



**CITY OF RICHMOND**

**REPORT TO COMMITTEE**

**TO:** General Purposes Committee  
**FROM:** David McLellan  
General Manager, Urban Development

*to Gen. Purposes Ctte - Sept 18/00*

**DATE:** September 8, 2000

**FILE:** 6045-11

**RE:** Fraser Basin Council - Flood Protection Issues Update

**STAFF RECOMMENDATION**

That staff initiate a public consultation program to determine the level of acceptance for increased flood construction requirements in Richmond.

A handwritten signature in cursive script, appearing to read "David McLellan".

David McLellan  
General Manager, Urban Development

Att. 1

## STAFF REPORT

### ORIGIN

The purpose of the presentation is to provide educational material about flood hazards and current management approaches as well as identify several recommended actions that are emerging from the Joint Program Committee; namely the recommendations of the Five Year Implementation Strategy. This report will be supplemented with a powerpoint presentation (an outline of which is attached to this report) prepared by the Fraser Basin Council as an educational tool on this issue. In addition this report will suggest that staff initiate a consultation process with Richmond residents to determine whether there is support to increase flood construction requirements in the City.

### ANALYSIS

The discussions being facilitated by the Fraser Basin Council involving the Ministry of Environment, a number of municipalities and other agencies are intended to help resolve outstanding issues between the various agencies. In the case of Richmond, future development is limited under the Liveable Region Strategic Plan pending the resolution of flood protection issues with the Ministry of Environment. Council has sought funding assistance from the Provincial Government to construct the mid-island dyke, without success to date. Senior staff of the Ministry of Environment have indicated that funding for a "pilot project" may be available given a comprehensive solution to all outstanding issues. The Ministry is particularly concerned about historic settlement areas and the provision of increased flood protection to these areas over the long term.

City staff have considered the following approaches and suggest, at this stage, that the community be consulted further on this matter.

## SINGLE-FAMILY RESIDENTIAL

### Background

It is anticipated that within the historic settlement area, single-family residential development will occur in the form of relatively small-scale infill subdivisions and as construction of new homes on existing lots. In order for floodproofing to be practical, it should be able to be implemented as construction occurs on individual existing lots and as small infill subdivisions of perhaps two or three lots are undertaken.

### Floodproofing Options Considered But Not Favoured

Floodproofing options that were considered include:

1. Fill to an elevation of 2.6 m – this option is not considered to be feasible due to concerns about poor interface with streets and adjacent sites, difficulties in providing disabled access, poor aesthetics, anticipated drainage problems, difficulty in retaining existing mature vegetation, and potential for compression damage to utilities and adjacent properties.

2. Elevation of habitable space to an elevation of 2.6 m by structural means (e.g. "basement", posts, etc.) – this option is not favoured due to the potential for damage to the portion of houses below the FCL (Flood Control Level), concern about the potential to establish residential use within basements and poor disabled access within buildings. It is noted that the concept of "wet floodproofing" for portions of buildings below the FCL is currently not well defined.
3. Partial floodproofing (e.g. to 1.75 m) using fill or structural means – this option is not favoured because it would not achieve full floodproofing of new development. The fill version of this option was also considered as the first step in a phased approach to raise fill levels over several redevelopment cycles but is considered inferior to the preferred option, which could achieve the same objective.

#### Preferred Floodproofing Option

The preferred floodproofing option for single-family residential development is considered to be a combination of fill and crawlspace to elevate habitable floor space to 2.6 m as shown in Figure 1. Although this approach has its challenges for implementation, it has the potential to achieve full floodproofing while balancing concerns regarding aesthetics, interface with streets and adjacent sites, disabled access and drainage.

In order to help manage the impacts of this option, the following criteria have been identified:

1. Fill of a site should be limited to a maximum grade difference of 1.0 m between adjacent sites (this would typically result in fill to an elevation of approximately 1.9 m).
2. Retaining walls on property line should have a maximum height of 0.65 m (to moderate visual impact between sites).
3. Sloped areas should have a maximum grade of 1:4 (it is noted that this combination of retaining wall and grading detail can accommodate the maximum fill within a minimum side setback if necessary – refer to Figure 1).
4. A crawlspace is required from the fill elevation to the FCL of 2.6 m (this could also take the form of a concrete slab on fill within foundation walls – as shown on Figure 1).
5. The main fill area should be restricted to the building envelope area rather than filling the whole lot (this would allow some flexibility for preservation of mature vegetation, would minimize reduction of the exempt area storage capacity identified in the 1989 Hay & Company report, and would assist to achieve appropriate grading to public streets in order to facilitate ramps for disabled access).
6. For infill subdivisions, the fill area should be in the form of a common mound (to eliminate the need to retain/slope between side lot lines of new lots).
7. Easements could be used to encourage creation of common mounds between infill subdivisions over time as adjacent properties redevelop.

## MULTI-FAMILY RESIDENTIAL

### Background

It is noted that multi-family residential sites vary considerably in size, location and characteristics. It is therefore desirable to retain flexibility in floodproofing options as one approach is unlikely to work for all sites.

### Townhouse Floodproofing Options

It is considered that the following floodproofing options should be available to the City for townhouse developments:

#### *Option 1:*

For small, infill townhouse developments of two-storeys – a combination of fill and crawlspace could be used with criteria similar to the preferred floodproofing option for single-family residential development.

#### *Option 2:*

For larger townhouse developments of two-storeys (e.g. over 1.5 acres) – floodproofing could be achieved by filling to the 2.6 m FCL, provided that 6 m setbacks are maintained (to allow for a suitable interface to adjacent sites and provision for disabled access ramps).

#### *Option 3:*

For townhouse sites with special considerations (e.g. significant vegetation or where considerable concern exists about interfacing with existing development on adjacent sites) - floodproofing could be achieved by structural means with three-storey townhouses which locate habitable space over parking and unit entries.

It is noted that a combination of the above options could also be used within a development.

### Exemption of Units in Apartment Style Developments

Many units in medium to high-density apartment developments are floodproofed by virtue of parking requirements. In the interest of providing attractive and active streetscapes, it is desirable to locate some townhouse style units adjacent to public streets; such units should be exempt from floodproofing requirements. A review of three developments indicated that between 2.4 and 5.5 percent of total units consisted of townhouse units which were not floodproofed due to their location adjacent to streets. In general, the developments with the most street frontage also had the greatest percentage of townhouse units which were not floodproofed.

With respect to exemption of units from floodproofing requirements, the following criteria is suggested:

1. The number of exempt units should be based on a formula which considers a site's total street frontage (e.g. one unit per 25 feet).

2. Exempt units should be required to have a reasonable percentage of their total floor space above the FCL (to enable movement of possessions in the event of a flood).
3. Partial floodproofing should be encouraged for exempt townhouse units. (It is noted that partial floodproofing which incorporates several steps up to doors can enhance streetscape and help to define public and private spaces).

### **COMMERCIAL DEVELOPMENT**

1. "Service commercial" developments (with relatively large setbacks) can be floodproofed relatively easily by filling sites; this form of floodproofing should be required.
2. For some forms of "downtown" non-retail commercial development (e.g. hotels, offices), substantial portions of recent developments have been floodproofed by locating parking and entries/lobbies at street level with the majority of floor space above the FCL (this form of floodproofing should be encouraged); and
3. The opportunity to floodproof "downtown" retail developments without adversely impacting streetscape and disabled access is limited; therefore floodproofing should not be required.

### **INSTITUTIONAL USES**

In discussion, it was agreed that it is desirable to floodproof institutional uses such as schools, hospitals, churches, community centres, etc., as such facilities could play a key role in the event of a major flood. It was also noted that many institutional uses occur on relatively large sites where fill or a combination of fill/crawlspace could be used with sufficient setbacks to provide an acceptable transition to adjacent sites and streets.

It is noted that if floodproofing of institutional sites were required, it would be advantageous to be able to review such developments through the Development Permit process; this would require an amendment to the Municipal Act.

The proposals noted above have been tabled through the Fraser Basin Council process with preliminary indications of acceptance from Ministry of Environment officials.

### **FINANCIAL IMPACT**

No budgetary impact.

## CONCLUSION

Floodproofing of most uses within the historic settlement area appears, on a preliminary technical investigation, to be possible but would require considerable management of interface issues between new floodproofed development and existing sites. The above suggested criteria should be considered preliminary and for discussion purposes only with the public to determine the level of community acceptance. If floodproofing in the exempt area is pursued, a more detailed review and analysis will be required.

David McLellan  
General Manager, Urban Development

DJM:djm

## **Presentation Outline: Flood.ppt**

### Integrated Flood Hazard Management: "Working Together to Reduce the Threat"

#### **Introduction and Background**

- *Definitions*
- *The Question is When, Not If*
- *When It Happens It will Hurt*
- *Overview of the 1948 Fraser River Flood*

#### **Current Approaches to Management**

- *Are We Ready?*
- *Flood Protection Works*
- *Fraser River Flood Control Program*
- *Floodplain Management*
- *Emergency Preparedness, Response and Recovery*

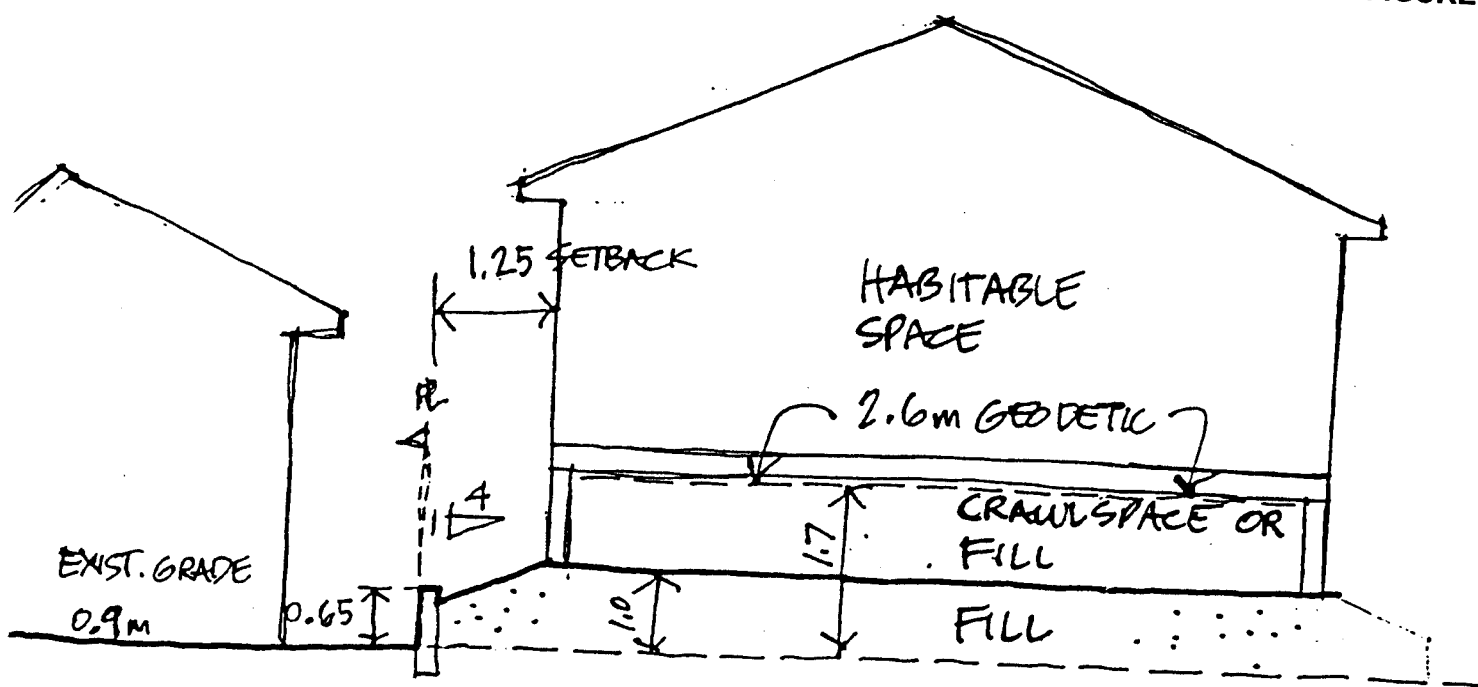
#### **Integrated Flood Hazard Management Strategy**

- *Need For Integrated Strategy*
- *1996 Integrated Strategy Developed*
- *Joint Program Responsibility*
- *JPC Subcommittees*
- *Organizations Participating on the Joint Program Committee / Subcommittees*

#### **Recommended Actions**

- *Five Year Implementation Strategy - Recommended Actions*
- *Floodplain Management - Actions*
- *Flood Protection Works and River Management - Actions*
- *Emergency Preparedness, Response, Recovery - Actions*
- *Flood Communications and Public Education - Actions*
- *Conclusions*

FIGURE 1



EXAMPLE OF PARTIAL FILL,  
RETAINING WALL  $\frac{1}{2}$  RAISED HABITABLE SPACE