

Waikato Regional Council
401 Grey Street
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Duncan Grant

Dear Duncan,

Addendum to Tauranga Taupo Service Level Review report

This Addendum is intended to accompany the Tauranga Taupo Service Level Review report issued to Waikato Regional Council (WRC) in February 2018.

The purpose of this Addendum is to present the assets performance grade and water level data in a format which can be used in WRC's Asset Management System.

The water levels are provided for the assets' design event, this is mainly the 2% Annual Exceedance Probability (AEP) event for the Tauranga Taupo River Flood Control Scheme.

The difference between the data used in this addendum and that included in the report are outlined below:

- 1) Asset data (locations, levels) are sourced from WRC Asset Management system,
- 2) Each asset is represented by points spaced at 100 m intervals and at the start and end chainage of the asset,
- 3) Asset height at each point is defined as the lowest level along the 100 m (or relevant) section,
- 4) Results are generally in line with previously reported results in terms of the system performance. However, some assets show a lower performance grade due to the stopbank height being used (lowest height in section).

Please note all levels are provided to two decimal places, however the "Actual Freeboard" calculation is based on the raw data (three decimal places).

1 Tables for Water Level and Elevation

1.1 Heuheu Parade Stopbank

Table 1.1: Heuheu Parade Stopbank performance grade

Asset ID	Description	Chainage provided with asset data	Cumulative Chainage	2%AEP flood level (mRL) ¹	SB height (mRL) from survey provided by WRC	Actual freeboard (m)	P (actual freeboard/design freeboard)	Performance grade
59746	Heuheu Parade (Section 1) SB 00	0	0	358.12	358.61	0.49	122%	1
35539	Heuheu Parade (Section 1) SB 01	80	80	358.27	358.63	0.36	90%	2
70979	Heuheu Parade (Section 2) Floodwall 00	0	80	358.27	358.74	0.47	118%	1
33797	Heuheu Parade (Section 2) Floodwall 01	100	180	358.56	358.74	0.18	45%	3
35537	Heuheu Parade (Section 2) Floodwall 02	133	213	358.65	359.33	0.68	170%	1
59576	Heuheu Parade (Section 3) SB 00	0	213	358.65	359.33	0.68	170%	1
36818	Heuheu Parade (Section 3) SB 01	20	233	358.7	359.31	0.61	153%	1

1 - These water levels are from the Mike1D model results

1.2 Eastern Stopbank

Table 1.2: Eastern Stopbank performance grade

Asset ID	Description	Chainage provided with asset data	Cumulative Chainage	2%AEP flood level (mRL) ¹	SB height (mRL) from survey provided by WRC	Actual freeboard (m)	P (actual freeboard/design freeboard)	Performance grade
69373	Eastern Section 1 SB 00	0	0	358.70	359.49	0.80* ²	199%	1
31460	Eastern Section 1 SB 01	5	5	358.70	359.19	0.50	124%	1
59763	Eastern Spillway Secondary 00	0	5	358.71	359.19	0.48	NA	5
35706	Eastern Spillway Secondary 01	45	50	358.99	359.09	0.10	NA	4
69395	Eastern Section 2 SB 00	0	50	358.99	359.61	0.62	155%	1
31461	Eastern Section 2 SB 01	51	101	359.07	359.46	0.43	99%	2
69333	Eastern Spillway Primary 00	0	101	359.07	359.5	0.39	NA	5
31465	Eastern Spillway Primary 01	100	201	359.09	359.18	0.09	NA	4
59738	Eastern Section 3 SB 00	0	201	359.09	359.79	0.70	174%	1
31462	Eastern Section 3 SB 01	100	301	359.18	359.77	0.59	148%	1
31463	Eastern Section 3 SB 02	200	401	359.24	360.2	0.96	241%	1
31464	Eastern Section 3 SB 03	300	501	359.35	360.21	0.86	215%	1
35531	Eastern Section 3 SB 04	400	601	359.51	360.08	0.57	143%	1

1 - These water levels are from the Mike1D model results 2 – Rounded up to 2 decimal places

Table 1.3: Eastern Stopbank Spillways

Asset ID	Description	Chainage provided with asset data	SB height (mRL) from survey provided by WRC	Flood Level (mRL) - From the Mike1D model results					
				50%AEP	10%AEP	5%AEP	2%AEP	1%AEP	1%AEP+CC
59763	Eastern Spillway <u>Secondary</u> 00	0	359.19	357.73	358.37	358.54	358.71	358.84	359.02
35706	Eastern Spillway <u>Secondary</u> 01	45	359.09	357.88	358.59	358.79	358.99	359.14	359.61
69333	Eastern Spillway <u>Primary</u> 00	0	359.50	357.95	358.66	358.87	359.07	359.22	359.65
31465	Eastern Spillway <u>Primary</u> 01	100	359.18	358.05	358.71	358.91	359.09	359.24	359.63

1.3 Western Stopbank

Table 1.4: Western Stopbank performance grade

Asset ID	Description	Chainage provided with asset data (also cumulative chainage)	2%AEP flood level (mRL) ¹	SB height (mRL) from survey provided by WRC	Actual freeboard (m)	P (actual freeboard/design freeboard)	Performance grade
59814	Western SB 00	0	359.14	359.47	0.33	83%	2
31469	Western SB 01	100	359.48	359.47	-0.01	-02%	5
31470	Western SB 02	200	359.7	360.40	0.70	175%	1
31471	Western SB 03	300	359.80	360.19	0.39	97%	2
31472	Western SB 04	400	360.52	360.39	-0.13	-31%	5
31473	Western SB 05	500	360.64	360.45	-0.19	-46%	5
31475	Western SB 06	600	360.67	360.80	0.13	33%	3
31476	Western SB 07	700	360.87	361.20	0.33	83%	2
31477	Western SB 08	800	360.93	361.08	0.15	37%	3
31478	Western SB 09	900	360.97	361.08	0.11	27%	3
31479	Western SB 10	1000	360.97	361.02	0.05	12%	4
31480	Western SB 11	1100	360.99	360.94	-0.05	-12%	5
31481	Western SB 12	1153	361.00	361.04	0.04	10%	4

¹ – These water levels are from the Mike2D model results

1.4 Kiko and Maniapoto Spillway

Table 1.5: Downstream Kiko Spillway weir performance grade

Asset ID	Description	Chainage provided with asset data	Cumulative chainage	2%AEP flood level (mRL) ¹	SB height (mRL) from survey provided by WRC	Actual freeboard (m)	P (actual freeboard/design freeboard)	Performance grade
70433	Kiko spillway abutment bank right 00	0	0	364.02	363.27	-0.76	-189%	5
70434	Kiko spillway abutment bank right 01	100	100	364.05	363.81	-0.24	-60%	5
59764	Kiko Spillway - Rockfill Spillway 00	0	145	363.91	363.20	-0.71	-178%	5
35545	Kiko Spillway - Rockfill Spillway 01	35	180	363.95	363.15	-0.80	-200%	5
70431	Kiko spillway abutment bank left 00	0	180	363.95	364.69	0.74	185%	1
70432	Kiko spillway abutment bank left 01	60	240	363.97	364.60	0.63	158%	1
1000000	Kiko spillway abutment bank left additional point	0	295	363.97	364.53	0.56	140%	1

1 - These water levels are from the Mike2D model results

Comment: The table shows that “Kiko spillway abutment bank right 00” and “Kiko spillway abutment bank right 01” is overtopping at these locations. This asset is located at Maniapotos bend left bank, downstream of the grade control structure, the model does not show overtopping in this area (although it does show overtopping downstream of this area) therefore either survey levels or LiDAR levels are not reflective of the terrain in the area. Note the data received also contains “Kiko spillway abutment bank right 02” this point is upstream of the Maniapotos bend spillway, and results for this point is shown in table 1.7 below.

Table 1.6: Downstream Kiko Spillway weir performance grade at range of events

Asset ID	Description	Chainage provided with asset data	SB height (mRL) from survey provided by WRC	flood level (mRL) - from the Mike2D model results					
				50%AEP	10%AEP	5%AEP	2%AEP	1%AEP	1%AEP+CC
59764	Kiko Spillway - Rockfill Spillway 00	0	363.20	362.80	363.51	363.82	363.91	363.98	364.09
35545	Kiko Spillway - Rockfill Spillway 01	35	363.15	362.80	363.54	363.71	363.95	364.01	364.12

Table 1.7: Maniapoto Spillway

Asset ID	Description	Chainage provided with asset data	Cumulative chainage along spillway	2%AEP flood level (mRL) ¹	SB height (mRL) from survey provided by WRC	Actual freeboard (m)	P (actual freeboard/ design freeboard)	Performance grade
70434	Kiko spillway abutment bank right 01 ²	100	0	364.05	363.81	-0.24	-60%	5
70423	Maniapoto Bend Spillway 00	0	29	364.04	363.64	-0.41	-101%	5
70424	Maniapoto Bend Spillway 01	30	63	364.06	363.24	-0.82	-204%	5
70435	Kiko spillway abutment bank right 02	160	87 ³	364.19	364.53	0.35	87%	2
1 - These water levels are from the Mike2D model results 2 - This point is also included in Table 1.5 3 - Note the cumulative chainage (based on measurement) is larger than the chainage provided								

1.5 Quarry Closure

Table 1.8: Quarry Closure Stopbank performance grade

Asset ID	Description	Chainage provided with asset data	Cumulative Chainage	2%AEP flood level (mRL) ¹	SB height (mRL) from survey provided by WRC	Actual freeboard (m)	P (actual freeboard/design freeboard)	Performance grade
59826	Quarry Closure Bank - SB Downstream of Spillway (Left) 00	0	0	367.44	Unavailable	Unavailable	Unavailable	Unavailable
35959	Quarry Closure Bank - SB Downstream of Spillway (Left) 01	90	90	367.64	368.38	0.74	184%	1
59762	Quarry Closure Bank - Spillway 00	0	90	367.64	367.52	-0.12	-310%	5
31999	Quarry Closure Bank - Spillway 01	50	140	367.66	367.52	-0.14	-360%	5
59817	Quarry Closure Bank - SB Upstream of Spillway (Right) 00	0	140	367.66	368.84	1.18	294%	1
31491	Quarry Closure Bank - SB Upstream of Spillway (Right) 01	94	234	367.77	368.47	0.70	175%	1
59816	Quarry Closure Secondary SB 00	0	234	367.77	368.60	0.83	208%	1
31499	Quarry Closure Secondary SB 01	30	264	367.78	366.02	-1.75	-438%	5
1 – These water levels are from the Mike2D model results								

Table 1.9: Quarry Closure spillway performance at a range of events

Asset ID	Description	Chainage provided with asset data	SB height (mRL) from survey provided by WRC	Flood level (mRL) - From the Mike2D model results					
				50%AEP	10%AEP	5%AEP	2%AEP	1%AEP	1%AEP+CC
59762	Quarry Closure Bank - Spillway 00	0	366.82	367.35	367.5	367.64	367.73	367.90	366.82
31999	Quarry Closure Bank - Spillway 01	50	366.83	367.37	367.51	367.66	367.75	367.92	366.83

1.6 Quarry Stopbank

Table 1.10: Quarry Stopbank performance grade

Asset ID	Description	Chainage provided with asset data	Cumulative Chainage	2%AEP flood level (mRL) ¹	SB height (mRL) from survey provided by WRC	Actual freeboard (m)	P (actual freeboard/design freeboard)	Performance grade
59813	Quarry SB 00	0	0	362.42	364.76	2.34	585%	1
33799	Quarry SB 01	95	95	362.42	363.12	0.70	175%	1
1 – These water levels are from the Mike2D model results								

1.7 Kiko Farm Stopbank

Table 1.11: Kiko Farm Stopbank 5% AEP flood level performance grade

Asset ID	Description	Chainage provided with asset data	Cumulative Chainage	5%AEP ¹ flood level (mRL) ²	SB height (mRL) from survey provided by WRC	Actual freeboard (m)	P (actual freeboard/design freeboard)	Performance grade
81757	Kiko Farm SB 06	574	0	360.92	359.96	-0.96	-239%	5
35530	Kiko Farm SB 05	500	74	359.13	359.44	0.31	78%	2
31382	Kiko Farm SB 04	400	174	359.08	359.40	0.32	81%	2
31381	Kiko Farm SB 03	300	274	359.08	359.46	0.38	96%	2
31380	Kiko Farm SB 02	200	374	359.08	359.35	0.27	69%	2
31379	Kiko Farm SB 01	100	474	359.08	359.19	0.11	29%	3
59731	Kiko Farm SB 00	0	574	359.08	359.19	0.11	29%	3
1 - The Kiko Farm Stopbank design is the 5% AEP event 2– These water levels are from the Mike2D model results								

1.8 Te Rangiita Freeboard Floodwall

Table 1.12: Te Rangiita Freeboard Floodwall 1% plus climate change performance grade

Asset ID	Description	Chainage provided with asset data	Cumulative Chainage	2%AEP flood level (mRL) ¹	1%AEP flood level (mRL) ¹	1%AEP + CC flood level (mRL) ¹	SB height (mRL) from survey provided by WRC	Actual freeboard (m) during 1%AEP+CC flood	P (actual freeboard/design freeboard) during 1%AEP+CC flood	Performance grade during 1%AEP+CC flood
59912	Te Rangiita Freeboard Floodwall 00	0	0	No spill	No spill	358.59	359.54	0.95	237%	1
59913	Te Rangiita Freeboard Floodwall 01	100	100	No spill	No spill	359.42	359.17	-0.25	-64%	5
59914	Te Rangiita Freeboard Floodwall 02	200	200	No spill	No spill	358.89	359.14	0.25	64%	2
59915	Te Rangiita Freeboard Floodwall 03	212	212	No spill	No spill	358.90	359.18	0.28	69%	2

1 – These water levels are from the Mike2D model results

1.9 Rediversion bank

Table 1.13: Rediversion bank 2% performance grade

Asset ID	Description	Chainage provided with asset data	Cumulative Chainage	2%AEP flood level (mRL) ¹	SB height (mRL) from survey provided by WRC	Actual freeboard (m)	P (actual freeboard /design freeboard)	Performance grade
59752	Rediversion Bank SB 00	0	0	364.07	362.67	-1.40	-349%	5
36454	Rediversion Bank SB 01	100	100	363.99	364.94	0.95	237%	1
36455	Rediversion Bank SB 02	120	120	363.94	365.06	1.12	280%	1

1 – These water levels are from the Mike2D model results

Comment: Rediversion Bank SB 00 is at the start of the stopbank at the western end (downstream) as this is a structure that starts at the water level, the height of the stopbank at this point has been taken as the lowest point (at chainage 0) therefore the performance scores 5 at this structure

2 Applicability

This report has been prepared for the exclusive use of our client Waikato Regional Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Kate Draper

Water Resources Engineer

Authorised for Tonkin & Taylor Ltd by:



.....
David Bouma

Project Director

Report reviewed by:



.....
Sarah Basheer

Project Manager

KEHD

t:\auckland\projects\19883\19883.1801\issued documents\addendum to TT service level reviewed final.docx

