

## 9. Human occupation of flood-prone lands

Valley floors are attractive areas for human settlement.

- Good access to rivers for transportation
- Fertile soil provided by frequent floods

However, there is always a risk of flood. Read D&L, Chapter 11 for an excellent description on this subject.

Here, we will briefly look at the situation in Calgary.

Ref: Osborn, G. and Rajewicz, R., 1998. Urban Geology of Calgary. *In*: Urban geology of Canadian Cities. Geological Survey of Canada Special Paper.

### History of flooding

Major floods of Bow River: 1902, 1915, 1929, 1932

Major floods of Elbow River: 1915, 1923, 1929, 1932, 2005

These are summer floods caused by heavy storm. No significant flood since 1932.

Public perception: Series of dams have prevented floods.

Hydrological studies:

“In summary, storage reservoirs on the Bow River system have negligible influences in moderating floods on the system, and could not account for the significant statistical differences between the early and later record”

Alberta Environment (1983)

This is the case because all reservoirs are filled through spring and summer for power generation in winter, and they do not provide much storage for flood control.

## Flood plain management

### Flood-frequency, Bow River Upstream of the Elbow River

Flood discharge (cfs)	Flood discharge (m <sup>3</sup> /s)	Exceedance probability (%)	Return period (yr)
30,000	850	10.0	10
50,000	1,420	4.5	22
80,000	2,270	1.4	70
100,000	2,840	0.7	150

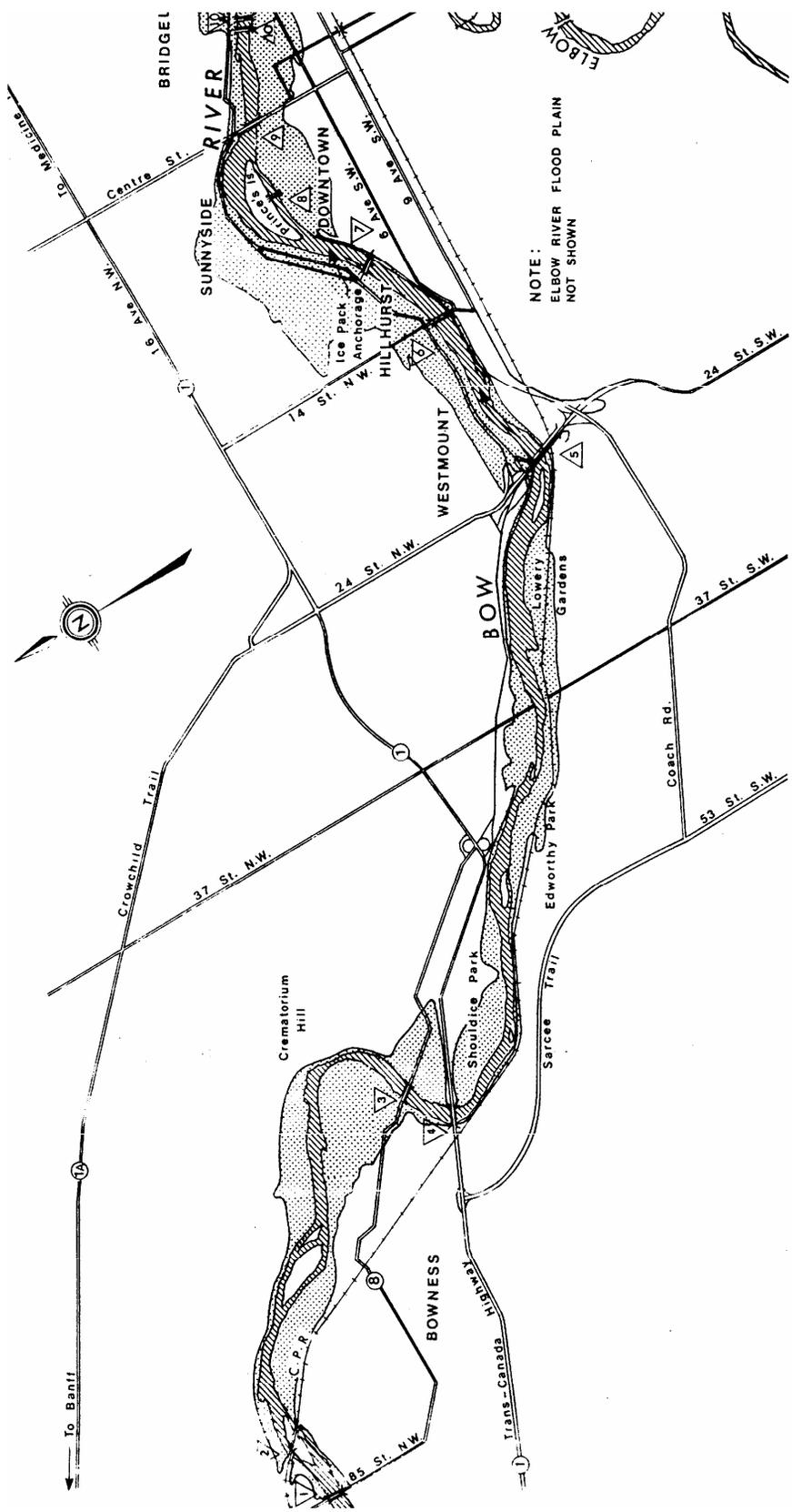
Ref: Montreal Engineering Co. Ltd., 1973. City of Calgary flood study.

The map of flood plain for 70-yr flood is shown in next page. Much of Downtown, Sunnyside, Bowness, and other residential areas are under water. This size of flood has not occurred since 1932, but it could occur anytime.

The City proposed management plans, but met with great disfavor by community group, who were worried that property values would decline if hazard zones were officially declared.

Since then, Alberta Environment (1983) published an updated report, using 100-yr flood. Consequent to this study, the City now has bylaws regarding floodway (narrow zone needed to convey most of the 100-yr flood) and floodplain (shallowly flooded area) special regulations.

- In floodway, new buildings are not permitted.
- In floodplain, new buildings must be designed so as to prevent structural damage by floodwaters.



**LEGEND**

-  RIVER CHANNEL
-  FLOOD PLAIN FOR 80,000 cfs. ABOVE ELBOW  
110,000 cfs. BELOW ELBOW

**LIST OF BRIDGES -** 

- 1 85th St. N.W.
- 2 TWIN BRIDGES (C.P.R. MAINLINE WEST)
- 3 SHOULDICE
- 4 TRANS-CANADA HIGHWAY
- 5 CROWCHILD
- 6 MEWATA (14th St. W.)
- 7 LOUISE (HILLHURST)
- 8 PEDESTRIAN
- 9 CENTRE STREET
- 10 LANGEVIN
- 10a NEW LANGEVIN
- 11 BAINES
- 12 SOUTH ST. GEORGE'S IS.
- 13 PEDESTRIAN
- 14 C. & E. (C.P.R. MAINLINE EDMONTON)
- 15 CUSHING
- 16 C.N.R. - FREIGHT TERMINAL
- 17 C.P.R. - MAINLINE EAST
- 18 BONNYBROOK
- 19 C.N.R. - MAINLINE EDMONTON

A map of the areas flooded by the 70-year flood of Bow River. (Montreal Engineering Co., 1973. City of Calgary flood study)

Year	Q (m <sup>3</sup> /s)	Rank	Prob	T (yr)
1932	1520	1	0.012	85.0
1929	1320	2	0.024	42.5
1915	1130	3	0.035	28.3
1923	841	4	0.047	21.3
1916	810	5	0.059	17.0
2005	791	6	0.071	14.2
1948	595	7	0.082	12.1
1953	578	8	0.094	10.6
1928	575	9	0.106	9.4
1927	564	10	0.118	8.5

