

Appendix C

Comparison of MIKEFLOOD Model Predictions with GWRC MIKE11 Model Results

The predictions of the MIKEFLOOD model were checked against:

- the limited calibration data available for the February 2004 flood; and
- the original GWRC MIKE11 model predictions for the standard flood case – a 1% AEP flood in the Waitohu Stream and a 5% AEP flood in the Greenwood sub-catchment (both floods adjusted for the possible future climate change effects to 2090).

Figure C-1 shows a longitudinal peak flood level profile along the Waitohu Stream between chainages 41000m and 45000m for the existing situation for the February 2004 flood (this covers the area where the Waitohu Stream floodplain is represented by a MIKE21 two-dimensional component in the MIKEFLOOD model). Table C-1 compares the peak flood level predictions against the measured data.

Table C-1 MIKEFLOOD model predicted peak flood levels for February 2004 flood compared to surveyed flood level data

Location	Model Chainage (m)	Surveyed Flood Level (m MSL Wellington datum)	MIKEFLOOD Model Predicted Flood Level (m MSL Wellington datum)	Difference (m)
Waitohu Valley Road	41485	44.60	45.10	+0.50
SH1 bridge – 25m upstream	42451	29.72	29.67	-0.04
SH1 bridge – 100m downstream	42576	28.95	28.93	-0.02
NIMT railway bridge	43006	23.14	23.62	+0.48

Figure C-1 and Table C-1 indicate that the MIKEFLOOD model appears to provide a satisfactory prediction of the peak flood level profile for the February 2004 flood based on the limited calibration data available. The prediction of the peak flood level profile is particularly good upstream and downstream of the SH1 bridge where the differences between predicted and surveyed flood levels are less than 0.05m. This is better than the original GWRC model which under-predicted the surveyed flood levels by 0.2-0.3m. The MIKEFLOOD model prediction of the peak flood level profile is not as good around the Waitohu Valley Road bridge and the NIMT railway bridge, over-estimating the surveyed flood levels by about 0.5m. This compares with overestimates of about 0.2m by the original GWRC model.

Unfortunately there are no surveyed peak flood level data available from other more recent large flood events with which to verify the predictive accuracy of the MIKEFLOOD model.

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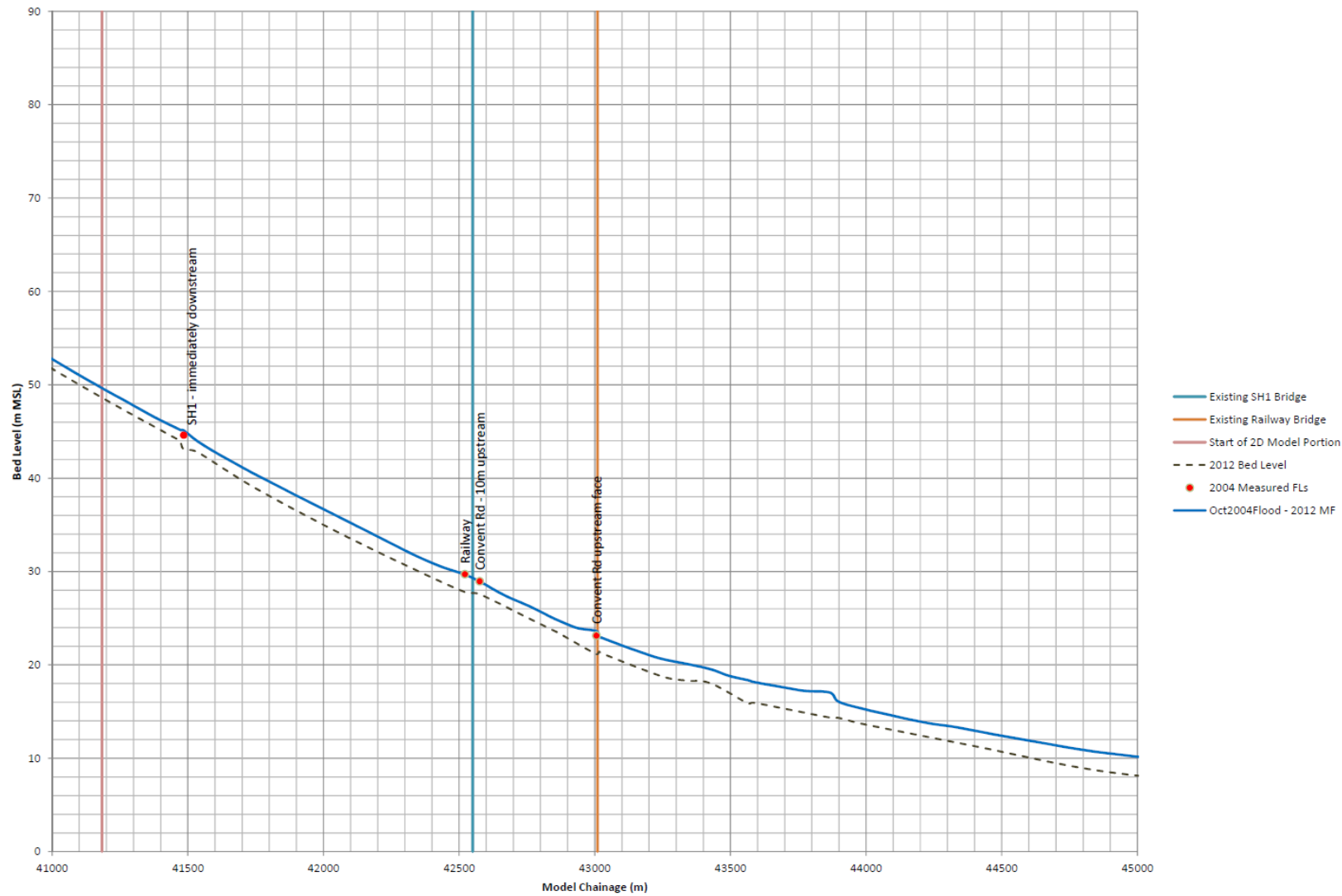


Figure C-1 Comparison of MIKEFLOOD model predicted peak flood level for February 2004 flood with surveyed peak flood level data

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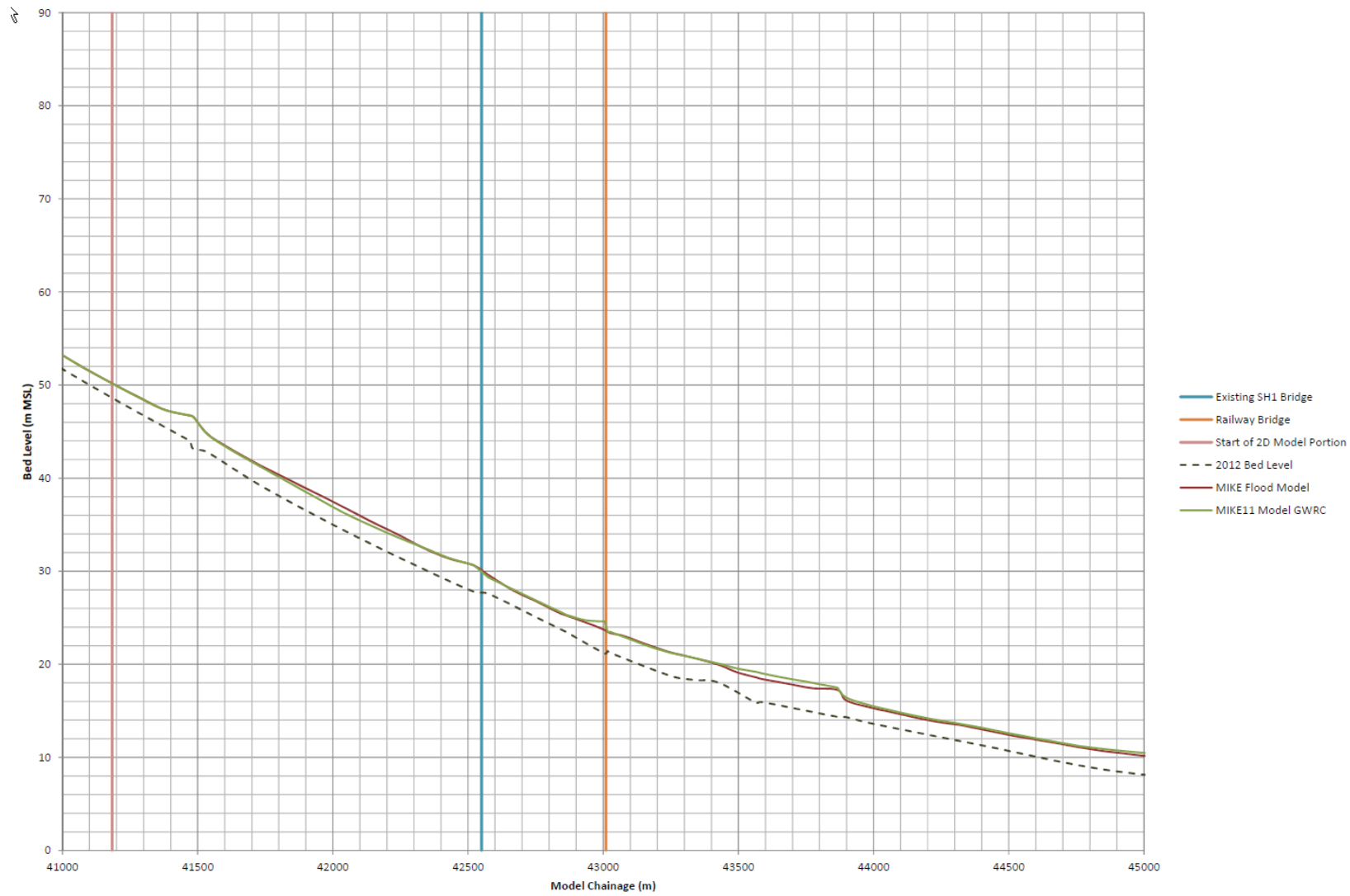


Figure C-2 Comparison of MIKEFLOOD and MIKE11 model predicted peak flood levels for 1% AEP flood adjusted for possible future climate change effects to 2090

Figure C-2 compares longitudinal peak flood level profiles predicted by the MIKEFLOOD model and the original GWRC MIKE11 model along the Waitohu Stream between chainages 41000m and 45000m for the standard flood case of the 1% AEP flood adjusted for possible future climate change effects to 2090. Table C-2 compares the tabulated peak flood levels from the two models at each main channel cross-section.

Table C-2 Comparison of MIKEFLOOD and MIKE11 model predicted peak flood levels at each Waitohu Stream surveyed cross-section for 1% AEP flood adjusted for possible future climate change effects to 2090

Location	MIKE11 Model Chainage (m)	GWRC MIKE11 Model Peak Flood Level (m MSL Wellington datum)	MIKEFLOOD Model Peak Flood Level (m MSL Wellington datum)	Difference (m)
	40984	53.48	53.48	0.00
Waitohu Valley Road bridge - upstream	41184	50.16	50.18	+0.02
	41474	46.73	46.69	-0.04
	41536	44.72	44.75	+0.03
	41741	41.09	41.23	+0.14
	42051	36.12	36.71	+0.59
	42341	32.47	32.41	-0.06
SH1 bridge	42521	30.67	30.62	-0.05
	42576	29.32	29.58	+0.26
	42866	25.29	25.35	+0.06
NIMT railway bridge - upstream	43006	24.60	23.72	--0.88
NIMT railway bridge - downstream	43026	23.48	23.38	-0.10
	43586	19.03	18.42	-0.55
	43995	15.52	15.31	-0.21
	44406	13.15	12.97	-0.18
	44846	10.92	10.70	-0.22

Table C-2 indicates that the peak flood level differences between the MIKEFLOOD model and the original GWRC MIKE11 model in the reach from chainage 41000m to chainage 45000m where the floodplain representation is different in the two models are generally within $\pm 0.3\text{m}$ with occasional outlier values beyond this range. The major difference at chainage 43006m upstream of the NIMT railway bridge is due to the different bridge geometries (the MIKE11 model incorporates the pre-2009 bridge while the MIKEFLOOD model incorporates the post-2009 bridge).

Overall the agreement between the two models is adequate to allow the MIKEFLOOD model to be used comparatively to make an assessment of the relative effects of the Expressway crossing of the Waitohu Stream.