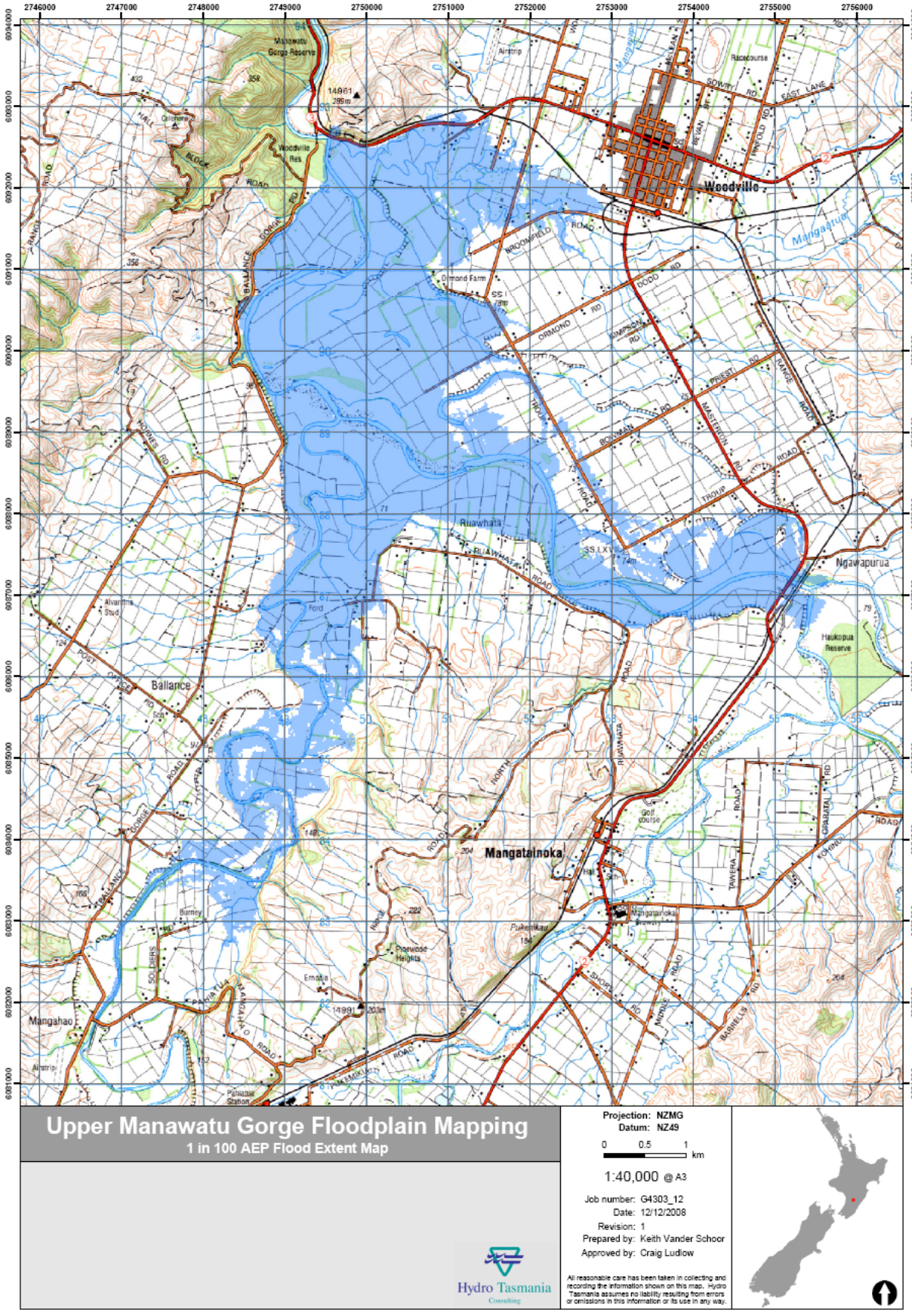


Figure 5-1 1 in 100 AEP Flood Extent

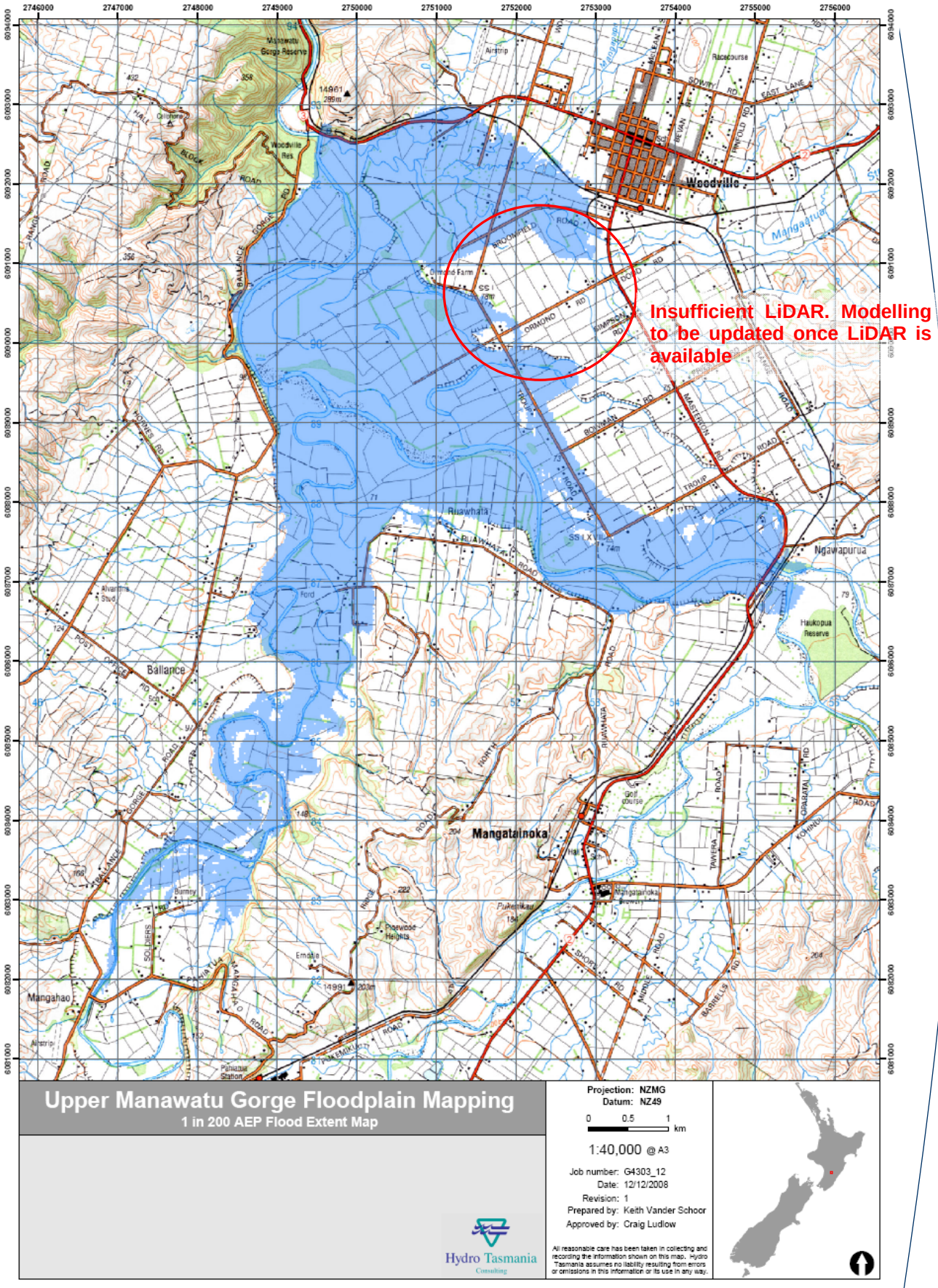


Figure 5-2 1 in 200 AEP Flood Extent

6. Library Flood Map Runs

Five historic flood events, covering the full range of measured flow at the gauge site, were run through the MIKE FLOOD model with the purpose of developing a series of maps showing inundation extents upstream of the gorge. Six additional model runs, based on scaled February 2004 flood hydrographs were run to provide an even spread of maps in between the maps from the historical runs and the flow estimated to cause flow to break out from the Manawatu River (750 m^3/s).

Table 6-1 shows the peak modelled flows at the Manawatu at Upper Gorge gauge site for the historical and interpolated model runs.

Table 6-1: Historic Flood Events, Peak Discharge of the Historic Flood Events and Interpolated Peak Discharge at the Gorge and Map Reference Number.

Flood Event	Modelled Peak Discharge (m^3/s)
Feb 2004 (First Peak)	2975
Interpolated Peak	2800
July 1992	2555
Interpolated Peak	2310
Interpolated Peak	2080
April 1991	1915
Interpolated Peak	1655
Oct 2000	1350
Interpolated Peak	1120
Feb 2004 (Second Peak)	940
Interpolated Peak	840
Base map	750

The inundation maps from the model runs are integrated with the flood forecasting system and referenced real-time based on the forecast discharge at Manawatu at Upper Gorge. Each map is reference by the peak discharge.

7. Web-Site Interface

7.1 Introduction

The web-site was developed in order to provide a visual estimate of expected inundation extents upstream of the Manawatu Gorge based on the forecast estimates of discharge at Manawatu at Upper Gorge from the real time flood forecasting model which was developed by HTC. Refer to *Horizons Regional Council Flood Forecasting System – Upper Manawatu Catchment Operating Manual*, 121040-Report-03, Hydro Tasmania Consulting, November 2008, for details of the real time flood forecasting model.

The web-site is automatically linked to the real time flood forecasting model, and based on the modelled flows at Manawatu at Upper Gorge from the latest model run, the most appropriate inundation extent map is chosen from the library of maps and is displayed along with relevant data for the particular flood event (eg, current flood level and flow data, time to peak at Manawatu at Upper Gorge).

7.2 Linkage to Real time Flood Forecasting Model

The web-site is supplied with information in an xml file which is output from the most recent flood forecast run and updated every 30 minutes. The code that produces the xml file is in the Upper Manawatu hydrologic model named “UpperGorge_hydrologic_model.tso” which will be located with the other Manawatu flood forecasting models (as part of the HRC Flood Forecasting System).

The flood forecasting model output map references (refer to Table 6.1) from the most recent model run for the following:

- Current flooding conditions
- Peak estimated flood
- Estimated flood at 1 hr increments for the 48 hr forecast.

The map references are used by the website to select and display the required flood extent map. Details of the website functionality are provided in section 7.3.

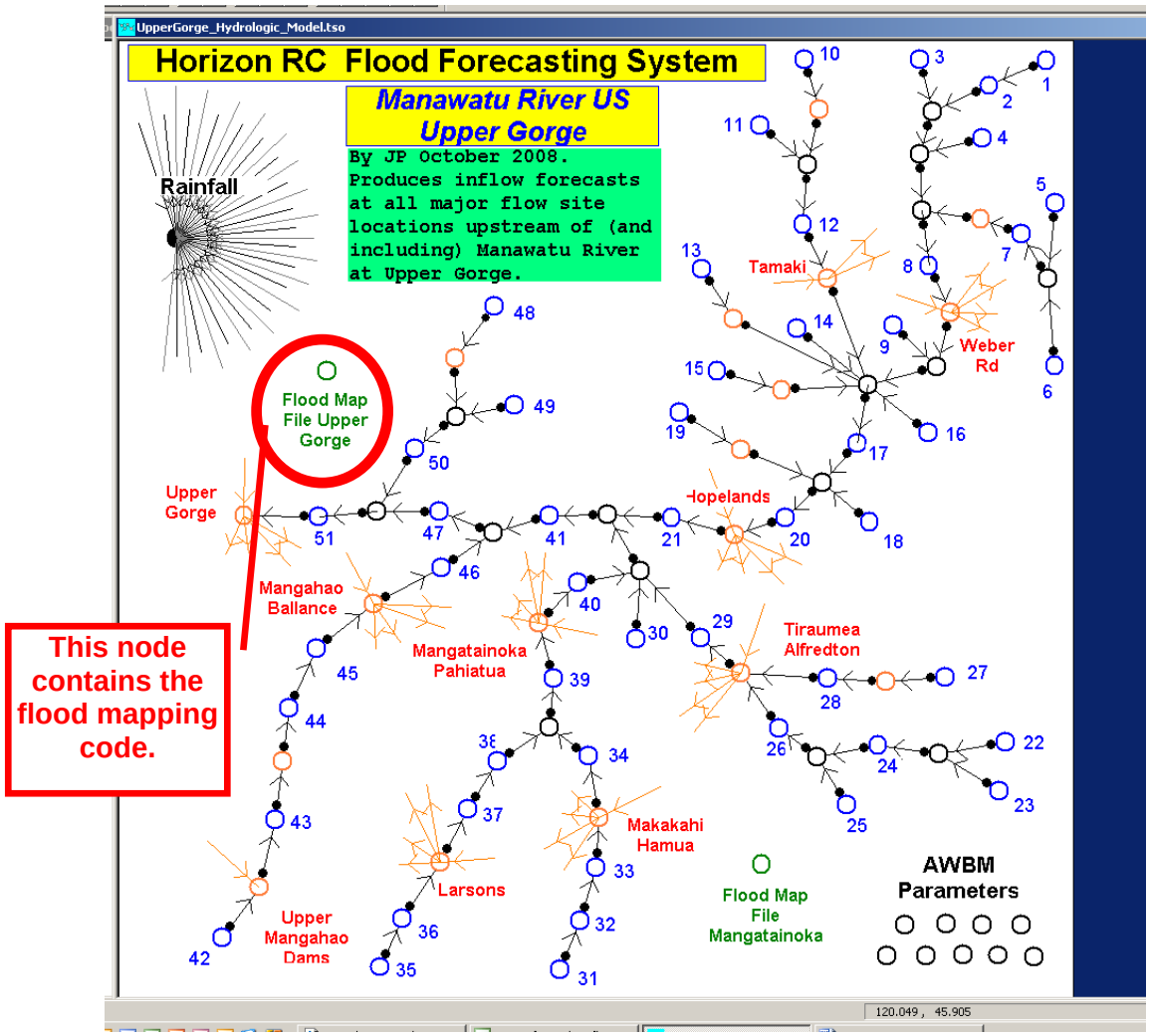


Figure 7-1 Location of xml file code in Upper Gorge hydrological model

7.3 Web-Site Description

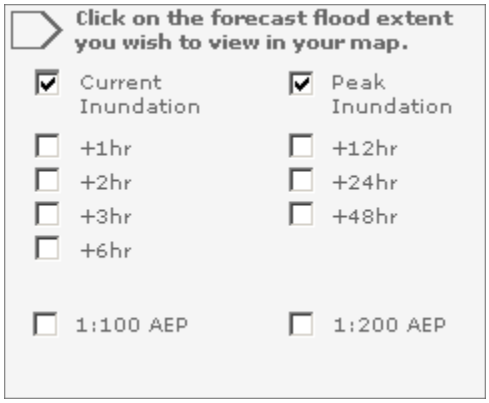
The web-site has been developed utilising HTML, Javascript and SVG technologies. HTML and Javascript are handled as default by web browser's, most web browser's require a plugin to be installed to handle SVG. If your browser does not have the plugin installed the web-site will notify you and give you the option to download it before continuing.

The web-site has been optimised for Internet Explorer. The layout has been developed for a screen resolution of 1024*768, it should however operate satisfactorily at a variety of screen resolutions.

The following functionality has been presented in the web-site:

Basic GIS Navigation Tools

Pan, Zoom, Zoom Full Extent, Mouse Pointer Coordinate Readout, Locality Window, Slider Bar Zoom In\Out.



Layer manipulation

Flood Forecast

The web-site reads flood forecast information dynamically from a file summarising forecast results which is produced by the real time flood forecast model. See Section 7.2 for more information on the flood forecast. If administrators wish to look at the raw forecast file it can be found in the web-site root directory, forecastData.xml.

Relevant components of the forecast information from this file are displayed to the user in the web-sites “General Information” section.

Fade Through and Animations

Fade Through

The fade through represents an animated picture of the forecast floodlines for the period from time of forecast to 48hrs into the future, at 1 hourly time steps.

Technical

Installation of the web-site was coordinated by Chris Veale of Horizons Regional Council.

The web-site interface has been built upon open source SVG solution provided by carto.net, for more information see the following web-site: http://www.carto.net/papers/svg/navigationTools/.

The following notes are relevant to the setup of the web-site,

All web-site files are stored within in the MR_FDSS directory on the web server.

The web-site must be hosted on a machine accessible by the machine on which the Real Time Flood Forecast Model (RTFFM) is hosted. The RTFFM needs to be configured to upload its forecast files to the MR_FDSS root directory.

User's machine clock must be on the same time zone as the server's clock.

Map Development

Two types of map data are displayed in the web interface – Background image and Floodlines.

Background Image

Sourced from 1:50k topographic maps supplied by Horizons. This image is a jpeg file and has been optimised for size whilst still retaining satisfactory image quality.

Floodlines

These are the lines\polygons displayed by the web-site when the user turns on the Current\Peak\1hr\2hr\etc floodlines in the web-site legend. These are also the floodlines used in the fadethrough. These lines are SVG vectors derived from ESRI Shapes files of the MIKEFLOOD model run outputs. They are accurate to 20m, the same resolution as the input grids used by MIKE FLOOD.

8. References

Hydro Tasmania Consulting, *Horizons Regional Council Flood Forecasting System – Upper Manawatu Catchment Operating Manual*, 121040-Report-03, November 2008.

1992 Measured Flood Levels. Table 31 and 32. (Source Unknown)

A. Flood Hydrographs

Flood hydrographs are provided for each of the flood events modelled.

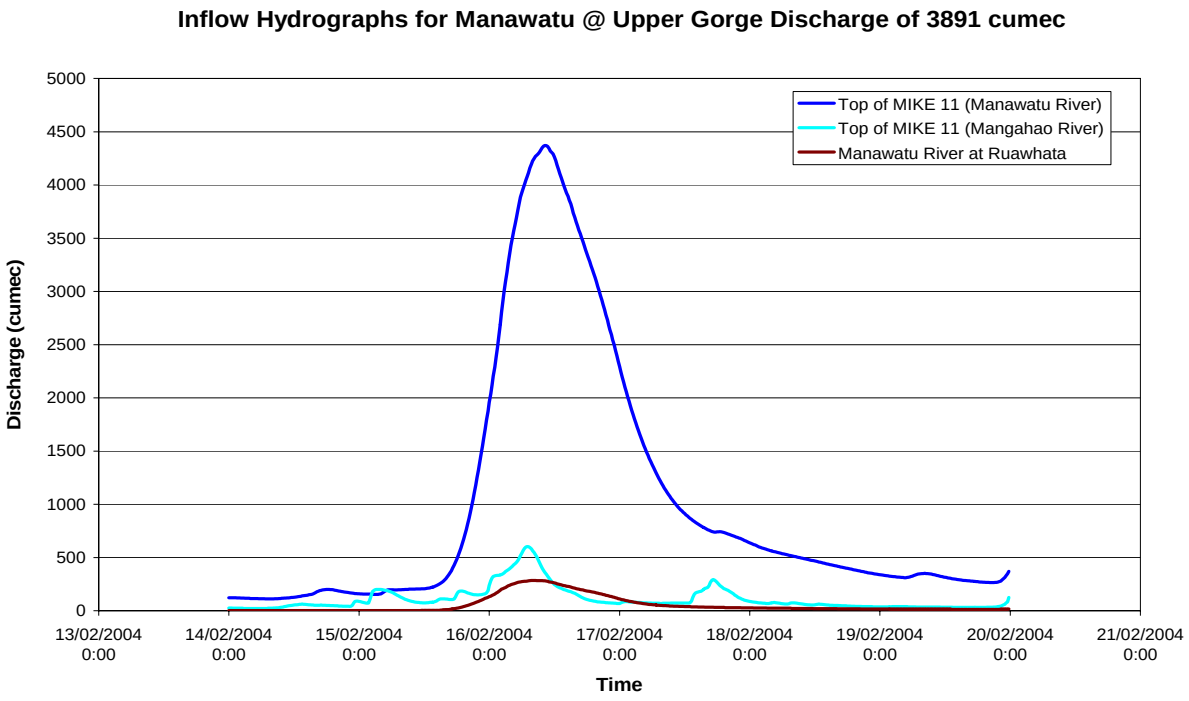


Figure A-1: 1 in 200 ARI Designed Flood Hydrographs

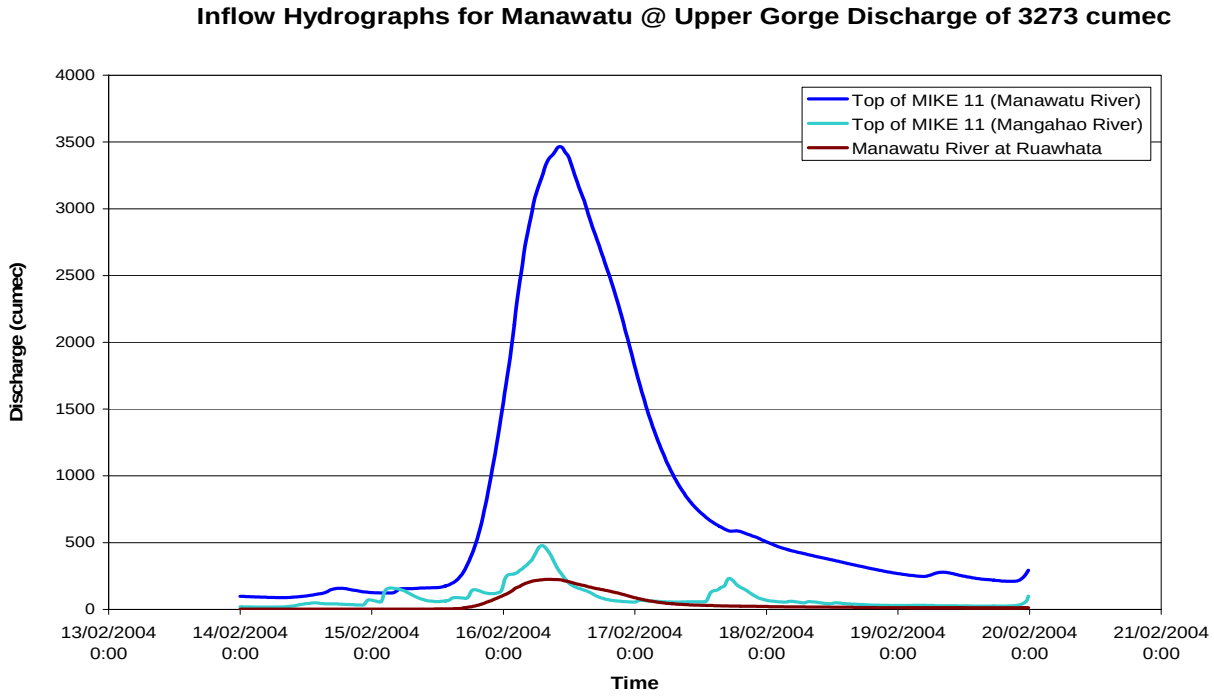


Figure A-2: 1 in 200 ARI Designed Flood Hydrographs

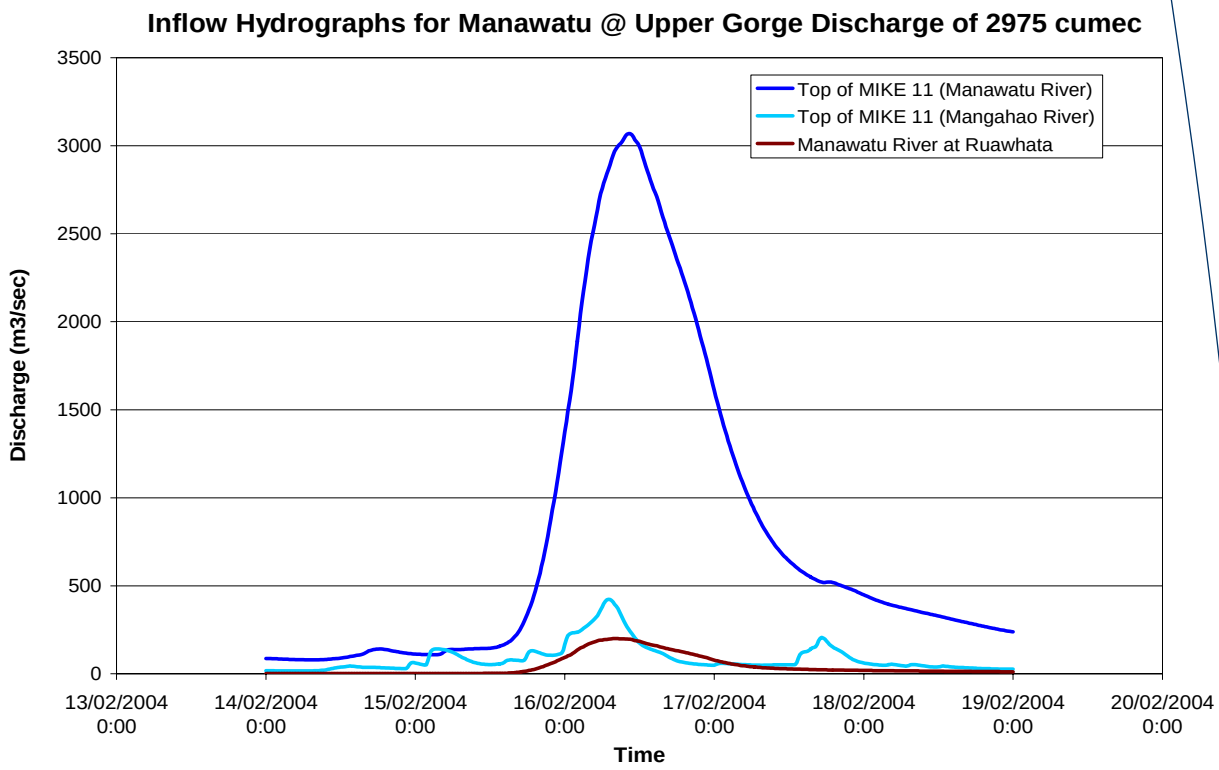


Figure A-3: February 2004 (First Event) Hydrographs

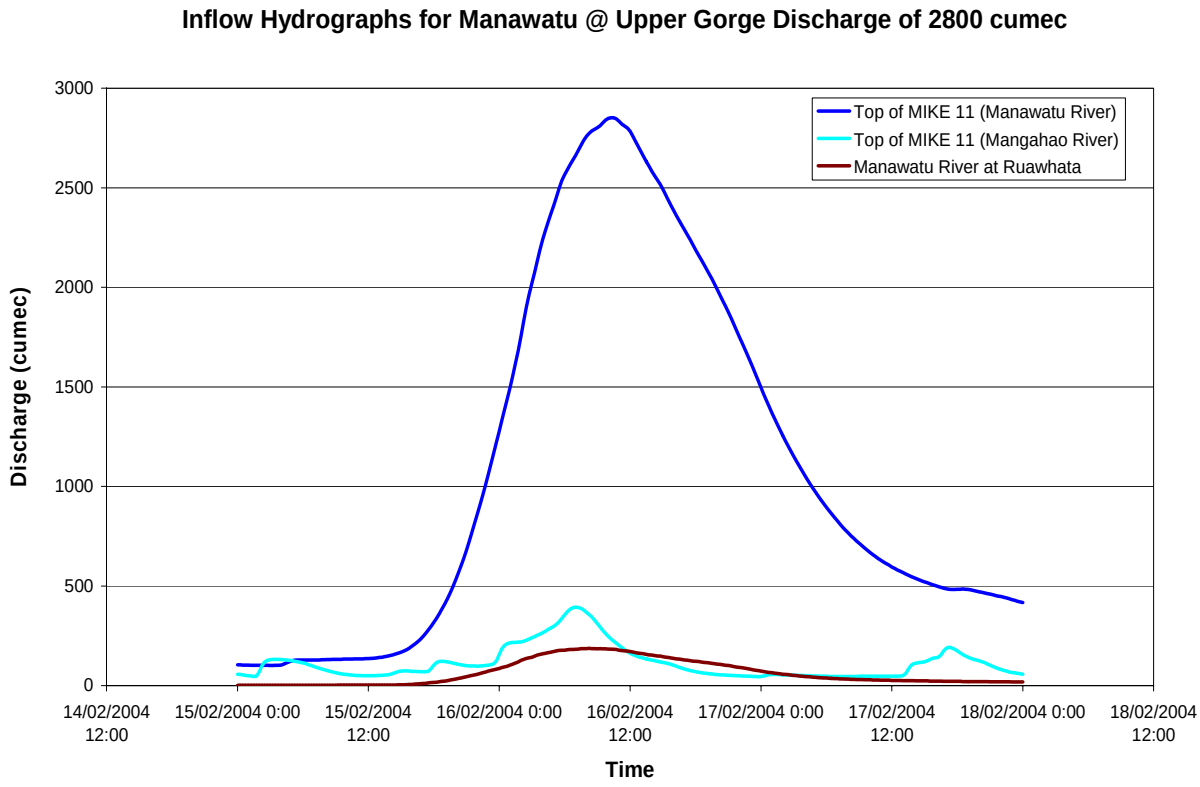


Figure A-4: Interpolated Inflow for the Upper Gorge Discharge of 2800 cumec

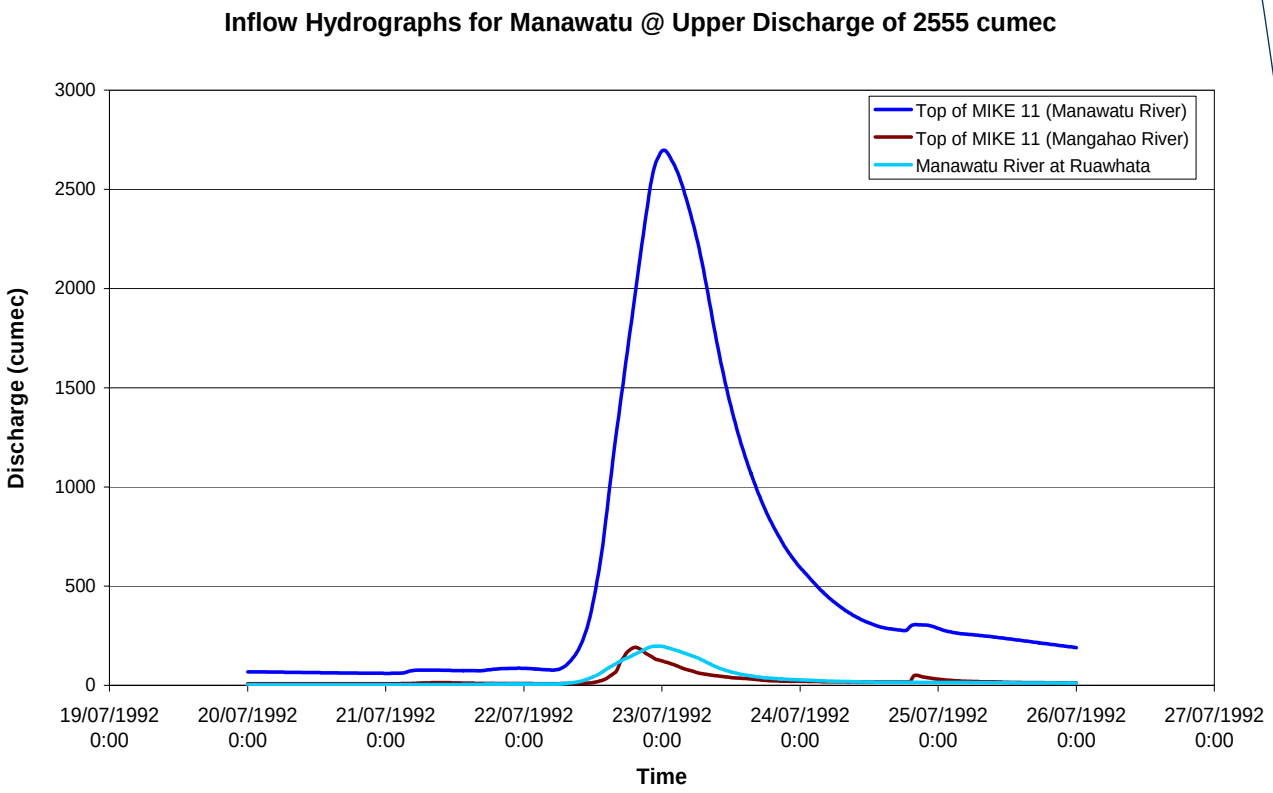


Figure A-5: July 1992 Hydrographs

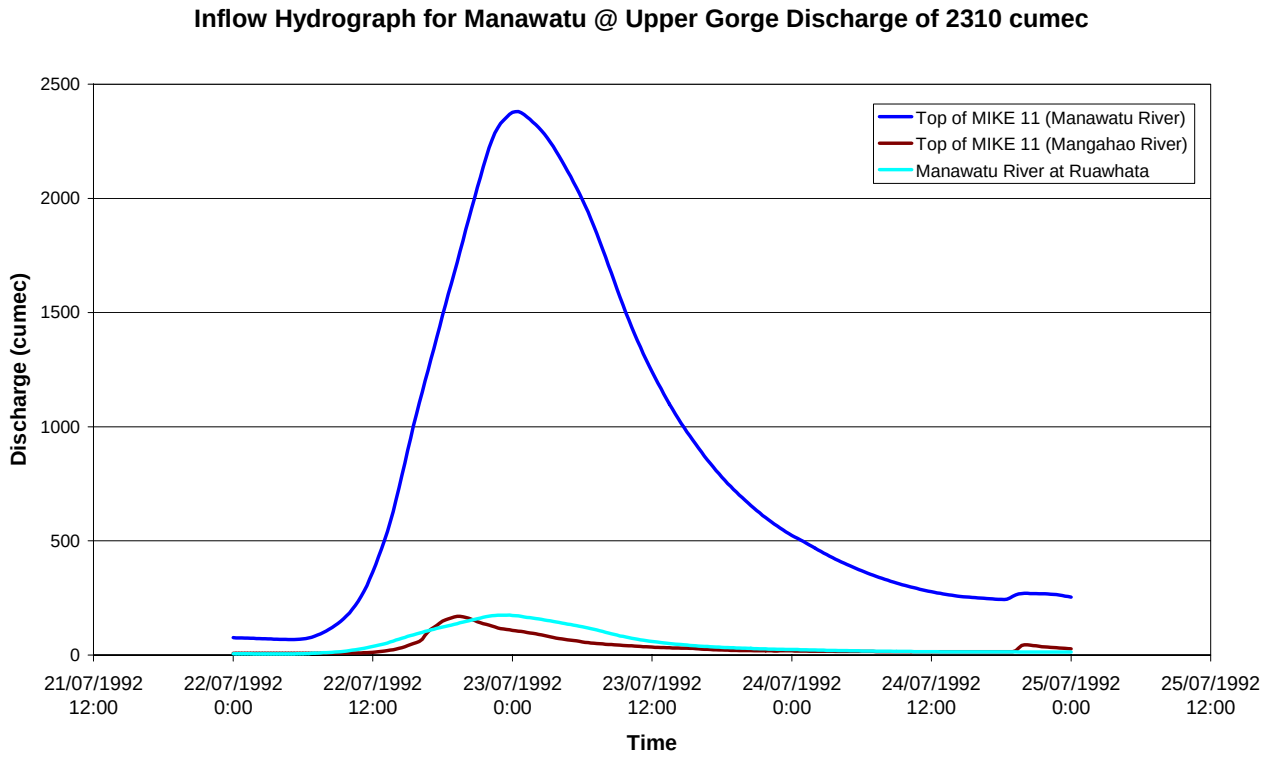


Figure A-6: Interpolated Inflow for the Upper Gorge Discharge of 2310 cumec

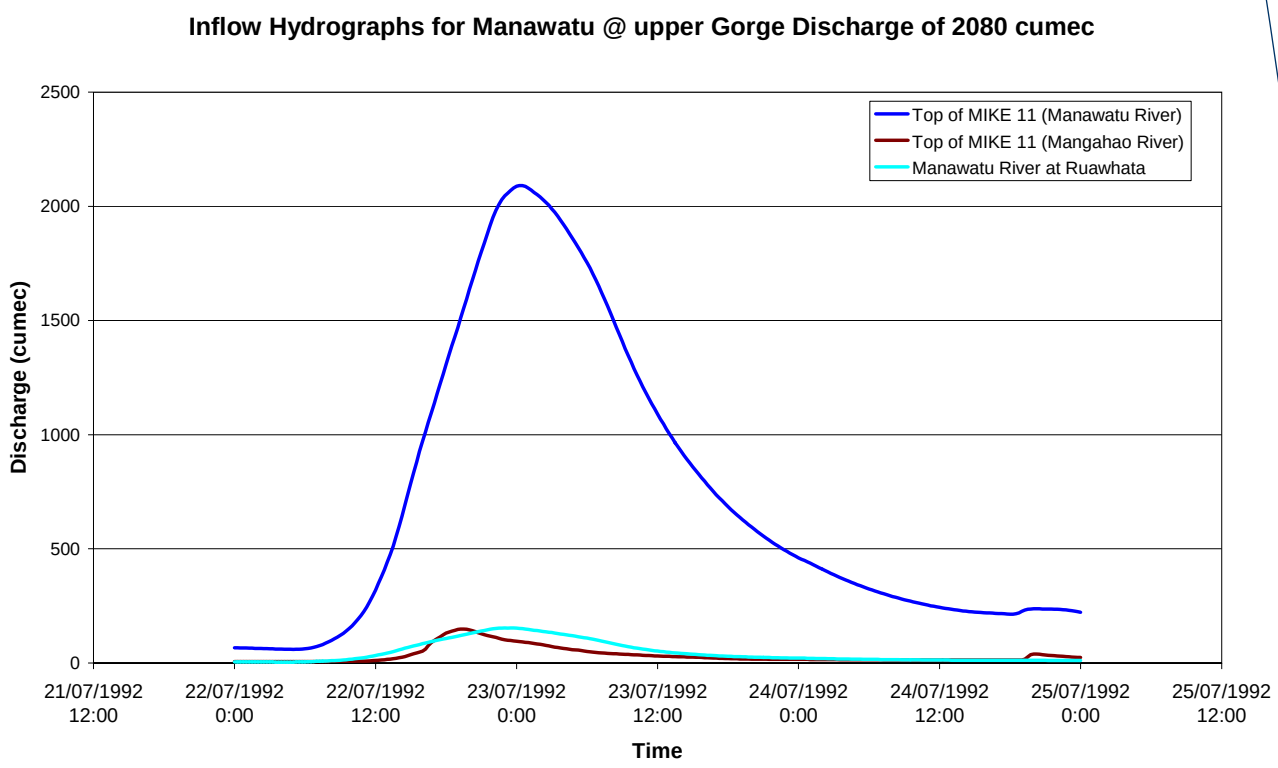


Figure A-7: Interpolated Inflow for the Upper Gorge Discharge of 2080 cumec

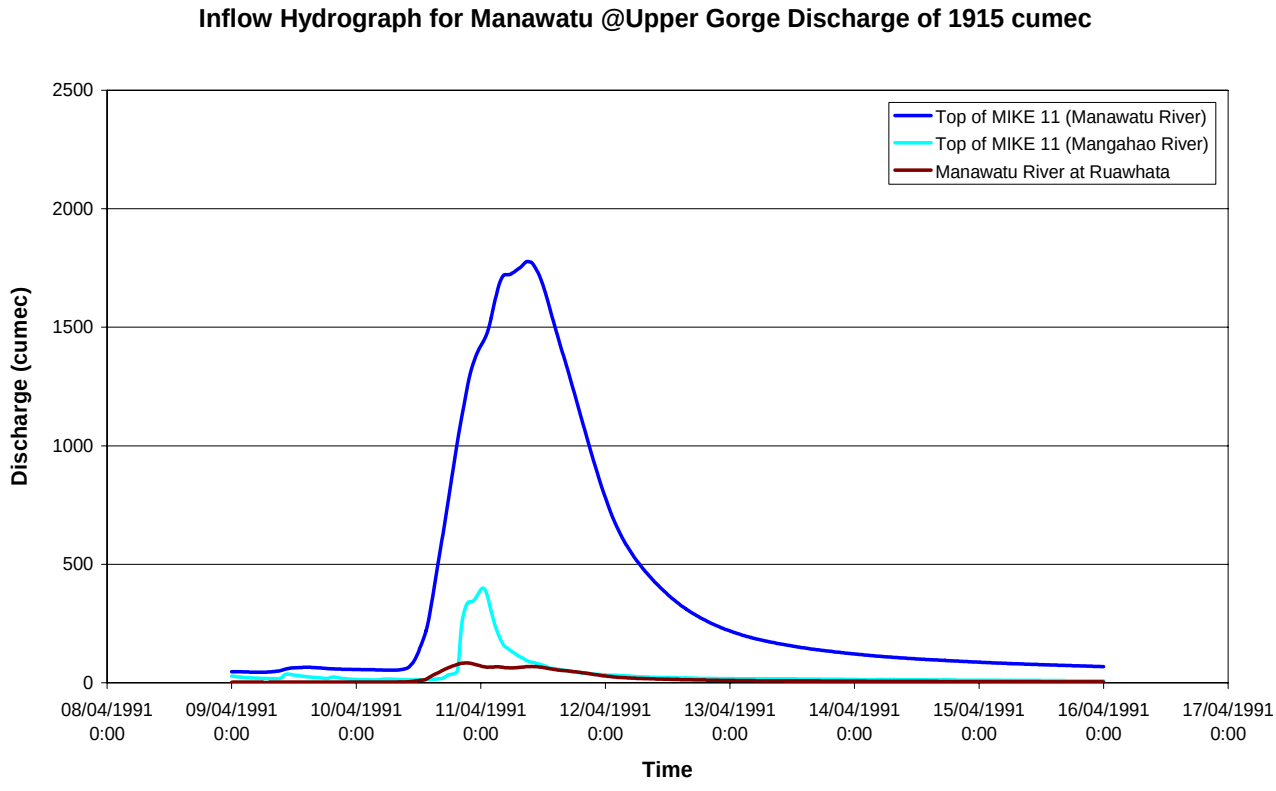


Figure A-8: April 1991 Hydrographs

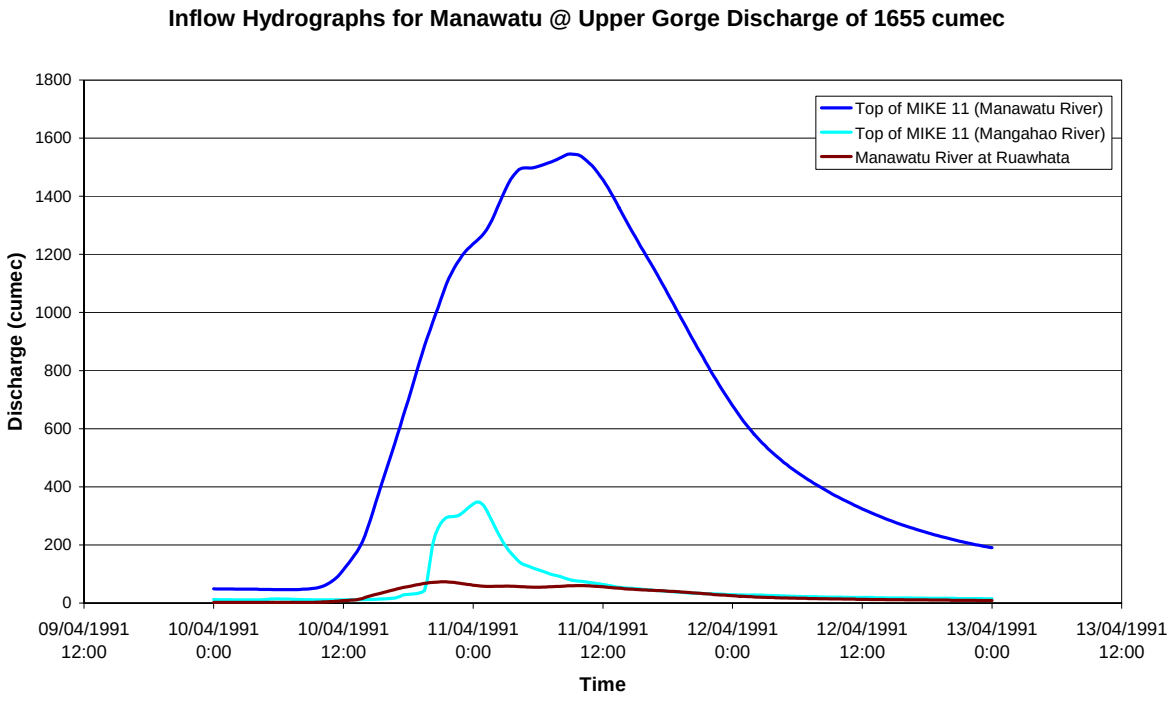


Figure A-9: Interpolated Inflow for the Upper Gorge Discharge of 1655 cumec

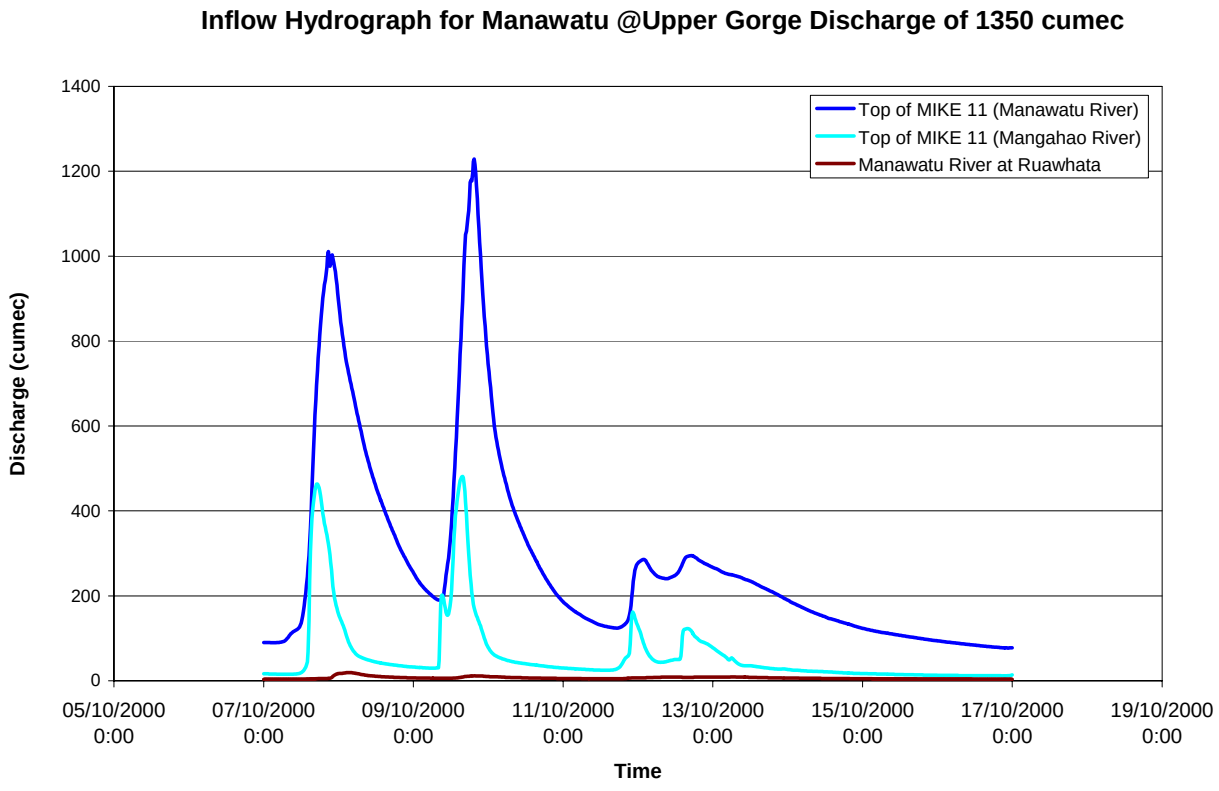


Figure A-10: October 2000 Hydrographs

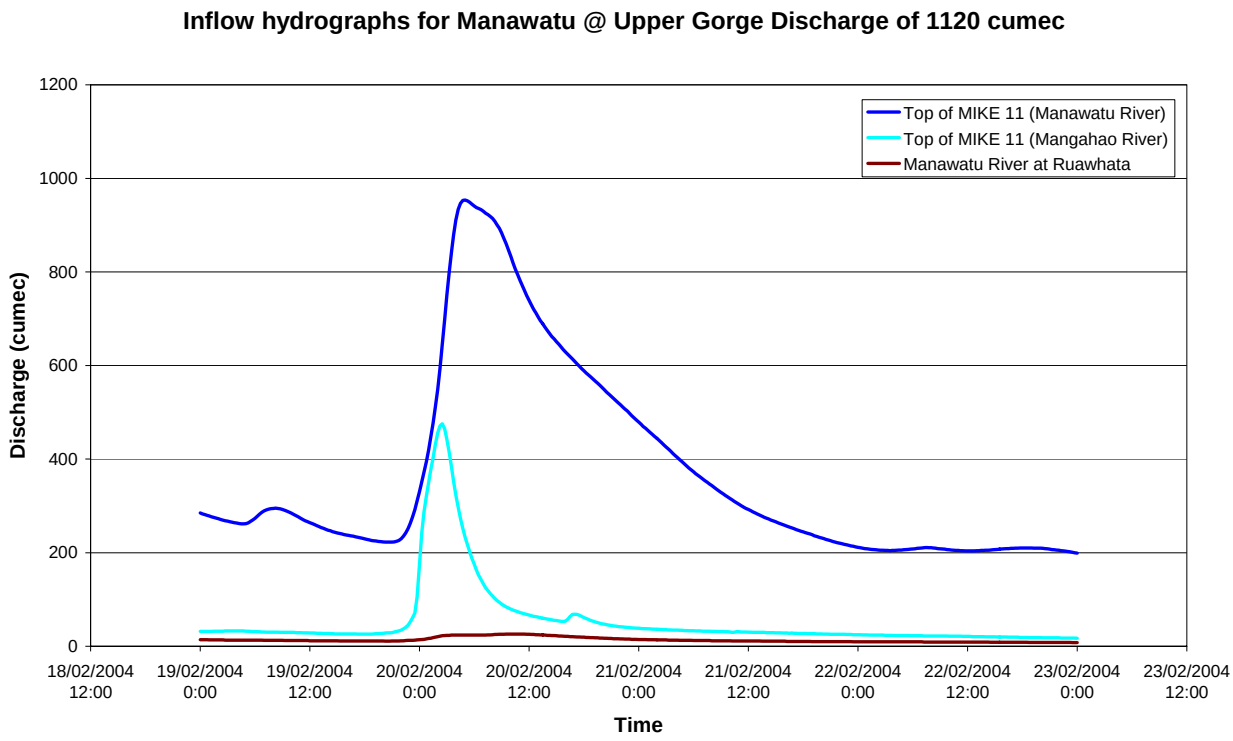


Figure A-11: Interpolated Inflow for the Upper Gorge Discharge of 1120 cumec

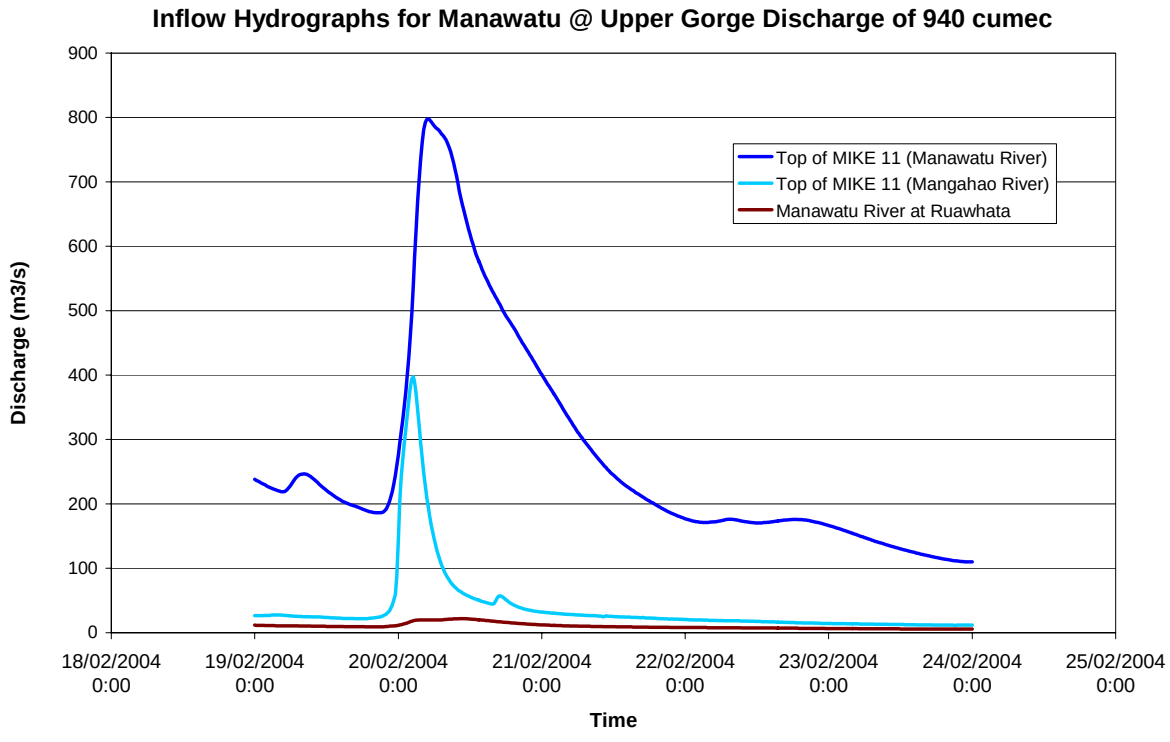


Figure A-12: February 2004 (Second Event) Hydrographs

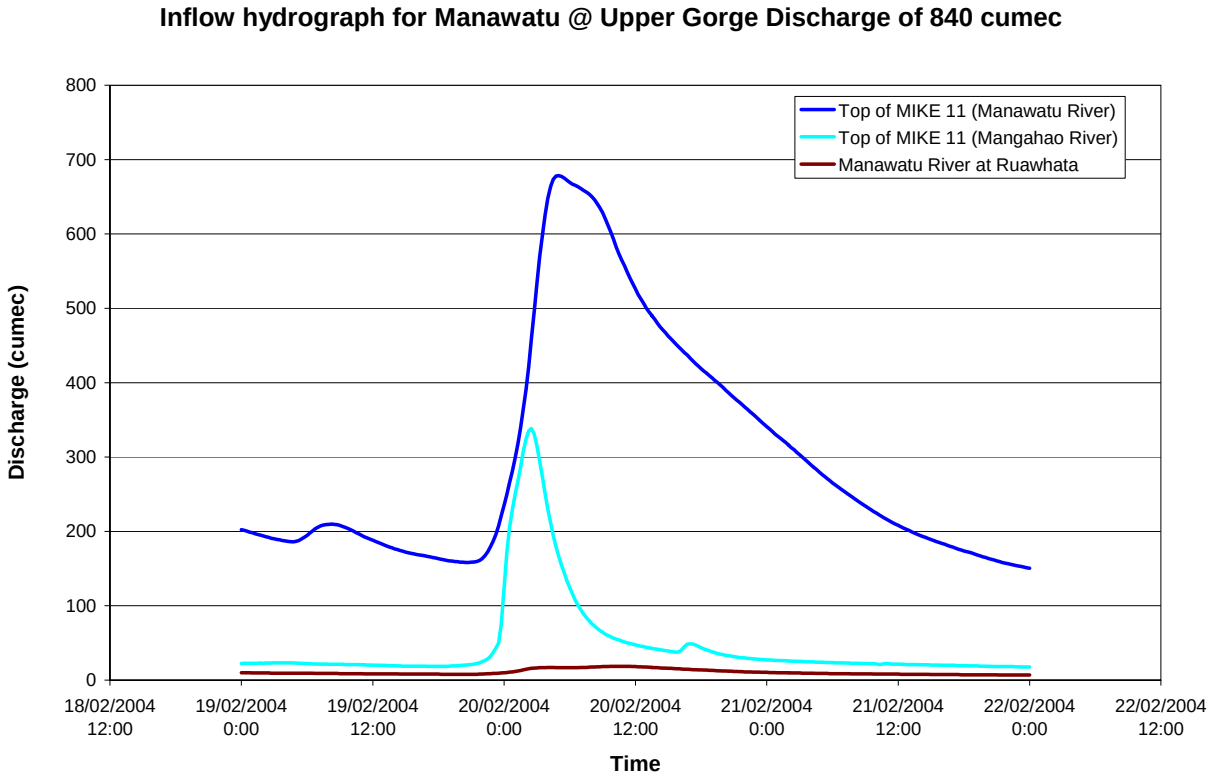


Figure A-13: Interpolated Inflow for the Upper Gorge Discharge of 840 cumec

B. Web-site Setup and Administration

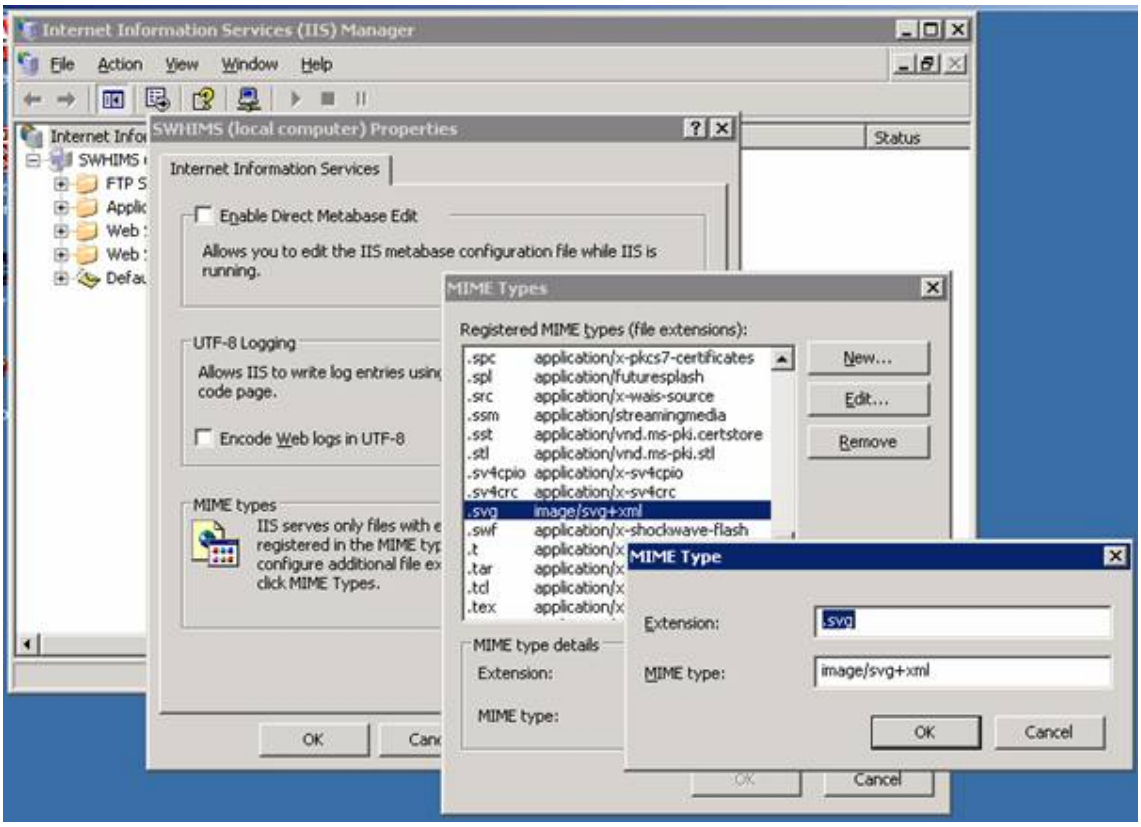
Setup Notes:

Step 1. – Upload of website files

Copy the web-site files (contained within MUG_FDSS directory) up onto your webserver into a location which is published to the web.

Step 2 – Web server

You may need to adjust you webserver settings to serve out SVG Mimetypes. If you are using IIS then this can be set in the following dialog box.

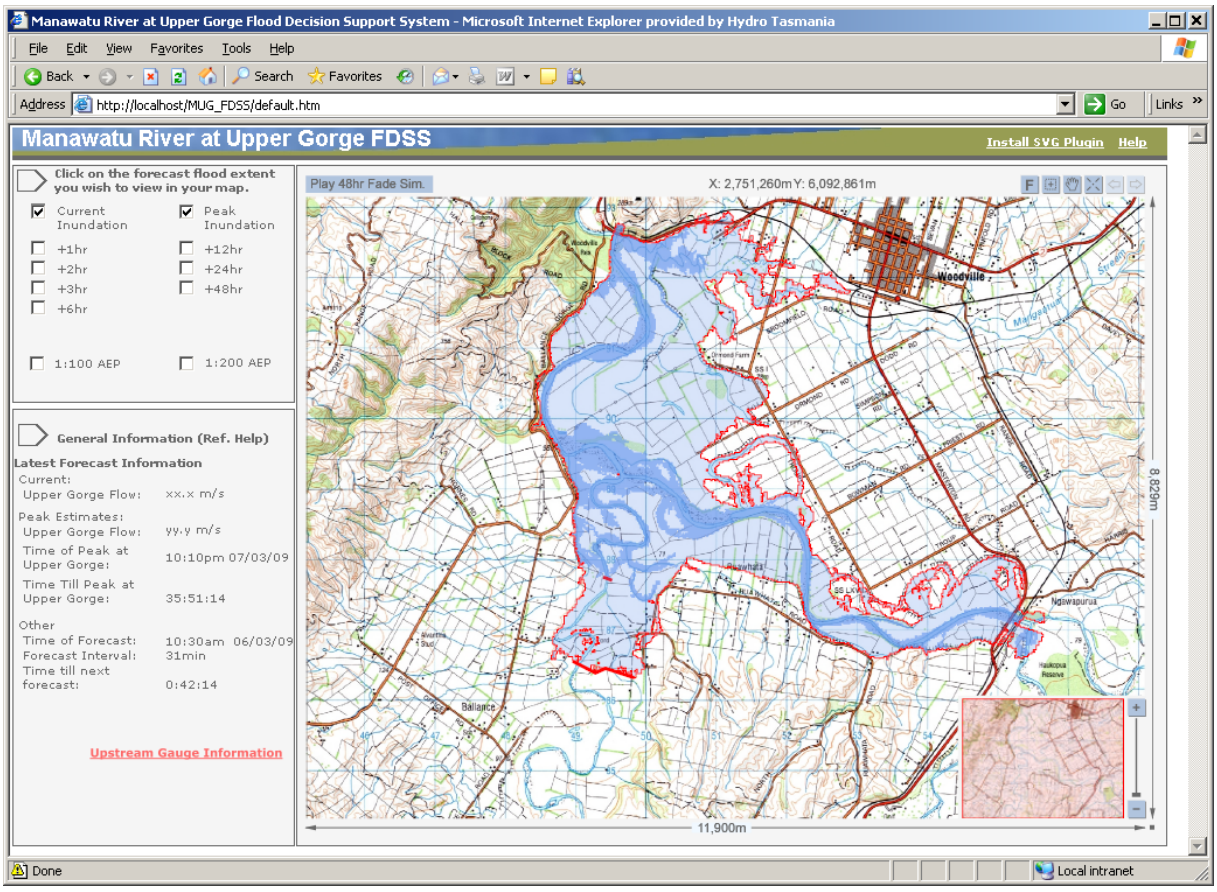


Step 2 – Check Functionality

From a user's machine navigate to the web-site location "http://webserverlocation/MUG_FDSS/Default.htm"

If you have the SVG plugin installed, the web-site should open and after few seconds the flood information will be displayed. If the plugin is not installed, you will be prompted to install it.

The web-site should look something like this (Floodlines will be different):



Web-site Administration

The following variables are stored in the file param.js. These can be modified by the web-site administrator to optimise the web-site performance and adjust its look and feel.

Settings

datafile - The location of the flood warning file. Location must be either the URL of the file or a relative pathname (relative to “HRC_Webpage.htm”), must contain file name and extension.

flooddatafile - The location of the flood extent lines file. Location must be either the URL of the file or a relative pathname (relative to “HRC_Webpage.htm”), must contain file name and extension.

noFloodScenarios - Number of modelled flood scenarios stored in system.

minTimeTillNextForecast - Forecast interval in minutes, note this value is displayed on the web-site page and determines how long the page waits until it looks for a new forecast file. This time period needs to be a minute or two higher than the actual period between forecasts to allow for the modelling machine to produce the new forecast (Note these times will not compound)

Look and Feel

nowFloodFillColour – SVG Colour of current flood

nowFloodOpacity – SVG opacity of current flood (0 – 1)

nowFloodOutlineColour – SVG Outline colour of current flood

nowFloodOutlineWidth - SVG Outline width of current flood

nowFloodOutlineOpacity – SVG Outline opacity of current flood (0 – 1)

peakFloodFillColour – SVG Colour of peak flood

peakFloodOpacity – SVG opacity of peak flood (0 – 1)

peakFloodOutlineColour – SVG Outline colour of peak flood

peakFloodOutlineWidth - SVG Outline width of peak flood

peakFloodOutlineOpacity – SVG Outline opacity of peak flood (0 – 1)

genFloodFillColour – SVG Colour of general flood

genFloodOpacity – SVG opacity of general flood (0 – 1)

genFloodOutlineColour – SVG Outline colour of general flood

genFloodOutlineWidth - SVG Outline width of general flood

genFloodOutlineOpacity – SVG Outline opacity of general flood (0 – 1)

Notes:

The “map” in the Floodwarnings must correspond with a floodline name in floodData.xml. See forecastData.xml for more information on the specification for flood warnings.

User’s machine clock must be on the same time zone as the modelling server’s clock.

User’s machines will need a SVG plugin installed for Internet explorer.

Web-site has been developed and tested for Internet Explorer V6.0, it may not operate correctly in other web browsers.

Errors

If you receive the following error message “Error: ‘null’ is null or not an object” try increasing the following variables,

startUpTime, loadForecastPause