



Corporate NO: C413

Report COUNCIL DATE: Mar. 22, 1999

COUNCIL-IN-COMMITTEE

TO: Mayor & Council **DATE: March 15, 1999**

FROM: Manager, Utilities & Construction

Engineering Department **FILE: 4898-717**

SUBJECT: Crescent Beach Erosion Protection

RECOMMENDATIONS

1. That the Crescent Beach erosion protection works, Alternative 3, be included in the City's capital ranking selection process for funding consideration in 2000.
2. That the City seek cost assistance for this work through the Provincial Flood Protection Assistance Fund.
3. That preliminary design work for Alternative 3 be undertaken.

INTENT

To advise Council of the results of the strategic study of the erosion and flood control requirements for the Crescent Beach Foreshore area and seek approval to proceed with an implementation plan.

BACKGROUND

The community of Crescent Beach lies at an average elevation of 2 to 2.5 meters and is protected from high tides and storm surges by a dyke which surrounds it. The foreshore walkway runs along the top of this dyke, which is located on City property.

The shoreline at Crescent Beach has experienced erosion, loss of land, beach and nearshore changes throughout the years. Due to wind direction, erosion occurs primarily on the west beach area and currently the north beach is stable. Figure 1 shows a plan view of the west beach area and its existing structures.

The concerns with the present situation are:

- erosion and cutting back of the dyke;
- height of the dyke is insufficient to protect the community of Crescent Beach against extreme high tides and storm surges; and
- erosion and down cutting of the beach.

Erosion at Crescent Beach has been occurring for many years and since 1914, a groyne system of one form or another has been in place on the West Beach. Timber groynes provide a barrier, slowing sediment transfer and in some locations collect sediment. Timber groyne structures are cost-effective measures to reduce beach erosion and in turn help protect the dyke. The foreshore walkway runs along the top of the dyke which is located on City owned land while the land below the high tide level is crown land.

Erosion, over the past decade, and particularly during the winter wind storms of 1997/98, has required the City of Surrey to implement emergency riprap placement where the dyke has been eroded. An overall study of the erosion and erosion control measures was initiated in early 1998.

RANGE OF ALTERNATIVES FOR EROSION PROTECTION

The Crescent Beach Foreshore Assessment was undertaken by a consultant with extensive experience in marine erosion to determine long-term capital works required to maintain the Crescent Beach foreshore area and the yearly operations and maintenance requirements.

The most critical element in helping reduce potential flooding of the Crescent Beach area is maintaining the integrity of the dyke. The dyke can be protected in the following ways:

- 1) armouring of the dyke with rock riprap;
- 2) building up and stabilizing the beach area seaward of the dykes; and
- 3) combination of 1 and 2.

In addition to the erosion protection options, is the issue of raising of the dyke to increase the degree of flood protection. This raising can range from just raising the low areas to a full raising to meet Provincial flood control guidelines.

The Foreshore Assessment Study reviewed the alternatives in more detail, which together with costs, are described as follows:

1. Placement of a riprap revetment on the existing dyke face, to stabilize and protect the dyke and walkway against wave attack; (\$400,000)
2. Upgrading and reconstruction of several groynes within the existing groyne field, with placement of additional beach fill. Replenishment of beach sands will be required every 10-20 years due to storm surge erosion; (\$950,000)
3. Upgrading and reconstruction of several groynes within the existing groyne field as shown in Figure 1, with placement of additional beach fill underlain with riprap to protect the edge of the dyke. Replenishment of beach sands will be required after 10 - 20 years due to erosion from storm surges. A cross-section showing the riprap underlying the beach fill material is shown in Figure 2 (\$1,300,000)

In addition to the above erosion protection works, the cost to raise the dyke to elevation 3.6 meters (existing dyke is at 2.9 - 3.0 meters), to provide protection to the full 200 year return period water level, commensurate with B.C. Environment guidelines is in the order of \$200,000. The raising to the 200 year protection level was last reviewed in 1983, when the dykes were last upgraded, but was at that time not supported by the Crescent Beach residents.

Public Input

The various foreshore stabilization concepts were presented to the Crescent Beach Ratepayers Association at a meeting in July, 1998, and to the general public at an open house in September, 1998. The community expressed a desire to maintain the sandy nature of the foreshore area with ease of access; namely support for alternatives 2 or 3.

Analysis

The least costly means of providing erosion protection to the dyke is Alternative 1, the armouring with rock which could be combined with repairs to the groynes to slow erosion of the existing beach area. However, this does not provide, or secure, a longer term high quality beach amenity; nor does it meet the preferences of the local residents.

Alternative 2 addresses, at least in the medium term, the beach issues, but does not provide adequate longer term erosion protection for the dyke.

The only option that maintains the beach amenity, meets the wishes of the local residents and provides longer term erosion stability for the dyke is Alternative 3. However, this is the most expensive alternative with a significant component of the cost being the restoration and replenishment of the beach material. This alternative will provide for an engineered protection of the dyke covered with sand material to protect the aesthetics of, and provide easy access to, the beach.

Under any of the above alternatives, the dyke should be raised slightly in low areas (Maple to just north of Beecher) in light of recent damage and dyke overtopping. Further public consultation would be undertaken on this height issue.

Under all of the alternatives, the sand beach will continue to erode over time due to storm surges. Upgraded groyne structures would reduce the rate of erosion; however, even with alternatives 2 and 3, which add a considerable amount of beach material, beach replenishment would still be required in 10 to 20 years.

In light of the above, we believe the real choice of Alternatives is between 1 and 3. The least costly means of protecting the dyke is Alternative 1; however, this will not protect the sand beach which will eventually be moved north leaving a pebble beach as exists south of Crescent Beach. The considerably higher cost of Alternative 3, which replenishes the sandy beach, needs to be seen in the light of the unique amenity that Crescent Beach provides to the whole of Surrey.

Consequently, the choice becomes one of where the community wishes to allocate its Capital resources. It is proposed that this choice be made in the capital ranking process which will allow Council to judge the priority of this work in the context of the City's overall Capital needs.

FUNDING

No Capital funds are included in the 1999 Capital Budget for any of the Alternatives. It is proposed that

Alternative 3 be included in the City's Capital Ranking process for Capital funding consideration in 2000.

It is also proposed that the City apply to the Provincial Flood Protection Assistance Fund for these works. The City received \$200,000 from this fund in 1997, for the upgrading of a section of the Colebrook Dyke. However, the total funding for the whole Province is in the order of \$3 million. Consequently, full funding for a project cost in the order of \$1.3 million may not be realistic.

To prepare for the City Capital Ranking process, and an application to the Flood Protection Assistance Fund, it is proposed that a preliminary design be undertaken with funding from Engineering General Revenue (Roads) sources.

City contributions would be made through General Revenue, as unlike the Serpentine Nicomekl dykes the Crescent Beach flood protection works are not related to City drainage operation, and consequently do not fall within the drainage utility program. Other issues of benefitter/user pay will also need to be addressed as part of the implementation process.

NEXT STEPS

Alternative 3 was presented to the FREMP Board in August, 1998. Consultation with the MoELP Wildlife Manager would be required for approvals. At the meeting, the Board would only endorse the riprap armouring of the toe of the dyke. More work would be required before the overall project could be accepted. The next steps of the process to repair the foreshore area include:

- 1) develop an implementation plan;
- 2) obtain approvals from senior levels of government and environmental agencies;
- 3) determine financing for the works, including requests for funding assistance; and
- 4) detailed design and further public consultation.

CONCLUSION

Based on the results of the comprehensive foreshore assessment, public consultation process, and preliminary response of senior government environmental agencies, it is proposed to pursue the foreshore erosion protection works based on Alternative 3, the beach replenishment and underlain armouring option. Issues pertaining to senior government jurisdictions, infrastructure upgrading, cost-sharing of capital works, the City's overall capital priorities, and environmental approvals will need to be addressed prior to implementation of any foreshore works.

In the meantime, the Engineering Department will continue to implement minor emergency erosion protection works for the dyke on an 'as needed' basis.

Paul Ham, P. Eng.

Manager, Utilities & Construction

CAB:brb/km

Attachments

c.c. - General Manager, Parks, Recreation and Culture

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