GREATER VANCOUVER SEWERAGE AND DRAINAGE DISTRICT (GVS&DD) BOARD OF DIRECTORS

REGULAR BOARD MEETING
Friday, March 25, 2022
9:15 A.M.
Meeting conducted electronically pursuant to the Procedure Bylaw
28th Floor Boardroom, 4515 Central Boulevard, Burnaby, British Columbia
Webstream available at http://www.metrovancouver.org

Membership and Votes

A G E N D A[1]

A. ADOPTION OF THE AGENDA

1. March 25, 2022 Regular Meeting Agenda
That the GVS&DD Board adopt the agenda for its regular meeting scheduled for March 25, 2022 as circulated.

B. ADOPTION OF THE MINUTES

1. February 25, 2022 Regular Meeting Minutes *pg. 5*
That the GVS&DD Board adopt the minutes for its regular meeting held February 25, 2022 as circulated.

C. DELEGATIONS

D. INVITED PRESENTATIONS

E. CONSENT AGENDA
Note: Directors may adopt in one motion all recommendations appearing on the Consent Agenda or, prior to the vote, request an item be removed from the Consent Agenda for debate or discussion, voting in opposition to a recommendation, or declaring a conflict of interest with an item.

[1] *Note: Recommendation is shown under each item, where applicable. All Directors vote unless otherwise noted.*

1. LIQUID WASTE COMMITTEE REPORTS

1.1 Iona Island Wastewater Treatment Plant Projects – Project Definition Engagement Results

pg. 11

That the GVS&DD Board receive for information the report dated March 2, 2022, titled "Iona Island Wastewater Treatment Plant Projects – Project Definition Engagement Results".

1.2 Iona Island Wastewater Treatment Plant Upgrade Projects – Project Definition and Conceptual Design Approval (Stage Gate 1)

pg. 64

That the GVS&DD Board:

a) approve the conceptual design for the Iona Island Wastewater Treatment Plant Upgrade Projects as developed through the project definition process and summarized in the report dated March 2, 2022 titled "Iona Island Wastewater Treatment Plant Upgrade Projects – Project Definition and Conceptual Design Approval (Stage Gate 1)", with an estimated cost of $9.9 billion, including escalation and risk reserve, subject to further stage gate approvals;

b) direct staff to continue focused efforts to pursue funding from Provincial and Federal governments;

c) direct staff to work collaboratively with member jurisdictions to confirm project cost allocations and rate impacts in accordance with *Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014*; and,

d) direct staff to finalize a funding and financing strategy for Board approval, and ensure capital expenditure cash flows for the Projects are updated and included in the annual budgeting process.

1.3 Out-of-Region Trucked Liquid Waste Discharge Requests

pg. 144

That the GVS&DD Board:

a) authorize staff to issue an out-of-region discharge number for trucked liquid waste generated from wastewater treatment plants owned and operated by the Fraser Valley Regional District from June 1, 2022 to May 31, 2024 pursuant to *GVS&DD Trucked Liquid Waste Bylaw No. 345, 2021*;

b) authorize staff to issue an out-of-region discharge number for trucked liquid waste generated from Correctional Service of Canada's Kent and Mountain Institutions, Agassiz, BC from June 1, 2022 to December 31, 2022 pursuant to *GVS&DD Trucked Liquid Waste Bylaw No. 345, 2021*; and

c) authorize staff to issue an out-of-region discharge number for trucked liquid waste generated from Point Roberts, Washington, U.S. from June 1, 2022 to May 31, 2027 pursuant to *GVS&DD Trucked Liquid Waste Bylaw No. 345, 2021*

as presented in the report dated February 7, 2022 titled "Out-of-Region Trucked Liquid Waste Discharge Requests".

1.4 Contract Amendment of RFP No. 14-205 - Design Build Consulting Services for the Lions Gate Secondary Wastewater Treatment Plant to Design Consultant, Engineer of Record Service *pg. 149*

That the GVS&DD Board:

a) amend the contract resulting from RFP No. 14-205 - Design Build Consulting Services for the Lions Gate Secondary Wastewater Treatment Plant in an amount of up to $15,000,000 (exclusive of taxes) to allow AECOM Canada Ltd. to become the design consultant for the project, subject to final review by the Commissioner; and

b) authorize the Commissioner and Corporate Officer to execute the required documentation once the Commissioner is satisfied that the amendment should proceed.

F. ITEMS REMOVED FROM THE CONSENT AGENDA

G. REPORTS NOT INCLUDED IN CONSENT AGENDA

1. LIQUID WASTE COMMITTEE REPORTS

1.1 Development Cost Charge Review Process and Rate Amending Bylaw *pg. 158*

[Recommendation a), b) and c): simple weighted majority vote.]

That the GVS&DD Board:

a) approve the implementation of new Development Cost Charge rates, as proposed, and endorse the inclusion of interest costs directly related to those activities that are approved by the Inspector of Municipalities in the Development Cost Charge program;

b) give first, second and third reading to the *Greater Vancouver Sewerage and Drainage District Development Cost Charge Amending Bylaw No. 353, 2022*; and

c) direct staff to forward the *Greater Vancouver Sewerage and Drainage District Development Cost Charge Amending Bylaw No. 353, 2022* to the Inspector of Municipalities for approval.

1.2 Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Amending Bylaw No. 352, 2022 *pg. 170*

[Recommendation a): simple weighted majority vote.]
[Recommendation b): 2/3 weighted majority vote.]

That the GVS&DD Board:

a) give first, second and third reading to *Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Amending Bylaw No. 352, 2022*; and

b) pass and finally adopt *Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Amending Bylaw No. 352, 2022*.

H. MOTIONS FOR WHICH NOTICE HAS BEEN GIVEN

I. OTHER BUSINESS

1. GVS&DD Board Committee Information Items and Delegation Summaries *pg. 174*

J. BUSINESS ARISING FROM DELEGATIONS

K. RESOLUTION TO CLOSE MEETING

Note: The Board must state by resolution the basis under section 90 of the Community Charter on which the meeting is being closed. If a member wishes to add an item, the basis must be included below.

That the GVS&DD Board close its regular meeting scheduled for March 25, 2022 pursuant to the *Community Charter* provisions, Section 90 (1) (g) as follows:

"90 (1) A part of a board meeting may be closed to the public if the subject matter being considered relates to or is one or more of the following:

(g) litigation or potential litigation affecting the regional district."

L. RISE AND REPORT (Items Released from Closed Meeting)

M. ADJOURNMENT/CONCLUSION

That the GVS&DD Board adjourn/conclude its regular meeting of March 25, 2022.

GREATER VANCOUVER SEWERAGE AND DRAINAGE DISTRICT
BOARD OF DIRECTORS

Minutes of the Regular Meeting of the Greater Vancouver Sewerage and Drainage District (GVS&DD) Board of Directors held at 1:14 p.m. on Friday, February 25, 2022 in the 28th Floor Boardroom, 4515 Central Boulevard, Burnaby, British Columbia.

MEMBERS PRESENT:

Burnaby, Chair, Director Sav Dhaliwal
Anmore, Director John McEwen*
Burnaby, Director Mike Hurley*
Coquitlam, Director Craig Hodge*
Coquitlam, Director Richard Stewart*
Delta, Director George Harvie*
Delta, Director Jeannie Kanakos*
Electoral Area A, Director Jen McCutcheon*
Langley City, Director Gayle Martin*
Langley Township, Director Jack Froese*
Langley Township, Director Kim Richter*
New Westminster, Director Jonathan Coté*
North Vancouver District, Director Lisa Muri*
Pitt Meadows, Director Bill Dingwall*
Port Coquitlam, Director Brad West*
Port Moody, Director Rob Vagramov* (departed at 1:23 p.m.)
Richmond, Director Malcolm Brodie*
Richmond, Director Harold Steves*
Surrey, Director Linda Annis*
Surrey, Director Doug Elford*
Surrey, Director Laurie Guerra*
Surrey, Director Doug McCallum*
Surrey, Director Allison Patton*
Vancouver, Director Christine Boyle*
Vancouver, Director Adriane Carr
Vancouver, Director Melissa De Genova*
Vancouver, Director Lisa Dominato*
Vancouver, Director Colleen Hardwick*
Vancouver, Alternate Director Pete Fry* for Director Kennedy Stewart
Vancouver, Director Michael Wiebe*
West Vancouver, Director Mary-Ann Booth*
Commissioner Jerry W. Dobrovolny (Non-voting member)

MEMBERS ABSENT:

North Vancouver City, Vice Chair Director Linda Buchanan
Burnaby, Director Pietro Calendino
Maple Ridge, Director Mike Morden
Surrey, Director Mandeep Nagra
White Rock, Director Darryl Walker

OTHERS PRESENT:

Chief Ken Baird†

STAFF PRESENT:

Chris Plagnol, Corporate Officer
Natalia Melnikov, Legislative Services Coordinator, Board and Information Services

*denotes electronic meeting participation as authorized by Section 3.6.2 of the *Procedure Bylaw*
† denotes electronic meeting participation

A. ADOPTION OF THE AGENDA

1. February 25, 2022 Regular Meeting Agenda

It was MOVED and SECONDED

That the GVS&DD Board

a) amend the agenda for its regular meeting scheduled for February 25, 2022 by adding On-Table report for Item 1.3 Amendment for Project Owner's Engineer (RFP No. 15-175) and Award of Contract Resulting from RFQ No. 21-457: North Shore Wastewater Treatment Plant (NSWWTP) Project; and

b) adopt the agenda as amended.

CARRIED

B. ADOPTION OF THE MINUTES

1. January 28, 2022 Regular Meeting Minutes

It was MOVED and SECONDED

That the GVS&DD Board adopt the minutes for its regular meeting held January 28, 2022 as circulated.

CARRIED

2. February 3, 2022 Special Meeting Minutes

It was MOVED and SECONDED

That the GVS&DD Board adopt the minutes for its special meeting held February 3, 2022 as circulated.

CARRIED

C. DELEGATIONS

No items presented.

D. INVITED PRESENTATIONS

No items presented.

E. CONSENT AGENDA

At the request of Directors, the following item was removed from the Consent Agenda for consideration under Section F. Items Removed From The Consent Agenda:

1.3 Amendment for Project Owner's Engineer (RFP No. 15-175) and Award of Contract Resulting from RFQ No. 21-457: North Shore Wastewater Treatment Plant (NSWWTP) Project

It was MOVED and SECONDED

That the GVS&DD Board adopt the recommendations presented in the following items as presented in the February 25, 2022 GVS&DD Board Consent Agenda:

1.1 Northwest Langley Wastewater Treatment Plant Expansion Program – Ground Improvements & Preload Project Update

1.2 Award of Phase C2 Engineering Construction Services RFP No. 14-163 for the Installation of Burnaby Lake North Interceptor No.2 – Winston St Ph. 2 – Trenchless Section

2.1 2022 Liquid Waste Sustainability Innovation Fund Application

CARRIED

The items and recommendations referred to above are as follows:

1.1 Northwest Langley Wastewater Treatment Plant Expansion Program – Ground Improvements & Preload Project Update

Report dated February 18, 2022, from Marie-Liesse Marc, Director, Major Projects, Project Delivery, providing the GVS&DD Board with the progress update on the Ground Improvements and Preload Project.

Recommendation:

That the GVS&DD Board receive for information the report dated February 18, 2022, titled "Northwest Langley Wastewater Treatment Plant Expansion Program – Ground Improvements & Preload Project Update".

Adopted on Consent

1.2 Award of Phase C2 Engineering Construction Services RFP No. 14-163 for the Installation of Burnaby Lake North Interceptor No.2 – Winston St Ph. 2 – Trenchless Section

Report dated January 25, 2022, from Roy Moulder, Director, Procurement, Procurement and Real Estate Services, and Colin Meldrum, Director, Engineering, Design and Construction, Liquid Waste Services, seeking GVS&DD Board authorization to award Phase C2, Engineering Construction Services, in an amount of up to $4,227,265 (exclusive of taxes) to the Phases A, B, and C1 consultant, AECOM Canada Ltd. for the installation of Burnaby Lake North Interceptor No. 2 – Winston St Ph. 2 – Trenchless Section.

Recommendation:
That the GVS&DD Board:

a) approve award of Phase C2, Engineering Construction Services, for an amount of up to $4,227,265 (exclusive of taxes) to the Phase A, B and C1 consultant, AECOM Canada Ltd, for the Installation of Burnaby Lake North Interceptor No.2 – Winston St Ph.2 – Trenchless Section, subject to final review by the Commissioner; and
b) authorize the Commissioner and the Corporate Officer to execute the required documentation once the Commissioner is satisfied that the award should proceed.

Adopted on Consent

2.1 2022 Liquid Waste Sustainability Innovation Fund Application

Report dated January 19, 2022, from Lillian Zaremba, Program Manager, Collaborative Innovations, Liquid Waste Services, presenting the GVS&DD Board with one project recommended for Sustainability Innovation Funding for consideration.

Recommendation:
That the GVS&DD Board approve the allocation from the Liquid Waste Sustainability Innovation Fund of $270,000 over two years starting in 2022 for Phase 1 of the Biorock: Innovative Building Material for Shoreline Protection, Carbon Sequestration, and Habitat Creation project.

Adopted on Consent

F. ITEMS REMOVED FROM THE CONSENT AGENDA

1.3 Award of Contract Resulting from RFQ No. 21-457: North Shore Wastewater Treatment Plant (NSWWTP) Project

On-table report dated February 23, 2022, from Cheryl Nelms, General Manager, Project Delivery, advising the GVS&DD Board of the results of the Request for Qualifications (RFQ) No. 21-457: North Shore Wastewater Treatment Plant (NSWWTP) Project, and recommending award of Contract 1 for Early Contractor Involvement and Construction Management Services estimated at $40 million, for the general contractor to deliver the North Shore Wastewater Treatment Plant Project to PCL Constructors Westcoast Inc.

1:23 p.m. Director Vagramov departed the meeting.

It was MOVED and SECONDED
That the GVS&DD Board:

a) approve the award of contract RFQ No. 21-457: North Shore Wastewater Treatment Plant (NSWWTP) Project to PCL Constructors Westcoast Inc, Contract 1 for Early Contractor Involvement and Construction Management Services estimated at $40 million, subject to final review by the Commissioner; and

b) authorize the Commissioner and Corporate Officer to execute the required documentation once the Commissioner is satisfied that the award should proceed.

CARRIED

G. REPORTS NOT INCLUDED IN CONSENT AGENDA

No items presented.

H. MOTIONS FOR WHICH NOTICE HAS BEEN GIVEN

No items presented.

I. OTHER BUSINESS

1. GVS&DD Board Committee Information Items and Delegation Summaries

It was MOVED and SECONDED

That the GVS&DD Board receive for information the GVS&DD Board Committee Information Items and Delegation Summaries, dated February 25, 2022.

CARRIED

J. BUSINESS ARISING FROM DELEGATIONS

No items presented.

K. RESOLUTION TO CLOSE MEETING

It was MOVED and SECONDED

That the GVS&DD Board close its regular meeting scheduled for February 25, 2022 pursuant to the *Community Charter* provisions, Section 90 (1) (e) and (i) as follows:

"90 (1) A part of a board meeting may be closed to the public if the subject matter being considered relates to or is one or more of the following:

(e) the acquisition, disposition or expropriation of land or improvements, if the board or committee considers that disclosure could reasonably be expected to harm the interests of the regional district; and

(i) the receipt of advice that is subject to solicitor-client privilege, including communications necessary for that purpose."

CARRIED

L. RISE AND REPORT (Items Released from Closed Meeting)

No items presented.

M. ADJOURNMENT/CONCLUSION

It was MOVED and SECONDED
That the GVS&DD Board adjourn its regular meeting of February 25, 2022.

CARRIED
(Time: 1:32 p.m.)

CERTIFIED CORRECT

Chris Plagnol, Corporate Officer

Sav Dhaliwal, Chair

51057462 FINAL

To: Liquid Waste Committee

From: Amanda McCuaig, Director, Communications, External Relations
Tom Sadleir, Program Manager, Community Engagement, External Relations

Date: March 2, 2022 Meeting Date: March 9, 2022

Subject: **Iona Island Wastewater Treatment Plant Projects – Project Definition Engagement Results**

RECOMMENDATION

That the GVS&DD Board receive for information the report dated March 2, 2022, titled "Iona Island Wastewater Treatment Plant Projects – Project Definition Engagement Results".

EXECUTIVE SUMMARY

Metro Vancouver began engagement activities for the project definition phase of the Iona Island Wastewater Treatment Plant (IIWWTP) Projects in June 2018. Engagement supported project introduction, the development of an initial design concept, and the development of a revised design concept in response to identified challenges. Staff engaged the GVS&DD Board, standing committees, staff advisory committees, Vancouver Sewerage Area member jurisdiction staff, the public and key stakeholders, and First Nations. Key themes that emerged during engagement were treatment level, regulatory deadline, health of the Salish Sea and Fraser River, chinook salmon, southern resident killer whales, resident and migratory birds, collaboration with Musqueam Indian Band, delivery strategy, cost, funding, and governance. Many issues raised during engagement were addressed in the development of the conceptual design, with others to be addressed during preliminary design. An engagement strategy will be developed to support the next stages including the preliminary design, early works, and ecological restoration projects.

PURPOSE

To provide the GVS&DD Board with a summary of engagement activities and key issues raised during the project definition phase of the Iona Island Wastewater Treatment Plant Projects, to support Board consideration of the final conceptual design and project definition report, which are the subject of a separate report to the Liquid Waste Committee, dated March 2, 2022, titled "Iona Island Wastewater Treatment Plant Upgrade Projects – Project Definition and Conceptual Design Approval (Stage Gate 1)". This report covers engagement from June 2018 to February 2022.

BACKGROUND

Metro Vancouver began engaging member jurisdictions, key stakeholders, the public, and First Nations on the Iona Island Wastewater Treatment Plant (IIWWTP) Projects in June 2018. At its October 2019 meeting, the GVS&DD Board authorized staff to complete the community engagement process needed to support the project definition phase of the projects.

Engagement periods during project definition were:

1. June 2018 to October 2019 – Project Introduction
2. November 2019 to April 2021 – Initial Design Concept
3. May to February 2022 – Challenges and Revised Design Concept

In July 2020, staff reported on the key themes to emerge from engagement that informed the selection of the initial design concept. In November 2021, staff reported on activities and results for fall 2021 engagement on the challenges identified and alternatives evaluated that led to the revised design concept endorsed by the GVS&DD Board in November 2021.

ENGAGEMENT PROCESS

Activities by Audience

A comprehensive summary of project definition engagement audiences and activities appears in the Attachment: Iona Island Wastewater Treatment Plant Projects – Project Definition Engagement Summary (June 2018 – February 2022).

Metro Vancouver engaged the following during project definition:

GVS&DD Board and Standing Committees
(Liquid Waste Committee, Finance and Intergovernment Committee, Regional Parks Committee)

Staff provided updates and/or recommendations at the following meetings:

- June 22, 2018 (GVS&DD)
- October 17, 2019 (Liquid Waste Committee)
- February 7, 2020 (Liquid Waste Committee – presentation only)
- February 22, 2020 (Council of Councils – presentation only)
- July 31, 2020 (GVS&DD – initial design concept)
- July 30, 2021 (GVS&DD)
- November 26, 2021 (GVS&DD – revised design concept)
- February 3, 2022 (GVS&DD special meeting)

Vancouver Sewerage Area Member Jurisdiction Staff

- City of Vancouver
- City of Richmond
- City of Burnaby
- University Endowment Lands
- University of British Columbia

Staff engaged Vancouver Sewerage Area (VSA) staff and provided updates at meetings dedicated to the IIWWTP projects on these dates:

- December 12, 2018
- January 31, 2019
- March 21, 2019
- April 25, 2019
- May 30, 2019
- August 1, 2019
- September 27, 2019
- February 27, 2020

- June 2, 2020
- October 7, 2020
- May 3, 2021
- June 15, 2021 (City of Vancouver)
- July 6, 2021 (VSA)
- September 14, 2021 (VSA)
- October 7, 2021 (City of Vancouver corporate leadership team)
- October 12, 2021 (VSA)
- Wk. of Jan 4, 2022 (phone calls)
- February 14, 2022 (VSA)

Vancouver Sewerage Area staff also participated in five integrated design process workshops in 2019/20 regarding the development of the design concept for the IIWWTP Projects.

Metro Vancouver Advisory Committees
Regional Administrative Advisory Committee (RAAC), Regional Engineers Advisory Committee (REAC), Regional Finance Advisory Committee (RFAC)

Staff provided IIWWTP Project updates at the following meetings:

- December 2019 (REAC)
- July 2021 (RAAC, RFAC, REAC)
- September 2021 (RAAC, REAC)
- October 2021 (RAAC, REAC, RFAC)
- January 2022 (REAC)
- January 2022 (REAC – major project engagement)
- February 2022 (RAAC, REAC)

Public and Key Stakeholders

- Residents and businesses
  - Community workshop and public comment period (January 9, 2019 – project introduction), 40 participants
  - Online community meetings and public comment period (May 19 and 21, 2020 – initial design concept), 130 participants
  - Online community meetings and public comment period (October 12 and 14, 2021 – revised design concept), 60 participants
- Community associations (meetings with Deering Island Homeowners Society, West Southlands Residents Association, Dunbar Residents Association, and Rotary Club of Richmond)
- Iona Beach Regional Park users (five pop-up engagement booths in the park and signage about upcoming on-site activities)
- Birders and naturalists (12 meetings and workshops with broader birder and naturalist community, and individual meetings with Vancouver Bird Advisory Committee and WildResearch – to discuss ecology and partnerships, breaches and fish migration, habitat enhancement, lagoon decommissioning, Iona Island Bird Observatory, and design concepts.
- Environmental groups: meetings / phone calls with Georgia Strait Alliance, Obabika, Fraser Riverkeeper
- Vancouver Airport Authority (10+ meetings and workshops to discuss areas of mutual interest, Ferguson Road upgrades, ecological restoration projects and aviation safety)

- Vancouver Fraser Port Authority (four meetings to discuss ecological restoration projects and early works)

Indigenous Nations and Tribal Council

- Musqueam Indian Band
- Tsleil-Waututh Nation
- Cowichan Tribes
- Halalt First Nation
- Lake Cowichan First Nation
- Lyackson First Nation
- Penelakut Tribe
- Seabird Island Band
- Shxw'ow'hamel First Nation
- Skawahlook First Nation
- Soowahlie First Nation
- Stó:lō Nation
- Stó:lō Tribal Council
- Stz'uminus First Nation

Musqueam Indian Band reserve lands are located in close proximity to the Iona Island Wastewater Treatment Plant. Their main reserve (I.R. #2) is directly across the north arm of the Fraser River. Metro Vancouver has worked closely with Musqueam throughout the project definition phase to gather their input to inform the development of the conceptual design. Fifteen meetings and workshops were held with Musqueam Indian Band on all aspects of the projects, including:

- Musqueam community meeting (June 5, 2019)
- Presentation to chief and council (May 19, 2020)
- Staff-to-staff meetings (2019 to 2022)
- Participation in Musqueam's celebration of National Indigenous Peoples Day (June 2018 and 2019)

Provincial and Federal Government

Meetings with the following also took place during the project definition phase to discuss regulatory issues and potential funding opportunities: Environment and Climate Change Canada; Infrastructure Canada; Canada Infrastructure Bank; federal members of parliament; BC Ministry of Environment and Climate Change Strategy; BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development; BC Ministry of Transportation and Infrastructure; and BC Ministry of Municipal Affairs.

Written Submissions

In addition to the activities described above, Metro Vancouver received the following written submissions regarding the IIWWTP projects:

- Emails: 240
- Letters/submissions in attached documents attached to emails: 16
- 2021 online public comment period submissions: 39
- Obabika emails to directors: ~ 1,350

Questions, comments, and issues raised in these submissions and during meetings were tracked and shared with the project team for consideration during project definition and in developing the conceptual design.

COMMUNICATIONS

The following communication tools were used to raise awareness about the IIWWTP Projects, provide project updates, and encourage participation in engagement opportunities:

- Updates posted regularly to the IIWWTP projects webpage (see Reference)
  - Approximately 11,960+ page views between June 2018 and February 2022
- 11,012 emailed newsletters and invitations to engagement opportunities provided via the project email subscription database
  - 1,270+ subscribers, as of February 2022
  - Commenced a quarterly project update newsletter in September 2021
- 8,787 newsletters and flyers to residents and businesses
  - Delivered by mail or hand delivery
- 21 newspaper advertisements placed in Burnaby Now, Richmond News, and Vancouver is Awesome
  - Promoted public engagement opportunities
- Web advertising on the webpages of The Ubyssey (UBC Student Newspaper) and Glacier Media to promote public engagement opportunities
  - Promoted public engagement opportunities
  - 32 social media posts about the project, with over 111,000 impressions Facebook, Instagram, Twitter
- Signs and flyers posted at Iona Beach Regional Park to upcoming engagement opportunities

ENGAGEMENT RESULTS

Feedback was provided to Metro Vancouver during meetings and workshops, via online public comment periods, and in separate submissions. A comprehensive summary of all feedback received during project definition appears in the Attachment.

Key issues raised during project engagement, focusing on most recent input, with Metro Vancouver staff responses

What we heard	Metro Vancouver staff response
Treatment Levels and Regulatory Requirements	
Desire for higher levels of treatment to enhance environmental protection	The conceptual design includes tertiary level wastewater treatment, exceeding regulatory requirements, and provisions to incorporate future advancements in treatment technology. The west side of the site has been reserved for the implementation of future advanced treatment for further removal of contaminants of emerging concern (CECs). Advanced treatment pilot testing will also be carried out as an extension of the pilot testing program that will be used to confirm secondary treatment performance and refine design parameters.

What we heard	Metro Vancouver staff response
Concerns with missing 2030 regulatory deadline for secondary treatment, and that secondary and tertiary treatment will not be in effect until 2035	Metro Vancouver has been in regular contact with provincial and federal regulatory agencies since challenges with meeting the regulatory deadline were identified. Metro Vancouver has also been proceeding with priority delivery tasks to mitigate further schedule impacts.
Health of the Marine Environment	
Concern for the health of the marine environment in the Salish Sea and Fraser River estuary, in particular, for chinook salmon and the southern resident killer whale	The primary benefit of the wastewater treatment plant upgrades is enhanced protection of water quality, by significantly reducing contaminant loads being discharged to the Salish Sea. The IIWWTP ecological restoration projects will help to restore Fraser River estuary processes by improving migratory pathways and habitat for salmon, including chinook salmon, the primary food of the southern resident killer whales.
Resident and Migratory Birds	
Desire to ensure protection of resident and migratory birds and bird habitat throughout construction and operation of the IIWWTP	Protection of bird habitat is one of the key objectives of the ecological restoration projects. Birder community input will continue to be sought as these projects are developed. The impact of construction activities on wildlife and habitat will be mitigated, where possible.
Concern with dewatering of the sewage lagoons and potential for altering existing island habitat for birds	The lagoons must be cleaned out to maintain the schedule and prepare the area for construction and ecological restoration activities. Biosolids will be removed from the lagoons for beneficial use at land reclamation sites. Metro Vancouver will work with birder groups during preliminary design to limit and mitigate the impacts to birds, wherever possible. We are committed to the creation of enhanced freshwater and saltwater habitat as part of the ecological restoration projects.
Concern with impact of potential increased large waterfowl on aviation safety at YVR	Metro Vancouver worked with YVR to refine the scope of the ecological restoration projects and will continue to meet during preliminary design to discuss this and other aspects of the projects.
Collaboration with Musqueam Indian Band	
Support expressed for reconciliation with Musqueam Indian Band through partnership	In addition to ensuring Musqueam involvement in the design of the WWTP, development of the ecological restoration projects and the interpretive program, Metro Vancouver and Musqueam are exploring opportunities to provide economic benefit to Musqueam through scholarships, training, employment, procurement, and commercial arrangements with Musqueam-owned and -affiliated businesses.

What we heard	Metro Vancouver staff response
Collaboration with Musqueam on cultural continuity, including recognition, is a key component of the partnership Musqueam and Metro Vancouver are planning for the projects	Metro Vancouver will continue to work with Musqueam on identifying and addressing what cultural continuity and recognition mean to Musqueam. Metro Vancouver seeks to learn from Musqueam as stewards of their cultural heritage, natural environment, and traditional territory.
Desire to protect traditional view to the southwest of Vancouver Island from Musqueam I.R.#2	This has informed project definition from the beginning and is reflected in the conceptual design.
Iona Beach Regional Park	
Musqueam interest in developing a co-management agreement for Iona Beach Regional Park, which also includes expanding Musqueam access to xʷəyeyət (Iona Island)	Metro Vancouver looks forward to meaningful Musqueam involvement related to the planning, design, construction and management of Iona Beach Regional Park, and to discussions around development of a co-management agreement for the park.
Desire to limit plant footprint encroachment into Metro Vancouver regional park land	Metro Vancouver is committed to a net gain in Metro Vancouver regional park land through any tenure changes and to minimizing impacts to sensitive ecological areas.
Construction and Operational Impacts	
Desire to minimize construction impacts (e.g. noise, light, air quality odour)	Metro Vancouver will work to mitigate impacts related to noise, light, air quality and odour, which may be experienced by nearby residents and businesses during construction, recognizing the scale and duration of construction.
Desire for improved odour control at the new plant	The odour control system proposed for the IIWWTP projects (covered odourous processes, carbon filtration and dispersion) will significantly reduce odour experienced by Musqueam community members, regional park users, and nearby residents and businesses.
Concern about impacts of barge berth location on Deering Island residents, including industrial noise and visual impacts over a 15-year duration, and related impacts to quality of life	The barge berth location was identified after considering various alternatives. The current location is preferred from permitting, schedule, and cost perspectives given relative location to new plant construction. Staff anticipate that barge berth operations – one barge per day at peak construction – will be limited to 12 hours a day. Metro Vancouver will continue to meet with Deering Island residents on design, possible mitigation measures, and schedule. Barge Berth construction is currently scheduled to start fall 2024.

What we heard	Metro Vancouver staff response
Desire for the Iona Island Causeway and Ferguson Road to be widened and a bike lane created for safety Desire for bike parking at Iona Beach Regional Park	The Iona Island causeway and Ferguson Road improvements will be undertaken with YVR and will address both the need to accommodate heavy construction traffic and the need to create safe bike and pedestrian pathways. Many of the ecological restoration projects and the interpretive program will enhance Iona Beach Regional Park visitor experience.
Resource Recovery Opportunities	
Interest in resource recovery outputs	A number of entities have expressed interest in receiving excess residual heat, reclaimed water, or biogas created by the new plant. Metro Vancouver will work hard to realize these opportunities where good business cases and community benefits are identified.
Costs, Delivery Strategy and Governance	
Concern with project costs and impacts to household rates	Due to the age and condition of the existing plant, the IIWWTP projects involve the concurrent upgrade and replacement of preliminary treatment facilities (34% of total costs) and the addition of secondary (49%) and tertiary (3%) treatment infrastructure. Best practice cost estimating and risk management for projects of this magnitude are being followed. A full cost and risk analysis with independent validation was conducted which, together with an expert Challenge Review Team, resulted in a revised design concept that addresses key challenges and provides potential for material cost savings. Future phases of design will include further value-engineering to identify opportunities to reduce the costs of the program. Funding options for the IIWWTP projects, including contributions from senior levels of government, are also being pursued to mitigate impacts to local ratepayers. Next steps will involve developing a funding and financing strategy as well as working collaboratively with member jurisdictions to confirm cost allocations and expected rate impacts.
Interest in, and potential concern with, the delivery strategy for a project of this scale and complexity	A flexible delivery strategy has been recommended to address the challenges and complexity of the projects. It will be further refined during: • the design work and pilot testing • early and enabling works to prepare the site

What we heard	Metro Vancouver staff response
	The delivery strategy is intentionally flexible to allow ongoing refinement as the design is further advanced and a project funding strategy is developed.
Interest in exploring modified governance models for the IIWWTP projects	Staff will continue to explore governance practices successfully applied in British Columbia and on national major infrastructure projects with input from members of the expert advisory panel and through ongoing discussions with member jurisdictions, and will provide regular updates to the Board on recommended governance modifications for the IIWWTP projects and other major projects.

NEXT STEPS

An engagement and communications plan will be developed to support the preliminary design phase of the projects. The public, key stakeholders, and First Nations will be afforded many opportunities to inform the detailed design and construction of the Iona Island Wastewater Treatment Plant Projects. These will include many formats, from regular meetings with Vancouver Sewerage Area member jurisdiction staff, to quarterly newsletter updates, to involvement on the technical advisory panel for the ecological restoration projects.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

Engagement activities were included in the 2018 to 2021 GVS&DD budgets. Additional resources were provided through the Board-approved Iona Island Wastewater Treatment Plant project definition budget. Future engagement activities for subsequent phases are part of the capital cost estimates for the Iona Island Wastewater Treatment Plant Projects.

CONCLUSION

Metro Vancouver began engagement activities for the project definition phase of the Iona Island Wastewater Treatment Plant (IIWWTP) Projects in June 2018. Engagement was done during project introduction, the development of an initial design concept, and the development of a revised design concept in response to identified challenges. Staff engaged with the GVS&DD Board, standing committees, staff advisory committees, Vancouver Sewerage Area member jurisdiction staff, the public, key stakeholders, and First Nations. Key themes that emerged during engagement were treatment level, regulatory deadline, health of the Salish Sea and Fraser River, chinook salmon, southern resident killer whales, resident and migratory birds, collaboration with Musqueam Indian Band, delivery strategy, cost, funding, and governance. Many issues raised during engagement were addressed in the development of the conceptual design, with others to be addressed or refined during preliminary design. An engagement strategy will be developed to support the next phase of WWTP preliminary design, early works, and the ecological restoration projects.

Attachment

Iona Island Wastewater Treatment Plant Projects – Project Definition Engagement Summary (June 2018 – February 2022)

Reference

Iona Island Wastewater Treatment Plant Projects webpage

49046381

Iona Island Wastewater Treatment Plant Projects

Project Definition Engagement Summary

June 2018 to February 2022

March 2022

51153949

Iona Island Wastewater Treatment Plant Projects

Project Definition Phase Engagement *June 2018 to February 2022*

MARCH 2022

Protecting human health and the marine environment in a growing region

Engagement and Outreach

Engagement for the Iona Island Wastewater Treatment Plant projects began in 2018 and included member jurisdictions, the public, key stakeholders, and First Nations. A summary of audiences and engagement activities is provided below.

Who we talked to

- **14** First Nations
- **81** Environmental groups
- **65** Community groups
- **61** Businesses & institutions near Iona Island
- **78** Sewer area permit holders
- **1,270+** Subscribers to the project email list

What we did

- **21** newspaper ads
- **34** meetings with stakeholders
- **40** meetings with member jurisdictions
- **14** community meetings and events
- **226** community meeting participants
- **1** online public comment period with **39** participants
- **11,960+** webpage visits
- **15** meetings with Musqueam Indian Band
- **85** letters to First Nations
- **111,013** social media impressions
- **19,799** emails and newsletters sent to participants

Feedback Highlights

Thank you to everyone who participated in Project Definition Phase engagement between June 2018 and February 2022. The purpose of this engagement phase was to receive feedback to inform the conceptual design of the Iona Island Wastewater Treatment Plant upgrade and associated ecological projects.

Below is a high-level summary of feedback received from stakeholders, the public, and First Nations:

What We Heard

Desire for higher levels of treatment to improve water quality in the Salish Sea

Concern with delay and missing regulatory deadline

Desire to protect and enhance Iona Island's ecosystems and habitat for birds and fish

Desire for protection of Musqueam views, and enhancement of cultural recognition and environmental stewardship

Desire for ongoing engagement, communication, and transparency as the projects progress

Concern about impacts of construction and plant operations on local communities, birds, and the environment

Desire to maintain and enhance natural beauty and visitor experience at Iona Beach Regional Park

Interest in the development of resource recovery opportunities

Interest in and concern with ratepayer impacts

Concerns about impact of barge berth location on Deering Island residents

Many issues raised during engagement were addressed in the development of the conceptual design, with others to be addressed during preliminary design. Stay tuned for upcoming engagement opportunities related to the design phase, ongoing priority delivery activities, and related permitting requirements.

Contact Us

Information Centre: **604-432-6200**
(Monday to Friday from 8:00 am to 4:30 pm)

After Hours Emergency: **604-451-6610**

ionawwtp@metrovancouver.org

metrovancouver.org and search 'Iona Island Wastewater Treatment Plant Projects'

metrovancouver
Together we make our region strong

Metro Vancouver is a federation of 21 municipalities, one electoral area and one treaty First Nation that collaboratively plans for and delivers regional-scale services. Its core services are drinking water, wastewater treatment and solid waste management. Metro Vancouver also regulates air quality, plans for urban growth, manages a regional parks system and provides affordable housing. The regional district is governed by a Board of Directors of elected officials from each local authority.

Table of Contents

1. Purpose

This report provides a summary of engagement activities and findings for the project definition phase of the Iona Island Wastewater Treatment Plant (IIWWTP) projects, from June 2018 to February 2022. The purpose of this engagement phase was to introduce the projects and receive feedback to inform the conceptual design of the treatment plant upgrades and associated ecological projects.

2. Project Description

The IIWWTP, located in Richmond, BC is being upgraded. The conceptual design includes tertiary treatment, a suite of ecological restoration projects, and opportunities for resource recovery. See map below.

Metro Vancouver wants to ensure the wastewater treatment plant makes a positive contribution to the health and well-being of people and the environment. The upgraded plant and related ecological projects will be designed to:

- Improve the level of treatment from primary to tertiary to protect water quality and the marine environment
- Withstand an earthquake and sea level rise
- Integrate with Iona Beach Regional Park and the surrounding environment
- Restore fish habitat, protect bird habitat and enhance terrestrial ecosystems
- Minimize odour
- Recover sustainable energy and resources from wastewater

Figure 1: Map showing location of the IIWWTP

3. Engagement Program Overview

The engagement program for the project definition phase spanned the period from June 2018 to February 2022, and included three stages:

1. June 2018 to October 2019 – Project Introduction
2. November 2019 to April 2021 – Initial Design Concept
3. May 2021 to February 2022 – Revised Design Concept

During the project introduction and initial design concept stages, Metro Vancouver undertook a variety of activities to provide information and receive input on the projects. Member jurisdictions, interested stakeholders, members of the public, and First Nations were provided with opportunities to give input on the three project objectives: upgrading the plant to a higher level of treatment, integrating the new plant with Iona Beach Regional Park and the surrounding environment, and exploring resource recovery opportunities. As project definition progressed, they were also provided with the opportunity to review and comment on the proposed initial design concept between spring and fall 2020.

Then, to inform the development of a revised design concept to address identified challenges with the initial design concept that was endorsed by the GVS&DD Board in July 2020, further engagement activities were conducted in summer and fall 2021. Staff provided updates and sought feedback on aspects of the projects that could result in revisions to the design concept that was presented during previous project engagement. This feedback was reported to the GVS&DD Board in November 2021, when the revised design concept was endorsed by the Board.

Feedback throughout the engagement program was tracked and shared with the project team for consideration in developing the conceptual design.

4. Engagement Audiences

There are numerous audiences with a range of interests in the IIWWTP projects. The following sections provide a summary of the audiences Metro Vancouver engaged with and received feedback from during the project definition phase, the associated engagement activities, and feedback received.

Project information and invitations to engagement opportunities were provided to a wide range of audiences, including environmental non-governmental organizations, community groups, businesses and institutions located near Iona Island, sewer area permit holders, adjacent residential communities in Richmond and Vancouver, Iona Beach Regional Park users, and others, through mailed newsletters and flyers, email newsletters, newspaper and web ads, social media, and direct outreach. A summary of the activities used to support the engagement program are provided in Section 10 – Communications and Promotions.

Feedback was collected through meeting notes, meeting transcripts, online questionnaires, correspondence, and comments collected at events, information booths, and over social media.

5. Board and Committee Reports and Presentations

Greater Vancouver Sewer & Drainage District (GVS&DD) Board, Liquid Waste Committee, Finance and Intergovernment Committee, Regional Parks

Reports and Presentations:

2018 to 2019 – Project Introduction

June 22, 2018 — GVS&DD Board Meeting
- Project Definition Update Report

2019 to 2021 – Initial Design Concept

October 17, 2019 — Liquid Waste Committee Meeting
- Community Engagement Process Report
- Project Definition Update Report

February 7, 2020 — Liquid Waste Committee Meeting
- Project Definition Update Presentation

February 22, 2020 — Council of Councils Meeting
- Project Update Presentation

July 31, 2020 — GVS&DD Board Meeting
- Initial Design Concept Report

2021 to 2022 – Revised Design Concept

July 14, 2021 — Finance and Intergovernment Committee Meeting
- Project Definition Update Report

July 15, 2021 — Liquid Waste Committee Meeting
- Project Definition Update Report

July 30, 2021 — GVS&DD Board Meeting
- Project Definition Update Report (Finance and Intergovernment Committee)
- Project Definition Update Report (Liquid Waste Committee)

November 4, 2021 — Liquid Waste Committee Meeting
- Revised Design Concept Report
- Revised Design Concept Engagement Summary

November 10, 2021 — Parks Committee Meeting
- Revised Design Concept Presentation

November 10, 2021 — Finance and Intergovernment Committee Meeting
- Revised Design Concept Report
- Revised Design Concept Engagement Summary

November 26, 2021 — GVS&DD Board Meeting
- Revised Design Concept Report

	• Revised Design Concept Engagement Summary
February 3, 2022	Special Meeting of the GVS&DD Board – IIWWTP Projects • Agenda Package • Presentation

6. Vancouver Sewerage Area Member Jurisdiction and Advisory Committee Engagement

City of Richmond, City of Vancouver, City of Burnaby, University Endowment Lands, University of British Columbia

Engagement Activities:

2018 to 2019 – Project Introduction	
November 23, 2018	Letter to Vancouver Sewerage Area (VSA) members to introduce the project definition phase of the project and invite recipients to regular meetings to communicate the project status and obtain feedback
December 12, 2018	Update presentation at VSA meeting
January 31, 2019	Update presentation at VSA meeting
March 21, 2019	Update presentation at VSA meeting
April 25, 2019	Update presentation at VSA meeting
May 15, 2019	Presentation to Vancouver City Council to provide an update on the Project Definition Phase
May 30, 2019	Update presentation at VSA meeting
August 1, 2019	Update presentation at VSA meeting
September 27, 2019	Update presentation at VSA meeting
2019 to 2021 – Initial Design Concept	
November 20, 2019	Presentation to Richmond City Council Public Works & Transportation Committee to provide an update on the project definition phase
December 2, 2019	Presentation to Burnaby City Council to provide an update on the project definition phase
December 2, 2019	Memo provided to City of Vancouver Council.
February 27, 2020	Update presentation at VSA meeting
April 17, 2020	Submission of comments received City of Richmond Engineering Department

June 2, 2020	Update presentation at VSA meeting
July 3, 2020	Update letter providing an overview of the preferred design concept sent to City of Burnaby Engineering Department
July 3, 2020	Update letter providing an overview of the preferred design concept and responses to submitted comments sent to City of Richmond Engineering Department
July 9, 2020	Update letter with attachment providing an overview of the preferred design concept sent to City of Vancouver Engineering Department
October 7, 2020	Update presentation at VSA meeting
November 26, 2020	Meeting with City of Richmond Engineering and Development staff to discuss resource recovery opportunities and ecological restoration projects.
January 13, 2021	Meeting with City of Richmond's Environmental Group to discuss potential IIWWTP ecological project partnership opportunities.
February 4, 2021	Update presentations to REAC

2021 to 2022 – Revised Design Concept

May 3, 2021	Update presentation at VSA meeting
June 15, 2021	Meeting with City of Vancouver Staff
July 6, 2021	Update presentation at VSA meeting
July 9, 2021	Update presentations to REAC
July 22, 2021	Update presentations to RAAC/RFAC
September 14, 2021	Update presentation at VSA meeting
September 16, 2021	Update presentations to RAAC/REAC
October 7, 2021	Presentation to City of Vancouver Corporate Leadership Team
October 12, 2021	Update presentation at VSA meeting
October 18, 2021	Update presentations to RAAC/REAC/RFAC
Week of Jan. 4, 2022	Project updates to VSA member jurisdiction staff via phone
January 7, 2022	Update presentation to REAC
January 20, 2022	Major Project engagement session for REAC
February 4, 2022	Update presentation to REAC
February 14, 2022	Update presentation at VSA meeting

Participation in other engagement activities	
2019 to 2020	VSA member jurisdiction staff also participated in five of the Integrated Design Process workshops held 2019 and 2020.

Key feedback received – VSA member jurisdictions:

- Concerns expressed regarding potential impacts to household rates.
- Interest in technical reports supporting conceptual design.
- Interest in climate and seismic considerations supporting conceptual design.
- Interest in earlier consideration of alternative sites for WWTP upgrades.
- Interest in project funding and financing strategy.
- Interest in project governance.

Key feedback received – City of Richmond:

Wastewater treatment and effluent discharge

- Support for a tertiary level of treatment for the new wastewater treatment plant.
- Suggestion that effluent standards be reviewed to further reduce any environmental impacts.

Ecological restoration and wildlife habitat enhancement

- Importance of Sturgeon Bank due to ecological function and flood attenuation properties, specifically along the west dyke.
- Recommendation that Metro Vancouver seek opportunities to contribute to the provincial and federal efforts to revitalize Sturgeon Bank through the Steveston and Iona restoration projects that are currently under way.
- Recommendation that Metro Vancouver include discussions supporting fish and wildlife habitat enhancement in their stakeholder engagement events and further consider all wildlife receptors specific to the provincially protected Sturgeon Banks Wildlife Management Area and McDonald Slough.
- Interest expressed in collaborating on the opening up of McDonald Slough, the causeway bridge replacement, and restoration and connectivity around the Sturgeon Bank. Staff noted increased public interest in improving and restoring connectivity in the lower Fraser River.
- Interest expressed in sharing lessons learned about snow geese management.
- Desire to continue conversation around using causeway materials as fill for dike restoration.
- Question as to whether Metro Vancouver has a path of compliance to navigate regulatory challenges associated with each of the ecological projects. Interest in potential to collaborate on how to approach some of the same permits required for ecological projects.
- Recommendation to look for lessons learned in other local ecology projects; projects managed by the City of Richmond that could offer lessons learned include a flow through the intertidal area in Terra Nova Park to attract spawning salmon (still conceptual) and dike restoration.
- Interest expressed in dike restoration using softer shore concepts, where such offsets are appropriate for the location.

Plant operations

- Recommendation that potential odour issues related to increased operation and expansion of the IIWWTP be investigated.

Iona Beach Regional Park access and amenities

- Recommendation that public access to Iona Beach Regional Park be maintained and enhanced, and pedestrian trails implemented to make the beaches to the south and west of the IIIWWTP more accessible.
- Recommendation that Metro Vancouver implement educational programming and interpretation amenities to promote ecological values of the marsh and foreshore areas.
- Support for the proposed educational and enjoyment opportunities for the public.

Road improvements and safety

- Recommendation that Metro Vancouver work with the City of Richmond and Vancouver Airport Authority (YVR) to provide protected cycling facilities along Ferguson Road and Iona Island Causeway to improve safety of the road for cyclists.
- Recommendation that the impacts of additional loading on the road be evaluated to ensure that stability for both sides of the road is not compromised.

Planning for the future

- Recommendation that Metro Vancouver consider climate change-induced sea level rise and flood risk management in the planning and implementation of this project and explore options to raise the land elevation and/or implement flood protection infrastructure to ensure operational capability of the treatment plant over its service life.
- Recommendation that Metro Vancouver anticipate future development associated with the project will follow the City of Richmond's Environmentally Sensitive Area Development Permit Process to secure appropriate compensation.

Resource recovery

- Recommendation that discussions regarding the facility's waste recovery initiative, which will produce resources of value to the City, such as water for irrigation, be included as a part of the project's stakeholder engagement events.
- Recommendation that Metro Vancouver explore opportunities to maximize energy and biological recovery from the wastewater treatment process.

7. Stakeholder and Public Engagement

Vancouver Airport Authority (YVR)

Engagement Activities:

2019 to 2021 – Initial Design Concept	
March 13, 2020	Initial meeting between YVR and the IIWWTP Project Team to hear comments and discuss key areas of interest
May 13, 2020	Online meeting with YVR on resource recovery opportunities associated with the IIWWTP projects

June 9, 2020	Design, Wildlife and Aviation Safety Meeting with YVR to discuss potential impacts on aviation safety of proposed habitat enhancements at Iona Island
June 19, 2020	Letter received with submission of comments from YVR on proposed habitat enhancement plan
September 1, 2020	Online meeting with YVR to discuss Ferguson Road cyclist safety
October 28, 2020	Online workshop with YVR on the IIWWTP projects
November 12, 2020	Online meeting with YVR to discuss project design and wildlife considerations
December 11, 2020	Online meeting with YVR to discuss potential synergies between YVR and Metro Vancouver in relation to BC Hydro substation
December 15, 2020	Online meeting with YVR to discuss habitat and wildlife considerations
February 5, 2021	Letter received from YVR with submission of comments regarding concerns with proposed expansion of marsh habitat in some areas due to potential impacts on aviation safety
March 4, 2021	Online meeting with YVR to review areas of concern in relation to bird migration
2021 to 2022 – Revised Design Concept	
September 22, 2021	Online engagement meeting with representatives from YVR
Participation in other engagement activities	
Various	YVR representatives participated in stakeholder workshops and meetings focused on birds and ecology (see "Birders and Naturalists" below).

Key feedback received:

Potential impacts of habitat enhancement on aviation safety

- Appreciation for Metro Vancouver's acknowledgement of YVR's concerns surrounding bird habitat and aviation safety. Desire to continue working together to ensure that YVR's concerns are addressed because increased bird abundance (specifically snow geese) pose one of the highest risks to aviation safety.
- Concerns expressed with the proposed creation of new marsh habitat south of the existing Iona Island shoreline or jetty. The proposed expansion of marsh habitat in Iona Bay (projects 08 and 19a) increases the likelihood of snow geese and other waterfowl activity in this area, and therefore increases the risk to aviation operations at YVR.

- Strong desire to minimize site features known to attract geese, such as large grassy areas, flat green roofs located away from predators, and open water areas.
- Support expressed for restoration plans that focus on fish, reduce attractiveness for waterfowl, and promote habitats for smaller birds like passerines and raptors.
- Request for Metro Vancouver to quantify and classify the area of proposed habitat features at IIWWTP; document the net area change by habitat type, document the risks or hazards associated with each feature, outline planned mitigation measures to addressed any increased risk to aviation safety, and identify whether there is a monitoring scheme to measure results.
- Comment that Metro Vancouver will need to conduct a study to consider the potential impacts of sediment mobilization and redistribution that would occur as a result of the McDonald Slough Causeway opening.

Development plans and Sea Island infrastructure

- Desire for Metro Vancouver to work with the City of Richmond and YVR to improve road conditions prior to construction to accommodate trucks and cyclists, and improve safety.
- Strong desire to have ongoing engagement with Metro Vancouver regarding anticipated transportation and traffic impacts of the IIWWTP Project on Ferguson Road, as safety on the existing road is an issue.
- Desire to know the location and sizing of utilities and any provisions for current and future utilities for the new Ferguson Road design.
- Interest in understanding Metro Vancouver's project schedule and priority delivery activities to assist with YVR's planning and delivery of its own planned projects in the coming years, including work already underway related to the utilities underneath Ferguson Road, traffic, and staging impacts.
- Interest in partnership opportunities between YVR and Metro Vancouver to establish a new Sea Island substation via BC Hydro and address shared needs for electrical upgrades.
- Desire for Metro Vancouver to consider using a barge for materials handling.
- Interest in what work Metro Vancouver has done to learn how the causeway breach could impact flows in the middle arm and through the blind channel. Desire to understand how the causeway breach could impact flows of water further upstream.

Cooperation and engagement

- Request for continued collaboration and discussions on ecological restoration projects, noting that Metro Vancouver has a responsibility to create a safe and low-hazard environment for aviation safety.
- Interest in participating in the Technical Advisory Panel for the ecological restoration projects.
- Interest in potential opportunities for Musqueam Indian Band, Metro Vancouver and YVR to work together and share information as the project moves forward.

Climate change

- Strong desire for any climate adaptation design to have a strong plan in place to ensure public safety.
- Interest in whether storm surges are being considered in Metro Vancouver's foreshore modelling.

Resource recovery

- Interest in resource recovery opportunities, including reclaimed water, biogas/renewable natural gas, and biocrude. Identified need to build business cases for some resource recovery opportunities such as district energy.
- Interest in reclaimed water opportunities; however, delivery volumes and methods of transportation (e.g. piping, trucking) to and from Sea Island are important considerations, as transportation methods and increased activities raise concerns with the existing Ferguson Road (e.g., traffic issues, road capacity).
- Request for more information about the scope of the effluent heat recovery feasibility study.

Engagement

- Appreciation expressed for continuing engagement on the IIWWTP projects and the opportunity to continue working together.

Vancouver Fraser Port Authority (VFPA)

Engagement Activities:

2019 to 2021 – Initial Design Concept	
July 9, 2020	Virtual meeting with Vancouver Fraser Port Authority to provide project updates and discuss IIWWTP ecological restoration projects
December 11, 2020	Virtual meeting with Vancouver Fraser Port Authority to discuss IIWWTP ecological restoration projects.
December 16, 2020	Virtual meeting with Vancouver Fraser Port Authority to discuss early IIWWTP project works
2021 to 2022 – Revised Design Concept	
October 4, 2021	Online engagement meeting with representatives from VFPA

Key feedback received:

Ecological projects

- Interest in being involved in the Technical Advisory Panel for the ecological restoration projects.

Plant location

- Interest in understanding if Iona Island was the only site considered for this development, given the identified complexities and estimated costs.

Impacts to ratepayers

- Interest in understanding when households across the region can expect to see impacts to rates.

Engagement

- Question as to whether Metro Vancouver presented all four proposed treatment technology options at public engagement opportunities during fall 2021 revised design concept engagement.

Residential Communities on the North Shore of the Fraser River

Deering Island Homeowners Society and West Southlands Residents Association

Engagement Activities:

2019 to 2021 – Initial Design Concept	
September 29, 2020	Virtual engagement meeting with Deering Island Homeowners' Society
2021 to 2022 – Revised Design Concept	
September 24, 2021	Virtual engagement meeting with Deering Island Homeowners Society representative
October 14, 2021	Email received from West Southlands Residents Association with questions regarding the project and proposed barge berth for materials transport
February 24, 2022	Virtual engagement meeting with Deering Island Homeowners Society and West Southlands Residents Association

Key feedback received:

Plant construction and plant operation

- Strong desire for tertiary treatment.
- Concern expressed regarding the impacts of noise and light pollution to Deering Island residents.
- Desire for the new plant to be built as far west as possible.
- Interest in construction mitigation measures including the potential for restrictions on construction hours.
- Question as to the impacts on the Deering Island residents' southwest view given raising of lands for climate change impacts and flood protection, together with the new treatment plant structures.
- Request to keep in mind that many of the houses on Deering Island are three stories tall when considering the trees for future screening of the treatment plant.
- Comment that Deering Island Homeowners Society supports this important environmental project overall.

Iona Island barge berth for materials transport

- Concerns regarding proposed location of the barge berth due to amount of industrial noise and visual impacts over a 15-year duration.
- Interest in consideration of other sites for the barge berth.
- Desire for Metro Vancouver to move the barge berth further west.
- Comment that the Fraser River area near Deering Island is typically noisy due to airplane and marine traffic, and becomes noisier at nighttime due to the frequency of barges. Concern expressed that a barge berth will bring more industrial noise to the area.

Project cost and schedule

- Interest in understanding how affordability concerns for ratepayers will be addressed.
- Concern with length of project schedule and concern and potential cost escalation due to the 18-year project timeline.

Project design and resource recovery

- Comment that the City of Vancouver has been conducting studies about flooding. Question as to whether the treatment plant has taken flooding into consideration.
- Question as to whether any studies related to the ecological restoration projects include consideration of the impact on the north shore of the Fraser.
- Question as to whether the current outfall can accommodate the new treatment plant's effluent discharge. Question as to whether the outfall is being updated.
- Question as to how Metro Vancouver will transport the reclaimed water or renewable natural gas to users in the areas. Question as to whether Metro Vancouver intends to use pipes for delivery, and whether studies have been done regarding installing pipes in the river.

Environmental Non-Governmental Organizations

Georgia Strait Alliance (GSA), Obabika, Fraser Riverkeeper

Engagement Activities:

2019 to 2021 – Initial Design Concept	
May 22, 2019	Meeting with Georgia Strait Alliance to present and discuss project background and community engagement to date
September to November 2019	1,344 emails received by Liquid Waste Committee members from members of the public requesting that the IIWWTP be upgraded to tertiary treatment as soon as possible
March 24, 2020	Meeting with Georgia Strait Alliance to provide project update, including design concepts and anticipated project timeline
June 4, 2020	Letter received with submission of comments from Georgia Strait Alliance
July 16, 2020	Georgia Strait Alliance/Obabika delegation presentations to Liquid Waste Committee
July 31, 2020	Georgia Strait Alliance/Obabika delegation presentation to GVS&DD Board
October 15, 2020	Letter received with submission of comments from Obabika regarding the initial design concept
October 15, 2020	Letter received with submission of comments from Fraser Riverkeeper regarding the initial design concept

2021 to 2022 – Revised Design Concept

September 29, 2021	Online engagement meeting with representatives from Georgia Strait Alliance and Obabika
October 22, 2021	Letter received with submission of comments from Fraser Riverkeeper
November 26, 2021	Delegation presentation by Obabika to GVS&DD Board

Key feedback received:

Treatment level

- Request that tertiary treatment be implemented at IIWWTP as soon as possible. Tertiary treatment is the best option for Metro Vancouver communities because it will prevent the largest quantity of harmful toxins from entering the Salish Sea. Request that all levels of government take action to fund the incorporation of tertiary treatment into the IIWWTP upgrade and expedite the timeline of the upgrade for completion as soon as possible.
- Desire for tertiary treatment to prevent harmful toxins like nitrogen, ammonia, metals, and microplastics from polluting the Salish Sea.
- Desire for IIWWTP to incorporate, at a minimum, tertiary treatment methods that specifically target the following contaminants of concern: persistent, bioaccumulative toxins including (but not limited to) PCBs, DDT, PFOS, PFOA, copper, phthalates, bisphenols, and current use pesticides, from household and industrial sources. Concerns raised about these contaminants, noting that a significant body of scientific knowledge shows that these contaminants are of major concern to chinook salmon and endangered southern resident killer whales.
- Desire for highest level tertiary treatment system, complete with the most protective technologies to be implemented as soon as possible. To include full nutrient removal (BNR) and accelerated resource recovery, to best protect our communities, water quality, and fish habitat.
- Desire for Membrane Biological Reactor, the standard tertiary system technology utilized around the globe, to be incorporated into the design because it represents the most protective option, using technology that filters out as many toxins as possible, ensuring that the receiving environment is not endangered.
- Concern that if highest level tertiary treatment standard is not met, this project will directly oppose Vancouver's Greenest City Initiative, the federal Coastal Foundation Fund and continue the flow of harmful contaminants into local and global waters.
- Question as to whether design concept includes significant nitrification and/or Biological Nutrient Removal (BNR). Comment that there are important co-benefits to consider such as reductions of contaminants of emerging concern (CECs).
- Comment that the plant upgrade is a once-in-a-lifetime opportunity to invest in the health of the Salish Sea and adjacent communities.
- Question as to whether the proposed treatment options remove toxins such as pharmaceuticals.

- Comment that the technologies could change over time, based on what is needed to address the CECs. For example, antidepressants are a big concern in Europe. Question as to whether specific technologies target toxins of that nature.
- Aerobic Granular Sludge may not require primary treatment as a separate stage. Question as to whether, if Aerobic Granular Sludge does seem reasonable for our region, would that mean that the primary treatment upgrade would not have to happen.
- Comment that Georgia Strait Alliance and Obabika are strongly in favour of national regulations and source control programs to reduce marine contamination in marine and freshwater environments.
- Interest in learning more about the technology options and associated evaluation methodology in relation to the technology options considered in the development of both the Initial Design Concept (July 2020) and the Revised Design Concept (November 2021).
- Comment that while this issue is directly impacting Vancouver, cities across the country look to Vancouver as a leader in environmental action. Its decisions will influence other municipalities facing these or similar choices. Metro Vancouver has the opportunity to be a leader in sewage treatment, and inspire municipalities with smaller populations, budgets, and publicity to take progressive steps to ensure the cleanest water possible.

Project schedule

- Desire for tertiary treatment to be implemented as soon as possible.
- Comment that while it is encouraging that Metro Vancouver is committing to what it states is tertiary treatment, the delay in adhering to the federal deadline by four years is disappointing. Comment that the 2034 to 2035 date is deeply concerning to Georgia Strait Alliance and caught them by surprise because no indication of this risk was communicated prior to the July 2021 project definition update Board report.
- Desire for further delays to be avoided as discharges of deleterious substances into fish-bearing habitat further damage the health of the Salish Sea with each passing day, and primary treated sewage released into the Georgia Strait impacts water quality in vital salmon and orca habitat.
- Question as to whether tertiary treatment will be operational at the same time as secondary treatment.
- Questions as to whether Metro Vancouver has received approval from the federal government to go past the 2030 regulatory deadline. Question as to whether the IIWWTP project could have been started earlier.
- Desire expressed to understand what occurred following the approval of the Liquid Waste Management Plan in 2011 and Metro Vancouver's commitment to focus efforts on the Lions Gate and Iona Island Wastewater Treatment Plants
- Question as to whether the digesters will be built in 2041, as was indicated in the IIWWTP July 2021 Board report.
- Georgia Strait Alliance recognizes that construction projects always take longer than planned, but sees opportunities to explore time savings. Question as to whether Metro Vancouver thinks there may be opportunities to accelerate schedule.
- Question as to whether there are any further impediments to the process (e.g. money, labour sourcing, financing) or if the timeline is reflective of the realities of constructing a large project.

Ecology and wildlife

- Strong interest in marine ecosystem and habitat protection in the Salish Sea and Fraser River, with contaminants and pollution being of significant concern.
- Comment that the Salish Sea and Fraser River are sensitive, ecologically vital areas that are under ongoing stress in great part due to decades of receiving highly contaminated effluent from IIWWTP discharges.
- Desire to ensure that the adjacent habitat built with the plant will benefit the wildlife whose habitat is impacted by delays in providing tertiary treatment.
- Comment that an expert technical working group has identified five areas of concern pertaining to orcas: contaminants, sanctuary, large vessels and acoustics, small vessels and noise, and prey availability. In regard to contaminants, working with the USA is important to create policy to protect the environment. The Salish Sea Ecosystem Conference presents opportunities to have conversations with experts in this field.
- Interest in understanding how Indigenous knowledge has been integrated into the ecological restoration projects planning to date.

Wet weather events

- Question as to how treatment plant technologies will be used at a changing scale during a high rainfall event and if there are certain efficiencies associated with different technologies during a higher rainfall.

Project cost and impacts to ratepayers

- Concern with the significant costs ratepayers and communities will face as a result of the proposed upgrades.
- Comment that while it is understandable that unforeseen circumstances arise in the most challenging of projects, the new estimate of $10 billion is a monumental increase over earlier cost estimates. Moving forward, Metro Vancouver must work to ensure transparency regarding the challenges that lead to any future cost overruns as soon as they encounter them.
- Interest in Metro Vancouver seeking federal funding to support the project, which may be available in the interest of southern resident killer whale protection.
- Comment that federal and provincial governments have made large contributions to recent treatment plant upgrades featuring advanced treatment levels.
- Question as to what dollar amount is associated with tertiary upgrades as opposed to secondary upgrades.
- Request for further elaboration on the combined sewer premium cost. Question as to whether this extends the timing of plant construction.
- Questioned how the 4% of total estimated project costs associated with resource recovery will be allocated.
- Offer extended by Georgia Strait Alliance to help Metro Vancouver in any way they can with discussions with federal and provincial government agencies regarding funding for the IIWWTP projects

Resource recovery

- Comment that nitrogen and phosphorus recovery should be considered in fertilized pellets separately, consistent with global technology of the past 15 years.
- Comment that proposed resource recovery options need further development, including nitrogen and phosphorous recovery, and higher gas yields using a two-phase anaerobic digestion approach, or microwave system. This also leaves room for better sludge destruction. This design could also create an energy-neutral plant in comparison to what is proposed.
- Concern expressed regarding continued land application of biosolids.
- Concern with proposed biocrude resource recovery concept. Comment that while it may work in principle, others have found it to have high operations and maintenance costs, especially compared to alternative energy sources employed elsewhere.

Birders and Naturalists

Given the ecological significance of Iona Island and the Fraser River estuary, Metro Vancouver is engaging with interested birders and naturalists including:

- Birds Canada
- City of Vancouver
- Delta Naturalists
- Ducks Unlimited
- Environment and Climate Change Canada
- Fraser Estuary Important Bird and Biodiversity Area Caretakers
- Hancock Wildlife Foundation
- Nature Canada
- Nature Trust of BC
- Nature Vancouver
- Stewardship Centre for BC
- WildResearch
- Wild Trust of BC
- Vancouver Airport Authority Staff - Environment and Aviation Safety
- Vancouver Whale Watch

Engagement Activities:

2018 to 2019 – Project Introduction	
April 4, 2019	Stakeholder Workshop (Birds & Lagoons)
June 10, 2019	Meeting with Vancouver Bird Advisory Committee – presentation on project background and community engagement to date
June 11, 2019	Stakeholder Workshop (Ecology & Partnerships)
June 12, 2019	Letter received from Birds Canada providing comments regarding Iona Island lagoon dewatering and bird habitat
2019 to 2021 – Initial Design Concept	
January 29, 2020	Stakeholder Workshop (Breaches & Fish Migration)
May 13, 2020	Online Stakeholder Workshop (Birds, Lagoons & Community Integration)

June 3, 2020	Online meeting with WildResearch to provide comments and discuss key areas of interest
July 16, 2020	WildResearch delegation presentation to the Liquid Waste Committee regarding the Iona Island Bird Observatory
August 25, 2020	Online meeting with WildResearch – project update presentation followed by discussion
September 10, 2020	Online Stakeholder Meeting (Birders & Naturalists)
October 5, 2020	Online meeting with Vancouver Bird Advisory Committee – project update presentation and discussion period
October 9, 2020	Letter received with comments from Dr. Rob Butler, Vancouver Bird Advisory Committee and Pacific Wildlife Foundation, regarding a proposal for a bird sanctuary at Iona Island
October 14, 2020	Letter received with submission of comments from WildResearch
October 15, 2020	Letter received with submission of comments from Birds Canada
April 19, 2021	Notification received that the Birding Section Committee of Nature Vancouver endorsing bird sanctuary proposal for Iona Island
2021 to 2022 – Revised Design Concept	
October 18, 2021	Online Stakeholder Meeting (Birders & Naturalists)
October 22, 2021	Letter received in follow up to October 18, 2021 Birders and Naturalists Meeting with submission of comments from 13 representatives of local bird conservation and research groups
December 17, 2021	Online Stakeholder Meeting (Birders & Naturalists) to discuss ecological studies and monitoring

Key feedback received:

Birds, wildlife, ecology, and habitat on Iona Island

- Desire for design to enhance habitat for waterfowl, shorebirds and other bird species, fish, and wildlife.
- Strong desire for Metro Vancouver to consider and protect Iona Island's strategic importance as an Important Bird Area along the Pacific Flyway for migratory birds and wildlife. Comment that the island is an important natural asset that warrants the utmost attention during the development of these projects.

- Comment that the sewage lagoons play a vital in supporting avian diversity on Iona Island—which is home to 285 observed species, the highest recorded diversity of birds in all of British Columbia. Concern expressed regarding the dewatering or altering of the sewage lagoons and potential for altering the island's ecological function by altering food availabilities and foraging options to the avifauna utilizing the island.
- Concerns that bird habitat could be lost or reduced in quality in a number of ways, including lagoons not actively being used by the new IIWWTP, ecologically sensitive habitat areas not being given sufficient priority, and sea level rise shrinking the mud flats and affecting foreshore habitat.
- Concerns raised relating to potential impacts on resident and migratory birds and wildlife at Iona as it relates to construction activities, particularly at key times of the year.
- Desire for the timeline related to the wetland enhancement component of project be adjusted to avoid a multi-year loss of bird habitat.
- Recommendation that areas be clearly identified as not open to the public to reduce the level of human disturbance. Comment that birds are sensitive to human disturbance with a primary concern being dogs.
- Request that the project team consider the objectives of the Vancouver Bird Strategy when refining plans for the IIWWTP.
- Desire for Metro Vancouver to look to and build up upon lessons learned from other local restoration projects, such as living dike pilot projects.
- Desire to work with natural systems that will lead to climate change resilience.
- Desire for improvement and creation of biofilm habitat creation to benefit Western Sandpipers and other migratory birds.
- Comment that bird populations have declined by 3 billion since 1970 and actions by individuals and governments are needed to halt that decline.

Fish, freshwater, and marine habitats

- Desire for Metro Vancouver to take this opportunity to allow for fish passage, water exchange, and natural sediment movement, by breaching anthropogenic barriers to fish migration in order to restore the function and relationship with the Fraser River that was altered by the creation of the jetties and causeway.
- Desire to reconnect the inter-jetty area with freshwater from the Fraser River while considering the complexities of ecosystems and the idea that changing water profiles may cause difficulties in ecosystem adaptation. Accessing increased freshwater has huge implications for fish; nutrient management will shift in the wetlands and there will be salinity changes.
- Desire to develop adaptive management strategies, including freshwater management in relation to Iona Island, the jetties and the inter-jetty area.
- Desire for Metro Vancouver to understand foreshore contaminants across different sites.
- Question as to how sea level rise affects the ecological restoration projects, given that levels could rise as much as one metre in the next century. Question as to how Metro Vancouver has considered that within the restoration plans, when Iona Island vegetation is very sensitive to tidal flows.

- Desire for Metro Vancouver to consider impacts on temperature and nutrient levels if converting lagoons to intertidal wetlands.
- Desire for Metro Vancouver to consider the benefits of added freshwater on biofilm and benefits of finer sediment in the inter-jetty area.
- Question as to whether log storage will continue to be allowed in McDonald Slough and around Iona Island. Desire for Metro Vancouver to lobby for log storage removal from McDonald Slough.
- Concerns raised about the impacts of microplastics on marine and estuarine wildlife and questions as to whether the treatment method proposed the new plant will remove microplastics.

Wildlife research and monitoring

- Concern expressed that without pre-disturbance monitoring and data collection, it will be impossible for Metro Vancouver to determine what impacts and changes in bird diversity, abundance, and condition have occurred, and whether restoration efforts have been successful. Desire for Metro Vancouver develop and implement a set of studies focusing on the pre-, during and post-construction monitoring. Comment that it is hugely important to have baseline studies before restoration gets going.
- Desire for Metro Vancouver to develop well designed monitoring programs for the sewage lagoons and adjacent habitats before any activities occur that could potentially alter the ecological function of the island, including monitoring activities before, during, and after construction. Desire for Metro Vancouver to engage with the local wildlife community to help co-develop and implement monitoring and research.
- Desire for a baseline study to be undertaken on the energetic supplement provided by the IIWWTP to bird communities of the Fraser Delta in order to ensure proposed restoration and enhancement projects are able to continue to provide the same level of habitat value.
- Desire for detailed assessment of bird diversity and abundance within and around the lagoons before commencing lagoon dewatering.
- Recommendation that Metro Vancouver undertake or support existing modeling of sea level rise and Fraser River hydrology models to inform restoration and enhancement activities at Iona Island.
- Desire to continue citizen science efforts at Iona Island such as the BC Coastal Waterbird Survey and the BC Beach Bird Survey.
- Desire for established wildlife and habitat research efforts within the park to be acknowledged by the project team and for organizations with research infrastructure within the park to be given as much notice as possible as to whether plant construction will necessitate the removal of infrastructure or cause other disruptions to data collection.
- Desire for key organizations that currently conduct wildlife research at Iona Island to be involved in future monitoring efforts and the development of monitoring protocols relating to disturbances and wildlife use and occupation of Iona Island before, during and after construction.
- Comment that WildResearch has made significant investments in Iona Island Bird Observatory over the last decade and changes to the site will have drastic impacts on WildResearch's monitoring programs and may completely alter its data and its relevance going forward. Comment that WildResearch requires at least seven mist net locations to remain stable so that it can be consistent in its link to a wider network.

- Question as to whether the WildResearch bird banding station will be included in the design and desire for it to remain in the park and be shown on the plans.
- Suggestion that Metro Vancouver review recent studies relating to impacts of general noise activities on wildlife and incorporate them into mitigation strategies.
- Suggestion for the creation of an endowment fund or other funding mechanism through Metro Vancouver as a means of sustaining research programs on Iona Island and acknowledging the extensive contributions made by volunteers in developing a diverse data set for the area.
- Request that contract documents for consultants require bird data to be put into national database as well as provincial database, as Birds Canada uses the national database.

Facility design

- Desire for bird-friendly building design standards to be incorporated into facility and building design, including glass and lighting standards.
- Desire for the new IIWWTP structures to be dark sky compliant and minimize noise.

Education, amenities, and park management

- Strong desire to maintain restricted access to parts of Iona Beach Regional Park for both people and dogs in order to protect sensitive habitat and minimize impacts on wildlife. Question as to whether there will be fenced off areas for semi-public access and more importantly quiet areas for birds.
- Desire for the project to include additional or upgraded park facilities that support wildlife conservation, education, and research, such as an interpretive centre, bird/fish viewing facilities, and bird banding structures.
- Interest in and support for development of Iona Island into a bird sanctuary with the associated designation and signage, to support the protection of birds and bird habitat.
- Desire for a venue to accommodate meeting space, educational workshops and other public programs that wildlife conservation organizations could utilize as operational headquarters.
- Desire expressed by some organizations to participate in the formation of an Iona Island Park Association and through this park association contribute to the development of an Iona Beach Regional Park Management Plan to ensure the habitat remains productive and protected and further explore opportunities for enhanced collaboration.
- Recommendation that an element thanking volunteers of the past and encouraging future volunteers be integrated into the design, as there have been countless hours of volunteer monitoring and stewardship from citizen scientists at Iona Island.
- Recommendation that the interpretive elements strive to represent and communicate a diverse range of messages related to birds and bird watching, including communications in multiple languages and multiple representations of knowledge related to birds and bird habitat, in order to encourage a diversity of societal groups to engage in bird watching activities.
- Interest in limiting vehicle traffic to the park and enhancing the public transport network to mitigate traffic disturbances to wildlife.

Park lands

- Desire to limit plant footprint encroachment into Metro Vancouver park land.
- Question as to the location of potential land swaps involving park land to allow for the increased footprint of the upgraded treatment plant. Interest in understanding the differences in ecological value of the locations included in the land swaps, given the goal of a no net-loss approach.

Collaboration and engagement

- Interest in fostering and showcasing ecological collaboration between the many organizations with interests in Iona Island and the surrounding area.
- Comment that the site is important to a number of stakeholders. Question as to whether there is an opportunity to leverage community partnerships for restoration, education and outreach activities and whether there is an opportunity for stakeholders to explore available funding.
- Desire for continued engagement with the local wildlife community to help develop and implement a research and monitoring program that will provide Metro Vancouver with the data required to assess the impact their projects on the bird life at Iona Island.

Community Associations in Vancouver and Richmond

Dunbar Residents' Association, Rotary Club of Richmond, Salish Park Leaseholders Association

Engagement Activities:

2018 to 2019 – Project Introduction	
May 7, 2019	Meeting with Dunbar Residents' Association
September 25, 2019	IIWWTP tour with Dunbar Residents' Association
2019 to 2021 – Initial Design Concept	
April 22, 2020	Online meeting with Rotary Club of Richmond
May 18, 2020	Email received from Salish Park Leaseholders Association with submission of comments re: mitigating construction and operation impacts
October 21, 2020	Interview for Dunbar Residents' Association fall 2020 Community Newsletter

Summary of feedback received:

Potential impacts to local communities and wildlife

- Suggestion that the project team consider using LED streetlights designed to maintain the quality and darkness of the night sky and to protect marine life and wildlife for areas adjacent to the water.
- Desire for buildings to be "dark sky" compliant, full cut off light fixtures, with a colour temperature of 2,700 Kelvin, in order to maintain the quality and darkness of the night sky.
- Request for white noise directional back-up alarms to be used on moving equipment.

- Request for crews to use white noise directional back up alarms recommended by WorkSafe BC on moving equipment.

Wastewater treatment, plant construction and effluent discharge

- Support expressed for tertiary wastewater treatment.
- Question as to whether the IIWWTP outfall is being replaced and whether the current outfall can accommodate the effluent discharge of the new IIWWTP.
- Question as to whether plans for the new treatment plant have taken flooding into consideration.

Project costs and funding

- Question as to whether funding for the IIWWTP can be obtained from the provincial and federal government.

Resource recovery

- Question as to how Metro Vancouver will transport the reclaimed water or renewable natural gas to consumers and whether there have been studies about installing pipes through the river for this purpose.

Community Members, Park Users, and Members of the Public

Engagement Activities:

2018 to 2019 – Project Introduction

July 12 and July 21, 2018	Two pop-up engagement booths at Iona Beach Regional Park • 70 people engaged
September 15, 2018	Engagement booth at Iona Beach Regional Park Great Canadian Shoreline Cleanup • 114 people engaged
January 9, 2019	Community Workshop – overview of the project provided, followed by facilitated discussion with community members • 43 people engaged
August 24, 2019	Engagement booth at Wings Over Iona event at Iona Beach Regional Park

2019 to 2021 – Initial Design Concept

February 14 and 15, 2020	Two engagement booths at VSB Student Sustainability Conference and Marpole-Oakridge Family Event Day event
May 19 and 21, 2020	Two online community meetings – project overview and update provided; including wastewater treatment, resource recovery options, and ecological restoration projects priorities; discussion followed • 128 people engaged

August 24 and September 26, 2020	Two pop-up engagement booths at Iona Beach Regional Park • 55 people engaged
2021 to 2022 – Revised Design Concept	
September 27 to October 22, 2021	Online public comment period – topics included treatment technology, plant footprint, project cost, and schedule • 39 participants
October 12 and 14, 2021	Two online community meetings – topics included treatment technology, plant footprint, project cost, and schedule; discussion followed • 55 participants
Other engagement activities	
May 27, 2021	Metro Vancouver co-hosted a project information session on Raincoast Conservation Foundation's North Arm Jetty Breaches Project – presentation included an overview of the IIWWTP ecological restoration projects • 37 participants

Key feedback received:

Wastewater treatment

- Strong desire for higher levels of wastewater treatment, particularly tertiary treatment.
- Desire for the effluent from the IIWWTP to be made as clean as possible because of the serious health implications to marine and human life.
- Desire for the tertiary treatment technology selected for the IIWWTP to be a high-quality system, classified as true tertiary or tertiary 2.
- Preference indicated for Membrane Bioreactor (MBR) secondary treatment technology.
- Concern regarding the continued discharge of non-tertiary treated effluent into the Salish Sea. Strong desire for Metro Vancouver to make long-term investments in the environment and protection of the Salish Sea.
- Desire for Metro Vancouver to consider future needs and treatment standard when building the plant, to ensure it will continue to meet regulatory standards and the needs of the region into the future.
- Question as to the final effluent quality produced by the treatment technology options considered as part of the revised design concept, in terms of total suspended solids, biological oxygen demand, and chemical oxygen demand,
- Desire for Metro Vancouver to demonstrate leadership in the areas of wastewater treatment and environmental action.

- Interest in understanding the evaluation/selection process for the treatment technology options considered in the lead up to the initial design concept and revised design concept, the associated criteria, and whether benefits or drawbacks beyond immediate construction costs were considered, such as debt to nature, plant footprint, or operational lifecycle costs.
- Desire for thought to be put into future-proofing the IIWWTP as new technologies become available/affordable.
- Desire for environmental impact and food web values of aquatic life in the Strait of Georgia to be major criteria in determining the wastewater treatment option to be used.
- Concern expressed regarding the impact of microplastic and microfiber pollution. Desire for the treatment technology selected to address this issue, considering impacts of microplastics on aquatic life at the bottom of the food web.
- Desire for the project team to explore treatment technologies that produce drinking water quality effluent.
- Interest expressed in the reverse osmosis/UV treatment process used by the treatment plant in Orange County, California, and desire for Metro Vancouver to investigate whether this technology would be appropriate for the IIWWTP.
- Request for information on monitoring processes for fecal coliform and other pathogens abeam and downstream from outfall.

Project schedule

- Concern expressed regarding missing the 2030 regulatory deadline for secondary treatment, and secondary and tertiary treatment coming into effect in 2034.
- Desire for tertiary treatment to be implemented as soon as possible—and no later than 2034—for the health of the surrounding environment.
- Concern regarding the negative effects of a delay in secondary and tertiary treatment on wildlife, the environment, and project cost.
- Comment that the cost of this project is great, but nature is not infinite. In other words, climate change is in full effect and we must protect wild environments with urgency rather than shuffling around dates, money and time.
- Comment that the delays on this project are indicative of a lack of concern and a lack of upholding the human and non-human right to a healthy environment.

Project cost

- Concern expressed about the high cost estimate for the project and that the challenges associated with the increased costs were not addressed earlier.
- Concern expressed regarding impacts to ratepayers. Desire for project to produce the best result while considering impact to households.
- Strong desire for Metro Vancouver to seek funding from senior levels of government and other sources to help finance this project.
- Interest in understanding if Metro Vancouver has looked into relocating the treatment plant to a different location, especially given current cost estimate.
- Request for Metro Vancouver to keep the improvement costs down by spreading the cost over 10 years, not 5 years.

- Desire for Metro Vancouver to make the proper investments now to ensure project is beneficial in the long term. Desire to consider the ecological and economic importance of the Fraser River Estuary and Salish Sea when considering investment on this project.
- Desire for further information regarding various components of the projects and their associated costs.

Ecological restoration projects, birds, and fish

- Strong desire for Metro Vancouver to recognize and protect the important terrestrial and marine ecosystem on and around Iona Island and the significance of the area to a variety of wildlife including migrating birds and salmon.
- Desire to protect and enhance Iona Island's ecology and habitat for birds and fish.
- General support for proposed ecological restoration projects to restore fish habitat, protect bird habitat, and enhance terrestrial ecosystems.
- Support expressed for restoring tidal function and connectivity in estuary by breaching barriers.
- Concern expressed regarding impacts of construction activities, the loss of the existing sludge lagoons, and increased park user access to currently restricted areas of the park on bird populations at Iona Island.
- Interest in the scope of the modelling, studies, and investigations being done to inform the projects, and whether lands on the north shore of the North Arm of the Fraser will be included.
- A number of concerns raised about the role of dogs in disturbing wildlife, with a strong desire to keep parts or all Iona Beach Regional Park pet-free.
- Concerns raised about potential loss of habitat that may result from the project and significant interest expressed in proposed plans for ecological restoration and habitat enhancement, with specific questions received regarding plans for the marshes, lagoons, and proposed causeway breaches.
- Concern expressed that clam shell dredging and associated disturbed contaminants could threaten the main beach and the thousands of people who frequent it. Request that studies be conducted on the impact to currents to ensure jetty breaches will not negatively impact Wreck Beach by causing sand to be swept away or by increasing pollution in the area.
- Concern regarding piecemeal approach to restoration in the Lower Fraser wetlands. Desire for a comprehensive, coordinated plan for restoration of the entire Fraser River Estuary.

Project location

- Question as to whether other locations for the treatment plant have been considered.
- Question as to how thorough the consideration of other possible locations for the treatment plant was.
- Question as to what portion of the current cost estimate is to cover earthquake stability and sea level rise, given this location on a floodplain island in the Fraser River estuary.

Climate change and sustainability

- Concern expressed regarding the impacts of climate change and sea level rise on Iona Island and the IIWWTP and interest in understanding how Metro Vancouver is addressing this issue. Concern regarding rising tides, storm surge and increasing flood risk from the Fraser River.
- Question as to whether there has been specific consideration of the costs of sea level rise and climate change, like that given to the seismic upgrades.

- Question as to what extent the lagoons are protected from higher tides expected from climate change.
- Question as to the height the plant is designed for in relation to sea level rise.
- Desire to work with natural systems, within the tidal marshes and across the island, that will lead to climate change resilience, particularly the impact of sea level rise.
- Desire for the project team to anticipate how sea level rise will further impact wildlife and habitat on Iona Island and plan ahead for the likely impacts that any further habitat loss will cause.
- Interest in whether Metro Vancouver considered the energy efficiency and carbon costs of the different technology options evaluated and whether these issues are being addressed in overall plant design.

Park access, amenities, and user experience

- Appreciation for natural beauty, connection to nature, and recreation opportunities offered by Iona Beach Regional Park. Desire for environment and visitor experience to be enhanced through the projects.
- Some participants expressed a desire for areas of the park to be closed to the public, and clearly identified as such, as a way to reduce the level of human disturbance to wildlife and give migrating birds a safe space to rest. Desire for spaces that currently have no public access to remain no access.
- Interest in the construction of boardwalks, wildlife viewing towers or other infrastructure that encourage the public to enjoy the area while causing minimal impact.
- Interest in improving non-vehicle access to the park by creating a public transit route to Iona Island, offering ferry service or building a pedestrian and cyclist bridge over the Fraser River and/or McDonald Slough.
- Strong desire for the Iona Island Causeway and Ferguson Road to be widened and a bike lane created for safety. Desire for bike parking at Iona Beach Regional Park.
- Desire for a staffed visitor welcome/interpretive centre in the overall design plan for the plant and park that could highlight internationally significant bird area, the importance of the Fraser River estuary to salmonid juveniles, ecologically friendly wastewater treatment, pollution prevention, and Musqueam culture.
- Interest in improvements to the park including a water refill station, better signage, more comfortable washrooms, benches, picnic tables, sheltered areas, interpretive signage and features, and/or a cafe.
- Desire to improve accessibility for wheelchair users and people with disabilities.

Construction impacts

- Concerns raised about the impacts of construction on bird habitat. Desire for bird resting/habitat area to be provided during construction and for construction activities to be planned during less critical times for birds.
- Concern regarding construction traffic becoming an issue for people who want to access the Iona Island recreational area during biosolids removal and construction.
- Desire for Metro Vancouver to consult wildlife biologists and incorporate their recommendations in construction plans.

Plant size and operation

- Concern expressed regarding the encroachment of the treatment plant footprint into regional park land. Desire to minimize or avoid encroachment.
- Request for information about how high and how big the plant will be. Concerns about the area/height/footprint of treatment buildings.
- Questions as to how much noise and light the new plant will emit.
- Question as to how strong the odour from the plant will be and request for information on how odour will be reduced.
- Concern about odour impacts, and strong desire for a high level of odour control.

Resource recovery

- Several questions received about biosolids, including the logistics of the current biosolids process, what class the existing biosolids are, and whether the biosolids will be dried to a level capable of incineration after the planned upgrades.
- Strong interest in potential resource recovery opportunities, including reclaimed water, biogas, methane, biosolids, and energy generation.
- Questions as to whether dried biosolids could be used as a low-carbon fuel for local cement kilns and what the potential uses are for reclaimed water.
- Question as to what is done with the sludge and dry waste solids, and whether they could be transported by empty coal trains to interior locations for soil blending for use in forests and agriland development.
- Interest in understanding the quality of the biosolids that will be produced at the plant and desire for beneficial reuse.

Education and research

- Interest expressed in a range of potential educational initiatives, such as a visitor welcome centre, interpretive opportunities, guided tours of the new IIWWTP, research partnerships with universities and the establishment of a wildlife research and education centre on Iona Island.

Stormwater management

- Several questions received about stormwater management, including expected timelines for completion of sewer separation, the planned process for managing stormwater at the new IIWWTP during wet weather flows and considerations that have been given to storing storm runoff so it can all be treated prior to discharge.
- Desire for complete separation of storm sewerage from domestic sewer lines.
- Question as to how stormwater will be controlled and grit handled in the new plant during storms. Question as to whether wet-weather events would impact the amount of treatment time and if so, if wet weather would result in greater quantities of contaminants being released into the receiving environment.
- Concern regarding the release of untreated or minimally treated wastewater during a high rainfall event.

Road improvements

- Concern about safety of Ferguson Road for cyclists and pedestrians.

First Nations

- Desire for First Nation engagement on this project and meaningful action towards reconciliation.
- Interest in learning First Nations' perspectives on the project.

Engagement and consultation

- Desire for increased communications regarding the projects and for Metro Vancouver to share updates regarding cost estimates and schedule.
- Concern regarding the lack of communication and transparency from Metro Vancouver to the community and the distrust it has created around the project. Desire for the region to communicate any changes to budgeting and timelines and any other complications with stakeholders and the public as soon as they encounter them. The community is an important part of creating a strong plan for the region, and that begins with open communication from Metro Vancouver.
- Questions received regarding the engagement and consultation process, including whether the presentation and meeting summaries from community engagement meetings will be made available to the public, deadlines for providing input on the project definition phase and whether additional engagement opportunities will be available as the project moves into detailed design.
- Desire for Metro Vancouver to make more information available to the public about the technical differences between primary, secondary and tertiary wastewater treatment.

8. First Nation Engagement

First Nations engagement activities and key feedback received are reported below. Feedback was collected through meeting notes, meeting transcripts and correspondence.

Information Sharing

In line with Metro Vancouver's Information Sharing Process, Metro Vancouver has reached out to 14 First Nations and Tribal Councils on the IIWWTP Projects:

- Musqueam Indian Band
- Tsleil-Waututh Nation
- Cowichan Tribes
- Halalt First Nation
- Lake Cowichan First Nation
- Lyackson First Nation
- Penelakut Tribe
- Seabird Island Band
- Shxw'ow'hamel First Nation
- Skawahlook First Nation
- Soowahlie First Nation
- Stó:lō Nation
- Stó:lō Tribal Council
- Stz'uminus First Nation

The following correspondence was sent to each First Nation or Tribal Council between November 2018 and February 2022. All correspondence included offer to meet and provide additional information about the projects.

2018 to 2019 – Project Introduction	
November 28, 2018	Project introduction letter
2019 to 2021 – Initial Design Concept	
September 3, 2020	Project update letter
December 17, 2020	Project update letter
2021 to 2022 – Revised Design Concept	
July 2, 2021	Project update letter
August 24, 2021	Project update letter
August 24, 2021	Project update letter
September 27, 2021	Engagement letter

Other engagement activities, and responses to the above noted correspondence are outlined in the sections below for each First Nation or Tribal Council that was available to actively engage or provided written responses.

Musqueam Indian Band

As part of ongoing collaboration and engagement with Musqueam Indian Band, feedback was provided through staff to staff meetings with the project team.

Engagement Activities:

2018 to 2019 – Project Introduction	
June 21, 2018	Engagement booth at Musqueam celebration of National Indigenous People's Day
May 1, 2019	Staff-to-staff meeting – reflections on integrated design process (IDP) workshop provided by Musqueam Indian Band; IIWWTP project, biosolids dewatering facility, and laydown pad project/lagoons decommissioning introduced by Metro Vancouver
June 5, 2019	Community meeting – topics included contracting opportunities, environmental concerns, Highbury Interceptor/river crossing, archaeology, resource recovery, current operations, community engagement and other MV projects
August 26, 2019	Ecological overview & opportunities meeting – overview of Iona Beach Regional Park and ecological health at Iona Island provided by Metro Vancouver
September 12, 2019	Staff-to-staff meeting – three draft concepts for the new IIWWTP presented by Metro Vancouver
2019 to 2021 – Initial Design Concept	
April 6, 2020	Online staff-to-staff meeting – project update provided by Metro Vancouver
May 19, 2020	Online project definition update presentation to Musqueam Chief and Council – update on project definition phase provided by Metro Vancouver and comments offered by Musqueam Chief and Council.
September 21, 2020	Online staff-to-staff meeting – project update provided by Metro Vancouver
September 21, 2020	Online park, cultural/heritage and relationship meeting – topics included cultural enhancement and impact mitigation, archaeology program, interpretive features planning process, ecological projects and developing a Memorandum of Understanding
November 6, 2020	Submission of letter containing Musqueam's initial comments on cultural recognition concepts as a starting point for future discussions.
2021 to 2022 – Revised Design Concept	
May 5, 2021	Online staff-to-staff meeting – discussion on the IIWWTP projects' geotechnical investigations and environmental sampling program and the wharf project design concept. Metro Vancouver shared information on the proposed McDonald Slough log storage plans.
June 30, 2021	Online staff-to-staff meeting – provided an update regarding ongoing priority activities, permits and approvals, the identified challenges with the July 2020

	design concept and subsequent work to refine the design, and upcoming engagement.
September 14, 2021	Online staff-to-staff meeting – Provided a project update and sought feedback on the July 2020 design concept, subsequent challenges identified, proposed treatment options being evaluated, and priority delivery activities
November 3, 2021	Document received with compilation of Musqueam staff comments regarding the history of IIWWTP video

Key feedback received

Relationships and reconciliation

- Comment that reconciliation is the tablecloth overlaying this project. Support expressed for reconciliation through partnership.
- Interest in knowing Metro Vancouver's position on the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and Truth and Reconciliation.
- Request for stewardship, not just consultation, for all projects.
- Support for habitat restoration initiatives.
- Interest in opportunities for Musqueam to tell their own history and desire to explore educational opportunities.
- Concerns raised about previous lack of consultation with Musqueam and that previous discussions around comprehensive waterfront planning did not go anywhere.
- Comment that would be a benefit to Metro Vancouver and Musqueam collectively presenting the project to the federal government for infrastructure funding to ensure the best project.
- MIB would like an ongoing relationship with MV. With regard to this project, desire to be involved throughout the project, including in the process and discussions in planning for the new IIWWTP.
- Musqueam is interested in an exclusive cooperative management agreement with Metro Vancouver for Iona Beach Regional Park similar to the arrangement Tsleil-Waututh has for Belcarra Regional Park.
- Comment that a good society is one where old men plant trees they will never sit in the shade of. Question raised as to how to work together to fulfill our social/generational responsibility.
- Comment that generational thinking is key: teach the next generation; look 7 generations back and 7 generations forward to create the best future.
- Suggestion for Metro Vancouver to emphasize how improvements are going to make things better for future generations by addressing how the new facility will make Musqueam safer, protect the watershed, the health of members, fish, flora and fauna, in addition to addressing impacts to archaeological areas.
- Desire for the project team to look at the broader effects up and down the river.
- Desire for the project team to consider how sea level rise/flood mitigation will create wide-ranging impacts on the river and territory.

- Question as to whether cumulative effects studies have been done, whether they are proposed as part of this project, and whether they will address not only how this project will affect the environment, but how this and other projects in the region cumulatively affect habitat. Question as to whether future planned development is being considered.
- Comment that anything that happens from the headwaters in the Fraser Valley all the way down impacts Musqueam, which is why it is important to study the cumulative effects of all of these impacts.
- It is important for Musqueam to have ongoing dialogue with Metro Vancouver about construction activities and potential long term impact on habitat.
- Appreciates Metro Vancouver's commitment to share permits early on in the permitting process. Support for the idea of Metro Vancouver sharing a preliminary permit review with Musqueam to help them identify and analyze permits of interest.
- Comment that Iona Island is very close to Musqueam and there are many family connections to the island.

Cultural continuity and environment

- Collaboration on cultural continuity, including recognition, is a key component of the partnership Musqueam and Metro Vancouver are building for the Project, which also includes expanding Musqueam access to xʷəyeyət (Iona Island). Comment that the most appropriate cultural recognition is inevitably linked to the story of Musqueam's past, current and future use of xʷəyeyət (Iona Island).
- Musqueam envisions the work on this project as a component of a larger potential collaboration with Metro Vancouver to promote cultural continuity and recognition throughout the region.
- Musqueam views cultural continuity, including cultural recognition, as an essential component of projects throughout Musqueam territory and is eager to undertake the Project at xʷəyeyət (Iona Island) with Metro Vancouver. It is important to recognize cultural recognition is only one component of cultural continuity. Cultural recognition is making Musqueam's presence and culture more visible to Musqueam and non-Musqueam people, but cultural continuity also includes delivering tangible benefits to Musqueam people by revitalizing or enhancing aspects of Musqueam culture impacted by colonization.
- For Musqueam, cultural continuity is about ensuring Musqueam knowledge, traditions and activities are passed on to future generations. Many projects in Musqueam territory have a long legacy of disrupting Musqueam's cultural continuity. Comment that we have an opportunity to undertake collaborative work on this cultural recognition project in a way that also supports cultural continuity, through not only recognizing but revitalizing and enhancing Musqueam culture.
- Musqueam wants to take a truly collaborative approach with Metro Vancouver by fully integrating Musqueam's perspective into the interpretive design and public-facing elements of both the treatment facility and the park on xʷəyeyət. As such, we propose an iterative process for developing key messages, identifying themes and reviewing and finalizing materials.
- hən̓q̓əmin̓əm̓ is the ancestral language of the Musqueam people and the language is inseparable from the territory itself. This project can support cultural continuity through both cultural recognition and enhancement. Integrating hən̓q̓əmin̓əm terms for places, species and concepts into the interpretative elements of the park provides recognition for Musqueam's distinct

understanding of and presence in these places. xʷəyeyət and other sites surrounding it are part of a network of Musqueam place names that contribute to a sense of place and identity through their meaning to Musqueam people and by tying together past, present, and the territory.

- Comment that Iona Island is very close to Musqueam and there are many family connections to the island.
- Desire for an agreement (Memorandum of Understanding suggested) to acknowledge and grant Nusqueam access to the closed areas of Iona Island, particularly the east end of the island. An MOU is a vehicle to transfer knowledge and keep future staff aware of the history of, and the process for, a project.
- Desire for Musqueam to be able to access Canfor Point because it is part of Musqueam's history and a natural classroom for Musqueam members to learn about wildlife and vegetation. Desire to create ways to provide traditional knowledge setting 'in the field'.
- Comment that it is important to open up the causeway at McDonald Slough for fish. The decline of eulachon started when the causeway was built. Comment that in 1915, before the slough was closed, it looked like you could walk across on the backs of salmon. Question as to whether there are plans to open up this closed off area. Desire to do breach correctly and take the time needed to study the current situation and future impacts prior to implementing big changes.
- Desire for studies to be conducted on what the impacts would be to open something that has been closed for so long. Comment that salmon fry are using the slough now. Question raised as to what would be released into the inlet given that the log booms have been there for a long time.
- Desire to maintain access to waterfowl for hunting to maintain continuity and transition of knowledge.
- Significant concern was expressed about impacts on waterfowl of noise and light as the foreshore area is one of the last available classrooms for teaching and hunting. It was suggested that ongoing dialogue with Metro Vancouver and long term monitoring would be appropriate to reduce impacts. Comment that this is one of the last areas where Musqueam members have access to waterfowl and that it is an irreplaceable resource on a cultural level, especially for hunting. Comment that lighting and noise will create impacts. Comment that losing access to this resource will impact cultural ceremonies.
- Desire to ensure future light levels from the plant are reduced current levels. Comment that wildlife migration patterns have changed to the point that the hunting ground is almost non-productive. The flight pattern moves towards the light and pulls them out of hunting ground.
- As Metro Vancouver has already recognized for this project, xʷəyeyət has several micro-climates, which can foster less commonly seen species, including some that have been traditionally harvested by Musqueam. The opportunity to repopulate endangered species and species that are sparsely available in Musqueam territory is a priority for Musqueam. The project could support this by refining the planting list with studies on which culturally and ecologically significant species are viable in the Project site.
- An important element of both Musqueam and Metro Vancouver's work on this project is recognition that xʷəyeyət is connected to an interrelated network of ecosystems. This is clearest in the work to enhance the island's aquatic habitats and improve connectivity for migrating fish species, including salmon, eulachon and sturgeon. The public facing components of this project should make clear to visitors that this work is a component of Musqueam's work, as stewards, to

ensure the health of Musqueam territory and the availability of its resources for future generations.

- Comment that at one time virtually every small creek supported a population of salmon and now the whole coast relies on about six rivers. Focus needs to be on restoring spawning habitat in creeks and rivers.
- Question as to how changes to address environmental priorities will be managed and maintained over time (e.g. controlling invasive blackberries in restoration areas).
- Desire to use MIB's 'preferred species list' when revegetating the island.
- Desire for the project team to consider impacts to the riverfront used by Longhouse dancers on the Musqueam side [north shore of the Fraser River].
- Musqueam's responsibility to act as stewards of our cultural heritage and traditional territory is an important component of Musqueam's sniẇ (teachings). Ensuring the tangible and intangible resources that sustain Musqueam culture are available for future generations is vitally important to Musqueam people. These heritage resources include both tangible and intangible components and are not limited to "archaeological" sites. A key message of the Project's cultural recognition should be that Musqueam's work with Metro Vancouver to protect heritage resources and restore the ecosystems on and connected to xʷəyeyət is an extension of this stewardship responsibility.
- In terms of the process for cultural recognition, Musqueam is interested in creating a Musqueam-Metro Vancouver working group that will continue to meet regularly throughout and beyond the completion of the Project. This will ensure that cultural recognition remains a priority beyond the design and installation of interpretative signage and that necessary updates and repairs are made.
- The work of cultural recognition is not quick and will require back and forth between Musqueam and Metro Vancouver to ensure the result is representative of Musqueam interests. This will involve work with Musqueam knowledge holders, time spent at the Project site, and the continual building of relationships.

Musqueam views and plant design

- Comment that the view from Musqueam to the south is important.
- Question as to how the proposed design changes impact views to Musqueam.
- Comment that the visual impact will be key to the community, and that images should be developed to show that more accurately moving forward. Clearer and more defined visuals are recommended.
- Request for the project team to elaborate on the size and heights of odour stacks, clarifiers and digesters. Concern regarding the visibility of tall structures. Request that the next set of renderings – particularly for a community meeting – include views from Musqueam so people can see visual impact from other parts of the community and not just at the river.
- Concern expressed around winter views, which require further consideration because the foreshore is most actively used in wintertime for wildfowl hunting and cultural activities.
- Request to consider blending the buildings into the landscape, perhaps even incorporating Salish culture, like a Salish longhouse, into the façade design.

- Comment that the community has to deal with the consequences of the project in a way that others do not, as it is occurring in such close proximity to Musqueam. The project is in Musqueam's backyard and Musqueam's territory.
- Question about level of treatment at the new Iona plant, and desire for tertiary treatment.

Language and education

- Desire to acknowledge territorial history via signage and shared knowledge. Also, to help inform and educate visitors to help them become stewards of the land.
- Including elements designed to support Musqueam people in speaking and hearing hən̓q̓əmin̓əm spoken would facilitate cultural enhancement through enabling Musqueam people to connect more deeply to Musqueam territory.
- Musqueam views xʷəyeyət (Iona Island) as a live classroom, both for Musqueam members and for the general public. Classrooms for Musqueam-to-Musqueam, Musqueam-to-public, and Metro Vancouver-to-public knowledge transfers are all important components of what can be achieved through this project.
- Musqueam wants to collaborate with Metro Vancouver on educating the public about the facility and the park by incorporating Musqueam knowledge and hən̓q̓əmin̓əm into outreach and educational materials.
- Musqueam sharing knowledge with Musqueam people and the public would require both spaces that are accessible to Musqueam, but less accessible to the public and spaces where the public is invited to learn from Musqueam and Metro Vancouver. This idea is based in the reality that Musqueam traditional knowledge is taught and learned by being on the land and the physical place where that knowledge originated. This requires uninterrupted access to allow for the learning process to take place. The exact locations for this learning can be determined through ongoing collaboration and dialogue, but this is an important concept to establish early in the process.
- In Musqueam's view, effective education requires an ongoing commitment and cannot be accomplished with a one-time investment in signage. Neither the land nor knowledge is static, so Musqueam is interested in developing a plan and legacy fund to support ongoing educational opportunities and ensure the upkeep of educational resources on xʷəyeyət. This type of commitment could facilitate Musqueam educators in sharing valuable knowledge with visitors and transform xʷəyeyət into a distinct educational space and place in Musqueam territory.
- It is essential Musqueam is able to retain all intellectual property it shares through participation in this process and receives copies of information, resources and final designs created for future educational purposes.
- In response to a question about the type of educational opportunities Musqueam would suggest, Musqueam emphasizes a desire to retain the culturally sensitive areas (and keep them culturally sensitive). It is also important to ensure that with certain cultural activities Musqueam are not "on show" to other visitors (e.g. with telephoto lenses). Generally positive feedback received on educational opportunities with an emphasis on the importance of an ongoing process for developing the educational approach.

Odour, light, and noise

- Desire for improved odour control at the new plant.
- Concerns raised regarding odour. It was noted that odour is especially bad on a hot day and that all residents are very concerned with odours from the plant.
- Comment that air quality is generally overlooked, but it goes right into the groundwater table and we live in a bog, so it stays in there.
- Question as to how air quality is being monitored. Comment that air quality is of great importance because Musqueam is right across the river. Question as to what will be monitored in the future, noting that odour is one element, but other emissions may have more impact. Interest in an air quality monitoring station on Musqueam land.
- Comment that odour is a topic of conversation in the community, relating to health and wellness.
- Concern regarding light emitted from current plant and reaching homes across the river and concern regarding light emitted from new plant.
- Desire for lighting to be full cutoff LED (2200 – 2700 kelvin) fixtures. Comment that 3000 Kelvin lighting fixtures are too blue.
- Interest in Iona Beach Regional Park designation as a dark-sky preserve. Comment that lower lighting levels are preferable for birds and astronomy.
- Concern regarding noise from new plant construction and operation.
- Desire for noise and light at night to be minimized. For example, directional lighting should be used to minimize overall glow and impacts to waterfowl. Solid structures may help baffle the sound.

Economic opportunities

- Desire for employment and procurement opportunities to be given to local First Nations and for "local First Nations" to be interpreted to mean Musqueam.
- Comment that contracting opportunities are present in all mitigation measures. Musqueam has an environmental group, for example, which could participate in habitat restoration and a civil contractor that could assist with the tidal bar restoration projects.
- Comment that there needs to be a greater emphasis, moving forward, on what contractual opportunities exist for Musqueam and what they mean.
- Desire for Musqueam to be involved in conversations around resource recovery.
- Question as to how much biogas will be produced, how much is required by the new plant and if there will be any surplus for possible Musqueam use.

History of IIWWTP video

- Concern expressed that Metro Vancouver's IIWWTP history video doesn't speak to the negative impacts the treatment plant has had on the Musqueam community. Also noted an opportunity to highlight how Musqueam and Metro Vancouver have moved from a place of no consultation, to the immersive and collaborative work being done today.

Highbury Interceptor and river crossing

- Comment that the issue of Highbury Interceptor is very significant to Musqueam, as it runs through the entire reserve. In addition to being consulted, Musqueam desires to be fully involved

throughout the process so that Musqueam feels safe and secure and fully knowledgeable about what goes through their land.

- Concerns expressed regarding the environmental and health impacts related to a re-routed Highbury Interceptor and a new river crossing.
- Concern regarding condition of soils around Highbury Interceptor.
- Concern regarding the age and condition of the Highbury Interceptor on Musqueam land and crossing the Fraser. Concern regarding how shallow the pipe tunnel is under the river.
- Desire for liner used on river crossing pipe to be extended to Highbury Interceptor section on Musqueam land.
- Highbury Interceptor is brought up almost daily in conversations at Musqueam between members and this piece requires more than just a conversation with MV, but a full action plan.

Tsleil-Waututh Nation

In response to the information sharing correspondence listed, Metro Vancouver received one letter from Tsleil-Waututh Nation. Details and key feedback received are provided below.

Engagement Activities:

2019 to 2021 – Initial Design Concept	
November 13, 2020	Letter received with comments from Tsleil-Waututh Nation, including request for capacity funding.

Key feedback received

Engagement and capacity funding

- Tsliel-Waututh Nation receives a high volume of referrals from Metro Vancouver and as such, is interested in developing a consultation process that is mutually beneficial to both parties. In the meantime, is unable to review projects without capacity funding. Requests confirmation whether or not Metro Vancouver will provide capacity funding for this Project.
- Meaningful consultation requires adequate timelines and resources (i.e., capacity funding) to participate in any review and assess potential infringement of rights. To date, review of the Project is limited due to lack of capacity funding, therefore this correspondence and/or review is not deemed consultation. The absence of a response or review from Tsliel-Waututh Nation also does not constitute consultation.
- Ongoing and detailed consultation throughout the Project's lifespan will be necessary to address potential impacts to Tsliel-Waututh Nation's rights, title and interests as they arise.
- Tsleil-Waututh requires Project updates and related documents for review.

Wastewater treatment

- Tsliel-Waututh Nation strongly supports increasing the wastewater treatment level to tertiary.
- Improving water quality in the Fraser River and Salish Sea is of paramount importance for the community.

Ecological restoration

- Tsliel-Waututh Nation sees the potential for net environmental gain from the Project, and is pleased to see the goals of improving water quality, restoring fish habitat, protecting bird habitat, and enhancing terrestrial ecosystems included in the project design concept.
- Tsliel-Waututh Nation requests Metro Vancouver include the opportunity for local First Nation groups to send monitors for works in and around waterways or sensitive environments.

Economic opportunities

- Tsliel-Waututh Nation requests Metro Vancouver include Indigenous procurement opportunities in tendering contracts.

Stó:lō Nation (People of the River Referrals Office)

Following the distribution of a project introduction letter in November 2018, Stó:lō Nation, via the People of the River Referrals Office, responded deferring review of the project to Musqueam Indian Band and Tsleil-Waututh Nation.

Engagement Activities:

2018 to 2019 – Project Introduction	
December 19, 2018	Email received from the People of the River Referrals Office deferring review of the project to Muqsueam Indian Band and Tsleil-Waututh Nation.

9. Meetings with Senior Government Agencies

Meetings with the following agencies took place during the project definition phase to discuss regulatory issues and potential funding opportunities: Environment and Climate Change Canada; Infrastructure Canada; Canadian Infrastructure Bank; federal members of parliament; BC Ministry of Environment and Climate Change Strategy; BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development; BC Ministry of Transportation and Infrastructure; and, BC Ministry of Municipal Affairs.

10. Communications and Promotions

The following communication tools were used to raise awareness about the IIWWTP Projects, provide project updates, and encourage participation in engagement opportunities:

- Updates posted regularly to the IIWWTP Projects webpage
  - 11,960+ page views between June 2018 and February 2022
- 11,012 emailed newsletters and invitations to engagement opportunities provided via the project email subscription database
  - Commenced a quarterly update newsletter in September 2021
  - 1,270+ subscribers as of February 2022
- 8,787 newsletters and flyers to residents and businesses, distributed by Canada Post or hand-delivery
  - 21 newspaper advertisements placed in Burnaby Now, Richmond News, and Vancouver is Awesome to promote public engagement opportunities
- Web advertising on the webpages of The Ubyssey (UBC Student Newspaper) and Glacier Media to promote public engagement opportunities
  - 32 social media posts about the project, with over 111,000 impressions across Facebook, Instagram, Twitter
- Signs and flyers posted at Iona Beach Regional Park to promote specific engagement opportunities

11. Next Steps

An engagement and communications plan will be developed to support the preliminary design phase of the projects. The public, key stakeholders, and First Nations will be afforded many opportunities to inform the detailed design and construction of the Iona Island Wastewater Treatment Plant Projects. These will include many formats, from regular meetings with Vancouver Sewerage Area member jurisdiction staff, to quarterly newsletter updates, to involvement on the technical advisory panel for the ecological restoration projects.

To: Liquid Waste Committee

From: Brett Young, Director, Major Projects, Project Delivery
Cheryl Nelms, General Manager, Project Delivery

Date: March 2, 2022 Meeting Date: March 9, 2022

Subject: **Iona Island Wastewater Treatment Plant Upgrade Projects – Project Definition and Conceptual Design Approval (Stage Gate 1)**

RECOMMENDATION

That the GVS&DD Board:

a) approve the conceptual design for the Iona Island Wastewater Treatment Plant Upgrade Projects as developed through the project definition process and summarized in the report dated March 2, 2022 titled "Iona Island Wastewater Treatment Plant Upgrade Projects – Project Definition and Conceptual Design Approval (Stage Gate 1)", with an estimated cost of $9.9 billion, including escalation and risk reserve, subject to further stage gate approvals;
b) direct staff to continue focused efforts to pursue funding from Provincial and Federal governments;
c) direct staff to work collaboratively with member jurisdictions to confirm project cost allocations and rate impacts in accordance with *Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014*; and,
d) direct staff to finalize a funding and financing strategy for Board approval, and ensure capital expenditure cash flows for the Projects are updated and included in the annual budgeting process.

EXECUTIVE SUMMARY

At its November 26, 2021 meeting, the GVS&DD Board endorsed a revised design concept for the Iona Island Wastewater Treatment Plant (IIWWTP) Projects and directed staff to finalize the project definition report for Board approval in March 2022.

The project definition phase was started in 2018 and the Project Definition Report (PDR) Summary is attached for reference. The PDR includes:

- the conceptual design for upgrading the WWTP, including resource recovery opportunities, and ecological restoration projects consistent with the endorsed revised design concept;
- a plan to construct the WWTP to meet the federal *Wastewater Systems Effluent Regulations* (WSER) by 2035, based on a Level 3 schedule for the endorsed revised design concept;
- an AACEI Class 4 cost estimate using Metro Vancouver's Best Practice Cost Estimating Framework; and
- a recommended delivery strategy that is intentionally flexible to address some of the complex program challenges and to allow for refinement as the design is further advanced, a funding and financing strategy is finalized, and project funding agreements are developed.

Approval of the project definition will allow staff to focus on the next phases of the projects related to advancing the design and undertaking early and enabling works to prepare the site for future

construction of the WWTP upgrades, so that the proposed schedule can be maintained. This will mitigate further delays in meeting the regulatory requirements and avoid the potential for increasing costs through escalation.

Completing the project definition, and confirming the project scope and budget, will also allow for clearer more focused efforts in pursuing and securing sources of funding for this major capital project and for collaborating with member jurisdictions on finalizing cost apportionment and household impacts.

With approval of the project definition and conceptual design, staff will continue with subsequent phase of works including WWTP design, as well as the early and enabling site works. Regular progress updates and approvals will be brought to the GVS&DD Board for consideration including, but not limited to, large contract approvals, land tenure changes, project funding agreements, and potential governance enhancements.

PURPOSE

To seek Board approval for the project definition and conceptual design for the Iona Island Wastewater Treatment Plant Projects as presented in the report dated March 2, 2022, titled "Iona Island Wastewater Treatment Plant Projects – Project Definition and Conceptual Design Approval (Stage Gate 1)".

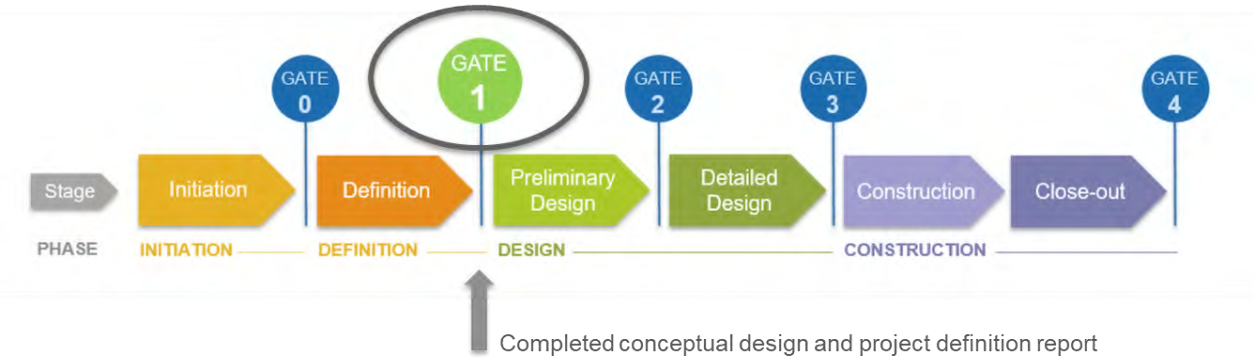

Figure 1: Stage Gate Approval Process

BACKGROUND

Existing Treatment Plant and Previous Studies

The existing Iona Island Wastewater Treatment Plant (IIWWTP) is a primary treatment plant located in Richmond, British Columbia. The plant was commissioned in 1963 and currently serves approximately 750,000 residents in the Vancouver Sewerage Area (VSA). As identified in Metro Vancouver's 2011 *Integrated Liquid Waste and Resource Management Plan*, the existing IIWWTP is to be upgraded to provide secondary treatment by December 31, 2030, to comply with the requirements of the federal *Wastewater Systems Effluent Regulations* (WSER).

The current facility is one of the last large wastewater treatment plants on the west coast of North America that provides only primary treatment, and it is highly vulnerable to both earthquakes and sea level rise. A comprehensive study was done in 2008 and 2009 that evaluated alternative options for future upgrading and expansion of the IIWWTP. This study included various scenarios for alternate

treatment plant locations, including smaller distributed treatment facilities in the VSA as well as other locations near Iona Island for a new centralized plant. The recommendation from the study was to upgrade the primary treatment processes to include secondary treatment at the current IIWWTP location.

Project Definition Goals

The project definition phase was initiated in 2018 adopting a multi-disciplinary integrated design process supported by public and First Nation engagement. The project definition was targeted to meet three project goals:

- Meet the WSER requirement to provide secondary treatment (as a minimum).
- Demonstrate Metro Vancouver's vision and commitment to sustainability by determining viable options for resource recovery.
- Integrate the facility into the surrounding community and Iona Beach Regional Park such that the plant complements the natural park ecosystem and environment.

By upgrading the level of wastewater treatment from primary to tertiary (beyond the regulated secondary treatment requirement), the proposed upgrades will reduce the discharge of select contaminants (total suspended solids and biochemical oxygen demand) from the waste stream by over 95%, bringing the treatment plant in line with higher levels of treatment already in place across much of North America and Europe.

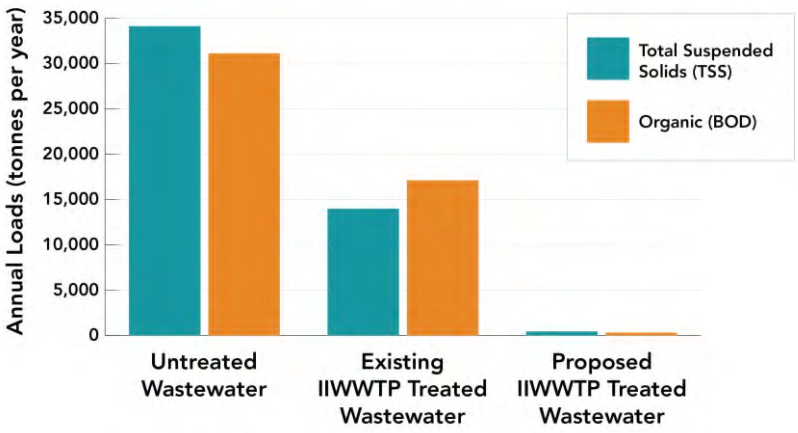

Figure 2: Tonnes of TSS and BOD Removed per Year by Proposed IIWWTP

The upgrades will also provide an opportunity for Metro Vancouver to partner with other organizations to continue to research and monitor ocean and estuary health, carry out pilot testing to target contaminants of emerging concern, and implement future upgrades at the IIWWTP to further minimize the impact of wastewater discharges on aquatic life.

Previous Board Reports

In July 2020, the GVS&DD Board endorsed an initial design concept, which included tertiary level treatment for the new plant, resource recovery opportunities, integration with Iona Beach Regional Park, and a range of ecological projects. With the transition of the projects to Metro Vancouver's new Project Delivery department at that time, the focus shifted to updating the project schedule and cost estimates, which included a more detailed assessment of constructability, risk, and delivery strategy.

This identified several challenges, resulting in delayed project completion with significantly higher than previously anticipated estimated costs.

In July 2021, the Board was provided information on these challenges, updated cost estimates and schedule, as well as the work being undertaken to address the identified challenges. This work included value engineering and a comprehensive challenge review of the initial design concept by a team of independent global experts, tasked with making recommendations to reduce costs and increase value.

In November 2021, the Board endorsed a revised design concept — based on recommendations from the challenge review — addressing the challenges identified and showing potential capital cost savings. The Board also directed staff to finalize the project definition for Board approval in March 2022 and to hold a special GVS&DD Board meeting to receive and fully consider project information, including costs.

Special GVS&DD Board Meeting in February 2022
On February 3, 2022, the GVS&DD Board held a workshop-style meeting with select Metro Vancouver committees and councilors from the VSA member jurisdictions, related to the IIWWTP Projects. Agenda topics included:

- Project background, needs and benefits;
- Treatment plant upgrades;
- Ecological restoration projects;
- Project schedule and cost estimates; and,
- Accountability: funding and governance.

Information on the projects presented at this meeting was also summarized in the Iona Island Wastewater Treatment Plant Projects – Conceptual Design Background Paper (Reference 1) that was distributed in advance of the meeting to facilitate discussion.

During this meeting a number of questions were raised with the following main themes:

- Project specific
  - Technical reports supporting recommendations
  - Construction mitigation plans
  - Adopting lessons learned from other large projects
  - Interest in delivery strategy
- Project funding
  - Securing provincial and federal contributions
  - Political engagement with federal and provincial governments
- Project governance
  - Other governance models

Information related to project-specific questions are in the attached PDR Summary and Background Paper with further details from the full project definition report being available once all these supporting documents are finalized.

Further details related to project funding and governance will continue to be addressed in future staff reports.

Previous Decision

At its regular meeting on November 26, 2021, the Board endorsed the Iona Island Wastewater Treatment Plant Projects revised design concept that involved (i) a modified layout of the plant allowing for concurrent construction of the additional digester capacity, and (ii) the flexibility of implementing either the Membrane Bioreactor (MBR) or the Aerobic Granular Sludge (AGS) secondary treatment technologies, both of which include more compact footprints.

CONCEPTUAL DESIGN

Implementing required upgrades to the plant provides an opportunity to implement one of Canada's most dynamic and transformative urban sustainability projects. Embedded within the project values are the shared priorities and interests of xʷməθkʷəy̓əm (Musqueam Indian Band) and its community members.

The revised design concept for the IIWWTP Projects, as developed through the project definition, incorporate these key features:

- tertiary level wastewater treatment
- advanced treatment pilot testing
- resource recovery opportunities
- climate adaptation and seismic resiliency
- ecological restoration
- integration with Iona Beach Regional Park

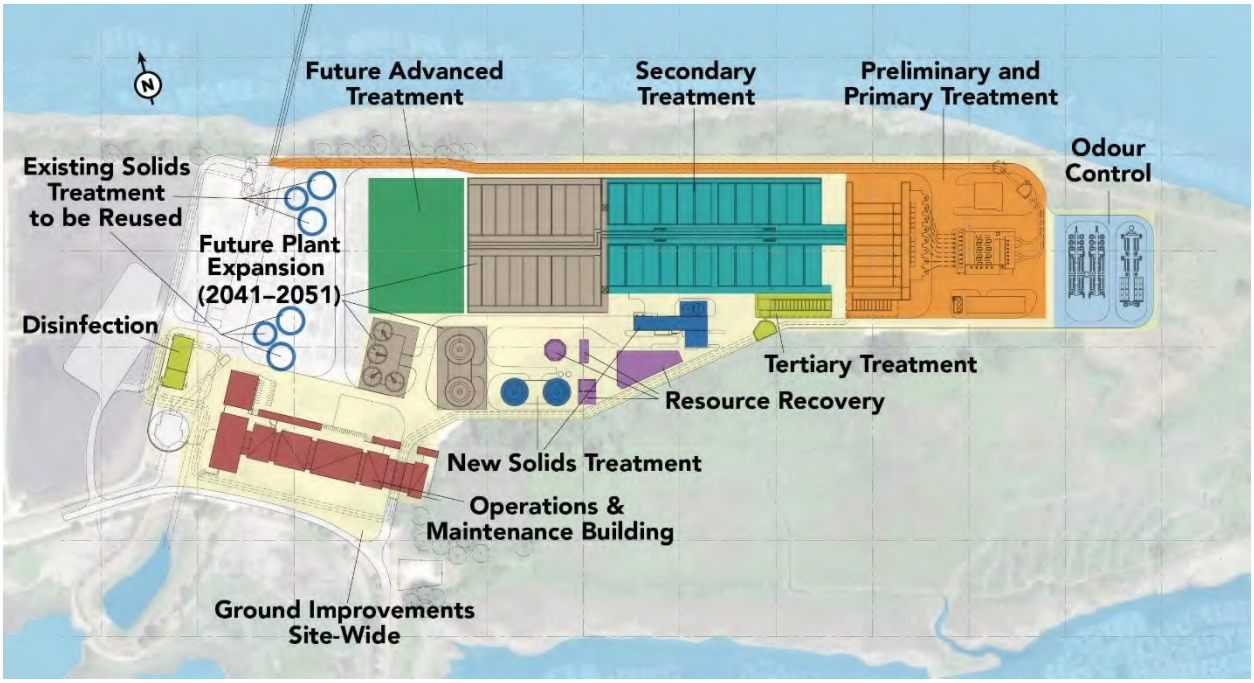

Figure 3: Iona Island Treatment Plant Upgrade Components

As indicated in Figure 3, space has been allocated for later expansions of the treatment plant as well as to include flexibility for future technology changes and additional levels of advanced treatment, with some of these future components located where the existing plant facilities are currently situated. In addition to future site planning, an advanced treatment pilot testing program will be carried out concurrent with the upgrades to address contaminants of emerging concern. Further

details on each of the treatment plant components, and resource recovery opportunities, are provided in the attached PDR Summary Report and Background Paper.

By restoring the foreshore and implementing ecosystem-based flood protection strategies, the ecological restoration projects will help the island's tidal habitats keep pace with sea level rise and provide a measure of protection for the plant and island from sea level rise, king tides, and storm waves. These projects will support the integration of the wastewater treatment plant with Iona Beach Regional Park and the community, increase park visitor connection to nature, contribute to nature-based climate change adaptation while restoring the island's diverse and sensitive ecosystems. The ecological projects are also necessary for securing the multiple permitting and approvals required to implement the plant upgrades.

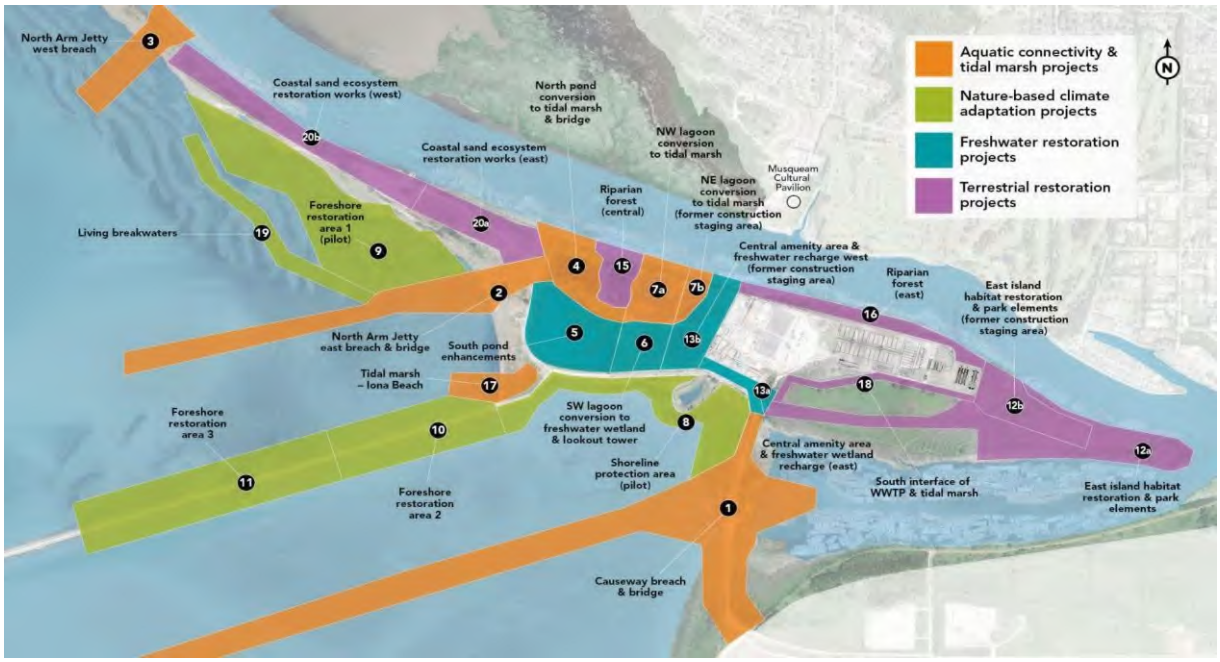

Figure 4: Ecological and Park Integration Projects

Further details on the ecological enhancement and park integration projects are provided in the attached PDR Summary and Background Paper.

Schedule

With the approval of the project definition, efforts will fully transition to the next phases of work. From 2022 to 2027 there will be a focus on design, early works, and ground improvements followed by the main WWTP infrastructure construction from 2028 to 2035, and final site restoration and projects closeout from 2035 to 2038.

Secondary treatment is anticipated to be operational by mid-2035, which is 4.5 years after the regulatory deadline of December 31, 2030, and final construction is forecast to be complete in 2038.

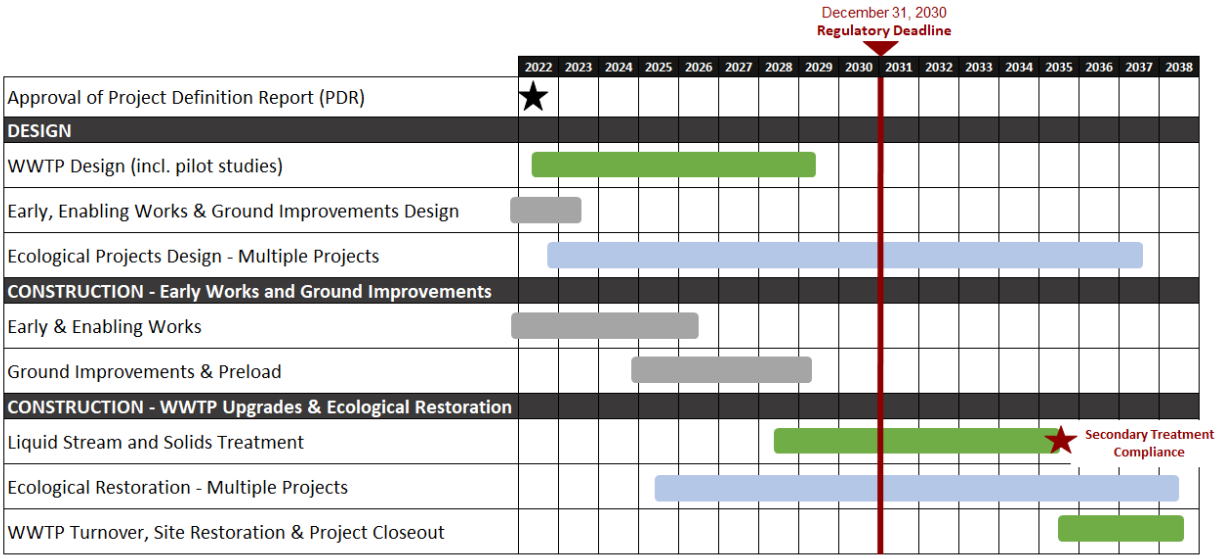

Figure 5: IIWWTP Projects Schedule

Ecological restoration projects will be undertaken before, during, and after the WWTP construction.

Cost Estimates - Capital

The Class 4 Capital Cost Estimates for the conceptual design as presented in the PDR are shown below.

		Base Case*	MBR	AGS
Total Design & Construction Costs	(2022 Dollars)	$6.9 B	$6.4 B	$6.4 B
Estimated Escalation	(3% per year)	$2.0 B	$1.9 B	$1.8 B
Risk Reserve		$1.4 B	$1.6 B	$1.6 B
Total Cost Estimate		**$10.4 B**	**$9.9 B**	**$9.8 B**
Range – low		$8.7 B	$8.3 B	$8.2 B
Range – high		$11.4 B	$11.0 B	$10.9 B

**Base Case is the July 2020 Design Concept*

Table 1: Total Estimated Project Cost (excluding financing costs)

This is the first major capital project to use Metro Vancouver's newly adopted Best Practice Project Cost Estimating Framework at such an early stage. The framework includes a more rigorous approach to addressing challenges inherent in estimating future costs on large, complex and lengthy projects, including using forecast cash flows to estimate escalation, as well as the inclusion of a project risk reserve and appropriate contingency amounts. The purpose of the framework is to provide a more complete and realistic estimate of the projects with a greater probability of actual costs at completion being within the original budget estimates.

A breakdown of the cost estimate by components of the overall upgrade projects is shown in Figure 5. While not broken out separately, the total combined cost of ground improvements needed to meet geotechnical and seismic design standards is estimated to be roughly 20% of total costs for multiple different components across the site.

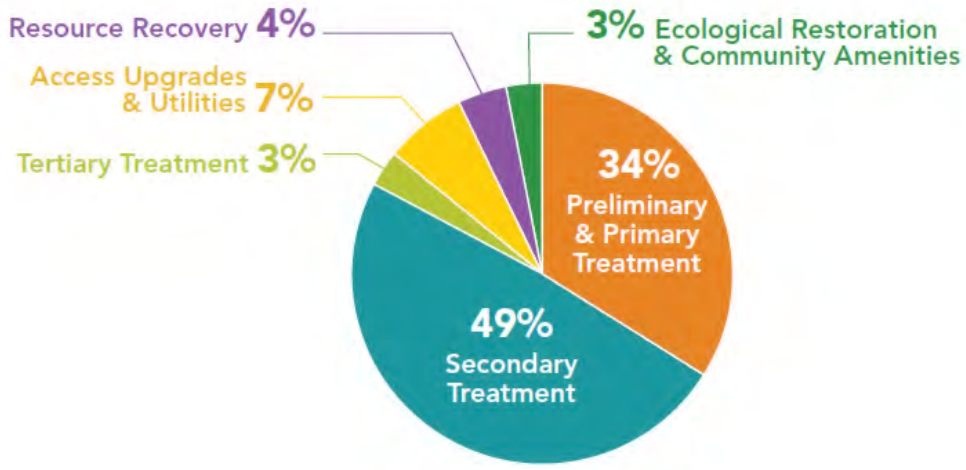

Figure 6: Breakdown of Cost Estimates

Using the project schedule and the more conservative cost estimate of the two technology options, a cash flow forecast for these capital expenditures is provided in Table 2 below.

IIWWTP Forecast Capital Expenditures	Period Subtotal	To 2021	2022	2023	2024	2025	2026
	$833	24	29	59	125	300	296
			2027	**2028**	**2029**	**2030**	**2031**
	$4,538		362	630	566	1,217	1,763
			2032	**2033**	**2034**	**2035**	**2036**
	$4,412		1,705	1,337	715	363	292
			2037	**2038**	**2039**	**2040**	
	$160		95	47	18	0	

Table 2: Estimated Capital Cost Cash Flow Forecast ($millions excluding financing costs)

Cost Estimates – Operations and Maintenance (O&M)

The upgrade from primary to secondary and tertiary levels of treatment requires a significantly larger and more complex facility that will increase annual operating costs, similar to those at other plants that already provide higher levels of treatment (e.g. Annacis Island WWTP).

The current primary plant is run by 45 O&M staff today and this will increase to an estimated 80 personnel once the new plant is operational in 2035. With escalation, the cost of operating and maintaining the existing WWTP in 2035 is estimated to be $29 million per year which will increase to a forecast $88 million (for the AGS technology) or to $99 million (for the MBR technology).

	Current Plant	Upgraded Plant
Annual O&M Costs (2035$)	$29 M	**$88 - $99 M**

Table 3: Annual O&M Cost Estimates

Key Risks

As part of the project definition, a structured methodology involving multiple team workshops, and reviews by an independent panel of specialist risk advisors, were used to develop a comprehensive risk register. As part of this process, over 200 potential risks were identified and used to inform a risk reserve value included in the project cost estimate.

The key risks identified at this stage are noted below:

- Affordability concerns for local taxpayers
- Funding uncertainty from over levels of government
- Delays in multiple complex permitting and approval requirements
- Constructability challenges and site constraints
- Commodity price variability and escalation
- Increases in interest rates impacting cost escalation and financing
- Management of multiple contract interfaces
- Coordination of works while operating existing plant
- Unforeseen factors such as inclement weather, pandemic
- Availability of local trades, consultants and professionals

Risk management is a continuous activity and all key risks will be closely monitored with mitigation plans updated as the projects transition to subsequent design and implementation stages.

Further details on the risk assessment are provided in the attached PDR Summary.

Recommended Delivery Strategy

The IIWWTP Projects involve a significant scale of interrelated works with complex interfaces occurring on a constrained site with restricted access; and requiring complex permitting for multiple concurrent design and construction projects over a challenging schedule.

As part of the project definition, a recommended delivery strategy has been developed to address and mitigate the challenges of the projects. This recommend strategy will continue to be refined by Metro Vancouver and external advisors and is intentionally flexible to allow ongoing refinement as the design is further advanced and a project funding strategy is developed.

Key elements of the recommended delivery strategy include:

- **Program management:** Establish an integrated IIWWTP program management office (IPMO) and retain a program management consultant to provide resources to enhance Metro Vancouver's capability and capacity.
- **Design responsibility:** Retain design contracts directly and, specifically, retain a single principal designer for the WWTP design to address complex interface issues and to foster coordinated operations input into the design.
- **Early works and ground improvements:** In order to meet the schedule, it is necessary to progress the design and delivery of a range of early works, ground improvements, access and utility works, and certain ecological works concurrently with ongoing design of the WWTP.

- **Early contractor involvement:** Adopt a collaborative approach to the construction of the core WWTP works, retaining a general contractor (the "Construction Partner") through a formal two-stage Early Contractor Involvement model starting in 2024.
- **Flexible contracting model for the WWTP Project construction:** Plan to deliver the core WWTP works under a hybrid contract model, with the Construction Partner scope consisting of plant-wide construction and logistics management, self-performance of construction for certain scope elements and management of construction activities by third-party contractors for other scope elements allowing the work to be broken into smaller packages to address risk and help increase local participation.
- **Conventional delivery for other program elements:** Under the auspices of the IPMO, deliver early works and ground improvements for the WWTP Project and the Offsite Work and Ecological Projects using conventional design-bid-build approaches or alternate delivery models for select projects.

Further details on the recommended delivery strategy are provided in the attached PDR Summary.

Impacts to Regional Park and Land Tenure Changes
Throughout the project definition process, careful consideration was given to developing the footprint of the plant required to meet construction and operational needs while mitigating the impact on island ecology, park users, and nearby residents.

As outlined in the report presented to the GVS&DD Board in November 2021, the revised design concept includes a limited use (approximately 3ha) of Metro Vancouver Regional District (MVRD) park land. This land transfer between public entities (MVRD and GVS&DD) protects sensitive ecological areas, creates additional parkland and helps align tenure with land use.

Through the integrated design process and in discussion with xʷməθkʷəy̓əm (Musqueam) and Regional Park staff, it was determined that extending the plant into land east of the existing wastewater treatment plant facilities would be best suited to accommodate the revised design concept. While moving plant facilities west or south would be simpler from a tenure perspective as there is more than sufficient GVS&DD tenure available in these directions, expansion west poses impacts to important xʷməθkʷəy̓əm view corridors while also creating two separate construction areas on either side of the existing plant operations, that would pose additional constructability challenges and potential costs. Expansion south carries significant impact on important and sensitive ecosystems.

Necessary land tenure changes will be facilitated through a land transfer between MVRD and GVS&DD, which will be subject to review and approval by both Boards. Staff are working closely to develop a memorandum of understanding and subsequent agreements that ensure a net gain in quality park land on the island. The land tenure transfer also requires provincial approval, which will include First Nation and public engagement. More information on the process will be brought forward in reports to MVRD and GVS&DD in April 2022.

PUBLIC AND FIRST NATION ENGAGEMENT

Metro Vancouver conducted engagement with member jurisdictions, the public, key stakeholders, and First Nations from 2018 to 2021.

Further details on project engagement are provided in a separate report on this agenda, titled *Iona Island Wastewater Treatment Plant Projects – Engagement Results*.

FUTURE BOARD DECISIONS

Following approval of the project definition and conceptual design (Stage Gate 1), staff will provide annual and quarterly project updates. In addition to these regular updates, future Stage Gate approvals for subsequent design and construction on individual projects, together with contract awards and land tenure issues, will be brought to the GVS&DD Board as required.

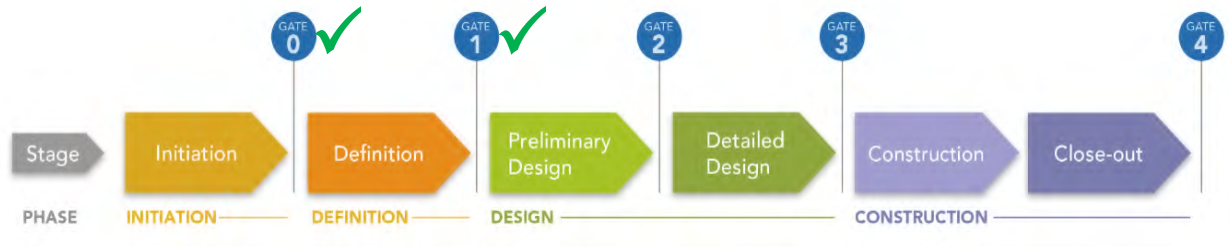

Figure 7: Stage Gate Process

Special reports and meetings may also be needed to address future funding agreements, and potential governance enhancements.

ALTERNATIVES

1. That the GVS&DD Board:
   a) approve the conceptual design for Iona Island Wastewater Treatment Plant Upgrade Projects as developed through the project definition process and summarized in the report dated March 2, 2022 titled "Iona Island Wastewater Treatment Plant Upgrade Projects – Project Definition and Conceptual Design Approval (Stage Gate 1)", with an estimated cost of $9.9 billion, including escalation and risk reserve, subject to further stage gate approvals;
   b) direct staff to continue focused efforts to pursue funding from Provincial and Federal governments;
   c) direct staff to work collaboratively with member jurisdictions to confirm project cost allocations and rate impacts in accordance with *Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014*;
   d) direct staff finalize a funding and financing strategy for Board approval, and ensure capital expenditure cash flows for the Projects are updated and included in the annual budgeting process.

2. That the GVS&DD Board receive for information the project definition and conceptual design for Iona Island Wastewater Treatment Plant Projects as summarized in the report dated March 2, 2022 titled "Iona Island Wastewater Treatment Plant Projects – Project Definition and Conceptual Design Approval (Stage Gate 1)", and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

Budget Implications and Household Impacts

With respect to the financial impact of the overall Iona Island WWTP Projects, there are many variables that have a bearing on the amount that will be built into levies and be borne by the ratepayers. On a macroeconomic level these include:

- Interest Rates – We are starting to see upward pressure on borrowing rates due to inflation. This increases the rate risk the program may experience over such a long duration.
- Escalation costs – Currently built into the cost estimates at 3% per annum but there is a risk of higher inflation.
- Resource availability – Both labour and non-labour. In both areas we are experiencing levels of uncertainty not previously seen.
- Regulatory uncertainties – It's important to keep excellent relationships with the regulatory agencies given the expected completion date is beyond the legislated deadline.

As this is a liquid waste project, the related costs are to be allocated in the respective tiers and apportioned in accordance with *Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014.* There continues to be ongoing analysis of the costs and impacts of this project including which tiers the components for this project are allocated. This has direct bearing on the levies and impacts for the four sewerage areas and the individual municipalities that they are composed of. Current estimate of tier allocations for the projects are shown in Figure 8.

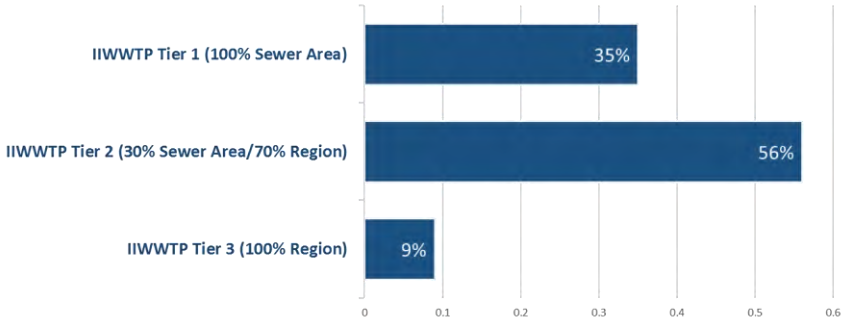

Figure 8: Potential Tier Allocation

The upgraded treatment plant will serve the region for future generations. As well, the capacity of the plant is planned to be able to accommodate the current flows from the combined sewer system. As sewer separation work continues and is completed within municipalities, the capacity that the plant is built for now will be able to accommodate population growth to 2051. Staff consider this approach to be in response to growth and continues to evaluate and work with the Province on the definition of the growth portion of the Iona Island WWTP Projects. The downside of increasing the growth portion of the project is that it puts further upward pressure on our DCC rates, and we are already encountering resistance to our current proposed DCC increases. Based on different approaches, the potential growth component (DCC recoverable) for the Iona Island WWTP Projects range from 8% to 28%.

In addition to the challenges of tier allocations and apportionment of growth costs, the starting place for the estimates of household impacts have been based on existing legislation, bylaws and policies,

the key being the *GVS&DD Act,* the *Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014*, and the Financial Management Policy. The challenges within these parameters include the following:

- Annual cost estimates to meet cash flow needs rather than equitable sharing of the costs of the use of the facility over its life.
- Debt servicing capacity limits within existing policy which will increase the need for pay as you go funding, and therefore levies and rates, in order to avoid debt in excess of policy.
- Debt servicing costs based on 15-year amortization, minimizing interest costs but paying of related borrowing over about a quarter of the facilities life-cycle.

Figures 9 and 10 below illustrate the ranges of the potential impact of the Iona Island WWTP Projects on a household for both the VSA and the rest of the region served by the GVS&DD, respectively. These charts also show the impacts of different funding and financing options that are being pursued.

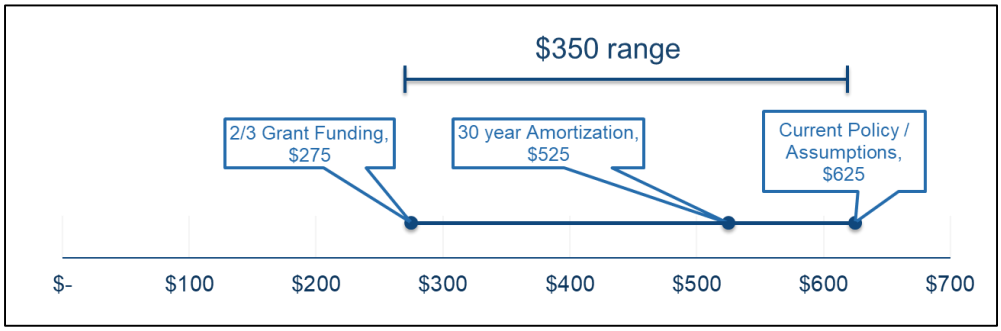

Figure 9: Vancouver Sewerage Area: Incremental Average Present Value Household Impact (Smoothed)

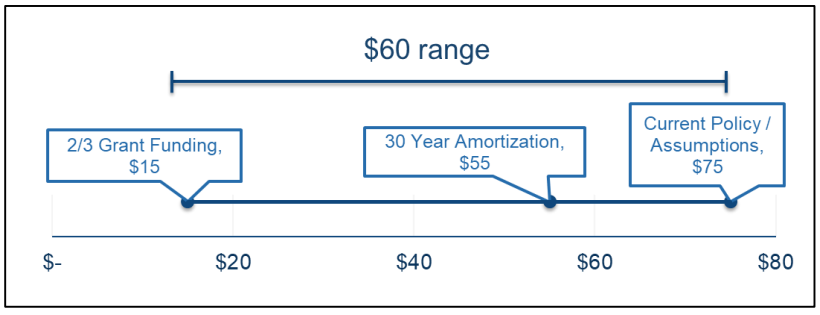

Figure 10: Other Sewerage Areas: Incremental Average Present Value Household Impact (Smoothed)

Metro Vancouver is examining all aspects of our enabling legislation and borrowing processes to find a smoothing mechanism to avoid rate shock with respect to the impact of this major project. Now that the project is defined, along with an associated cost estimate, this work will continue into the next design stages with the goal of finding a resolution for Board consideration in 2023.

Funding Opportunities

Metro Vancouver is exploring all options for funding and financing the IIWWTP Projects. These include:

- vigorously pursuing funding and grants from the Government of Canada and Province of BC;
- working with the Municipal Financing Authority (MFA) as our legislated borrower;
- exploring funding opportunities with the Canada Infrastructure Bank (CIB).

Metro Vancouver's funding and financing objective is to minimize the annual household impact on regional ratepayers, promote fairness amongst the users paying for the facility, and ensure that member jurisdictions are able to collect adequate financial resources to meet their own service requirements.

A key driver for the replacement of the plant is the federal and provincial regulatory requirements for secondary treatment. Significant engagement has been undertaken and will continue to be undertaken with federal and provincial governments and other stakeholders to secure co-investment funding and alleviate the impact on ratepayers in the region.

It is critical that local governments are supported in reaching regulatory compliance and Metro Vancouver is seeking co-investment from the federal and provincial governments - with an initial focus on securing equal funding of 1/3 each (Metro Vancouver, Federal, Provincial) for Phase 1 - $750 million over five years.

Should Metro Vancouver be successful in receiving a grant of two thirds for the first phase of work, this would reduce the household impact of the project in Vancouver Sewerage Area by $46 per year, and the household impact across the rest of the region by just under $20 per year.

CONCLUSION

Staff recommend approval of the project definition and conceptual design for the Iona Island Wastewater Treatment Plant Projects which includes tertiary treatment to meet regulatory requirements, together with previously endorsed opportunities for resource recovery, ecological enhancements, and integration with the regional park and surrounding communities.

Approval of the project definition will allow staff to focus on the next phases of the project related to advancing the design and undertaking early and enabling works to prepare the site for future construction of the WWTP upgrades, so that the proposed schedule can be maintained. This will mitigate further delays in meeting the regulatory requirements and increasing costs through escalation.

Completing the project definition, and confirming the project scope and budget, will also allow for a more focused effort in pursuing and securing source of funding for this major capital project and for collaborating with member jurisdictions on finalizing cost apportionment and household impacts.

Attachment

Project Definition Report Summary

References

1. Iona Island Wastewater Treatment Plant Projects – Conceptual Design Background Paper
2. Iona Island Wastewater Treatment Plant Projects – Revised Design Concept, dated October 29, 2021 (Page 40)
3. Iona Island Wastewater Treatment Plant Projects – Project Definition Update, dated June 23, 2021 (Page 25)
4. Iona Island Wastewater Treatment Plant Project Design Concept, dated June 23, 2020 (Page 12)

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IONA ISLAND WASTEWATER TREATMENT PLANT PROJECTS

SUMMARY REPORT

MARCH 2022

PREFACE

The goals outlined in this document for the Iona Island Wastewater Treatment Plant Projects represent an integrated vision for the upgrade of the wastewater treatment plant and a desired future on xʷəyeyət (Iona Island) based on extensive early and ongoing public, stakeholder, and First Nations engagement as well as conceptual project design. Subject to approval by the Metro Vancouver Board, realizing the vision of this scope of work will involve the development of a series of independent projects including the wastewater treatment plant upgrades as well as a suite of ecological projects, among others. While this Project Definition Report describes an integrated vision that the scope of work seeks to achieve, projects that will contribute to achieving this vision are independent undertakings, each subject to their own regulatory review and planning processes.

Figure 1. Aerial rendering over the proposed IIWWTP Projects in 2051 looking west. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

AGS	AEROBIC GRANULAR SLUDGE
CRT	CHALLENGE REVIEW TEAM
GVS&DD	GREATER VANCOUVER SEWERAGE & DRAINAGE DISTRICT
IIWWTP	IONA ISLAND WASTEWATER TREATMENT PLANT
IPMO	IIWWTP PROJECTS PROGRAM MANAGEMENT OFFICE
MBR	MEMBRANE BIOLOGICAL REACTOR
MVRD	METRO VANCOUVER REGIONAL DISTRICT
PDR	PROJECT DEFINITION REPORT
PMC	PROGRAM MANAGEMENT CONSULTANT
WWTP	WASTEWATER TREATMENT PLANT

Figure 2. Aerial rendering over the proposed IIWWTP Projects in 2051 looking east. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

01. INTRODUCTION: AN INTEGRATED VISION

The proposed Iona Island Wastewater Treatment Plant (IIWWTP) Projects and supporting conceptual design described in this report represent a vision for implementing required upgrades to the existing IIWWTP while simultaneously improving the relationship between infrastructure and nature to enhance the resilience of the Metro Vancouver region. In this vision, infrastructure is resistant, adaptable, and builds the local economy; wastewater is treated and extracted resources are put to their best use; natural habitats are thriving and are accessible places of respite for people and wildlife; relationships with Indigenous groups are being developed through meaningful partnerships; and the site is designed in consideration of sea level rise and the other anticipated impacts of a changing climate throughout the twenty-first century.

The existing IIWWTP currently services the Vancouver Sewerage Area by providing a primary level of treatment. In accordance with federal regulations for wastewater effluent quality, the IIWWTP is required to be upgraded to a secondary level of treatment. In addition to significantly improving the effluent quality received by the Salish Sea, the work required to achieve these necessary upgrades offers a critical opportunity to replace aged infrastructure, mitigate vulnerability to sea level rise and earthquakes, and contribute to the recovery of biodiversity within the Fraser River estuary, the Salish Sea, and the region.

Located on xʷəyeyət (Iona Island), the existing IIWWTP occupies a complex site at a critical intersection of human and ecological systems. The WWTP is situated directly across from xʷməθkʷəy̓əm (Musqueam), at the mouth of the Fraser River, and in the middle of Iona Beach Regional Park. From the perspective of human infrastructure, the IIWWTP is the end point of a full-service water utility that delivers world-class drinking water, collects and treats waste streams, and returns treated effluent to the Salish Sea. Similarly, it is located at an ecological confluence—one that provides nursery grounds for out-migrating juvenile salmon, spawning grounds for many types of adult fish, and a critical stopover for hundreds of thousands of birds who migrate north and south along the Pacific Flyway route every year. The transformative vision for the proposed IIWWTP Projects begins to mend historical disruption to this part of the Fraser River in order to have wide-reaching benefits for both people and wildlife.

In support of this transformative vision, the conceptual design of the IIWWTP Projects has been developed as a portfolio of interrelated undertakings. Wastewater treatment plant (WWTP) upgrades will significantly improve effluent quality received by the Salish Sea, substantially mitigate odour emissions, protect against critical risks to wastewater treatment including earthquakes, and provide flexibility for future advancements in treatment technology; resource recovery initiatives will reduce greenhouse gas emissions and demonstrate Metro Vancouver's commitment to a sustainable future; park and community integration will improve community health, enhance park experience, and communicate changes occurring on the island; ecological restoration projects will provide habitat compensation for the revised layout of the upgraded IIWWTP, redress past environmental damage, and support the regeneration of healthy ecological processes; and climate adaption improvements will provide long term resilience to sea level rise and the other anticipated impacts of a changing climate.

The required upgrades to the existing WWTP are the primary driving force behind the IIWWTP Projects but the ancillary works contemplated also offer a critical opportunity to provide significant benefits to the region. Amid escalating impacts and rising public awareness of global climate challenges, completion of the IIWWTP Projects will position Metro Vancouver as a leader in developing innovative models for infrastructure within the rapidly changing paradigm that climate change demands.

Summarized in the following pages is a scope of wastewater treatment infrastructure upgrades and restoration activities that collectively represent the largest capital works project ever undertaken by Metro Vancouver.

Once completed, these upgrades and restoration activities will result in a remarkable legacy for the citizens of Metro Vancouver. By improving public and community health through the implementation of secondary and tertiary level of treatment, restoring and enhancing ecosystems, increasing resilience to climate change and earthquakes, establishing meaningful partnerships, and stimulating the local economy, the IIWWTP Projects will become a beacon of regenerative community infrastructure for the twenty-first century.

Figure 3. Aerial photograph over the existing IIWWTP and sludge lagoons in 2018 looking west (Metro Vancouver).

02. PROJECT PURPOSE & SUMMARY

02-A. PROJECT GOALS & REGULATORY REQUIREMENTS

The primary purpose of the IIWWTP Projects is to upgrade the existing WWTP to meet regulatory requirements for the provision of a minimum level of secondary treatment. Both Metro Vancouver's 2011 *Liquid Waste Management Plan* and the federal *Wastewater Systems Effluent Regulations*, legislated in 2012, require that the existing IIWWTP be upgraded to secondary treatment no later than December 31, 2030.

The existing IIWWTP remains one of the last large WWTPs on the west coast of North America to provide only a primary level of treatment. Commissioned in 1963, the current IIWWTP has served the region for nearly sixty years but is now nearing the end of its service life. Further, this aging infrastructure is highly vulnerable to both earthquakes and sea level rise. Either of these certain hazards, when realized, would challenge the viability of the current WWTP and could result in a total loss of wastewater treatment for the City of Vancouver, the University Endowment Lands, and small portions of Richmond and Burnaby for many years.

Within this context, the conceptual design has been developed specifically to fulfill three fundamental goals established by Metro Vancouver:

- **To meet, at a minimum, all regulatory requirements for providing secondary treatment.**
- **To demonstrate Metro Vancouver's vision and commitment to a sustainable future by developing viable resource recovery options.**
- **To integrate the IIWWTP with Iona Beach Regional Park and the surrounding communities of the lower Fraser River in a way that provides benefits for both the human and non-human inhabitants of the area.**

02-B. IMPROVED RECEIVING WATER QUALITY

In meeting regulatory requirements and achieving Metro Vancouver's three fundamental goals, the proposed IIWWTP Projects will significantly improve the effluent quality received by the Salish Sea. This is essential as all five species of Pacific salmon and resident orca whales are under threat from a wide range of impacts, including treated wastewater discharged to the Salish Sea. The fate of these iconic species draws public attention but there are many lesser-known species that are facing similar fates. The health of all species is interconnected.

The provision of upgraded treatment at the IIWWTP is an important step to help regenerate the ecological health of the aquatic ecosystems in the Fraser River estuary, Sturgeon Bank, and the entire Salish Sea. The proposed upgrades at the IIWWTP will reduce the discharge of total suspended solids and biochemical oxygen demand by over 95%, reduce greenhouse gas emissions, and provide a safeguard against a baseline of harmful chemicals in the wastewater effluent stream while bringing our region in line with the basic treatment standards already in place across North America and Europe. The upgrades will also provide a basis for Metro Vancouver to partner with other organizations to continue to research and monitor Salish Sea and Fraser River estuary health, carry out pilot testing to target persistent and harmful compounds referred to as "contaminants of emerging concern" and implement future advanced treatment upgrades at the IIWWTP to further minimize the impact of wastewater discharges on aquatic life in the Salish Sea.

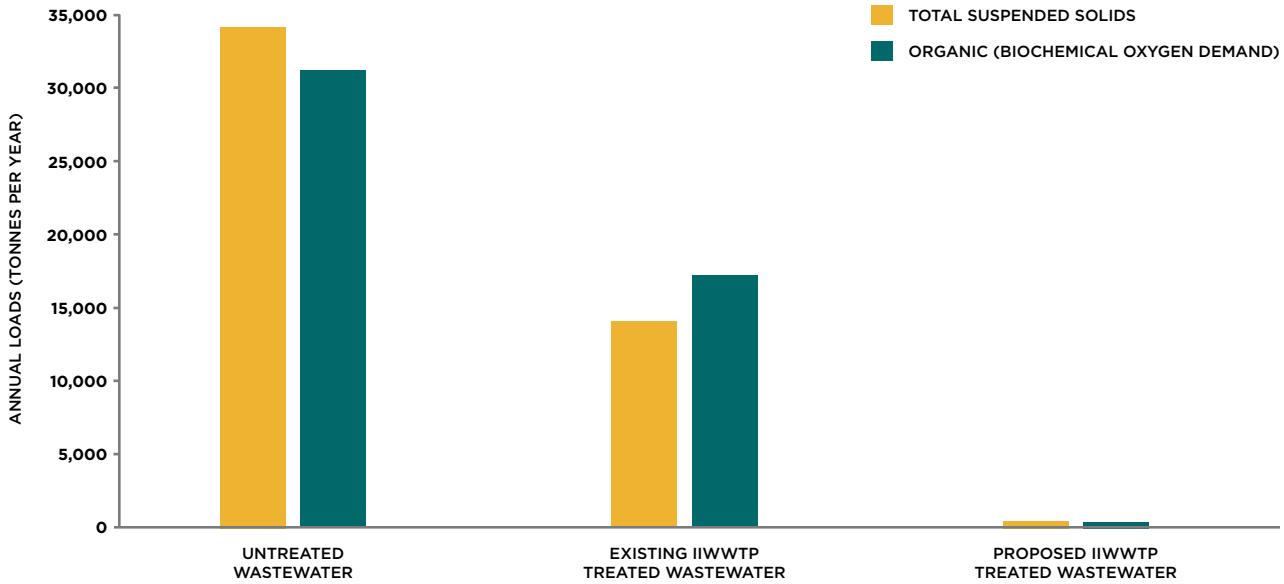


Figure 4. Chart comparing annual solids and organic discharge.

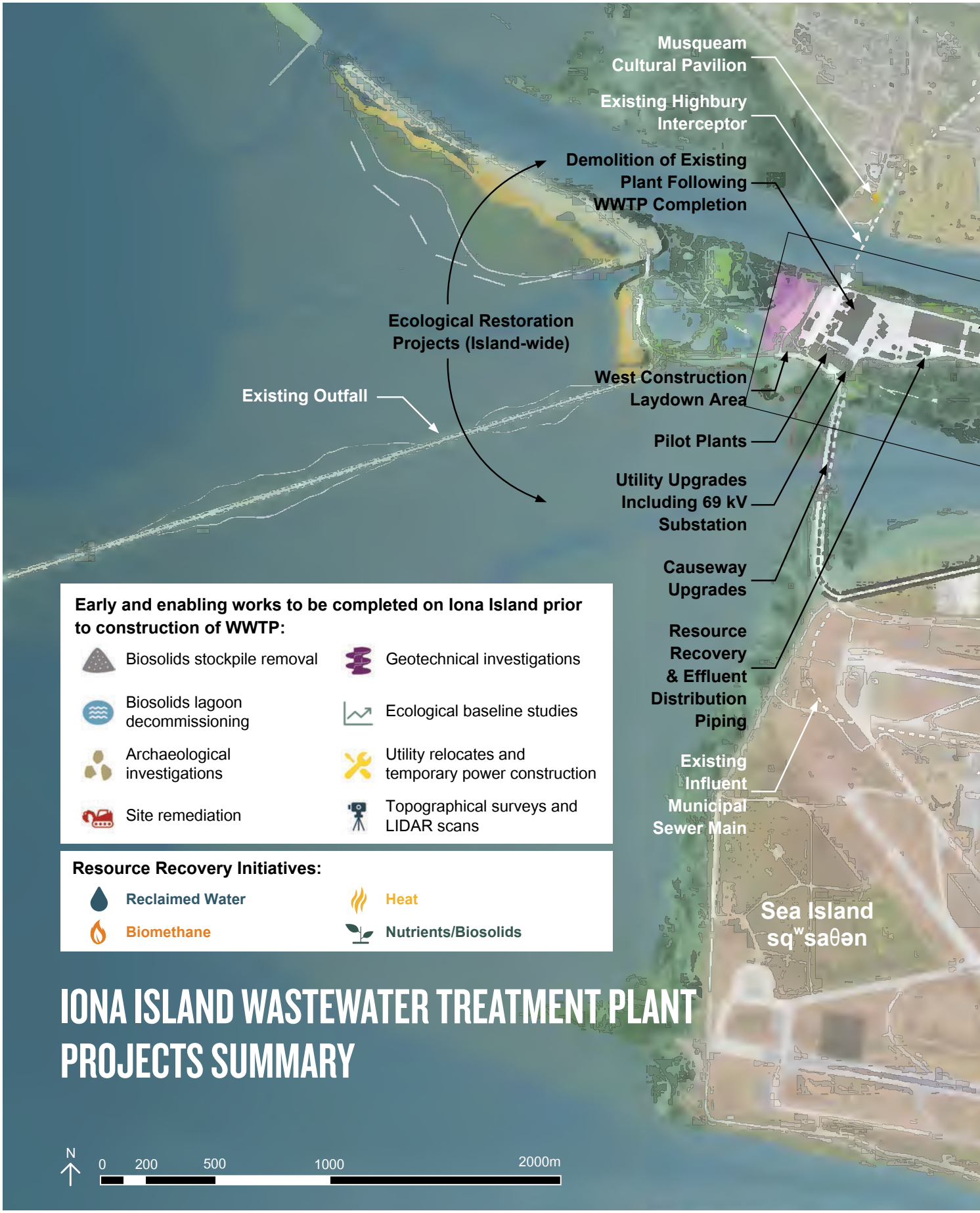
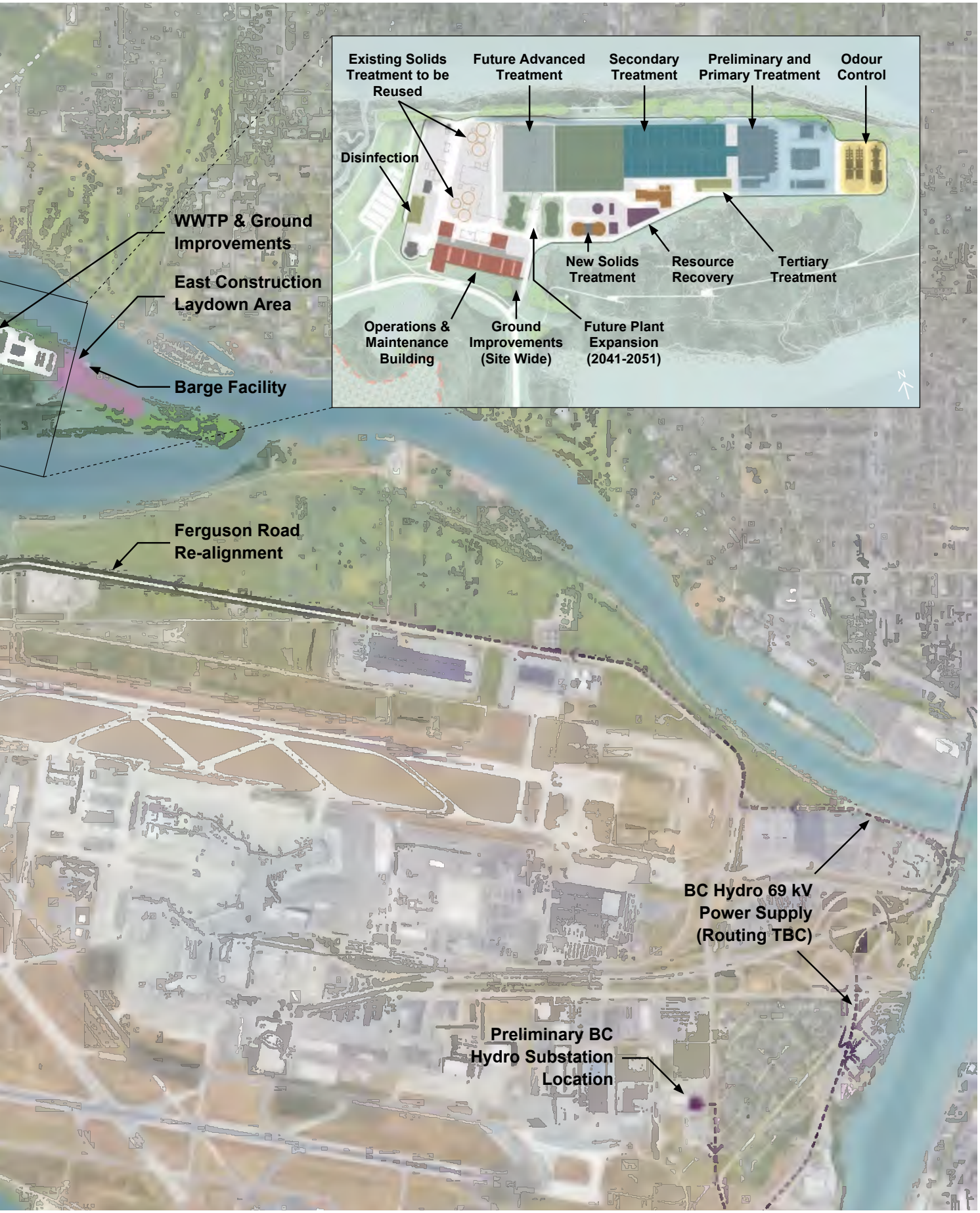


Figure 5. Map summarizing key works contemplated as part of the IIWWTP Projects.



**NOTE: Drawings as shown are conceptual and subject to additional study and design development.

02-C. SUMMARY OF PROJECTS

The conceptual design of the IIWWTP Projects described in this report establishes an integrated vision that the holistic scope of work seeks to achieve; however, the projects that will contribute to achieving this vision are independent undertakings, each subject to their own regulatory review and planning processes. Figure 5 provides a map of key works contemplated as part of the IIWWTP Projects, summarized by following list:

- IIWWTP upgrades to secondary and tertiary levels of treatment, as expanded on below
- Ferguson road, causeway, and utility upgrades
- Site access improvements
- Climate adaptation improvements
- Ecological restoration projects
- Park and community integration projects
- Interpretive programming

On their own, the required upgrades to the existing IIWWTP represent a major scope of work comprised of numerous related undertakings—many of which are significant projects in their own right. The following list highlights key works contemplated as part of the proposed IIWWTP upgrades:

- Reuse of existing liquid and solids treatment technologies, where feasible
- Site-wide ground improvements to meet provincial and national seismic design standards
- Replacement of preliminary and primary treatment infrastructure, including influent pumping
- Addition of secondary treatment infrastructure
- Addition of tertiary treatment and disinfection infrastructure
- Supplementation of existing solids treatment infrastructure with new two new digesters and ancillary components to treat extra solids removed by the upgraded liquid stream processes
- Addition of enhanced odour control
- Addition of integrated resource recovery initiatives
- Replacement of the Operations & Maintenance Building
- Provision of space for future expansion and advanced wastewater treatment infrastructure

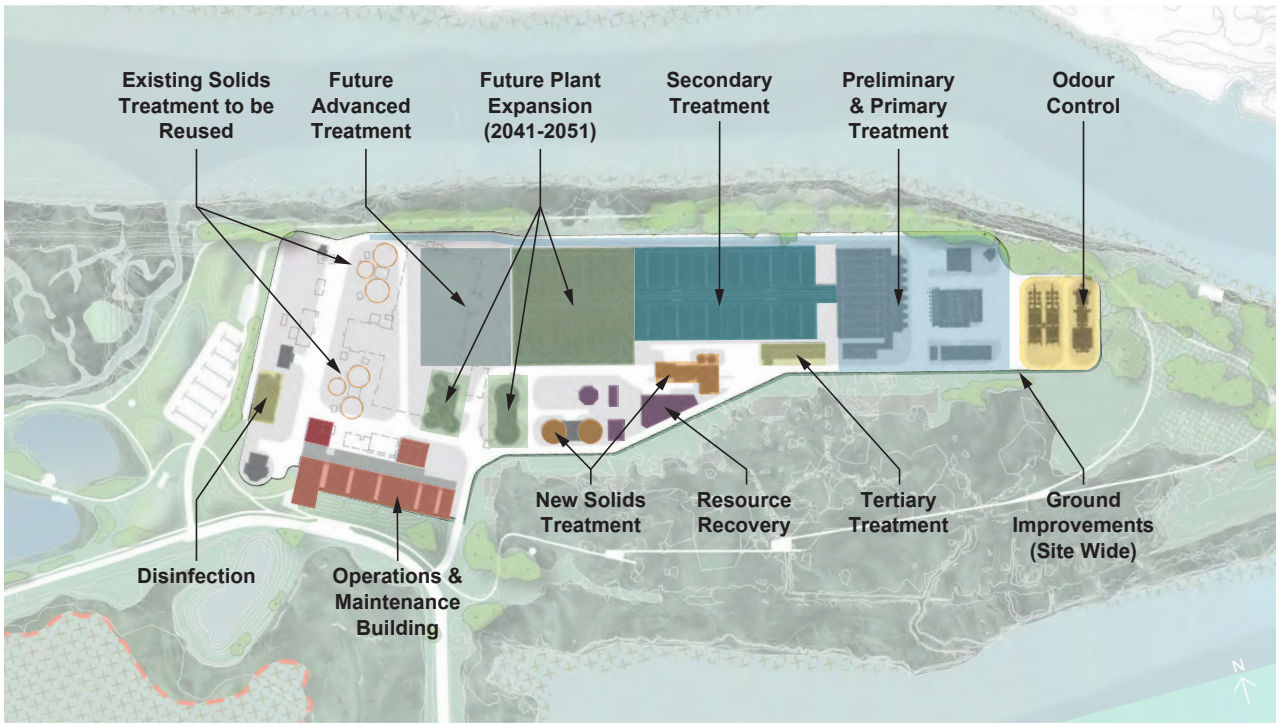


Figure 6. Key components of the proposed IIWWTP. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

02-D. BENEFITS OF PROJECTS

Once realized, the IIWWTP Projects will achieve significant benefits for the health of the region in five key categories:

1. Protect Public and Community Health

Beyond the public health benefits that will be realized through the cascading impacts of improved effluent quality, the IIWWTP Projects include several specific outcomes that will contribute to the long-term protection of our community's health. Upgrades to the existing IIWWTP will ensure safe, resilient, and effective wastewater treatment for the Vancouver Sewerage Area throughout the twenty-first century; ecological restoration projects and park improvements will protect and enhance the Iona Beach Regional Park in order to foster accessible relationships between people and nature in a region where natural area is rapidly decreasing; and odour emissions will be controlled through a series of odour control systems to the impact of the IIWWTP on nearby sensitive receptors including Musqueam, park users, hospitals, homes, and schools.

2. Restore and Enhance Ecosystems

The proposed upgrades to the existing IIWWTP will exceed the regulatory requirements for wastewater treatment through the provision of both secondary and tertiary levels of treatment to substantially improve the quality of treated wastewater being discharged to the Salish Sea. The upgraded IIWWTP will significantly contribute to mitigating impacts on marine ecosystems, provide a safeguard against a baseline of harmful chemicals in the waste stream, and provide flexibility for future advancements in wastewater treatment technology including integration of the growing knowledge around contaminants of emerging concern.

At the same time, the holistic suite of ecological restoration projects considered within the conceptual design will further support the regeneration of Iona Island's diverse ecosystems. The implementation of breaches, creation of off-channel habitat, and restoration of intertidal wetlands will enhance estuary health and fish habitat by reconnecting the river and sea; the regeneration and expansion of freshwater wetlands and uplands areas will enhance native and novel habitats on the island; and living breakwaters as well as thin-layer sediment augmentation will help tidal habitats keep pace with sea level rise.

Beyond Iona Island, the IIWWTP Projects will help contribute to region-wide carbon neutrality by 2050 through a variety of energy and resource recovery initiatives. Among other potential opportunities, effluent heat recovery will provide a significant heat source for off-site district energy systems; biogas produced in the digestion process will continue to be captured to generate heat and power for WWTP operations; biogas upgrading will produce renewable natural gas for injection to the existing FortisBC natural gas distribution grid; and reclaimed water will be used to replenish the island's freshwater wetlands with further opportunities to use nutrients from the WWTP to meet the ecological needs of receiving ecosystems as well as use reclaimed water for off-site beneficial use.

3. Create Resilient Infrastructure

The IIWWTP Projects include numerous considerations to improve the adaptability and resilience of our region's wastewater treatment infrastructure. The implementation of ecosystem-based flood protection strategies and an increased flood construction level will help ensure the viability of the IIWWTP in the face of the anticipated impacts of a changing climate; site-wide ground improvements will improve resilience to earthquakes; and reserved space for future advancements in wastewater treatment technologies will enable the implementation of emerging technologies and future treatment process upgrades over time.

4. Enable Meaningful Partnerships with Indigenous Groups

Metro Vancouver is working closely with Musqueam on the development of the IIWWTP Projects. Metro Vancouver is committed to respecting Musqueam traditional and cultural values and recognizes that the lower Fraser River Watershed benefits from their knowledge and ongoing stewardship of the Fraser River and Salish Sea.

Metro Vancouver recognizes that Musqueam use of the lands and waters at Iona Island, Sturgeon Bank, and throughout the Salish Sea has been disrupted in the past century and understands that their community's health and well-being is intricately linked to the health of the Fraser River estuary's ecosystems. To that end, the IIWWTP Projects have incorporated ecological priorities and interests raised by Musqueam at several workshops and meetings.

The IIWWTP Projects will continue to be approached as an opportunity to develop meaningful partnerships with Indigenous groups. Discussions with Musqueam and other Indigenous groups regarding their priorities and interests for the IIWWTP Projects are ongoing.

5. Stimulate Local Economy

The IIWWTP Projects will involve thousands of people in their execution, injecting hundreds of millions of dollars into the local economy. The IIWWTP Projects will look for all opportunities for participation by local contractors and suppliers during construction as well as long-term employment for local workers after the WWTP is operational. This will help to build the capacity and capability of workers in the Metro Vancouver region and the province of British Columbia to continue implementing projects of similar scale and ambition, further benefiting our region in the decades to come through the ongoing legacy of the IIWWTP Projects.

Figure 7. Aerial rendering over the proposed IIWWTP Projects in 2051 looking northeast. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

03. PROJECT CONTEXT

03-A. ECOLOGICAL HISTORY OF IONA ISLAND

The land now known as Iona Island had its origins less than 5,000 years ago as a sandbar at the mouth of a highly dynamic and unique Fraser River. Following its initial formation in the Fraser River estuary, higher parts of the island would have supported wet meadows while the foreshore would have supported rich tidal marshes and mudflats. High flows in early summer once enriched the island's lowlands with fine sediment, and innumerable tree trunks and root wads carried by the river would have been brought to the mudflats. Extensive shellfish beds were located off the island's banks, countless young fish grew in the tidal marshes and channels, and several species of mature fish—including herring, oolichan, and smelt—would return every year to spawn on the shores. The island's mudflats would have also been home to biofilm—a mix of bacteria and single-celled algae that yields a critical food source for the millions of migrating shorebirds that still come to the island today. Altogether, this rich and diverse ecosystem contributed to its importance for food gathering by Musqueam and other Indigenous groups.

European settlement quickly transformed the dynamics of the Fraser River estuary through dikes, jetties, and dredging. Dredging in the North Arm of the Fraser River began in the 1910s, followed shortly by the construction of the first part of the North Arm Jetty in 1917 to facilitate navigation. From the 1920s to the 1950s, dredge material from the North Arm was deposited on the island, allowing cottonwood forest and rare coastal sand ecosystems to develop on newly created uplands. These habitat types likely did not exist on the island prior to this intervention but they are now of vital importance for several at-risk plant communities and diverse bird species.

In the 1950s, site preparation for the first IIWWTP began. Work included extensive dredging, infilling of the former south channel to create a causeway, the creation of an elevated area for the WWTP, and the construction of six sludge lagoons. Today, the shallow open water of the sludge lagoons abounds with invertebrates that attract bats, swallows, diverse waterfowl, and shorebirds.

By 1990, two unused lagoons to the west were converted to freshwater wetlands and the Iona Beach Regional Park had been established. These freshwater wetlands are novel habitats whose cattail and bulrush marshes and open water areas support wading birds, waterfowl, river otters, beavers, mink, Pacific tree frogs, and many other species. The ponds are also classified as critical habitat for endangered western painted turtles.

Today, the unique microcosm of ecologically significant native and novel habitats found at Iona Island has become home to a rich diversity of species while also hosting the IIWWTP and the well-loved Iona Beach Regional Park. However, the impacts of infrastructural development on the island, industrial activities upriver, and a changing regional climate, among other factors, all threaten biodiversity in the Fraser River estuary. Protecting the uniqueness of life in this place is essential to protecting the health of all living systems, including our human communities.

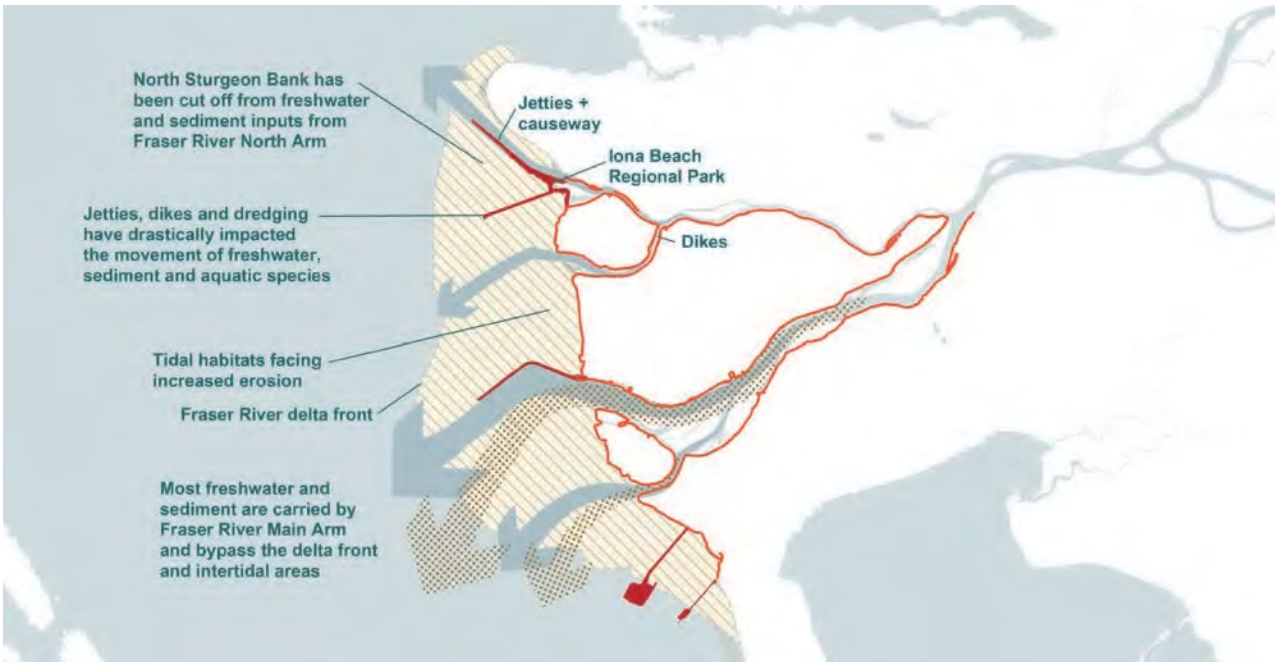


Figure 8. Freshwater and sediment flows from the Fraser River into the Salish Sea.

03-B. HISTORY OF THE IIWWTP

The foundation of Metro Vancouver's regional framework for wastewater treatment was established over a century ago. In 1913, a document known as the Lea Report established the principle of a joint sewerage district while recommending a separated sanitary and stormwater system. In 1953, an update known as the Rawn Report further established the administrative framework and treatment guidelines for the current Greater Vancouver Sewerage and Drainage District (GVS&DD) while recommending the continuation of the combined sanitary and stormwater system for the City of Vancouver that remains in place to this day.

Within this context, the original IIWWTP was commissioned in 1963. Following the recommendations of the Rawn Report, a dam was established across sqʷsaθən staɬəẁ (McDonald Slough) at the present-day causeway to prevent the backflow of primary effluent into the Fraser River and a south jetty was constructed to direct primary effluent away from City of Vancouver beaches. In the 1980s, a deep-sea outfall and effluent pump station were constructed to better disperse primary effluent in the receiving waters of the Salish Sea. While the capacity of the original IIWWTP has been moderately expanded over the years through various upgrades, much of the original infrastructure remains in place to this day and is nearing the end of its service life.

Today, the IIWWTP is still a primary treatment facility that serves approximately 750,000 residents in the Vancouver Sewerage Area, which includes the City of Vancouver, Musqueam, the University Endowment Lands, sqʷsaθən (Sea Island), and small portions of both the City of Richmond and City of Burnaby.

Since the release of the Lea Report and the Rawn Report, our knowledge of the sensitivity of the Fraser River estuary and Salish Sea to stressors, including wastewater, has grown immensely. At the same time, we have a better understanding of the contaminants within wastewater, including their persistence and harm to aquatic life. No longer is the focus simply on public health and conventional secondary treatment parameters (ie. biochemical oxygen demand and total suspended solids). Instead, concerns now take into account the cumulative effects of discharges at the watershed scale, including the impacts of nitrogen and phosphorus, the impact of climate change on marine waters, and the impact of contaminants of emerging concern. While the full impact of contaminants of emerging concern on aquatic life remains under study and continues to evolve, it is becoming clear that the ability to selectively target and treat these contaminants will be a critical focus of future wastewater treatment technology in the twenty-first century.

Figure 9. Aerial photograph over the existing IIWWTP and sludge lagoons in 2018 looking west (Metro Vancouver).

03-C. ARCHAEOLOGICAL ASSESSMENTS

With guidance from Musqueam, we know that Iona Island is a named place of importance for Indigenous groups, both throughout history and in the present. This assertion has been further supported through the findings of an Archaeological Impact Assessment carried out on Iona Island.

The initial field survey conducted as a part of the Archaeological Impact Assessment identified six areas with potential to contain archaeological materials. During field testing of these locations, one area at the eastern end of the island included archaeological materials: chipped stone tool fragments resulting from the creation of stone belongings. These materials were found in dredged material that had been placed on the island in the 20th century, though the materials themselves are presumed to be much older. These findings have been recorded in a site form and registered with the Government of British Columbia.

The results of the Archaeological Impact Assessment field program indicate that there are both shallow dredged sediments as well as much deeper deposits on Iona Island. While the former have been proven to contain archaeological materials, the latter has the potential to indicate earlier use and possible occupancy of the island. Based upon these results, the conceptual design team has recommended that an additional monitoring and testing program be developed in conjunction with Musqueam, which will focus on testing the area of the upgraded IIWWTP. Provisions for the historical, ecological, and traditional use of Iona Island should also be planned for in conjunction with Musqueam and other practitioners during the next phase of the IIWWTP Projects.

Figure 10. Iona Island in the 1920s prior to the development of the WWTP (City of Vancouver Archives).

03-D. MUSQUEAM CULTURAL CONTINUITY

The following comments were provided by Musqueam. It is not intended to be a comprehensive summary of input received from Musqueam, but these comments will form an integral part of discussions in developing a collaborative partnership between Metro Vancouver and Musqueam for the IIWWTP Projects.

Musqueam views cultural continuity, including cultural recognition, as an essential component of projects throughout Musqueam territory and is eager to undertake the project at xʷəyeyət with Metro Vancouver. It is important to recognize cultural recognition is only one component of cultural continuity. Cultural recognition is making Musqueam presence and culture more visible to Musqueam and non-Musqueam people, but cultural continuity also includes delivering tangible benefits to Musqueam people by revitalizing or enhancing aspects of Musqueam culture impacted by colonization.

For Musqueam, cultural continuity is about ensuring Musqueam knowledge, traditions and activities are passed on to future generations. Many projects in Musqueam territory have a long legacy of disrupting Musqueam cultural continuity. It is our view that we have an opportunity to instead undertake our collaborative work on this cultural recognition project in a way that also supports cultural continuity, through not only recognizing but revitalizing and enhancing Musqueam culture.

Musqueam wants to take a truly collaborative approach with Metro Vancouver by fully integrating Musqueam's perspective into the interpretive design and public-facing elements of both the treatment facility and the park on xʷəyeyət. As such, we propose an iterative process for developing key messages, identifying themes and reviewing and finalizing materials.

Collaboration on cultural continuity, including recognition, is a key component of the partnership Musqueam and Metro Vancouver are building for the project, which also includes expanding Musqueam access to xʷəyeyət. In our view, the most appropriate cultural recognition is inevitably linked to the story of Musqueam's past, current and future use of xʷəyeyət. As some of the ideas presented in this document demonstrate, cultural recognition concepts will evolve as the relationship between Metro Vancouver and Musqueam continues to take shape. We look to both share Musqueam's vision for cultural recognition on xʷəyeyət and engage in dialogue about the relationship between Musqueam and Metro Vancouver going forward.

High-Level Concepts

After internal discussion, several high-level concepts emerged that form the foundation of Musqueam's vision for cultural recognition efforts for the project. These concepts present opportunities to advance the overarching concept of cultural continuity and should be integrated into interpretative designs for the park and other public-facing elements of the project.

hən̓q̓əmin̓əm̓

hən̓q̓əmin̓əm̓ is the ancestral language of the Musqueam people and the language is inseparable from the territory itself. This project can support cultural continuity through both cultural recognition and enhancement. Integrating hən̓q̓əmin̓əm̓ terms for places, species and concepts into the interpretative elements of the park provides recognition for Musqueam's distinct understanding of and presence in these places. xʷəyeyət and other sites surrounding it are part of a network of Musqueam place names that contribute to a sense of place and identity through their meaning to Musqueam people and by tying together past, present, and the territory. Including elements designed to support Musqueam people in speaking and hearing hən̓q̓əmin̓əm̓ spoken would facilitate cultural enhancement through enabling Musqueam people to connect more deeply to Musqueam territory.

Musqueam's Stewardship Responsibility

Musqueam's responsibility to act as stewards of our cultural heritage and traditional territory is an important component of Musqueam's sniw̓ (teachings). Ensuring the tangible and intangible resources that sustain Musqueam culture are available for future generations is vitally important to Musqueam people. These heritage resources include both tangible and intangible components and are not limited to "archaeological" sites. A key message of the project's cultural recognition should be that Musqueam's work with Metro Vancouver to protect heritage resources and restore the ecosystems on and connected to xʷəyeyət is an extension of this stewardship responsibility.

Musqueam's commitment to fulfilling our stewardship responsibility is evident in Musqueam's work with Metro Vancouver to protect and enhance sensitive ecosystems in our territory. As Metro Vancouver has already recognized for this project, xʷəyeyət has several micro-climates, which can foster less commonly seen species, including some that have been traditionally harvested by Musqueam. The opportunity to repopulate endangered species and species that are sparsely available in Musqueam territory is a priority for Musqueam. The project could support this by refining the planting list with studies on which culturally and ecologically significant species are viable in the project site. An important element of both Musqueam and Metro Vancouver's work on this project is recognition that xʷəyeyət is connected to an interrelated network of ecosystems. This is clearest in the work to enhance the island's aquatic habitats and improve connectivity for migrating fish species, including salmon, eulachon and sturgeon. The public facing components of this project should make clear to visitors that this work is a component of Musqueam's work, as stewards, to ensure the health of Musqueam territory and the availability of its resources for future generations.

Figure 11. Aerial photograph over the existing IIWWTP looking southwest towards Vancouver Island, an important Musqueam cultural view corridor (Metro Vancouver).

Rebuilding Classrooms

Musqueam views xʷəyeyət acting as a live classroom, both for Musqueam members and for the general public. Classrooms for Musqueam-to-Musqueam, Musqueam-to-public, and Metro Vancouver-to-public knowledge transfers are all important components of what can be achieved through this project. Furthermore, Musqueam wants to collaborate with Metro Vancouver on educating the public about the facility and the park by incorporating Musqueam knowledge and hən̓q̓əmin̓əm̓ into outreach and educational materials.

Musqueam sharing knowledge with Musqueam people and the public would require both spaces that are accessible to Musqueam, but less accessible to the public and spaces where the public is invited to learn from Musqueam and Metro Vancouver. This idea is based in the reality that Musqueam traditional knowledge is taught and learned by being on the land and the physical place where that knowledge originated. This requires uninterrupted access to allow for the learning process to take place. The exact locations for this learning can be determined through ongoing collaboration and dialogue, but this is an important concept to establish early in the process. Musqueam is interested in having sections of the park temporarily closed to the public at designated times to facilitate Musqueam cultural or rights-based uses. We feel communicating the temporary closures itself communicates a vital message to the public – Musqueam continues its cultural and traditional practices throughout its traditional territory.

Ongoing Commitment to Education

In Musqueam's view, effective education requires an ongoing commitment and cannot be accomplished with a one-time investment in signage. Neither the land nor knowledge is static, so Musqueam is interested in developing a plan and legacy fund to support ongoing educational opportunities and ensure the upkeep of educational resources on xʷəyeyət. This type of commitment could facilitate Musqueam educators in sharing valuable knowledge with visitors and transform xʷəyeyət into a distinct educational space and place in Musqueam territory. Musqueam envisions the work on this project as a component of a larger potential collaboration with Metro Vancouver to promote cultural continuity and recognition throughout Metro Vancouver.

Cultural Recognition Processes

In terms of the process for cultural recognition, Musqueam is interested in creating a Musqueam-Metro Vancouver working group that will continue to meet regularly throughout and beyond the completion of the project. This will ensure that cultural recognition remains a priority beyond the design and installation of interpretative signage and that necessary updates and repairs are made.

The work of cultural recognition is not quick and will require back and forth between Musqueam and Metro Vancouver to ensure the result is representative of Musqueam interests. This will involve work with Musqueam knowledge holders, time spent at the project site, and the continual building of relationships. The creation of a working group with Musqueam knowledge holders will be vital, and funding will be required to adequately compensate those providing their knowledge.

It is essential Musqueam is able to retain all intellectual property it shares through participation in this process and receives copies of information, resources and final designs created for future educational purposes.

Figure 12. The Musqueam Cultural Pavilion located directly across the North Arm of the Fraser River from the IIWWTP.

03-E. IONA ISLAND TODAY

Sitting at the mouth of the North Arm of the Fraser River within the City of Richmond, Iona Island is surrounded by a diverse mix of wild and developed land. McDonald Slough is to the southeast, Sturgeon Bank and the Salish Sea are to the west, and what is now known as Musqueam Indian Reserve No.2 is to the north.

Iona Island itself is managed in part by Metro Vancouver Regional Parks, who maintain the Iona Beach Regional Park, Metro Vancouver Liquid Waste Services, who operate the IIWWTP, and the Vancouver Fraser Port Authority, who manage the north jetty. McDonald Slough is currently used extensively for log boom storage, owing to its sheltered position along the North Arm of the Fraser River. The adjacent section of the Fraser River was routinely dredged in the past by the Vancouver Fraser Port Authority, but maintenance of the navigable channel is now the responsibility of local jurisdictions. To the northeast of the island is a residential community on Deering Island, the semi-rural residential neighbourhood of Southlands, and several golf courses. To the south is Sea Island, home to the Sea Island Conservation Area, the Vancouver International Airport, and what is now known as Musqueam Sea Island Indian Reserve No.3. The only road access to the island is via Ferguson Road, which passes along the north side of the airport and a zone of airport-related logistics facilities.

Currently, land tenure on Iona Island represents a complex scenario. Ownership is comprised of a mix of leased and fee simple land, split between the Metro Vancouver Regional District (MVRD), the GVS&DD, the Vancouver Fraser Port Authority, and the Crown. In many cases, current land tenure is not consistent with present or future land use. As a result, land tenure changes will be required to rationalize property boundaries and accommodate the revised layout of the upgraded WWTP while also protecting sensitive ecosystems. Ultimately, these changes will result in consolidated GVS&DD lands for the construction and operation of the WWTP with the added benefit of a net increase in MVRD park land.

The Iona Beach Regional Park encompasses 733 hectares and attracts around 400,000 visitors per year to the rugged character of the island and its long beaches.

The flat site appeals to walkers and cyclists who are attracted to the island's quiet trails as well as to the outfall jetty trail. Iona Island is connected to Richmond, Vancouver, and the region's transit systems, with future connections planned as part of Metro Vancouver's *Regional Greenways 2050* strategy. Additionally, the island is internationally recognized as an Important Bird and Biodiversity Area because of its habitat diversity and location along the Pacific Flyway: a bird migration route that extends from Patagonia to Alaska. Further, the foreshore and surrounding area that makes up the Sturgeon Bank Wildlife Management Area is designated as a Ramsar wetland site, marking its international significance.

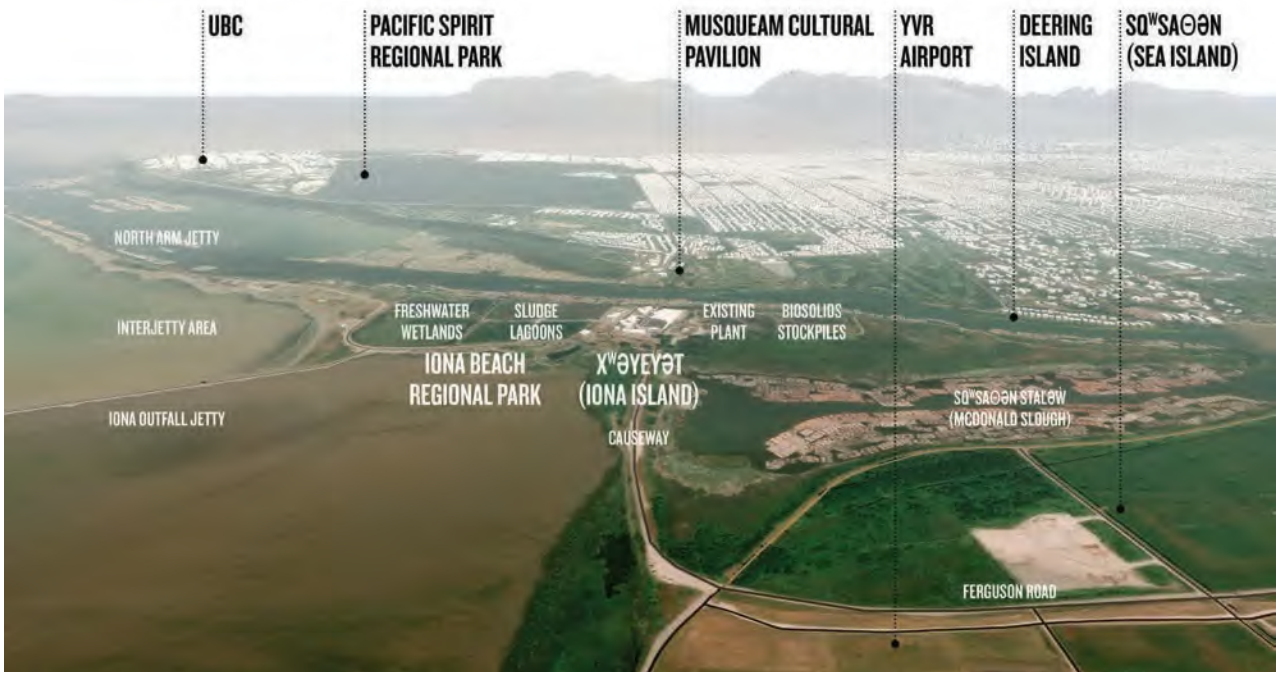


Figure 13. Location diagram indicating Iona Island's major identifying features and surrounding context in 2020, highlighting the inherent diversity and complexity of the IIWWTP Projects' site.

03-F. CLIMATE CHANGE

Research, such as that documented in Metro Vancouver's *Climate Projections for Metro Vancouver* and *Climate 2050 Strategic Framework*, indicates that human-induced climate change will have profound impacts on the physical and cultural life of the region. Climate change is expected to result in significant changes to regional average and extreme weather conditions. Continued changes to average and extreme weather conditions will affect the frequency, severity, and extent of climate hazards. For the Iona Island area, the following conditions are projected:

- Drier summers along with wetter falls and winters
- Warmer average winter and summer temperatures
- Projected sea level rise of approximately 1.0 metre by 2100

Among other impacts, these changes are expected to result in infrastructure stresses, climate hazards, reduced air quality, possible electrical service interruptions due to forest fires, and a loss of tidal ecosystems due to sea level rise.

The effects of many of these impacts have already been felt within the region today, including during the extreme heat and rainfall events experienced by Metro Vancouver in 2021. At Iona Island, recent king tides have also caused unprecedented levels of inundation and erosion. While our understanding of the impacts of a changing climate continues to evolve, it is clear that adapting to these current and future impacts will be vital to maintaining the viability of the IIWWTP and the surrounding regional park throughout the twenty-first century.

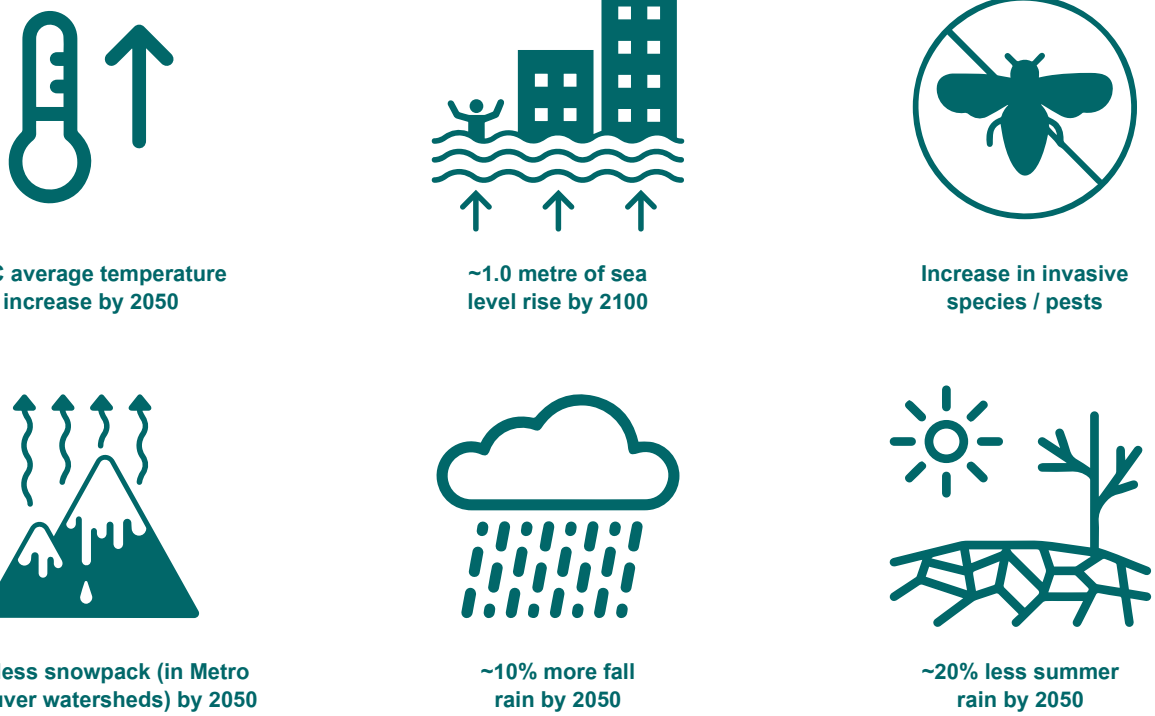


Figure 14. Regional climate change impacts as outlined by Metro Vancouver's *Climate Projections for Metro Vancouver* and *Climate 2050 Strategic Framework*.

Figure 15. Aerial rendering over the proposed IIWWTP Projects in 2051 looking north depicting the high water level. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

04. PROJECT DEFINITION APPROACH & DESIGN STRATEGIES

04-A. INTEGRATED DESIGN PROCESS

The Project Definition Report (PDR) for the IIWWTP Projects summarized in this document is the result of a comprehensive Integrated Design Process (IDP) designed to weave together a diversity of expertise including engineering, architecture, coastal geomorphology, ecology, archaeology, Indigenous understanding, and community understanding of Iona Island and the surrounding area. As this IDP continues through implementation phases it will serve to strengthen relationships between Metro Vancouver, Iona Island, and the community; optimize synergies between ecological restoration and WWTP projects; initiate and develop a range of social and cultural benefits; restore ecological systems; help achieve higher performance for lower cost; and set the stage for successful implementation by developing champions to support and expand upon this transformational work. Through an ongoing IDP, the PDR and corresponding conceptual design will create a strong foundation for future generations to continue to build upon.

From the outset of the project definition phase in 2018, Metro Vancouver and the conceptual design team have continually developed an IDP tailored to the diversity of the IIWWTP Projects that centers around a consistent habit of cross-disciplinary engagement and regular reporting. Through this tailored IDP, the development of the PDR has focused on exploring interrelated synergies between the proposed IIWWTP upgrades and the ecological restoration projects to achieve an integrated vision which includes larger socio-economic and ecological systems transformations.

Integrated Design Process Principles

Consistent with industry standard best practices, the IDP for the IIWWTP Projects has been approached as a living process, whereby there is a continuous practice of improving technical and ecological relationships, as well as relationships between people involved. In this way, the whole evolves to be greater than the sum of the parts. This living process continues to be guided by three overarching principles:

- Approaching technical and ecological systems as a deeply interrelated whole
- Ensuring the entire team, with community input, works together as a coordinated organism to solve problems with the perspectives of different disciplines
- Understanding the integration work as an ongoing evolutionary process and practice

To successfully realize the IIWWTP Projects, an IDP will continue throughout the transition, procurement, and implementation phases.

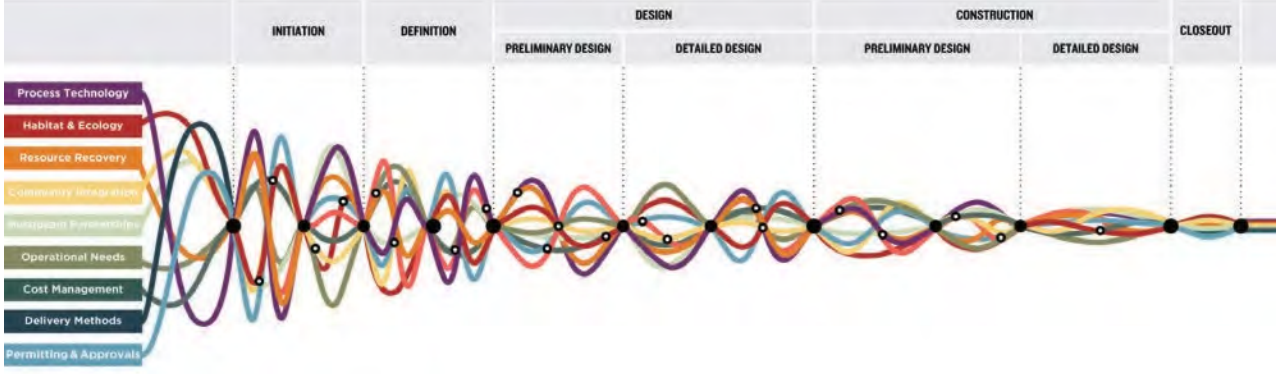


Figure 16. The diagram above adapts the typical Integrated Design Process to the IIWWTP Projects.

04-B. GUIDING PRINCIPLES

At the outset of the project definition phase, the broad project team created the following principles, which have guided the development of the conceptual design and PDR. These have served as a touchpoint and north star through the IDP, helping identify the potential for an integrated project, supporting each participant engaged in the process, building institutional capacity within Metro Vancouver for ongoing corporate evolution, and laying the foundation for work that will enhance the resilience of the region and serve as a legacy for generations to come.

As developed by the broad project team during the IDP, the guiding statement for the project definition and conceptual design of the IIWWTP projects was:

To *meaningfully shift how we approach adaptability, resilience (including to climate change) and effects on living systems through creating an adaptive, effective, and resilient wastewater treatment facility,*

in a way *that inspires Metro Vancouver's citizens to nurture the evolutionary health of this place's unique social and ecological resources by stimulating a transformational web of interrelationships,*

so that *cascades of benefit are created and continually evolved for the inhabitants of the Greater Vancouver region, the Salish Sea, and the global community for seven generations and beyond.*

Building on the statement above, the broad project team then developed a series of principles to shape the ongoing development of the PDR:

1. **Stimulate interconnectedness...**
   through the development of place specific ecological systems
2. **Build collaboration...**
   between all communities in this place
3. **Develop a will for stewardship...**
   in all who touch the Projects
4. **Advance wastewater treatment...**
   at home and abroad
5. **Consider Triple Bottom Line effects...**
   when making all decisions
6. **Realize potential...**
   using an integrative process across boundaries and across time

The IDP identified that the primary driver across all disciplines involved in the IIWWTP Projects was the overall physical and spiritual health of the Salish Sea. This driver acted as an overarching framework in which all other aspects of the IIWWTP Projects were nested. Figure 18 below serves to visualize these nested scales.

Figure 17. Diagram depicting the nested scales of health in the IIWWTP Projects.

04-C. WASTEWATER TREATMENT STRATEGIES

The project definition and conceptual design have sought to achieve a visionary future for wastewater treatment at the IIWWTP through the implementation of the following series of strategies:

- Improve effluent quality using secondary and tertiary level treatment complete with seasonal nitrogen removal to target conventional parameters of biochemical oxygen demand, total suspended solids, and organic matter as well as increase removal of contaminants of emerging concern to reduce stressors on the receiving environment and improve the health of the Salish Sea
- Utilize biogas (with purification to Fortis distribution quality) and effluent heat recovery to reduce regional greenhouse gas emissions and move towards region-wide carbon neutrality by 2050
- Recover resources from wastewater such as the use of treated effluent as reclaimed water and the production of biosolids for beneficial use
- Replace aging infrastructure that is nearing the end of its service life
- Reduce odours and related impacts on the neighbouring communities
- Be a research incubator for wastewater treatment technologies and related ecological restoration approaches
- Attract new staff to work at IIWWTP and Metro Vancouver in a safe and modern environment
- Engage with the community to tell the story about wastewater treatment, resource recovery, and ecological restoration

Figure 18. Strategies to achieve a visionary future for wastewater treatment at the IIWWTP.

Staged Implementation and Design Horizons

The wastewater treatment strategies included in the conceptual design focus on serving the Vancouver Sewerage Area until 2101. This long design horizon requires a flexible approach be taken to infrastructure design to accommodate future changes in population, regulations, ecosystem health, technology, climate, resource recovery, and societal expectations for treatment standards.

The proposed IIWWTP upgrades are designed to meet the regulatory requirements for the provision of a secondary level of treatment and are expected to be commissioned and put into service by 2035. These upgrades are designed to serve the needs of the Vancouver Sewerage Area until 2051 and will include a near complete replacement of the existing IIWWTP with new secondary and tertiary treatment infrastructure. However, viable components of the existing IIWWTP will be reused, including the deep-sea outfall, effluent pump station, and solids treatment facilities including digesters and ancillary infrastructure.

Table 1 presents a summary of the population projections and corresponding design flows used to establish the design basis for the conceptual design of the IIWWTP Projects. The cost estimates presented in Section 06-C account for the infrastructure required to accommodate population growth through 2051.

In 2051, an expansion will be required to accommodate projected population growth and serve the needs of the Vancouver Sewerage Area through 2101. The existing digesters and their ancillary components will also be replaced alongside this planned expansion. Table 2 summarizes the IIWWTP's staged implementation timeline and corresponding design horizons.

Table 1. Vancouver Sewerage Area Population Projections and Corresponding IIWWTP Design Wastewater Influent Flows

PARAMETER	YEAR 2031	YEAR 2051	YEAR 2101
Population	855,982	945,870	1,124,576
Average Dry Weather Flow (ML/d)	396	416	473
Annual Average Flow (ML/d)	496	516	523
Peak Wet Weather Flow (ML/d)	1530	1530	1530

Table 2. IIWWTP Staged Implementation and Design Horizon Timeline

YEAR	CONDITION
2035	Implementation of the proposed IIWWTP upgrades to meet the secondary treatment regulatory requirement.
2051	Design horizon for the proposed IIWWTP upgrades expected to be commissioned in 2035.
2051	Implementation of the future IIWWTP expansion to accommodate population growth.
2101	Design horizon for the future IIWWTP expansion expected to be commissioned in 2051.

**NOTE: Dates shown in Table 2 are subject to change.

Siting Strategies

While the IIWWTP Projects includes work spanning across and beyond Iona Island, the revised layout of the upgraded IIWWTP will occupy area primarily to the east of the existing WWTP. The revised layout has been carefully considered in relation to several existing site constraints as well as feedback received from Musqueam, Metro Vancouver stakeholders, Metro Vancouver Regional Parks, and the public.

The following summarizes the main siting strategies considered for the revised layout:

- Provide a setback from the high-water mark of all existing foreshore and wetland areas
- Return the existing sludge lagoons to park use while maintaining their role as an important habitat for migratory birds
- Mitigate visual impacts on culturally important Musqueam views towards Vancouver Island to the west of the WWTP
- Avoid impacts to sensitive ecosystems and salmon bearing streams to the south of the WWTP
- Prioritize areas predominantly overgrown with invasive species on the eastern side of Iona Island

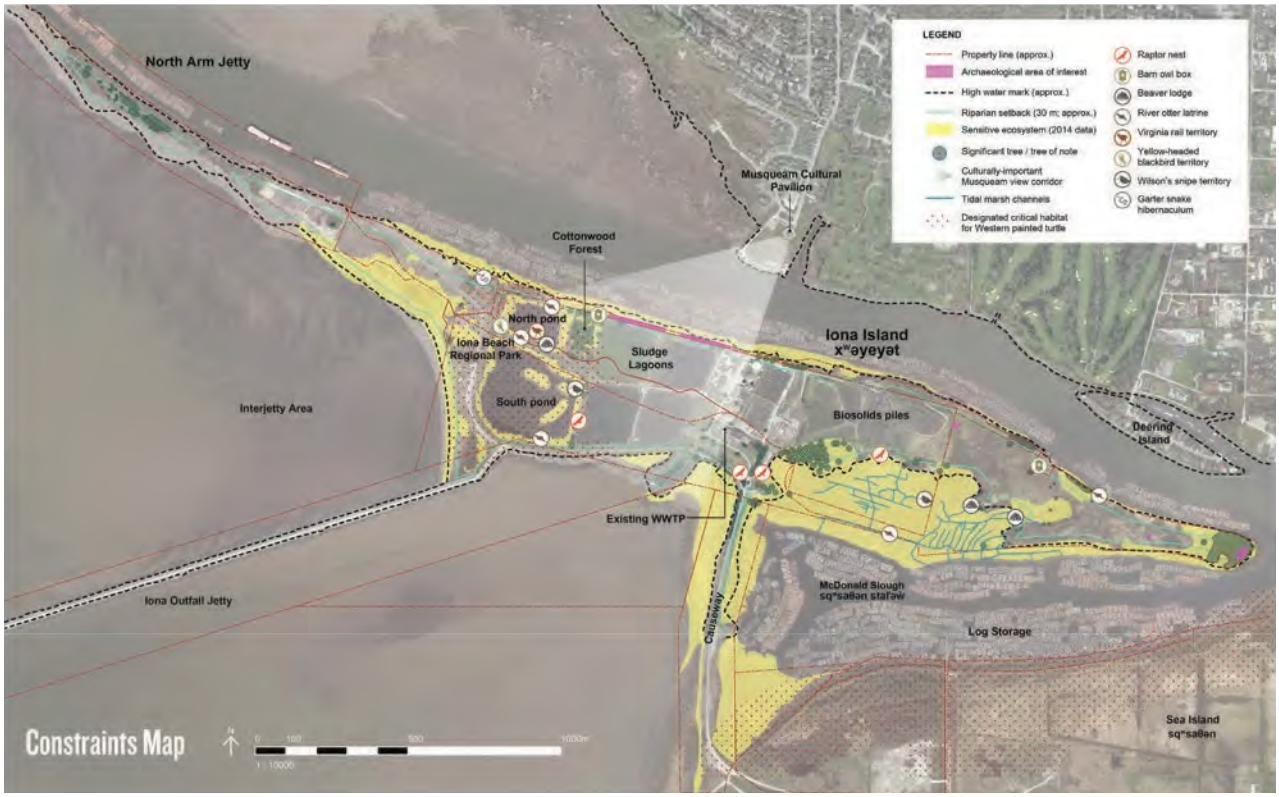


Figure 19. Constraints Map summarizing key considerations driving the proposed IIWWTP layout.

04-D. SUSTAINABILITY STRATEGIES

Metro Vancouver frameworks, plans, and policies establish a clear vision for long term sustainability throughout the region. In response, Metro Vancouver and the conceptual design team has established several aspirations for the IIWWTP Projects and subsequent plant expansion in support of Metro Vancouver's long term regional vision. These aspirations are:

1. **Contribute to Metro Vancouver's long term regional vision of being carbon negative**
2. **Treat water as a precious resource**
3. **Produce minimal waste**
4. **Be a magnet for innovation**
5. **Be an educational hub**
6. **Be a partnerships anchor**
7. **Be a catalyst for partnerships with First Peoples**
8. **Be a catalyst for regeneration**
9. **Be a catalyst for climate change adaptation and resilience**
10. **Be in service to all living systems**

To support the completed works in contributing to these aspirations, the conceptual design team has evaluated a wide range of sustainability rating systems as well as framework and policy contexts within Metro Vancouver. While several rating systems have been identified as important tools to measure the sustainability performance of the proposed IIWWTP upgrades expected to be commissioned in 2035, these systems are unable to evaluate the performance of the IIWWTP over its entire lifecycle, including upgrades and expansion in 2051 and the corresponding design horizon of 2101.

True systems regeneration is living and evolving over time. An adaptive framework is necessary to measure the ongoing resilience and regenerative capacity of the system to adapt to shifting environmental dynamics and a changing climate. This discontinuity between 2035 rating system targets and the regenerative aim for the entire lifecycle of the IIWWTP Projects is what the team calls "the regenerative gap."

To address this gap, key performance indicators have been established for the sustainability aspirations, providing a roadmap to achieve true regeneration over time. Within the key performance indicator matrix, 2035 targets set an intermediary goal for the performance of the proposed upgrades. As work extends beyond the perimeter of the WWTP and considers the holistic health of the island and its foreshore, each of the 2035 targets and design strategies have been established at three scales: the Welcome Centre and Operations & Maintenance Building, the WWTP, and the island.

Together, the following complementary rating systems and regenerative design strategies are integrated within the conceptual design:

- **LEED Gold** (minimum performance) for the Welcome Centre and Operations & Maintenance Building.
- **Envision Gold** (minimum performance) for the WWTP process buildings.
- **Salmon-Safe Certification** considered for the WWTP.
- **Regenerative design strategies** embedded within all projects.

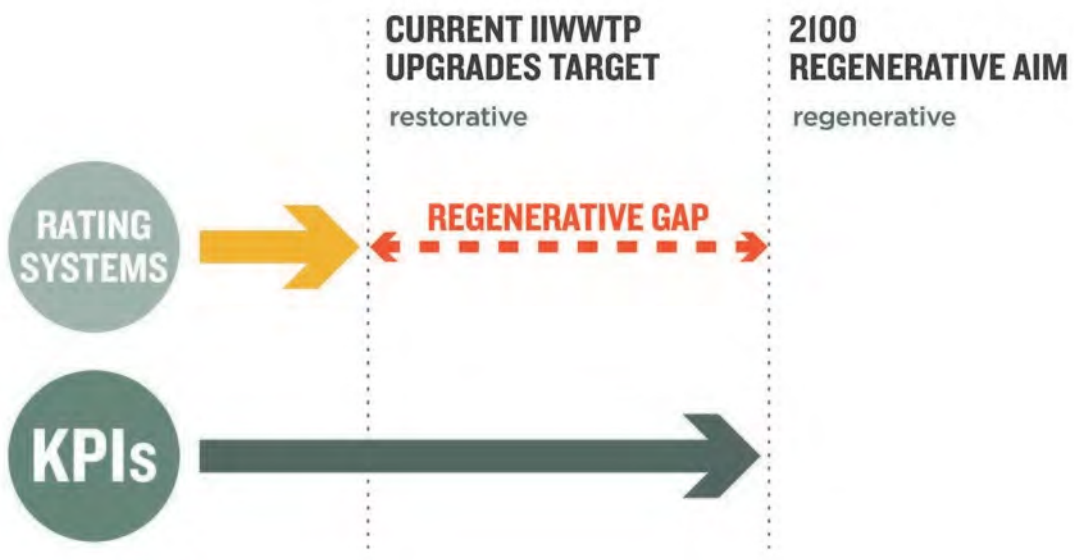


Figure 20. Diagram indicating the ability of the key performance indicators (KPIs) to address the regenerative gap.

IRR & CIRCULAR ECONOMY

1. Biogas exported off-site
2. Buildings and process heating from heat pumps on effluent water stream
3. Biosolid nutrients for offsite use
4. Rock and grit for flood protection build-up
5. Reclaimed effluent water for irrigation, ecosystem restoration, and commercial use
6. District Energy to adjacent communities
7. Pilot programs test new technology

EMBODIED CARBON

8. Low-carbon concrete
9. Mass timber construction
10. Reuse of existing treatment facilities
11. Sourcing local materials
12. Design for durability

CARBON NEGATIVE

13. Solar photovoltaics
14. High-performance building envelopes
15. Massing and orientation for passive daylighting & ventilation
16. High-efficiency lighting & HVAC in compartmentalized program zones

WATER

17. Rainwater collection
18. Reclaimed water for non-potable use
19. Low-irrigation landscaping

HEALTH & WELLBEING

20. Red List Free materials
21. Biophilic design
22. Views and access to nature and daylight
23. Operable windows

Figure 21. Abbreviated summary of all three scales of sustainability strategies applied to the IIWWTP Projects.

ECOSYSTEM REGENERATION

24. Restoring native and novel habitats
25. Jetty & causeway breaches connect aquatic habitat
26. Transforming sludge lagoons into healthy wetlands
27. Bird-friendly glazing

COMMUNITY

28. Siting & screening to reduce visual impacts
29. Odour control
30. Construction & operational noise mitigation
31. Expanded park amenities and trails
32. Musqueam & community partnerships
33. Welcome Centre and educational hub
34. Interpretive programming

CLIMATE CHANGE ADAPTATION

35. Flood construction level at 7m geodetic
36. Managed retreat of foreshore habitat
37. Ecology-based flood mitigation
38. Landscape-based stormwater management
39. Breakwaters protect against storm surges

TRANSPORTATION

40. Electric vehicle charging
41. End-of-trip facilities for staff
42. Bus lay-bys and turnarounds
43. Expanded parking for park visitors
44. Enhanced cycling paths

**NOTE: Drawings as shown are conceptual and subject to additional study and design development.

04-E. CLIMATE CHANGE ADAPTATION STRATEGIES

As outlined in Section 03-F, the anticipated impacts of a changing climate pose significant threats to Iona Island and the broader region. In order to maintain the viability of the IIWWTP throughout the twenty-first century, the conceptual design includes several targeted actions to respond to these climate impacts.

By reinforcing the scope of the proposed IIWWTP upgrades with regards to adaptability, resilience, and improved effects on living systems, this work will help further Metro Vancouver's goals and targets of building regional resilience and achieving region-wide carbon neutrality by 2050. Targeted actions for responding to climate change and contributing to region-wide carbon neutrality as incorporated in the conceptual design are outlined below.

Rise Above Sea Level Rise

Sea level rise is projected to have the most tangible impact on the IIWWTP Projects. The provincial guideline documents project approximately 1.0 metre of sea level rise by 2100. The conceptual design responds to these challenges in the following ways:

- Establishing a flood construction level for the WWTP's buildings and structures at 7.0 metre geodetic to account for sea level rise, land settlement, high tide, storm surge, wave effect, and a freeboard safety factor
- Locating all critical infrastructure (such as electrical equipment and control rooms) at or above the flood construction level
- Using watertight protection for any non-critical interior spaces located below the flood construction level
- Raising all roadways and bridges over time
- Incorporating sea level rise adaptation measures into tidal habitat restoration projects, including breaches and breakwaters to help foreshore areas receive and retain more sediment as well as thin-layer sediment augmentation where appropriate

Integrate Technical and Living Systems

The anticipated effects of climate change on both soft and hard infrastructure will be significant. Beyond addressing projected sea level rise, the conceptual design responds to these challenges in the following ways:

- Integrating technical and living stormwater infrastructure so that ecosystems and the IIWWTP will both benefit from their shared presence on Iona Island
- Partnering with Musqueam and other Indigenous groups when imagining and executing work on Iona Island to advance the process of reconciliation in British Columbia and Canada using *the Declaration on Rights of Indigenous Peoples Act* and the *United Nations Declaration on the Rights of Indigenous Peoples* as guides
- Enhancing access while retaining the wild character of Iona Beach Regional Park so that it can remain a place of respite and contemplation.
- Diversifying the range of park experiences so that the park can inspire a broader range of visitors
- Developing a robust interpretive program to tell the stories of the past, present, and future of Iona Island, including the important role of the IIWWTP in the health of the region

Enhance and Restore Existing Ecosystems

The island's diverse ecosystems will be impacted by climate change. Tidal habitats will have a chance to migrate upland where space allows but there is also opportunity to help them keep pace with sea level rise through sediment augmentation. Terrestrial habitats will be threatened by increased groundwater salinity, hotter temperatures, drier summers, wetter winters, and potential new pests and diseases. The conceptual design responds to these challenges in the following ways:

- Benefiting aquatic ecosystems on Sturgeon Bank and across the Salish Sea through improved effluent quality
- Expanding habitat, improving resilience, and increasing the health of the island's ecosystems through ecological restoration projects
- Increasing forest cover along the Fraser River and around freshwater wetlands to help shade riparian areas and mitigate hotter summers
- Recharging freshwater wetlands with high quality treated effluent from the upgraded IIWWTP to maintain water levels, particularly during the summer months
- Enhancing estuary health and fish habitat by reconnecting the river and sea through breaches, the creation of off-channel habitat, and restoration of intertidal wetlands

04-F PARK & COMMUNITY INTEGRATION STRATEGIES

Throughout the project definition phase, Metro Vancouver and the conceptual design team have undertaken an extensive engagement process to work with a wide variety of organizations impacted by the IIWWTP Projects, including neighbours, park user groups, local government, and Indigenous groups. From these many engagements it is clear the IIWWTP Projects are seen as a once in a century opportunity to lead by example and work with nature while providing essential park and wastewater infrastructure as well as a suite of ecological restoration projects.

Park and community integration strategies for the IIWWTP Projects were developed through the feedback received through this extensive and ongoing engagement process as well as in reference to Metro Vancouver's *Regional Parks Plan* and *Regional Parks Natural Resource Management Framework*. The following strategies have been incorporated in the conceptual design:

- **Integrate Musqueam priorities:**
  Express respect for the cultural values and deep history of Musqueam and other Indigenous groups through site layout and other aspects of the WWTP design.
- **Support Musqueam knowledge transfer:**
  Partner with Musqueam to share the richness and diversity of the environment through education.
- **Foster connections with nature:**
  Foster and enhance connections with nature by protecting and enhancing the wild and secluded character of the park.
- **Create park-wide education opportunities:**
  Use park programming, educational opportunities and interpretive elements to foster a deeper understanding of the site's ecological and cultural importance, treatment processes and Metro Vancouver's mandate.
- **Enable partnerships:**
  Create opportunities for partnerships with conservation organizations, researchers, and others to be involved with research and education, such as by providing meeting and research space for groups.
- **Protect and restore ecosystems:**
  Ensure that the siting and layout of the IIWWTP responds to ecologically sensitive areas and the community's desire to minimize the visual impact of the WWTP where possible.
- **Keep park visitors safe:**
  Use buildings, fences, and other elements to create a safe and secure separation between public and WWTP activities.
- **Use the IIWWTP to create a park welcome experience:**
  Use the public-facing buildings and site design to create a welcoming experience for park visitors.
- **Minimize impacts of the IIWWTP on neighbours and park visitors:**
  Minimize the impacts of odour, noise, light, traffic and construction disturbance on neighbours and park visitors.

Specific ecological restoration strategies for Iona Island and its foreshore have been developed through background research and discussions with a number of individuals and groups working on issues related to Iona Island and the health of the Fraser Estuary. Discussions were and are being held with the Musqueam, subject matter experts, stakeholder groups, environmental stewards, and the broader public. This work has revealed the extent of past estuary degradation due to human intervention and informed the approach to ecological restoration proposed in the conceptual design.

The six ecological health enhancement strategies articulated to guide ecological restoration work at Iona Island include:

1. **Improve water quality.**
2. **Restore estuary health and fish habitat.**
3. **Enhance terrestrial and freshwater habitats.**
4. **Foster resilience to sea-level rise**
5. **Connect people to nature.**
6. **Integrate Musqueam cultural values and interests.**

Figure 22. Diagram depicting the six ecological enhancement opportunities.

04-G. PARTNERSHIPS ANCHOR

The 2019 to 2022 *Metro Vancouver Board Strategic Plan* recognizes the importance of partnerships as a means to achieve its goal of the "efficient delivery of core services and collaborative regional decision making" and to achieve its commitment to region-wide carbon neutrality by 2050. Similar themes have emerged in discussions and collaborative work undertaken during IDP workshops in the preparation of the PDR.

Significantly, the IIWWTP Projects has emerged as a potential partnerships anchor for Metro Vancouver upon which to build a strong and diverse network of partnerships. These collaborations extend beyond the operation of the IIWWTP itself to include member jurisdictions within the region, non-governmental organizations, Musqueam and other Indigenous groups, senior government, the private sector, members of the public, academic and educational institutions, and industry and research organizations. Such partnerships will be critical for successfully realizing the ambitious vision of the IIWWTP Projects, including integrated resource recovery initiatives, ecological restoration projects, and park and community integration including interpretive programming.

It is important to highlight that much of this work is already underway. Notably, discussions have begun between Metro Vancouver and Musqueam on the work to be undertaken, with input from Musqueam having been fundamental in shaping the project vision and corresponding conceptual design. Additional conversations with Musqueam and other Indigenous groups will continue as the IIWWTP Projects develop, using *the United Nations Declaration for the Rights of Indigenous Peoples* and *the B.C. Declaration on the Rights of Indigenous Peoples Act* as important guiding documents.

Similarly, Metro Vancouver has an established relationship with academic institutions and non-government organizations that can be expanded to support the long-term monitoring and research needed for the ecological restoration projects contemplated at Iona Island.

To be effective, this concept of a partnerships anchor will require the development of a governance model by Metro Vancouver that creates alignment across these many groups. It is the belief of the conceptual design team that the next phase of planning and construction of the IIWWTP Projects presents a perfect opportunity to design, test, and develop this model.

Figure 23. Aerial rendering over the proposed IIWWTP Projects in 2051 looking east. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

04-H. CHALLENGE REVIEW

In 2021, Metro Vancouver assembled a panel of nine independent subject matter experts to comprise the IIWWTP Challenge Review Team (CRT). Led by an experienced facilitator, these experts possess substantial experience covering wastewater process engineering, geotechnical engineering, landscape architecture and ecology, building architecture and sustainable design, constructability, and scheduling.

The CRT's overarching mandate was to review all work completed, challenge the design basis and decisions made, and identify potential cost savings and value-add opportunities without compromising the WWTP's ability to meet regulatory requirements for the provision of a secondary level of treatment. CRT engagement spanned four separate workshops over the duration of project definition phase.

CRT Workshop:

The first CRT engagement included a workshop held from June 21-24, 2021. The CRT provided approximately 35 recommendations for consideration spanning wastewater treatment, geotechnical, constructability, ecological, and environmental topics. Several key considerations emerged specific to wastewater treatment:

- The need to consider the potential for accelerating nitrogen removal within the wastewater treatment process design
- The need to consider smaller footprint treatment technologies to reduce capital costs
- The need to evaluate whether the ground motions model used to simulate earthquakes as part of the geotechnical design work is appropriate and whether alternative ground motions models warrant consideration

The conceptual design team took these key considerations under advisement to inform a revised work plan for the remainder of the project definition phase.

CRT Second Engagement:

The second engagement of the CRT took place on September 13, 2021. The CRT provided commentary and questions related to the proposed treatment technologies and corresponding layouts. The CRT also provided high-level commentary on the proposed delivery strategy work stream and on Metro Vancouver's best practices cost estimating framework.

CRT Third Engagement:

The third engagement of the CRT took place on October 7, 2021. CRT process engineering experts were asked to review the two short-listed treatment technologies, Membrane Biological Reactor (MBR) and Aerobic Granular Sludge (AGS), as well as the rationale used to screen out the other previously short-listed technologies. The CRT was in support of the decision to short-list the MBR and AGS technologies as these technologies both offered small WWTP footprints, allowed for the construction of digesters in parallel with the rest of the IIWWTP upgrades, and enabled a more constructible layout.

CRT Fourth Engagement:

The fourth engagement of the CRT took place on December 17, 2021. The purpose of this re-engagement was to review the progress of the conceptual design prior to finalizing the PDR. Topics reviewed included:

- Updated ecological restoration projects phasing and schedule
- Proposed acceleration of the Iona Island Interpretive Program
- Considerations for the relocation of the Welcome Centre and Operations & Maintenance Building
- MBR and AGS pilot testing objectives and work plan
- MBR and AGS process flow diagrams, process schematics, and hydraulic profiles

The CRT provided commentary on each of the five topics and was generally in support of the work completed and the proposed plan to finalize the PDR with the flexibility to accommodate both MBR and AGS secondary treatment technologies.

04-I. CONSTRUCTABILITY REVIEW

The unprecedented scale and complexity of the IIWWTP Projects is compounded by numerous factors unique to the location, including a relatively constrained site, the need to work within and adjacent to an active public park, extensive ground improvements required to ensure post-disaster resiliency, and limited site access through Sea Island and the causeway, among others. To respond to these challenges, the development of the PDR included the ongoing involvement of a constructability advisor and a constructability review of the conceptual design to ensure that site considerations and logistical challenges of constructing the IIWWTP Projects are reflected in the development of the capital cost estimate, risk register, construction schedule, and recommended delivery strategy.

The constructability review included an assessment of:

- Logistical challenges associated with laydown areas for parking, facilities, material and equipment storage
- Logistical challenges associated with concurrent construction contract packages and associated working areas, separation distances, available space for cranes, on-site roadways, and safe movement of workers and vehicles
- Realistic productivity rates for ground improvements—including stone columns and pre-load—based on construction equipment availability, spacing and productivity rates in similar ground conditions, and the delivery of materials to site by both trucks and barge
- Realistic labour resource constraints based on crane spacing, safe working space, and site access considerations
- Construction sequencing of scope elements to address site logistics and constructability challenges
- Average and peak traffic estimates associated with labour, equipment, and materials required to support the construction activities over each phase of work

Figure 24. Aerial rendering over the proposed IIWWTP Projects in 2051 looking north. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

Laydown Requirements

The constructability review established preliminary laydown requirements for the duration of construction activities, indicated in their peak condition by Figure 26 below. Laydown areas have been based on an assessment of space required to accommodate material stockpiles, equipment laydown, concrete batch plant, staff parking, construction labour lunchrooms and washrooms, and contractor office space. Current considerations for laydown areas propose space located to the east of the upgraded IIWWTP layout as well as in the existing sludge lagoons to the west of the existing IIWWTP. The corresponding sequence of lagoon desludging and infill activities has been incorporated into the overall project schedule to align with laydown requirements. Further work will be undertaken to ensure that adequate water surface for local and migratory bird species is maintained throughout the duration of construction.

Future Constructability Refinements

Additional construction planning and reviews will occur throughout subsequent design stages to ensure the logistical challenges posed by the unique site, scale, and complexity of the IIWWTP Projects are adequately addressed. Key considerations for future work include:

- Execution of site access upgrades to mitigate system-wide traffic congestion (including the barge berth as well as Ferguson Road and causeway upgrades)
- Optimization of laydown areas and their associated uses, including the possibility of off-site laydown to reduce on-site requirements
- Consideration of impacts of future ecological surveys and associated environmentally sensitive areas on construction and mitigation of impacts
- Resolution of site access and logistical challenges associated with construction labour requirements
- Integration of schedule and timing of related works (eg. concrete batch plant, influent and effluent infrastructure, ground improvements, utility relocations, ecological restoration projects, etc.)

Figure 25. Diagram depicting peak laydown requirements for the construction of the IIWWTP Projects. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

Figure 26. Aerial rendering over the proposed IIWWTP Projects in 2051 looking south.

**NOTE: Drawings as shown are conceptual and subject to additional study and design development.

05. CONCEPTUAL DESIGN

05-A. PROJECT DEFINITION

The conceptual design developed during the project definition phase and described in this report seeks to fulfill the three primary goals established by Metro Vancouver prior to the commencement of the IIWWTP Projects. As referenced in Section 02-A, these goals are:

- **To meet, at a minimum, all regulatory requirements for providing secondary treatment.**
- **To demonstrate Metro Vancouver's vision and commitment to a sustainable future by developing viable resource recovery options.**
- **To integrate the IIWWTP with Iona Beach Regional Park and the surrounding communities of the lower Fraser River in a way that provides benefits for both the human and non-human inhabitants of the area.**

In July 2020, the GVS&DD Board endorsed an initial design concept, which included a tertiary level treatment for the upgraded IIWWTP, resource recovery opportunities, integration with Iona Beach Regional Park, and a range of ecological restoration projects.

In July 2021, the GVS&DD Board was provided with a project update that identified several challenges with the earlier design concept—including higher than expected cost estimates and a longer schedule duration—as well as the work being undertaken to address the identified challenges.

In November 2021, the GVS&DD Board was presented with a revised design concept for the IIWWTP Projects that addressed the recommendations of the CRT, indicated potential capital cost-savings, allowed for concurrent construction of the extra digestion capacity required, and included the flexibility for implementing one of two proven secondary treatment technologies: MBR or AGS. The GVS&DD Board endorsed the revised design concept and directed staff to finalize the PDR for Board approval in March 2022.

The conceptual design and implementation plan outlined in the following sections represents the revised design concept for the IIWWTP Projects, indicating the ability to upgrade the IIWWTP to a secondary level of treatment in accordance with the federal *Wastewater Systems Effluent Regulations* by 2035.

Figure 27. Metro Vancouver's three primary goals for the IIWWTP Projects.

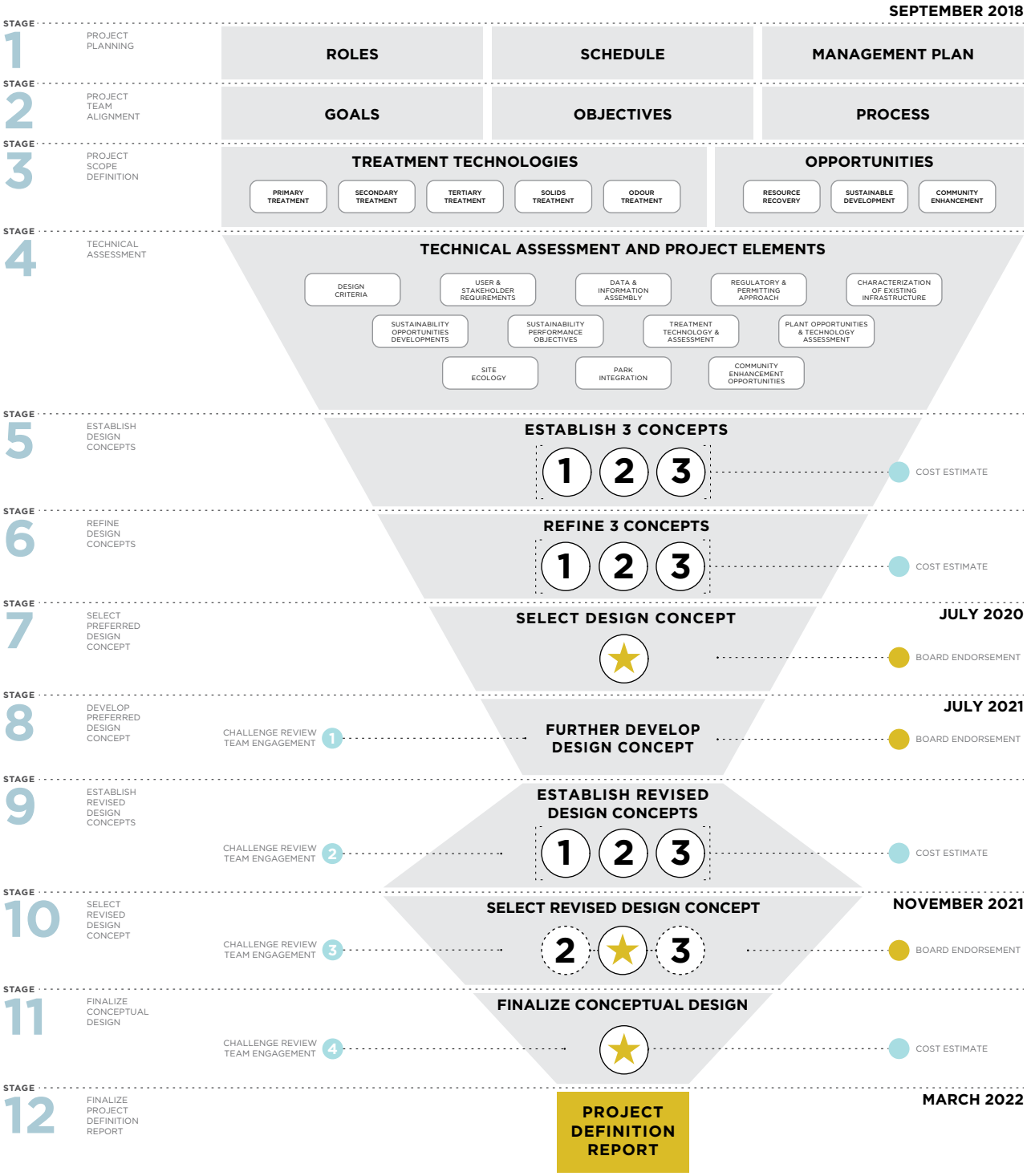


Figure 28. Project Funnel Diagram depicting key aspects of the project definition process.

05-B. PROPOSED IIWWTP UPGRADES

The following discussion describes the main wastewater treatment components comprising the liquid treatment, solids treatment, and odour control upgrades.

Preliminary Treatment

The influent from the Vancouver Sewerage Area's combined sewer system and Sea Island will flow via a 3 metre diameter and 700 metre long influent sewer to a new preliminary treatment system, which includes a two-stage coarse and fine screening system as well as grit removal. The purpose of the preliminary treatment system is to mechanically remove non-organic debris that would otherwise cause operational and maintenance issues for downstream equipment or reduce the quality of the final biosolids product. The materials removed by the screening process will be washed and trucked to the Metro Vancouver Waste-to-Energy facility. The grit collected from the grit removal system will either be processed for beneficial reuse on-site or hauled to a landfill. The preliminary treatment system will be designed for the peak wet weather flow of 1,530 megalitres per day conveyed via the Highbury Interceptor to the IIWWTP.

An influent pump station will be located downstream of the preliminary treatment system to raise the screened and degritted waste stream to the primary treatment system.

Primary Treatment

Flows from the preliminary treatment system in excess of two times average dry weather flow will be diverted to cloth media filters for treatment to remove suspended solids and blended with filtered secondary effluent. The use of cloth media filters to treat wet weather is a recent innovative development in the industry and offers Metro Vancouver the advantages of a small WWTP footprint, high treatment efficiency, and low operations and maintenance costs.

Up to two times average dry weather flow from the preliminary treatment system will flow to the primary treatment system, which will be based on lamella clarifier technology. The purpose of primary treatment is to remove organic carbon in the form of suspended solids. Lamella clarifiers employ inclined plates to increase the surface settling area of the tanks, thereby reducing process footprint requirements. The primary effluent from the lamella clarifiers will flow to the secondary treatment process and primary sludge will be pumped to a thickening process for further treatment.

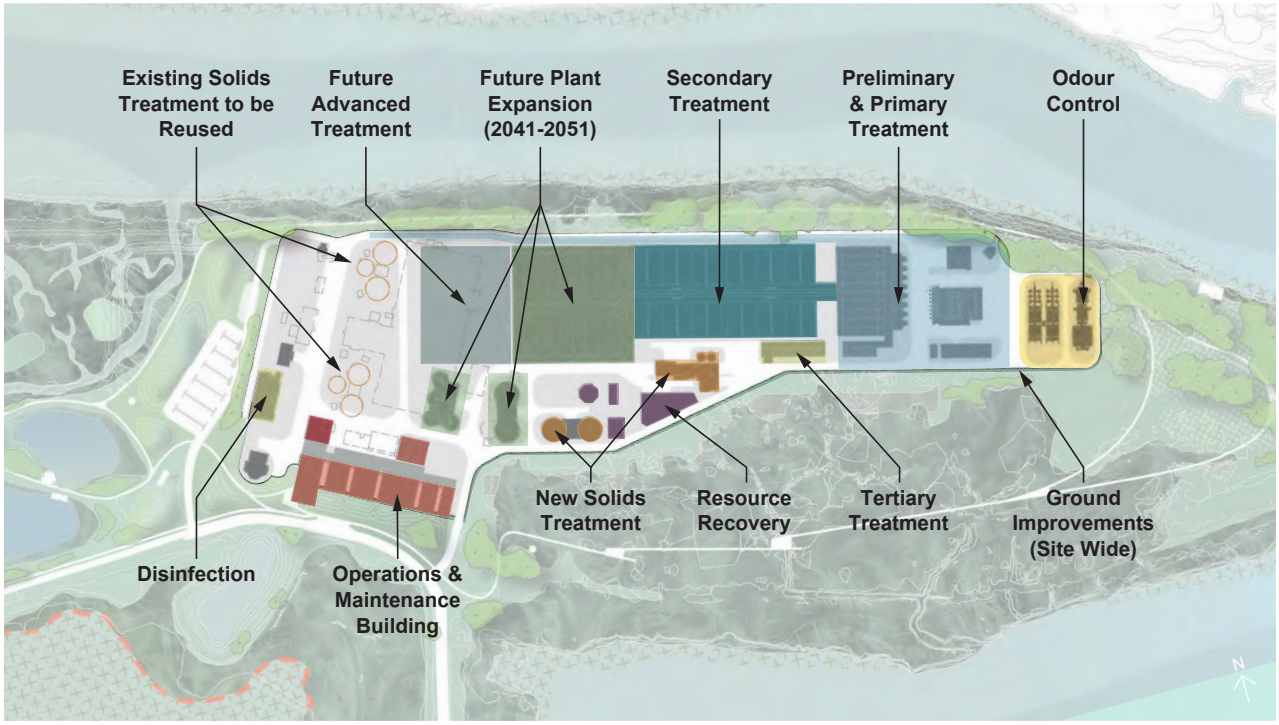


Figure 29. Key components of the proposed IIWWTP. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

Secondary Treatment, Tertiary Treatment, and Disinfection

Primary effluent from the lamella clarifiers will flow by gravity to the secondary treatment process, which is intended to remove suspended, colloidal, soluble organic matter, some nutrients, and contaminants of emerging concern carried over in the primary effluent while achieving a minimum of seasonal nitrogen removal. The conceptual design includes flexibility for consideration of two alternative secondary treatment technologies: MBR and AGS. These secondary treatment technologies are subject to further pilot testing and the refinement of design and commercial considerations.

MBR technology is similar to conventional activated sludge technology, which includes activated sludge reactors followed by gravity clarification, except that the gravity clarification process is replaced by membrane filtration. The advantages of MBR technology include its small footprint and tertiary level effluent quality. MBR technology is a mature technology and proven at WWTPs similar in scale to the IIWWTP. The treated effluent from a MBR system will not require subsequent filtration nor is it expected to require disinfection. A portion of the solids in the activated sludge tanks upstream of the membrane tanks will be removed continuously and sent to the solids treatment system for processing. Normally, the membrane effluent will flow by gravity to the existing effluent pump station while during wet weather periods it will be blended with disinfected effluent from the wet weather filters. Ultraviolet disinfection is the last treatment step before discharge to the Salish Sea.

AGS technology is a relatively recent technological development that uses a sequencing batch reactor process to select for dense and fast settling granules. The advantages of AGS technology are its small footprint, robustness, and mechanical simplicity as well as its ability to remove nitrogen and phosphorus. Many WWTPs around the world are now using the AGS technology; however, it is not yet well proven at facilities of similar scale to the IIWWTP. The secondary effluent from an AGS system will flow by gravity to tertiary filters to further reduce the amount of particulate matter in the effluent. A portion of the solids from the AGS reactors will be removed during each treatment cycle and sent to the solids treatment train for processing. Normally, following ultraviolet disinfection, the final effluent will be discharged to the existing effluent pump station and the subsequent deep-sea outfall while during wet weather periods the final effluent will be blended with discharge from the wet weather filters.

To compare each of the alternative secondary treatment technologies, Metro Vancouver will carry out a comprehensive pilot testing program to evaluate how each performs based on the expected operating conditions at the IIWWTP and identify the best technology for the proposed IIWWTP upgrades. The preferred technology will be selected in mid-2025 following completion of the pilot testing program and refinement of corresponding cost estimates.

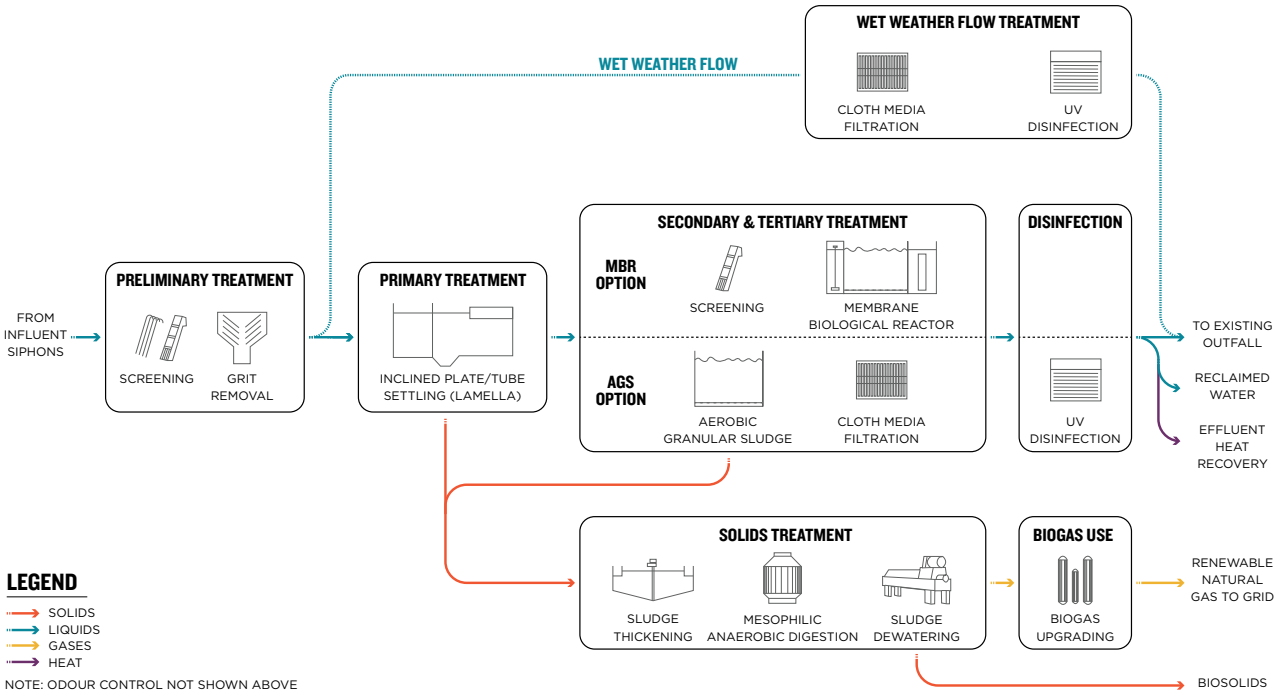


Figure 30. Diagram describing the treatment process for the proposed IIWWTP upgrades commissioned in 2035.

Solids Treatment

To support the beneficial use of biosolids and other resource recovery opportunities, sludge streams generated by the liquid treatment processes will be anaerobically digested. This digestion process will be designed to operate at thermophilic temperatures to produce Class A biosolids end product as set out in the British Columbia Organic Matter Recycling Regulation. Initially, the new digesters will be operated at mesophilic temperatures to match the design of the existing digesters. The anaerobic digestion process will produce biogas that will be captured for energy recovery and upgraded as biomethane (renewable natural gas) for export to the FortisBC natural gas grid. The recently refurbished existing digesters will continue to be used and new digesters will be installed to provide increased capacity for processing additional sludge from the upgraded liquid treatment system. The reuse of the existing digesters provides the flexibility for Metro Vancouver to adopt technology advances such as the hydrothermal liquefaction technology in the future should this innovative technology that converts sludge into biocrude proves to be feasible upon completion of the demonstration-scale testing at Metro Vancouver's Annacis Island WWTP.

Upstream of digestion, primary sludge will be thickened in the existing IIWWTP gravity thickeners and secondary sludge will be thickened in new mechanical thickeners. The sludge thickening process reduces the water content of the feed sludge to the digesters, thereby making the digesters more efficient and compact.

Downstream of digestion, the digested sludge will be dewatered to produce sludge cake in the biosolids dewatering facility and loaded into trucks for hauling off-site as part of Metro Vancouver's biosolids beneficial use program. Supernatant from the thickeners and centrate from the dewatering centrifuges will be returned to the primary influent channel for treatment.

Odour Control

Odour emissions from the upgraded IIWWTP will be controlled using prevention, containment, treatment, and dispersion. The design includes covering and ventilating elements that produce odours, in a way that suits the specific processes for operability and maintainability, but still allows negative pressure to be maintained to minimize the escape of odours. Odour sources will be grouped based upon proximity and exhaust characteristics.

An odour control facility will be provided for the liquid treatment stream and equipped with a two-stage odour treatment system. All high-strength odours will be treated first in a biological trickling filter treatment system and second combined with air from the low-strength odour sources and further treated by activated carbon. An odour stack will be used to disperse the treated air to further reduce impacts on neighbours, businesses, and park users in the vicinity of the IIWWTP and ensure no foul odours will be detected at the perimeter of the WWTP.

Separate odour control systems will be provided for the existing solids treatment infrastructure that will be reused in the proposed IIWWTP upgrades and for the new solids treatment system.

Figure 31. Aerial rendering over the proposed IIWWTP Projects in 2051 looking northeast. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

Welcome Centre and Operations & Maintenance Building:

The upgraded IIWWTP will require roughly double the number of operations and maintenance staff as that needed for the existing IIWWTP. To accommodate the increased need for operations and maintenance space, the conceptual design includes a Welcome Centre and Operations & Maintenance Building at the southwest corner of the site along Ferguson Road.

The operations and maintenance portion of the building will serve as the operational centre of the WWTP, complete with upgraded and expanded electrical, maintenance, and instrumentation shops, as well as a new controls system and staff working space. The facility will also include a new regional laboratory for analyzing wastewater and WWTP performance, including new technologies to help improve efficiencies and reduce overall regional laboratory costs.

Located near the WWTP entrance, the new Welcome Centre and Operations & Maintenance Building will be the most visible public face of the upgraded IIWWTP. Designed to create a welcoming facade to the rest of the WWTP, these buildings reflect the long held regional practice of using wood in important structures and speak to Metro Vancouver's role for leadership and stewarding health in the region. The building will include publicly accessible space serving as a Welcome Centre, which can be used for Metro Vancouver Regional Parks programs, conservation organizations, meetings and conferences, and interpretive displays, and will provide an opportunity to showcase Musqueam culture.

The combined Welcome Centre and Operations & Maintenance Building will maintain robust security for IIWWTP operations and maintenance activities by providing separate secure entries for the public, staff, and deliveries. A public entrance is provided from the park side of the WWTP's security perimeter while delivery and staff access will occur through a secure and monitored entrance on the WWTP side of the perimeter security line. The WWTP's perimeter is secure yet visually open, and it—as well as taller structures—are designed with a consistent architectural approach to minimize their visual presence.

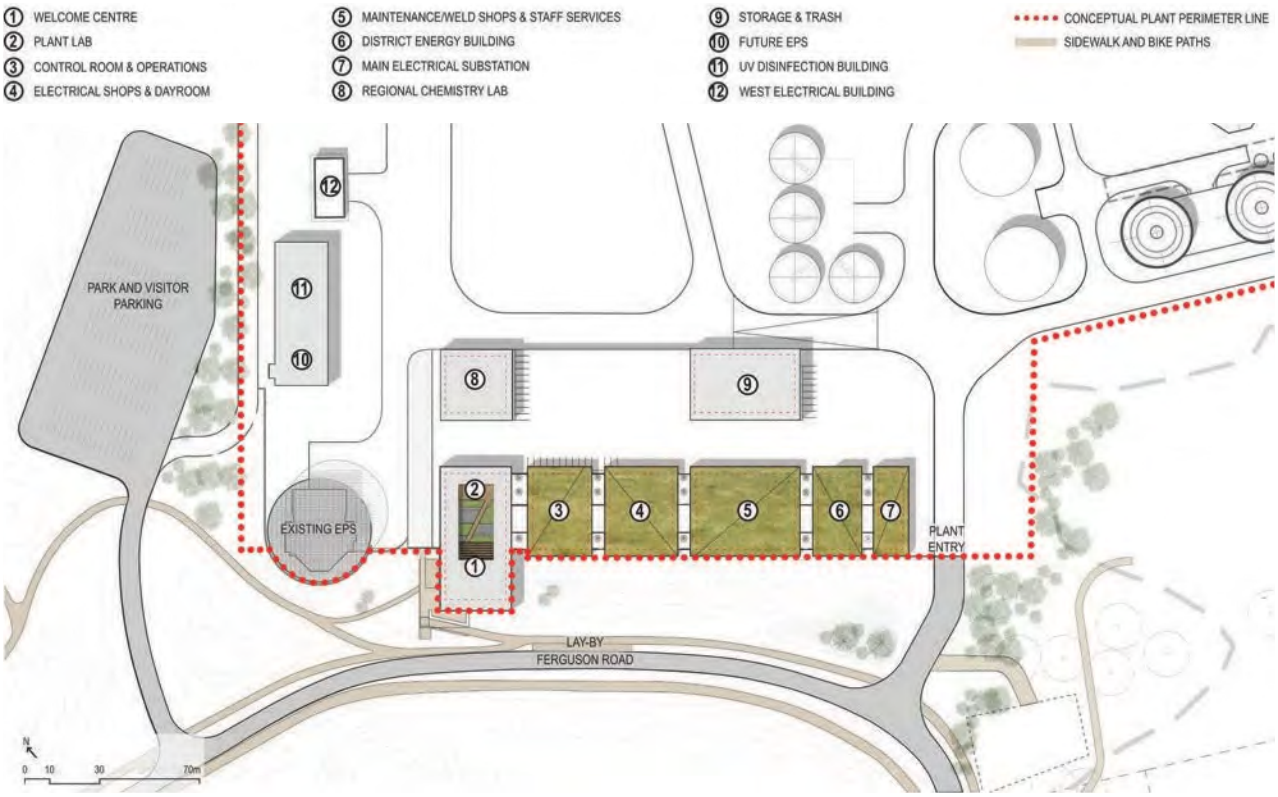


Figure 32. Site plan of the proposed Welcome Centre and Operations & Maintenance Building. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

05-C. FUTURE IIWWTP UPGRADES

The proposed IIWWTP upgrades have been designed to allow for future upgrades to enhance levels of treatment, recover additional resources, and increase capacity until 2101 while also enabling pilot testing and implementation of emerging technologies.

01. Liquid Treatment

Beyond the proposed upgrades, allowances are included in the site plan for infilling of infrastructure within the revised WWTP layout to increase capacity. Space is provided on the west side of the site for major upgrades and other uses and this future infrastructure will remain within the boundary of the upgraded IIWWTP layout so as not to interrupt Musqueam's important cultural views towards Vancouver Island. The existing effluent pump station and deep-sea outfall will continue to be used in the foreseeable future.

02. Solids Treatment

A key planning decision for the proposed IIWWTP upgrades has been to reuse as much of the existing solids treatment infrastructure as possible. An interim solids upgrade is planned for 2051 to coincide with the next liquid treatment capacity expansion, at which time Metro Vancouver will decide on which technologies to use to expand or replace aging solids treatment infrastructure. The decision could be to continue with additional anaerobic digestion units or begin to integrate hydrothermal processing technologies. Space is allocated in the existing WWTP footprint for future expansion, including additional digesters which can be operated at thermophilic temperature to produce Class A biosolids, flow-through vessels, digested sludge storage tanks, and primary sludge fermenters.

03. Advanced Treatment

Where existing primary treatment infrastructure is currently located on the west side of the revised layout, space has been reserved for the implementation of future advanced treatment for removal of contaminants of emerging concern. Contaminants of emerging concern are facing increased scrutiny from the public and regulators throughout the world and research on these advanced technologies has advanced considerably in recent years. For planning purposes, two potential technologies for advanced treatment are being considered: advanced oxidation coupled with activated carbon filtration and reverse osmosis. It is also anticipated that new technologies will continue to emerge in the future on this important issue. As such, the design provides for considerable flexibility for future enhancements.

As an extension of its pilot testing program, Metro Vancouver intends to carry out an advanced treatment pilot testing program using the preferred secondary treatment technology selected for the proposed IIWWTP upgrades.

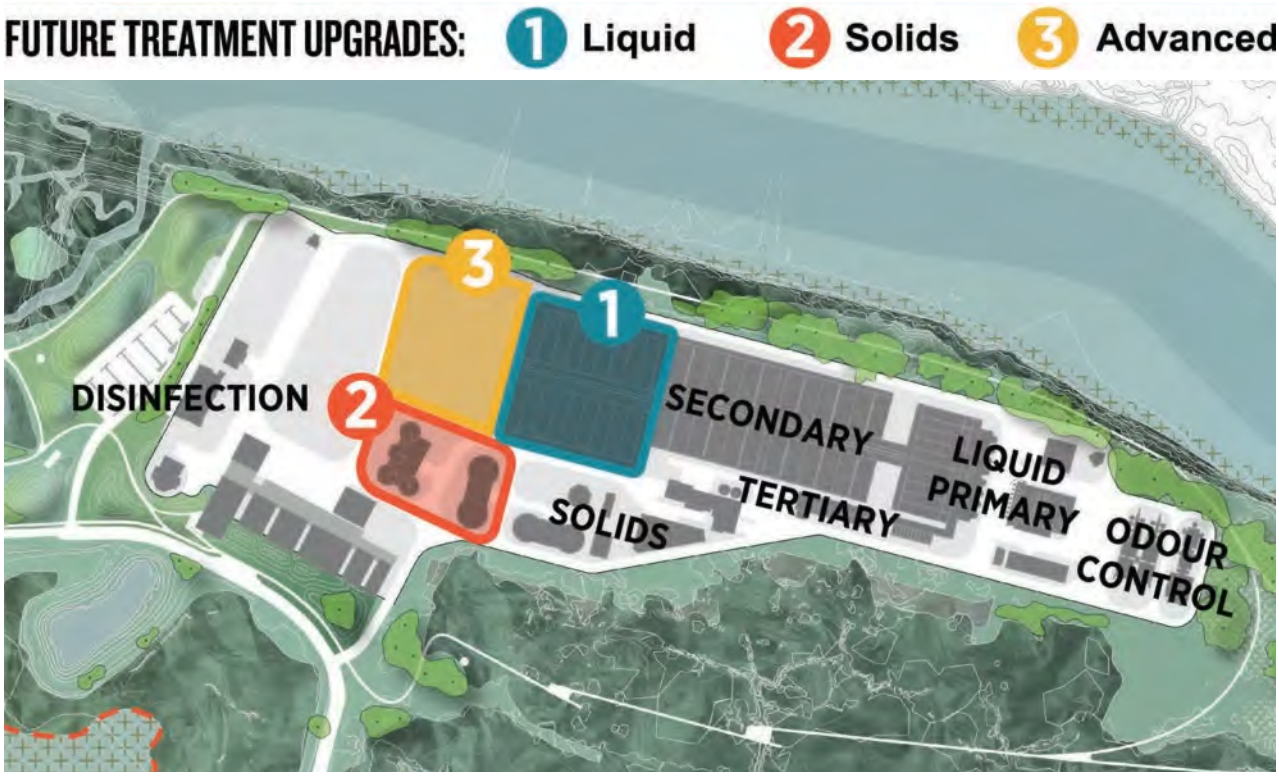


Figure 33. Diagram depicting future liquid, solids, and advanced treatment areas at the IIWWTP.

05-D. RESOURCE RECOVERY INITIATIVES

Our society's current linear model of resource extraction and management—the "take-make-waste" model is unsustainable. In contrast, Metro Vancouver's vision as outlined in the 2019 to 2022 *Metro Vancouver Board Strategic Plan* is to embrace "collaboration and innovation in providing sustainable regional services that contribute to a livable and resilient region and a healthy natural environment for current and future generations." The vision is a circular economy which designs waste out of the system, maintains continuous flows of biological and technical materials, and creates a strong and diverse network of partnerships. The IIWWTP Projects, when complete, will be a foundation for transitioning to the circular economy and an important catalyst for regional transformation towards resource recovery and reuse.

Two fundamental elements of this transformation are embodied in the conceptual design for the proposed IIWWTP upgrades. First, the treatment system has been selected to support a wide range of technical pilot projects and ongoing research to inform future technological innovation and future advanced treatment options, including removal of contaminants of emerging concern which, in turn, will allow for expanded water reuse opportunities. Further, this pilot testing work will be supported by integrating several elements into the WWTP: a regional chemistry lab, the provision of conference facilities for visitors, and the integration of public education space in the Welcome Centre and Operations & Maintenance Building to stimulate interest and behaviour change in members of the public.

Second, the conceptual design will produce a range of resources on-site and off-site. Further technical and financial studies will guide the implementation of these integrated resource recovery strategies, including:

- Biogas upgrading to renewable natural gas and injection to the FortisBC natural gas grid
- Reclaimed water for facility uses on site
- Reclaimed water for freshwater wetland recharge on Iona Island, with opportunities to also use nutrients from the WWTP to meet the ecological needs of the receiving ecosystems
- Potential for reclaimed water for off-site use by industry and the public
- Effluent heat recovery for on-site process and space heating needs
- Effluent heat recovery (combined with reclaimed water pipeline) for off-site district energy systems
- Biosolids reuse for local park and ecology projects on Iona Island and within and outside the wider Metro Vancouver region as well
- Grit reuse for on-site flood protection through land raising

Transitioning to a circular economy model requires a fundamental rethinking of how we establish and operate all systems, with integrated resource recovery playing a critical role in closing the resource loop and designing out the waste from the operations of the project. With the delivery of these initiatives Metro Vancouver will again be providing national leadership in this important area.

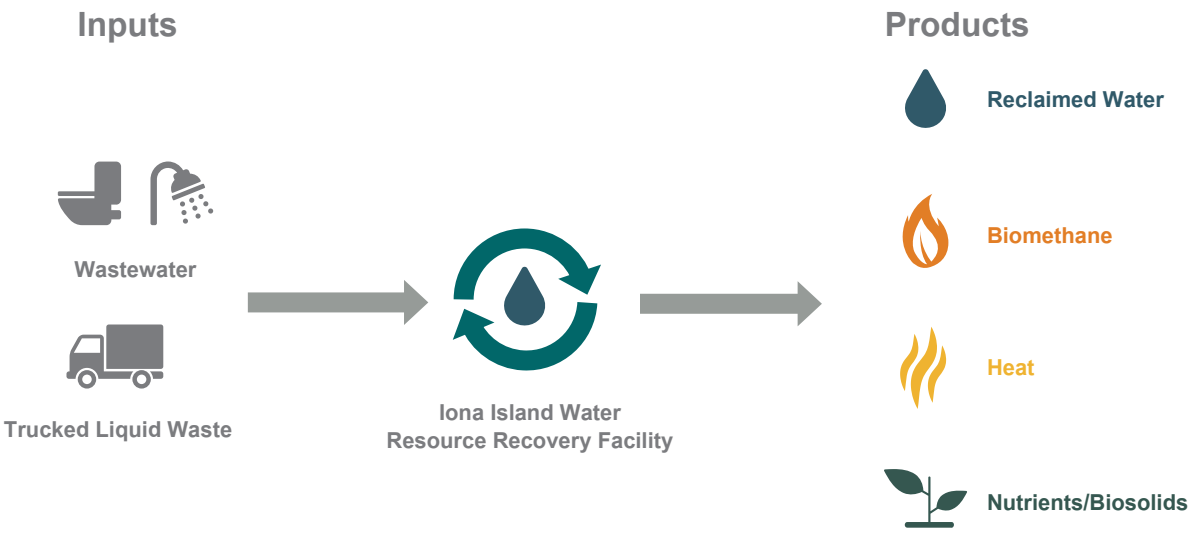


Figure 34. Integrated resource recovery inputs and products.

05-E. ECOLOGICAL RESTORATION &PARK INTEGRATION

While the conceptual design describes an integrated vision that the IIWWTP Projects seek to achieve, the projects that will contribute to achieving this vision are independent undertakings, each subject to their own regulatory review and planning processes. In support of this vision, the ecological restoration projects at Iona Island have been developed around the following six strategies:

Improve water quality:

Water quality in the Salish Sea will be improved by implementing tertiary treatment at the upgraded IIWWTP, with capacity to add additional advanced treatment processes over time. Water quality in McDonald Slough will be improved through the implementation of a causeway breach, with additional study on the future of log storage in McDonald Slough to be undertaken during subsequent phases. Further, there is potential for existing groundwater contamination to be addressed to improve water quality along the shoreline.

Restore estuary health and fish habitat:

Aquatic connectivity through the north jetty and causeway will be re-established via several breaches, helping out-migrating juvenile salmon to access critical rearing habitat in Sturgeon Bank more directly from the North Arm of the Fraser River. Hydrodynamic modeling will be undertaken to inform the next phase of design development of these features. Additionally, living breakwaters are proposed to reduce wave energy and retain sediment close to shore, thin-layer sediment augmentation will seek to help tidal habitats keep pace with sea level rise, and new off-channel tidal marsh will be created along the North Arm of the Fraser River. Foreshore habitat enhancements will be done in consultation with the Vancouver Airport Authority to ensure airline regulations and safety considerations will be embedded in the design.

Enhance terrestrial and freshwater habitats:

The conceptual design aims to enhance the quality of native and novel habitats on the island, including the at-risk coastal sand ecosystem, riparian cottonwood forest, shrub-grassland, and freshwater wetlands. These enhancements will benefit a diversity of species, especially the large numbers of birds that use the island and foreshore as a stopover along their migration route. Freshwater habitat enhancements will include: the creation of deeper water zones and riparian shading for cooler water temperatures; the incorporation of nesting, basking and overwintering habitat elements for western painted turtles; the addition of an inflow stream of high-quality treated effluent from the upgraded IIWWTP; and the maintenance shallow open water areas to mimic some of the values of the existing sludge lagoons. Further, riparian cottonwood forest and coastal sand ecosystems will be expanded by converting invasive-dominated shrub-grassland to these ecologically important habitat types. Cottonwood forest will also be expanded along the north edge of the island to improve riparian habitat and help screen views of the IIWWTP.

Foster resilience to sea level rise:

The conceptual design incorporates nature-based flood protection strategies to help the island's tidal habitats keep pace with sea level rise while providing a measure of flood through wave mitigation. The combination of breaching and adding passive sediment trapping structures, such as breakwaters and sill walls, is anticipated to help foreshore areas receive and retain more sediment. Thin-layer sediment augmentation is also proposed as a pilot project in the interjetty area to evaluate its suitability as an active adaptation technique.

Connect people to nature:

Community input has revealed the important role of Iona Beach Regional Park for allowing people to connect to nature. The conceptual design fosters additional connections to nature through engaging park elements, such as bird blinds, dipping docks and lookouts, as well as the development of an interpretive program that enhances educational programming in the expanded park area. The ecological restoration projects will also create new opportunities for connecting to nature, such as experiencing restored tidal habitats and enhanced bird habitat in the footprint of the existing sludge lagoons. Connecting people to nature in a myriad of ways on Iona Island is an important social benefit of the conceptual design.

Integrate Musqueam cultural values and interests:

Musqueam use of the lands and waters at Iona Island, Sturgeon Bank, and throughout the Fraser River estuary has been profoundly disrupted in the past century and Musqueam has identified that their community's health and well-being is intricately linked to the health of the Fraser River estuary's ecosystems. The conceptual design has incorporated the ecological priorities and interests shared with the team by Musqueam at several workshops, including supporting fish habitat; designing terrestrial ecosystems that support traditional harvesting; breaching the jetties and causeway; allowing Musqueam access for traditional resource use, cultural practices and knowledge transfer; recognition through signage and naming; and ensuring the work plan extends beyond the proposed IIWWTP upgrades and considers future generations. Discussions with Musqueam and other Indigenous groups regarding their priorities and interests for the IIWWTP Projects are ongoing.

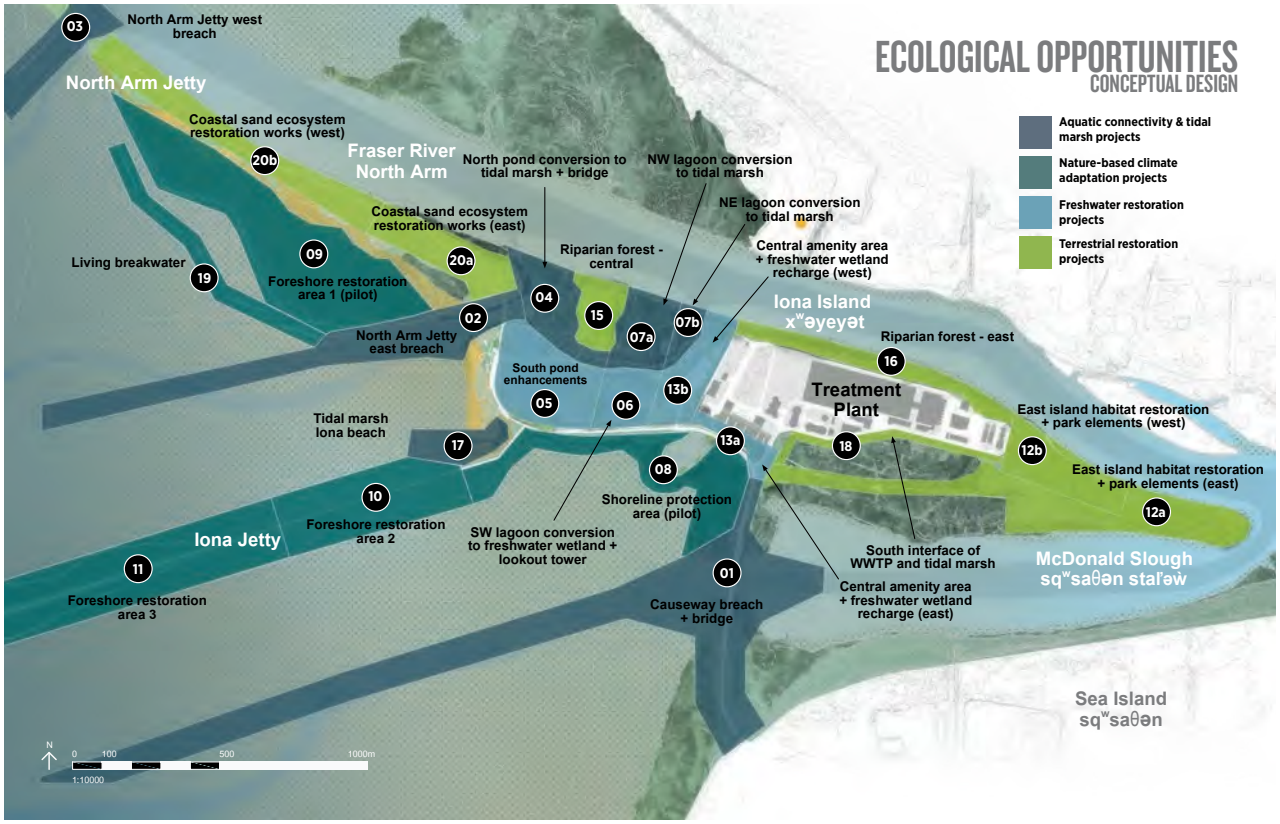


Figure 35. Summary of the ecological restoration projects contemplated as part of the IIWWTP Projects. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

Figure 36. Perspective showing park, plant, and ecological projects in 2051 looking east. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

Park and Community Integration

In addition to the ecological restoration projects described above, the IIWWTP Projects have sought to achieve meaningful relationships between the WWTP and the surrounding Iona Beach Regional Park in several ways:

- A layout that responds to the ecological and community values of Iona Beach Regional Park
- A Welcome Centre and Operations & Maintenance Building that forms a welcoming front door to the island and helps to screen the WWTP from public view
- Careful screening of the IIWWTP from all sides
- Siting of taller structures within the centre of the revised layout to further reduce the visual impact of the WWTP
- Beneficial reuse of water and biosolids within the park
- Nature-based flood protection for the entire island
- Habitat compensation for the impacts of the upgraded IIWWTP
- Expanded educational, recreational, and experiential offerings of the park, including proposed interpretive programming

The result of the conceptual design is a rich and varied landscape in which the upgraded IIWWTP generally recedes into the background of the Iona Beach Regional Park while being sited on the most suitable land.

Figure 37. Perspective showing the proposed Welcome Centre and Operations & Maintenance Building and park entry area in 2051 looking northwest. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

05-F. IONA ISLAND INTERPRETIVE PROGRAM

The conceptual design of the IIWWTP Projects includes a roadmap for a robust interpretive program at Iona Island that aims to: socialize changes occurring on the island before, throughout, and after construction of the IIWWTP; instill a sense of environmental stewardship in park visitors and staff; create space for Musqueam to share stories with the public as well as each other; increase public understanding of wastewater treatment and the beneficial reuse of resources; and highlight the site's ecological restoration initiatives and strategies for adapting to a changing climate. To realize these goals, the PDR outlines several interpretive themes, communications strategies, supporting site features, partnership opportunities, and potential participants that would be actively engaged in shaping, telling, and receiving the story of the island through the proposed interpretive program.

Interested and Affected Parties

Four distinct interested and affected parties emerge as participants in the proposed interpretive program. These are:

- Metro Vancouver
- Executing Parties (including staff, consultants, and contractors involved in realizing the IIWWTP Projects)
- External Parties (including park visitors, the general public, partner organizations, and local municipalities)
- Musqueam

Each of these parties has a unique relationship with the island and each will require uniquely tailored elements within the interpretive program. Current considerations include mobilizing staff within Metro Vancouver to manage, develop, and administer the interpretive program, both in planning and delivering educational content as well as establishing and managing critical relationships across all interested and affected parties.

Figure 38. Perspective showing the proposed Welcome Centre in 2051, where space will be provided for interpretive programming. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

Figure 39. Perspective of the proposed park path system looking east depicting both fresh (right) and tidal (left) wetlands in 2051.

**NOTE: Drawings as shown are conceptual and subject to additional study and design development.

06. PROJECT IMPLEMENTATION

06-A. PROJECT COMPLEXITY & RISKS

WWTP upgrades generally represent one of the most challenging and complex types of civil infrastructure projects undertaken by municipalities due to multi-disciplinary involvement, highly visible construction, and vital importance to the health and safety of both receiving water and residents served. The IIWWTP is no exception, representing one of the largest projects ever delivered by Metro Vancouver and carrying unique challenges associated with its location, scale, complexity, and longevity. The following discussion identifies some of the specific risks with potential impacts on the IIWWTP Projects, their nature and root causes, and the corresponding mitigation strategies being developed to monitor and mitigate these risks over the lifespan of the IIWWTP Projects.

Factors Internal to the Projects

The scale and tight implementation deadline of the IIWWTP Projects poses a high level of design and construction complexity. Complexity is further compounded by the unique features posed by the location of the work on Iona Island, including constrained site access, mixed land tenures, poor existing geological conditions for the construction of foundations, geotechnical and corresponding ground improvements design challenges, proximity to residential neighbourhoods, and immediate adjacency to the Iona Beach Regional Park and sensitive ecosystems. Further, the IIWWTP Projects are subject to multi-jurisdictional review and complex permitting requirements that pose potential compounding effects.

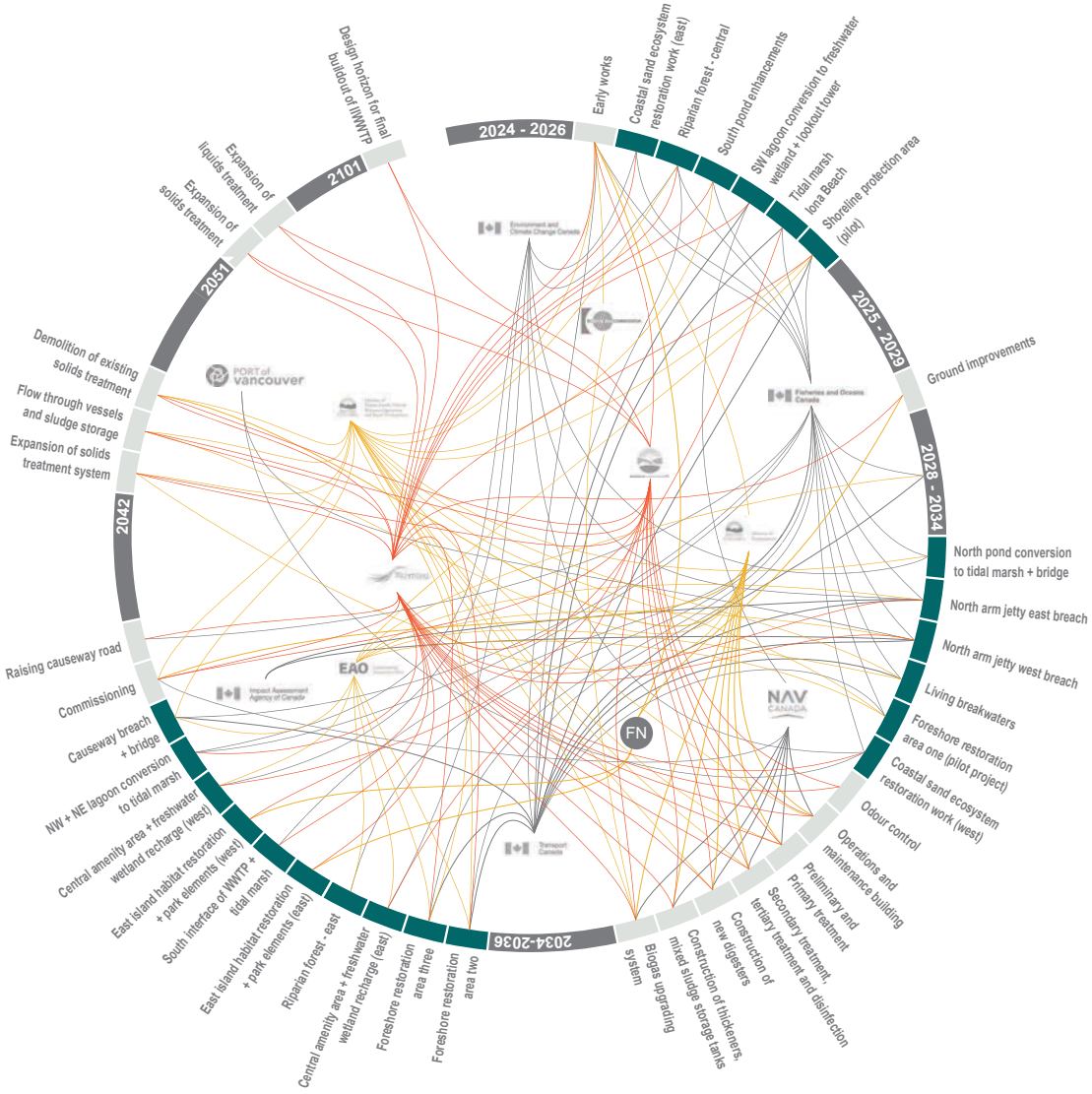


Figure 40. A relationship network diagram illustrating the complexity and interrelationships between the myriad of permits required for the IIWWTP Projects. The outer ring of the diagram indicates project phases, broken into IIWWTP Projects (grey) and ecological restoration projects (green). Nodes within the ring represent permitting organizations, with project specific relationships drawn and colour coded to reflect scale (Regional = red, Provincial = yellow, Federal = grey).

Factors External to the Projects

Several external factors contribute to the complexity and risk of the IIWWTP Projects. Increased patterns of uncertainty and disruption associated with climate change, the COVID-19 pandemic, changing market and labour conditions including variable escalation rates, and constrained manufacturing and industry capacity for specialized components all carry potential impacts for the IIWWTP Projects.

Risk Analysis

Given the unique complexity facing the IIWWTP Projects, a robust risk assessment process was undertaken to identify, manage, and quantify risks as well as inform an appropriate level of risk reserve included in the capital cost estimate.

As part of this process, Metro Vancouver used a structured methodology to carry out a quantitative risk assessment, including the development of a comprehensive risk register. The risk register was developed collaboratively through a series of workshops with Metro Vancouver, the project definition team, and a panel of independent specialist risk advisors, culminating in the identification and quantification of over 200 potential risks, several of which carry significant cost impacts should they materialize.

A summary of the key risks that have the potential to substantially impact the IIWWTP Projects schedule and cost are presented below:

- Stress to Metro Vancouver's organizational capacity resulting from implementation of Metro Vancouver's largest project ever concurrent with other major projects
- Affordability concerns and uncertainty around senior government funding
- Delays in multiple complex permitting and approval requirements
- Delays in procurement and contracting
- Delays resulting from potential archaeological findings
- Constraints on construction activities resulting from stakeholder impacts and concerns
- Constraints on market participation resulting from projects scale and risk
- Local and global supply constraints on labour and materials
- Commodity price variability and escalation
- Constructability challenges and site constraints
- Multiple contract interfaces and tie-ins to the existing operating WWTP
- Third-party utility requirements for design input and upgraded infrastructure
- Unforeseen factors such as inclement weather or pandemic

These critical risks will be closely monitored as the IIWWTP Projects transition beyond the project definition phase to subsequent design and implementation stages. It is important to note that the project risk register and risk reserve estimate is a living document that will continue to be updated throughout the entire lifecycle of the IIWWTP Projects, serving as a critical tool to be used by Metro Vancouver's Project Management Team to proactively mitigate and manage potential impacts on schedule, quality, and cost.

Risk Mitigation

Active management of the risks identified within the risk register is critical to the success of the IIWWTP Projects. Metro Vancouver has implemented numerous proactive strategies to actively manage risks, including—but not limited to—the following:

- The establishment of a Project Management Office within the Project Delivery Department to serve as a centre of excellence for the development of project management standards and best practices that will be adopted across the Project Delivery portfolio of projects
- The establishment of a Project Management Team, including Metro Vancouver staff and a Program Management Consultant (PMC)
- The establishment of a Stage Gate Framework including predetermined budget, schedule, and quality reviews at each gate
- The ongoing engagement of a CRT to ensure independent critical review of project assumptions and direction at each significant milestone
- The establishment of a Best Practice Cost Estimating Framework
- The establishment of a recommended delivery strategy that provides Metro Vancouver with maximum flexibility to mitigate identified risks and adapt to prevailing market conditions with projects appropriately sized to market capacity
- The advancement of discussions with key partners, stakeholders, and regulators including: collaboration with Musqueam to advance development of necessary agreements to ensure alignment around project objectives; partnership with YVR to deliver road safety improvements; ongoing work with BC Hydro to advance a System Impact Study to determine capacity limitations and upgrade requirements; and ongoing communication with several regulatory bodies to advance the development of a unified regulatory approach to facilitate project permitting and land tenure requirements while ensuring all parties are kept up to date on project status, aligned with project objectives, and providing input, where possible, to mitigate risks identified within the risk register

Preliminary risk mitigation strategies already underway will be further developed as the IIWWTP Projects continue throughout subsequent implementation phases.

06-B. PROJECT SCHEDULE

To maintain uninterrupted operation of the existing IIWWTP, construction of the proposed IIWWTP upgrades must be carefully sequenced to allow the new secondary treatment infrastructure to be built and put into service before existing infrastructure can be decommissioned and demolished. The management of permitting and approvals, including the integration and delivery of the ecological restoration projects, is also highly involved with correct sequencing critical for project success. A baseline schedule has been established to manage these critical activities, charting a path for project delivery beyond the completion and endorsement of the project definition and conceptual design in March 2022.

The following discussion describes key activities included in this baseline schedule:

2022 - 2027: WWTP Design and Early & Enabling Works

The period from 2022 to 2027 will focus on undertaking the pilot testing, preliminary design, and detailed design of the upgraded IIWWTP as well as necessary on-site early and enabling works, including: on-land and marine based geotechnical investigations, several ecological restoration projects, barge berth construction, removal of the existing biosolid stockpiles, groundwater and soil remediation, ground improvements including preloading and the installation of stone columns and subterranean seismic barriers, utility upgrades, Ferguson Road realignment, causeway upgrades complete with a separated multi-use trail and dedicated construction road to improve site access and enhance safety for all users, BC Hydro power cable relocation and construction power connection, and influent sewer construction.

2028 - 2035: WWTP Construction & Ecological Restoration

The period from 2028 to 2035 will include construction of the following: the preliminary, primary, secondary, and tertiary treatment systems, additional digester capacity to accommodate sludge from the secondary treatment process, the Welcome Centre and Operations & Maintenance Building, and the new BC Hydro high voltage electrical power feeds. Extensive bulk excavation and earth moving projects within the surrounding park will take place during this period, as will the construction of several additional ecological restoration and park integration projects.

2036 - 2038: Site Restoration & Projects Closeout

The period from 2036 to 2038 will include site restoration, post IIWWTP commissioning, demolition and removal of the existing primary treatment facilities, and the remainder of the ecological restoration and park projects.

Regulatory Discussions

Metro Vancouver, Provincial regulators, and Environment and Climate Change Canada—the federal regulatory body who enforces the Canadian *Wastewater Systems Effluent Regulations*—are engaged in discussions on the project's expected schedule. Metro Vancouver is committed to delivering a project that is safe to operate and attains the milestone of secondary treatment as soon possible. Metro Vancouver is also committed to a fully integrated project that reflects environmental enhancements, full engagement with Musqueam, and a final effluent quality that would exceed regulatory standards.

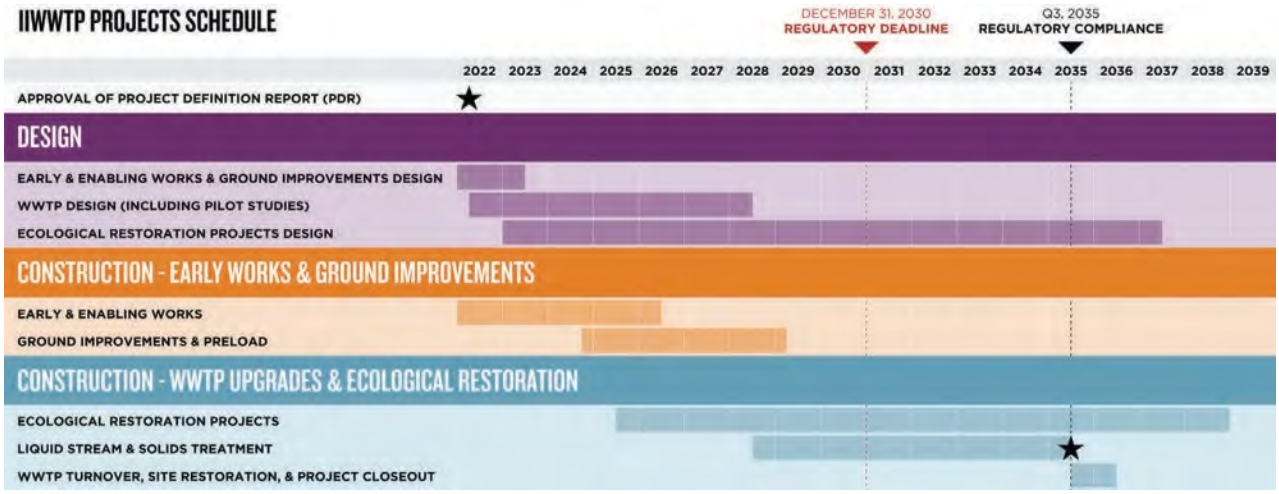


Figure 41. Summary of the baseline schedule for the IIWWTP Projects.

06-C. PROJECT COST ESTIMATES

Capital Cost Estimate

The IIWWTP Projects Class 4 capital cost estimate was developed in accordance with the American Association of Cost Engineering International recommended practices and Metro Vancouver's Best Practice Cost Estimating Framework.

Table 3 presents the total capital cost estimate for both the MBR and AGS design concepts, inclusive of all ancillary and off-site components as well as ecological restoration projects.

Operations and Maintenance Cost Estimate

The upgraded IIWWTP will require annual operations and maintenance expenditures to cover the costs of staff labour, energy (electricity and natural gas), odour control, chemical consumption, potable and non-potable water demand, equipment maintenance, residual management (biosolids, grit, screenings), as well as credits for the sale of renewable natural gas (i.e. biomethane).

The upgrade from primary to secondary and tertiary levels of treatment requires a significantly larger and more complex facility that will increase annual operating costs as compared to the existing primary plant. In 2022, the current IIWWTP is run by 45 operations and maintenance staff. This will increase to an estimated 80 personnel once the upgraded IIWWTP is operational in 2035. Table 4 presents a summary of the projected operation and maintenance costs required to operate the upgraded WWTP.

The MBR design concept projected operations and maintenance costs are approximately 10% higher than the AGS design concept, primarily due to the increased energy costs required to operate a MBR plant and the additional costs required to replace membrane modules every 10 to 12 years.

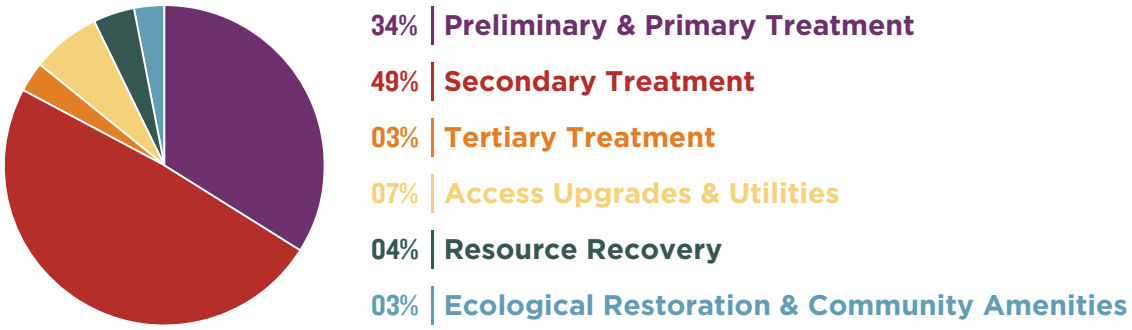


Figure 42. Pie chart breaking down the capital cost estimate for the IIWWTP Projects by major component.

Table 3. Summary of the IIWWTP Projects Capital Cost Estimate ($ millions)

DESCRIPTION	MBR DESIGN CONCEPT	AGS DESIGN CONCEPT
Total Design & Construction Costs (2022 dollars)	$6,437	$6,371
Estimated Escalation (3% per year)	$1,863	$1,844
Risk Reserve	$1,620	$1,620
Total Capital Cost Estimate	**$9,920**	**$9,835**
Accuracy Range - Low (-20%)	$8,256	$8,190
Accuracy Range - High (+30%)	$10,966	$10,173

Table 4. Summary of the IIWWTP Projects Operations and Maintenance Cost Estimate ($ millions)

DESCRIPTION	MBR DESIGN CONCEPT	AGS DESIGN CONCEPT
Annual Operations and Maintenance Costs (2035 dollars)	**$99**	**$88**

06-D. RECOMMENDED DELIVERY STRATEGY

As part of the IDP, a recommended delivery strategy for the IIWWTP Projects has been developed in conjunction with the conceptual design, schedule, cost estimates, and constructability review.

As identified throughout this report, the IIWWTP Projects represent a suite of interrelated works across Iona Island. These include the core works directly related to the proposed IIWWTP upgrades, off-site and ecological restoration projects that can typically be delivered independent of the WWTP, a number of ongoing Metro Vancouver projects preparing for future redevelopment of the WWTP, and adjacent projects which are not included in the scope of the IIWWTP Projects but will still need to be managed during planning, design, and construction. The following discussion summarizes key characteristics and recommendations of delivery strategy to successfully deliver this complex undertaking.

Key Characteristics

There are a number of key characteristics of the IIWWTP Projects that directly influence the recommended delivery strategy, including:

- An understanding of success for Metro Vancouver as measured against ambitious and long-term goals beyond the direct construction of the WWTP
- An undertaking of unique scale and complexity for both Metro Vancouver and the region, including individual scope elements with nominal construction values in excess of $500 million
- An implementation schedule requiring timely, efficient, and largely concurrent construction of a significant portion of the scope of work
- Complex interfaces throughout project implementation requiring a wide range of project management, construction management, and technical expertise to ensure successful delivery
- A complex and constrained site with limited access and challenging logistics, particularly considering both the existing operating IIWWTP and the high public value of the island
- Ongoing evolution of the design including selection of the preferred secondary treatment technology and development of the detailed design
- A complex regulatory, stakeholder, and partner environment with the goal of continuous engagement and flexibility to respond to community needs as the work advances

Recommended Delivery Strategy

During the IDP, a range of procurement objectives, implementation approaches, and delivery strategies were developed and assessed in the specific context of the long-term objectives and challenging design and construction timelines inherent in the IIWWTP Projects scope of work. The following recommendations summarize the key elements of the recommended delivery strategy:

- **Program management:** Metro Vancouver should establish an integrated IIWWTP Projects program management office (IPMO) and retain a PMC to provide resources to enhance Metro Vancouver's capability and capacity. The IPMO is responsible for overall program development efforts, including management and coordination of design and construction activities program-wide.
- **Design responsibility:** It is recommended that Metro Vancouver retain design contracts directly to allow for flexibility and continued influence over the design. Metro Vancouver should specifically retain a single principal designer to progress the preliminary design of the WWTP. While design-build may be considered for individual scope elements as part of detailed implementation, it is not seen as a viable strategy for the WWTP scope of work as a whole.
- **Advanced works:** In order to meet its schedule goals, Metro Vancouver must progress the design and delivery of a range of early works, ground improvements, access, and utility works, as well as phase one of the ecological restoration projects concurrent with ongoing design of the WWTP. Several of these scope elements are significant in scale and appropriate governance and program integration will be critical.
- **Early contractor involvement:** It is recommended that Metro Vancouver adopt an integrated and collaborative approach, retaining a general contractor (the Construction Partner) through a formal two-stage early contractor involvement model. During the Stage 1 - Preconstruction Services, the Construction Partner is to provide constructability input into design and lead procurement and construction planning, schedule development, and construction cost estimating. During Stage 2 -Implementation, the Construction Partner undertakes construction execution.

- **Flexible contracting model for WWTP construction:** It is recommended that Metro Vancouver plan to deliver the WWTP works under a hybrid contract model, with the Construction Partner scope consisting of plant-wide construction and logistics management, self-performing construction for agreed scope elements, and managing construction activities by third party contractors for other elements. The IPMO plays a critical role in the contract administration of the Construction Partner's efforts and retains authority over all contracting decisions.
- **Conventional delivery for other elements:** Under the auspices of the IPMO, the advanced works as well as the off-site work and ecological projects should be delivered using conventional design-bid-build approaches, although alternative delivery (e.g. design-build) may considered if appropriate for specific scope elements.

It is recommended that Metro Vancouver proceed with the appointment of a PMC as soon as possible after approval of the PDR to maintain progress. This will be followed by procurement of the WWTP Design Engineer-of-Record and the WWTP Construction Partner, concurrent with early design and construction packages.

Outcomes of the Recommended Delivery Strategy

The recommended delivery strategy outlined in this section provides a comprehensive and flexible approach to successfully implement this complex and evolving scope of work that will:

- Effectively manage the constrained WWTP site and logistics through an integrated construction management approach with a common Construction Partner
- Allow Metro Vancouver the opportunity to adjust the scale of the Construction Partner contract, providing flexibility to respond to market appetite and capacity as well as Metro Vancouver evolving perceptions regarding risk management
- Allow the opportunity for Metro Vancouver to leverage the capacity and capability of the selected Construction Partner to support procurement and related efforts if, and where, this is in service of the full scope of work
- Provide early opportunity to collaborate with the Construction Partner to foster local and Indigenous economic participation
- Maximize the transparency of the evolving cost estimates, including risk and contingency management, through early and ongoing collaboration with the selected Construction Partner
- Maximize the flexibility and responsiveness of procurement and risk management to market conditions, including labour, material, supply chain, and broader economic risks as well as the risks which may arise subsequent to final secondary technology selection

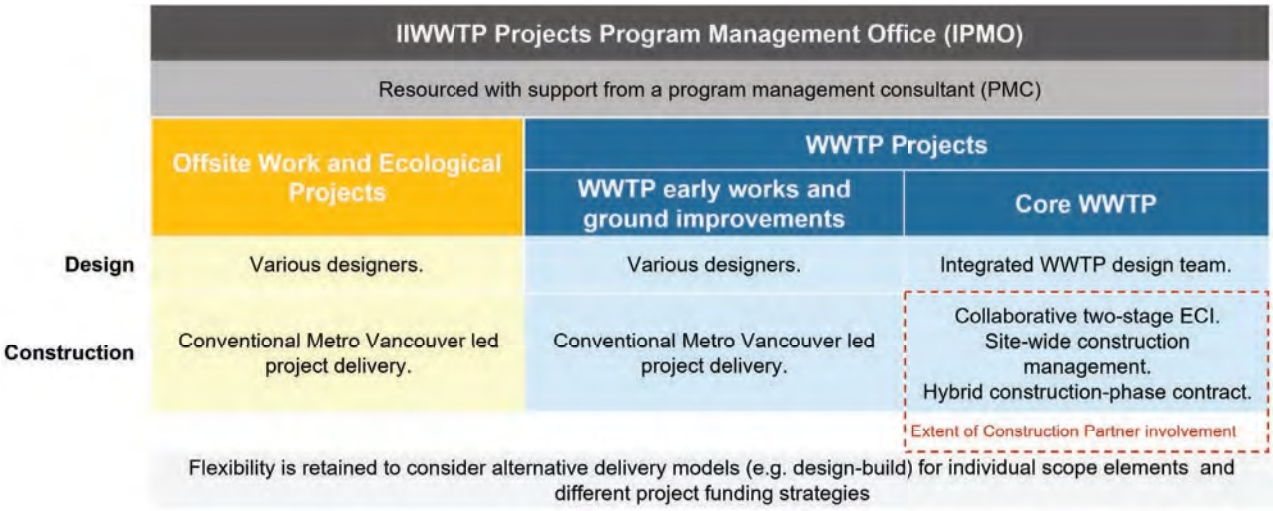


Figure 43. Overview of the recommended delivery strategy for the IIWWTP Projects.

06-E. STAGE GATE FRAMEWORK

The IIWWTP Projects will follow Metro Vancouver's Stage Gate Framework, developed by the Project Management Office to guide all major projects. The Stage Gate Framework defines several key milestones at which certain project specific requirements must be met before being approved to progress to subsequent stages. This process enables consistent communication of information to decision makers over a project lifecycle, facilitating feedback and approval from Metro Vancouver's Committees and Board and achieving greater transparency and clarity into projects of the highest value, risk, and consequence within Metro Vancouver's portfolio. The Stage Gate Framework is also a means of ensuring standardized project management best practices, processes, clarity on roles and responsibilities, robustness of project oversight, effectiveness of risk management, and rigor in project reporting and communication.

The project definition and conceptual design described in this report marks a significant milestone within the Stage Gate Framework as the IIWWTP Projects approach Stage Gate 1.

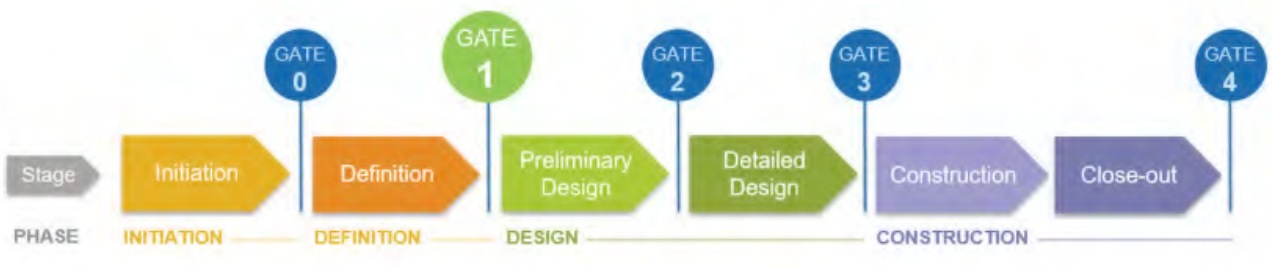


Figure 44. The Metro Vancouver Stage Gate Framework, used to guide all major projects. The completion of the PDR marks a significant milestone as the IIWWTP Projects approach Stage Gate 1.

06-F. PRIORITY NEXT STEPS

The PDR including the conceptual design, baseline schedule, Class 4 capital cost estimate, and recommended delivery strategy will serve as an important benchmark setting the future direction of the IIWWTP Projects. While much remains to be further developed and defined throughout preliminary design, detailed design, and construction stages, the finalized PDR clearly identifies the following priority next steps:

Continuing Integration

The IIWWTP Projects, most importantly the water quality improvements, ecosystem restoration, and partnerships with Musqueam, are critical to the ongoing health of the region and the Salish Sea. Continuing to utilize an integrated process involving the widest range of expertise is essential to realizing these important outcomes.

Recommended Delivery Strategy Refinement

Following approval of the PDR, the next steps to further refine and implement the recommended delivery strategy focus on establishing the capability, capacity, systems, and processes to deliver the IIWWTP Projects. These priorities include:

- **Appoint and mobilize the PMC:** Following award of the PMC contract, prioritize critical mobilization and program initiation efforts.
- **Establish the IPMO:** Establish critical systems and processes appropriate for the scale and complexity of the IIWWTP Projects and in compliance with Metro Vancouver policies to allow robust project controls and ongoing monitoring of performance against project objectives.
- **Align critical development milestones and efforts:** Further develop the interface milestones between critical design, early contractor involvement, and Stage Gate Framework efforts.
- **Procure the WWTP Design Engineer-of-Record:** Plan and implement the procurement of the IIWWTP Engineer-of-Record to progress the preliminary and detailed design of the WWTP.
- **Complete further market engagement:** Seek feedback from the construction sector on the recommended delivery strategy to validate the approach.
- **Construction Partner procurement:** Develop the detailed scope of the Construction Partner preconstruction effort and prepare for procurement.
- **Progress the early works and ground improvements works:** Continue ongoing efforts to design, plan, and implement scope of works that facilitate construction of the WWTP.

Early and Enabling Works

In order to advance the complexity and scale of the IIWWTP Projects in an effective and timely manner, it is critical that a number of early and enabling works be executed in tandem with the preliminary and detailed design stages. These early and enabling works include:

- Removal of the existing biosolid stockpiles
- Upgrades to Ferguson Road and the causeway, including road widening to accommodate construction queuing and cyclist safety
- Utility upgrades to the WWTP site
- Design of BC Hydro upgrades
- Development of laydown areas and construction roads
- Construction of the barge berth
- Development of off-site staging areas
- Preload and ground improvements across the construction site
- Pilot testing of proposed treatment processes

Treatment Process Pilot Testing

The current design of the upgraded IIWWTP contemplates two potential secondary treatment technologies: MBR and AGS. The selection of which treatment technology is best suited for the proposed IIWWTP upgrades will be evaluated through comprehensive on-site pilot testing of both technologies using influent from the IIWWTP itself. Commencing in 2023, the pilot testing program will simulate expected operating conditions at IIWWTP with each technology tested under a range of operating conditions.

Permitting

The unique site, scale, and complexity of the IIWWTP Projects presents complicated permitting requirements spanning municipal, provincial, and federal regulatory authorities. To address the inherent complexity, Metro Vancouver is working with all regulatory bodies to develop a unified permitting strategy with clarity on scope, timelines, and potential exemptions. Permitting processes have already begun in relation to land tenure discussions and early and enabling works in order to maintain the project schedule. Regular conversations with key regulatory bodies are also ongoing to further confirm, refine, and advance permitting processes while ensuring all authorities are kept up to date on project status.

Following approval of the PDR, a regulatory working group will be established with key agencies to ensure permitting complexity is adequately addressed. Among others, these agencies include the Ministry of Forests, Lands, and Natural Resource Operations, the Department of Fisheries and Oceans, Environment and Climate Change Canada, Nav Canada, and the Vancouver Fraser Port Authority.

Land Tenure

Throughout the project definition process, thorough investigations have been undertaken of the layout required for the construction and operation of the upgraded WWTP on Iona Island. In discussion with Metro Vancouver Regional Park staff and Musqueam, it was determined that land east of the existing WWTP would be best suited to accommodate the revised layout, as expansion west poses impacts to important Musqueam view corridors and expansion south carries significant impact on ecologically sensitive ecosystems.

To accommodate the revised WWTP layout, a title transfer will be required between the MVRD and the GVS&DD that will address the land tenure challenges previously identified in Section 03-E, rationalize property boundaries with proposed land use, and provide a net increase in park land. Title transfer will require approval from Metro Vancouver Committees and Boards as well as provincial regulatory authorities and will also include public and First Nations consultation.

Temporary Work within MVRD Land

Temporary work will be required within MVRD lands to facilitate completion of the IIWWTP Projects. This work will include approximately one year of archaeological and geotechnical investigations, approximately four years of temporary laydown space for ground improvements, and approximately six years of temporary laydown space for construction of the upgraded IIWWTP. All work within MVRD lands will be conducted in consideration of potential findings from archaeological investigations and impacts on sensitive ecosystems. Commencing in 2022, this temporary work will continue until approximately 2034, following which, remaining ecological restoration projects and site restoration activities will leave the Iona Beach Regional Park in a restored and improved state by 2038.

Ecological Projects

In order to advance the suite of ecological restoration and enhancement projects alongside construction of the IIWWTP, it will be critical to select a design team and begin preliminary design following approval of the PDR. Given the ecological sensitivity of Iona Island, several of these projects present potential long permitting application preparation and acceptance durations that could carry significant impacts to the overall IIWWTP Projects schedule. Conducting preliminary design early to facilitate permit application preparation and bundling will be vital to advancing this work in accordance with the baseline project schedule. Many of these projects also represent early opportunities to realize the vision presented by the IIWWTP Projects before commissioning of the upgraded IIWWTP. The initial implementation of ecological pilot projects and subsequent monitoring can be expected to further inform the design of ecological restoration projects.

Musqueam & Public Engagement

Given the impacts of the facility on Musqueam, YVR, and the public experience in Iona Beach Regional Park, it is expected that ongoing discussion with a wide range of groups will occur. Based on feedback received, design improvements can be expected to emerge over the coming years from this process of continued engagement. It should be emphasized, however, that huge opportunities exist to advance reconciliation through partnerships with Musqueam at Iona Island and that these can be expected to have an impact on the final design and operation of the IIWWTP Projects, especially those relating to the Iona Beach Regional Park.

Interpretive Programming

Section 05-F identifies proposed interpretive programming as a critical opportunity to raise awareness, sustain public goodwill, and build a network of partnerships before and throughout the long IIWWTP construction timeline. An essential first step in advancing this work will be to mobilize staff within Metro Vancouver to manage, develop, and administer the interpretive program. Led by an Integrated Education Manager, these staff will hold three vital roles:

- Plan, develop, and administer the interpretive program
- Integrate across Metro Vancouver departments to facilitate the development and execution of the interpretive program
- Establish educational partnerships across all interested and affected parties, particularly Musqueam for the planning, programming, and development of interpretive content

Figure 45. View from the roof of the proposed Welcome Centre and Operations & Maintenance Building in 2051 looking southwest towards Vancouver Island.

Figure 46. Perspective of the operations and maintenance works yard in 2051 looking west.

Figure 47. Aerial rendering over the proposed IIWWTP Projects in 2051 looking west.

**NOTE: Drawings as shown are conceptual and subject to additional study and design development.

07. CONCLUSION: AN ONGOING LEGACY

As identified throughout this Summary Report, the continuum of work contemplated by the IIWWTP Projects represents a unique opportunity to create a significant and ongoing legacy for the region. The success of this work will depend on the ongoing processes established to regenerate and enhance life at Iona Island and within the broader Metro Vancouver region. Through the continuation of an integrated design and delivery process, work on the IIWWTP Projects will further develop and evolve until 2038. Following, continual improvement will be achieved through ongoing WWTP and park operations. The living process inherent in this holistic scope of work means:

- The design and delivery works will continue to evolve in an integrated way
- The WWTP and ecological projects will continue to develop in consideration of one another
- The technical design will continue to focus on and pursue incremental improvements
- The cost estimate, risk register, schedule, delivery strategy and other critical elements will continue to be reviewed and developed in order to identify cost-savings and ensure effective financial stewardship of the IIWWTP Projects
- The public engagement process will continue to engage a wide range of users and build a network of integrated partnerships
- The partnerships with Musqueam and other Indigenous groups will continue to develop and inform further work
- The IIWWTP Projects will continue to demonstrate a transformative model for approaching urban infrastructure alongside ecological restoration, climate change adaptation, and Indigenous reconciliation

The scope of work summarized in this report, when realized, will represent a remarkable legacy for the citizens of Metro Vancouver. The implementation of the required WWTP upgrades will contribute to the long-term health of Metro Vancouver and the Salish Sea; the implementation of the park and ecology projects will improve resilience to climate change and create places of respite for all who visit Iona Island; the creation of thousands of jobs will inject hundreds of millions of dollars into the local economy; and the establishment of partnerships with Musqueam and other Indigenous groups has the potential to provide an early example of reconciliation within Canada. Further, the integrated design and delivery of the ambitious scope of work contemplated by the IIWWTP Projects will serve to build the skills and capacity of both Metro Vancouver and the regional workforce to continue implementing projects of similar scale and ambition in the decades to come.

Ultimately, with the completion of the IIWWTP Projects, the integrated vision outlined in this report will become a beacon of regenerative community infrastructure for the twenty-first century. Achieving this vision will carry profound impacts for the health of human and non-human living systems while also demonstrating a new model for infrastructure projects, one that addresses the critical issues facing our world in the twenty-first century.

Figure 48. Aerial rendering over the proposed IIWWTP Projects in 2051 looking west. **NOTE: Drawings as shown are conceptual and subject to additional study and design development.

To: Liquid Waste Committee

From: Dana Zheng, Program Manager, Policy, Planning and Analysis, Liquid Waste Services

Date: February 7, 2022 Meeting Date: March 9, 2022

Subject: **Out-of-Region Trucked Liquid Waste Discharge Requests**

RECOMMENDATION

That the GVS&DD Board:

a) authorize staff to issue an out-of-region discharge number for trucked liquid waste generated from wastewater treatment plants owned and operated by the Fraser Valley Regional District from June 1, 2022 to May 31, 2024 pursuant to *GVS&DD Trucked Liquid Waste Bylaw No. 345, 2021*;
b) authorize staff to issue an out-of-region discharge number for trucked liquid waste generated from Correctional Service of Canada's Kent and Mountain Institutions, Agassiz, BC from June 1, 2022 to December 31, 2022 pursuant to *GVS&DD Trucked Liquid Waste Bylaw No. 345, 2021*; and,
c) authorize staff to issue an out-of-region discharge number for trucked liquid waste generated from Point Roberts, Washington, U.S. from June 1, 2022 to May 31, 2027 pursuant to *GVS&DD Trucked Liquid Waste Bylaw No. 345, 2021*

as presented in the report dated February 7, 2022 titled "Out-of-Region Trucked Liquid Waste Discharge Requests".

EXECUTIVE SUMMARY

As set out in *GVS&DD Trucked Liquid Waste Bylaw No. 345, 2021* (the "TLW Bylaw"), effective June 1, 2022 the discharge of trucked liquid waste (TLW) generated outside the Metro Vancouver region is restricted at GVS&DD's wastewater treatment plants (WWTPs). Out-of-region waste cannot be accepted unless first issued an out-of-region discharge number as authorized by the GVS&DD Board (the "Board") for a stipulated period. If authorized, these discharges would be subject to all of the provisions in the TLW Bylaw applicable to TLW generated within the region.

In January, 2022, requests were received for continuing discharge of out-of-region TLW after June 1, 2022 by the following applicants:

- Fraser Valley Regional District (the "FVRD");
- Correctional Service of Canada's Kent and Mountain Institutions in Agassiz, BC; and
- Point Roberts, Washington, U.S.

Staff recommend that the Board authorize the issuance of out-of-region discharge numbers to each of these three requestors for TLW discharge as presented based on, respectively, disruptions to neighbouring infrastructure from recent unprecedented flooding in the FVRD; an existing temporary allowance for Correctional Service of Canada; and Point Roberts' long-standing reliance on GVS&DD WWTPs due to their unique geographic circumstances.

PURPOSE

This report seeks GVS&DD Board authorization for staff to issue out-of-region discharge numbers to three generators for the continuing discharge of out-of-region TLW at GVS&DD WWTPs.

BACKGROUND

Metro Vancouver's WWTPs are designed and funded based on wastewater generated from within the region. In recent years, Metro Vancouver TLW facilities have seen an increase in out-of-region TLW, in particular of higher strength non-domestic TLW, which can create stresses on WWTP infrastructure and limit the ability of WWTPs to respond to demand fluctuations. The processing of non-domestic TLW is becoming more challenging as digester capacity is limited with aging infrastructure in a growing region. While current volumes of out-of-region TLW are relatively small (approximately 1,000-2,000 m^3 out of 110,000 m^3 annually), they are not insignificant in relation to overall capacity. As part of the TLW review carried out from 2018 to 2021 leading to bylaw amendments and adoption of the new TLW Bylaw in 2021, the Board decided there was a need to address the challenge of out-of-region TLW being brought to Metro Vancouver facilities for disposal. For this reason, provisions were inserted into the new TLW Bylaw that provide a mechanism for the Board to prioritize the TLW generated within the region as capacity is stretched, and to make decisions to authorize out-of-region TLW on a case-by-case, time-limited basis only. TLW generated within the region needs to be prioritized as capacity diminishes.

The TLW Bylaw restricts discharges of TLW from outside the region effective June 1, 2022 to those out-of-region generators who have obtained an out-of-region discharge number valid for a stipulated period, as authorized by the Board. Pursuant to section 7A (5)(b) of the *Greater Vancouver Sewerage and Drainage District Act*, as part of its "Further objects", the Board is granted the additional power "To establish the uses to which its waste disposal facilities may be put and by whom they may be used." Below, staff have highlighted certain factors believed to be relevant to the Board's consideration of these requests for Metro Vancouver facilities' receipt of out-of-region discharges. If authorized by the Board, and following the issuance of out-of-region discharge numbers for these requests, discharges will be subject to all of the provisions in the TLW Bylaw applicable to TLW generated within the region, including the requirement for non-domestic TLW to have a valid Trucked Liquid Waste Authorization issued by the Sewage Control Manager. Receipt of these discharges is conditional on compliance with the TLW Bylaw.

Requests from three generators of out-of-region TLW to discharge at MV WWTPs after June 1, 2022 were received in January 2022 and are presented, below.

Fraser Valley Regional District Out-of-Region TLW Request:

Requestor	Engineering and Community Services Dept., FVRD
Source	Five small WWTPs owned and operated by FVRD
Service Population	~1,000 residences
Type	Waste activated sludge from liquids stream treatment processes
Quantity	~350 m^3 per year
Requested Period	June 1, 2022 to May 31, 2024
Reason	Due to flood events in November 2021, plans for the construction of a new WWTP in FVRD with capacity to treat and process waste activate sludge from all five WWTPs was delayed until 2024.

Staff Comment on FVRD's Request:
This is non-domestic high strength TLW that can be difficult to manage depending on quality; however, Metro Vancouver has been temporarily receiving this waste since 2020 without operational issue. Staff indicate this requested amount of waste activated sludge can be managed on a temporary basis until May 31, 2024 at MV WWTPs.

Correctional Service of Canada's Kent and Mountain Institutions Out-of-Region TLW Request:

Requestor	Engineering and Maintenance, Pacific Regional Headquarters, Correctional Service of Canada
Source	Small WWTP at Kent and Mountain Institutions in Agassiz, BC
Service Population	~1,000 people
Type	Waste activated sludge from liquids stream treatment processes
Quantity	~660 m^3
Requested Period	June 1, 2022 to December 31, 2022
Reason	Currently no solids processing capacity. A new dewatering press to process the sludge into biosolids is planned to be in place by the end of 2022.

Staff Comment on Correctional Service of Canada's Request:
This is non-domestic high strength TLW that can be difficult to manage depending on quality; however, Metro Vancouver has been temporarily receiving this waste since 2019 without operational issue. Staff indicate this requested amount of waste activated sludge can be managed on a temporary basis until December 31, 2022 at MV WWTPs.

Point Roberts, Washington, U.S. Out-of-Region TLW Request:

Requestor	The Potty Wagon (hauler of Point Roberts septic waste)
Source	Point Roberts septic systems
Service Population	~2,200 residences
Type	Septic tank waste
Quantity	~370 m^3 per year
Requested Period	June 1, 2022 to May 31, 2042 (20 years)
Reason	All residences within Point Roberts are on septic systems because no sewer system is in place and is not planned due to the unique geographic circumstances of only sharing a land border with Canada. No septic services from Blaine, Washington are available due to international border issues.

Staff Comment on Point Roberts' Request:
Septic tank waste as domestic TLW is relatively easy to process at GVS&DD WWTPs and poses fewer process challenges compared to higher strength, non-domestic TLW. Metro Vancouver has been receiving this domestic TLW from Point Roberts for more than 15 years without operational issue. While the Potty Wagon hauler from Point Roberts requested a 20-year term, staff recommend the Board consider a shorter 5-year stipulated period (June 1, 2022 to May 31, 2027) to allow for periodic review of this arrangement.

ALTERNATIVES

1. That the GVS&DD Board:
   a) authorize staff to issue an out-of-region discharge number for trucked liquid waste generated from wastewater treatment plants owned and operated by the Fraser Valley Regional District from June 1, 2022 to May 31, 2024 pursuant to *GVS&DD Trucked Liquid Waste Bylaw No. 345, 2021*;
   b) authorize staff to issue an out-of-region discharge number for trucked liquid waste generated from Correctional Service of Canada's Kent and Mountain Institutions, Agassiz, BC from June 1, 2022 to December 31, 2022 pursuant to *GVS&DD Trucked Liquid Waste Bylaw No. 345, 2021*; and,
   c) authorize staff to issue an out-of-region discharge number for trucked liquid waste generated from Point Roberts, Washington, U.S. from June 1, 2022 to May 31, 2027 pursuant to *GVS&DD Trucked Liquid Waste Bylaw No. 345, 2021*.

   as presented in the report dated February 7, 2022 titled "Out-of-Region Trucked Liquid Waste Discharge Requests".

2. That the GVS&DD Board receive for information the report dated February 7, 2022 titled "Out-of-Region Trucked Liquid Waste Discharge Requests" and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

No financial implications. As defined in the TLW bylaw, discharge fees designed to recover the costs of receiving and treating TLW will apply to all TLW received at MV WWTPs.

CONCLUSION

Effective June 1, 2022, discharge of out-of-region TLW to MV WWTPs is restricted in accordance with the TLW Bylaw, unless specifically authorized by the Board for a stipulated time period. Three requests for discharges of out-of-region TLW are presented for Board consideration. Staff recommend that the Board authorize staff to issue an out-of-region discharge number for each of:

- waste activated sludge from FVRD WWTPs – approximately 350 m^3 per year for a stipulated period of two years;
- waste activated sludge from Correctional Service of Canada's Kent and Mountain Institutions – approximately 660 m^3 for a stipulated period of seven months; and
- septic tank waste from Point Roberts, Washington, U.S. – approximately 370 m^3 per year for a stipulated period of five years.

Staff recommend Alternative 1, that the Board authorize staff to issue out-of-region discharge numbers for TLW discharge as presented for each of these three requests based on, respectively, disruptions to neighbouring infrastructure from recent unprecedented flooding in the Fraser Valley Regional District; an existing temporary allowance for Correctional Service of Canada; and Point Roberts' long-standing reliance on MV WWTPs due to their unique geographic circumstances.

If authorized by the Board and following the issuance of out-of-region discharge numbers for these requests, discharges will be subject to all of the provisions in the TLW Bylaw applicable to TLW generated within the region. Receipt of these discharges is conditional on compliance with the TLW Bylaw.

Reference

GVS&DD Trucked Liquid Waste Bylaw No. 345, 2021

49555360

To: Liquid Waste Committee

From: Cheryl Nelms, General Manager, Project Delivery

Date: March 4, 2022 Meeting Date: March 9, 2022

Subject: **Contract Amendment of RFP No. 14-205 - Design Build Consulting Services for the Lions Gate Secondary Wastewater Treatment Plant to Design Consultant, Engineer of Record Service**

RECOMMENDATION

That the GVS&DD Board:

a) amend the contract resulting from RFP No. 14-205 - Design Build Consulting Services for the Lions Gate Secondary Wastewater Treatment Plant in an amount of up to $15,000,000 (exclusive of taxes) to allow AECOM Canada Ltd. to become the design consultant for the project, subject to final review by the Commissioner; and

b) authorize the Commissioner and Corporate Officer to execute the required documentation once the Commissioner is satisfied that the amendment should proceed.

EXECUTIVE SUMMARY

Metro Vancouver has terminated its contract with Acciona Wastewater Solutions LP and is moving forward with a new project delivery model to complete the North Shore Wastewater Treatment Plant Project. Under the new model, Metro Vancouver will work with a general contractor to finalize construction and a design consultant to complete the design, to be the Engineer of Record, and to provide quality assurance services.

Metro Vancouver staff have worked collaboratively with AECOM for them to become the design consultant. This will require an amendment to their current "Owners Engineering" agreement which will allow AECOM to assume all design responsibilities and obligations for the North Shore Wastewater Treatment Facility including both the constructed and future works. Initial amendment of AECOM's contract in the amount of up to $15,000,000 reflects the Phase 1 scope of services under this new delivery model.

PURPOSE

On January 20, 2022, the GVS&DD issued a notice of termination of the contract between GVS&DD and Acciona Wastewater Solutions LP (Project Co). Following termination of the contract, Metro Vancouver proceeded with work to engage an alternate general contractor and design consultant to deliver the project as quickly as possible and in the best interest of the region, with an intent to minimize costs and risks to the public.

The design and construction of the North Shore Wastewater Treatment Plant Project is partially complete. Completed construction includes ground improvement, approximately half of the superstructure structural concrete, and some in-street wastewater conveyance works.

This report is to request authorization by the GVS&DD Board to amend the contract with AECOM Canada Ltd. (AECOM) to assume the design consultant responsibilities for Phase 1 in an amount of up to $15,000.000 (exclusive of taxes).

BACKGROUND

Under the previous project delivery model, Project Co was responsible for the design, construction, commissioning, and process for performance for the plant.

To help to expedite the project while also retaining the ability for competitive pricing of construction for the final delivery of the project, Metro Vancouver has adjusted the project delivery model to retain a general contractor and a design consultant separately.

In accordance with this adjusted project delivery model, the design delivery will be conducted in 2 phases: design diligence review and development (Phase 1), and design completion and construction field services (Phase 2). Under Phase 1, the design consultant and the general contractor will work collaboratively with Metro Vancouver to advance the design and to develop a detailed execution plan, schedule and cost estimate to complete the project. Phase 2 will be the completion of all design, construction, and commissioning of the project (see Attachment for more information on the general contractor approach).

Since project initiation, AECOM has been the owner's engineer, reviewing all design submissions by Project Co on behalf of Metro Vancouver. The original competition to engage an owner's engineer was RFP No. 14-205 - Design Build Consulting Services for the Lions Gate Secondary Wastewater Treatment Plant. This project has since been renamed to North Shore Wastewater Treatment Plant Project.

Pursuant to the *GVS&DD Offers and Delegation Bylaw No. 284, 2014* (Bylaw) and the *Procurement and Real Property Contracting Authority Policy* (Policy), procurement contracts which exceed a value of $5 million require the approval of the GVS&DD Board of Directors.

This report is being brought forward to the Liquid Waste Committee to consider the recommendation to the GVS&DD Board to amend the contract for AECOM to change from being the project owner's engineer to become the project's design consultant, wherein they will undertake completion of the project design in collaboration with Metro Vancouver.

DESIGN CONSULTANT SERVICES

Metro Vancouver staff have negotiated with AECOM to develop an amendment to their current "Owners Engineering" agreement which will allow AECOM to assume all design responsibilities and obligations for the North Shore Wastewater Treatment Facility.

AECOM are uniquely positioned to assume the role of design consultant for the completion of the design of the North Shore Wastewater Treatment Plant. Their participation in the project from initiation — which included the development of the indicative design and technical specification through to fulfilling their current role as owner's engineer — gives them a comprehensive

understanding of the current status of the design and construction for the north shore facility. Their willingness to assume all obligations and responsibilities of the design consultant and process guarantee makes them a strategic partner. This approach will assist Metro Vancouver in mitigating delays to the overall schedule and provides the most cost effective approach to the transfer of design consultant responsibilities. It will also enhance Metro Vancouver's ability to maintain construction continuity by completing the design more efficiently and will facilitate Metro Vancouver's successful completion of the project.

Under this amendment AECOM will assume all design obligations needed to finalize design and they will augment Metro Vancouver in providing construction management services along with commissioning and operational support for the North Shore Wastewater Treatment Plant. Under the amended contract, AECOM will be required to ensure the quality of the construction meets Metro Vancouver's expectations and all aspects of the final constructed facility meets the life expectancy criteria.

In AECOM's new role as design consultant they will now hold the process guarantees and will ensure that the plant is fully operable and maintainable while meeting its federal and provincial obligations with regards to effluent performance.

The transition of AECOM to assume the role of Metro Vancouver's design consultant will enable cost savings by fast tracking portions of the design and maintaining construction continuity.

ALTERNATIVES

1. That the GVS&DD Board:
   a) amend the contract resulting from RFP No. 14-205 - Design Build Consulting Services for the Lions Gate Secondary Wastewater Treatment Plant in an amount of up to $15,000,000 (exclusive of taxes) to allow AECOM Canada Ltd. to become the design consultant for the project, subject to final review by the Commissioner; and
   b) authorize the Commissioner and Corporate Officer to execute the required documentation once the Commissioner is satisfied that the amendment should proceed.

2. That the GVS&DD Board not approve the amendment of the contract to allow AECOM to become the design consultant for the North Shore Wastewater Treatment Plant, and direct staff to report back to the GVS&DD Board with options for an alternate course of action.

FINANCIAL IMPLICATIONS

The Phase 1 Design Consultant, Engineer of Record service will include design due diligence review and design development services. The budget for this phase of the design consultant services is estimated at $15 million. As part of Phase 1, Metro Vancouver will work with the design consultant and the new general contractor to develop a plan to complete the project, including a revised project budget and schedule.

The award for Phase 2 design completion and construction field services will be brought to the Board for future approval. This will come after the revised budget and schedule to complete the North Shore

Wastewater Treatment Plant has been approved by the Board. The estimated value for both phases is $60,000,000 (exclusive of taxes)

If the GVS&DD Board approves Alternative 1, the contract will be amended to AECOM in the amount of up to $15,000,000 (exclusive of taxes) for RFP No. 14-205 - Design Build Consulting Services for the Lions Gate Secondary Wastewater Treatment Plant. The current approved program budget for the North Shore Wastewater Treatment Plant Program ($1.058b). It is anticipated that the approved project budget and current year cash flow can accommodate the amendment.

The GVS&DD has the choice not to proceed with Alternative 1, but staff will need further direction on how to proceed with the project. It will result in a delay to the project schedule and is anticipated to add additional costs to the overall project and likely impact the schedule of the North Shore Wastewater Treatment Plant Project.

CONCLUSION

Metro Vancouver has implemented an approach finding alternative delivery partners for the North Shore Wastewater Treatment Plant that is designed to get the project delivered as quickly and efficiently as possible while considering cost competitiveness.

Under this amendment, AECOM will assume all design obligations to finalize design and they will support Metro Vancouver by providing construction management services along with commissioning and operational support for the North Shore Wastewater Treatment Plant. Under the amended contract AECOM will be required to ensure the quality of the construction meets Metro Vancouver's expectations and all aspects of the final constructed facility meets the life expectancy criteria.

The transition of AECOM to assume the role of Metro Vancouver's design consultant, "Engineer of Record" will enable cost savings by fast tracking portions of the design and maintaining construction continuity.

It is recommended that the Board authorize the Commissioner and the Corporate Officer to amend the contract with AECOM Canada Ltd. in the amount of up to $15,000,000 (exclusive of taxes).

Attachment

Award of Contract Resulting from RFQ No. 21-457 - North Shore Wastewater Treatment Plant (NSWWTP) Project", February 23, 2022

50462633

To: Liquid Waste Committee

From: Cheryl Nelms, General Manager, Project Delivery

Date: February 23, 2022 Meeting Date: February 23, 2022

Subject: **Award of Contract Resulting from RFQ No. 21-457: North Shore Wastewater Treatment Plant (NSWWTP) Project**

RECOMMENDATION

That the GVS&DD Board:

a) approve the award of contract RFQ No. 21-457: North Shore Wastewater Treatment Plant (NSWWTP) Project to PCL Constructors Westcoast Inc, Contract 1 for Early Contractor Involvement and Construction Management Services estimated at $40 million, subject to final review by the Commissioner; and
b) authorize the Commissioner and Corporate Officer to execute the required documentation once the Commissioner is satisfied that the award should proceed.

EXECUTIVE SUMMARY

Metro Vancouver has terminated its contract with Acciona Wastewater Solutions LP and is moving forward with a new contracting model to complete the North Shore Wastewater Treatment Plant Project. Under the new model, Metro Vancouver will work with a general contractor to finalize construction and a design consultant to finalize the design and provide quality assurance.

The delivery model for the general contractor is similar to an early contractor involvement contract, whereby the general contractor will provide constructability expertise during the completion of the design (Contract 1). If successful negotiation of a guaranteed maximum price or fixed price agreement can be made, then we will bring back to the Board for approval a recommendation for the contractor to assume the construction of the facility (Contract 2). This contract model is based on a cost-competitive strategy that allows for collaboration between contractor, designer, and Metro Vancouver while mitigating overall schedule delays.

The contract opportunity was a publically posted request for qualifications and was conditional on the termination of the existing contract. Metro Vancouver engaged professional advisors, a fairness monitor, and a due diligence reviewer in the evaluation process. It is recommended that Contract 1 for the general contractor role be awarded to PCL Constructors Westcoast Inc.

PURPOSE

This report is to advise the GVS&DD Board of the results of the Request for Qualifications (RFQ) No. 21-457: North Shore Wastewater Treatment Plant (NSWWTP) Project, and to recommend award of Contract 1 for Early Contractor Involvement and Construction Management Services estimated at $40 million, for the general contractor to deliver the North Shore Wastewater Treatment Plant Project to PCL Constructors Westcoast Inc.

BACKGROUND

On January 17, 2022, the GVS&DD Board directed staff to issue a notice of termination of the contract between GVS&DD and Acciona Wastewater Solutions LP ("Project Co"). Following termination of the contract, Metro Vancouver proceeded with other activities to deliver the project as quickly as possible and in the best interest of the region, with an intent to minimize costs to the public.

The design and construction of the North Shore Wastewater Treatment Plant Project is partially complete. Completed construction includes ground improvement, approximately half of the superstructure structural concrete, and some in-street wastewater conveyance works.

Pursuant to the *GVS&DD Offers and Delegation Bylaw No. 284, 2014* (Bylaw) and the *Procurement and Real Property Contracting Authority Policy* (Policy), procurement contracts which exceed a value of $5 million require the approval of the GVS&DD Board of Directors.

This report is being brought forward to the Liquid Waste Committee to consider the recommendation to the GVS&DD Board to authorize the award of general contractor services to PLC Constructors Westcoast Inc.

CHANGES TO CONTRACT MODEL

Under the previous contract, Acciona and their partners were responsible for the design, construction, commissioning, and process for performance for the plant.

To help to expedite the project while also retaining the ability for competitive pricing of services for the final delivery of the project, Metro Vancouver has adjusted the approach to retain a general contractor and a design consultant separately. The general contractor and design consultant will work collaboratively with Metro Vancouver to complete design, construction, and commissioning.

The delivery model for construction is an early contractor involvement contract, whereby the general contractor will provide constructability expertise during the completion of the design (Contract 1). Then, if successful negotiation of a guaranteed maximum price or fixed price agreement can be made, they may assume the construction of the facility (Contract 2).

In Contract 1, the general contractor will be responsible for reviewing the design and construction progress to date, developing a plan to deliver the project, doing some early works, and working with Metro Vancouver to define a revised project budget and schedule in order to enable the guaranteed maximum price or fixed price contract negotiation. If a negotiated agreement can be achieved, staff will report back to the Board for approval of Contract 2 for the completion of construction for the treatment plant.

To fill the role of the design consultant, Metro Vancouver staff are working collaboratively with AECOM senior leaders to develop an amendment to their current "Owners Engineering" agreement that will allow AECOM to assume "Engineer of Record" responsibilities and obligations for the North Shore Wastewater Treatment Plant, including both the constructed and future works. If an

agreement that is in the best interest of Metro Vancouver can be negotiated, the nature of that agreement will be reported to the Board.

Considerations for Competitive Pricing

Metro Vancouver has developed a contract approach to bringing in the general contractor that allows for completion of design and progress on construction in the shortest possible time frame while still planning for tenders or work packages that could be bid on to keep overall costs of delivery competitive. The approach allows for maximum agility and opportunities for competitive pricing, and is driven by schedule without sacrificing the need for competitive pricing.

Contract 1: Construction Management Services

In Contract 1, the general contractor will work with Metro Vancouver to establish project execution plans that will create more certainty on cost estimates. Work under this contract is anticipated to include:

- Contributing to design, procurement, and construction definition finalization;
- Detailed in-situ construction field assessment and analysis;
- Developing detailed project execution plan;
- Equipment and materials procurement;
- Equipment and materials take-off and pricing;
- Major work package tendering and pricing;
- Developing and maintaining cost estimates; and
- Developing a GMP or fixed price and firm schedule for completion of construction under Contact 2.

Other anticipated services under Contract 1 include initiation of construction of concrete works (approximately 40,000m³ remaining) and other early construction works and site services. Services performed under Contract 1 will be paid for on a cost-plus basis, with the exception of early construction works which may be on either a cost-plus or a fixed price basis.

Contract 2: Construction Delivery

Under Contract 2, the general contractor will be responsible for the completion of construction and commissioning of the project to the fixed price or guaranteed maximum price and schedule and in accordance with execution plans or other plans or agreements developed under Contract 1. If a negotiated agreement can be achieved, staff will report back to the Board for approval of Contract 2 for the completion of construction for the treatment plant.

For each package of work that needs to be constructed, it will either be self-performed (by the general contractor) or sub-contracted. For packages that go to tender, the general contractor will also have the option to participate in a procurement process alongside other interested contractors.

GENERAL CONTRACTOR RECOMMENDATION

Metro Vancouver began the process of procuring a general contractor to complete construction of the North Shore Wastewater Treatment Plant in the fall of 2021. On November 25, 2021 Metro Vancouver posted a public Request for Qualifications (RFQ) to seek a new contractor, conditional on

the termination of the existing contract. The RFQ was advertised on the Corporation and BC Bid websites. It closed on December 17, after three weeks in market.

Metro Vancouver's goal was to select a general contractor that:

- Has experience in taking over and completing projects of similar complexity and scope;
- Will commit highly qualified staff to the project;
- Will partner with the Corporation in design completion and discipline integration to maximize efficiency and ultimate value to taxpayers;
- Understands the value of economic opportunities for local contractors and suppliers; and
- Will safely build an asset of high quality to a firm price and schedule, once these two targets are determined, in compliance with applicable permits and regulatory conditions.

Evaluation Process

To support the rigor of the evaluation, Metro Vancouver engaged a fairness monitor, who observes the whole process as an independent observer of the fairness of the competitive process. Metro Vancouver has also engaged a due diligence reviewer, who reviews the evaluation process as to whether it is followed in accordance with the RFQ and is conducted consistently and without bias.

Metro Vancouver engaged professional advisors with extensive experience in major capital infrastructure projects to review the process of selecting a new contractor, and to participate in the review and assessment of all proposals submitted.

Metro Vancouver short-listed three respondents. The three short-listed respondents were:

- Aecon Water Infrastructure Inc.
- Graham Infrastructure LP
- PCL Constructors Westcoast Inc.

Considerations in evaluation included:

- Qualifications and experience of the firm
- Qualifications and experience of the staff put forward
- Pricing margins
- Information received through an interview and presentation about the respondents' qualifications, experience, and approach for completing construction of the plant

ALTERNATIVES

1. That the GVS&DD Board:
    a. approve the award of contract RFQ No. 21-457: North Shore Wastewater Treatment Plant (NSWWTP) Project to PCL Constructors Westcoast Inc, Contract 1 for Early Contractor Involvement and Construction Management Services estimated at $40 million, subject to final review by the Commissioner; and
    b. authorize the Commissioner and Corporate Officer to execute the required documentation once the Commissioner is satisfied that the award should proceed.

2. That the GVS&DD Board not approve the award for contract services for the completion of the North Shore Wastewater Treatment Plant, and direct staff to report back to the GVS&DD Board with options for an alternate course of action.

FINANCIAL IMPLICATIONS

If the GVS&DD Board approves Alternative 1, a contract will be awarded to PCL Constructors Westcoast Inc in a cost plus contract to complete Contract 1.

Currently, the North Shore Wastewater Treatment Plant program is budgeted for $1.058B. This includes the cost of the treatment plant, the conveyance project, and preliminary design for decommissioning the Lions Gate plant. Metro Vancouver will work with the new general contractor to develop a plan to complete the project, including a revised project budget and schedule. Spend to date for the North Shore Wastewater Treatment Plant Program is $498 million.

The budget for Contract 1 is estimated at $40 million. The approved 2022 cash flow for the North Shore Wastewater Treatment Plant Program is $267 million.

The GVS&DD Board has the choice to not proceed with Alternative 1. But staff will need further direction on how to proceed with the project. It will result in a delay to the project schedule and is anticipated to add additional costs to the overall project.

CONCLUSION

Metro Vancouver has implemented an approach finding alternative delivery partners for the North Shore Wastewater Treatment Plant that is designed to get the project delivered as quickly and efficiently as possible while considering cost competitiveness.

The contract model developed for the general contract positions Metro Vancouver to work in a highly collaborative way with the new general contractor to complete construction in the shortest possible time frame while still planning for tenders or work packages that could be bid on to keep overall costs of delivery competitive. The approach allows for maximum agility and opportunities for competitive pricing, and is driven by schedule without sacrificing the need for competitive pricing.

Within this contract, Metro Vancouver will work collaboratively with the new general contractor to develop a plan to complete the project, including a revised project budget and schedule. Work will be done within the approved 2022 budget for the North Shore Wastewater Treatment Plant. The budget for Contract 1 is estimated at $40 million. Subsequent elements of the contract (Contract 2) will return to the Board for future approval. The approved 2022 cash flow for the North Shore Wastewater Treatment Plant Program is $267 million.

Metro Vancouver evaluated the proposals with support from professional advisors and oversight from a fairness monitor and due diligence reviewer. It is recommended that the contract under Request for Proposal No. 21-457: North Shore Wastewater Treatment Plant (NSWWTP) Project, Contract 1 for Early Contractor Involvement and Construction Management Services, be awarded to PCL Constructors Westcoast Inc.

50460133

To: Liquid Waste Committee

From: Joe Sass, Director, Financial Planning, Finance Services

Date: March 1, 2022 Meeting Date: March 9, 2022

Subject: **Development Cost Charge Review Process and Rate Amending Bylaw**

RECOMMENDATION

That the GVS&DD Board:

a) approve the implementation of new Development Cost Charge rates, as proposed, and endorse the inclusion of interest costs directly related to those activities that are approved by the Inspector of Municipalities in the Development Cost Charge program; and
b) give first, second and third reading to the *Greater Vancouver Sewerage and Drainage District Development Cost Charge Amending Bylaw No.353*; and
c) direct staff to forward the *Greater Vancouver Sewerage and Drainage District Development Cost Charge Amending Bylaw No.353* to the Inspector of Municipalities for approval.

EXECUTIVE SUMMARY

As part of a plan to update the liquid waste development cost charge (DCC) program more frequently, a program review was initiated in 2020, with approval from the GVS&DD Board in July 2021 to proceed with engagement on the proposed update to the liquid waste development cost charge program.

Significant engagement with industry, member jurisdictions, First Nations and the public was undertaken in the Fall of 2021 in which feedback and comments were received and addressed. Of note is the inclusion of interest associated with financing growth capital in the calculation of DCC rates based on specific feedback from member jurisdictions. It is recommended that the GVS&DD Board approve the implementation of the new DCC rates and the amending DCC bylaw and direct staff to forward the DCC amending bylaw to the Inspector of Municipalities for approval. Once the bylaw is approved by the Inspector of Municipalities, staff will bring back the bylaw for final adoption by the GVS&DD Board.

PURPOSE

The purpose of this report is to provide an update on the GVS&DD DCC rate review, summarize feedback from public consultation and from First Nations engagement, and to recommend the Board give three readings to *Greater Vancouver Sewerage and Drainage District Development Cost Charge Amending Bylaw No.353.*

BACKGROUND

The liquid waste DCC program within the GVS&DD was implemented in 1997 via a DCC Bylaw. The purpose of the program is to ensure that new development in the region helps fund the cost of the liquid waste infrastructure expansion required to service that development. Rates are calculated

based on regional growth projections, projected costs of growth projects, projected interest rates, and assist factors, among other variables.

As part of the process to regularly update the DCC rates more frequently, a program review was initiated in 2020. An internal cross-departmental DCC Steering Committee has been leading this review concurrently with planning the implementation of a new water DCC program. An engagement plan and updates to the liquid waste DCC rates were drafted and presented to the GVS&DD Board in July 2021.

On July 30, 2021 the GVS&DD Board passed the following resolution:

> "That the GVS&DD Board direct staff to proceed with engagement on the proposed update to the liquid waste development cost charge program as described in the report dated June 25, 2021, titled "Engagement Plan for Liquid Waste Development Cost Charge Program Update"."

This report summarizes the feedback provided from the consultation and engagement sessions and presents a bylaw to amend the DCC rates.

CONSULTATION AND ENGAGEMENT PROCESSES

In early 2021, a dedicated webpage was launched providing information on the updates to the DCC program, the review process and the proposed rates. Visitors to the website could also register for the mailing list to receive additional information on the DCC updates. Staff also reached out to the Urban Development Institute to discuss a format for consultations that would best suit their members.

Virtual public meetings were held on September 13 and September 15 and virtual meetings for the purposes of engagement with First Nations took place on September 17th, September 23rd, and October 21, 2021. At each meeting, Metro Vancouver representatives from Finance explained the proposed DCC Program and answered questions from those in attendance.

SUMMARY OF FEEDBACK

Through two formal public consultations and three First Nation engagement sessions, there were 163 registrants representing the development industry, First Nations, the public and member jurisdictions. In addition, there was a follow up consultation specifically with the City of Vancouver to address specific questions and comments as it relates to the Vancouver Sewerage Area. Each session began with a presentation summarizing regional growth, the capital projects planned to address growth, summary of the Industry Capacity Analysis, the proposed rates, the household impacts and the review process.

This was followed by questions from attendees on topics of interest to them. With a diverse group of attendees, there were a wide variety of questions and concerns. The key issues identified and discussed are summarized into the basic themes as set out below.

Financial Impact

Many in the development community expressed concern regarding the cumulative impact of rate increases of the various DCCs. Specifically, it was indicated there have been increases to municipal, TransLink, and Metro Vancouver DCCs, as well as increases in community amenity charges and additional building code requirements. The development community expressed that although each rate increase in itself may not be significant, the cumulative financial burden on developers is substantial.

In response to the concerns, through the commissioning of the Industry Capacity Analysis, staff assessed the impact of the proposed DCC rates on industry. The rates proposed and presented at the consultation sessions take the results of this study into effect. The GVS&DD is responding to regional growth and has to undertake the development of the necessary infrastructure as required by its mandate. The DCC charge strives to support the principal of "growth paying for growth". Should the DCC's not be sufficient, sewer levies will have to be increased to pay for growth infrastructure. This not only means that all regional residents are paying for growth, but that the affordability for all is impacted. There are, however, some conditions under which DCC's can be waived in order to support the creation of affordable rental housing units, through the *Bylaw to Establish a Waiver or Reduction of Development Cost Charges for Not-for-Profit Rental Housing No. 322, 2018*.

Earlier Consultation

Within the development community there was overall consensus that early notice of potential DCC rate increases would be helpful. This would help developers to accommodate the rate increases in their plans and financial analyses, as it is much more difficult to manage an increase in costs after sites have been purchased and financing arranged. The development community requested to be notified as soon as possible of any proposed rate increases, even if the notification involves only estimates of new rates.

Accordingly, although not currently provisioned in the *Greater Vancouver Sewerage and Drainage District Act*, the development industry also supports predictable annual increases in rates, rather than large periodic increases.

Need for Regional Coordination

Several member jurisdictions suggested the new rates could potentially limit their ability, particularly in the Vancouver Sewerage Area, to raise their own DCC rates in the future. Given the large growth demands the region is experiencing, should the regional DCC charges not be sufficient to fund growth infrastructure, sewer levies would need to be increased to pay for any shortfall.

It was suggested that consideration be given to coordinating and aligning GVS&DD changes with TransLink and the municipalities to understand in advance the collective impacts. Also, coordination of the timing of any changes would simplify the administrative burden necessary for the municipal staff that collect the charges. The challenge is trying to coordinate timing with member jurisdictions that are updating the DCC rates.

First Nations

First Nations' concerns involved whether regional DCCs will apply to First Nations' lands and, if they do, how they may impact infrastructure development on those lands. Also, it was suggested that, as a framework for reconciliation, it would be worthwhile for Metro Vancouver to understand the collective history of First Nations as stewards of the lands, and to proceed in a respectful and conscious way.

DCC RATE AMENDING BYLAW

The Greater Vancouver Sewerage and Drainage District Development Cost Charge Amending Bylaw No.353 (Attachment 1) has been structured with the following:

The rates are as proposed in July 2021 and as presented through the stakeholder consultation and First Nation engagement processes. The proposed effective date is upon the adoption of the bylaw.

ALTERNATIVES

1. That the GVS&DD Board:
   a) approve the implementation of new Development Cost Charge rates, as proposed, and endorse the inclusion of interest costs directly related to those activities that are approved by the Inspector of Municipalities in the Development Cost Charge program; and
   b) give first, second and third reading to the *Greater Vancouver Sewerage and Drainage District Development Cost Charge Amending Bylaw No.353;* and
   c) direct staff to forward the *Greater Vancouver Sewerage and Drainage District Development Cost Charge Amending Bylaw No.353* to the Inspector of Municipalities for approval.

2. That the Liquid Waste Committee receive for information the report dated March 1, 2022 titled "Development Cost Charge Review Process and Rate Amending Bylaw" and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

If the Liquid Waste Committee approves Alternative 1, the report will be forwarded to the GVS&DD Board for approval. Details of the DCC sewerage area rate structure and changes are summarized in Attachment 2. The completion of the liquid waste infrastructure necessary to meet the needs of growth in the region is predicated on the collection of sufficient funding from that growth to pay for it when required.

If the Liquid Waste Committee does not approve Alternative 1, further analysis may be required to determine the resulting financial impacts. Delays in implementation may have an impact on the ability to generate sufficient revenues to meet the needs of the growth capital plan.

CONCLUSION

Following GVS&DD Board direction, an engagement process was undertaken concerning the proposed update to the liquid waste DCC program, at two public consultation sessions and three First Nations engagement sessions held in September and October 2021. There were 163 registrants at the sessions representing the development industry, member jurisdictions, First Nations and the public. Key feedback provided included concerns on the potential impact on housing affordability,

the desire for earlier consultation, the need for regional coordination and consideration of the impact on First Nations.

Based on the feedback received it is recommended that the *Greater Vancouver Sewerage and Drainage District Development Cost Charge Amending Bylaw No.353* be given three readings and that staff be directed to forward it to the Inspector of Municipalities for approval. Staff recommend Alternative 1.

Attachments

1. *Greater Vancouver Sewerage and Drainage District Development Cost Charge Amending Bylaw No.353*
2. DCC Rate Structure and Changes Summary

49262339

GREATER VANCOUVER SEWERAGE AND DRAINAGE DISTRICT
AMENDING BYLAW NO. 353, 2022
A Bylaw to amend "Greater Vancouver Sewerage and Drainage District Development Cost Charge Bylaw No. 254, 2010"

WHEREAS:

A. The Board of Directors of the Greater Vancouver Sewerage and Drainage District has adopted "Greater Vancouver Sewerage and Drainage District Development Cost Charge Bylaw No. 254, 2010", a bylaw imposing development cost charges on every person who obtains approval of a subdivision or a building permit authorizing the construction, alteration or extension of a building or structure from a Member Municipality; and

B. The Board of Directors of the Greater Vancouver Sewerage and Drainage District wishes to amend "Greater Vancouver Sewerage and Drainage District Development Cost Charge Bylaw No. 254, 2010";

NOW THEREFORE the Board of Directors of the Greater Vancouver Sewerage and Drainage District, enacts as follows:

Citation

1. The official citation of this bylaw is "Greater Vancouver Sewerage and Drainage District Development Cost Charge Amending Bylaw No. 353, 2022".

Schedules

2. The following Schedules are attached to and form part of this bylaw:
   Schedule "A", Fraser Sewerage Area – Development Cost Charge Rates;
   Schedule "B", Lulu Island West Sewerage Area – Development Cost Charge Rates;
   Schedule "C", North Shore Sewerage Area – Development Cost Charge Rates; and
   Schedule "D", Vancouver Sewerage Area – Development Cost Charge Rates.

Amendment of Bylaw

3. The "Greater Vancouver Sewerage and Drainage District Development Cost Charge Bylaw No. 254, 2010" is hereby amended as follows:

   a) Section B of the preamble is deleted and replaced as follows:

      B. Development cost charges provide funds to assist the GVS&DD in paying capital costs, including interest costs directly related to those activities that are approved by the Inspector of Municipalities to be included as capital costs, incurred to provide, construct, alter or expand sewerage facilities to service development within the area of the GVS&DD, excluding the portion of capital costs charged by the GVS&DD to Member Municipalities under section 54 of the Act;

b) Schedules “A”, “B”, “C” and “D” are deleted in their entirety and replaced with the Schedules “A”, “B”, “C” and “D” which are attached to and form part of this bylaw.

Read a first time this _____ day of _____, _____.

Read a second time this _____ day of _____, _____.

Read a third time this _____ day of _____, _____.

Approved by the Inspector of Municipalities this _____ day of _____, _____.

Passed and finally adopted this _____ day of _____, _____.

Sav Dhaliwal, Chair

Chris Plagnol, Corporate Officer

FRASER SEWERAGE AREA – DEVELOPMENT COST CHARGE RATES

	Description	Rate
1.	Residential Dwelling Unit	$6,254 per Dwelling Unit
2.	Townhouse Dwelling Unit	$5,390 per Dwelling Unit
3.	Apartment Dwelling Unit	$4,269 per Dwelling Unit
4.	Non-Residential Use	$3.30 multiplied by the number of square feet of Floor Area

LULU ISLAND WEST SEWERAGE AREA – DEVELOPMENT COST CHARGE RATES

	Description	Rate
1.	Residential Dwelling Unit	$3,313 per Dwelling Unit
2.	Townhouse Dwelling Unit	$2,756 per Dwelling Unit
3.	Apartment Dwelling Unit	$2,042 per Dwelling Unit
4.	Non-Residential Use	$1.54 multiplied by the number of square feet of Floor Area

Schedule C

NORTH SHORE SEWERAGE AREA – DEVELOPMENT COST CHARGE RATES

	Description	Rate
1.	Residential Dwelling Unit	$3,300 per Dwelling Unit
2.	Townhouse Dwelling Unit	$2,786 per Dwelling Unit
3.	Apartment Dwelling Unit	$2,030 per Dwelling Unit
4.	Non-Residential Use	$1.67 multiplied by the number of square feet of Floor Area

VANCOUVER SEWERAGE AREA – DEVELOPMENT COST CHARGE RATES

	Description	Rate
1.	Residential Dwelling Unit	$3,335 per Dwelling Unit
2.	Townhouse Dwelling Unit	$2,983 per Dwelling Unit
3.	Apartment Dwelling Unit	$1,988 per Dwelling Unit
4.	Non-Residential Use	$1.63 multiplied by the number of square feet of Floor Area

DCC Rate Structure and Changes Summary

Sewerage Area	Land Use	DCC Proposed	DCC Existing	% Increase
Fraser Sewerage Area	Residential	$ 6,254/unit	$ 5,428/unit	15%
	Townhouse	$ 5,390/unit	$ 4,695/unit	15%
	Apartment	$ 4,269/unit	$ 3,530/unit	21%
	Non Residential	$ 3.30/sqft	$ 2.67/sqft	24%
Lulu Island Sewerage Area	Residential	$ 3,313/unit	$ 2,214/unit	50%
	Townhouse	$ 2,756/unit	$ 1,915/unit	44%
	Apartment	$ 2,042/unit	$ 1,388/unit	47%
	Non Residential	$ 1.54/sqft	$ 1.05/sqft	46%
North Shore Sewerage Area	Residential	$ 3,300/unit	$ 2,300/unit	44%
	Townhouse	$ 2,786/unit	$ 2,076/unit	34%
	Apartment	$ 2,030/unit	$ 1,416/unit	43%
	Non Residential	$ 1.67/sqft	$ 1.20/sqft	39%
Vancouver Sewerage Area	Residential	$ 3,335/unit	$ 1,811/unit	84%
	Townhouse	$ 2,983/unit	$ 1,618/unit	84%
	Apartment	$ 1,988/unit	$ 1,072/unit	86%
	Non Residential	$ 1.63/sqft	$ 0.93/sqft	76%

To: Liquid Waste Committee

From: Dana Zheng, Program Manager, Policy, Planning and Analysis, Liquid Waste Services

Date: February 16, 2022 Meeting Date: March 9, 2022

Subject: **Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Amending Bylaw No. 352, 2022**

RECOMMENDATION

That the GVS&DD Board:

a) give first, second and third reading to *Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Amending Bylaw No. 352, 2022*; and
b) pass and finally adopt *Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Amending Bylaw No. 352, 2022*.

EXECUTIVE SUMMARY

Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Amending Bylaw No. 352, 2022 (the "TLW Amending Bylaw") is presented for Board adoption. The proposed amendments address enforceability issues identified after the adoption of *Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Bylaw No. 345, 2021* (the "TLW Bylaw") on May 28, 2021.

PURPOSE

To seek GVS&DD Board adoption of the TLW Amending Bylaw.

BACKGROUND

Metro Vancouver receives domestic and non-domestic trucked liquid waste (TLW) at the Iona, Annacis, and Northwest Langley Wastewater Treatment Plants. Domestic TLW includes waste from septic tanks, portable toilets and holding tanks. Non-domestic TLW includes higher strength liquid waste such as grease trap waste and chemical waste such as deicing fluid from YVR airport. Approximately 105,000 m^3 per year of domestic TLW and approximately 5,000 m^3 per year of non-domestic TLW are discharged at Metro Vancouver's TLW facilities.

The new TLW Bylaw was adopted by the Board on May 28, 2021 to improve the regulation of TLW discharges to the sewer system and wastewater treatment plants. It was recently determined that bylaw amendments are required to better clarify the responsibility of TLW generators. The proposed TLW Amending Bylaw includes wording improvements that improve clarity and enforceability.

PROPOSED TLW BYLAW CHANGES

The proposed changes to the TLW Bylaw are:

- Terminology and formatting updates to clarify scope of definitions; and,
- Improved clarity on the responsibility of TLW generators (within and out-of-region) in respect of requirements for lawful disposal of their TLW at Metro Vancouver's TLW facilities.

ALTERNATIVES

1. That the GVS&DD Board:
   a) Give first, second and third reading to *Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Amending Bylaw No. 352, 2022*; and
   b) Pass and finally adopt *Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Amending Bylaw No. 352, 2022*.

2. That the GVS&DD Board receive for information the report dated February 16, 2022, titled "Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Amending Bylaw No. 352, 2022" and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

No financial implications are anticipated.

CONCLUSION

The new TLW Bylaw was adopted by the Board on May 28, 2021. Upon implementation, it was discovered that better clarity is needed within the bylaw regarding the responsibility of TLW generators. The proposed TLW Amending Bylaw includes wording improvements that improve clarity and enforceability. Staff recommend Alternative 1.

Attachment

GVS&DD Trucked Liquid Waste Amending Bylaw No. 352, 2022 (49893021)

Reference

GVS&DD Trucked Liquid Waste Bylaw No. 345, 2021

49268652

GREATER VANCOUVER SEWERAGE AND DRAINAGE DISTRICT
BYLAW NO. 352, 2022
A Bylaw to amend Greater Vancouver Sewerage and Drainage District
Trucked Liquid Waste Bylaw No. 345, 2021

WHEREAS:

A. the Greater Vancouver Sewerage and Drainage District (the "GVS&DD") Board (the "Board") has adopted "Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Bylaw No. 345, 2021" to regulate the direct and indirect discharge of trucked liquid waste into any sewers and drains connected to a sewage facility operated by the GVSⅅ and

B. the Board wishes to amend "Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Bylaw No. 345, 2021".

NOW THEREFORE the Board of the Greater Vancouver Sewerage and Drainage District enacts as follows:

Citation

1. The official citation of this bylaw is "Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Amending Bylaw No. 352, 2022". This bylaw may be cited as "Trucked Liquid Waste Amending Bylaw No. 352, 2022".

Amendment of Bylaw

2. "Greater Vancouver Sewerage and Drainage District Trucked Liquid Waste Bylaw No. 345, 2021" is hereby amended as follows:

   (a) In section 3, the definition "***discharge, or allow or cause to be discharged, directly or indirectly***" is deleted and replaced as follows:

   "discharge, or allow or cause to be discharged, directly or indirectly" includes but is not limited to, a discharge by a *generator* indirectly discharging *trucked liquid waste* utilizing the services of a *hauler* to discharge the *trucked liquid waste* into a *sewage facility*;

   (b) In section 3, in the definitions ***"domestic trucked liquid waste"***, ***"hauler"*** and ***"non-domestic trucked liquid waste"***, the phrase "in accordance with Part 2," is deleted;

   (c) In section 3, in the definition "**Sewer Use Bylaw"** the bolded term **"Sewer Use Bylaw"** is italicized;

(d) Section 7.1 is added as follows:

7.1 Subject to section 12, no *person* shall *discharge, or allow or cause to be discharged, directly or indirectly*, any *non-domestic trucked liquid waste* into a *sewage facility* unless:

(a) a *trucked liquid waste authorization* has been issued in respect of the discharge, and the *person* is in compliance with the terms and conditions of such *trucked liquid waste authorization*, as applicable; or

(b) it is *non-domestic trucked liquid waste* collected from a *food sector establishment* regulated by the *Grease Interceptor Bylaw*.

(e) Section 12 is deleted and replaced with:

12. After June 1, 2022, in addition to other applicable requirements of this Part, no *person* shall *discharge, or allow or cause to be discharged, directly or indirectly* into a *sewage facility*, any *trucked liquid waste* originating from or collected from an *out-of-region generator,* unless an *out-of-region discharge number* valid for a stipulated period has first been obtained in respect of the discharge of the *trucked liquid waste*.

Read a first, second and third time this _____ day of _____, _____.

Passed and finally adopted this _____ day of _____, _____.

_____
Sav Dhaliwal, Chair

_____
Chris Plagnol, Corporate Officer

COMMITTEE INFORMATION ITEMS AND DELEGATION SUMMARIES

Greater Vancouver Sewerage and Drainage District
Board Meeting Date – Friday, March 25, 2022

This information item, listing recent information received by committee, is provided for the GVS&DD Board's information. Please access a complete PDF package here.

Liquid Waste Committee – March 9, 2022

Delegation Summaries:
No delegations presented

Information Items:
5.4 Development of a Wet Weather Pricing Approach

51366650