



City of Richmond

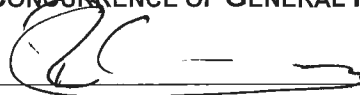
Report to Committee

To: Public Works and Transportation Committee **Date:** April 27, 2018
From: Lloyd Bie, P.Eng.
Acting Director, Engineering **File:** 10-6340-20-
P.17302/Vol 01
Re: **South Arm Dike Upgrade Between Gilbert Road and No. 3 Road**

Staff Recommendation

That the staff report titled "South Arm Dike Upgrade Between Gilbert Road and No. 3 Road," dated April 27, 2018, from the Acting Director, Engineering, be received for information.


Lloyd Bie, P.Eng.
Acting Director, Engineering
(604-276-4075)

REPORT CONCURRENCE		
ROUTED TO: Parks Services	CONCURRENCE ☒	CONCURRENCE OF GENERAL MANAGER 
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	INITIALS: CS	APPROVED BY CAO 

Staff Report

Origin

As part of the 2017 and 2018 Capital Programs, Council approved upgrades to the south dike, including the section between Gilbert Road and No. 3 Road. The design for upgrading this dike has progressed to the point where impacts to the adjacent area have been identified.

The purpose of this report is to provide Council with background information for this dike upgrade and the public information plan for the project. The public information plan will include trail access during construction and information on trees and shrubs affected by the project.

This report supports Council's 2014-2018 Term Goal #6 Quality Infrastructure Networks:

Continue diligence towards the development of infrastructure networks that are safe, sustainable, and address the challenges associated with aging systems, population growth, and environmental impact.

Analysis

Project Background

Richmond's flat, low lying topography has inherent flood risk from inundation and rainfall. Understanding and managing this risk is critical to the City's success and a primary municipal responsibility. Richmond's diking and drainage systems provide a high level of flood protection for businesses and residents in Richmond. These systems require ongoing maintenance and upgrading to maintain this high level of service given ageing infrastructure challenges and forecasted climate change induced sea level rise.

Richmond City Council adopted the 2008 – 2031 Richmond Flood Protection Management Strategy in 2008. This strategy is the overarching framework that guides Richmond's flood protection activities. As presented at the February 26, 2018 Public Works and Transportation Committee Meeting, staff are currently updating the flood protection management strategy to incorporate the latest climate change science and seek new options and opportunities to improve flood risk management.

Guided by this strategy and aging infrastructure planning, the City has developed Dike Master Plans, ongoing maintenance programs and capital plans for infrastructure improvements. The Dike Master Plan is a comprehensive guide to upgrade the City's dikes. It identifies future dike alignments and associated issues such as wave mitigation strategies. There are five phases to the Dike Master Plan. Phase 1 was endorsed by Council on April 22, 2013, Phase 2 was presented to Council in April 2018, and work on Phases 3, 4 and 5 are scheduled to be completed in 2018.

Dike upgrade capital projects are identified through a combination of factors, including the existing dike elevation, other capital projects that impact the dike (i.e. drainage pump stations), and condition assessments of the existing dike. Once a section of dike is identified for upgrade and a project is endorsed by Council as part of the Capital Program, the Dike Master Plan provides guidance on the design details for that project.

South Arm Dike Upgrade Between Gilbert Road and No. 3 Road

This South Arm Dike Upgrade project was approved by Council as part of the 2017 Capital Program and includes approximately 650m of dike between Gilbert Road and No. 3 Road. This dike is located entirely on City property and is shown in Figure 1 below.

Figure 1 – South Arm Dike Upgrade Project Extents



Existing Site Conditions

Dyke Road is located along the top of the dike in this area. There is also a very well used section of the South Dike Trail. The trail is separated from the road for about $\frac{3}{4}$ of the length of the project area. The rest of the trail is directly beside the road and also acts as the road shoulder. Parking spaces, benches and picnic tables for trail users are located at either end of the project area. Immediately north of Dyke Road is a large drainage canal. There are also a number of trees in and along the bank of the drainage canal, ranging in size from 5cm to 110cm diameter at breast height (DBH). The property just north of the Fraser River between Gilbert Road and No. 3 Road is owned by the City and is used for various purposes, including a City tree farm and the Kwantlen Polytechnic University (KPU) Richmond Incubator Farm.

Agricultural Land Reserve

The project site is located on City owned property within the Agricultural Land Reserve (ALR). Dike construction and maintenance is a permitted use in the ALR. City staff have discussed the dike upgrade project with planning staff at the Agricultural Land Commission (ALC) and have been advised that no formal application or notification to the ALC is required.

Project Scope and Future Dike Raising

The dike will be raised by approximately 1.6m vertically. This is high enough to protect the City from climate change induced sea level rise until at least 2100. The perimeter drainage pump stations constructed over the past few years have also been raised to provide this level of flood protection.

Raising the dike will require the dike to be widened, which will impact the existing drainage canal to the north. This canal will be filled in and replaced with a new canal further inland, away from the dike. Moving the drainage canal away from the dike improves the stability of the raised dike. Infilling the canal will impact 10 trees (10-15cm DBH) that are currently within the banks of the canal. Staff will attempt to relocate these, however due to equipment access issues these may need to be removed and replaced under the direction of a certified arborist.

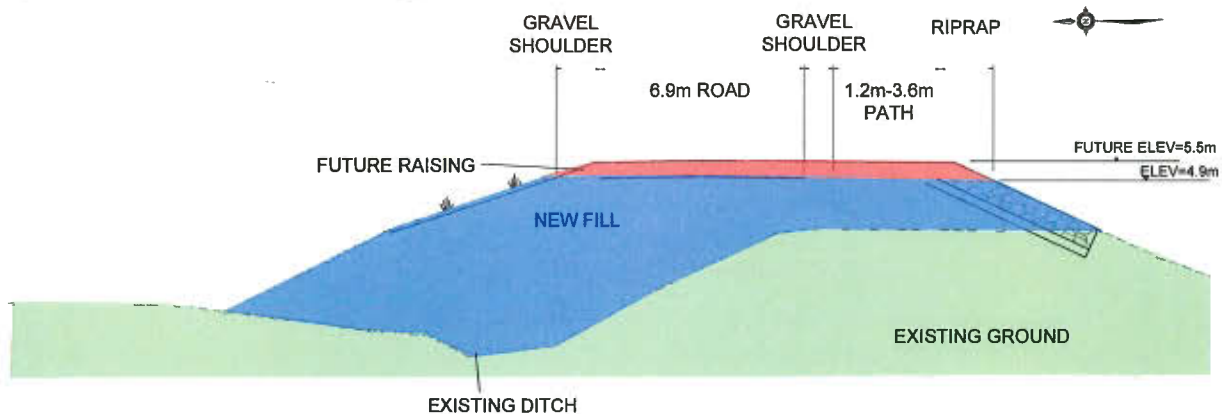
Dyke Road will be reinstated atop the raised dike. The portion of the South Dike Trail that is currently separated from the road ranges from 2m to 3m wide. The portion of the trail/road shoulder that is not separated from the road ranges from 1m to 2m wide. Where space allows, the existing trail is being widened to 3.6m and separated from the road with bollards.

In the portion of the project where the existing trail is not separated from the road, there are four sizable trees close to the existing dike and canal (ranging from 25cm DBH to 60cm DBH). To avoid impacting these trees, a 1.2m wide trail will be installed in this area.

New picnic tables, benches and trash receptacles will also be installed.

The Dike Master Plan identifies a future need to raise dikes to an elevation of 5.5m to provide flood protection beyond the year 2100. During the detailed design process, the dike profile and new canal location were required to accommodate a design elevation of 5.5m. A typical cross section showing the proposed works is as follows:

Figure 2 – South Arm Dike Upgrade Typical Cross Section



Dike Fill Material/Native Material

The key component to the dike is the fill material. A significant amount of the fill needs to be impervious to water to act as a dam against the water outside of the dike. This impervious fill is not commonly available - it contains much more clay and silt than regular fill material. The clay and silt also make this material very sensitive to weather conditions. It can only be placed and compacted in dry conditions. If conditions are rainy, the material cannot be compacted properly.

The allowable ratio of clay and silt to other larger particles must also be within a narrow range, further limiting the availability of suitable fill material.

Due to the tight material requirements and location of the project site within the ALR, staff will be heavily involved in the management of materials being imported and exported from this project. Wherever possible, native material will be re-used either in the project or on the adjacent City property. Any proposed imported material will be tested to ensure that it meets the required environmental and technical standards prior to being brought onto the site.

Tree Removal and Compensation

The project is being designed to minimize the impacts to existing trees. There are 10 red alder (10-15cm DBH) that are impacted by the proposed project scope. These are located within the banks of the existing canal. Staff will attempt to relocate these, however due to physical constraints these may need to be removed and replaced under the direction of a certified arborist.

Tree removal (if required) will be staged with construction. Depending on the contractor's methodology, the trees may be removed at the beginning of the project to facilitate relocation of the entire drainage canal at once, or tree removal may be in sections over the duration of the project. With either timeline, bird nest surveys will be done prior to the removal of any trees or shrubs.

Construction Impacts to Road, Trail and Land Users

Dyke Road will be closed to vehicle traffic during active construction. Vehicles will be redirected to Steveston Highway via Gilbert Road and No. 3 Road. The off-street parking will be closed to the public during various stages of construction at either end of the project site (approximately 50 parking spaces).

The existing dike trail in this area is used by pedestrians and recreational cyclists. Some of the benches and picnic tables removed for construction will be temporarily relocated outside of the construction area. During procurement for this project, bidders will be required to base their bids on maintaining a temporary 3m wide path from Gilbert Road to No. 3 Road throughout construction. However, periodic temporary closures of the path may be required.

KPU is leasing a portion of the City owned land for the Richmond Incubator Farm. Staff have informed KPU throughout the design process of potential impacts to the incubator farm. Based on the current design, some plots may need to be relocated to accommodate realignment of the farm service road. Staff will continue to communicate with KPU throughout the project.

Project Schedule and Procurement

The dike upgrade work is scheduled to commence in late summer 2018. Due to the varying availability and sensitivity of the dike fill material to weather, construction is anticipated to extend for up to 1 year. During active construction, Dyke Road will be closed to traffic. However, since placing impervious fill is impractical for extended periods through the winter, Dyke Road may be re-opened to traffic during these periods.

Staff are currently prequalifying contractors to bid on this project. This will help to ensure that the eventual low bidder is experienced with handling the sensitive impervious fill material, able to adequately address trail use issues, and is an active participant in communicating with the public during construction.

Project Information Plan

This project was featured in the 2018 Capital Construction Projects Open House that was held on April 18, 2018. Questions from the public regarding this project were focused on the general level of flood protection for the entire City, rather than specific questions on this project location.

A public information session will be held at the south dike on Saturday June 23, 2018 from 1pm to 4pm. The public will be advised of the open house via signs adjacent to the project site, social media and advertisements in the local newspapers.

Project information signs will be installed at either end of the site. In addition to an overview of the dike raising scope and schedule, these signs will include information on impacts to trees, existing trails, parking areas, picnic areas and planned interim measures. Contact information for the City's Project Manager will also be provided should the public have further inquiries about the trail access, tree removal, compensation, or any other aspects of the project prior to construction.

During construction, the contractor will be required to have a dedicated communications person available for the duration of the project. The City will also have a dedicated communications contact for this project in addition to the Project Manager.

Financial Impact

Funding to complete South Arm Dike Upgrades was approved by Council as part of the 2017 and 2018 Capital Budgets (along with dike upgrades in other locations). The approved budget is \$8,850,000.

Conclusion

The South Arm Dike Upgrade Between Gilbert Road and No. 3 Road has been approved as part of the 2017 and 2018 Capital Program. Design has progressed to the point where impacts to the adjacent area have been identified. A preliminary Project Information Plan has also been formulated to communicate impacts to road and trail users, and the general public. Work is continuing on finalizing the design and completing procurement for this project.



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