

2 Review of Historic Flood Data

The section provides a review of the historical flood data that could potentially be used in the calibration of the backwater model. The focus of this review is to determine whether there is consistency in the water level and flow data between floods and whether there are any changes in flow and dyking patterns that could potentially affect recorded water level and model calibration/verifications etc. Based on this review a synthesis of the information as it applies to backwater modelling is summarized at the end of this section.

As the majority of the historical data is recorded in imperial units and given that the information is locally known in this system, the imperial system has been adopted for this report. Use of the imperial system avoids round-off or conversion errors and allows cross-checking of the information with historical reports. Metric units have been used in this report where data has been geospatially located in the UTM coordinate system – a metric system. Therefore, water level profiles will have mixed units, elevation or stage in feet and chainage in kilometres.

The floods of 1950 and 1966 represent the largest “pre-Floodway” Winnipeg floods in recent record with water levels at the James Ave Pumping Station in the City of Winnipeg (CoW) reaching 30.3 ft and 26.2 ft above James Avenue datum (JAD) respectively (Table 2.1). Zero for JAD is normal winter ice level or elevation 727.57 ft Assumed Sea Level (ASL) relative to GSC 1929 Adjustment. Normal summer water level is 6.5 ft JAD or elevation 734.0 ft. With St. Andrews Lock and Dam in place in the summer this water level is relatively constant throughout the City of Winnipeg. Normal flood stage for Winnipeg is generally considered around 18.0 ft JAD.

The 1950 and 1966 flood years, also represent years where a significant amount of additional hydraulic information was collected along the river(s), which is why these years were chosen as the focus of this review. With the opening of the Red River Floodway in 1969, spring flood stages typically would only reach a maximum stage of 18 to 20 ft JAD. While the 1997 flood represents the Flood of the Century (i.e. the 20th century) for the Red River, the diversion of approximately 65,000 cfs around the City via the Red River Floodway saved Winnipeg from significant flooding. In 1997, the river only reached 24.5 ft JAD (Table 2.1) however there was a gradual decrease in the water level slope going

northward to an equivalent water level difference of 25.0 ft JAD (Red River Operating Review Committee, 1999). This change in slope was due to backwater effects from the floodway outlet as will be shown later in Section 4.

Table 2.1
Recent Historical Stages and Flows on Red River (As Recorded)

Year	James Avenue Stage (ft)	Date of Peak	Red River at Lockport (cfs)	Red River at Redwood (cfs)
1948	23.4	May 1		
1950	30.3	May 19	N/A	103,440
1956	21.9	Apr 27	N/A	68,700
1966	26.2	Apr 14	89,500	88,200
1979	19.2	May 9	98,200	54,900
1997	24.5	May 3	150,400	77,800

Notes:

Flow data from Water Survey of Canada.

N/A – not available.

Red River Floodway became operational 1969.

In 1950, recorded Red River flow of 103,440 subject to review in this study.

The methodology used in this review included:

- initial literature search
- review and analysis of the information;
- additional supplemental requests for information; and,
- final analysis and drawing conclusions relevant to the backwater modelling effort.

The initial literature included:

- assembling information provided by Manitoba Conservation;
- Acres Library and personal libraries of Acres staff working on the project;
- online searches of Provincial, City public libraries;
- online Internet searches of articles or pictures dealing with the 1950 flood;
- microfiche review of Winnipeg Free Press; and
- review of flood photography in the Manitoba Archives.

Some of the more relevant documents with respect to the 1950 and 1966 flood are:

- Clark, R. H. 1950. Notes on Red River Floods with Particular Reference to the Flood of 1950;
- Flood Forecasting Committee Meeting Notes 1966;
- Greater Winnipeg Dyking Board. 1951. Final Report on the activities of Greater Winnipeg Dyking Board from its inception on July 10, 1950 to October 1, 1951;
- Hurst, W. D. Chief Engineer, City of Winnipeg. 1957. The Red River Flood of 1950. Papers read before the Historical and Scientific Society of Manitoba;
- Long, J. A. 1971 Red River Floods with Particular Reference to the Flood of 1956, 1966 and 1969;
- Long, J. A., and E. T. Wagner 1970. Discharge Relationship for Red River at Redwood Bridge Gauge;
- Mackay, G.H. 1998. A Review of the Stage Discharge Relationship for the Red River at Winnipeg;
- Manitoba Emergency Measures Organization 1966. 1966 Flood Report,
- Manitoba Flood Relief Fund. 1950. River Rampant; and,
- Winnipeg Free Press 1966 microfiche records.

Other additional reports were reviewed and if cited they appear in the reports reference list.

2.1 1950 Flood

On May 1, 1948, just 2 years prior to the 1950 flood, a flood caused the Red River to reach an elevation of 23.4 ft James Avenue. According to Hurst (1957) most of the low-lying districts i.e. St. Vital, and Riverview districts in Winnipeg and low lying areas of St. Boniface and West Kildonan were saved by hastily erecting temporary dykes. The 1950 flood was devastating for the Red River Valley and the City of Winnipeg with water levels rising to approximately 7 ft higher than 1948. Historical information on conditions leading up to the 1950 flood can be found in Clark (1950), Hurst (1957) and Bumsted (1993).

In 1950, about 8,200 homes in Greater Winnipeg were inundated, with 5,500 having water over the first floor (Clark 1950). The most heavily impacted areas were those in the south portion of the City as shown in Figure 2-1, flooding impacted 4468 houses in St. Vital, 1236 houses in Fort Garry and 688 houses in

Riverview. Other areas of the City were also impacted including: St. Boniface (524 houses); Assiniboine (468 houses); Point Douglas (424 houses); Scotia (509 houses); and, East Kildonan (294 houses) (Red River Valley Board, 1951). Figure 2-2 shows an aerial photograph of the flooding in the Riverview and a portion of the flooding in St. Vital. Figure 2-3 shows an oblique airphoto of the same area.

While large areas of the southern portion of the City were flooded, other areas were protected by construction of temporary dykes; most notably St. Boniface (Figure 2-2 and Figure 2-4). Without the construction of temporary dyking it is estimated much larger areas would have been flooded (Figure 2-5). Examination of both Figures 2-1 and Figure 2-5 shows significant flooding would have occurred in St. Boniface, some additional outward flooding in Fort Garry away from the river and some additional easterly flooding in the East Kildonan area from Louise Bridge downstream to past the Redwood Bridge. **There is the potential that the constrained river in the Norwood (St. Boniface) area may have resulted in elevated water levels and potentially in the Redwood area.**

Hurst (1957) reports that by May 8 the river had risen to elevation 27.9 ft JAD and that the approaches to the various bridges were under water and that the only usable crossing linking the east and west sides was the old Redwood Bridge, see Figure 2-1 for location of bridges. To provide additional east-west bridge crossings, the City of Winnipeg built up the westerly approach to Provencher Bridge along Water Avenue. This approach, built with limestone hauled from the Stonewall quarry north of the City, was 700 ft long and in some areas the water was 7 ft deep. The ramp was completed by May 14, having being constructed in just 3 days. Figure 2-6 and Figure 2-7 show construction and completion of the west approach. **The construction of this approach is significant from a hydraulics perspective because the overland flow that had been flowing through the CNR rail yards (Figure 2-8) was shunted through the Provencher Bridge, this would have likely caused an elevated water level upstream of the Provencher Bridge.**

On May 13, Hurst notes that approaches to the Osborne and Maryland Bridge on the Assiniboine River and the Norwood Bridge were awash and these bridges were abandoned. James Avenue stage on that date was 30.10 feet. **Significant amounts of debris are also moving down the river as witnessed by the debris trapped at the Norwood Bridge, Figure 2-9, which could have caused some staging at the bridge.**