City of Burnaby

Item	
Meeting	2016 Jul 25

COUNCIL REPORT

TO:	CITY MANAGER	**DATE:**	2016 Jul 20
FROM:	DIRECTOR PARKS, RECREATION & CULTURAL SERVICES	**FILE:**	61100-01

SUBJECT: **BURNABY FRASER FORESHORE PARK - PROPOSED FRASER RIVER DYKE REACH 8 ALIGNMENT AND PUBLIC CONSULTATION**

PURPOSE: To request approval for the presentation of the alignment plan for the proposed Fraser River Dyke Reach 8 within Burnaby Fraser Foreshore Park at a Public Open House to be held from 4:00 pm to 8:00 pm on 2016 September 13 at Riverway Golf Course.

RECOMMENDATIONS:

1. **THAT** the alignment plan for the proposed Fraser River Dyke Reach 8 within Burnaby Fraser Foreshore Park be approved for presentation to the community for public review and comment at a Public Open House to be held from 4:00 pm to 8:00 pm on 2016 September 13 at Riverway Golf Course, as outlined in this report.

REPORT

At its 'Open' Meeting of 2016 July 20, the Parks, Recreation and Culture Commission received the above noted report and adopted the recommendaton contained therein.

Dave Ellenwood
DIRECTOR PARKS, RECREATION & CULTURAL SERVICES

DE:km
Attachment
Burnaby Fraser Foreshore Park – Proposed Fraser River Dyke Reach 8 Alignment (2016.07.25)
Copied to: Director Engineering

City of Burnaby

Item	6
Director's Report No.	7
Meeting	2016 Jul 20

COMMISSION REPORT

TO: CHAIR AND MEMBERS
PARKS, RECREATION & CULTURE COMMISSION

FROM: DIRECTOR PARKS, RECREATION &
CULTURAL SERVICES

SUBJECT: **BURNABY FRASER FORESHORE PARK – PROPOSED FRASER RIVER DYKE REACH 8 ALIGNMENT AND PUBLIC CONSULTATION**

RECOMMENDATION:

1. **THAT** the alignment plan for the proposed Fraser River Dyke Reach 8 within Burnaby Fraser Foreshore Park be approved for presentation to the community for public review and comment at a Public Open House to be held from 4:00 pm to 8:00 pm on 2016 September 13 at Riverway Golf Course, as outlined in this report.

REPORT

INTRODUCTION

The City is undertaking an ongoing program to upgrade flood protection works along the nine reaches of the Fraser River foreshore in Burnaby. Reaches 5-9 are primarily located within Burnaby Fraser Foreshore Park as illustrated in the attached Reach Location diagram (Attachment #1). Upgrades to existing dykes and the introduction of new dykes within Burnaby Fraser Foreshore Park has successfully been completed in Reaches 6, 7 (+ portion 8) and 9. Planning for new flood protection works in Reach 8 is now underway.

Associated Engineering, the project consultant, recently presented four potential Dyke alignment options within the park to staff of the Engineering and Parks, Recreation and Cultural Services Departments for review and discussion and a general consensus on a preferred alignment has now been reached. Before proceeding to the public consultation component of the project, Commission approval to present the proposed preferred alignment for the Reach 8 Dyke within Burnaby Fraser Foreshore Park to the public for review and comment is requested.

EVALUATION OF PROPOSED REACH 8 DYKE ALIGNMENTS

Associated Engineering evaluated a number of potential alternative alignments for the Reach 8 Dyke works, considering special issues and constraints. A general overview of the project area within Burnaby Fraser Foreshore Park is shown in Figure 2-1

(Attachment #2). The Reach 8 project area commences at Byrne Creek and extends west to include Glen-Lyon Creek. Glenlyon Parkway and the Fraser River define the inland and foreshore edges of the project area.

Burnaby Fraser Foreshore Park is comprised of a narrow strip of foreshore on the north arm of the Fraser River, and three fingers of land that extend inland of various length, breadth and physical character. Reach 8 has a greater depth of riparian vegetation along the Fraser River foreshore, a remnant forest bog extending east from Glen-Lyon Creek, the Sussex Creek outlet and lookout feature, trails, and landscaped open spaces surrounding two storm water management ponds on the Glenlyon Parkway frontage of the park.

The primary issues that need to be considered in laying out the Reach 8 Dyke in this area of Burnaby Fraser Foreshore Park include the following:

- Existing environmental value, potential impacts, and potential future enhancement opportunities.
- Ground conditions and geotechnical requirements.
- Construction and maintenance costs.
- Traffic and utility impacts.
- Disturbance to trail and impacts to trail users.
- Impacts to the Metro Vancouver water main and sanitary trunk sewer (west of Glenlyon Creek watercourse).
- Ability to raise the dyke elevation in the future.

It should also be noted that the Inspector of Dykes does not permit the planting of trees and vegetation, including riparian vegetation along streams, on the dyke and dyke side slopes. Therefore any existing trees and vegetation removed for the proposed Reach 8 dyke alignment works will not be replaced within the dyke footprint and its setbacks.

PROPOSED REACH 8 DYKE EASTERN ALIGNMENT

Given the primary considerations outlined above, the alignment through the eastern portion of Reach 8 (west from Reach 7 to Sussex Creek, as shown in Figure 2-2 Attachment #3) is relatively evident. From the existing floodwall at the Byrne Creek flood box it would follow the existing Dyke alignment north towards Glenlyon Parkway. The dyke would then run west along the boulevard and northerly edge of the park, and would tie into the existing flood box at Sussex Creek. Beyond the flood box it would continue west and into the park within the grassed clearing. Given the available open space in this area of the park, there would be an opportunity to re-grade the park land to achieve the design crest elevation with gentle side slopes, rather than a conspicuous trapezoidal cross section for the dyke. The benefits of this approach within the eastern portion of Reach 8 include the following:

- It presents a conventional dyking approach.

- It would tie into the existing flood box on Sussex Creek, rather than requiring a new flood box along the foreshore. The existing flood box could be modified to include structural floodwall extensions similar to those at Byrne Creek.

- It would be off-set from the existing road cross section. This would allow future dyke improvements to occur without needing to raise the road, which would require excavating and reinstating the road gravels and asphalt, and may require additional measures to limit seepage potential. It would also limit the disturbance to traffic during construction.

- It would be as far from the river as possible, which has the following benefits:

  - It would limit environmental impacts along the foreshore by avoiding foreshore vegetation and the riparian area.
  - It has less geotechnical issues and is more stable.
  - It would provide easier constructability and more flexible construction timing options by avoiding the Fraser River.
  - It would avoid existing utilities.

Based on the above, this approach clearly appears to be the preferred alignment from every perspective, including environmental, geotechnical, cost, utility, traffic, and future raising due to climate change. In addition, this approach also preserves the treed riparian character of the foreshore experience that park users currently enjoy.

PROPOSED WESTERN ALIGNMENT

The alignment of the Reach 8 Dyke through the western portion of the study area (west from Sussex Creek to the eastern end of Reach 9) is somewhat less apparent at first glance.

Throughout this section, the Glenlyon Parkway road cross section currently acts as the dyke. However, in order to address climate change and sea level rise projections, the crest elevation of the dyke will need to be raised. There are a number of issues with using the road cross section as the dyke, making it expensive and disruptive to raise the dyke to maintain an appropriate level of protection. Raising the road would require the removal and reinstatement of the road gravels and asphalt, impacts to utilities in the road, special seepage control measures, and would cause disturbances to traffic and businesses during construction.

The consultant identified four potential alternative alignments for the dyke at the west end. The following alternative alignments were considered in detail and discussed with City staff from the Engineering and Parks, Recreation and Cultural Services Departments.

Option A – Retained Foreshore Dyke along the Existing Park Trail

Under this approach, a new dyke would be constructed along the existing foreshore trail shown in Figure 2-3(a) (Attachment #4). Some of the benefits and drawbacks of this alignment would include the following:

- The dyke would follow the existing trail footprint, which would limit the number of tree removals required and would have relatively low impacts to the Burnaby Fraser Foreshore Park. However, construction along this trail segment would impact trail users temporarily. Re-planting of trees and vegetation along the dyke side slopes would not be permitted.

- It would require the construction of a new flood box on Glen-Lyon Creek at the foreshore and cross the Metro Vancouver water main. This flood box could include a horizontal flap gate to facilitate fish passage, similar to those gates currently located at the upstream flood box beneath North Fraser Way.

- This alignment would cut off the connection between the Fraser River and its foreshore area, and would preclude foreshore environmental enhancements. It would, however, still provide the opportunity for enhancements to Glen-Lyon Creek.

- The foreshore alignment has geotechnical concerns related to dyke stability. Regardless of the seismic design criteria that are adopted for the project, there are geotechnical benefits to locating the dyke further away from the bank of the Fraser River.

- This alignment can restrict construction timing and methods when compared with a dyke that is set back from the river.

This alignment would require approximately 420 m. of dyke for the western portion of Reach 8.

Option B – Retained Setback Dyke Parallel to Foreshore

Based on observations made during the Consultants preliminary site visit, there exists a natural height-of-land that is setback approximately 100 m. from the foreshore. This feature appears to divide the occasionally-wetted Fraser River foreshore area from the Glen-Lyon Creek overbank area. For this alignment, the new dyke would be constructed along the approximate alignment of this height-of-land, as shown in Figure 2-3(b) (Attachment #4).

This alignment is similar to Option A, except that it is setback from the Fraser River. As such, it provides the following benefits and drawbacks:

- As with Option A, it would require a new foreshore flood box on Glen-Lyon Creek and cross the Metro Vancouver water main.

- This alignment would not follow the existing trail, and would therefore have a greater impact on the upland area of Burnaby Fraser Foreshore Park and require a greater number of tree and vegetation removals. However the dyke could be retained with concrete blocks to limit the footprint.

- The dyke crest would provide a new scenic trail through the park. This direct paved connection is particularly beneficial for users of the Burnaby Urban Trail network.

- By following the existing height-of-land, it would maintain the ecological connection between the Fraser River and the foreshore. This would maintain the potential for future enhancements along the river foreshore in this area. This could include the establishment of intertidal marsh or mudflat habitat, and/or subtidal riverbed habitat within the park.

- This alignment would allow for future enhancements to the tributaries to Glen-Lyon Creek landward of the dyke.

- Being setback from the river's edge, the geotechnical and constructability concerns and associated costs are lower than they would be in Option A.

This alignment would require approximately 420 m. of dyke for the western portion of Reach 8.

Option C – Retained Dyke along Glen-Lyon Creek Trail, with New Foreshore Flood Box

This alignment would run parallel to Glen-Lyon Parkway, North Fraser Way, and the east side of Glen-Lyon Creek before crossing Glen-Lyon Creek and the Metro Vancouver water main and tying into Reach 9, as shown in Figure 2-3(c) (Attachment #4). This alignment provides the following benefits and drawbacks:

- As with all the previous options, it would cross the Metro Vancouver water main at Glen-Lyon Creek and would require a new flood box at the Fraser River.

- Compared to the two alignments presented above, this alignment would be approximately double the length because it would follow the perimeter of the bog

forest extending inland from the river to North Fraser Way and beyond within this area of the park.

- This alignment would follow the existing Glen-Lyon Creek trail and therefore would limit the number of tree removals within the park. However, given space constraints with the boulevard south of North Fraser Way, tree removals would likely be required along the periphery of the park. Because the total dyke length is long, the number of tree removals would still be significant.

- Being setback from the river's edge, the geotechnical and constructability concerns and associated costs are lower than they would be in Option A.

- The dyke would allow the ecological connectivity between the Burnaby Fraser Foreshore Park and the Fraser River to remain, but it would confine the eastern overbank area of Glen-Lyon Creek, and would eliminate the potential for environmental enhancements immediately adjacent to the creek. Re-planting of trees and vegetation along the dyke side slopes, including the riparian zone along Glen-Lyon Creek, would not be permitted.

This alignment would require approximately 830 m. of dyke for the western portion of Reach 8.

Option D – Retained Dyke along Glen-Lyon Creek Trail, with New Flood Box near North Fraser Way

This alignment would follow the same alignment as Option C, but instead of locating the new Glen-Lyon flood box at the foreshore, the flood box would be constructed closer to North Fraser Way, as shown on Figure 2-3(d). As such, the existing creek would be cut off, and would need to be relocated through the forested bog that extends inland from the river in this portion of the Burnaby Fraser Foreshore Park. This alignment provides the following benefits and drawbacks:

- As with all the previous options, it would cross the Metro Vancouver water main at Glen-Lyon Creek.

- Compared with Options A and B, this alignment would be approximately double the length because it would follow the perimeter of the bog forest extending inland from the river to North Fraser Way and beyond within this area of the park.

- This alignment would follow the existing Glen-Lyon Creek Trail and therefore would limit the number of tree removals within the park. However, given space constraints within the boulevard south of North Fraser Way, tree removals would likely be required along the periphery of the park. Because the total dyke length is long, the number of tree removals would still be significant.

- Being setback from the river's edge, the geotechnical and constructability concerns and associated costs are lower than they would be in Option A.

- Glen-Lyon Creek would be cut off at the mouth of the Fraser River, and a flood box would be provided further upstream instead, with the Creek diverted to the east through the park. This would modify the hydrologic and ecological function of the park because of the significant realignment undertaken. This would also require additional tree removals and potentially result in further loss of trees in this area of the park over time due to the hydrologic changes.

- This alignment has the potential for more elaborate long-term environmental enhancements along the realigned Glen-Lyon Creek, which could include channel complexing, the establishment of new pools and meanders, development of new aquatic and riparian habitat, and enhanced riparian planting. These potential enhancements could complement the environmental improvements recently completed in the park on Glen-Lyon Creek upstream of the rail tracks.

- The flood box and creek relocation could all be constructed off-line, allowing Glen-Lyon Creek to maintain its function and current alignment until the works are completed, at which point the creek could be diverted, and the existing foreshore CSP culvert abandoned.

- The realignment of Glen-Lyon Creek associated with this alignment would require extensive construction within the park to establish a new creek alignment, which would be environmentally and recreationally disruptive, and would be considerably more expensive than the other dyke alignments considered.

This alignment would require approximately 830 m. of dyke for the western portion of Reach 8.

EVALUATION OF REACH 8 DYKE ALIGNMENT OPTIONS

For the western portion of Reach 8, there are several constraints that are common to all four of the alignment options presented above. These include the crossing of the Metro Vancouver water main, and the need for a new flood box for Glen-Lyon Creek. There are also key economic benefits that are common to all of the options, which include avoiding impacts to existing municipal utilities and limiting the impact and disturbance of existing roads.

Based on the benefits and drawbacks of each option as highlighted above, the City's Consultant has evaluated the alignments in a qualitative sense. Recognizing that all of the options have some common impacts, the Consultant's evaluation focused on the aspects that differ from one option to the next and a ranking system was developed that focuses on the following ranking criteria:

- Cost
- Tree removals
- Environmental Impacts
- Potential for environmental enhancement along Glen-Lyon Creek
- Potential for environmental enhancement along the Fraser River
- Geotechnical stability

For each of these aspects, a relative score was assigned for each category, based on the favourability of each, where a score of 3 indicates the highest favourability, a score of 1 indicates the lowest favourability, and a score of 2 is assigned when the impacts are relatively neutral. The option with the highest score is then considered as the most favourable option. This evaluation is shown in Table 2-1 (Attachment #5).

Based on this evaluation of the alternative dyke alignments for the western portion of Reach 8, the setback dyke parallel to the Fraser River (Option B) is the preferred option. The key benefits of this alignment are summarized as follows:

- It has the shortest overall length, which reduces construction and maintenance costs and impacts to the park land, trees and vegetation and existing trail infrastructure.
- It minimizes disturbance to park users during construction.
- It will enhance the trail system with the park for recreational users and pedestrians and cyclists using the Burnaby Fraser Foreshore Urban Trail which is classified Regional Greenway.
- It maintains ecological connectivity between the Fraser River and the foreshore portion of the Burnaby Fraser Foreshore Park.
- It maintains the connectivity between Glen-Lyon Creek and the adjacent riparian area to the east, and does not preclude future environmental enhancements to Glen-Lyon Creek through this area.
- It is setback from the bank of the Fraser River, providing a benefit in terms of geotechnical stability and constructability.

PREFERRED REACH 8 DYKE ALIGNMENT

Associated Engineering, the City's Consultant for the Fraser River Foreshore Dyke-Reach 8 Project, has reviewed the constraints within the Fraser River Foreshore Dyke Reach 8 project area and evaluated a number of options for the dyke alignment. The intent of the evaluation was to determine the alignment that would balance benefits and drawbacks of the dyke alignment, considering cost, environmental impacts and enhancement opportunities, ground conditions, impacts to roads, trails and utilities, and also the ability to raise the dyke in the future. Based on this evaluation, the recommended alignment is shown in Figure 3-1 (Attachment #6).

PUBLIC CONSULTATION COMPONENT

A public consultation requirement was included in the terms of reference for the Fraser River Foreshore Dyke Reach 8 Project. The first consultation focuses on presenting to the public, the alignment options for the dyke, and the evaluation and selection of the preferred alignment.

It is therefore proposed, that the public be invited to review and comment on the proposed preferred alignment for the Reach 8 flood protection works at an upcoming Public Open House scheduled for Tuesday, 2016 September 13, from 4:00 to 8:00 p.m. in the Mulligan's venue at Riverway Golf Course.

Promotion of the Public Open House will be coordinated by Parks and Engineering Department staff and will include notices posted in the park, on the city website and at local libraries and recreation facilities.

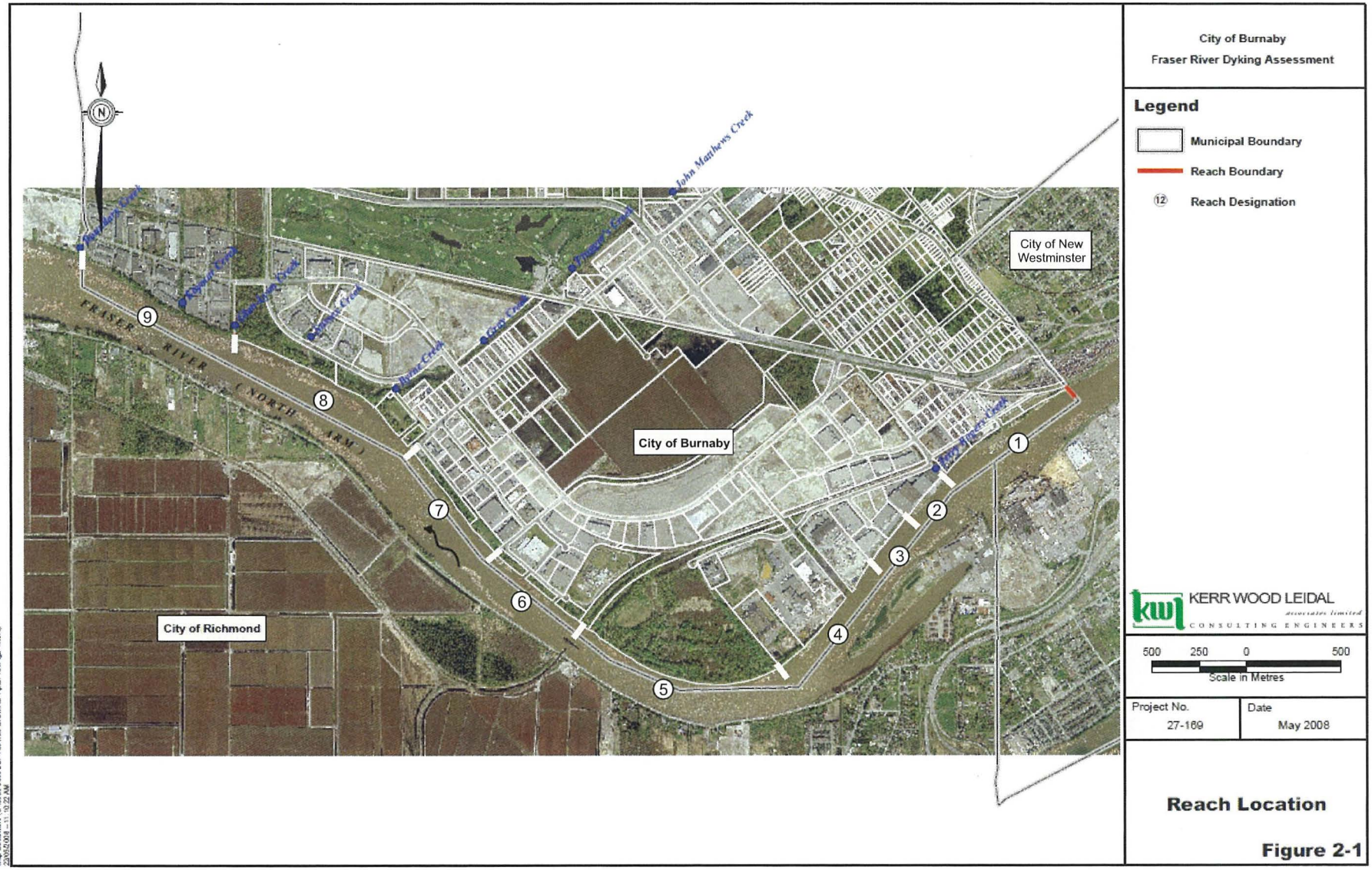
Input from the Open House will be incorporated into the preparation of the final design concept for the Reach 8 flood protection works which will be presented for the approval of Commission at a future date.

D. Ellenwood

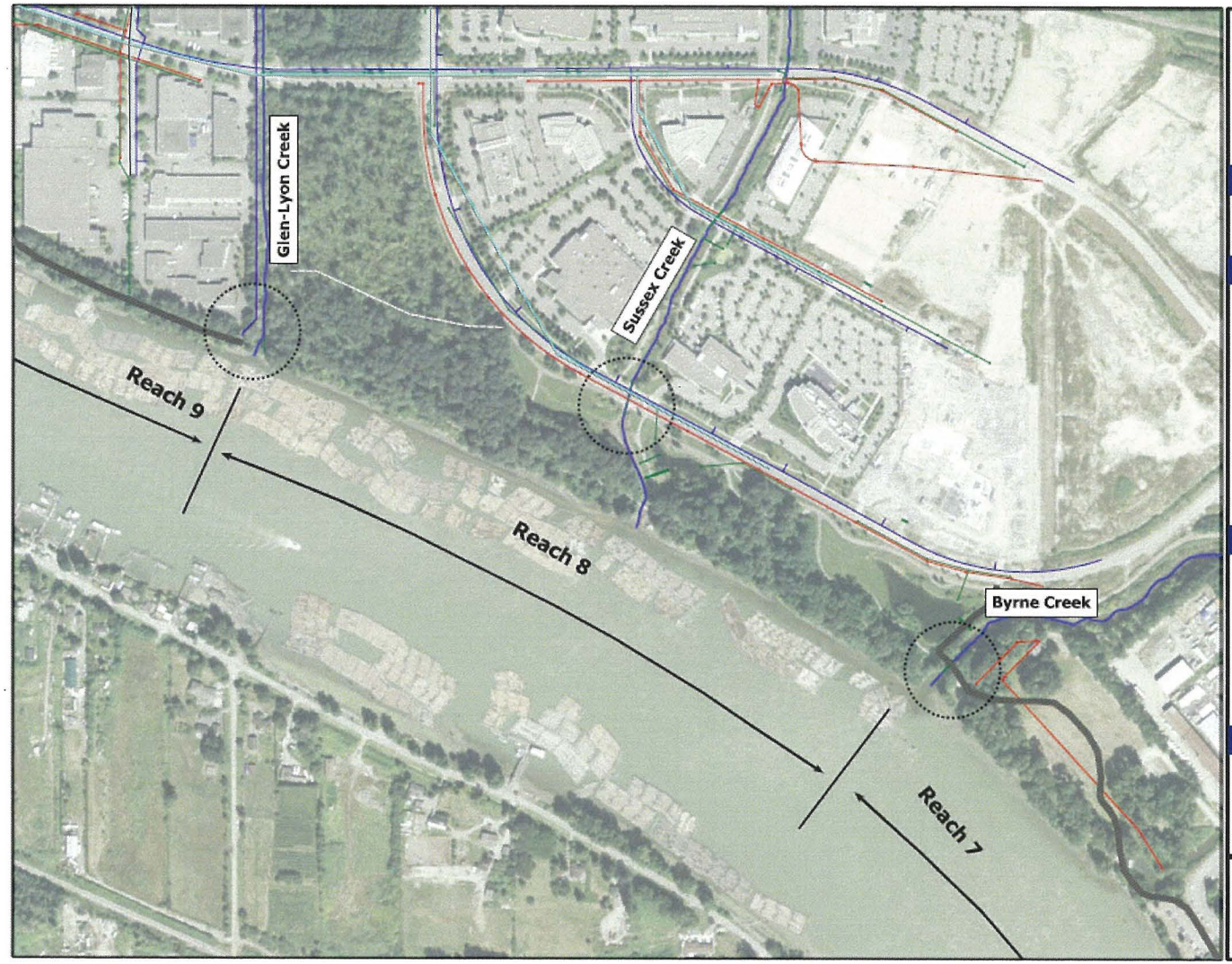
Dave Ellenwood
DIRECTOR PARKS, RECREATION & CULTURAL SERVICES

ATS:AE:ats:
Attachments (6)
P/Admin/AS/Burnaby Fraser Foreshore Park-Proposed Fraser River Dyke Reach 8 Alignment.docx

Copied to: Director Engineering



Attachment #1



FRASER RIVER FORESHORE
REACH 8 DYKE

FIGURE 2-1:

Reach 8 Project Site Overview

LEGEND

- Creek
- Existing Dyke
- Utility - KM
- Storm
- Sanitary
- Water
- Critical Structure

PROJECT NO.: 2016-2315

DATE: JUN-2016

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Attachment #2

FRASER RIVER FORESHORE
REACH 8 DYKE

FIGURE 2-2:

Reach 8 Dyke Eastern Alignment Options

LEGEND

Proposed Reach 8 Dyke - Eastern Alignment
Creeks
Existing Dyke

PROJECT NO.: 2016-2315

DATE: JUN-2016

SCALE: 1: 3,500

CLIENT

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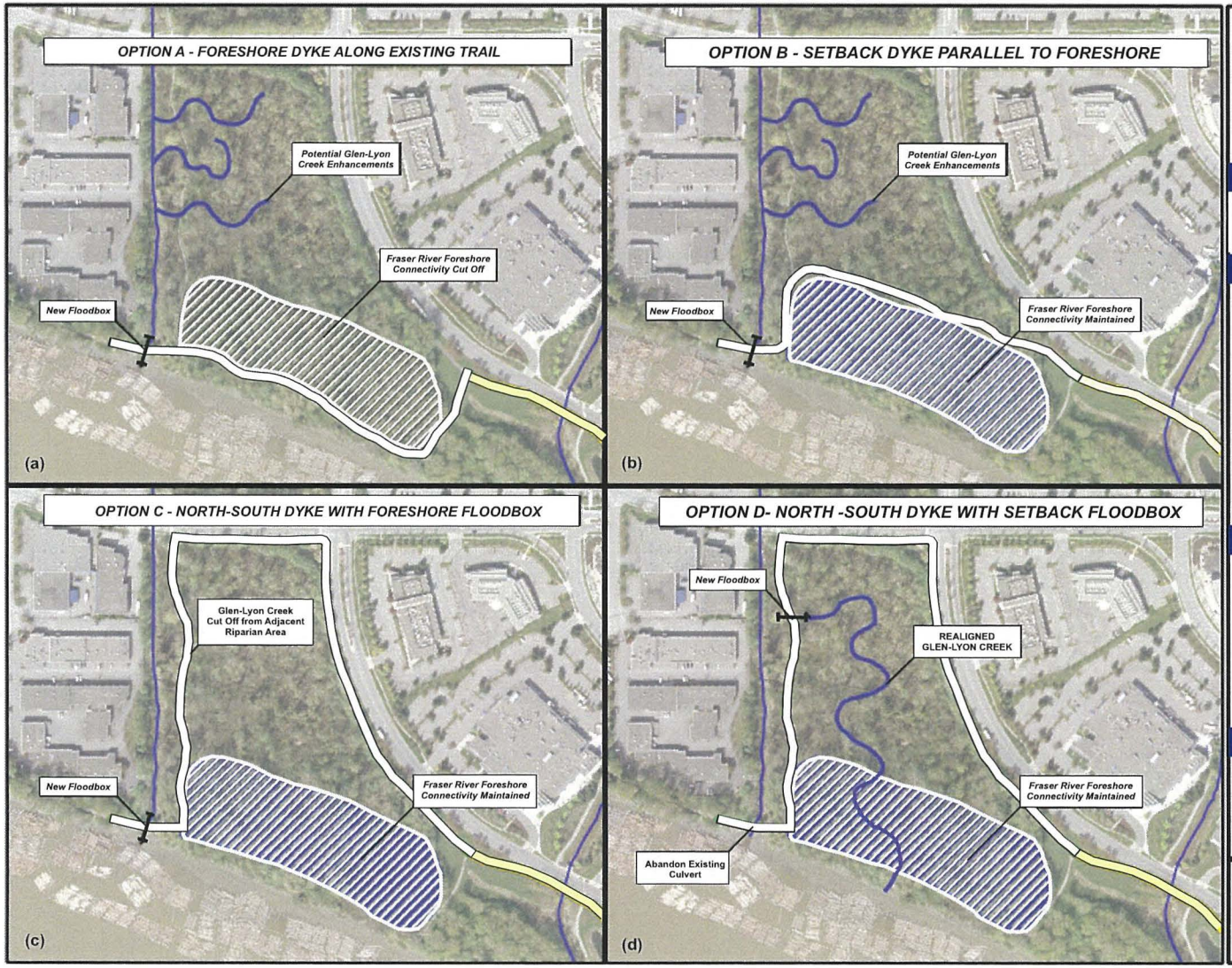
Attachment #3



FRASER RIVER FORESHORE

REACH 8 DYKE

FIGURE 2-3:

Reach 8 Dyke Western Alignment Options

LEGEND

- Potential Reach 8 Dyke - Western Alignment
- Proposed Reach 8 Dyke - Eastern Alignment
- Existing Dyke
- Creeks
- Floodbox

PROJECT NO.:2016-2315

DATE: JUN-2016

SCALE: 1:3,500

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Attachment #4

Table 2-1

Favourability of Alignment Options for the Western Portion of Reach 8

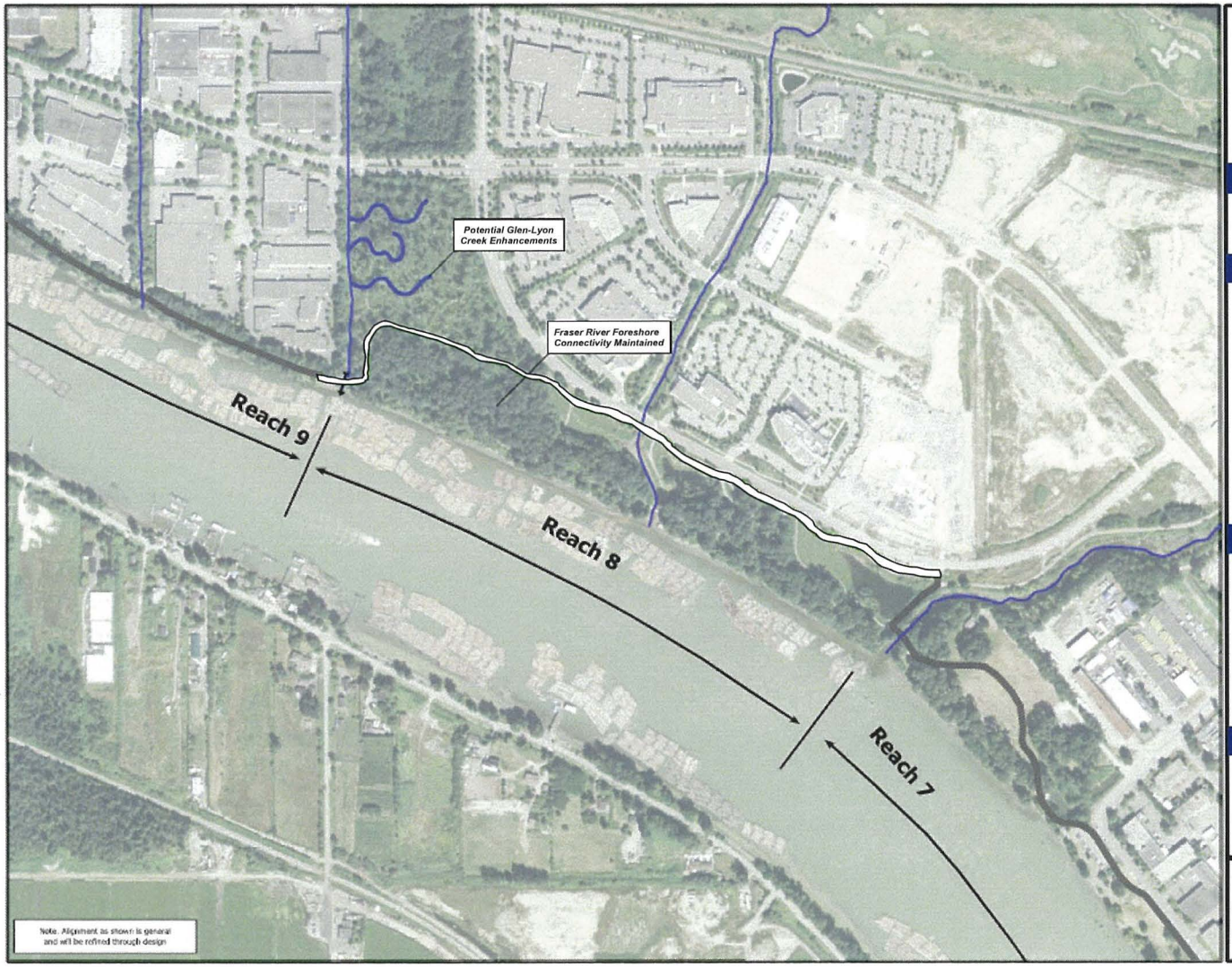
Option	Cost	Tree Removals	Environmental Impacts	Environmental Enhancement Potential		Geotechnical	Total Favourability Score
				Glen-Lyon Creek	Fraser River		
A	3	3	2	3	1	1	13
B	3	2	3	3	2	2	15
C	1	2	2	1	3	3	12
D	1	2	1	3	3	3	13

Ranking: **3: Most Favourable**

2: Neutral

1: Least Favourable

Highest Total Score = Most Favourable Option



FRASER RIVER FORESHORE
REACH 8 DYKE

FIGURE 3-1:

Reach 8 Dyke - Recommended Alignment

LEGEND

- Reach 8 Dyke - Recommended Alignment
- Creeks
- Existing Dyke
- Floodbox

PROJECT NO.: 2016-2315

DATE: JUN-2016

SCALE: 1:7,500

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City of Burnaby

Associated Engineering

Attachment #6