PROVINCE OF BRITISH COLUMBIA
MINISTRY OF ENVIRONMENT
WATER MANAGEMENT BRANCH

REPORT ON THE FLOODPLAIN MAPPING STUDY

SALMON RIVER NEAR PRINCE GEORGE

An Overview of the Study Undertaken
to Produce Preliminary Floodplain Mapping
for the Salmon River near Prince George

by

R.W. Nichols, P. Eng.
Senior Hydraulic Engineer
Special Projects Section

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TABLE OF CONTENTS

	Page No.
Title Page	i
Table of Contents	ii
Preface	1
1. STUDY AREA	1
2. DESIGNATED FLOOD	2
3. SURVEY AND MAPPING DATA	2
4. FLOOD MAGNITUDES	3
5. HYDRAULIC ANALYSIS	4
5.1 General	4
5.2 Cross Section Plot Run	4
5.3 Model Calibration	4
5.4 Sensitivity to Flow	5
5.5 Sensitivity to Manning's "n"	5
6. FLOODPLAIN MAPPING	5
7. CONCLUSIONS AND RECOMMENDATIONS	7

Appendices

Appendix 1 - Detailed Information Sources used in the Floodplain Mapping Study

Appendix 2 - Study Area Location

Appendix 3 - Stage Discharge Curve - Gauging Station 08KC001

Appendix 4 - Water Surface Profiles - Salmon River

Appendix 5 - Preliminary Floodplain Mapping, Salmon River Near Prince George, Drawing 85-62, Sheets 1 and 2

REPORT ON THE FLOODPLAIN MAPPING STUDY
SALMON RIVER NEAR PRINCE GEORGE

Preface

The purpose of this report is to present a description of the methodologies used and the results of the study undertaken to produce the attached preliminary floodplain mapping sheets, Drawings 85-62, Sheets 1 and 2 (Appendix 5).

1. STUDY AREA

The study area, located approximated 25 km. north of Prince George as shown on Appendix 2, covers 13 m. of the Salmon River upstream of the confluence of the Fraser River in the Fraser-Fort George Regional District.

The area is within the interior plateau of the Intermontane System, one of the six main physiographic regions in the Province. Mean annual precipitation averages between 40 to 75 cm. in the Salmon River drainage area. Mean daily temperatures range from a low of -15°C in January to a high of +16°C in July. (Appendix 1.1)

The Salmon River has an average slope of 0.25% in the study area and rises a total of approximately 32 metres in a distance of 13 km. upstream of the Fraser

River confluence. The drainage area of the Salmon River at the mouth is 4530 km^2 and 4300 km^2 at the gauging station (08KC001), which is located in the study area.

2. DESIGNATED FLOOD

In accordance with the policy of the Ministry of Environment, the flood levels and floodplain limits shown on the floodplain mapping sheets are based on a designated mean daily flow of 412 m^3/s at gauging station 08KC001 (1:200 year frequency) plus an allowance for freeboard.

3. SURVEY AND MAPPING DATA

A total of sixteen river cross sections were surveyed by the Surveys Section of the Ministry of Environment in July of 1979. Additional survey information available included thalweg data, bridge details and photographs at the river cross section locations. (Project No. 79FDC-5, Appendix 1.2)

Preliminary office studies indicated the need for additional cross section information in the study area. A total of 16 cross sections were estimated from the topographic mapping and thalweg data. The river channel area was adjusted until known stage-discharge conditions in the study area were duplicated. River cross section information at gauging station 08KC001 was also used in the study, based on information provided by Water Survey of Canada.

Highwater mark data, based on levels observed on April 16, 1984, was obtained with the cooperation of regional staff of the Ministry of Environment located in Prince George.

Orthophoto, topographic base mapping for the study area (2 metre contour interval, 1:5000 scale) was based on air photography obtained in 1977. The mapping was produced by the Mapping Section, Surveys and Resource Mapping Branch of the Ministry of Environment (Project No. 79-064 T-0, Appendix 1.3).

4. FLOOD MAGNITUDES

The Surface Water Section, Water Management Branch of the Ministry of Environment carried out a study in April of 1984 (Appendix 1.4) to estimate the required peak flow for the study area. The frequency analysis was based on Water Survey of Canada Gauge No. 08KC001, which has been in operation since March of 1953. Peak annual flows occur as a result of snowmelt with maximum daily flows generally occurring between mid-April to mid-May.

Stage-discharge data for the gauge is shown on Appendix 3. The recorded mean daily flow for April 16, 1984, during which highwater mark data was obtained, was 103 m^3/s at the gauge. The highest metered discharge, which occurred on May 6, 1974, amounted to 376 m^3/s. The recommended 1:20 year and 1:200 year daily flow at the gauge is 335 m^3/s and 412 m^3/s respectively.

5. HYDRAULIC ANALYSIS

5.1 General

The information sources listed in Appendix 1 were utilized in the HEC-2 water surface profile computer program developed by the Hydrologic Engineering Center, U.S. Army Corps of Engineers. The profile calculations assumed open water flow conditions.

5.2 Cross Section Plot Run

A computer plot of the river cross sections was obtained to assess the river cross section data input and the extentions of the sections obtained from the existing topographic mapping in the study area. Output from the plot run was also used to review the flow regime, loss coefficients, bridge information, reach lengths, overbank information and relative Manning's "n" values.

5.3 Model Calibration

The river model was calibrated to match the observed highwater data obtained on April 16, 1984, when the flow at the gauge was 103 m^3/s. Channel "n" values were calibrated to average 0.038 in the study area. The calculated flood levels averaged to within 0.13 metres of the levels observed during the April 16, 1984 flood. The flood profile is shown on Appendix 4.

5.4 Sensitivity to Flow

The calibration flow of 103 m^3/s has an average water level of 1.0 metre below the water level resulting from a 1:20 year daily flow of 335 m^3/s and 1.2 metres below the water level resulting from a 1:200 year daily flow of 412 m^3/s. The designated flood level (flow equals 412 m^3/s, 0.6 m freeboard included) is shown on Appendix 4.

An increase in flow of 20% above the designated flood (412 m^3/s) results in an average water level increase of 0.2 metres, which is within the freeboard allowance of 0.6 metres.

5.5 Sensitivity to Manning's "n"

An increase in channel "n" values in the study area from 0.04 to 0.055 results in an average level increase of 0.30 metres for a 1:200 year daily flow of 412 m^3/s, which is within the freeboard allowance of 0.6 metres.

6. FLOODPLAIN MAPPING

The flood levels determined in the study were used to draw the designated floodplain limits onto the existing 2 metre contour topographic mapping of the study area.

The 1:200 year flood level (freeboard included) of the Fraser River at the confluence of the Salmon River was assumed to be 580.6 metres. The difference between the calculated 1:200 year flood level at the South Fort George Gauge on the Fraser River in Prince George and the water level observed at the gauge on July 12, 1979, was determined. This difference was applied to the observed July 12, 1979, water level at the confluence of the Salmon River (plus freeboard) to obtain the 580.6 flood level used in this study. Appendix 4 indicates that the assumed Fraser River flood level does not effect Salmon River flood levels upstream of cross section 2.3.

The attached drawings (Appendix 5) were produced and indicate the following information:

- the floodplain mapping indicates the location of river cross-sections, the designated floodplain limits, the flood levels determined in the study, the location of survey monuments and the location of gauge no. 08KC001.

- the study area covers 13 km. of the Salmon River Valley upstream of the Fraser River confluence.

- the Salmon River in the study area is a meandering watercourse of moderate (0.25%) slope which is subject to channel avulsion and buildup of debris during flood flows.

7. CONCLUSIONS AND RECOMMENDATIONS

1. This report presents an overview of the studies undertaken to produce the floodplain mapping sheets for the Salmon River near Prince George.

2. The floodplain mapping is deemed to be preliminary as it is based on 2 metre contour mapping and the limitations in river cross section information noted in this report. The mapping is based on the best information available and the results can be used for administrative purposes related to the preparation of hazard map schedules for official plans; floodproofing requirements in zoning and building bylaws; and the identification of floodable land by subdivision Approving Officers.

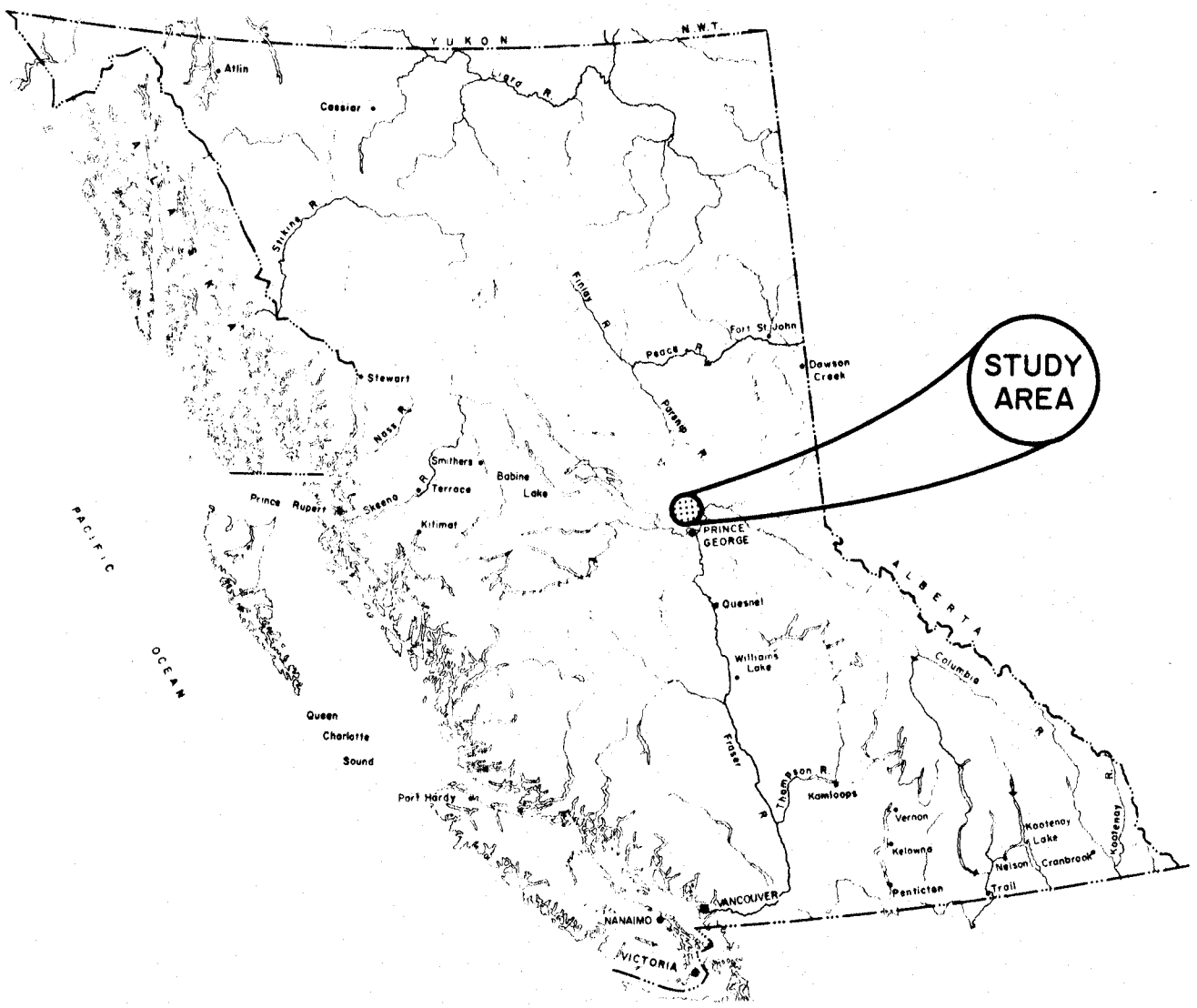
R.W. Nichols, P. Eng.
Senior Hydraulic Engineer
Special Projects Section

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APPENDIX 1

Detailed Information Sources Used in the Floodplain Mapping Study - Salmon River near Prince George

No.	Source	Contents
1.	Atlas of British Columbia, U.B.C. Press W.R. 912.711 F231 C.4	General information on the people, environment and resource used.
2.	Ministry of Environment, Water Management Branch, Surveys Section, Project No. 79FDC-5, July, 1979	Computer printouts of 16 river cross sections, thalweg and bridge details, photographs of river cross sections.
3.	Ministry of Environment, Surveys and Resource Mapping Branch, Project No. 79-064 T-O.	Orthophoto, topographic mapping, 1:5000 scale, 2 metre contours, date of photography 1977.
4.	Ministry of Environment, Surface Water Section, Water Management Branch, "Flood Frequency Analysis, Salmon River near Prince George", memorandum dated April 19, 1984 File: 0305030-HEC 2	Estimates of peak flows in the study area based on Gauge No. 08KC001, Water Survey of Canada.



STUDY AREA LOCATION

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON
FLOODPLAIN MAPPING STUDY
SALMON RIVER NEAR PRINCE GEORGE

SCALE: VERT
HOR AS SHOWN

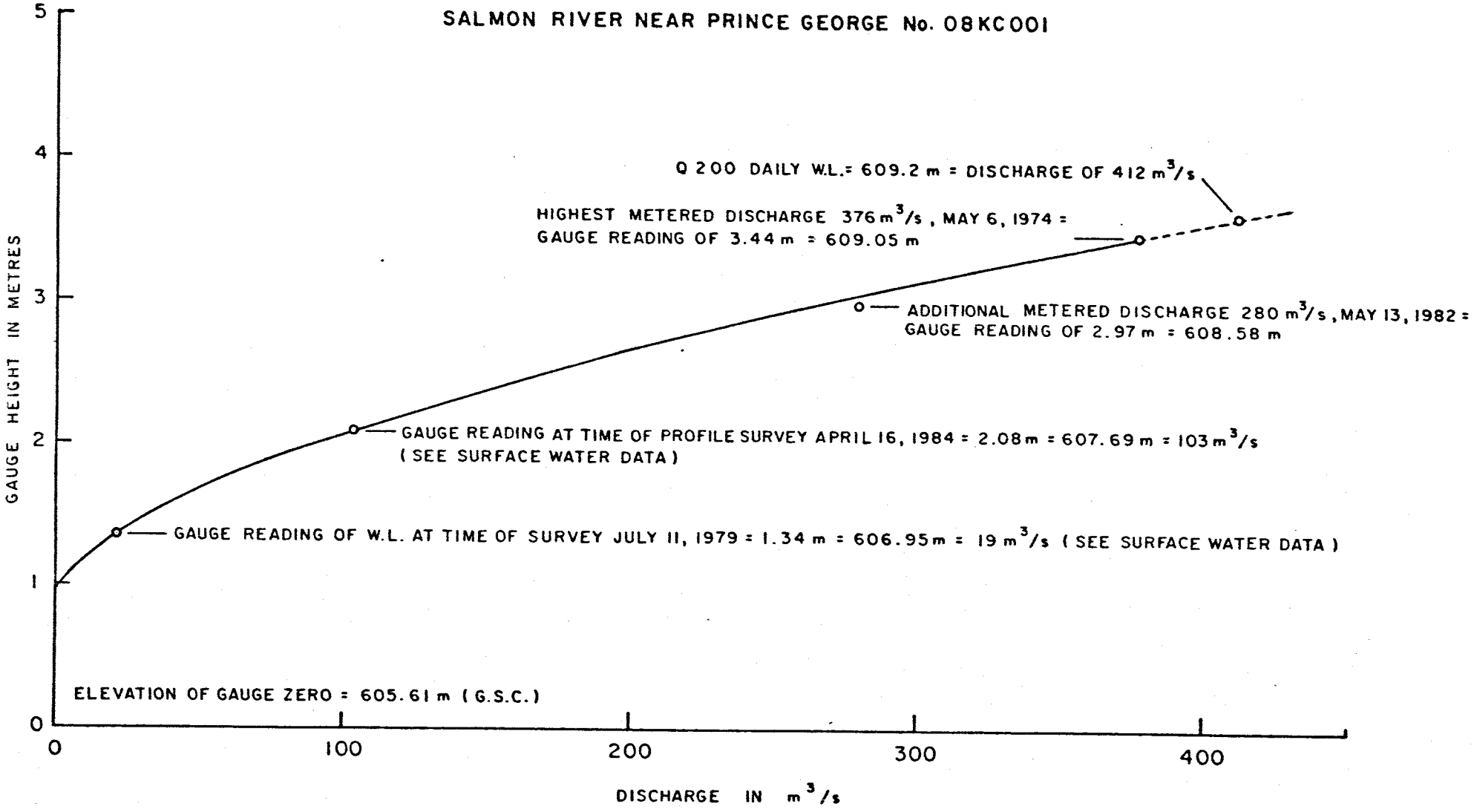
DATE
JAN. 1986

R.W. NICHOLS ENGINEER

FILE No 00-5800-S.1 APPENDIX No. 2

BCIL 7673-M E

STAGE – DISCHARGE CURVE FOR GAUGING STATION
SALMON RIVER NEAR PRINCE GEORGE No. 08KC001

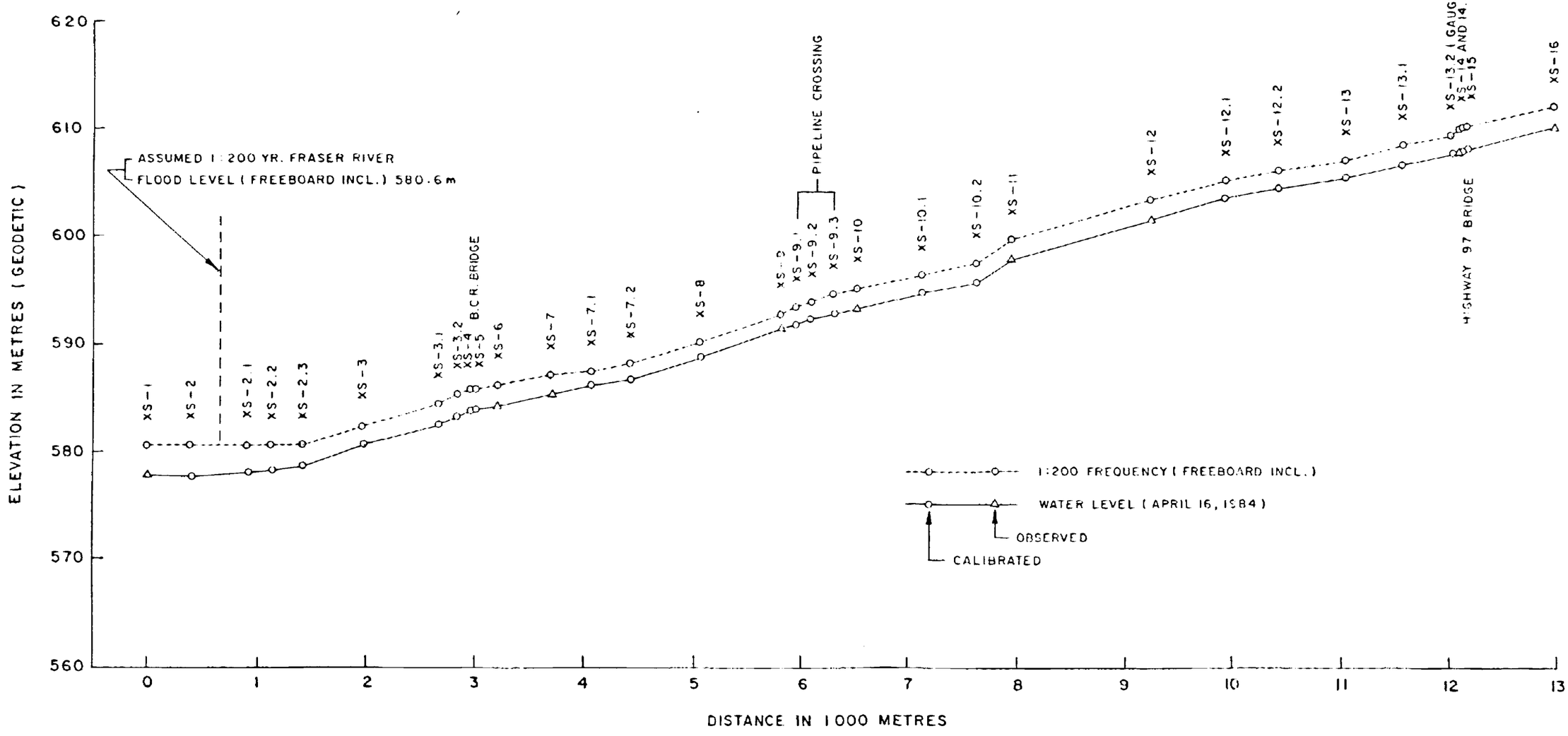


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WATER SURFACE PROFILES



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Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

FLOODPLAIN MAPPING STUDY

SALMON RIVER NEAR PRINCE GEORGE

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FILE No. 00 5800-S.1 APPENDIX No.	4

DISTRIBUTION LIST FOR FLOODPLAIN MAPPING

SALMON RIVER

Mr. Dennis Roberts Regional Water Manager Ministry of Environment Prince George, B.C.	1011 Fourth Avenue Prince George, B.C. V2L 3H9
Mr. K. Chisholm Inspector of Dykes Ministry of Environment Abbotsford, B.C.	34345 Wye Road Abbotsford, B.C. V2S 4N2
Mr. Ken Scofield Approving Officer Ministry of Transportation and Highways Prince George, B.C.	213, 1011 - Fourth Avenue Prince George, B.C. V2L 3H9
Mr. Authur Stauble Chairman Fraser - Fort George Regional District Prince George, B.C.	987 Fourth Avenue Prince George, B.C. V2L 3H7