



# Corporate Report

NO: C013

COUNCIL DATE: June 11, 2007

---

## COUNCIL-IN-COMMITTEE

TO: **Mayor & Council** DATE: **June 6, 2007**

FROM: **General Manager, Engineering** FILE: **5225-10**  
**General Manager, Parks, Recreation & Culture**  
**Acting General Manager, Planning & Development**

SUBJECT: **Development Within Agricultural Floodplains and Flood Prone Areas**

---

## RECOMMENDATIONS

It is recommended that Council:

1. Endorse in principle the policy of limiting future urban and suburban development in agricultural floodplains and flood prone areas based on information provided in this report;
2. Authorize staff to proceed with further work, including liaison with appropriate agencies, stakeholders and Committees, to develop and bring forward for Council consideration a policy and corresponding By-law amendments to restrict development in agricultural floodplains and flood prone areas;
3. Direct staff to continue to process in-stream development applications in the floodplain but to ensure that such encroachment/impact on the floodplain is minimized and that any impacts to the floodplain are mitigated; and
4. Direct that any development applications for sites in floodplains or flood prone areas received after the date of Council's consideration of this report be held in abeyance until a City Policy on development and filling in floodplains and flood prone areas is adopted by Council.

## INTENT

The City's current by-laws and strategies do not adequately address the potential impacts of development in the floodplains and flood prone areas of the City. This report highlights these concerns and makes recommendations for Council's consideration.

## BACKGROUND

Large portions of the City of Surrey lie within floodplains. Most of these areas are zoned agricultural and in the Agricultural Land Reserve (ALR). The map attached as Appendix 1 illustrates the location of the City's major floodplain areas.

Flooding that occurs from time in the City is related to 3 separate causes. These are:

<b>Area:</b>	<b>Cause:</b>
Crescent Beach, Mud Bay, Colebrook Road Area	- High tides and on-shore winds
Port Kells, Port Mann, Bridgeview, South Westminster	- Fraser River freshet
Serpentine, Nicomekl, Little Campbell River Lowlands	- Local winter rainstorms

Each of these floodplain areas is addressed with different flood protection strategies. Crescent Beach, South Westminster and Bridgeview are protected by dykes with the intention that flooding would only occur under extreme circumstances. In the Port Mann and Port Kells area, properties are filled to an elevation above projected flood levels, with the intention of protecting habitable areas of the dwellings from floods (i.e., 1 in 200 year flood). The Mud Bay, Colebrook, Serpentine and Nicomekl floodplains are primarily designated agricultural, with the Little Campbell River Floodplain being primarily in the Semiahmoo Indian Reserve. It is not practical to flood protect these agricultural areas to the same level as residential and industrial areas and, as such, flooding occurs on a regular basis in these areas but the duration and extent of the flooding is controlled so that agricultural uses remain viable.

Agricultural floodplains provide natural hydraulic storage and conveyance opportunities for large volumes of water that either naturally flow through or collect in these areas. Floodplains also provide important habitat that contribute to the City's biodiversity. The Province sets flood protection levels to ensure habitable floor areas are flood protected to the 1 in 200 year return storm elevation (i.e., in any given year there is a 0.5% chance that flood waters will reach an elevation higher than the flood protection elevation). Although it is rare, flooding of these areas can never be fully avoided. The loss of floodplain areas through filling contributes to the creeping up of flood levels on properties that remain in the floodplain and environmental impacts.

Limiting the intensity of land use in floodplain areas of the City has been a long standing principle that has been followed in many areas. The City's Official Community Plan (OCP) and Neighbourhood Concept Plans (NCPs) reflect these principles by keeping the floodplain as agricultural land or by designating it as green space that was not to be developed.

Recently there have been a number of development applications that require fill to be placed in floodplain areas to maximize lot yield. This situation has occurred where the

ALR boundary does not come to the edge of the floodplain. This report primarily addresses the implications of placing fill in the floodplains.

## **DISCUSSION**

Filling in the floodplain has the following issues and implications:

1. Impacts on Drainage;
2. Undermines the effectiveness of Municipal Infrastructure;
3. Causes the Loss of Important Habitat;
4. Creates a Financial Burden to the Broader Community;
5. Results in Ground Subsidence and Climate Change;
6. Geotechnical and Haulage of Fill, Impact of Large Fill Requirements;
7. Expectations of New Residents; and
8. Impact to the Development Industry.

Each of these areas is addressed in the following discussion.

### **Impact on Drainage**

To date, most of the City's floodplain in the Serpentine and Nicomekl Valley is used for agricultural purposes with the majority of properties held in the Agricultural Land Reserve (ALR). The City's lowland drainage strategy was developed to control flooding in support of agricultural purposes. The main goal of the strategy is to limit the duration of surface flooding to minimize damage to agricultural lands and crops. The objectives related to flood proofing in urbanized areas are different from the objectives in agricultural areas. In general, owners in new urban or suburban developments do not view recurring surface flooding of their property as an acceptable standard regardless of the duration of such flooding.

The current approval process for proposed development within the floodplain includes a review by Engineering Department staff of the technical implications of filling the property to achieve ground elevations above the 1 in 200 year flood level. By raising lowland properties, the conveyance and storage capacity in the floodplain is reduced. The Engineering review is focused on ensuring that no adverse impacts occur to the local drainage system and adjacent properties as a result from the development. The detailed assessment of the impact often leads to a quantified loss of storage and a small increase to the flooding of surrounding properties. Issues surrounding flooding in the lowlands are often incremental in nature. In other words, an increase of 1 or 2mm by one development does not seem like much but when there are multiple incremental impacts of 2mm, a significant impact is created.

### **Municipal Infrastructure**

Urban and suburban development in the floodplain requires services such as roads, sanitary sewers (including pumps), water systems and drainage. Failure or poor performance of infrastructure in floodplains is common in comparison to non-floodplain areas. For example, road closures are common in floodplain areas as floodwaters inundate the road and create unsafe conditions. In new urban and suburban areas, this

would result in isolating residential areas and possibly limit access by emergency vehicles. Erosion and structural deterioration of the road occurs much more rapidly if the road is inundated with flooding on a regular basis.

The City's sanitary sewer and water systems are also more prone to failure due to flooding. Flood inflow into the sanitary system frequently leads to sanitary overflows. This may result in uncontrolled discharges of untreated sewage to the ground surface at manholes or sewer backups into buildings and properties. Flooding can also cause pipe breaks in the water distribution system resulting in cross-contamination of the water system. Infrastructure can be designed specifically for lowland flood prone areas to minimize these failures, but ultimately it will still be more susceptible to failure and require more maintenance than in other higher non-flood prone locations.

### **Loss of Important Habitat**

Most floodplains in the City are considered to be environmentally sensitive areas and include significant wildlife habitat. Habitat, such as seasonal wetlands and marshes, are decreased as development encroaches into the floodplain and as floodplains are filled. Seasonally flooded areas are essential habitat for migratory and wintering waterfowl and are forage areas for mammals. Although there is much floodplain habitat in Surrey, the fringe areas often contribute to rare and unique environmentally significant areas called *ecotones*. Ecotones exist where distinctly different habitats are juxtaposed. Two examples of ecotones in Surrey are along the Serpentine and Nicomekl Rivers where upland forests are adjacent to floodplain grasslands. These forest and floodplain interfaces are critical for all wildlife including deer that graze in the meadows and raptors that nest and roost in the forests and feed in the floodplain. This situation often occurs in fringe areas between farmland and suburban areas.

The OCP attempts to protect natural and environmentally sensitive areas. Conserving areas containing significant natural features and wildlife as open space, and protecting the quality and integrity of ecosystems, including air, land, water, vegetation and wildlife, are key components of the OCP policy. Prohibiting the conversion of agricultural floodplain land uses to more dense urban or suburban uses assists in preserving these areas. These areas are often identified as green space in the City's NCPs and are often identified for preservation through the development process as parkland dedication, parkland acquisition, and/or through the use of "no disturbance" restrictive covenants.

### **Financial Burden to the Rest of the Community**

Homes can be constructed on fill to reduce the risk of flooding. However, access and services may be limited or not available during periods of flooding of the surrounding land. In these cases some homes can be isolated during floods. Emergency services are not typically available to these homes during flood events. Similarly, water and sewer service is difficult to maintain to these homes during flood events.

Although these homeowners realize they live in a floodplain, they still expect the City to resolve these types of inconveniences. The City is often not capable of providing expected levels of service after a development proceeds in areas where the floodplain has been filled, especially when it involves further capital expenditures and becomes a

burden to other Surrey taxpayers. In many cases, there is no way to provide additional flood proofing without further negatively impacting neighbouring properties.

Currently, certain areas of Cloverdale experience flooding during rain events exceeding a 1-in-10-year return period. Current research predicts flood levels in lowland areas to rise in the future due to climate change. The continuing development of floodplain areas is expected to result in increasing costs to the local environment, the property owners, and the City of Surrey. One of the tools available to limit these potential consequences is the City's Zoning By-law, No. 12000, which could be amended to prohibit future urban and suburban development within the floodplain. Alternatively Council may, by policy, not rezone the floodplain area for urban or suburban development.

### **Ground Subsidence and Climate Change**

Predictions of long-term ground subsidence in the lowland areas and global climate change may place floodplain developments at even greater risk. Current research predicts rising sea levels due to climate change. The current boundaries of the City's floodplains are based on the 1 in 200-year flood elevation as determined by the Ministry of Environment in 1994. In view of recent climate change studies and subsidence concerns, the floodplain boundary elevation may require adjustment to better reflect current conditions.

### **Geotechnical and Haulage of Fill, Impact of Large Fill Requirements**

Intensification of land use in floodplain leads to large-scale soil depositing requirements. Low intensity uses such as farmhouses or agricultural buildings are acceptable in the floodplain in support of agricultural uses. However, for more intense urban or suburban land uses large scale filling is required. This type of filling has a large impact to flood water storage capabilities and leads to many geotechnical challenges and uncertainties. There are often loading failures in the lowlands as a result of the placement of fill.

A collateral impact of filling is related to the hauling of fill material to the fill site. Residents often complain of the long periods of disruption associated with thousands of trucks delivering material to specific site. The heavy loads associated with fill operations cause the rapid deterioration of roads, particularly in the floodplain where the soils underlying the roads is often soft and unable to withstand the heavy traffic.

### **Expectations of New Residents**

In areas that are prone to flooding habitable floor areas of buildings must be above the design flood elevation. The current flood proofing requirements within the floodplain may not adequately reflect the future home owner's expectations for their residence since the elevation of the residence is set so that the habitable area of the dwelling is not flooded for a design event. These houses are constructed such that bottom of the floor joists are just above the flood elevation, leaving the crawlspaces, garages, or surrounding yards susceptible to flooding. In many cases the municipal services required for the property are prone to flooding. The flooding of these non-habitable areas is often unsatisfactory to new residents. The situation cannot be easily changed or remediated since it is inherently part of the design of the building and surrounding areas.

### **Impact to the Development Industry**

The City's OCP and existing NCP's recognize floodplains with respect to their form and function, and do not show development encroaching to the floodplain. Historically this has created no expectation regarding the potential for development within the floodplains. By reaffirming the City's intent to protect the floodplain from development, development community will not have unreasonable expectations about the potential for development of such lands. Under current conditions reinforcing the City's interest to continue to protect the City's floodplains from development will not negatively impact the development industry. A few recent applications deviate from this approach and it is important that the City reinforce its position regarding development in the floodplains at this time so that expectations are aligned with reality.

### **Process and Implementation**

Staff recommend that a comprehensive review process be undertaken involving appropriate agencies/stakeholders and Committees, including the Environmental Advisory Committee, Agricultural Advisory Committee, and the Development Advisory Committee with a view to developing a comprehensive City Policy related to development and filling in the City's flood plains and flood prone areas. The review could also lead to amendments to By-laws in support of the Policy.

### **CONCLUSION**

Based on the above discussion, it is recommended that Council:

- Endorse in principle the policy of limiting future urban and suburban development in agricultural floodplains and flood prone areas based on information provided in this report;
- Authorize staff to proceed with further work, including liaison with appropriate agencies, stakeholders and Committees, to develop and bring forward for Council consideration a policy and corresponding By-law amendments to restrict development in agricultural floodplains and flood prone areas;
- Direct staff to continue to process in-stream development applications in the floodplain but to ensure that such encroachment/impact on the floodplain is minimized and that any impacts to the floodplain are mitigated; and

- Direct that any development applications for sites in floodplains or flood prone areas received after the date of Council's consideration of this report be held in abeyance until a City Policy on development and filling in floodplains and flood prone areas is adopted by Council.

Paul Ham, P.Eng.  
General Manager, Engineering

Laurie Cavan  
General Manager  
Parks, Recreation & Culture

How Yin Leung  
Acting General Manager, Planning & Development

PH/VL/CAB/kd2/brb

Appendix 1 – Map: Major Floodplain Areas