Appendix 3: Letter to NSW Office of Water

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Contact: Jubrahil Khan
Phone: 02 8245 2049
Fax: 02 8245 2104

Our Ref: STW110341

NSW Commissioner for Water
NSW Office of Water
G P O Box 3889
Sydney NSW 2001

21 November 2012

Dear Mr Harriss,

I refer to the augmentation of Chaffey Dam to 100GL and the need to lower the storage level of the dam during construction of the raised morning glory spillway.

Chaffey Dam provides water and drought security to the city of Tamworth and irrigators along the Peel Valley. Increasing Chaffey Dam capacity to 100GL has been determined as cost effective for future requirements.

Chaffey Dam has been ranked by the NSW Dams Safety Committee (DSC) as being in the “Extreme Flood Failure” hazard category. Stage 1 of the upgrade at Chaffey Dam has been completed, with full compliance being incorporated into the proposed augmentation works.

The Commonwealth and New South Wales Governments have committed contributions of $16.945 million and $6.647 million to the augmentation component of the works with the Tamworth Regional Council contributing $3.36 million. The NSW Government will fund the dam safety component of the project.

The 100GL augmentation will involve raising the full supply level of the dam by 6.5 metres to 525.1 metres AHD, thus the morning glory spillway by 6.5 metres, raising the crest of the dam by 8.4 metres, reconfiguring the auxiliary spillway fuseplug and realignment of roads that are impacted by the raising of the full supply level. The project is expected to be completed by mid 2015.

State Water Corporation has commenced planning and approval works for the construction to commence by June 2013. The detailed design is in progress and expected to be completed by the end of October. The Environmental Impact Assessment in accordance with the Director Generals Requirements is well advanced and is expected to be ready for submission to Department of Planning by the end of November 2012. Construction is expected to start before June 2013.

The morning glory spillway remains the primary spillway for any spills for flood events up to an annual exceedence probability (AEP) of 1 in 10,000. The construction of the raised bell mouth requires work below the current full supply level. In the event the dam is at full capacity this construction cannot commence.

Due to the timeframe in which the funds have been allocated by the Federal and NSW Governments, the construction must be completed by end of June 2015 and does not allow programming the construction work in a dry season when the storage maybe below full supply.

State Water undertook storage behaviour analysis for a number of storms for storage level lowered by 1 metre, 1.5 metre and 2 metres below the current full supply level. Lowering of the storage level by 2 metres to RL516.8 m will provide the best opportunity to commence raising of the morning glory and provide a reduced risk to construction from flooding. (Refer to Attachment 1 for details). During this period the inflows and any downstream demand will be managed by operating the valves. Lowering of the storage level by 2 meters will reduce the storage volume of Chaffey Dam by 11GL and will be required for a maximum period of 6 months.

Based on the order of construction, raising of the morning glory spillway is not expected to commence before May 2014. Start of this work will also depend on the storage behaviour at the time and the contractor's assessment of the weather forecast for the period of construction.

State Water Corporation is seeking your approval to maintain a Temporary FSL, 2 metres below the current FSL for a period of six months, expected to commence in May 2014, to enable construction of the raised morning glory spillway.

The project manager for Chaffey Dam Augmentation and Safety Upgrade will provide all necessary information for Office of Water to assess this request. He can be contacted on 02 8245 2049 or email: Jubrahil.Khan@statewater.com.au.

Yours sincerely

Brett Tucker
CEO
State Water Corporation

Attachments:
Attachment 1. Chaffey Dam Construction flood conditions

Attachment 1

Black & Veatch Ltd
Grosvenor House
69 London Road
Redhill, SURREY
RH1 1LQ

BLACK & VEATCH

TECHNICAL NOTE

To		Date	15/10/2012
Copy			
From	Rob Fraser	Ref	
Subject	**Bowling Alley Point velocities and construction flood conditions**		

1 INTRODUCTION

The purpose of this note is to:

- Determine flow velocities in the Peel River during flood events for use in the design of the Bowling Alley Point bridge;
- Simulate potential flood conditions during construction to assess the likely flood rise to overflow level; and
- Simulate potential flood conditions during construction to assess the likelihood of the dam crest level being reached.

2 WATER LEVELS AND FLOW VELOCITY AT BOWLING ALLEY POINT

2.1 Information available

The following information was provided to B&V to assess flood conditions at Bowling Alley Point:

1) A report (*Chaffey Dam – 1 in 100 year flood analysis*) dated January 2008, determining the flood impact at the "New Road Bridge".
2) A MIKE11 model of the river upstream of Chaffey Dam accompanied by Excel results spreadsheets, received from State Water on 7 March 2012.
3) A detailed report (*Hydrologic Assessment of Auxiliary Spillway Options for Augmented Chaffey Dam*) dated November 2011, containing a complete set of inflow hydrographs.

Key points to note about the January 2008 report are that:

- The 1 in 100 year flood inflow was calculated using a calibrated RORB model of the catchment developed in 1998, with rainfall intensities calculated from the procedure in AR&R 1999.
- The flood hydrograph is split into two parts: one entering the top of the model (Inflow_1); and one distributed across the modelled reach (Inflow_2). The peak of Inflow_1 is 1091m^3/s and the peak combined inflow is 1347m^3/s, for the critical 18 hour storm.
- Flood levels were estimated using a MIKE11 model of a 10.5km reach of the Peel River, with Chaffey Dam as the downstream limit of the model.
- The predicted 1 in 100 year flood level at the bridge is 527.9mAHD.

The MIKE11 model provided is that referred to in the January 2008 report. The model results do not, however, match those in the report. There is no information on what methods/guidelines were used in estimating the 1 in 100 year flood inflow, which has a peak of

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1582m^3/s. However, there seems to be a mistake in how the inflows are connected in the model since this inflow is used twice, once at the upstream end and also distributed across the modelled reach. This double counting gives a much higher flood level at the bridge (530.5mAHD). Re-running the model with just a single inflow at the upstream end of the model gives a peak flood level of 527.8m. Note that the hydrograph shape is important in determining the flood peak, hence the slightly lower flood level despite a higher peak inflow than in the 2008 report.

The inflow hydrographs in the November 2011 report were used by B&V in the reservoir flood routings to assess the auxiliary fuseplug design. The method used for simulating the inflow hydrographs is the same 1998 calibrated RORB model of the catchment with point design rainfalls estimated from the procedure in AR&R 1999, in this case using the CRCFORGE-Extract computer program. The peak inflow for the 1 in 100 year 18-hour storm is 1149m^3/s.

2.2 Approach

Water levels and velocities at Bowling Alley Point have been assessed using the MIKE11 model with the following modifications:

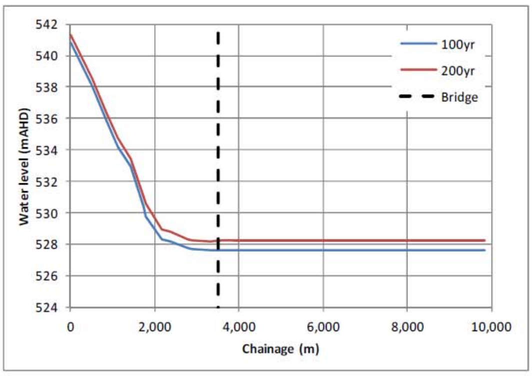
- The inflow hydrographs have been taken from the November 2011 State Water report. A single inflow has been applied at the upstream end of the modelled reach.
- The outflow rating for the morning glory spillway has been changed to the one used by B&V in the reservoir routing studies. This rating is based on a new WES profile weir rather than simply the existing morning glory spillway raised by 6.5m.

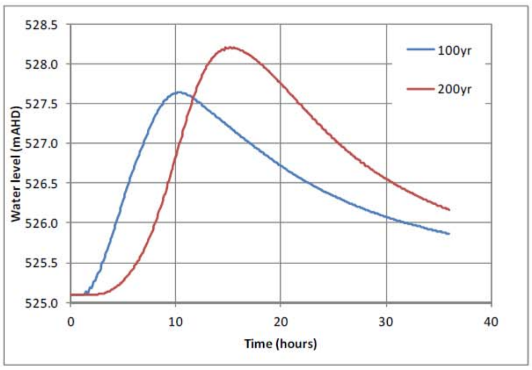
2.3 Results

According to the previous MIKE11 modelling, the Bowling Alley Point bridge is located at chainage 3514m. The results have been assessed for the closest model nodes – chainage 3611.40m for water level and chainage 3464.45m for velocity. Results for the 1 in 100 and 1 in 200 AEP events are shown in Table 2.1 and Figure 2.1.

Table 2.1 - Peak water levels and velocities at Bowling Alley Point

Event	Peak water level (mAHD)	Peak velocity (m/s)
1 in 100 AEP	527.6	1.3
1 in 200 AEP	528.2	1.3





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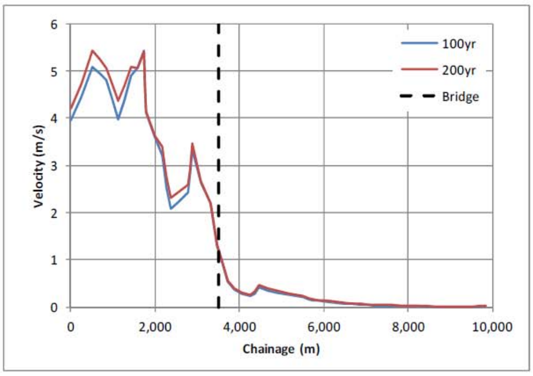

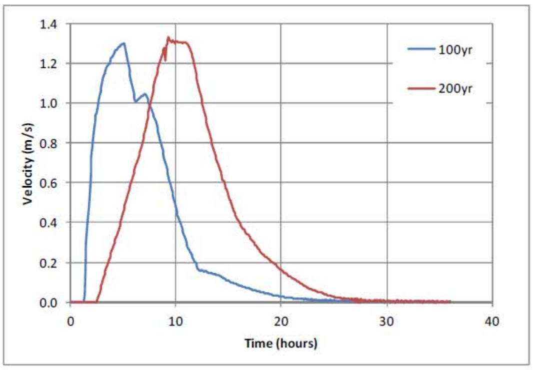

Figure 2.1 - Water levels and velocities at Bowling Alley Point

3 CONSTRUCTION FLOOD CONDITIONS – FLOOD RISE TO OVERFLOW LEVEL

Flood routings have been undertaken to assess the effect of controlling reservoir water levels below the morning glory spillway level during construction. The time delay between the first inflow and the reservoir reaching the morning glory crest level has been extracted from the results. These results are presented in Table 3.1, Table 3.2 and Figure 3.1.

We used the 1 in 5, 10, 20 and 50 AEP inflow hydrographs provided by State Water in August 2012 for the critical 18 hour storm duration (results in Table 3.1 and Table 3.2). For the 1 in 100 to 1 in 1000 AEP events, the inflow hydrographs were taken from the November 2011 State Water report. These were for a suite of storm durations between 6 and 72 hours. In these events, the 6 hour storm gives the quickest rise of overflow level (Table 3.1 and Figure 3.1) but the 18 hour storm gives a higher peak water level (Table 3.2).

Table 3.1 - Time to reach overflow level

Event	Time to reach overflow level from initial inflow (hours)		
	Start 1m below overflow	Start 1.5m below overflow	Start 2m below overflow
1 in 5 AEP	10.5	-	-
1 in 10 AEP	5.9	8.3	-
1 in 20 AEP	5.7	6.6	7.5
1 in 50 AEP	4.2	5.1	5.8
1 in 100 AEP	2.6	3.2	3.9
1 in 200 AEP	2.5	2.9	3.3
1 in 500 AEP	2.3	2.6	2.9
1 in 1,000 AEP	2.3	2.6	2.9

Table 3.2 - Peak water level

Event	Peak water level in reservoir (mAHD)		
	Start 1m below overflow	Start 1.5m below overflow	Start 2m below overflow
1 in 5 AEP	518.65	518.30	517.96
1 in 10 AEP	519.14	518.81	518.48
1 in 20 AEP	519.92	519.65	519.38
1 in 50 AEP	520.68	520.44	520.20
1 in 100 AEP	521.24	521.06	520.86
1 in 200 AEP	521.94	521.79	521.64
1 in 500 AEP	523.09	522.91	522.72
1 in 1,000 AEP	524.26	524.09	523.90

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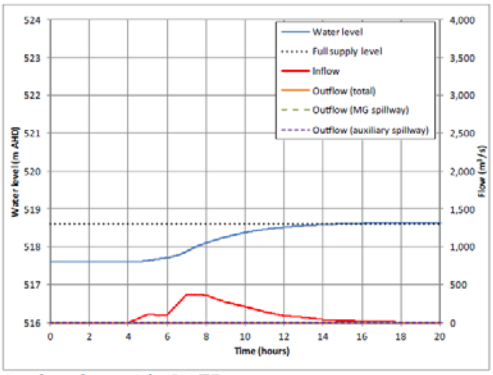
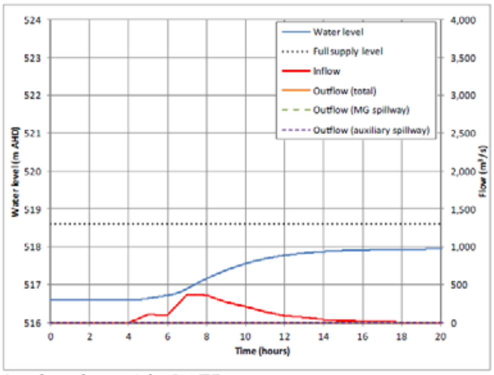
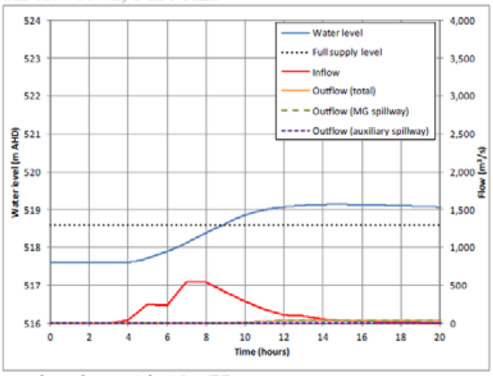


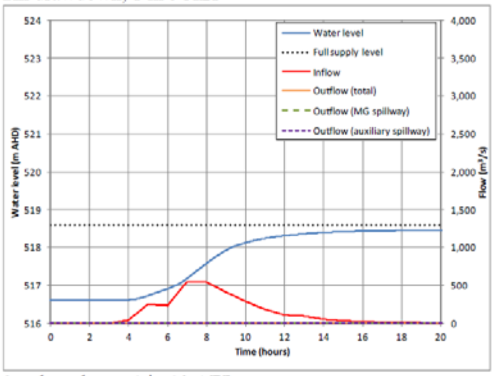
1m drawdown, 1 in 5 AEP



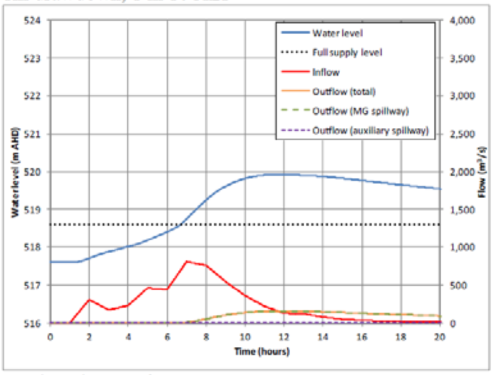
2m drawdown, 1 in 5 AEP



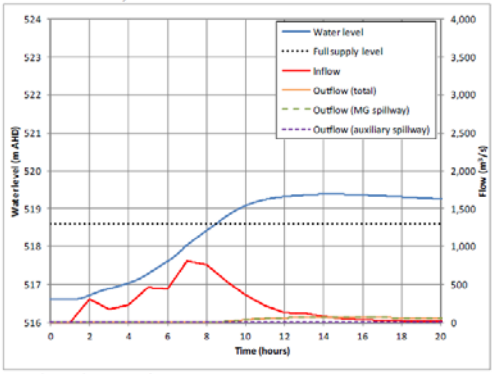
1m drawdown, 1 in 10 AEP



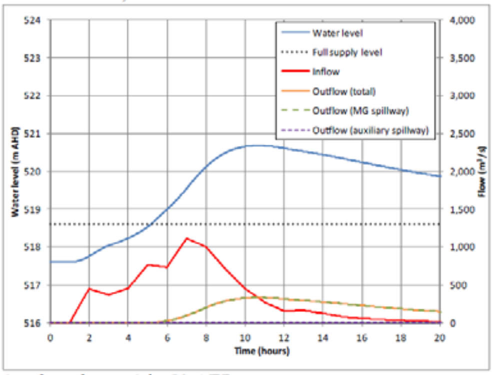
2m drawdown, 1 in 10 AEP



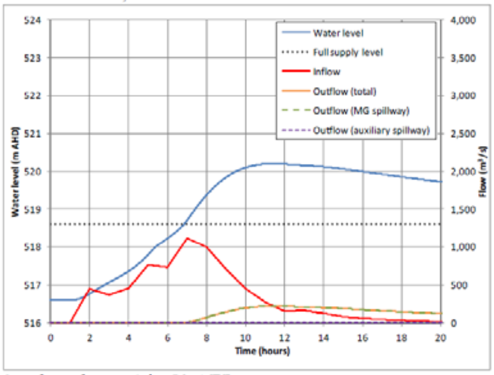
1m drawdown, 1 in 20 AEP



2m drawdown, 1 in 20 AEP



1m drawdown, 1 in 50 AEP



2m drawdown, 1 in 50 AEP

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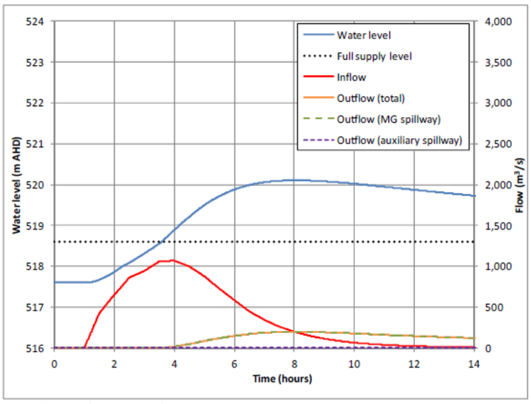
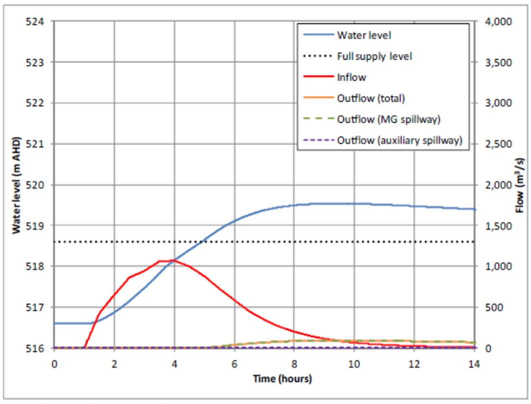
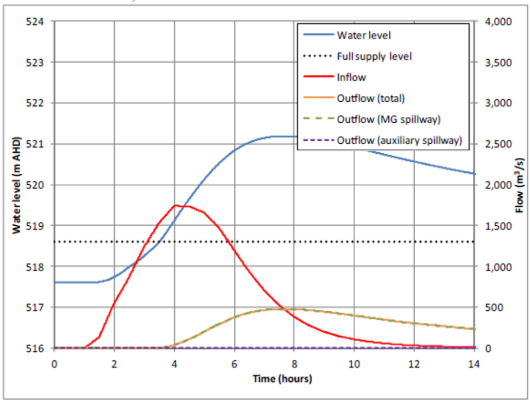


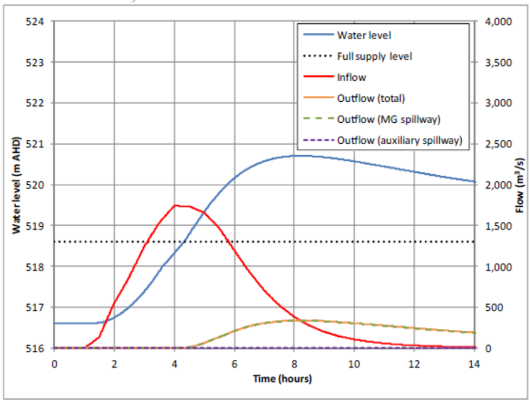
1m drawdown, 1 in 100 AEP



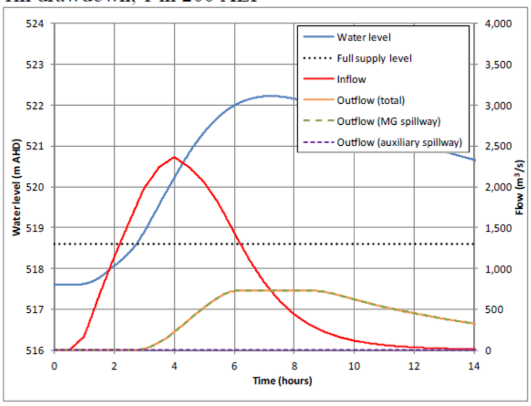
2m drawdown, 1 in 100 AEP



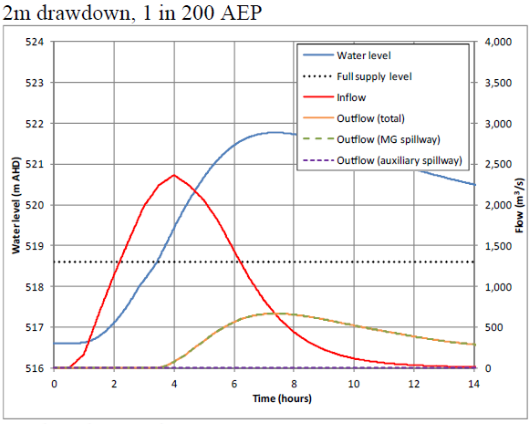
1m drawdown, 1 in 200 AEP



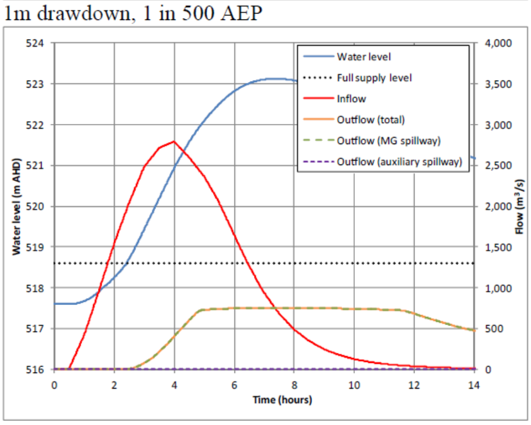
2m drawdown, 1 in 200 AEP



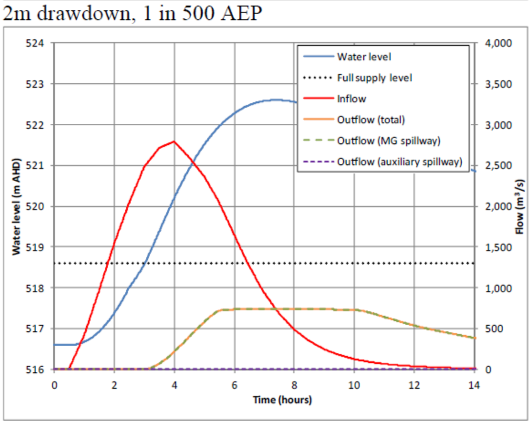
1m drawdown, 1 in 500 AEP



2m drawdown, 1 in 500 AEP



1m drawdown, 1 in 1000 AEP



2m drawdown, 1 in 1000 AEP

Figure 3.1 - Flood rise to overflow level

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