641	23,205,492	4,301,801	363,533	60,589	2,144,842	8,381,524	8,603,603	71,000,000
Total Option 2	**33,552,459**	**164,350,956**	**193,483,917**	**35,282,160**	**3,106,223**	**517,704**	**18,326,714**	**83,365,931**	**73,513,937**	**605,500,000**
Option 3 - 4 Sites										
Conveyance	9,359,785	67,446,858	58,726,843	21,912,902	1,643,084	273,847	9,694,193	17,270,821	38,886,310	225,214,642
Liquid Treatment	9,777,469	58,577,183	56,567,531	13,491,195	1,140,101	190,017	6,726,596	41,430,791	26,982,391	214,883,274
Solids Treatment	6,738,301	33,477,752	38,984,429	7,226,879	610,722	101,787	3,603,261	4,783,990	14,453,757	109,980,877
Existing System Capacity Upgrades	1,067,327	1,481,682	5,143,162	-	73,354	12,226	432,791	574,610	1,736,055	10,521,207
Resource Recovery	1,482,684	23,466,386	8,578,066	5,839,859	493,509	82,252	2,911,704	20,465,822	11,679,718	75,000,000
Land	3,929,416	23,572,432	22,733,631	5,039,620	425,883	70,981	2,512,712	8,836,086	10,079,239	77,200,000
Total Option 3	**32,354,981**	**208,022,292**	**190,733,662**	**53,510,455**	**4,386,654**	**731,109**	**25,881,257**	**93,362,120**	**103,817,470**	**712,800,000**
Option 4 - 7 Sites										
Conveyance	9,278,905	70,834,562	58,445,117	28,779,728	6,354,007	600,587	27,355,495	30,040,561	80,984,709	312,673,670
Liquid Treatment	11,118,169	81,238,152	64,324,148	25,779,882	3,708,845	592,464	9,326,653	15,635,365	39,723,302	251,446,979
Solids Treatment	7,092,658	35,238,297	41,034,563	7,606,929	642,839	107,140	3,792,751	5,035,573	15,213,859	115,764,609
Existing System Capacity Upgrades	1,046,382	1,452,606	5,042,234	-	71,915	11,986	424,298	563,334	1,701,987	10,314,741
Resource Recovery	1,482,684	32,266,386	8,578,066	15,590,190	134,382	22,397	792,855	20,152,661	3,180,379	82,200,000
Land	3,973,320	30,940,559	22,987,638	7,803,842	1,379,241	223,878	5,205,708	5,965,172	14,920,642	93,400,000
Total Option 4	**33,992,118**	**251,970,562**	**200,411,766**	**85,560,570**	**12,291,230**	**1,558,451**	**46,897,759**	**77,392,665**	**155,724,878**	**865,800,000**

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GRANT APPLICATION SUMMARY

Costing has been completed for the five option sets put forward by Urban Systems.

Grants:
All option sets include a single plant for biosolids thus the biosolids grant is incorporated in every option.

The grants have been applied to components that most closely resemble the componenct in the current grant agreements.
- Option 1a - This component set most closely resembles the agreement component sets.
- Option 1b - The components also closely resemble the agreement component sets. This total is greater by the cost of tertiary treatment.

- Option 2 - The components closely resemble the agreement component sets excluding the satellite plant in Colwood.
- Option 3 - The two main plants have capacity to process 100% of the flows and the largest has capacity for approximately 74% with the next largest plant having capacity for 26% of the flow.
The grants have been apportioned between the two largest plants, which together resemble the agreeements.
- Option 4 - this option is substantially different from the current agreements so the grant has been apportioned across the five plants that together have capacity for 100% of the flow.
Discussions with the funders are expected to commence when the final option set is determined.

Option	Capital Cost	Grant	Total After Grant	Operating Costs (at 2020)	Operating Costs (at 2030)
1a - 1 plant	1,030,700,000	482,500,000	548,200,000	16,895,000	21,765,000
1b - 1 plant (tertiary)	1,130,600,000	482,500,000	648,100,000	21,631,667	26,435,000
2 - 2 plants	1,088,000,000	482,500,000	605,500,000	17,736,667	22,810,000
3 - 4 plants	1,195,300,000	482,500,000	712,800,000	19,481,667	25,345,000
4 - 7 plants	1,348,300,000	482,500,000	865,800,000	20,513,333	26,630,000

The PPP Canada grant is the lesser of 25% of shareable cost ($333.6 million) and $83.4 million. Costs are estimated at $258 million, thus the grant at 25% is $18.9 million below the maximum $83.4 million.

Contribution Agreement (Grant) Summaries:
The senior government grants currently applied to the project are capped at an overall total of $501.4 million. There are three separate funding agreements with the Federal Government:
Federal Government:
· Bulding Canada Fund for $120 million for the construction of a Wastewater Treatment Plant (McLoughlin), marine outfall pipe, and completion of the Victoria Harbour Crossing.
· Green Infrastructure Fund for $50 million for the implementation of attenuation tanks and upgrades to existing pump stations and piping systems.
· PPP Canada for $83.4 million for a biosolids energy center treatment facility for wastewater sludge, including 18 km of pipes to carry sludge.

The Provincial funding agreement is for $248 million for the construction of a Wastewater Treatment Plant, an Energy Centre for Sludge Treatment, and Conveyance System upgrades as per the approved Liquid Waste Management Plan.

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APPENDIX F

ANNUAL ESTIMATED COST PER HOUSEHOLD (at 2030)
(after grant)

		OAK BAY	SAANICH	VICTORIA	ESQUIMALT	SONGHEES	ESQUIMALT NATION	VIEW ROYAL	COLWOOD	LANGFORD	TOTAL
OPTION 1a - 1 PLANT											
Annual Debt Cost	42,082,080	2,583,779	12,656,768	14,899,797	2,717,149	239,185	39,864	1,411,194	1,873,620	5,660,723	42,082,080
Annual Operating Costs	21,765,000	1,518,845	6,565,431	8,087,462	1,446,838	105,866	17,644	635,197	864,574	2,523,143	21,765,000
2030 Projected Population Equivalents (UFR)											
Residential		19,614	114,825	91,500	19,824	1,965	194	11,059	20,365	40,420	319,767
ICI		1,485	41,398	44,109	7,033	580	-	3,308	12,216	19,142	129,270
Total		21,099	156,223	135,609	26,857	2,545	194	14,367	32,582	59,562	449,038
# of Households (PPE / 3)		7,033	52,074	45,203	8,952	848	65	4,789	10,861	19,854	149,679
COST PER HOUSEHOLD		**$ 583**	**$ 369**	**$ 509**	**$ 465**			**$ 427**	**$ 252**	**$ 412**	**$ 427**
OPTION 1b - 1 PLANT TERTIARY											
Annual Debt Cost	49,779,460	3,059,282	14,981,951	17,640,759	3,215,971	282,148	47,025	1,664,672	2,210,157	6,677,496	49,779,460
Annual Operating Costs	26,435,000	1,844,571	7,974,385	9,822,141	1,757,413	128,591	21,432	771,547	1,050,162	3,064,757	26,435,000
2030 Projected Population Equivalents (UFR)											
Residential		19,614	114,825	91,500	19,824	1,965	194	11,059	20,365	40,420	319,767
ICI		1,485	41,398	44,109	7,033	580	-	3,308	12,216	19,142	129,270
Total		21,099	156,223	135,609	26,857	2,545	194	14,367	32,582	59,562	449,038
# of Households (PPE / 3)		7,033	52,074	45,203	8,952	848	65	4,789	10,861	19,854	149,679
COST PER HOUSEHOLD		**$ 697**	**$ 441**	**$ 608**	**$ 556**			**$ 509**	**$ 300**	**$ 491**	**$ 509**
OPTION 2 - 2 PLANTS											
Annual Debt Cost	46,521,955	2,577,912	12,627,461.30	14,865,813.56	2,710,809.36	238,658.22	39,776.37	1,408,083.50	6,405,195.86	5,648,244.55	46,521,955
Annual Operating Costs	22,810,000	1,518,845	6,565,431	8,087,462	1,446,838	105,866	17,644	635,197	1,909,574	2,523,143	22,810,000
2030 Projected Population Equivalents (UFR)											
Residential		19,614	114,825	91,500	19,824	1,965	194	11,059	20,365	40,420	319,767
ICI		1,485	41,398	44,109	7,033	580	-	3,308	12,216	19,142	129,270
Total		21,099	156,223	135,609	26,857	2,545	194	14,367	32,582	59,562	449,038
# of Households (PPE / 3)		7,033	52,074	45,203	8,952	848	65	4,789	10,861	19,854	149,679
COST PER HOUSEHOLD		**$ 583**	**$ 369**	**$ 508**	**$ 464**			**$ 427**	**$ 766**	**$ 412**	**$ 463**
OPTION 3 - 4 PLANTS											
Annual Debt Cost	54,875,524	2,490,876	16,014,776	14,683,795.79	4,119,548.61	337,710.32	56,285.05	1,992,490.90	7,187,563.49	7,992,477.61	54,875,524
Annual Operating Costs	25,345,000	1,536,557	7,013,286	8,169,293	2,064,766	140,837	23,473	845,019	2,195,165	3,356,604	25,345,000
2030 Projected Population Equivalents (UFR)											
Residential		19,614	114,825	91,500	19,824	1,965	194	11,059	20,365	40,420	319,767
ICI		1,485	41,398	44,109	7,033	580	-	3,308	12,216	19,142	129,270
Total		21,099	156,223	135,609	26,857	2,545	194	14,367	32,582	59,562	449,038
# of Households (PPE / 3)		7,033	52,074	45,203	8,952	848	65	4,789	10,861	19,854	149,679
COST PER HOUSEHOLD		**$ 573**	**$ 442**	**$ 506**	**$ 691**			**$ 593**	**$ 864**	**$ 572**	**$ 536**
OPTION 4 - 7 PLANTS											
Annual Debt Cost	66,822,382	2,623,509	19,447,070	15,467,765.83	6,603,558.72	948,636.25	120,281.15	3,619,565.73	5,973,160.33	12,018,835.00	66,822,382
Annual Operating Costs	26,630,000	1,535,335	7,624,235	8,164,566	2,557,606	300,124	47,121	1,056,219	1,545,877	3,798,916	26,630,000
2030 Projected Population Equivalents (UFR)											
Residential		19,614	114,825	91,500	19,824	1,965	194	11,059	20,365	40,420	319,767
ICI		1,485	41,398	44,109	7,033	580	-	3,308	12,216	19,142	129,270
Total		21,099	156,223	135,609	26,857	2,545	194	14,367	32,582	59,562	449,038
# of Households (PPE / 3)		7,033	52,074	45,203	8,952	848	65	4,789	10,861	19,854	149,679
COST PER HOUSEHOLD		**$ 591**	**$ 520**	**$ 523**	**$ 1,023**			**$ 976**	**$ 692**	**$ 797**	**$ 624**

Technical Memo #3 includes cost estimates for additional capital works to be constructed in 2030. $90.6 million is the estimate for Solids Treatment and new works for sewage treatment range from $162 million to $220 million. These costs and the impact of these costs are not included in the schedules because they are based on requiring additional capacity to handle the estimated increased flows to 2045.

ANNUAL ESTIMATED COST PER HOUSEHOLD (at 2030)
(after grant)

APPENDIX F

	OAK BAY	SAANICH	VICTORIA	ESQUIMALT	SONGHEES NATION	ESQUIMALT NATION	VIEW ROYAL	COLWOOD	LANGFORD	TOTAL
OPTION 1a - 1 PLANT										
Annual Debt Cost	2,583,779	12,656,768	14,899,797	2,717,149	239,185	39,864	1,411,194	1,873,620	5,660,723	42,082,080
Annual Operating Costs	1,518,845	6,565,431	8,087,462	1,446,838	105,866	17,644	635,197	864,574	2,523,143	21,765,000
2030 Projected Population Equivalents (UFR)										
Residential	19,614	114,825	91,500	19,824	1,965	194	11,059	20,365	40,420	319,767
ICI	1,485	41,398	44,109	7,033	580	-	3,308	12,216	19,142	129,270
Total	21,099	156,223	135,609	26,857	2,545	194	14,367	32,582	59,562	449,038
# of Households (PPE / 3)	7,033	52,074	45,203	8,952	848	65	4,789	10,861	19,854	149,679
COST PER HOUSEHOLD	**$ 583**	**$ 369**	**$ 509**	**$ 465**			**$ 427**	**$ 252**	**$ 412**	**$ 427**
OPTION 1b - 1 PLANT TERTIARY										
Annual Debt Cost	3,059,282	14,981,951	17,640,759	3,215,971	282,148	47,025	1,664,672	2,210,157	6,677,496	49,779,460
Annual Operating Costs	1,844,571	7,974,385	9,822,141	1,757,413	128,591	21,432	771,547	1,050,162	3,064,757	26,435,000
2030 Projected Population Equivalents (UFR)										
Residential	19,614	114,825	91,500	19,824	1,965	194	11,059	20,365	40,420	319,767
ICI	1,485	41,398	44,109	7,033	580	-	3,308	12,216	19,142	129,270
Total	21,099	156,223	135,609	26,857	2,545	194	14,367	32,582	59,562	449,038
# of Households (PPE / 3)	7,033	52,074	45,203	8,952	848	65	4,789	10,861	19,854	149,679
COST PER HOUSEHOLD	**$ 697**	**$ 441**	**$ 608**	**$ 556**			**$ 509**	**$ 300**	**$ 491**	**$ 509**
OPTION 2 - 2 PLANTS										
Annual Debt Cost	2,577,912	12,627,461	14,865,814	2,710,809	238,658	39,776	1,408,084	6,405,196	5,648,245	46,521,955
Annual Operating Costs	1,518,845	6,565,431	8,087,462	1,446,838	105,866	17,644	635,197	1,909,574	2,523,143	22,810,000
2030 Projected Population Equivalents (UFR)										
Residential	19,614	114,825	91,500	19,824	1,965	194	11,059	20,365	40,420	319,767
ICI	1,485	41,398	44,109	7,033	580	-	3,308	12,216	19,142	129,270
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# of Households (PPE / 3)	7,033	52,074	45,203	8,952	848	65	4,789	10,861	19,854	149,679
COST PER HOUSEHOLD	**$ 583**	**$ 369**	**$ 508**	**$ 464**			**$ 427**	**$ 766**	**$ 412**	**$ 463**
OPTION 3 - 4 PLANTS										
Annual Debt Cost	2,490,876	16,014,776	14,683,796	4,119,549	337,710	56,285	1,992,491	7,187,563	7,992,478	54,875,524
Annual Operating Costs	1,536,557	7,013,286	8,169,293	2,064,766	140,837	23,473	845,019	2,195,165	3,356,604	25,345,000
2030 Projected Population Equivalents (UFR)										
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COST PER HOUSEHOLD	**$ 573**	**$ 442**	**$ 506**	**$ 691**			**$ 593**	**$ 864**	**$ 572**	**$ 536**
OPTION 4 - 7 PLANTS										
Annual Debt Cost	2,623,509	19,447,070	15,467,766	6,603,559	948,636	120,281	3,619,566	5,973,160	12,018,835	66,822,382
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2030 Projected Population Equivalents (UFR)										
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COST PER HOUSEHOLD	**$ 591**	**$ 520**	**$ 523**	**$ 1,023**			**$ 976**	**$ 692**	**$ 797**	**$ 624**

Technical Memo #3 includes cost estimates for additional capital works to be constructed in 2030. $90.6 million is the estimate for Solids Treatment and new works for sewage treatment range from $162 million to $220 million. These costs and the impact of these costs are not included in the schedules because they are based on requiring additional capacity to handle the estimated increased flows to 2045.

December 7, 2015

Monthly Report to the CRD from the Fairness and Transparency Advisor November 2015

This report provides a summary of the FTA's activities for the Core Area Sewage Treatment Project for the period from **October 29th** to **November 25th.**

FTA Activities

Monitoring Role

During this period, the FTA continued to review and monitor upcoming meetings of the various committees, flagging any potential issues associated with transparency, impartiality, or fairness.

Other Activities

Complaints

There was no contact from the public received during this reporting period.

October - November 2015 Complaints Statistics

Number of applications received	0
Number of "eligible" complaints	0
Number of decisions rendered	0
Number of Complaints previously reported	2

As indicated in the table, no complaints were received. This brings the number of formal complaints received by the FTA to date to 2.

Activities Summary

Provided in the table below is a summary of the FTA's Project hours devoted to each of the abovementioned tasks.

October - November 2015 Activities

Activity	Hours Worked
Setting up procedures	0
Monitoring	2.7
Meetings	0
Complaints	0
Other admin	.2
Total	**2.9**

The total number of hours to be billed for this period (spanning the period of October 29th to November 25th) is 2.9 for a total of $509.50 plus tax.

Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Notice of Meeting and Meeting Agenda

Westside Wastewater Treatment and Resource Recovery Select Committee

Tuesday, November 24, 2015 **2:00 PM** **Esquimalt Town Hall, 1229 Esquimalt Road**

Due to the location, this meeting will not be available on video.

B. Desjardins (Co-Chair), C. Hamilton (Co-Chair), Chief R. Sam, Chief A. Thomas, D. Screech, L. Seaton, S. Young

1. Approval of Agenda

2. Adoption of Minutes

2.1. **15-1257** Adoption of the Minutes of October 27 and November 2, 2015

Recommendation: That the minutes of October 27 and November 2, 2015 be adopted.

Attachments: 2015-10-27 Minutes Westside WTRRSC

2015-11-02 Minutes Westside WTRRSC

3. Chair's Remarks

4. Presentations/Delegations

5. Committee Business

5.1. **15-1271** Technical Analysis for Further Comprehensive Evaluation of Potential Sites, Scenarios and Technologies

Recommendation: That the Westside Select Committee receive this report for information.

Attachments: Staff Report: Technical Analysis for Evaluation of Potential Sites

Appendix A: Westside Technical Team Analysis

5.2. **15-1272** Westside Solutions Public Consultation Update

Recommendation: That the Westside Wastewater Treatment and Resource Recovery Select Committee receive this report for information.

Attachments: Staff Report: Westside Solutions Public Consultation Update

Appendix A: Westside Consultation Plan

5.3. **15-1266** Westside Concept Planning - Phase 2 Budget Update No. 2

Recommendation: That the Westside Wastewater Treatment and Resource Recovery Select Committee receive this report for information.

Attachments: Staff Report: Westside Phase 2 Budget Update No. 2

Appendix A: Table Showing Budget

5.4. **15-1275** Eastside Wastewater Treatment and Resource Recovery Select Committee Verbal Update

6. New Business

7. Adjournment

Next Meeting: To be determined

To ensure quorum, please advise Allison Boyd 250-360-3129 if you or your alternate are unable to attend.

Making a difference...together

Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Meeting Minutes
Westside Wastewater Treatment and Resource Recovery Select Committee

Tuesday, October 27, 2015 **10:30 AM** **Esquimalt Town Hall, 1229 Esquimalt Road**

PRESENT:

MEMBERS: B. Desjardins (Co-Chair), C. Hamilton (Co-Chair), D. Screech, L. Seaton
Absent: Chief R. Sam; Chief A. Thomas; S. Young

STAFF: B. L. Hutcheson, General Manager, Parks and Environmental Services; D. Lokken, General Manager, Finance and Technology; S. Santarossa, Corporate Officer (Recorder); D. Telford, Senior Manager Environmental Engineering; A. Genero, Manager Accounting Services; L. Taylor, Communications Coordinator; S. Hallatt, Manager, Aboriginal Initiatives

ALSO PRESENT: L. Helps, Chair, Eastside; L. Hundleby, Alternate Director; B. Burton-Krahn, Alternate Director; R. Atkins, Technical Oversight Panel; E. Lee, Urban Systems; G. Nason, Colwood; S. Russell, Colwood; M. Baxter, Colwood; R. Morrison, Esquimalt; J. Miller, Esquimalt; L. Hurst, Esquimalt; J. O'Reardon, Aurora, C. Houghton, Aurora; K. Anema, View Royal

Co-Chair Desjardins called the meeting to order at 11:05 a.m.

1. Approval of Agenda

The agenda was amended to consider Item 5.4 before Item 5.1 and to add Item 6.1 - Correspondence from Township of Esquimalt regarding Potential Sites for Wastewater Treatment Plants in Township of Esquimalt.

MOVED by Director Screech, SECONDED by Co-Chair Hamilton,
That the agenda be adopted as amended.
CARRIED

2. Adoption of Minutes

2.1. **15-1193** Adoption of the Minutes of September 29, 2015

MOVED by Director Seaton, SECONDED by Director Screech,
That the minutes of September 29, 2015 be adopted.
CARRIED

3. Chair's Remarks

There were none.

4. Presentations/Delegations

There were none.

5. Committee Business

5.4. 15-1014 Eastside Select Committee - Verbal Update

This item was considered before Item 5.1.

Director Helps, Chair of the Eastside Select Committee, reported that the Committee met last week and received an update from Urban Systems on the option sets. She noted that the range of distributed options fits with the Westside flows and that the current focus is on costing the 2 and 5 plan option set. Urban Systems will report on the option sets at their next meeting on November 23 prior to the December 2 Core Area Liquid Waste Management Committee meeting. Director Helps also noted that Westside Select Committee appears to be ahead in the process at this time.

MOVED by Director Screech, SECONDED by Co-Chair Hamilton,
That the verbal update be received for information.
CARRIED

5.1. 15-1187 Westside Technical Team Analysis on Report from Urban Systems for Phase 2 of the Westside Wastewater Treatment Plant Siting Analysis

E. Lee, Urban Systems, and R. Killian, Carollo (via teleconference), provided a PowerPoint presentation regarding Phase II Technical Report and highlighted the following:

- feasibility and costing elements
- design criteria
- target markets
    - water reuse - 4 plant creates an operating deficit where a 2 plant option is close to addressing operating costs
    - solids and heat recovery - anaerobic digestion is energy positive for wastewater solids and gasification with yard waste improves the case
- solids recovery technologies review
- costing factors
- option sets - advantages and challenges
    - 4 plant option set
    - 1 plant option set
    - 2 plant option set
- site prioritization

R. Killian highlighted the following in relation to solids and heat recovery:

- Cost to manage yard waste
- Gasifiers are more beneficial for larger facilities
- Additional cost of $6-10 million to include solids processing at a facility
- Biochar from gasifiers vs. bio solids from anaerobic digestion
- Anaerobic digestion is an energy positive approach whereas gasification is energy neutral and requires yard waste to make it energy positive
- Centralized option has better economies of scale
- The market will determine the options for resource recovery once an option set is identified

- Revisiting the issue of land application of bio solids and biochar

The consultants were requested to outline the difference between biochar and bio solids and other uses for biochar at a future Core Area Liquid Waste Management Committee meeting.

The Committee was requested to consider limiting the analysis to anaerobic digestion and gasification with yard waste at large sites only.

It was noted that the Westside CAOs and Technical Group only received this information the day before and did not have ample time to review the information.

MOVED by Co-Chair Hamilton, SECONDED by Co-Chair Desjardins,
That further consideration of this item be postponed to a meeting to be scheduled before November 4, 2015.
CARRIED

5.2. 15-1178 Westside Wastewater Treatment - Phase 2 Public Consultation (draft Ipsos polling report anticipated to be circulated at the meeting)

C. Houghton, provided a PowerPoint presentation regarding Phase 2 of the Public Consultation process and highlighted the following:
- Public engagement history and objectives
- Methodology
- Possible public engagement with Eastside
- Public engagement timing
  - Stage 1 - October 20 to November 30
  - Stage 2 - December 1 to January 13
  - Stage 3 - post January 13

C. Houghton noted that 92% of those interviewed had not before participated in a public consultation process regarding sewage treatment but that 63% were aware of the issue. A report outlining more detail will be provided at the next meeting.

MOVED by Director Screech, SECONDED by Co-Chair Hamilton,
That further consideration of this item be postponed to the next meeting.
CARRIED

5.3. 15-1177 Westside Concept Planning - Phase 2 Budget Update No. 1

MOVED by Director Screech, SECONDED by Co-Chair Hamilton,
That the Westside Wastewater Treatment and Resource Recovery Select Committee receive this report for information.
CARRIED

6. New Business

15-1196 Correspondence: Township of Esquimalt, October 15, 2015 re: Potential Sites for Wastewater Treatment Plants in Township of Esquimalt

Correspondence dated October 15, 2015 was circulated for consideration. In the interest of time, the Committee agreed to postpone consideration of this item to the next meeting.

MOVED by Director Screech, SECONDED by Co-Chair Hamilton,
That the correspondence be received for information and postponed for discussion at the next meeting.
CARRIED

7. Adjournment

MOVED by Director Seaton, SECONDED by Co-Chair Hamilton.
That the meeting adjourn at 11:58 am.
CARRIED

_____

CHAIR

_____

RECORDER

Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Meeting Minutes
Westside Wastewater Treatment and Resource Recovery Select Committee

Monday, November 2, 2015 **1:30 PM** **Esquimalt Town Hall, 1229 Esquimalt Road**

PRESENT:

MEMBERS: B. Desjardins (Co-Chair), C. Hamilton (Co-Chair), D. Screech, L. Seaton, W. Sifert (for S. Young)
Absent: Chief R. Sam; Chief A. Thomas
ALSO PRESENT: B. Burton-Krahn, Alternate Member; E. Lee, Urban Systems; G. Nason, Colwood; M. Baxter, Colwood; R. Morrison, Esquimalt; J. Miller, Esquimalt; J. Davidson, View Royal
L. Hurst, Esquimalt; J. O'Reardon, Aurora, C. Houghton, Aurora; K. Anema, View Royal; J. Bowden, Langford
STAFF: B. L. Hutcheson, General Manager, Parks and Environmental Services; D. Lokken, General Manager, Finance and Technology; S. Santarossa, Corporate Officer (Recorder); D. Telford, Senior Manager Environmental Engineering; L. Taylor, Communications Coordinator; S. Hallatt, Manager, Aboriginal Initiatives, A. Boyd, Committee Clerk (recorder)

Co-Chair Hamilton called the meeting to order at 1:30 p.m.

1. Approval of Agenda

MOVED by Co-Chair Desjardins, SECONDED by Director Screech,
That the agenda be approved.
CARRIED

2. Chair's Remarks

There were none.

3. Presentations/Delegations

There were none.

4. Committee Business

4.1. 15-1187 Westside Technical Team Analysis on Report from Urban Systems for Phase 2 of the Westside Wastewater Treatment Plant Siting Analysis

E. Lee of Urban Systems provided a review of the PowerPoint from the previous meeting including some updated slides. He noted that there was a fulsome discussion with the Westside Technical Committee since the last meeting.

J. Miller of Westside Technical Committee provided an update noting some things need to be further explored, including flows, as their report is based on

63ml flows.

E. Lee noted that biochar has broader uses and applications but we need to know who is going to use it and biosolids have less range but are more established.

MOVED by Co-Chair Desjardins, SECONDED by Director Screech,
That Urban Systems clarify the content of biochar vs. biosolids for the purpose of land application consideration.
CARRIED

E. Lee noted that looking at 2030 vs. 2045 design flows (table 2.1 in report) we are building for 2030, but also looking out to 2045 to accommodate growth. The 2045 flows are part of a previous draft version and there as a placeholder on the table with the data coming from the broader regional population percentage growth provided by the municipalities.

Discussion ensued relative to:
- design and capacity for the future
- water reclamation
- potential future flows in Colwood and Langford, with new development
- additional costs when adding on to a single plant
- all plant options are assuming similar tertiary treatment

MOVED by Co-Chair Desjardins, SECONDED by Alternate Director Sifert,
That Westside Wastewater Treatment and Resource Recovery Select Committee refer to the Core Area Liquid Waste Management Committee:
That the use of yard and garden waste as a feedstock be considered at a future meeting of the Core Area Liquid Waste Management Committee.
CARRIED

MOVED by Co-Chair Desjardins, SECONDED by Director Screech,
That the Westside Wastewater Treatment and Resource Recovery Select Committee recommend:
1. That Westside Wastewater Treatment Plant Citing Analysis - Phase 2 Report (Urban Systems, October 2015) be forwarded to the Core Area Liquid Waste Management Committee for information;
2. That the three options presented in this report be considered further as part of the Core Area Phase 2 feasibility, technical and life-cycle costing analysis; and,
3. That the list of prioritized sites accompany the three option sets for further study in Phase 2 of the Core Area analysis.
CARRIED

MOVED by Co-Chair Desjardins, SECONDED by Director Screech,
That the Westside Technical Committee comments for further analysis and matrix be endorsed by the Westside Wastewater Treatment and Resource Recovery Select Committee and forwarded to the Core Area Liquid Waste Management Committee for inclusion in the next phase of analysis.
CARRIED

MOVED by Co-Chair Desjardins, SECONDED by Alternate Director Sifert,
That analysis of water reclamation through the above options be incorporated as part of Westside option sets next phase of evaluation, within overall core work.

DEFEATED
Opposed: Screech, Seaton, Sifert

MOVED by Co-Chair Desjardins, SECONDED by Director Screech,
That the following motion be referred by the Westside Wastewater Treatment and Resource Recovery Select Committee to the Core Area Liquid Waste Management Committee at an appropriate time in the future:
That the CRD work with the private sector to distribute risk appropriately in an effort to identify and fund the recovery of the resources available in the sewage. CRD to issue a Request for Statements of Interest (RFSI) to the general private market to propose on resource recovery opportunities with their technologies and provide the CRD with a two-step all-in cost to install the technology, receive (solids or liquid) the product, process it and provide a higher value material as well as the recovered materials extracted from the product.

That the CRD evaluate these proposals and rank them based on their:
1. Alignment with CRD Goals and Objectives
2. Environmental Benefit
3. Cost
4. Risk to CRD and member municipalities
CARRIED

Staff was requested to determine how the Technical Committee can continue to participate in the process.

4.2. 15-1178 Westside Wastewater Treatment - Phase 2 Public Consultation (draft Ipsos polling report anticipated to be circulated at the meeting)

C. Houghton noted that the IPSOs Reid survey results were just in and provided a PowerPoint on some of the key results. She also noted that for part of the public participation she will get highschool students engaged in a competition.

MOVED by Co-Chair Desjardins, SECONDED by Director Screech,
That the Westside Wastewater Treatment and Resource Recovery Select Committee endorse the public consultation plan as presented in Appendix A.
CARRIED

MOVED by Director Screech, SECONDED by Co-Chair Desjardins,
That the IPSOs Reid survey results, upon further review, be brought back to the next Westside Wastewater Treatment and Resource Recovery Select Committee meeting.
CARRIED

5. Correspondence

5.1. 15-1196 Correspondence: Township of Esquimalt, October 15, 2015 re: Potential Sites for Wastewater Treatment Plants in Township of Esquimalt

MOVED by Co-Chair Desjardins, SECONDED by Director Screech,
That the correspondence be received for information and that the Westside Wastewater Treatment and Resource Recovery Select Committee remove the

"Esquimalt Village Project Plans - Site Profile #18 Esquimalt Town Centre", as a potential sewage treatment site.
CARRIED

6. New Business

There were none.

7. Adjournment

MOVED by Co-Chair Desjardins, SECONDED by Alternate Director Sifert,
That the meeting adjourn at 2:54 p.m.
CARRIED

_____
CHAIR

_____
RECORDER

Making a difference...together

EHQ 15-135

REPORT TO WESTSIDE WASTEWATER TREATMENT AND RESOURCE RECOVERY SELECT COMMITTEE
MEETING OF TUESDAY, NOVEMBER 24, 2015

SUBJECT **TECHNICAL ANALYSIS FOR FURTHER COMPREHENSIVE EVALUATION OF POTENTIAL SITES, SCENARIOS AND TECHNOLOGIES**

ISSUE

To provide Select Committee members with Terms of Reference and expected outcomes of the next phase of technical analysis on possible wastewater/resource recovery facilities on the Westside.

BACKGROUND

The Westside technical committee, consisting of technical staff and consultants from the participating communities, has been involved in guiding the technical work and analysis of Westside activities.

Under the direction of the municipal technical committee, Urban Systems and Carollo Engineers prepared and presented a report to the Westside Select Committee on October 29, 2015. The objectives of the report included:

- Wastewater Treatment Technologies (liquids): focus on technologies that span secondary to tertiary treatment for potential costing.
- Solids Treatment and Recovery: focus on technologies for gasification and digestion for one-plant, two-plant and four-plant comparisons.
- Resource Recovery Target Market: focus on target markets and highest potential locations for reclaimed water and solids recovery.
- Indicative Design: focus on instructional outcomes from the workshop to guide option set analysis and costing.
- Order of Magnitude: focus on costing for one-plant, two-plant or four-plant option sets.
- Site Reprioritization: focus on incorporating technical analysis, real estate findings and overall feasibility into a node-by-node update.

The technical committee conducted a high-level assessment and provided comment on the report's findings and analysis (see Appendix A). The analysis concluded that while there were valuable information and insights in the report, there needed to be a further, more detailed look at a number of critical factors.

Urban Systems and Carollo are in the process of integrating the technical and financial analysis they produced for the Westside, with sites and scenarios brought forward by the Eastside Select Committee in conjunction with the Technical Oversight Panel. This work will be brought forward for public consultation in December and January.

In a meeting with the Westside technical committee on November 16, 2015, Urban Systems provided a verbal update as to how they are addressing the issues raised by the technical

committee for the December report to the Core Area Liquid Waste Management Committee (Technical Memo #3). That report will consist of a more thorough analysis of sites, scenarios, technologies and order of magnitude costing associated with the various options.

Urban Systems has agreed to provide a verbal report to the Westside Select Committee on their technical analysis and how it responds to issues raised by the Westside municipal technical committee.

CONCLUSION

As Technical Memo #3 will be presented to the Core Area Liquid Waste Management Committee in December and then brought forward for public consultation, a Westside Select Committee update from Urban Systems is a critical step in ensuring that the committee's Terms of Reference and Project Framework are being met.

WESTSIDE STAFF WORKING GROUP

The Westside staff working group is in agreement with this report.

RECOMMENDATION

That the Westside Select Committee receive this report for information.

Submitted by:	Dan Telford, P.Eng., Project Manager, Core Area Wastewater and Resource Recovery Project
Concurrence:	Glenn Harris, Ph.D., R.P.Bio., Acting General Manager, Parks & Environmental Services

CH:cl

Attachment: Appendix A – Westside Technical Team Analysis

APPENDIX A

Westside Technical Team Analysis

In the time available to fully consider the report authored by Urban Systems for Phase 2 of the Westside Wastewater Treatment Plant Siting Analysis, the technical committee has conducted a high level assessment to help inform recommendations and actions in moving the wastewater treatment and resource recovery process forward for the Westside. Regardless of the time constraints, the technical team has great confidence in the work done by Urban Systems in the short period of time and limited budget available to do the level of analysis that this important project deserves.

The report highlights several important points for consideration, most notably issues regarding dealing with solids, and enlisting the private sector in providing solutions that meet the outcomes to be articulated by decision makers.

As this report is only one step in the overall project, it is hoped that following steps will incorporate a more comprehensive and detailed evaluation of the following factors in order to arrive at a decision that best meets the needs, values and aspirations of the communities:

- Integration of public opinions as indicated in the various public engagement activities over the last year and how it applies to the characteristics of each solution set,
- Full life cycle costing as per industry standards - potentially over 50 years
- Further and a more thorough cost analysis including potential revenues and cost offsets with sensitivity analyses for those factors that are very difficult to forecast, e.g., availability and value of water,
- Inclusion of costs associated with acquiring sites for proposed facilities,
- Exclusion of those sites that are not available for acquisition,
- Quantifying non-financial benefits and liabilities associated with options particularly associated with water reclamation, energy recovery and climate change, and
- Addressing the need for resiliency within proposed solutions.

As a final note it needs to be documented that the flows used in the report do not match the flows now anticipated from Saanich and Victoria West. Unfortunately these revisions were received too late to be used in the calculations. Clearly the conclusions on viable sites – particularly in Esquimalt - could be affected by the significant difference in these numbers and must be addressed without delay.

WESTSIDE SOLUTIONS
Westside Wastewater Treatment & Resource Recovery

Based on the draft report the following matrix broadly summarizes the characteristics of the three solution sets covered by the report and in accordance with the decision criteria support by the Select Committee in its Project Framework.

West Side Option Set Matrix — Positive | Neutral | Fair

NC North Colwood
EFN Esquimalt First Nation
Lang Meaford
VR View Royal

Criteria	Option 4A - Lang/NC/VR/EFN Four Plant			Option 1B - EFN One Plant			Option 2C - NC/EFN Two Plant		
Capital $									
Operating $									
Life Cycle $									
Existing Infrastructure									
Revenue and Resource									
Water re-use									
Capacity Phasing									
Carbon Footprint									
Positive and Safe for Public									
Water Quality Tertiary									
Size									
Near Trunk Main									
Near Truck Route									
On Site Solids (EFN)									
Include other waste (EFN)									

The matrix presented above is not intended to be an in depth and definitive recommendation from the WTC, however it may assist the reader in comparing the 3 options presented.

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EHQ 15-136

REPORT TO WESTSIDE WASTEWATER TREATMENT AND RESOURCE RECOVERY SELECT COMMITTEE
MEETING OF TUESDAY, NOVEMBER 24, 2015

SUBJECT Westside Solutions Public Consultation Update

ISSUE

To provide information regarding Westside Solutions public consultation activities.

BACKGROUND

In October 2014, the Westside Select Committee launched the Westside Solutions Project as a way to inform, educate and involve Westside residents and stakeholders in decisions about Westside wastewater treatment and resource recovery. Since then, the Westside Select Committee has undertaken a number of successful public engagement initiatives, including open houses, innovation days, roundtables, community events and online surveys. Through the efforts of municipal staff and consultants, thousands of residents from Colwood, Esquimalt, Langford, View Royal, Songhees Nation and Esquimalt Nation participated in the public consultation process.

In October 2015, Westside Solutions launched a poll in Westside communities to further engage the public using recognized industry polling standards. The methodology included a tiered approach, which involved broadening the response pool to residents who have not yet been engaged in the process, along with those who have been engaged in the process to date. This stakeholder group was asked if they could be contacted in the future to provide further feedback as distributed options are defined and preliminary costing information becomes available, and 34% of respondents agreed. The Westside Phase 2 Public Consultation plan is attached as Appendix A.

Additional highlights from the poll of Westside residents include:

- 68% of respondents say they are closely following wastewater planning
- 91% of respondents had not participated in previous planning activities
- 50% of respondents are most concerned with the continued discharge of sewage into the ocean
- 24% of respondents are most concerned with the increase to their tax bill
- 20% of respondents are most concerned with impact on neighbourhood quality of life
- 81% of respondents prefer a higher cost solution that allows for potential reuse

In November, Westside Solutions and Eastside Community Dialogues began planning the integration of some region-wide public engagement approaches, while continuing to maintain the focus on responding to specific community processes and values. Integrated activities include an online survey for all of the Core Area, a newspaper insert and coordinated advertising purchases.

The newspaper insert will focus on advising Core Area residents of the potential options and will include information about each of the five option sets, a glossary of terms, an overview of the public consultation process and how feedback is being considered, and information on how residents can further participate in the wastewater conversation. The insert will also be available at community centres, municipal halls and online on the Westside Solutions website.

WESTSIDE STAFF WORKING GROUP

The Westside staff working group is in agreement with the content of this report.

CONCLUSION

The Westside Solutions public consultation plan will provide Westside communities opportunities to give further public feedback to the Westside Wastewater Treatment and Resource Recovery Select Committee and Core Area Liquid Waste Management Committee, to assist the committees in identifying preferred solution sets for wastewater treatment in the Core Area.

RECOMMENDATION

That the Westside Wastewater Treatment and Resource Recovery Select Committee receive this report for information.

Submitted by:	Andy Orr, Senior Manager, Corporate Communications
Concurrence:	Glenn Harris, Ph.D., R.P.Bio., Acting General Manager, Parks & Environmental Services

LT:cl

Attachment: Appendix A – Westside Consultation Plan

Public Engagement Plan

WESTSIDE SOLUTIONS
Westside Wastewater Treatment & Resource Recovery

STAGE 1

METHODOLOGY	TARGET	OBJECTIVE/OUTCOME
IPSOS telephone poll of randomly selected respondents	• Randomly selected residents from Westside communities and First Nations - N=400	• statistical data on attitudes of randomly selected Westside residents • identification of residents who wish to participate in more detailed online workbooks and questionnaires
Online options workbook/questionnaire "SolutionSpeak" – a more detailed online analysis of options adopted by Westside Select Committee (October 27)	• general population • previously identified pool of respondents	• engage public in feedback on sites and scenarios • educate on technology options – benefits/drawbacks • educate on resource recovery options – benefits and costs • identify further information requirements through process
Media release and editorial board meetings	• Media partners • general population	• inform public of options and solutions • greater public feedback
Social media (municipal web pages, Facebook sites, twitter – CRD website, Facebook and twitter)	• general population	• inform public of options and solutions • greater public feedback
Launch online newsletter/update fact sheet	• general population • partners	• regular updates on project's progress
Joint Westside/Eastside High school student engagement competition (possible prizes)	• students • general population	• engage younger demographic in wastewater treatment resource recovery project • receive innovative design and integration concepts
Work with CRD and Eastside to reorganize and update wastewater website www.crd.bc.ca/project/wastewater-planning	• general population	• better information access on CRD site

STAGE 2

METHODOLOGY	TARGET	OBJECTIVE/OUTCOME
Joint Westside/Eastside online survey regarding solutions and costs decided at the CALWMC December meeting	• general population • previously identified pool of respondents	• feedback on wastewater treatment and resource recovery solutions and associated costs for entire region
Offer meetings and open houses targeted to specific stakeholder groups	• community associations particularly focusing on communities where a facility could be sited • business associations • chambers of commerce • recreation organizations	• present more detailed information to community members • encourage more feedback on online survey tool
Press release and editorial meetings	• press • general population	• inform public of options and solutions • greater public feedback
Paid advertising campaign on option sets: Joint Westside / Eastside including • **Black Press** • **Online TC** • **Used Victoria** • **Facebook**	• general population	• inform public of options and solutions • greater public feedback
Westside postcard drop	• residents of the Westside	• inform public of options and solutions • greater public feedback
Social media (municipal web pages, Facebook sites, twitter – CRD website, Facebook and twitter)	• general population	• inform public of options and solutions • greater public feedback
Ongoing newsletters	• general population • partners	• regular updates

STAGE 3

METHODOLOGY	TARGET	OBJECTIVE/OUTCOME
Joint Westside/Eastside information session on design possibilities (Bruce Hayden)	• general population	• engage public at looking at design opportunities
Design charrette for option chosen by CALWMC at January meeting	• neighbourhood groups in area(s) where facility(s) are to be sited • general public	• public participation in facility design and innovation • potential new and innovative concepts

Targeted stakeholder meetings	• neighbourhood groups where facility(s) are to be sited	• address concerns of citizens
Support for municipalities if requested on potential re-zoning	• municipalities	• information
Select and Announce winner of High School engagement competition	• students • general population	• continued engagement of younger demographic
Social media (municipal web pages, Facebook sites, twitter – CRD website, Facebook and twitter)	• general population	• inform public of options and solutions • greater public feedback
Ongoing newsletters	• general population • partners	• regular updates

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REPORT TO WESTSIDE WASTEWATER TREATMENT AND RESOURCE RECOVERY SELECT COMMITTEE
MEETING OF TUESDAY, NOVEMBER 24, 2015

SUBJECT Westside Concept Planning – Phase 2 Budget Update No. 2

ISSUE

To provide the Westside Wastewater Treatment and Resource Recovery Select Committee (Westside Select Committee) with a monthly budget update.

BACKGROUND

At its meeting of November 5, 2014, the Westside Select Committee directed staff to provide a budget status update on a monthly basis for the identification of potential treatment sites and public consultation phase of the project.

Phase 1 of the Concept Planning for this project was completed and closed out on August 31, 2015. The Phase 1 Final Budget Update No. 8 was approved by the Westside Select Committee on September 29, 2015 with actual expenditures of $366,870. Phase 1 invoices that were received after September 29 have been added to the Phase 2 budget, in the Revised Budget column of Appendix A.

Phase 2 of the Concept Planning for this project commenced September 1, 2015 with an anticipated completion by December 31, 2015. Actual expenses and outstanding commitments are summarized in Appendix A.

FINANCIAL IMPLICATIONS

Under the Core Area Wastewater Treatment Program budget, requisitioned funds can only be apportioned on the cost sharing basis on which they were raised. The cost sharing of the Program budget is currently apportioned based on 2030 design capacity, 70% average dry weather flow and 30% average annual flow, as previously declared by each participant. This cost sharing may be revisited by the participants in the service. The Westside collectively accounts for 26.76% of the total Core Area requisition funds raised. Westside expenditures will be funded from the four Westside municipal participant's requisition funds as follows.

Colwood	15.92%
Esquimalt	24.85%
Langford	47.31%
View Royal	11.92%

CONCLUSION

Phase 2 Concept Planning for the project commenced on September 1, 2015, with an anticipated completion by the end of December 2015. Due to the accelerated pace of work on the project, invoicing received from some of the suppliers and consultants has tended to lag somwhat. The

actual expenditures incurred but invoiced after the reporting cutoff date are carried forward to the following update report. The Committee will continue to receive monthly budget updates for Phase 2 Concept Planning through to the end of December 31, 2015.

RECOMMENDATION

That the Westside Wastewater Treatment and Resource Recovery Select Committee receive this report for information.

Submitted by:	Dan Telford, P.Eng., Senior Manager, Environmental Engineering
Concurrence:	Glenn Harris, Ph.D., R.P.Bio, Acting General Manager, Parks & Environmental Services

DT:mer

Attachment: Appendix A – Westside Concept Planning – Phase 2 Budget Update No. 2

APPENDIX A

WESTSIDE WASTEWATER TREATMENT AND RESOURCE RECOVERY
SELECT COMMITTEE

Westside Concept Planning - Phase 2 Budget Update No. 2
October 31, 2015

	BUDGET	REVISED BUDGET (Oct 2015)	ACTUAL	COMMITTED	TOTAL	REMAINING
Outreach						
Consultants						
Outreach and Consultation	48,562	67,799	37,987	27,500	65,487	2,312
Technical Support	60,000	64,260	55,383	8,877	64,260	0
Outreach Disbursements	40,000	44,928	5,728		5,728	39,200
Project Management						
Staff and Wages	20,000	20,000	-		-	20,000
Miscellaneous	5,000	5,022	22		22	5,000
Westside Total	**$ 173,562**	**$ 202,009**	**$ 99,120**	**$ 36,377**	**$ 135,496**	**$ 66,513**

Revised Budget due to late invoices from Phase 1.

Motion from the November 25, 2015 Technical and Community Advisory Committee (TCAC) meeting to go forward to the Core Area Liquid Waste Management Committee

9. New Business:

Motion to Support Director Derman's Motion

MOVED by C. Witter, **SECONDED** by D. Purewall,
That the TCAC endorse Director Derman's motion

a. That the Core Area Liquid Waste Committee initiate a high level Request for Expressions of Interest designed to fully canvas the private sector and allow integrated waste approaches and other innovative solution sets to come forward.
b. That the Core Area Liquid Waste Committee insure means are established to fully and independently evaluate the viability of integrated waste approaches and other innovative solution sets in a manner that does no compromise the interests of applicants.

and respectfully request that the CALWMC implement it.

CARRIED
Ishiguro, Coburn, Tiedje, White OPPOSED

Motion for Which Notice Has Been Given:

OPTIONS FOR WASTEWATER TREATMENT – DIRECTOR HAMILTON

WHEREAS: It is critical that there be positive action taken to meet funding deadlines and regulatory requirements for waste water treatment for the Capital Regional District;

BE IT RESOLVED that: Capital Regional District (CRD) staff be directed to support municipalities and First Nations who want to explore options for waste water treatment that are economically responsible, technically feasible, environmentally sound and meet current provincial and federal deadlines;

AND THAT funding be provided from the sewage treatment budget to support an independent assessment of alternative locations to McLoughlin and Hartland, with full and regular engagement of staff and elected representatives from participating municipalities, First Nations and the public; and,

AND THAT any decisions taken to amend the Liquid Waste Management Plan be done in an open and transparent public process;

AND THAT any further money spent be recoverable under the funding arrangement with the Provincial and Federal Governments and that clarity be sought that the funding arrangement with Provincial and Federal governments be able to support the communities to the extent it supported the CRD driven process .

August 5, 2014