--------- Forwarded message ----------
From: Peter Blackwood <Peter.Blackwood@boprc.govt.nz>
To: Peter West <Peter.West@boprc.govt.nz>, Ken Tarboton <Ken.Tarboton@boprc.govt.nz>
Cc: Martin Butler <Martin.Butler@boprc.govt.nz>, Mark Townsend <Mark.Townsend@boprc.govt.nz>
Bcc:
Date: Tue, 20 Jun 2017 05:09:45 +0000
Subject: Information Request KC 20170617 07:56
Hi Ken,

This is all for today.

Pete

Peter Blackwood
Principal Environmental Engineer
Bay of Plenty Regional Council Toi Moana

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Thriving together – mō te taiao, mō ngā tāngata

From: Peter West
Sent: Tuesday, 20 June 2017 4:56 p.m.
To: Peter Blackwood
Cc: Martin Butler; Mark Townsend
Subject: Information Request KC 20170617 07:56

Peter,
Please find below a response to Kyle Christensen's Information Request of 7:56am on the 17th of June.
Please edit as you see fit.

-
General notes about gauges that were not fully operational:

Tauranga at Ranger Station (Ranger) rain gauge was operational throughout but not correctly connected in the model due to a recent change in site identifier code.
Kokamoka rain gauge was not operational throughout. Data became available later.
Both of these items (above) would also have had localised impacts on Rain Radar data inputs (known about and assessed at the time).
Rangitāiki at Aniwhenua Barrage is the water level for Lake Aniwhenua. This is used to inject or subtract river flows from dam operations there. This gauge was not operational after about 3pm on the 3rd.

In the model, each rain gauge has its "stand-in" rain gauge that automatically is used if no data is available at the actual gauge.
For Kokamoka, the stand-in gauge is Tarapounamu.
For Galatea Basin: Kokamoka
For Ranger: Kokamoka
So for model runs with these three gauges "out" Tarapounamu depths would have been used in their place.
This note does not apply to radar correction procedure. Only the gauge-rain scenario in the hydrological model.

<u>Forecast specific notes about which gauges were not operational:</u>

Forecast of 4pm on 4 April;
Kokamoka
Ranger
Aniwhenua Barrage

6am on 5 April;
Galatea Basin
Kokamoka
Ranger
Aniwhenua Barrage

9am on 5 April;
Kokamoka
Ranger
Aniwhenua Barrage

12pm on 5 April;
Kokamoka
Ranger

Aniwhenua Barrage

3pm on 5 April;
Galatea Basin
Kokamoka
Ranger
Aniwhenua Barrage

6pm on 5 April.
Galatea Basin
Kokamoka
Ranger
Aniwhenua Barrage WL
Murupara WL

The information request asked which gauges were available for use. The above information provides which were-not available. The list below shows what is normally used in the forecasting system.

As described, gauge rainfall depths are applied to each model subcatchment based on an inverse-distance-squared weighting factor (distance from gauge to area centroid of the subcatchment).
The following list indicates the relative influence on flood estimation of each of the 13 raingauges used in the model (sum of weighting x subcatchment area as a percentage).
This list is for the model area not including the Murupara subcatchment. The Murupara subcatchment is the single largest catchment and is 79% influenced by the Kokamoka raingauge (which was not sending). The Murupara subcatchment has a very small specific flood response due to its flatness and its deep pumice soils covered largely in pine forest. Including it in the list below would unhelpfully skew the indication. The influence of the lack of the Kokamoka gauge input has not been fully analysed but it is not thought to be large.

Galatea Basin	17%
Huiarau at Huiarau Summit	4%
Kaituna at Whakarewarewa	2%
Okaro Meteorology at Birchalls	6%
Rangitaiki at Kokomoka	4%

Rangitaiki at Te Teko	8%
Tarapounamu at Summit	13%
Tarawera at Awakaponga	2%
Waihua at Waihua Rain Gauge	15%
Waimana at Ranger Stn	3%
Whakatane at Huitieke Link	5%
Whakatane at Kopeopeo	2%
Whirinaki at Galatea	19%

River flow gauges are used to indicate observed flows on the report sheet. They do not contribute to the actual model result.
The lake level gauges at Aniwhenua Barrage and at Lake Matahina are used to add/ subtract flows from the river routing (net storage) in the model.
The flood forecast derived from radar rain data is usually the primary output (considered the most reliable) and is not meant to be strongly impacted by missing raingauge data, however (as described) a bug was identified in the raingauge correction system that would have locally impacted rain radar data near Kokamoka and Ranger; and for part of the time, near Galatea Basin.

Peter

Peter West

Bay of Plenty Regional Council Toi Moana

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Thriving together – mō te taiao, mō ngā tāngata

From: Kyle Christensen [mailto:kyle@christensenconsulting.co.nz]
Sent: Saturday, 17 June 2017 2:06 p.m.
To: Martin Butler
Cc: Frances Skilton; charlie.price@stantec.com; Michael Cullen; Mark Townsend; Peter West; Peter Blackwood
Subject: Re: Information Request

Hi Martin,

I have located the forecast information in Objective Connect but would still like clarification on what actual (rainfall & riverflow) data was available and used for each forecast.

Thanks

Kyle Christensen

Rivers & Stormwater Engineer

m | 022 620 9047
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w | www.christensenconsulting.co.nz

From: Kyle Christensen <kyle@christensenconsulting.co.nz>
Date: Saturday, 17 June 2017 at 7:56 AM
To: Martin Butler <Martin.Butler@boprc.govt.nz>
Cc: Frances Skilton <frances@tregaskisbrown.com>, "charlie.price@stantec.com" <charlie.price@stantec.com>, Michael Cullen <honmichaelcullen@gmail.com>, Mark Townsend <Mark.Townsend@boprc.govt.nz>, Peter West <Peter.West@boprc.govt.nz>, Peter Blackwood <Peter.Blackwood@boprc.govt.nz>
Subject: Re: Information Request

Hi Martin,

I have a further request regarding the flood forecasting during the event -

The information provided by Peter West in the presentation on 8 June provides flood forecasts made at 6pm on 3 April and 12am on 6 April.

Can I please have additional forecast information (I only require Matahina peak inflow and time of peak) for the following forecast times -
4pm on 4 April;
6am on 5 April;
9am on 5 April;
12pm on 5 April;
3pm on 5 April;
6pm on 5 April.

For each forecast can you please state which rain gauges and river flow gauges were operational and able to be used for the forecast.

Thanks and regards

Kyle Christensen

Rivers & Stormwater Engineer

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From: Martin Butler <Martin.Butler@boprc.govt.nz>
Date: Friday, 16 June 2017 at 5:19 PM
To: Kyle Christensen <kyle@christensenconsulting.co.nz>
Cc: Frances Skilton <frances@tregaskisbrown.com>, "charlie.price@stantec.com" <charlie.price@stantec.com>, Michael Cullen <honmichaelcullen@gmail.com>, Mark Townsend <Mark.Townsend@boprc.govt.nz>, Peter West <Peter.West@boprc.govt.nz>, Peter Blackwood <Peter.Blackwood@boprc.govt.nz>
Subject: RE: Information Request

Request received and transmitted onwards; I can't offer a response delivery time yet.

Kind regards

Martin Butler Information Liaison
Regional Planner
Bay of Plenty Regional Council Toi Moana

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Thriving together – mō te taiao, mō ngā tāngata

From: Kyle Christensen [mailto:kyle@christensenconsulting.co.nz]
Sent: Friday, 16 June 2017 5:01 p.m.
To: Martin Butler
Cc: Frances Skilton; charlie.price@stantec.com; Michael Cullen; Mark Townsend; Peter West; Peter Blackwood
Subject: Re: Information Request

Thank you Martin.

I also have one further request.

Can you please run a scenario where the dam discharge is increased to 550m3/s at 1800 on 5 April. I would like to know what dam reservoir level could have been achieved with this outflow and then on that basis what the optimised peak dam outflow would then have been. I would also like the modelled water level time series for MIKE 11 model chainage RANGITAIKI 13868 for this scenario.

Thanks and regards

Kyle Christensen

Rivers & Stormwater Engineer

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From: Martin Butler <Martin.Butler@boprc.govt.nz>
Date: Friday, 16 June 2017 at 2:59 PM
To: Kyle Christensen <kyle@christensenconsulting.co.nz>
Cc: Frances Skilton <frances@tregaskisbrown.com>, "charlie.price@stantec.com" <charlie.price@stantec.com>, Michael Cullen <honmichaelcullen@gmail.com>, Mark Townsend <Mark.Townsend@boprc.govt.nz>, Peter West <Peter.West@boprc.govt.nz>, Peter Blackwood <Peter.Blackwood@boprc.govt.nz>
Subject: RE: Information Request

Hi Kyle

Our Engineers and consultants are working on this and hope to have your answer after the weekend.

Kind regards

Martin Butler
Regional Planner
Bay of Plenty Regional Council Toi Moana

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Thriving together – mō te taiao, mō ngā tāngata

From: Kyle Christensen [mailto:kyle@christensenconsulting.co.nz]
Sent: Friday, 16 June 2017 2:06 p.m.
To: Martin Butler
Cc: Frances Skilton; charlie.price@stantec.com; Michael Cullen; Mark Townsend; Peter West; Peter Blackwood
Subject: Information Request

Hi Martin,

I wish to request a modelled water level time series for MIKE 11 model chainage RANGITAIKI 13868 for a dam outflow of 680 m3/s. Please use a scaled inflow hydrograph based on the analysis presented by Peter West on 8 June, reference - Retrospective analysis of dam management Scenario B Part 2 lake prep level at 70.0 mRL.

Best regards

Kyle Christensen
Rivers & Stormwater Engineer

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