ITEM 4 & 5

CLIENTS|PEOPLE|PERFORMANCE

Wide Bay Water

QFCI

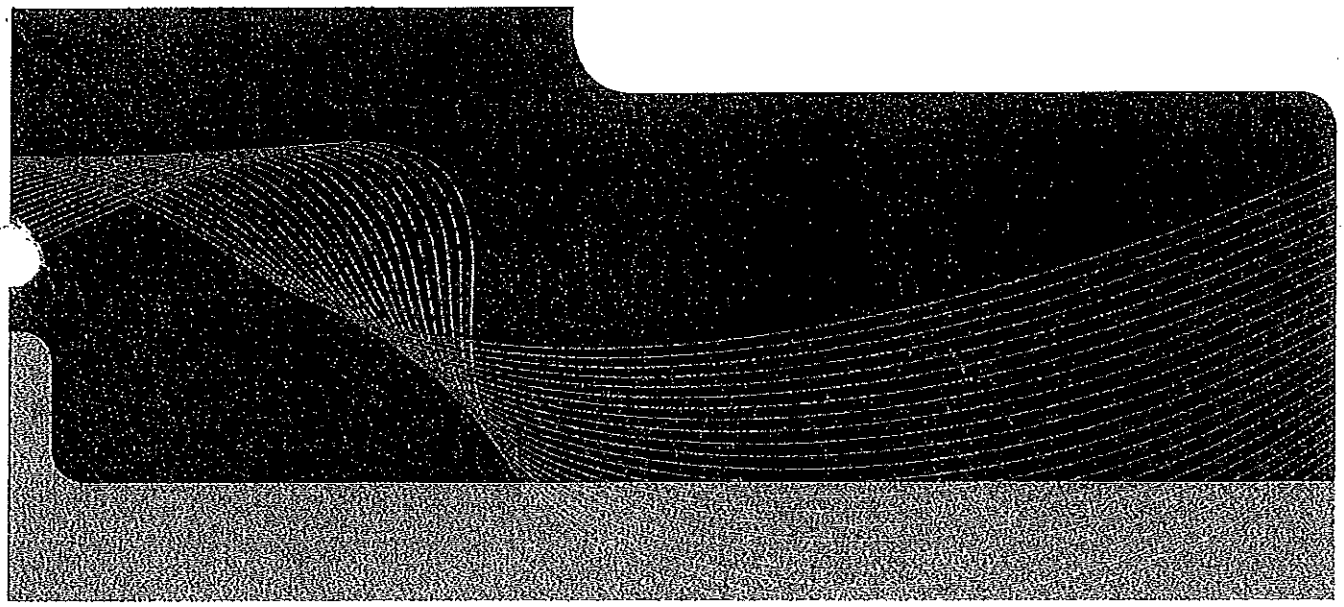
Date: 12/10/11 JM

Exhibit Number: 788

Lenthalls Dam Flooding

Draft Report

February 2009



1. Introduction

1.1 Background

This flood investigation was commissioned by Wide Bay Water as an addendum to a series of studies previously carried out for the Lenthalls Dam Raising Project.

The Lenthalls Dam Raising Project involved raising the full supply level (FSL) of the dam by 2m (24m AHD to 26m AHD) to provide an additional storage capacity of approximately 11,375 ML (17,256 ML to 28,630.5 ML). The 2m raising was carried out in December 2007 using Crest Gates, a patented system produced by Flowgate Projects Pty Ltd of South Africa. The Crest Gates open by moving downwards to release floodwaters.

Unfortunately, all the Crest Gates were inoperable and failed to open during a moderate rainfall event in February 2008. This resulted in rising water levels at the dam backing up along the tributaries and adversely impacting on the upstream flood levels. It has been widely reported that three residents were stranded at a farmhouse on the western floodplain of Logbridge Creek, approximately 6 km upstream of the dam, as a result. While the rising water levels were attributed to the failure of the Crest Gates, the stranding also occurred because the Emergency Action Plan (EAP) for Lenthalls Dam was not activated. This meant that the residents affected were not informed or evacuated.

Review and rectification works for the Crest Gates as well as other aspects of the Lenthalls Dam Project are currently underway. A preliminary assessment of the backwater effects upstream of the dam was completed by GHD on the 12th September 2008. The preliminary study was carried out using design flows obtained from the Queensland Main Roads Rational Method. A HEC-RAS hydraulic model developed during the design stage of the Lenthalls Dam Project, using cross sectional data derived from photogrammetry survey, was adopted for flood level analysis.

The 12th September 2008 preliminary study did not include survey cross sections in the hydraulic model extending sufficiently downstream to the dam. In addition, hydrological modelling was not carried out to establish the annual exceedance probabilities (AEP) associated with various design water levels in the dam.

This present study builds on the work carried out in the September 2008 study, taking into account the above limitations, and includes additional hydrological analyses and hydraulic modelling of the backwater effects along the creeks. The effects of different gate operation scenarios are also assessed.

1.2 Objectives

The primary objective of this study is to review and extend the flood investigation carried out on the 12th September 2008, with the aim of providing a more detailed assessment of the flood behaviour associated with the Lenthalls Dam upgrading works. The scope of work includes the following:

- Update contents of 12th September 2008 report;
- Address queries raised by Department of Natural Resources and Water (DNRW) in response to

above report;

- Review media reports relating to the February 2008 event;
- Collate available rainfall and dam water level information for the February 2008 storm event;
- Evaluate the magnitude of flood event of February 2008;
- Review and update RORB hydrology model developed by DNRW during the design stages of the Lenthalls Dam project for use in this study;
- Estimate design flows in catchment, tributaries and dam using the RORB model for full range of floods up to the 1% AEP (1 in 100 year ARI) event;
- Estimate design flows, dam water levels, and upstream flood levels, with the dam spillway crest gates (1) fully operational and (2) not operational;
- Review and extend the HEC-RAS flood model to include additional cross sections downstream of Logbridge Creek and Doongul Creek to the dam wall;
- Estimate flood levels along the Doongul Creek and Logbridge Creek system for the full range of flood events between the 50% AEP and 1% AEP event; and
- Assess the potential impact of failure of the Crest Gates on upstream flood behaviour.

The Lenthalls Dam catchment is briefly described in Section 2. Data available and adopted for this study is presented in Section 3. This is followed by a description of the study methodology in Section 4. Additional catchment and drainage information, as well as study assumptions are also detailed in this section. The study findings are presented in Section 5 and the summary and conclusions in Section 6.

2. Study Area

The Lenthalls Dam catchment is situated in the Wongi State Forest (Figure 2-1). It rises at the Seaview and Robinson Ranges, near Fairlies Knob (287 m AHD) and Cabbage Tree Mountain (237 m AHD), and generally falls in a north-easterly direction to Lenthalls Dam, where the lowest elevations approximate 23m AHD near the southern vicinity of the dam.

The catchment extends 29 km in length, 20 km in width, and covers an area of about 512 km^2. Five major creek systems, giving rise to the fork-like appearance at the dam inlet, discharge into Lenthalls Dam, these being Duckinwilla Creek, Doongul Creek, Woolmer Creek, Sugarbag Creek and Harwood Creek. Other upstream tributaries include Powell Creek, Logbridge Creek, Melville Creek, Forbes Creek and an unnamed tributary at the lower reaches east of Logbridge Creek near Warrah Road - Kellogum Forestry Road.

Both Powell Creek and Logbridge Creek discharge into Doongul Creek. Approximately 460 m downstream of the confluence of Doongul Creek and Logbridge Creek is a major causeway along Warrah Road. This major causeway consists of two 5.4m wide by 2.4m high box culverts, which enable flows to discharge under the causeway under low flow conditions. It is understood that the surface of the causeway has been raised by approximately 400 mm to 26.15m AHD in recent years.

Land use within the catchment consists mostly of natural forests, with pockets of rural pastures, particularly just upstream of the confluence of Doongul Creek and Longbridge Creek. A farmhouse is located approximately 400 m upstream of this confluence (Figure 2-1). It is noted that it was at this farmhouse that three family members were stranded when the Lenthalls Dam Crest Gates failed to operate during the storm of February 2008.

Based on data obtained from Google Earth, it is estimated that the ground elevation is lowest at the northern side of the farmhouse property block, at about 28 m AHD. East and west of the property, the ground levels are higher at about 29 m AHD, and 30 m AHD towards the southern side.

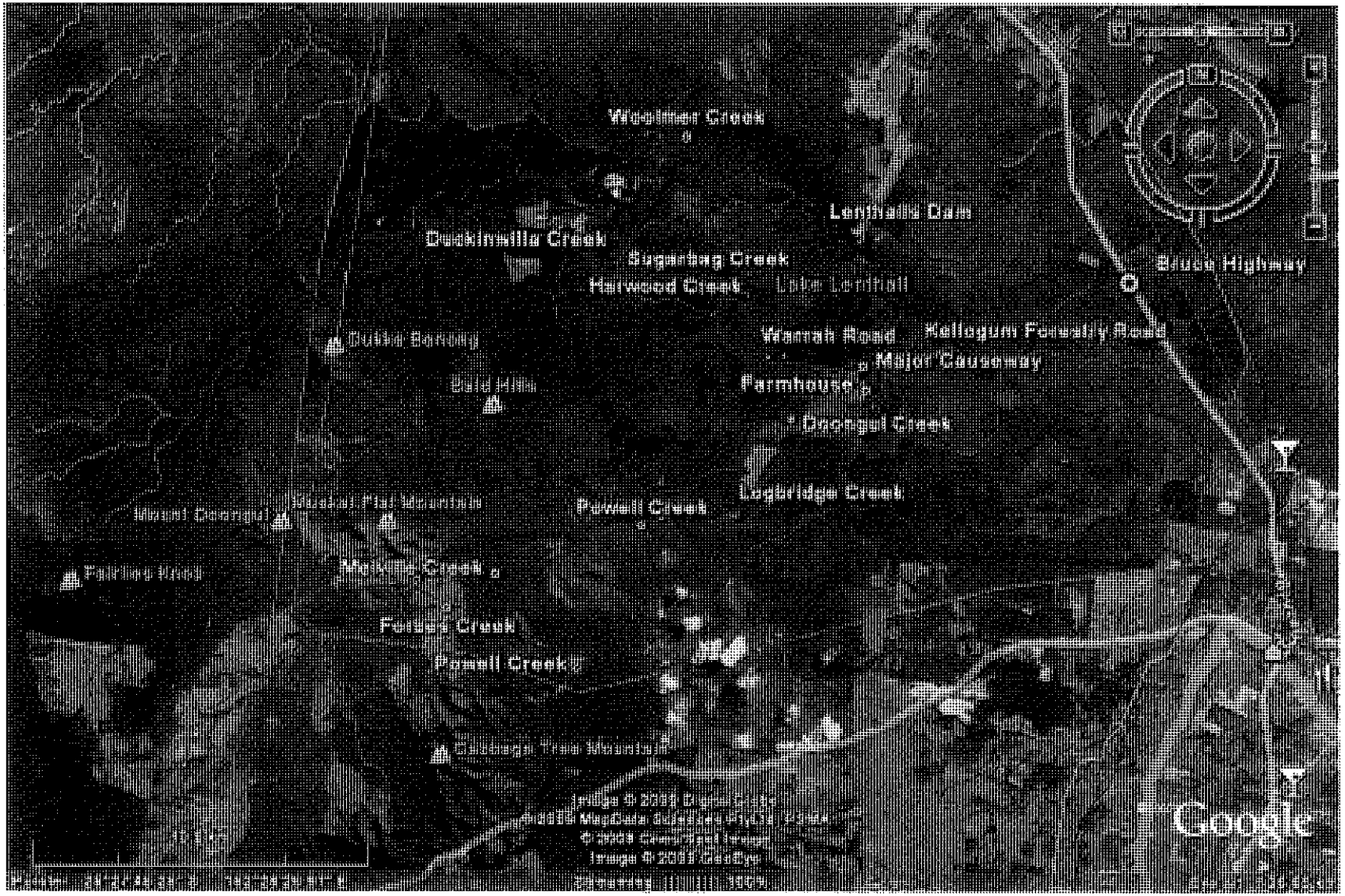


Figure 2-1: Lenthalls Dam Catchment

3. Available Data

Data obtained and reviewed for the study included the following:

- Lenthalls Dam Comprehensive Dam Safety Inspection Report, Wide Bay Water, October 2002;
- Lenthalls Dam Gates Failure 2008, A Case Study (Damian Carstens, 2008);
- Letter from Wide Bay Burnett Conservation Council to Minister of Water Resources, 25 June 2008;
- Comments by writer identifying writer as the owner of farmhouse, Water Engineering Australia, 6 September 2008;
- Digital Terrain Model of site (from aerial photogrammetry) at 2m contour intervals supplemented by field survey of creek at selected locations;
- RORB hydrology model (Department of Natural Resources and Water (DNRW, 1999);
- HEC-RAS hydraulics model (GHD, 12 September 2008);
- Spillway rating curves with all gates operational and all gates not-operational (GHD, December 2008);
- Lenthalls Dam Water Levels, daily levels from 1 January 2007 to 30 November 2008, DNRW (Wide Bay Water, 3 December 2008);
- Daily rainfall at Lenthalls Dam (Station No. 040906), Howard (Station No. 040098), Musket Flat (Station No. 040902), 1 January 2007 to 30 November 2008, DNRW (Wide Bay Water, 3 December 2008 and Bureau of Meteorology, December 2008);
- Water Levels at Lenthalls Dam at various time intervals, 1 February 2008 to 15 February 2008 (Station No. 40906, Bureau of Meteorology 2009);
- Daily rainfall at Maryborough (Station No. 040126), 1 February to 29 February 2008, Bureau of Meteorology;
- Half-hourly rainfall data at Maryborough (Station No. 040126), 1 February 2008 to 15 February 2008, Bureau of Meterology;
- CRC-Forge rainfall data for Lenthalls Dam for 20%, 10%, 5%, 2% and 1% AEP events (extracted December 2008); and
- Rainfall intensity-frequency-duration data for Lenthalls Dam from Australian Rainfall and Runoff (ARR, 1987).

4. Study Methodology

4.1 Introduction

A key aspect of this study relates to the flood behaviour at Lenthalls Dam and along Logbridge Creek during the February 2008 storm. Specifically, the spillway Crest Gates at the dam failed to open, and the flood levels backing up along Logbridge Creek rose sufficiently high, such that three residents at the farmhouse were stranded during the storm. The evaluation of this storm event was therefore considered to be integral component of this study.

The RORB rainfall-runoff model was used to simulate the hydrological behaviour of the catchment. The model was initially calibrated using rainfall and water level records available at Lenthalls Dam for the February 2008 storm event. It was then used to estimate the flood discharges at key locations along the creek system.

Water surface profiles along Logbridge Creek corresponding to the February 2008 event were calculated using the HEC-RAS flood model. Resident reports of the flood level reached at the farmhouse property were obtained and used to assist in the calibration of the HEC-RAS model.

The calibrated RORB and HEC-RAS models were subsequently used to predict the flood behaviour at Lenthalls Dam and along Logbridge Creek, Doongul Creek, and the unnamed tributary for the 50%, 20%, 10%, 5%, 2% and 1% AEP (annual exceedance probability) design storm events. The scenarios with the Crest Gates fully closed and not operational, and fully opened and operational, were also investigated. The February 2008 storm event was evaluated with reference to the above findings. Additional details are provided below.

4.2 Hydrology

4.2.1 RORB Model

The RORB model was used to model the hydrological behaviour of the catchment. RORB is a networked rainfall and runoff model that is widely used in Australia for flood estimation (Australian Rainfall and Runoff, ARR 1998). The RORB model originally developed by DNRW (1999) was reviewed and used for this study. Development of the model included the following tasks:

- Sub-dividing the catchment into a series of sub-catchment areas, taking into account the catchment topography, stream junctions and other locations of interest; and
- Determination of the model parameters k_c and m, which represent the effects of the catchment in delaying the runoff response to rainfall, and the non-linearity of the catchment response to rainfall excess, respectively.

The DNRW RORB model was modified in this study to better represent the creek system and sub-catchment areas in Doongul and Logbridge Creeks, particularly in the downstream reaches. In total, 32 sub-catchments were delineated. All the sub-catchments were classified as natural rural catchments and

the stream reaches as natural reaches. The final RORB model layout set up is shown in Figure 4-1.

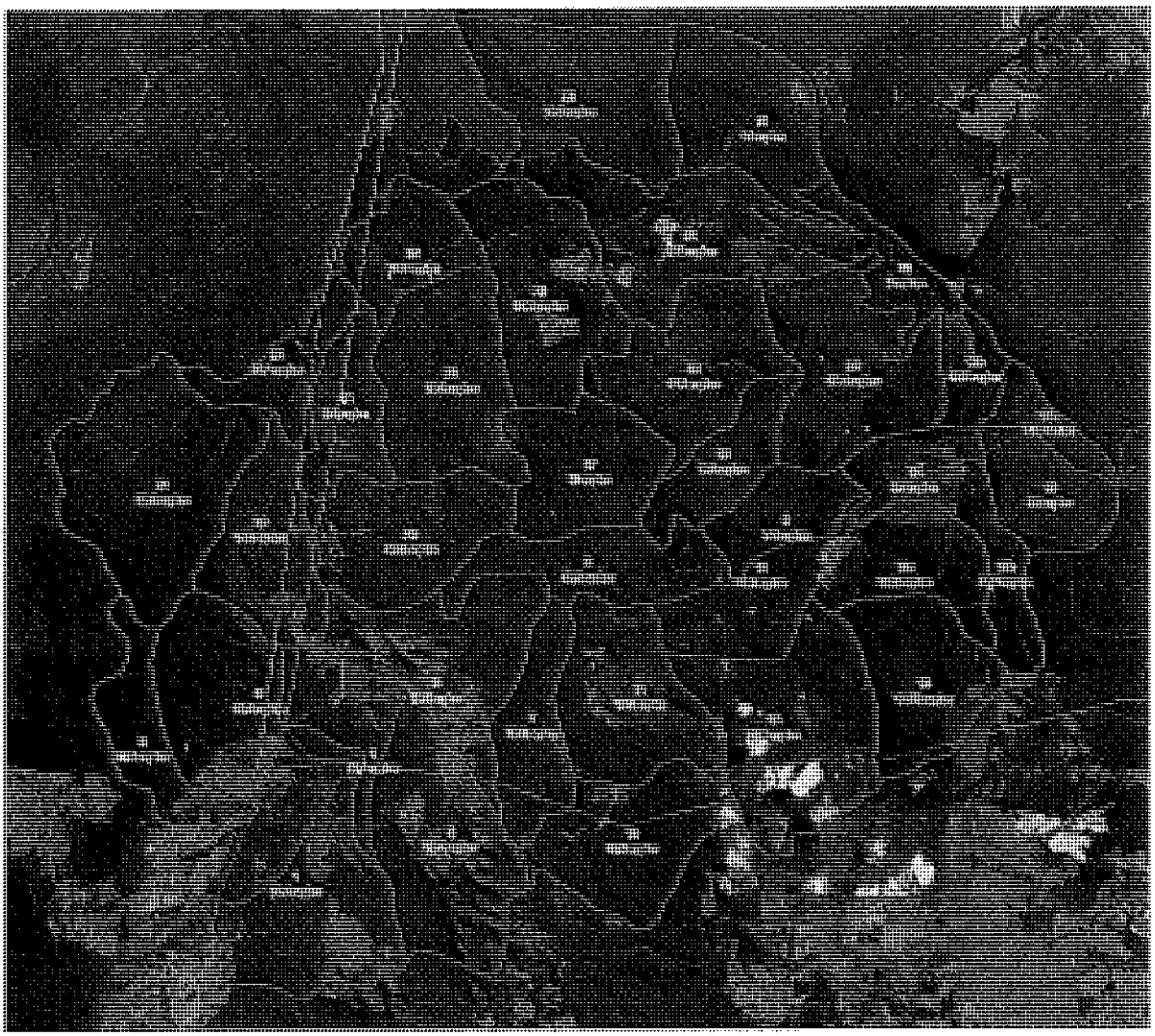


Figure 4-1: RORB Model for Lenthalls Dam Catchment

4.2.2 Lenthalls Dam Storage Characteristics

Dam storage characteristics and rating curves for the spillway Crest Gates were obtained from Wide Bay Water and reviewed and updated. The adopted stage-storage and storage-discharge data are presented in Table 4-1. Stage discharge curves, with and without operation of the Crest Gates, are shown in Figure 4-2. It is noted that the upgraded full supply level for the dam is 26m AHD, and that in Table 4-1 and Figure 4-2, the data relates only to either the gates being fully operational or fully non-operational. Scenarios with a combination of gates working and failing have not been included in this study.

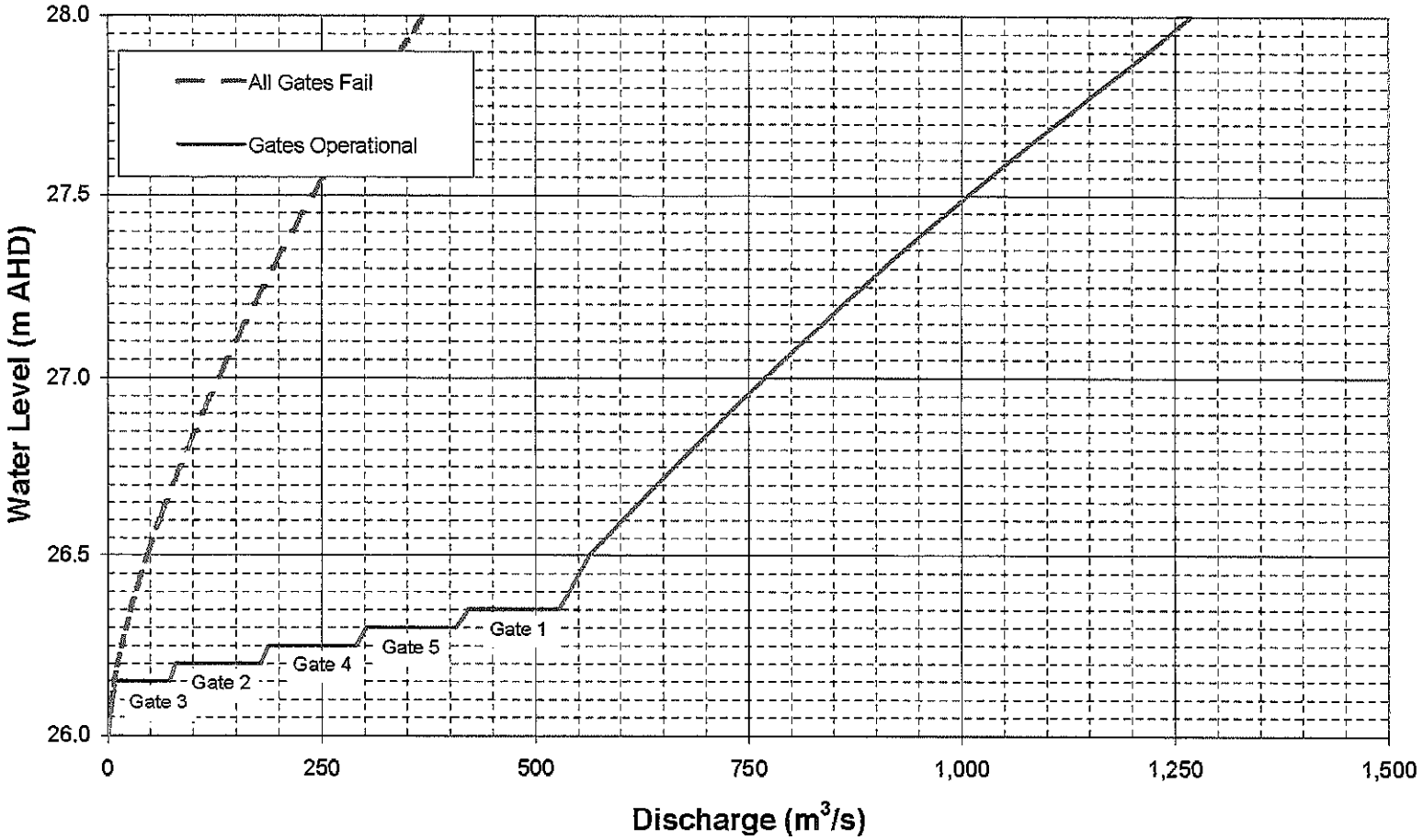


Figure 4-2: Rating Data for Lenthalls Dam with Crest Gates Operational and Non-Operational

Table 4-1: Lenthalls Dam Storage and Discharge Characteristics

Elevation Storage		Storage Discharge		
Elevation (m)	Storage (ML)	Storage (ML)	Discharge m3/s	
			Gates Operational	Gates Not Operational
12.00	0	28,631	0	0
12.20	0.67	29,768	9	8
14.00	512.7	29,768	73	8
16.00	1650	30,148	79	12
18.00	3801	30,148	179	12
20.00	6951	30,527	188	16
21.00	8938	30,527	291	16
21.40	9823	30,906	302	21
21.80	11,260	30,906	407	21
23.00	13,990	31,365	421	27
24.00	17,260	31,365	528	27
24.20	18,030	32,741	563	46
24.80	20,770	33,659	602	61
25.00	21,840	34,576	642	76
26.00 FSL	28,630	35,493	683	93
26.30	30,910	36,411	726	111
26.31	31,000	37,328	770	131
26.35	31,370	38,504	815	151
26.36	31,460	39,681	861	172
26.40	31,820	40,857	908	193
26.41	31,920	42,034	957	216
26.45	32,280	43,210	1007	240
26.46	32,370	44,386	1058	264
26.50	32,740	45,563	1110	289
26.51	32,830	46,739	1164	315
27.00	37,330	47,916	1219	342
27.50	43,210	54,943	1471	485
28.00	49,090	62,257	1741	644
29.00	63,720	70,782	2028	818
30.00	81,380	79,610	2332	1005
31.00	102,400	89,783	2653	1204
32.00	127,100	100,292	2991	1415
33.00	155,700	112,267	3321	1638
34.00	188,300	124,608	3664	1870
35.00	225,300	138,508	4017	2113
		152,799	4381	2365
		168,712	4755	2627
		185,030	5140	2898
		203,115	5534	3177

4.2.3 Historical Rainfall Data

Historical rainfall information available within the proximity of the study area includes the following:

- Lenthalls Dam (Station No. 040906);
- Howard Post Office (Station No. 040098);
- Musket Flat (Station No. 040902); and
- Maryborough (Station No. 040126).

The Lenthalls Dam and Musket Flat rainfall gauges are both located within the Lenthalls Dam catchment, at the dam itself, and in the middle of the catchment approximately 17km upstream of the dam near Doongul Creek, respectively. By comparison, the Howard gauge is located 10km to the north and downstream of Lenthalls Dam, while the Maryborough Station is situated approximately 22km south-east of the dam in a different catchment.

Only daily time-step rainfall records were available at Lenthalls Dam, Howard Post Office, and Musket Flat. These were provided by Wide Bay Water Corporation for the February 2008 storm event (1st February-15th February 2008), together with daily time-step water level data measured at Lenthalls Dam. However, this data was found to be inadequate for the purposes of this study. This was because only the date, but not the time of day, was recorded for both the rainfall and water level data. Initial calibration trials also indicated that the daily time-step series were insufficient, as they excluded the rainfall pattern within each day and during the height of the storm, and thus the flow peaks and dam water levels could not be correlated and modelled accurately.

Discussions with the Bureau of Meteorology (BOM) indicated that the closest rainfall station with suitable data was Maryborough. This consisted of half-hourly time-step rainfall depths covering the full period of the February 2008 storm. These detailed rainfall records at Maryborough were subsequently acquired from the BOM. For consistency, detailed daily rainfall data at Lenthalls Dam, Musket Flat, Howard Post Office and Maryborough were also obtained from the BOM and used for this study.

The daily rainfall data available at Lenthalls Dam, Howard Post Office, Musket Flat, and Maryborough are plotted in Figure 4-3. The half-hourly time-step data available at Maryborough are shown in Figure 4-4 and Figure 4-5. It is noted that a few data gaps exist in the half-hourly data at Maryborough, between 8pm to 11.30pm on the 7th February 2008 (probably due to equipment malfunction), and that the remaining data is not quality controlled. However, this is not considered to have affected the overall integrity of the data.

Overall, only the daily time-step rainfall data at Lenthalls Dam and Musket Flat, coupled with the half-hourly time-step data at Maryborough, and all obtained from the BOM, were adopted for this study. Due to difficulties in correlating the daily time-step rainfall and water level data obtained from Wide Bay Water, these other data were later discarded and not used.

Rainfall temporal patterns were initially derived from the half-hourly time-step Maryborough data for the February 2008 event. The daily rainfall depths at Lenthalls Dam and Musket Flat were then distributed according to the half-hourly temporal patterns obtained for Maryborough and applied to the Lenthalls Dam catchment as part of the hydrological study. Additional details of this process are provided in

Section 4.2.5.

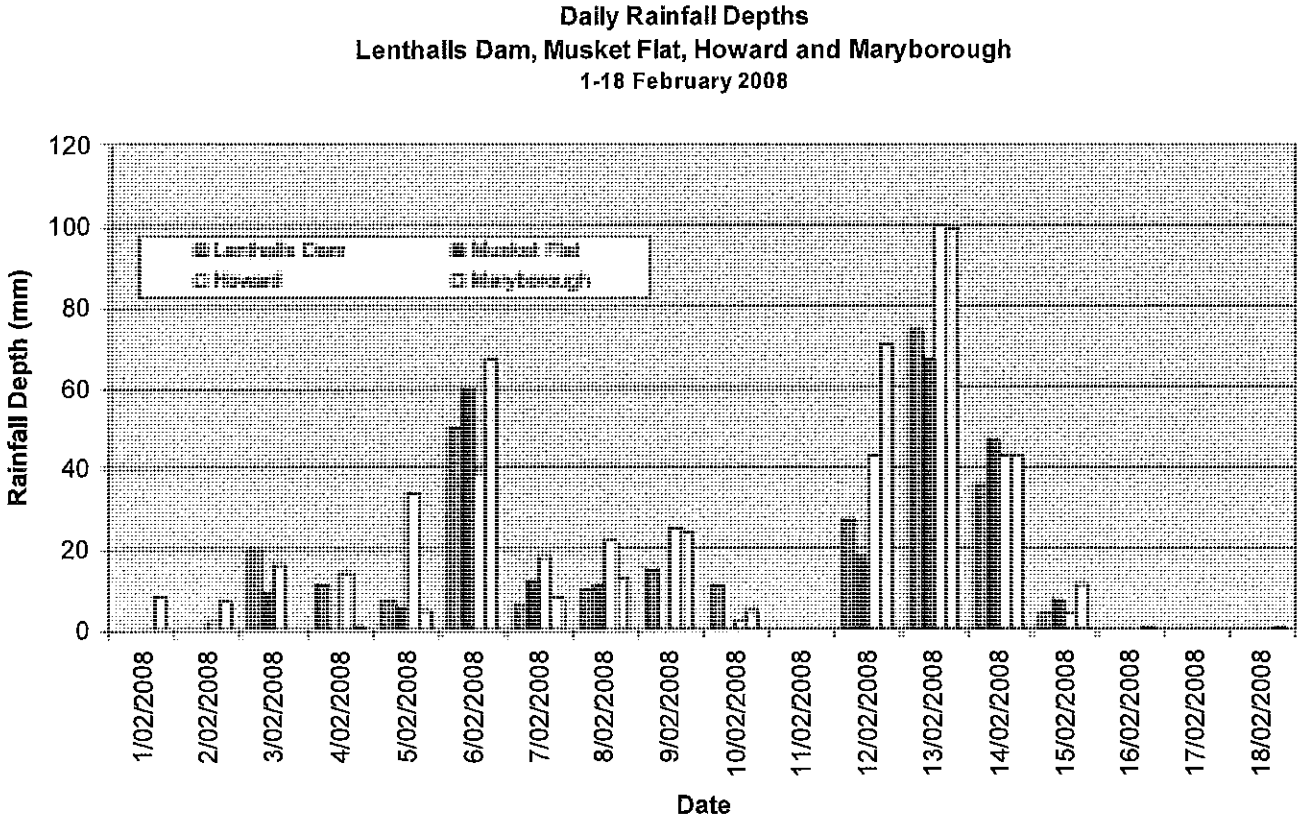


Figure 4-3: Daily Rainfall Data at Lenthalls Dam, Musket Flat, Howard, and Maryborough Rainfall Stations (Bureau of Meteorology)

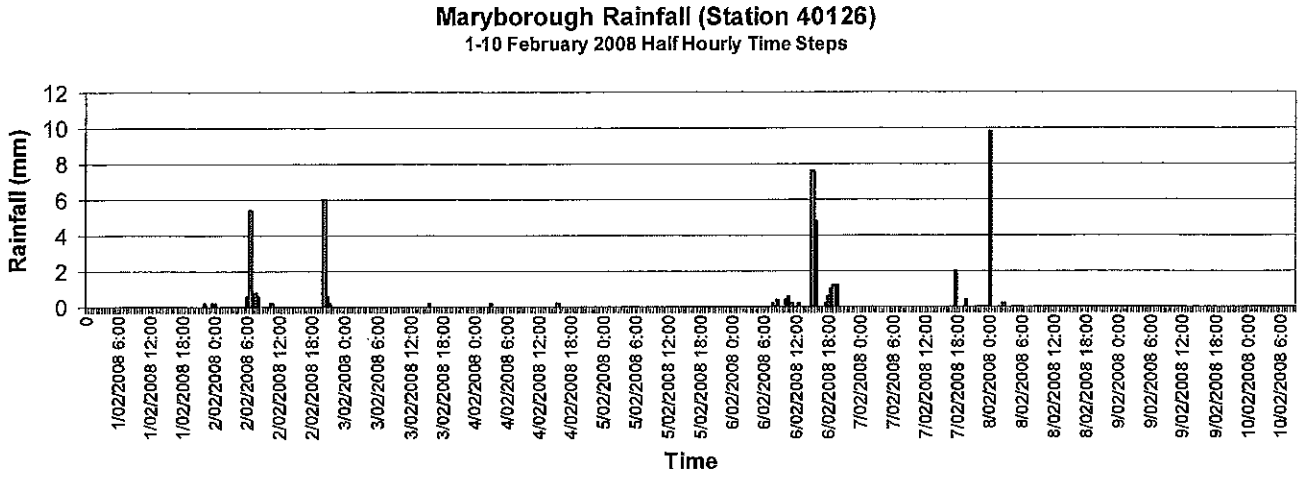


Figure 4-4: Half hourly Rainfall Data at Maryborough (1-10 February 2008)

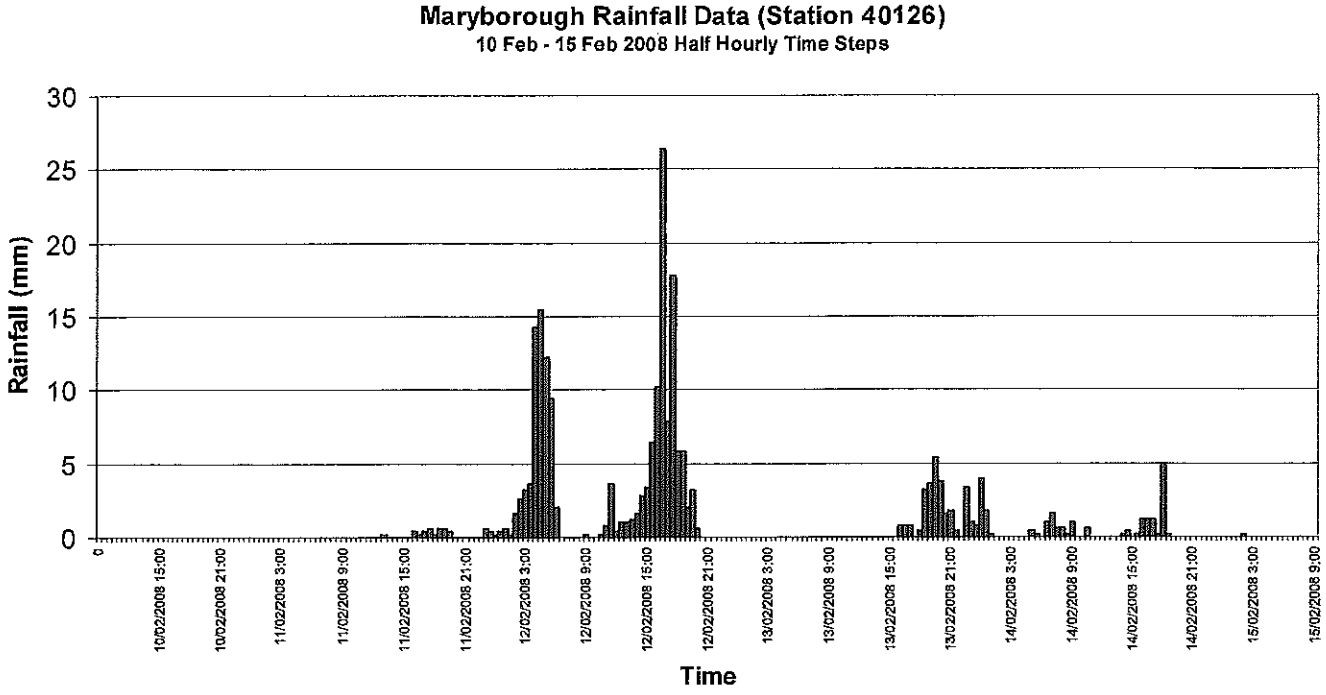


Figure 4-5: Half hourly Rainfall Data at Maryborough (10-15 February 2008)

4.2.4 Historical Streamflow and Water Level Data

No streamflow information at any of the creeks within the catchment and nearby vicinity was available. The use of streamflow data for calibration of the hydrology models is generally preferred, as it provides a direct representation of the rainfall-runoff process in the catchment. In view of this lack of data, water level data available at Lenthalls Dam was analysed instead and used to assist in the calibration.

Water level data recorded at Lenthalls Dam, for the February 2008 storm, was initially obtained from Wide Bay Water, as noted earlier. This was later supplemented, and then replaced, with more detailed data obtained from the Bureau of Meteorology (BOM). The BOM water level records are presented in Figure 4-6.

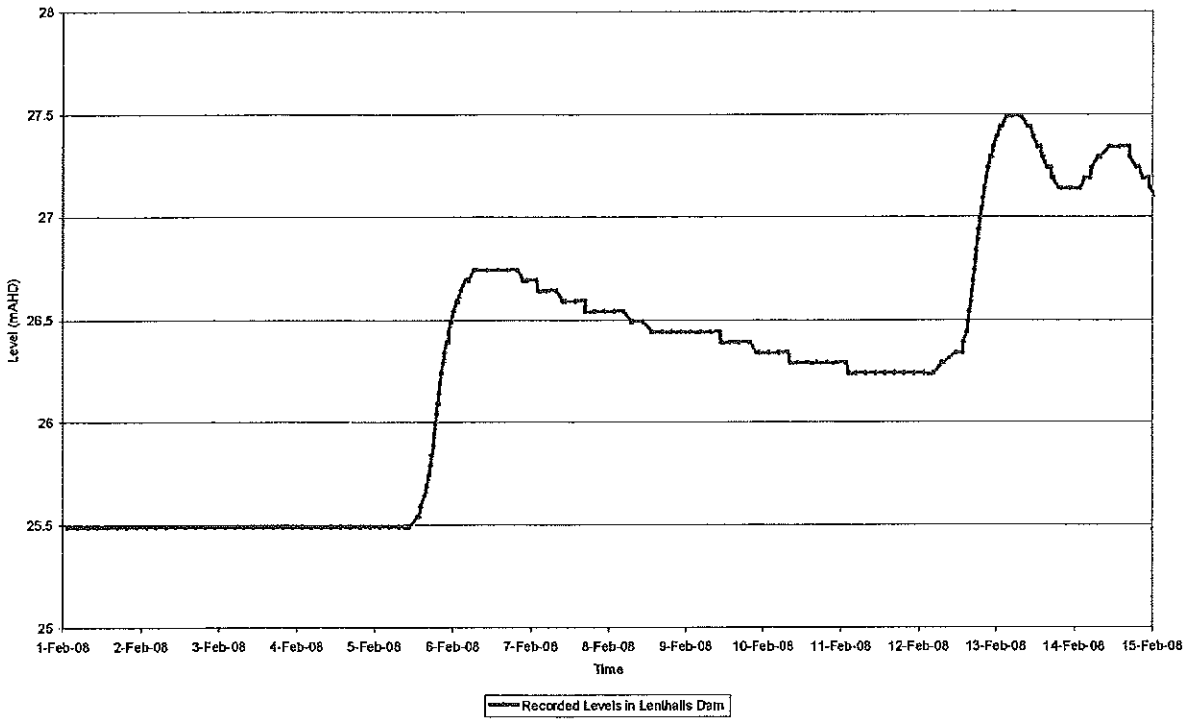


Figure 4-6: Water Level Data Recorded at Lenthalls Dam for February 2008 Event (BOM)

Using the BOM water level data presented in Figure 4-6, and the Lenthalls Dam elevation-storage-discharge data in Table 4-1, the outflow hydrograph at Lenthalls Dam over the storm period could be derived. The results are presented in Figure 4-7.

In Figure 4-7, it is seen that the outflow hydrograph peaked on the 13th February 2008 (3.26am to 7.42am). This corresponds to a peak dam water level of 27.49m AHD and a peak dam outflow of approximately 237 m^3/s.

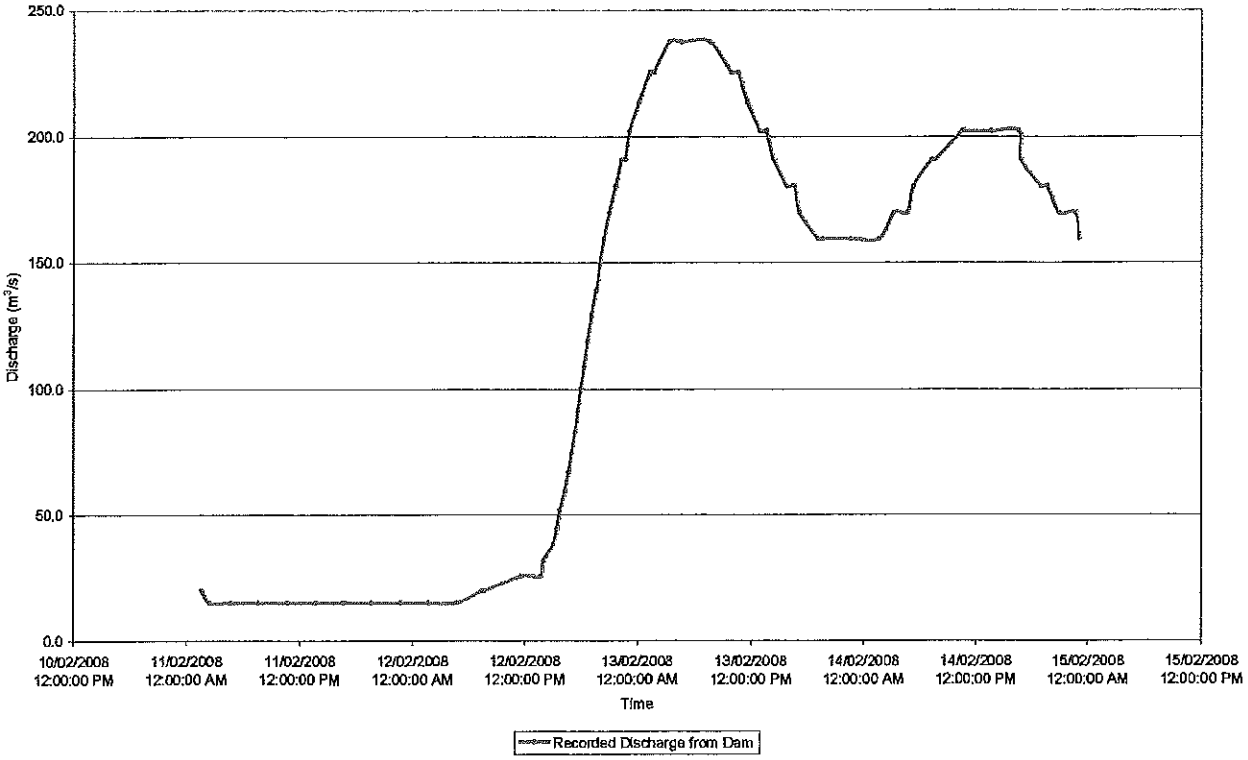


Figure 4-7: Outflow Hydrograph Derived at Lenthalls Dam Using Recorded BOM Water Levels

Historical flood level data for the Lenthalls Dam catchment was not available during the study. However, based on media reports, a water level of 28.5m AHD was reached at the farmhouse during the February 2008 storm. It is not clear at this stage whether this level has actually been surveyed or has only been estimated. Pending the confirmation of the accuracy of this level and the availability of other data, the reported water level of 28.5m AHD at the farmhouse was adopted for this study.

4.2.5 Calibration of RORB Model

The RORB model was calibrated for the February 2008 event using the daily rainfall patterns at Lenthalls Dam and Musket Flat modified using the half-hourly time-step rainfall pattern at Maryborough, and the outflow discharge curve derived for Lenthalls Dam.

The rainfall temporal pattern at Maryborough was first derived from the half-hourly data. The resulting half-hourly time-step pattern was then applied to the daily rainfall depths at Lenthalls Dam and Musket Flat, as noted earlier. This assumes that the temporal patterns at Maryborough, Lenthalls Dam, and Musket were similar. Based on similarities in the daily rainfall depths and trends evident at these three stations (Figure 4-3), and considering that there was no other local temporal pattern available within the vicinity of the Lenthalls Dam catchment, this assumption was considered to be justifiable. Incremental

half-hourly rainfall depths estimated for Lenthalls Dam and Musket Flat on this basis were thus adopted and specified in RORB for calibration of the model.

In order to account for spatial effects within the Lenthalls Dam catchment, both sets of rainfall data at Lenthalls Dam and Musket Flat stations were used. A simple weighting system based on the Theissen Scheme, was adopted in relating the rainfall characteristics to each of the sub-catchments.

The calibration process involved setting up historical storm files and running the RORB model with catchment parameters and rainfall losses such that a match was achieved against the recorded water level or derived outflow hydrograph at Lenthalls Dam.

Detailed assessment of the rainfall and water level/ outflow hydrograph data at Lenthalls Dam, for the storm data from the 1st to 15th February 2008, indicated that the rainfall series and dam water level behaviour from the 11th February to the 14th February was most suitable for calibration purposes. This was because of a lull in the rainfall at Musket Flat (8th, 9th and 10th February) and Lenthalls Dam (10th February) and near equilibrium of the resulting water level in the dam, at about 26.24m AHD (2.32am 11th February to 4.42am 12th February), prior to the commencement of additional rainfall in the catchment. The peak water level in the dam (27.49m AHD, 3.26am to 7.42am, 13th February) also occurred within this period, as noted earlier. The 11th February to 14th February 2008 rainfall series was thus chosen for calibration of the RORB model.

The RORB parameters k_c and m were estimated as part of the calibration process. As noted earlier, k_c represents the effect of the catchment in delaying the runoff response to rainfall, while m represents the non-linearity of the catchment response to rainfall excess. Based on typical m values recommended in Australian Rainfall and Runoff (1998), a value of 0.8 was adopted for calibration.

A range of k_c values were initially trialled, guided by regional k_c estimates obtained in accordance with Australian Rainfall and Runoff and the RORB manual, and the influence of rainfall loss parameters specified in the model. Based on the results of these trials, a k_c value of 30 was found to be appropriate and adopted for the Lenthalls Dam catchment.

The RORB program also allows catchment losses to be modelled using either the initial/ continuing loss approach or the initial/ runoff coefficient approach. For this investigation, the initial/ continuing loss approach was used. It is noted that the latter approach is generally more suitable for partly urbanised catchments. A wide range of initial and continuing loss values were tested during the calibration process. Based on these results, an initial loss of 8mm and continuing loss of 2mm/hr was considered to be appropriate for the February 2008 storm event.

The final RORB catchment parameters adopted are summarised in Table 4-2. The results of the RORB calibration are plotted in Figure 4-8. In this figure, the outflow hydrograph at the dam outlet calculated using RORB is compared with the recorded data. A translational time shift has also been applied to match the start of the two outflow hydrographs.

Table 4-2: RORB Parameters Adopted for February 2008 Storm Event

Parameter	Adopted Value
Catchment kc	30
Catchment m	0.8
Initial Loss (mm)	8
Continuing Loss (mm/hr)	2

Overall, it can be seen from the results in Figure 4-8 that a high degree of correlation is achieved between the modelled and recorded data at Lenthalls Dam. This includes the outflow peak discharge, hydrograph shape and volume, and overall timing of the hydrograph. The catchment response to the initial rainfall burst, as well as the rising limb and falling limb also compare well. It is noted that rainfall in the catchment occurring after passage of the peak outflow was not input in the RORB model. This explains the absence of the second peak observed in the recorded outflow hydrograph but not the RORB hydrograph.

Ideally, a wide range of storm events should be used for calibration and verification in order to ensure that a robust hydrological model is developed. This could not be done for this study due to a lack of readily available data, as limited data for only the February 2008 storm event was available. Nevertheless, it was considered that the above calibration was adequate and the RORB model was adopted for design flood estimation.

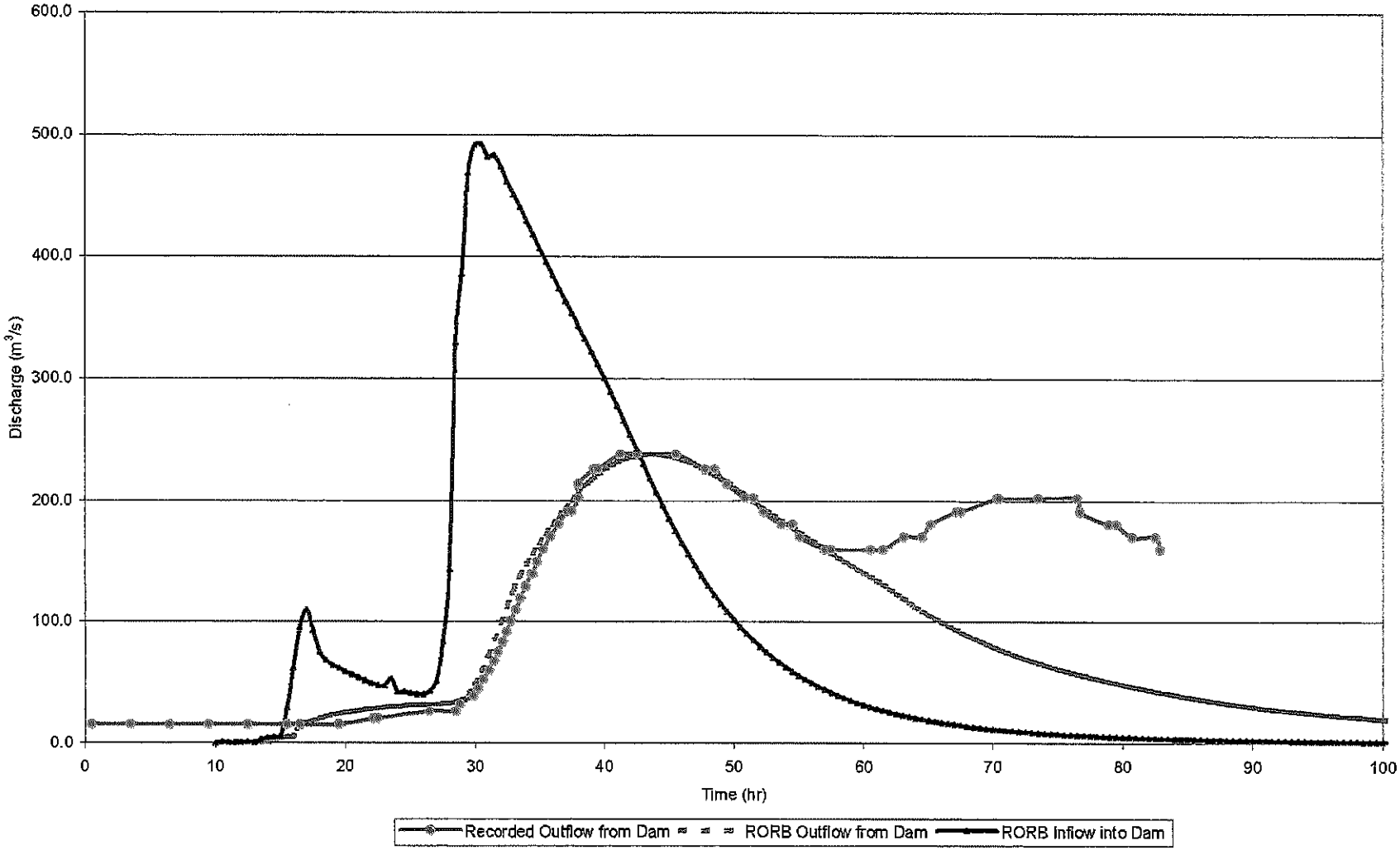


Figure 4-8: Results of RORB Calibration for February 2008 Storm Event

4.2.6 Design Flow Estimation

The calibrated RORB model was used to generate design flood hydrographs at strategic locations throughout the Lenthalls Dam catchment. The RORB k_c, m, initial loss, and continuing loss parameters obtained from calibration of the February 2008 event were considered to be appropriate and adopted for the design runs.

A range of design storm durations ranging from 1 to 72 hours, were assessed, in order to determine the critical flows at each location. Design rainfall depths for different storm durations were estimated in accordance with the procedures of Australian Rainfall and Runoff (ARR Volume 2, 1998) and the CRC Forge Method for Queensland (Lenthalls Dam catchment). The critical rainfall depths estimated from the two methods were adopted for the modelling. It was found that the rainfall depths derived from the CRC Forge Method were generally higher. For the 50% AEP storm event, however, CRC Forge estimates were not available and the ARR estimates were used. The design rainfall depths obtained from the CRC Forge Method are presented in Table 4-3.

Table 4-3: CRC Forge Rainfall Depth-Frequency-Duration Data

Duration	CRC Forge Design Rainfall (mm) for various Storm AEP Events								
	20%	10%	5%	2%	1%	0.5%	0.2%	0.1%	0.05%
15 min	31.42	35.43	40.9	48.27	54.69	61.16	69.91	76.66	83.45
30 min	44.68	50.29	57.98	68.34	77.44	86.59	98.98	108.5	118.2
1 hr	61.04	68.65	79.06	93.05	105.4	117.9	134.8	147.8	160.9
3 hrs	87.38	98.65	114	134.6	152.5	170.6	195	213.8	232.7
6 hrs	108.6	122.9	142.3	168.4	190.9	213.4	244	267.5	291.2
12 hrs	135.3	153.5	178	211.3	239.4	267.7	306	335.5	365.3
18 hrs	161.2	184.9	216.5	259.9	294.5	329.3	376.4	412.7	449.3
24 hrs	182.1	210.6	248.4	300.4	340.4	380.7	435.1	477.2	519.4
48 hrs	231.2	267.4	315.4	381.5	435.8	492.2	570.8	632.7	698
72 hrs	253.4	293.1	345.6	418.1	480.3	546.8	640.2	716.2	797.2
96 hrs	261.8	302.8	357.1	432	497.5	568.5	671	755.5	846.1
120 hrs	268.5	310.6	366.2	443	510.9	583.3	687.3	773	865.7

Peak discharges for floods of 50%, 20%, 10%, 5%, 2% and 1% AEP (annual exceedance probability) were computed at key locations throughout the catchment. This was carried out for dam outflow scenarios with all the gates operational and not operational. In general, the critical storm duration for the catchment was found to be between 18-24 hours. The design flood results obtained from RORB are presented and discussed in Section 5.1. These outputs were later used in the HEC-RAS hydraulic model for estimation of the design flood levels along the creek system.

4.3 Hydraulics

4.3.1 Hydraulics Flood Model

The HEC-RAS hydraulic model (US Army Corps of Engineers, Version 4.0, March 2008) was considered to be suitable and used to model the flood behaviour at the creek system.

HEC-RAS is a one-dimensional flood model that is widely used around the world and in Australia. The program is intended for calculating water surface profiles for steady and unsteady gradually varied flow in natural or man made channels. HEC-RAS can model both subcritical and supercritical flow profiles. The effects of various obstructions such as bridges, culverts, weirs and structures in the floodway may also be incorporated. The computational procedure is based on the solution of the one-dimensional energy equation, with energy loss due to friction evaluated using Mannings equation.

Input data to the HEC-RAS model consists of flow rates, a representation of the stream geometry, upstream and downstream boundary conditions, and estimates of the channel and overbank roughness parameters. In most instances, the channel is represented in the form of cross sections of the stream and floodplain, with the cross sections defined at known distances apart. The channel roughness parameter is usually represented by a Mannings n roughness coefficient at each cross section.

4.3.2 HEC-RAS Model

The HEC-RAS model developed for the preliminary flood study (GHD, 12 September 2008, Section 3) was extended and used for this study. The following reaches were modelled:

- Doongul Creek from Lenthalls Dam Inlet to 1.1km upstream of confluence with Logbridge Creek;
- Logbridge Creek from its confluence with Doongul Creek to 6.1km upstream (or 5.56km upstream of farmhouse); and
- Unnamed tributary from its confluence with Doongul Creek to 0.7km upstream of minor causeway at Warrah Road (Kellogum Forestry Road).

It is noted that the extent of the HEC-RAS model included the farmhouse location, where three residents were stranded during the February 2008 storm. Additional details of the HEC-RAS model completed are presented in Table 4-4 and Figure 4-9. This includes the two causeways and culvert structures along Warrah Road (Kellogum Forestry Road), and the access road bridge further upstream along Logbridge Creek.

The HEC-RAS model was defined as a steady state model in this study. Peak flow estimates calculated from RORB for each specific design AEP event were used as inflows to the HEC-RAS model. Similarly, the water surface elevations at Lenthalls Dam obtained from RORB were adopted as the downstream tailwater levels for the hydraulic analysis. Mannings n roughness values for various reaches of the creek system were estimated on the basis of past experience, typical guideline values, and through a trial and error process.

Table 4-4: HEC-RAS Model Details

Reach Name	HEC-RAS model reach identifier	Length (km)	Number of Creek Cross Sections in HEC-RAS	Number of Bridges or Culverts Modelled
Doongul Creek[a]	LogbridgePowell-3	2.8	7	0
Doongul Creek[b]	LPds	2.9	6	1[f]
Doongul Creek[c]	Doongul-1	1.1	3	0
Logbridge Creek[d]	LogbridgePowell-1	6.1	11	1[g]
Unnamed tributary[e]	Tributary-2	1.9	8	1[h]

a: Doongul Creek from dam inlet to confluence with unnamed tributary
b: Doongul Creek from above confluence to confluence with Logbridge Creek
c: Doongul Creek upstream of confluence with Logbridge Creek
d: Logbridge Creek upstream of confluence with Doongul creek (farmhouse reach)
e: Unnamed tributary from the east downstream of Warrah Road
f: Major causeway at Warrah Road consisting of two 5.4m wide x 2.4m high box culverts
g: 3.6m wide x 3.6m high bridge crossing opening
h: Minor causeway consisting of two 0.375m diameter culverts and one 1.2m wide x 0.9m high box culvert

4.3.3 HEC-RAS Model Calibration

The HEC-RAS model was calibrated to the February 2008 event prior to adopting it for design flood level estimation. The process of calibration is usually achieved by adjusting the Mannings n roughness coefficient until the calculated flood levels adequately match the recorded historical flood levels. In this study, historical flood level data was not available at the time of the study. This is with the exception of the anecdotal flood level at the farmhouse, which was reported, through the media, to have reached approximately 28.5m AHD during the February 2008 event.

Numerous HEC-RAS calibration trials were initially carried out using the RORB discharge hydrographs computed with daily time-step rainfall data at Lenthalls Dam and Musket Flat. These initial efforts proved futile however, and indicated that calibration was not achievable unless abnormally high Mannings n values were specified in the HEC-RAS model. It was for this reason that rainfall temporal patterns at smaller time-steps were later sought and obtained from Maryborough Station, and transposed for use in the Lenthalls Dam catchment.

Based on the temporal patterns adopted from Maryborough, the RORB model was successfully recalibrated and used to generate the runoff hydrographs in the Lenthalls Dam catchment, as noted in Section 4.2.5. The peak inflows derived from the final RORB model for the February 2008 event were then adopted for the final HEC-RAS model. As noted earlier, the corresponding water level at Lenthalls Dam, also derived from RORB, was used as the starting water level in HEC-RAS. It is noted that during the February event, all the gates were closed and inoperable. This was taken into account as part of the modelling.

Figure 4-9: HEC-RAS Model Extent

The final results obtained from HEC-RAS for the February 2008 flood are presented in Table 4-5. For these results, Mannings n roughness coefficients of between 0.09 and 0.22 were used to represent the roughnesses in the channel and overbank areas. An n value of 0.09 was used in the overbank areas near the farmhouse. For most of the other channel sections, an n value of 0.21 was used in the creeks, and 0.22 in the overbank areas. It is noted that the floodplain areas near the farmhouse consist of pastures, with the other areas consisting mostly of natural forests.

In general, it is considered that the above n values adopted for the calibration are relatively high and at the upper end of typical guideline values, particularly near the farmhouse and within the creeks. However, as no other observed flood level data was available, other than the reported level of 28.5m AHD at the farmhouse, the above roughness coefficients were accepted in order to secure the calibration.

A number of reasons are available, which may explain the relatively high Manning's n roughness values above. It may simply be that the February 2008 flood level of 28.5m AHD reported at the farmhouse has been overestimated, as it is not clear at this stage whether that level has been surveyed. There was no other data available which could corroborate this information. Another possibility is that there may have been significant blockages in the creek system (e.g fallen tree branches) during that event, which may have led to increased resistance to flow and therefore Mannings n roughness values. The accuracy of the DTM survey provided for the study may also warrant investigation, though initial checks suggest that they are consistent with other data available.

Overall, the calibration was considered to be satisfactory, and the calibrated HEC-RAS parameters were adopted for this study.

Table 4-5: Results of HEC-RAS Calibration for February 2008 Flood Event

Location	HEC-RAS Name		HEC-RAS Flood Level (m)	Reported Flood Level (m)
	Identifier	Chainage		
Lenthalls Dam Inlet	LogbridgePowell-3	400	27.49	27.49*
Doongul Ck	LogbridgePowell-3	800	27.50	
Doongul Ck	LogbridgePowell-3	1200	27.50	
Doongul Ck	LogbridgePowell-3	1600	27.50	
Doongul Ck	LogbridgePowell-3	2000	27.51	
Doongul Ck	LogbridgePowell-3	2300	27.52	
Doongul Ck	LogbridgePowell-3	3220	27.56	
Unnamed Ck	Tributary-2	4520	27.62	
Unnamed Ck	Tributary-2	4612.5	27.62	
Unnamed Ck	Tributary-2	4724.5	27.64	
Unnamed Ck (Minor Causeway)	Tributary-2	4730		
Unnamed Ck	Tributary-2	4735.5	27.64	
Unnamed Ck	Tributary-2	4823.5	27.65	
Unnamed Ck	Tributary-2	4920	27.67	
Unnamed Ck	Tributary-2	5360	27.72	
Doongul Ck	LPds	5724	27.74	
Doongul Ck	LPds	5913	27.99	

Location	HEC-RAS Name		HEC-RAS Flood Level (m)	Reported Flood Level (m)
	Identifier	Chainage		
Doongul Ck (Major Causeway)	LPds	5920		
Doongul Ck	LPds	5927	28.01	
Doongul Ck	LPds	6075.5	28.17	
Doongul Ck	LPds	6350	28.28	
Doongul Ck	Doongul-1	400	28.27	
Doongul Ck	Doongul-1	800	29.05	
Doongul Ck	Doongul-1	1200	29.67	
Logbridge Ck (Just upstream of Farmhouse)	LogbridgePowell-1	7030	28.47	28.5
Logbridge Ck	LogbridgePowell-1	7540	28.77	
Logbridge Ck	LogbridgePowell-1	8183	30.99	
Logbridge Ck (Access Bridge)	LogbridgePowell-1	8190		
Logbridge Ck	LogbridgePowell-1	8197	31.00	
Logbridge Ck	LogbridgePowell-1	8850	31.88	
Logbridge Ck	LogbridgePowell-1	9140	32.20	
Logbridge Ck	LogbridgePowell-1	10280	33.66	
Logbridge Ck	LogbridgePowell-1	11340	35.09	
Logbridge Ck	LogbridgePowell-1	11770	35.43	

* Recorded dam water level with Crest Gates closed and inoperable.

4.3.4 Design Flood Level Estimation

The calibrated HEC-RAS model was adopted and used to calculate the water surface profiles along the creek system for the 50%, 20%, 10%, 5%, 2% and 1% AEP design flood events. Design inflows from RORB corresponding to these events were used in the HEC-RAS model. Water surface levels at Lentalls Dam, calculated from RORB, were used as the tailwater levels for the HEC-RAS analysis. The same Mannings n roughness coefficients established from the calibration process were adopted for the design runs. Two Crest Gates scenarios, one with the gates closed and not operational, and the other with the gates opened and fully functional, were assessed.

5. Findings

5.1 Design Flows

5.1.1 Scenario 1: Crest Gates Closed and Not Operational

Peak design discharges for the 50%, 20%, 10%, 5%, 2% and 1% AEP storm events, computed from RORB, are presented in Table 5-2 at key locations along the Doongul Creek – Logbridge Creek system. These results are for the scenario with all the Crest Gates closed and not operational. It is noted that, some discharge still occurs, due to overtopping of the gates, under this condition. For convenience and ease of reference, the peak water elevation at the dam corresponding to each design event is included in the first row of the table.

In Table 5-1, it is noted that the peak flows shown are the maximum flows derived from a range of storm durations from 1-72 hours. In general, the peak or critical flows are mostly from the 18-hour storm duration. The exceptions are Doongul Creek (HEC-RAS Doongul-1) where the 12-hour storm was critical, the upstream reaches of Logbridge Creek (HEC-RAS LogbridgePowell-1) where the 1 to 3 hour storms were critical, and the small tributary (HEC-RAS Tributary-2) where the 1-hour storm was critical.

Based on the results in Table 5-1, it is observed that under the 50% AEP (or 1 in 2 year ARI) event, a maximum dam water elevation of 27.8m AHD is reached. This dam water level increases as the magnitude of the AEP event is increased, as expected, and is estimated to reach a level of 30.26m AHD for the 1% AEP (or 1 in 100 year ARI) event. It is noted that this maximum 1% AEP dam water level of 30.26m AHD is well below the original dam crest level of 34m AHD, which has since been raised by about 6m as part of the Lenthalls Dam upgrade project.

Comparison of the 50% AEP (1 in 2 year ARI event) water level at the dam with that recorded for the February 2008 event is also useful. These results (see footnote to Table 5-1) show that at the dam, the magnitude of the February 2008 event is less than the 50% AEP (or 1 in 2 year ARI) event. Specifically, the maximum February 2008 dam water level (27.49m AHD) is found to be approximately 0.32m below the 50% AEP level.

The corresponding dam inflows and outflows are similarly lower for the February 2008 event, relative to the 50% AEP flows. Overall, these results suggest that the February 2008 event was a relatively modest storm event.

5.1.2 Scenario 2: Crest Gates Open and Fully Operational

Peak design discharges for the 50%, 20%, 10%, 5%, 2% and 1% AEP storm events were similarly computed from RORB for the scenario with all the gates opened and fully operational. These results (Scenario 2) are summarised in Table 5-2, and correspond to the peak flows extracted from the full range of storm durations assessed.

Comparison of the results in Table 5-2 (Scenario 2) with those of Table 5-1 (Scenario 1), indicate that the maximum dam water levels reached are significantly lower with the gates opened (Scenario 2), as

expected. For the 50% AEP event, the maximum dam water level for Scenario 2 is approximately 1.4m lower than that for Scenario 1, while for the 1% AEP event, Scenario 2 is 1.74m lower.

Table 5-1: Peak RORB Flows for Design Events (Scenario 1: Crest Gates Not Operational)

HEC-RAS Location	Peak Discharges for Design AEP Storm Events (m^3/s)					
	50%	20%	10%	5%	2%	1%
Dam Water Level (m)	27.81	28.52	28.88	29.30	29.86	30.26
Peak Dam Outflow	317.5	524	636	782	990	1145
Peak Dam Inflow	604.9	960.2	1158	1425	1796	2090
LogbridgePowell-3 (Ch 3220)	280.7	451.1	547.8	678.9	863.6	1008
Tributary-2 (Ch 5360)	48.4	74.6	87.4	104.9	125.9	147.3
LPds (Ch 6075.5)	274.9	441.2	553.1	657.3	835.5	972.7
LPds (Ch 6350)	274.1	440.1	553.1	659.1	833.6	972.2
Doongul-1 (Ch 1200)	216.1	347.3	418.5	516.6	645.9	758.6
LogbridgePowell-1 (Ch 8183)	119.2	182.1	214.4	259.3	319.5	374.2
LogbridgePowell-1 (Ch 12490)	83.07	125.7	147.7	178.3	219.7	258.4

Note for February 2008 Event: Dam Water Level = 27.49m, Peak Inflow = 492 m^3/s, Peak Outflow = 237 m^3/s.

Table 5-2: Peak RORB Flows for Design Storm Events (Scenario 2: Crest Gates Operational)

HEC-RAS Location	Peak Discharges for Design AEP Storm Events (m^3/s)					
	50%	20%	10%	5%	2%	1%
Dam Water Level (m)	26.39	26.94	27.23	27.63	28.15	28.52
Peak Dam Outflow	538.1	743.4	877	1072	1339	1536
Peak Dam Inflow	604.9	960.2	1158	1425	1796	2090
LogbridgePowell-3 (Ch 3220)	280.7	451.1	547.8	678.9	863.6	1008
Tributary-2 (Ch 5360)	48.4	74.6	87.4	104.9	125.9	147.3
LPds (Ch 6075.5)	274.9	441.2	553.1	657.3	835.5	972.7
LPds (Ch 6350)	274.1	440.1	553.1	659.1	833.6	972.2
Doongul-1 (Ch 1200)	216.1	347.3	418.5	516.6	645.9	758.6
LogbridgePowell-1 (Ch 8183)	119.2	182.1	214.4	259.3	319.5	374.2
LogbridgePowell-1 (Ch 12490)	83.07	125.7	147.7	178.3	219.7	258.4

It can be seen, from Table 5-1 and Table 5-2, that the peak inflows at various locations along the creek system, for Scenarios 1 and 2, are identical, as expected. The only difference is the dam outflows, with

the outflows for Scenario 2 being 34% to 69% higher. These results are considered to be reasonable.

It is further noted from Table 5-1 and Table 5-2 that failure of the Crest Gates to open resulted in an increase in the dam water level of up to 1.4m for the 50% AEP event. However, this is not expected to translate to a similar increase in flood level further upstream near the farmhouse property for the February 2008 event.

Rather, it is expected that the corresponding increase in flood level near the farmhouse attributed to failure of the gates, for the February 2008 event, would be more modest, due to the higher ground topography upstream at that location. While additional model runs have not been undertaken to confirm this impact, it may be inferred from the results later presented in Section 5.2, that the additional increase in water level at the farmhouse, due to failure of the Crest Gates, is likely to be within 400mm.

5.2 Design Flood Levels

5.2.1 Scenario 1: Crest Gates Closed and Not Operational

Design flood levels for the 50%, 20%, 10%, 5%, 2% and 1% AEP flood events computed at various locations throughout the Doongul Creek and Logbridge Creek systems are presented in Table 5-3. These flood levels represent the scenario with the Crest Gates closed or not operational. Essentially, they show how the water surface profiles would back up along the creeks as a result of the elevated water levels in the dam. It is noted that even though the gates are closed, some discharge still occurs from the dam due to overtopping of the gates (Figure 4-2).

In Table 5-3, the results show that both the minor and major causeways would be inundated and possibly impassable for the full range for floods between the 50% AEP and 1% AEP. The major causeway is located along Doongul Creek approximately 450m downstream of its confluence with Logbridge Creek (HEC-RAS LPds Section 5920). The minor causeway is located along the minor tributary approximately 1.9km upstream of its confluence with Doongul Creek (HEC-RAS Tributary-2 Section 4730).

At the minor causeway, it is estimated that the inundation depth over the road would range from 1.6m for the 50% AEP event to 4.5m for the 1% AEP event. For the major causeway, the corresponding depths of flow over the road are estimated to be 2.3m and 5.6m, respectively. It is considered that these depths of flow are significant, notwithstanding the fact that the area is fairly remote. At these depths, both causeways would be classified as high hazard floodways.

It is also estimated that the flood level near the farmhouse property would reach approximately 28.9m AHD for the 50% AEP event, and 32.3m AHD for the 1% AEP event. Thus, the reported February 2008 flood level of 28.5m at the farmhouse, if confirmed, equates to a flood level approximately 0.4m below the 50% AEP event. This result is consistent with that highlighted in Section 5.1.1, and indicates that the February 2008 event was a relatively small event with a magnitude less than the 50% AEP.

It is noted that no data was available to verify the depths of flow over the causeway for the February 2008 event.

Table 5-3: Design Flood Levels for various Flood Events (Scenario 1: Crest Gates Closed)

Location	HEC-RAS Name		Design Flood Level (m) for AEP Event					
	Identifier	Chainage	50%	20%	10%	5%	2%	1%
Lenthalls Dam Inlet	LogbridgePowell-3	400	27.81	28.52	28.88	29.30	29.86	30.26
Doongul Ck	LogbridgePowell-3	800	27.82	28.54	28.9	29.33	29.9	30.31
Doongul Ck	LogbridgePowell-3	1200	27.82	28.55	28.92	29.35	29.93	30.34
Doongul Ck	LogbridgePowell-3	1600	27.83	28.56	28.93	29.37	29.96	30.38
Doongul Ck	LogbridgePowell-3	2000	27.84	28.58	28.95	29.40	29.99	30.42
Doongul Ck	LogbridgePowell-3	2300	27.85	28.60	28.98	29.43	30.03	30.47
Doongul Ck	LogbridgePowell-3	3220	27.91	28.71	29.12	29.61	30.26	30.73
Unnamed Ck	Tributary-2	4520	27.98	28.82	29.25	29.75	30.41	30.88
Unnamed Ck	Tributary-2	4612.5	27.98	28.82	29.25	29.75	30.41	30.88
Unnamed Ck	Tributary-2	4724.5	27.99	28.83	29.25	29.75	30.41	30.89
Unnamed Ck (Minor Causeway)[1]	Tributary-2	4730						
Unnamed Ck	Tributary-2	4735.5	28.00	28.80	29.27	29.73	30.41	30.91
Unnamed Ck	Tributary-2	4823.5						
Unnamed Ck	Tributary-2	4920	28.00	28.80	29.27	29.73	30.41	30.91
Unnamed Ck	Tributary-2	5360	28.01	28.81	29.27	29.73	30.41	30.91
Doongul Ck	LPds	5724	28.18	29.18	29.69	30.27	31.02	31.52
Doongul Ck	LPds	5913	28.45	29.46	29.95	30.52	31.25	31.76
Doongul Ck (Major Causeway)[2]	LPds	5920						
Doongul Ck	LPds	5927	28.46	29.47	29.96	30.53	31.25	31.77
Doongul Ck	LPds	6075.5	28.64	29.66	30.14	30.70	31.41	31.92
Doongul Ck	LPds	6350	28.78	29.84	30.33	30.89	31.61	32.12
Doongul Ck	Doongul-1	400	28.76	29.82	30.30	30.87	31.58	32.09
Doongul Ck	Doongul-1	800	29.57	30.59	31.07	31.63	32.37	32.83
Doongul Ck	Doongul-1	1200	30.25	31.25	31.69	32.21	32.85	33.28
Logbridge Ck (Just upstream of Farmhouse)	LogbridgePowell-1	7030	28.93	30.01	30.51	31.07	31.78	32.29
Logbridge Ck	LogbridgePowell-1	7540	29.01	30.08	30.57	31.12	31.82	32.32
Logbridge Ck	LogbridgePowell-1	8183	31.13	31.51	31.65	31.83	32.10	32.51
Logbridge Ck (Access Bridge)	LogbridgePowell-1	8190						
Logbridge Ck	LogbridgePowell-1	8197	31.14	31.52	31.66	31.85	32.11	32.52
Logbridge Ck	LogbridgePowell-1	8850	32.06	32.26	32.43	32.64	32.91	33.11
Logbridge Ck	LogbridgePowell-1	9140	32.38	32.56	32.74	32.96	33.23	33.44
Logbridge Ck	LogbridgePowell-1	10280	33.74	34.27	34.46	34.70	34.99	35.23
Logbridge Ck	LogbridgePowell-1	11340	35.21	35.64	35.84	36.09	36.39	36.65
Logbridge Ck	LogbridgePowell-1	11770	35.55	36.00	36.21	36.46	36.77	37.04

1: Minor causeway level = 26.4m AHD 2: Major causeway level = 26.15m AHD

5.2.2 Scenario 2: Crest Gates Opened and Fully Operational

Design flood levels for the 50%, 20%, 10%, 5%, 2% and 1% AEP flood events along the Doongul and Logbridge Creek system are shown in Table 5-4. These flood levels are with the Crest Gates fully opened and operational. Under these conditions (gates opened), the water level in the dam is between 1.4m (50% AEP event) to 1.74m (1% AEP event) lower than those with the gates closed, as noted earlier.

In Table 5-4, the results indicate that both the minor and major causeways would be submerged, even with the Crest Gates fully opened and functional, for the range of design floods simulated. In the case of the minor causeway (Unnamed Creek, HEC-RAS Tributary-2, Section 4730), a flood depth of about 0.4m over the road is estimated for the 50% AEP event, and increasing to a depth of 3.3m for the 1% AEP event. Similarly, for the major causeway (Doongul Creek, HEC-RAS LPds, Section 5920) flood depths of 1.6m and 5m are estimated for the 50% and 1% AEP events, respectively. These depths are lower than those for Scenario 1, as expected. In practical terms, however, they are still relatively high (except for the minor causeway for the 50% AEP event), and high hazard conditions are expected to prevail.

Near the farmhouse location, the flood level is estimated to range from 28.5m AHD for the 50% AEP to 31.9m AHD for the 1% AEP event (Table 5-4, Scenario 2). Comparison of these flood levels (50% and 1% AEP) with those for Scenario 1, indicates that closure or non-operation of the Crest Gates leads to a flood level increase of between 0.33-0.43m near the farmhouse. For the 50% AEP event, the difference in flood level attributed to closure of the gates is about 0.4m.

The above results confirm that failure of the Crest Gates during the February 2008 flood resulted in an elevated flood level at the farmhouse. Additional model runs have not been undertaken to determine the extent of this increase. However, on the basis of the above findings, it is estimated that the flood level increase at the farmhouse, due to failure of the gates, is of the order of 0.3 to 0.4m.

Table 5-4: Design Flood Levels for Various Flood Events (Scenario 2: Gates Opened)

Location	HEC-RAS Name		Design Flood Level (m) for AEP Event					
	Identifier	Chainage	50%	20%	10%	5%	2%	1%
Lenthalls Dam Inlet	LogbridgePowell-3	400	26.38	26.94	27.23	27.63	28.15	28.52
Doongul Ck	LogbridgePowell-3	800	26.4	26.97	27.27	27.68	28.22	28.60
Doongul Ck	LogbridgePowell-3	1200	26.41	26.99	27.29	27.71	28.26	28.66
Doongul Ck	LogbridgePowell-3	1600	26.42	27.01	27.32	27.75	28.32	28.72
Doongul Ck	LogbridgePowell-3	2000	26.44	27.04	27.37	27.81	28.38	28.79
Doongul Ck	LogbridgePowell-3	2300	26.46	27.09	27.42	27.87	28.46	28.89
Doongul Ck	LogbridgePowell-3	3220	26.57	27.29	27.68	28.20	28.87	29.35
Unnamed Ck	Tributary-2	4520	26.73	27.55	27.97	28.53	29.20	29.68
Unnamed Ck	Tributary-2	4612.5	26.74	27.55	27.98	28.53	29.21	29.68
Unnamed Ck	Tributary-2	4724.5	26.79	27.57	27.99	28.54	29.21	29.69
Unnamed Ck (Minor Causeway)[1]	Tributary-2	4730						
Unnamed Ck	Tributary-2	4735.5	26.81	27.57	27.99	28.54	29.23	29.71
Unnamed Ck	Tributary-2	4823.5	26.93	27.58	28.00	28.55	29.23	29.71

Location	HEC-RAS Name		Design Flood Level (m) for AEP Event					
	Identifier	Chainage	50%	20%	10%	5%	2%	1%
Unnamed Ck	Tributary-2	4920	27.07	27.6	28.02	28.55	29.24	29.71
Unnamed Ck	Tributary-2	5360	27.42	27.74	28.01	28.57	29.24	29.72
Doongul Ck	LPds	5724	27.06	28.15	28.75	29.43	30.24	30.78
Doongul Ck	LPds	5913	27.76	28.75	29.31	29.90	30.63	31.14
Doongul Ck (Major Causeway)[2]	LPds	5920						
Doongul Ck	LPds	5927	27.77	28.76	29.32	29.91	30.64	31.15
Doongul Ck	LPds	6075.5	28.11	29.10	29.65	30.18	30.89	31.37
Doongul Ck	LPds	6350	28.31	29.35	29.92	30.45	31.16	31.64
Doongul Ck	Doongul-1	400	29.29	29.32	29.89	30.42	31.12	31.60
Doongul Ck	Doongul-1	800	29.39	30.35	30.84	31.38	32.13	32.56
Doongul Ck	Doongul-1	1200	30.14	31.15	31.59	32.10	32.72	33.13
Logbridge Ck (Just upstream of Farmhouse)	LogbridgePowell-1	7030	28.52	29.58	30.18	30.70	31.39	31.87
Logbridge Ck	LogbridgePowell-1	7540	28.73	29.70	30.26	30.77	31.44	31.91
Logbridge Ck	LogbridgePowell-1	8183	31.16	31.53	31.67	31.86	32.09	32.25
Logbridge Ck (Access Bridge)	LogbridgePowell-1	8190						
Logbridge Ck	LogbridgePowell-1	8197	31.18	31.54	31.68	31.89	32.10	32.27
Logbridge Ck	LogbridgePowell-1	8850	32.08	32.26	32.43	32.65	32.91	33.11
Logbridge Ck	LogbridgePowell-1	9140	32.39	32.58	32.74	32.96	33.23	33.44
Logbridge Ck	LogbridgePowell-1	10280	33.77	34.27	34.46	34.70	34.99	35.23
Logbridge Ck	LogbridgePowell-1	11340	35.21	35.64	35.84	36.09	36.39	36.65
Logbridge Ck	LogbridgePowell-1	11770	35.55	36.00	36.21	36.46	36.77	37.04

1: Minor causeway overflow level = 26.4m AHD 2: Major causeway overflow level = 26.15m AHD

6. Summary and Conclusions

An investigation of the potential impacts of failure of the Lenthalls Dam spillway Crest Gates on upstream flood behaviour has been carried out.

The hydrological model RORB was used to simulate the rainfall and runoff processes in the catchment. The hydraulic model HEC-RAS was used to assess the flood behaviour along the creek system. Both models were calibrated to the February 2008 storm event prior to use for design flood estimation. Data adopted for the calibration included rainfall data, water surface level records at the dam, and a reported flood level at a farmhouse situated approximately 6km upstream of the dam.

Peak discharges at various locations along the creek system, as well as the inflow and outflow behaviour at the dam, were estimated for the 50%, 20%, 10%, 5%, 2% and 1% AEP events. For each storm AEP event, two scenarios were assessed, firstly with all the Crest Gates closed and not operational (Scenario 1), and secondly, with all the gates opened and operational (Scenario 2).

The results indicate that failure of the Crest Gates would lead to an increase in water level in the dam of about 1.4m for the 50% AEP (or 1 in 2 year ARI) event, and up to 1.74m for the 1% (or 1 in 100 year ARI) AEP event. This corresponds to an increase in dam outflow of 69% and 34%, respectively.

At the major causeway along Doongul Creek, just downstream of its confluence with Logbridge Creek (Warrah Road), failure of the gates is estimated to result in an increase in flood depth of between 0.6 and 0.7m. At the minor crossing (Kellogum Forestry Road), the flood depth increase is estimated to be 1.2 to 1.3m. High hazard conditions are expected to occur at the causeways for most of the design flood events assessed.

Further upstream near the farmhouse, along Logbridge Creek, the effect of the gate failure on flood level increase is found to be less pronounced. This local increase in flood level is estimated to be between 0.33 and 0.43m for the full range of design floods between the 50% AEP and 1% AEP events. The impact of the gate failure during the February 2008 event is also estimated to fall within this limit.

Comparison of the reported flood level for the February 2008 event with those calculated for the design flood events indicate that the February event was a relatively small event. Accordingly, the magnitude of the February 2008 event is assigned to be slightly less than the 50% AEP event.

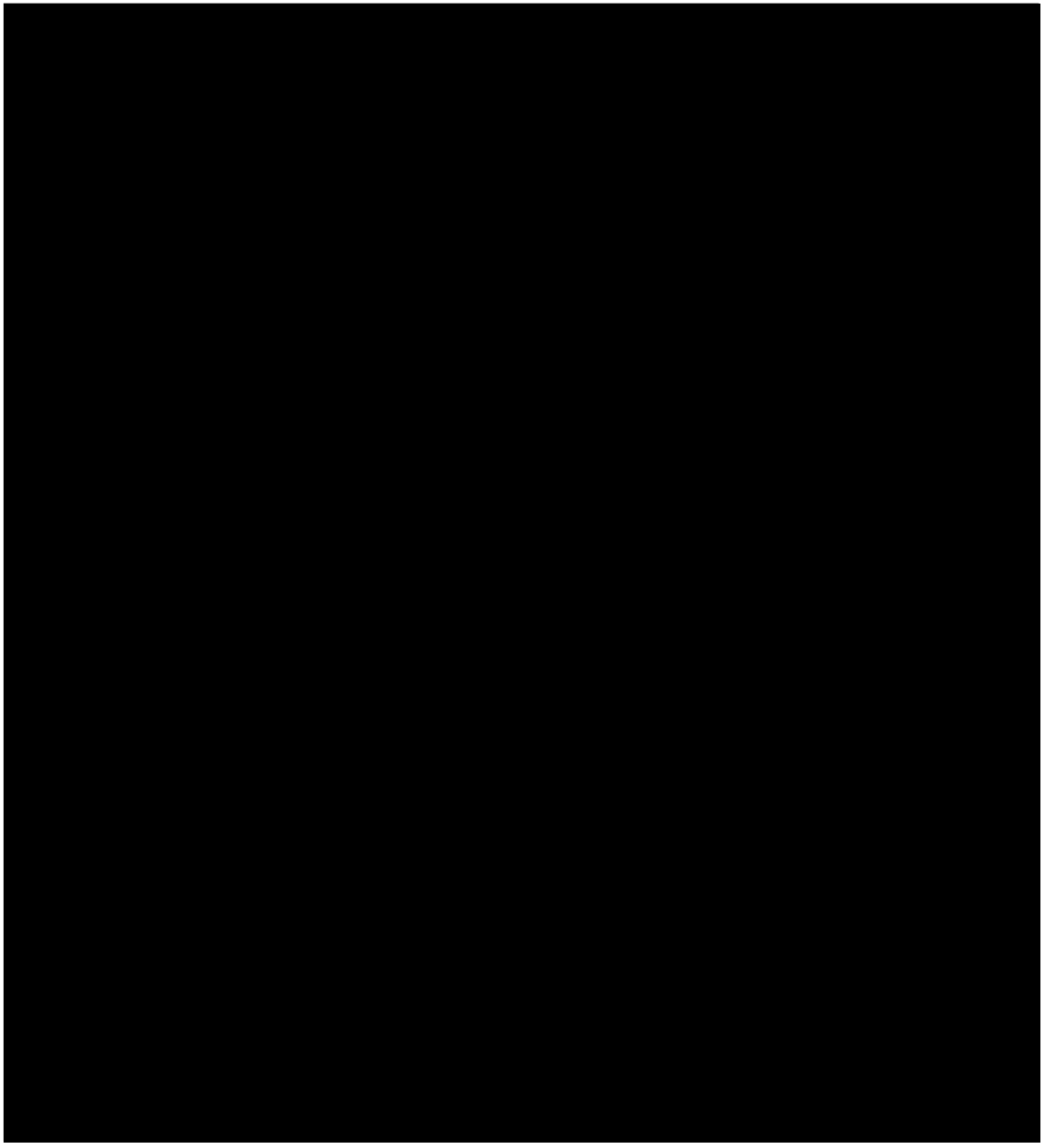
It is recommended that the reported flood level of 28.5m at the farmhouse during the February 2008 flood be confirmed through survey, if not already done so. It is also recommended that other flood level marks that may still exist in the catchment be obtained as part of the survey. This includes the depths of flow over the causeways for that event.

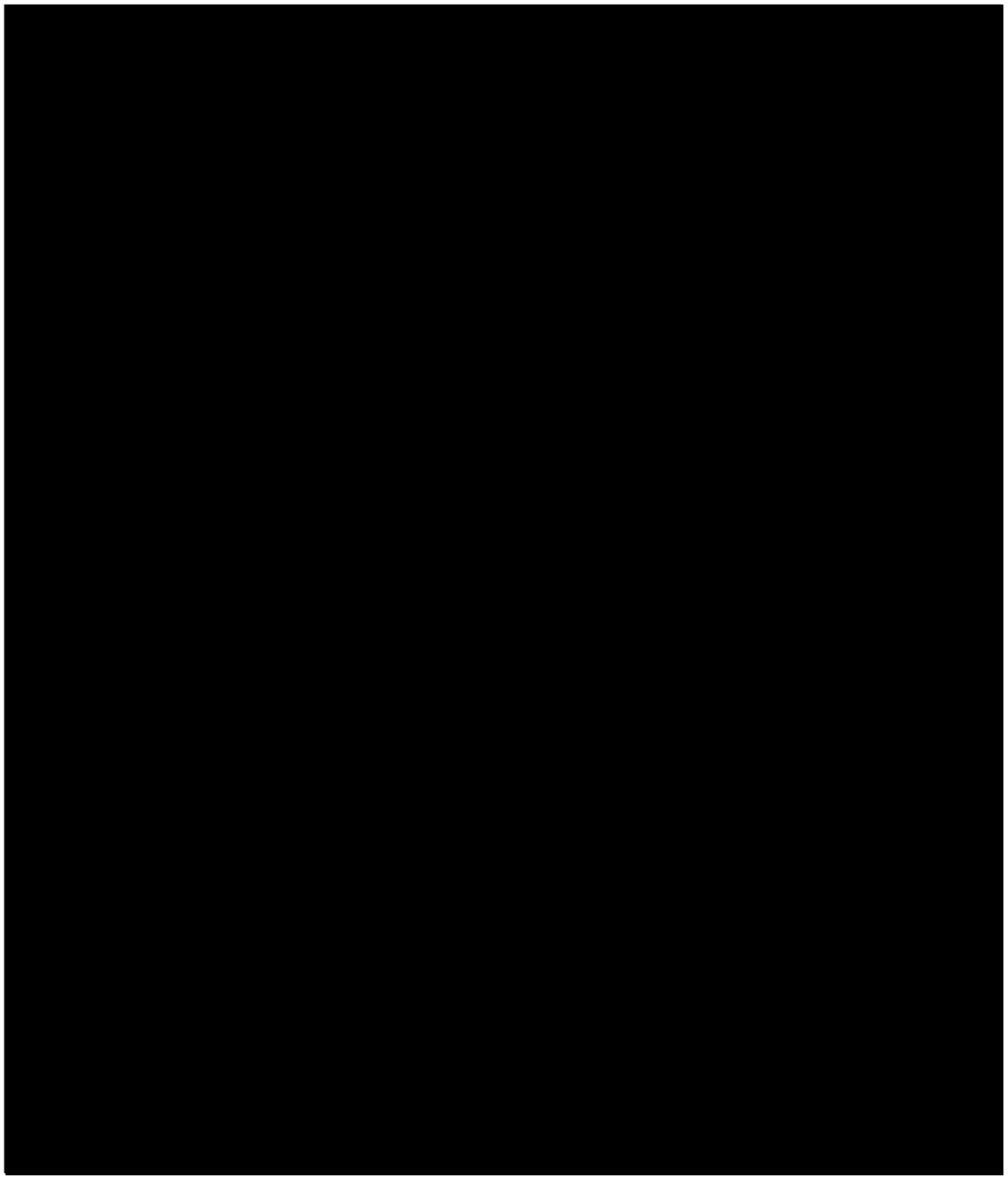
It is noted that the models used in the study have only been calibrated to the February 2008 flood at this stage. It is recommended that the models be calibrated and verified using other historical flood events, if additional data becomes available.

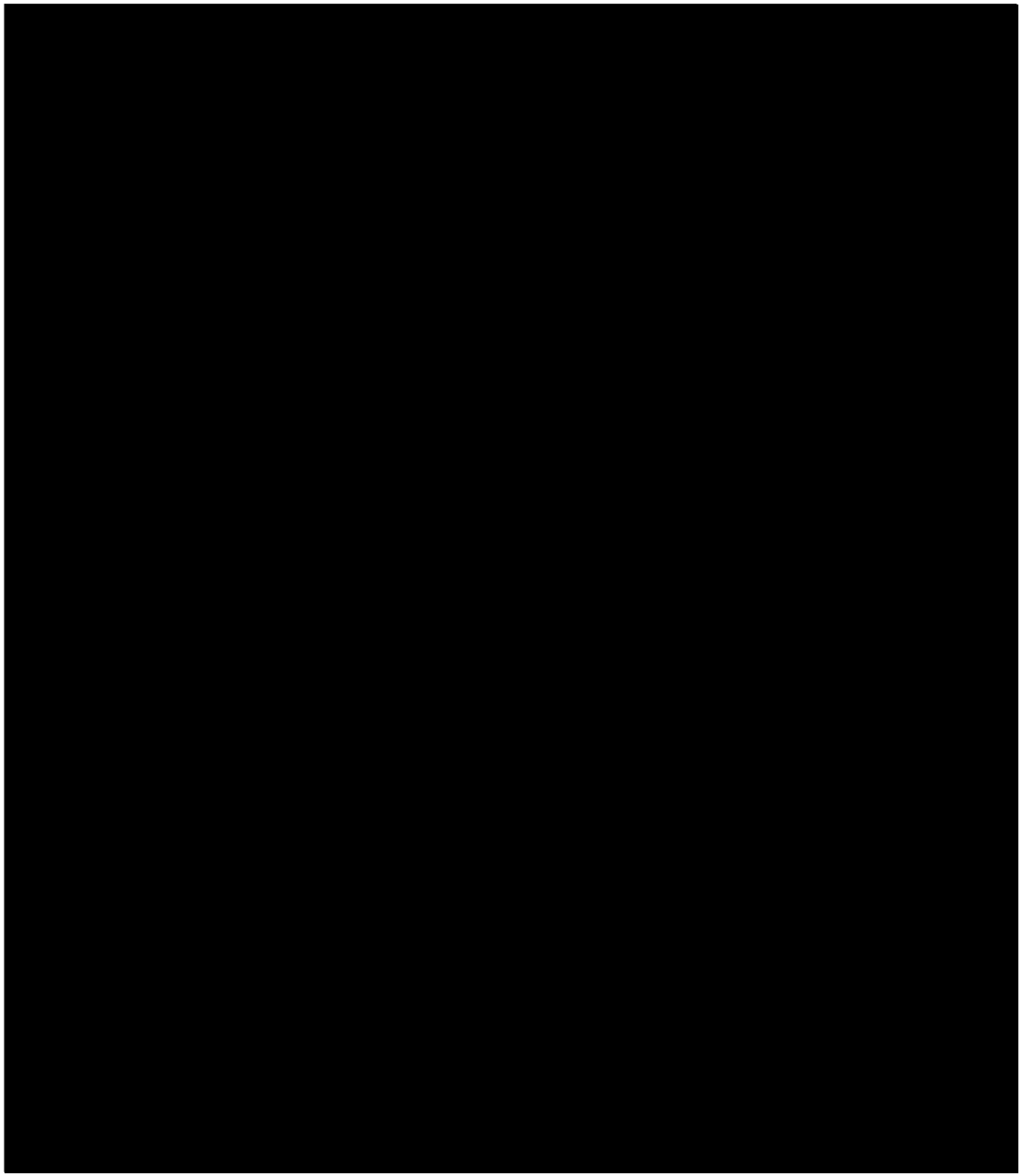
Appendix A

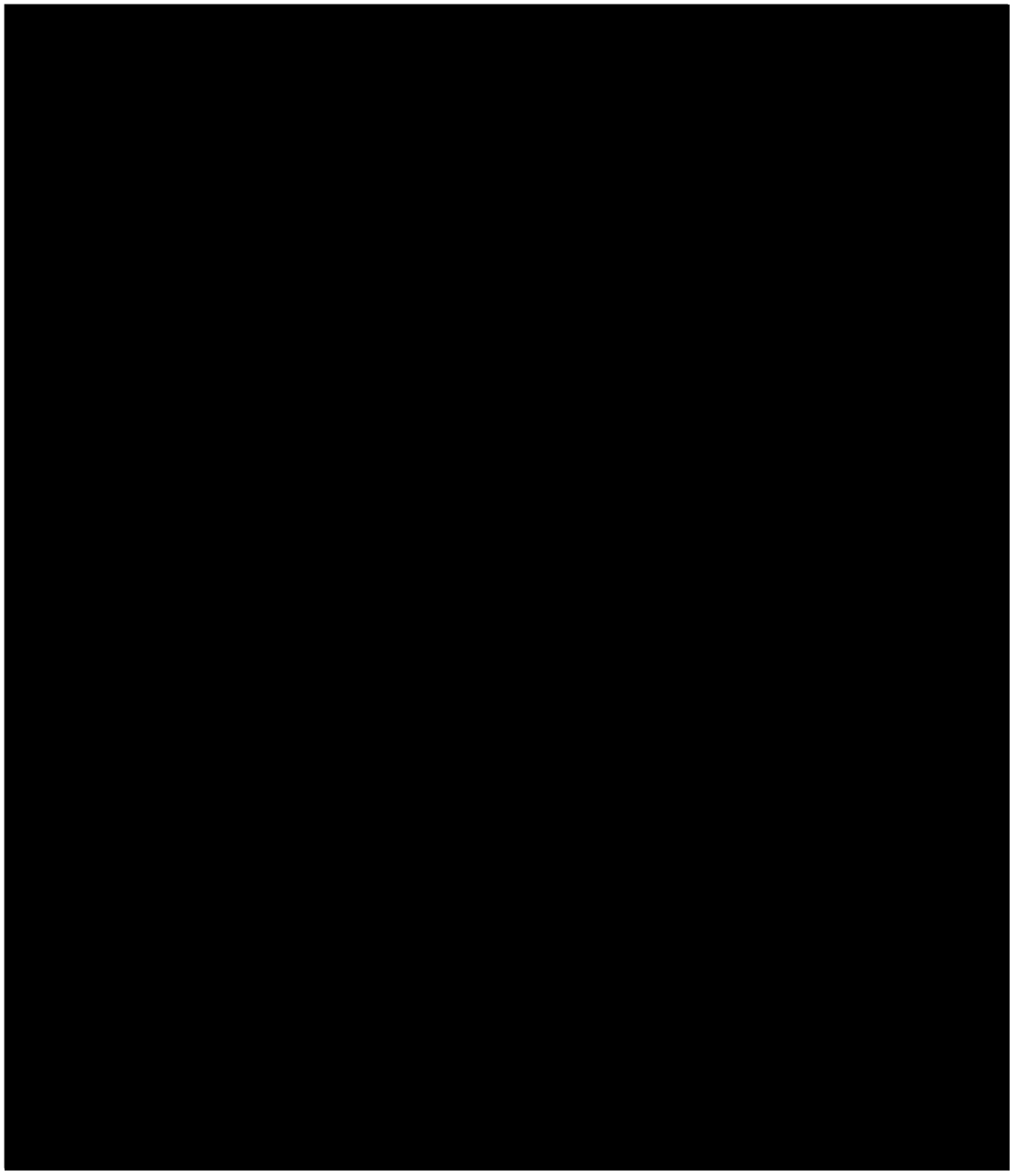
Media Reports

WATER ENGINEERING
AUSTRALIA







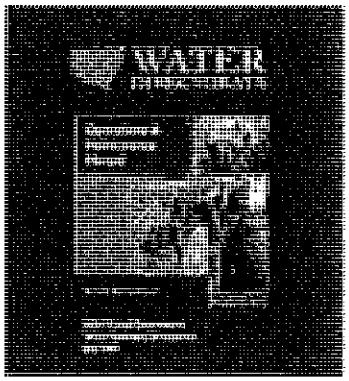


WATER DIRECTORATE

RECENT VISITORS

The Water Directorate regularly invites water industry respresentatives to our meetings to discuss pertinent issues.

Click here to view our recent visitors.



News

Lenthalls Dam Gate Failure

10 November 2008

The Lenthals Dam Crest gates were installed in 2007 and failed to o 2008. In February 2008 high rainfall led to a moderate flood event a gates failed to lower to release flood water.

In this incident, manual operation of the gates did not occur it is be operable. The operating authority failed to implement the Emergenc evacuate flood impacted upstream sites.

Three persons were put at risk due to upstream flooding. Had the fl severe the persons trapped faced injury or death.

A copy of a recent research paper by Damian Carstens on the Lenth to download. It provides an interesting risk management case study factors. The Water Directorate encourages our members to read thi learning from and improving our responses to such incidents.

Download a copy of the Lenthalls Dam Gate Failure Research Paper

For more information contact:

Name: Gary Mitchell
Email: [redacted]
Address: [redacted] Kent St, Sydney
Phone: [redacted]
Fax:

GREENPEACE AUSTRALIA PACIFIC

- Home
- About
- Contact us

Queensland climate review must address coal exports

Queensland Sustainability Minister Andrew McNamara has announced a review of the state's climate change strategy. Due in part to Australia ratifying Kyoto and new science forecasting accelerating climate change, the review is expected to be completed later this year. Yet to be credible, the review must also address Queensland's massive coal exports.

The greenhouse gas emissions produced when Queensland's exported coal is burned are vast and far exceed those produced by the state itself. Just because this coal is used elsewhere does not mean the impacts will not be felt by Queenslanders.
Every tonne of coal we export comes back to Australians as climate change impacts. For Queensland that means hotter temperatures, less rain, and the gradual death of the Great Barrier Reef.

If Queensland really wants to help stop dangerous climate the review must outline how it will rein in its expanding coal industry. Furthermore it has to draft a blueprint for how to transition Queensland's economy away from coal and towards a clean energy future.

A Newspoll commissioned by Greenpeace last year revealed that, when asked about Australia's export coal industry, 71% of Queenslanders said coal exports should be capped or reduced.

86% of Queenslanders supported Mr Rudd introducing new policies that will ensure Australia's greenhouse gas emissions begin to decrease within the next three years. 74% said the government should begin phasing out existing coal-fired power stations and replacing them with renewable energy generation by 2010.

The figures for the state are similar to the national results.

This entry was posted on Friday, February 29th, 2008 at 2:09 pm and is filed under Queensland, Coal, Climate change | Global warming, Renewable energy. You can follow any responses to this entry through the RSS 2.0 feed. You can leave a response, or trackback from your own site.

4 Responses to "Queensland climate review must address coal exports"

1. *pkqottynwm* Says:
   March 23rd, 2008 at 12:39 am

   zatyry | [url=http://wuzyxi.com]ranuxo[/url] | [link=http://papoha.com]hehuwy[/link] | http://rytyzu.com | pixyhy | [http://ropyzo.com teheko]

2. *Toni Robinson-Randall* Says:

May 2nd, 2008 at 1:04 pm

The government will make a token effort to do something about the coal exports .. eg clean coal (what a joke). The royalties paid to the government are much to great for the government to change it's attitude. Money and Power = Corruption, is what it is about. The Government in it's wisdom has granted "Shale Oil" exploration in the Whitsunday's. The proposal thus far is to open cut mine to 600mtrs deep the wetlands to the shore line in the Airlie Beach, Laguna Quays area of Queensland. They have also allowed 12 NEW coal mines to open up in the Central Coal District of Qld. The government is playing with the people and not totally informing them of their plans.

3. *Lenthalls Dam Washout* Says:
September 7th, 2008 at 2:01 pm

Dont place much faith in anything Andrew Mcnamara says or does - he is weak ineffectual minster - with no real interest in the enviornment. I know I am a local from his Hervey Bay Electorate.
Andrew is more concerned with his local business relationships and other networks than good governance. This is played out in terms of the underfunding for the EPA and the tokenism you see in his sustainabilty programs.
By way of backgroound a little story.
Lenthalls Dam Gates (Burrum River) were designed to increase the impoundment and release flood flow - for environmental reasons. It was to be a have the cake and eat it solution - the people of Hervey Bay had more urban water but the Burrum River would flush with spring / summer rain.

The gates were installed at a cost of over $10 Million Dollars in December 2007 and failed to operate virtually from inception - the gates jammed in the up position refusing to lower to release flood flow. Andrew Mcnamara was quoted in the Fraser Coast Chronicle (our local paper) saying words to this effect - I have had enough glasses of wine with Tim Waldron (dam operator) to know that this is a good project.
Nothing has been done about the wasted funds and the gates still dont work - this is the sort of result on the environment you will get from the QLD Labour Govt
- this is our story:
I have concerns that Australias water infrastructure managers may not be up to the responsibilities involved.
By this I mean the states, water corporations like Wide Bay Water and local govermments.

Our own experience of dam gate failure at Lenthalls Dam on the Burrum River is a telling - it is indicative of an inability to understand risk and manage public saftey issues

You would imagine that Dam infrastructure in Australia is safe - however our experience on the Burrum River in QLD shows just how easy it is to become a fatality when Dam Infrastructure fails.

Gates constructed in December 2007 at Lenthalls Dam on the heavily impounded Burrum River failed to lower to release flood water as designed in Febuary 2008.
Wide Bay Water was the constructing authority and responsible for the design and operation of the dam gate infrastructure.
Our upstream farm house, where the tributaries join the dam proper was cut of when flood water continued to back up much higher than the constructing authority Wide Bay Water had predicted the water levels would ever go.
Three family members were stuck at our farm house. The emergency evacuation plan found in the Lenthalls Dam Emergency Action Plan called for evacuation after water levels reached RL26.91 - water levels reached 27.4 at the dam wall flowing over the blocked gates and

backed up to RL28.5 at our house. No one evacuated the famuily members stranded in rising water.
No one from the constructing authority Wide Bay Water contacted us to undertake evacuation or explain the risk we faced due to Crest Gate Failure.
We believe the CEO Tim Waldron was overseas at conference when the event happed. The Operations manuals for the dam place responsibilty with the CEO as does the action plan. He has not been called to account for his failure to take responsible action to ensure an evacuation would occur in his abscence if required.

If the rain event had not stopped the three people cut off at our flood impacted farm house would have been inundated by metres of water.

We heard about the dam failure from other locals close to the dam wall who had heard the gates have failed - we now have full evidence to verify the dam gate failure.

What our situation highlights is that while most fatalities from failed dams and failed dam infrastructure have occurred in the countries of the south ie third world the west is not imune from dam infrastructure failure.

The capacity of first world dam operators to manage infrastructure/ risk and operational and human failure is not consistent.
We were very lucky the rain event that caused the flooding to back up over the failed dam gate, stopped.
It is however only a matter of time before a dam infrastructure failure in the first world causes fatalities.
We feel that maybe operational and human failures that have occured without fatality have been coverd up and are not generally reported or researched.
It is likely constructing authorities keep these instances quiet.
Please see the small news article that did report the event (not comprehensively).

See the article:
Resident fears dam gates risk flooding
Posted Wed May 21, 2008 8:26am AEST
Updated Wed May 21, 2008 8:25am AEST
• Map: Hervey Bay 4655
A land-holder upstream of a major dam south-west of Hervey Bay says multi-million dollar barriers on the storage are broken, putting her family at risk of flooding.
Queensland Deputy Premier Paul Lucas will officially open the $16 million project at Lenthalls Dam, which is designed to more than double the storage's capacity.
In what is claimed to be an Australian first, the two metre high crest gates sink when the dam reaches capacity to prevent flooding upstream and provide for environmental flows.
But Esther Allan says in February the gates jammed, causing water to back up onto her property.
"This is an extremely expensive piece of infrastructure. Ratepayers paid for this and their expectation would be that it would be operable," she said.
"If it wasn't, we need to know why - not only because our family's safety was put at risk, but because ratepayers expect to get a result from the infrastructure they pay for."
The local government corporation that runs Lenthalls Dam says the gates do not work, but it was monitoring the rising water.
Wide Bay Water general manager David Wiskar says adjustments were needed during the dam's commissioning and are continuing.
"The gates were all needing some fine-tuning. At the moment we were able to complete that tuning on three of the gates," he said.
"There's two that remain to be done, but we're waiting until the level in the dam falls to an

adequate level to [do] those final two."
The Lenthalls Dam Gates are still not fully operational today September 2008 and heading into the QLD summer flood season.

We can evidence what we are saying.
We dont have too much faith that any government authority will maintain our saftey, and our economy is currently healthy and well economically resourced.

Infrastructure once built needs to be operable ongoing through good economic times and bad. Infrastructure needs to be able to operate as designed in all conditions.

Climate Change will continue to place increased pressure on infrastructure in Australia the frequency of extreme storm and weather events will be a counterpoint to extreme drought.

If the infrastructure cannot be managed safely now - those who live in areas affected by damming have much to worry about. Climate change will increase the risks posed by failed infrastructure.

The risks remain for all of those who live on dammed river systems.

4. *Lenthalls Dam Washout* Says:
January 12th, 2009 at 7:46 am

270 Downstream Residents at Risk as Lenthalls Dam Gates Hervey Bay are still not operable. Wide Bay Water Corporation still have not consulted affected residents upstream regarding the Emergency Action Plan in the event an evacuation is required or residents need to be contacted.

With a view to investigating the reasons that Public Saftey with Respect to Lenthalls Dam Gate Failure has never been taken too seriously (or at least upstream saftey issues) we have been looking in the the qualifications and background of the key decision makers within Wide Bay Water Corporation.

Engineers Registered with the as Proffessional Engineers with the Board of Proffessional Engineers Queensland have an obligation under their code of practice to act with public saftey as a priority.

It came as a suprise to us to find that of the senior staff and the CEO of WBW only one person a Peter Robbins of Springwood is registered with the BPEQ to operate as an engineer in QLD. The only other BPEQ registered engineer at Wide Bay Water Corporation in a senior decision making role is Mr Thomsen on the board of Directors WBW. Mr Thomsen is located at Ormiston not Hervey Bay.

The requirements are that unregistered engineers, and it seems there are many in WBW HB, must act under the direct Locational supervision of a registered Engineer.

That is they must be supervised by enineers located at Hervey Bay.

Is the CEO under constant supervision by MR Thomsen from the Board? and if so how much is the ratepayer paying for Mr Thomsen to be continually in HB supervising the CEO? The continual travel from Ormiston Brisbane would be expensive?
The Operations Manual for Lenthalls dam placeds ultimate responsibility for operation with the CEO? Who is supervising the CEO with respect to the Civil and Mechanical and Hyraulogical management of Lenthalls Dam?

Where are is the supervising engineer located?

We are confused about how all this works but at least now we feel we understand where the lack of understanding with respect to the saftey of upstream land holders may lie.

Not being BPEQ registered Engineers these senior staff at WBW do not have the same obigations a registered engineer with BPEQ would have.
It is in the public interest to ask would they be more focussed on public saftey if the code of practice for registered engineers applied to them?

Wether this explains the strange lack of consultation with respect to the Emergency Action Plan and the inability to ensure that practical workable contact numbers are included in this document and the lack of admission to land holders about the risk they face we dont know.

It is in the public interest to ask how water corporations like Wide Bay Water manage their responsibilities and whom is BPEQ qualified to make decisions and issue instruction Water and Dam management is a serious responsiblity as is public expenditure.

If ratepayes and tax payers have to pay for continual duplicated BPEQ supervision from outside consultants they dont get value for money - but they may not get the best decisions as those in management not BPEQ registered can and will over ride the recommendations given.

It is in the public interest to as is Time Waldron CEO Wide Bay Water Corporation a BPEQ registered decision maker or not?
The CEO is listed in the Lenthalls Dam Operations Manual as the responsible entity for the Dams Safe operation.

Leave a Reply

Name (required)

Mail (will not be published) (required)

Website

Submit Comment

Enter the letters you see below.

- **Search**

Search

- **Archives**

  - February 2009
  - January 2009
  - December 2008
  - November 2008
  - October 2008
  - September 2008
  - August 2008
  - July 2008
  - June 2008
  - May 2008
  - April 2008
  - March 2008
  - February 2008
  - December 2007
  - November 2007
  - October 2007
  - September 2007
  - August 2007
  - July 2007

- **Categories**

- CCS (11)
- Climate change | Global warming (140)
- Coal (51)
- Emission Trading (11)
- Energy [R]evolution Tour (32)
- Forests and climate change (6)
- General (3)
- Genetic Engineering (4)
- Grassroots action (24)
- Green Investment (3)
- Green New Deal (3)
- Greenhouse Mafia (2)
- International Meetings: Poznan | Kyoto | Bali | APEC | (44)
- Media reports on climate change (7)
- Nuclear (2)
- Overfishing (1)
- Past issues - Federal election (16)

- Peace and disarmament (2)
- Queensland (15)
- Renewable energy (44)
- Uncategorized (6)
- Voices from the forest (4)
- Whales (4)

Blogroll

- EcoEarth.Info
- Greenfoot
- GreenMaven

Greenpeace Blogs

- Greenpeace International
- Greenpeace International climate blog
- Greenpeace New Zealand Blog
- Greenpeace UK Blog

Visit the Greenpeace Australia Pacific website

Entries (RSS) | Comments (RSS)

LENTHALLS DAM GATES FAILURE 2008 – A CASE STUDY IN GATE RELIABILITY AND HUMAN FACTORS, FAILURE TO IMPLEMENT RISK MANAGEMENT PROCEDURE.

Damian Carstens

Abstract

The city of Hervey Bay is a growing tourist community that is located a comfortable 3.5 hour drive north from Brisbane. To meet growing water demands in the community, Wide Bay Water Corporation (WBW) required the raising of its water supply – Lenthals Dam.
Queensland Dam owners are aware of their obligation to manage their dams to minimise adverse environmental impacts and public risk.

In 2002 Tim Waldron CEO Wide Bay Water Corporation, KD Murray and Allan Crichton Principal Dam Engineer GHD published a study of options for the increase of Lenthals Dam, the paper is titled Raising Lenthals Dam – A Case Study in New Technology and the Environment. This publication referenced the final choice chosen for the dam increase; 2m crest gates to raise the full supply level to AHD26. A gated system was seen as beneficial in meeting post winter flood objectives[1].

The dam is assessed as Failure Impact Assessment Category 2, population at risk 270 not including upstream population and upstream state forest recreational users. The relevant standard is QLD Dam Safety Management Guidelines February 2002.
The Lenthals Dam Crest gates were installed in 2007 and failed to operate as designed from January 2008. In February 2008 high rainfall led to a moderate flood event, all gates inoperable. The gates failed to lower to release flood water.
In this incident, manual operation of the gates did not occur it is believed the mechanism was not operable. The operating authority failed to implement the Emergency Action Plan and failed to evacuate flood impacted upstream sites. Three persons were put at risk due to upstream flooding. Had the flooding been more prolonged or severe the persons trapped faced injury or death.

Australia has a strong reputation with respect Dam Safety and Incident management, this near fatal incident offers an opportunity to review and amend existing Dam Safety Requirements, Risk Management and Gate Reliability Criteria...
This incident provides ANCOLD with an opportunity to review all current guidelines and enhance Dam Safety standards with emphasis on the importance of mitigating human failure and ensuring public safety.

Introduction

Emergency Management Plans and arrangements are designed to treat residual risk and this is their place in the process.[2] It is clearly evident that the Dam Owner/ Operator, Regulators, Community and Emergency Management Planners need to establish clear communication.

---

[1] Tim Waldron, K D Murray and Allan Crichton. *Raising Lenthalls Dam - A Case Study in New Technology and the Environment.* Dam Infrastructure Technology Review, Wide Bay Water , Hervey Bay: IPWEA, 2002.

[2] Dam Safety Risk Treatments Steve Warren Australian Journal of Emergency Management2001

Reducing consequences can be achieved by workable functioning evacuation plans and warning systems[3] that seem to be absent in the Lenthals Dam Feb 2008 Incident.
Human behaviour is an important consideration in the management of Dam Failure risk; "...simple mistakes, operational, mismanagement, unnecessary oversights, or destructive intent can interact with other hazards to compound the possibility of failure[4]"

This case study considers the Human Failures that contributed to the upstream flood risk in the Lenthals Dam Failure February 2008. To what extent did a failure to follow Lenthals Dam Emergency Action Plan (EAP) requirements enhance the risks posed to the public?
It is in the public interest to ask a series of questions regarding the implementation of the Emergency Action Plan during the February 2008 event and the draft format of the EAP when the Lenthals Dam Incident occurred.

- Is it acceptable that the EAP was in draft when the Lenthals Dam Gate Failure occurred?
- Is it acceptable that the section of the EAP titled affected landholders was blank?
- Is it acceptable that the regulator approved the dam increase and gates whilst still waiting on key compliance requirements to be met?
- How could it be that the crest gate system chosen got the seal plate and gate seal clearance so wrong?
- Is it acceptable that prior to the Lenthals Dam Failure incident upstream landholders were not contacted, consulted or briefed as to the circumstances in which evacuation would occur?
- Should members of the public exposed to such a risk, be relocated prior to construction, thereby eliminating many of the risks faced and alleviating the constructing authority from the more onerous aspects of risk management, liability and negligence exposure?
- Despite assurances by Wide Bay Water Corporation that the gates were to operate automatically and lower at lower water levels after the Feb08 event, the gates did not operate automatically. In fact one was lowered manually and the rest did not lower manually despite water levels lowering. How is it that the dam operator was so uninformed during the incident regarding the operational and risks of failure in flood that they could not provide the regulator with accurate information?

To what extent would a strict adherence to the requirements in the Emergency Action Plan have minimised the risks posed to members of the public isolated by flood waters?

In the light of the Lenthals Dam Gate Failure Incident, Water Infrastructure Operators and Risk Managers should now address the changes required to be made to Dam Safety Risk Management and Dam Safety Requirements to ensure that future Dam Failure Incidents in Australia do not occur.
In the event of an incident steps must now be taken to ensure that EAP requirements are consistently adhered to.

---

[3] Dam Safety Risk Treatments Australian Journal of Emergency Management Steve Warren Victoria State Emergency Service

[4] Indiana Department of Natural Resources Dam Safety Inspection Manual 280803

Background

Lenthals Dam was constructed in 1983- 1984 to supply water to the Hervey Bay City Council area. The capacity of the storage is 17,256 ML for a Full Supply Level (FSL) at 24.0m AHD.

The existing dam consists of a zoned earthfill embankment, which is approximately 350 metres long. The elevation of the embankment crest is 34.0 metres AHD. The mass concrete ogee spillway is located on the right bank and is 75 metres wide energy dissipation channel, tapering over a distance of approximately 95 metres.

Two weirs downstream of Lenthals, Burrum Number 1 (AMTD 23.3 K=km) and Burrum Number 2 AMTD 28.2 km) complete the in river distribution system which diverts water from Lenthals Dam to water treatment plants.

The storage capacity for Lenthals Dam is based on photogrammetric mapping. The catchment covers 500km2 with the majority of the flow generated by the two tributaries Doongul and Logbridge Creek.

To ensure that there is adequate water supply for the future needs of Hervey Bay region, it was proposed that the FSL of Lenthals Dam be raised by two metres from its existing FSL of 24.0m AHD to 26.0m AHD. This provided an additional 11,150 ML of storage[5]. (Tim Waldron 2002)

In December 2007 the full supply level was raised 2m using Crest Gates. The Crest Gate is a patented system produced by Flowgate Projects (Pty) Ltd, South Africa[6].

The Lenthals Dam Raising Design Report[7] describes the construction as 2m Crest Gates comprising "...4 no. 14.8m wide gates and 1 no. 9.8m wide gate (total Length of spillway crest reduced from 75.3m to 69m). The crest gates open by moving downwards.

The gates failed to operate as designed from January 2008; the Principal Dam Gate Failure Incident occurred in 2008. Rectification works on the Crest Gates are still underway at the time of writing.

Individuals at Risk

- 270 Individuals down stream
- 12 Individuals Upstream (approx not included in EAP) and unknown numbers of campers at Wongi Campsite

At the time of the incident 3 individuals were isolated by rising flood waters at a farm house upstream. Those cut off by rising upstream floodwaters were not initially aware of the Gate Failure Incident and were not notified by the Dam Operator WBWC.

---

[5] Raising Lenthals Dam – A Case Study in New Technology and the Environment Tim Waldron Wide Bay Water Corporation, K D Murray Sun Water and Allan Crichton GHD

[6] Raising Lenthals Dam – A Case Study in New Technology and the Environment Tim Waldron K D Murray and Allan Crichton 2002

[7] 411/16039/00/60817 February 2006

Lenthals Dam Gate Failure February 2008 - the Incident

The incident is best described by the Dam Operator Wide Bay Water (WBWC) the following is quoted from correspondence, 10 March WBWC to Principal Engineer (Dam Safety) Water Industry Regulation, Department of Natural Resources QLD (Author Peter Care Director Engineering Consultancy Services (WBWC).

- On the 29th January Wide Bay Water (WBWC) staff were successful in opening (lowering) the centre and smallest gate installed on the dam structure water level at the time was 25.44m. The dam designers were notified at the time.
  Author Note: It is unclear if this Incident was reported to Dam Safety at the time, when Dam Safety were contacted on the 14th of February the regulator was not aware that the gates were not operable (manually or otherwise) This would constitute an incident.
- On the 5th of February 2008 heavy rainfall in the Lenthals Dam catchment resulted in the dam water level exceeding RL26 and overtopping the crest gates.
- By 6th of February the dam water level had reached RL26.55m and none of the five gates had opened as designed. The first gate should have opened at 26.15 with each gate opening at 50mm reservoir levels.
- On the 11th February the dam water level had dropped to 26.20m with still no gates opening. The Crest Gate Designers, GHD attended the site to view the gate in operation.
  Author Note – the affected land holders and individuals were not notified of the gate malfunction in the continuing rain event.

- Continued heavy rainfall in the catchment resulted in the dam level reaching 27.41 on the 12th of February with **no gates opening. GHD** and their sub-consultant Flowgate Projects from South Africa were notified of the events. WBWC were notified by GHD that there was potential for all gates to drop of their own accord if the dam levels exceeded27.55 and that the smallest gate may drop as water levels receded.
  Author note: The EAP called for evacuation after water levels reached RL26.91 and no evacuation of the affected public occurred, there was no public announcement of risk or the need to evacuate.
- On the 16th of January 2008 around midday the smallest gate opened and remained down for about 15 hours to release flows down the Burrum River. The gate closed automatically at the correct now reduced reservoir level.
- On the 18th of February, GHD and WBW were able to open Gate 1, adjacent to the walkway, with the assistance of a hydraulic jack. Once open the gate responded normally to manual control and closed without incident within 15 minutes on operating the manual control valve.
- GHD and Flowgate Projects staff attended the site on 25th February to determine the cause of the gates failure to open as designed. Gate 1 was lowered again with the assistance of a hydraulic jack which established that the primary cause of the inoperability was due to the seal friction as a result of the high pressure exerted on the gate seals. An external load of approximately 600kg was sufficient to operate the gate and allow the gate to lower. Subsequent operation was achieved with 200kg of external load. The gate outlet was adjusted to reduce the flow out of the gate and increase the volume of water within the gate during filling to increase the opening weight of the gate and allow it to lower. This was trialled and Gate 1 operated without any external assistance.

- The outlets for each of the five gates have subsequently been adjusted to allow automatic operation along with the lowering of the emergency inlet weirs- to ensure complete buoyancy tank filling at a lower water level.
  Author note: this does not seem an accurate reflection of the situation as the gates did not lower and it was not possible to lower them automatically, the gates did not automatically open subsequent event in June 2008 and there is evidence to suggest the gates could not be manually lowered in June 2008.
- Measurements of the gap between the spillway lintel seal plates and the seal clamping plate on each gates confirmed that the compression of the seal is greater than calculated during the design stage. **Author Note:** Why wasn't this discovered at final certification.
- During the repeated operation of Gate 1 the movement of the gate was carefully observed and the gate once clear of the seal plate moves easily and freely. Gate closure after closing of the manual control valve is consistent and without incident.
- GHD and Flowgate Projects are presently evaluating options for adjusting the current gate arrangement, in the short term to ensure reliable operation of the gates, and in the long term to provide a permanent solution to prevent high load on the lintel seal. The long term solution may require the dam level to be below RL24.0m or the installation of stop logs on the dam crest to allow modification to be made.
  Author note: gates still under repair manual lowering is believed impeded.

Immediately prior to the February 2008 Lenthals Dam water level was at FSL RL26. The January rain had filled the catchment.
It is believed that the Crest Gates installed, were inoperable from the date of installation.
The recorded peak water level at Lenthals Dam was RL27.4 on 12 February 2008.

Properties and the Wongi Water Hole Campground are directly upstream from the impoundment where the Burrum River is joined by tributaries Doongul Creek and Lenthals Dam. Raised water levels in this location caused by flooding and gate failure are a significant risk as egress from these sites is impeded by cut roads in flood events.

The affect of the Lenthals Dam Gate failure was upstream flooding (to higher levels than recorded at the impoundment wall), roads were cut off and water rose around the residence where 3 individuals were stranded. The flood level 1.4m over the seized gates was higher than modelling for previous incidents recorded in the EAP but not much lower than publicly documented historical flood incidents.

Risk Management and Incident Reporting Requirements.

At the time of the Incident in February 2008 the Lenthals Dam Emergency Action Plan was still in Draft, and the affected land holders contact section was blank. The requirements in that Lenthals Dam EAP were:

- *Reservoir Level is approaching RL26.5 and further rain is forecast or reservoir is rising, check all gates are open when reservoir level reaches 26.5. If all gates are not opened operate manually the gates in order to open those*[8]
- *Reservoir Level is approaching RL26.91and further rain is forecast or reservoir is rising (Historical Peak 26.91...The major flooding will prompt the evacuation of many houses ... Declare a Major*

[8] Lenthals Dam Emergency Action Plan Table 5.6 41/16885/02/358620

Flood Incident, advise the CEO, WBW of status and evacuation process... Continue to advise the CEO, WBW that the evacuation is in process[9]
The Dam Safety Condition Schedule Lenthals Dam (#309) stated:
".2 where the reservoir headwaters are such that inundation of any upstream dwellings is likely, such dwellings must be considered in the preparation of any action Emergency Action Plan. "
The current EAP at the time of the incident did not consider upstream dwellings.

"The EAP must cover the potential failure of any part of the structure that can put a population at risk either upstream or downstream. The emergency events described in the EAP shall cover those events as outlined in the Queensland Dam Safety Management Guidelines – February 2002, and include such failure modes as: .....c. Failure of control structures such as intake works, outlet works and gated spillways i. loss of one and all gates in a sunny day event, ii) Loss of one and all gates in a flood event.
4. Inundation mapping shall be developed as outlined in Queensland Dam Safety Management Guidelines – Feb 2002 and shall be of sufficiently large a scale so as to easily identify those areas subject to possible danger."[10]
"
It was noted than in the event of an emergency, *"the dam operator must notify the Chief Executive, Natural Resources and Water within forty- eight (48) hours. The notification shall include a brief description of the event and the time of activation of the Emergency Action Plan. It was noted in"*[11].

It was noted in the Lenthals Dam Safety Conditions Audit Report that "The *biggest issue for Wide Bay Water (WBW) is the lack of systems / staff for operating the dam with the commencement of wet season so WBW should give priority to finalise this O&M manual and train staff to operate and maintain the equipment." "There is no record of any past inspections carried out on the Dam, with the completion of the Dam upgrade works Annual inspections should be carried out for 2008"*[12]

It is in the public interest to ask, why Lenthals Dam was given approval and commissioned if these issues were unaddressed.
How is it, the Dam Safety Regulator was told on initial enquiry with Wide Bay Water that the gates were not commissioned i.e. were in the lowered flow release position rather than commissioned and unable to release flow?

Human Factors: Failure to implement risk management procedures as required by Lenthals Dam Emergency Action Plan

The Lenthals Dam operator did not follow Emergency Action Plan procedures when the gates failed. After the water reached RL26.5 it was not possible to manually lower gates[13]. Water levels reached 27.4 no evacuation was carried out as required in the Lenthals Dam Emergency

[9] Lenthals Dam Emergency Action Plan Table 5.7 41/16885/02/358620
[10] Dam Safety Condition Schedule Lenthals Dam Condition Schedule.doc NRW
[11] Page 6 section 11 Dam Safety Condition Schedule Lenthals Dam Condition Schedule.doc NRW
[12] Page 10 Lenthals Dam Wide Bay Water Dam Safety Audit 2007 Natural Resources and Water QLD Govt.
[13] Lenthals Dam Emergency Action Plan Table 5.6 41/16885/02/358620

Action Plan Table 5.7 41/16885/02/358620. Affected members of the public were not notified of the gate failure or of the risk, not surprising when this section (Affected Landholders) was blank in the only draft of the document available.

- Both Tables 5.6 and 5.7 require the notification of SES and Police. Members of the public contacted Police at Maryborough and State Emergency Services (SES) at the time of emergency they did not know there was a problem with the Lenthals gate operation or that individuals were isolated in rising floodwater upstream.
- The version of the EAP in February 2008 did not have a section covering "the *potential failure of any part of the structure that can put a population at risk either* **upstream** *or downstream."* The EAP in existence in Feb 08 did not seem to address in detail steps to deal with a gate failure in a flood event even though tables in the document address possible levels should this occur. The EAP did not have any mention of **upstream** flood risk or methods of evacuation should this occur.

It is apparent that the affected upstream public and stakeholders were not consulted when the consultants GHD compiled the Lenthals Dam Emergency Action Plan and it is recommended that greater consultation and openness be a requirement in the compilation of Emergency Action Plans. The provision of Inundation mapping for flood and dam failure and consultation preconstruction may well have eliminated the risks to upstream individuals entirely.

Local knowledge can contribute to a greater understanding of flows into a catchment when historical recorded data is not available. It must be a requirement of future Dam planning and Dam safety planning that this knowledge is included in modelling and tested against the hypothesis and conclusions in the modelling of probable dam failure and flood incidents.

It is recommended that when Dam Infrastructure is planned Emergency Action Plans are complete and Dam Safety requirements are met before the infrastructure is installed and operational. Suitably trained staff must be in employ prior to installation/ completion rather than at some later point.
Risk Assessments and Risk Assessment Trees are no substitute for commonsense on behalf of the constructing authority and Dam operator. Sometimes a simple cost benefit analysis will provide a solution. if individuals face significant harm in the event of a failure and a cost benefit analysis reveals a low cost solution (compared with the overall project and liability risk over the life time of the infrastructure)– then this low cost solution must be taken up. Relocating upstream parties prior to construction would have eliminated the majority of the risks faced. Due to the low upstream population this could have been achieved at minimal cost – why was this option rejected by a well funded constructing authority, why does the dam operator reject this option now, the risks are unchanged.

The risks faced by the public were greatly enhanced in the February 2008 incident as documents (EAP) were incomplete and processes were not followed (no evacuation undertaken).
In the interests of public safety it must be asked if between July 2007 and February 2008 given identified issues of *lack of systems / staff for operating the dam*[14], any steps had been taken to address the inadequacies identified by Dam Safety Natural Resources and Water.

[14] Page 10 Lenthals Dam Wide Bay Water Dam Safety Audit 2007 Natural Resources and Water QLD Govt

It must be asked would public safety be enhanced if the regulator was better resourced to penalise and take action against Dam Operators who don't comply with the requirements set out.
It might be asked if Building Industry Regulators have a legislated capacity to apply punitive action why doesn't the regulator of Dam Safety in this specific instance 270 persons are at risk and the infrastructure is significant. What is the QLD government doing about this?

The Lenthals Dam Gate Failure February 2008 Incident provides an opportunity for further investigation and greater understanding of how it is that a well resourced Dam operator (Wide Bay Water) could fail to follow the recommendations made by Natural Resources and Water QLD within the time frames.
This situation may well have added to the Human Failures that magnified the risk posed by individuals when the gate infrastructure failed.

It is vital to consider that the results of the gate failure and associated human factors were minimised by the cessation of rain not by any action taken by the operator or the regulator or emergency services. Luck was the critical factor in the lack of injury or fatality this is unacceptable.

The public have a high expectation of infrastructure managers and in this case the public expectation was not met, worse could have happened.

Dam Safety NRW QLD are continuing to monitor the situation and can provide more details:
Peter Allen
Director Dam Safety (Water Supply)
Office of the Water Supply Regulator
Telephone [redacted] **Mobile** [redacted] **Facsimile** [redacted]
Email [redacted]
www.nrw.qld.gov.au

Article from: Independent Dam Safety Monitors http://www.independenetdamsafetymonitors.com

Home About Dam Failures

Bedford Weir QLD Bursts Killing 4yr Old Girl Lenthalls Dam Safety Audit Report 2007 for Wide Bay Water Corporation QLD Department Natural Resources re Wide Bay Water Corporation Dam Gates Failure Lenthalls Dam Failure Hawaii Dam Failure Fairbairn Dam Emerald Flooding January 2008 Articles

QLD Dam Safety- Lenthalls Gates Failure Improving Dam Safety Vaiont Dam Disaster Potential Dam Catastrophe Leads to Mass Lawsuit AG sues owner of faulty Taunton dams Attorney General Sues Taunton Dam Owner to Address Safety Concerns Dam Builders Cut Corners on Safety Environmental Effects Useful Links

Dams No Tillegra Dam Group Hydrocoop Probe International Contact Us You are Here: Home

WIDE BAY WATER CORPORATION HERVEY BAY LENTHALLS DAM (QLD) GATES FAILURE 2008 –

A CASE STUDY IN GATE RELIABILITY AND HUMAN FACTORS, FAILURE TO IMPLEMENT RISK MANAGEMENT PROCEDURE.

The Lenthalls Dam Crest gates were installed in 2007 and failed to operate as designed from January 2008. In February 2008 high rainfall led to a moderate flood event, all gates inoperable. The gates failed to lower to release flood water.

In this incident, manual operation of the gates did not occur, it is believed the mechanism was not operable. The operating authority failed to implement the Emergency Action Plan and failed to evacuate flood impacted upstream sites. Three persons were put at risk due to upstream flooding.

Had the flooding been more prolonged or severe the persons trapped faced injury or death.

Australia has a strong reputation with respect Dam Safety and Incident management, this near fatal incident offers an opportunity to review and amend existing Dam Safety Requirements, Risk Management and Gate Reliability Criteria.

This incident provides an opportunity to review all current guidelines and enhance Dam Safety standards with emphasis on the importance of mitigating human failure and ensuring public safety.

For the Lenthalls Dam Gates Failure Research paper and the Gutteridge Haskins & Davies (GHD) Blank Emergency Action Plan for Wide Bay Water Corporation, City of Hervey Bay (Local Government Owned Corporation providing water and wastewater services), please refer to the links below. (requires Adobe Reader)

Click here to read the report and click here to view the Wide Bay Water Corporation Blank Emergency Action Plan prepared by Gutteridge Haskins & Davies (GHD).

Wide Bay Water Corporation Water Services Provider DRAFT Version of the Operation Manual for Lenthals Dam (prepared by Gutteridge Haskins & Davies) GHD and the Chief Executives Officers Responsibilty (Tim Waldron CEO).

Click here to read an extract of the Click here to read Wide Bay Burnett Conservation Council's letter to the Minister Queensland State Government Department of Natural Resources and Water regarding Wide Bay Water Corporation (Local Government Owned Corporation) of former Hervey Bay City Council now Fraser Coast Regional Council and Interium Resource Operatiors Licence in 2004 and the innundation of Wongi Waterholes due to Lenthals Dam Gates failure to operate.

Appendix B

RORB Model Results

GHD
GHD Brisbane
Lenthalls Dam RORB
41 19335

www.ghd.com.au
sydmail@ghd.com.au
Tel: 02 9239 7000 Fax: 02 9239 7199
10 Bond St Sydney, 2000

Gates Non Operational									
ARI	Cross section name	GHD RORB 72hr	GHD RORB 48hr	GHD RORB 24hr	GHD RORB 18hr	GHD RORB 12hr	GHD RORB 6hr	GHD RORB 3hr	GHD RORB 1hr
2	Doongul	119.4	130.6	173.3	205.8	**216.1**	194.5	157.9	67.36
5	Doongul	201.4	228.7	298.6	328.4	**347.3**	309.5	249.8	112.1
10	Doongul	251.2	284.8	370.4	395.4	**416.5**	371.8	298.1	135.4
20	Doongul	320.2	360.1	470.4	487.2	**516.6**	458.4	366.5	168.4
50	Doongul	408.5	418.7	575.9	620.1	**646.1**	577.7	461.8	216.2
100	Doongul	494.7	508.2	684.7	722.4	**758.6**	681.9	548.2	261.2
2	12490	30.7	48.59	70.44	48.1	73.42	74.2	**83.07**	80.5
5	12490	49.62	79.93	112.1	72.61	109	110.7	**125.7**	125.1
10	12490	60.74	97.97	135.7	86.19	127.8	129.7	**147.7**	147.5
20	12490	75.48	121.7	167.5	106.3	153.3	155.8	**178.3**	178.3
50	12490	87.06	134.6	188.6	127	173.9	183	211	**219.7**
100	12490	103.2	159.4	219.9	147	201.1	211.8	246.3	**258.4**
2	D5890 (6183)	53.11	72.39	99.13	77.47	110.2	114.5	**119.2**	108.1
5	D5890 (6183)	87.03	121.1	160.6	117.1	168.2	174.2	**182.1**	167.1
10	D5890 (6183)	107.2	149	195.9	139.1	199.3	205.3	**214.4**	196.4
20	D5890 (6183)	134.1	186.9	244.1	169	242	248.2	**259.3**	237
50	D5890 (6183)	153.2	207.4	276.5	207.6	276.2	295.9	**319.6**	290.9
100	D5890 (6183)	182.8	247	324.7	240.4	322	344.1	**374.2**	342
2	D4050 (6350)	153.1	154.3	197.3	**274.1**	256.1	225.6	191.2	128.2
5	D4050 (6350)	251.4	268.9	343	**440.1**	416.1	357.1	301.6	202.2
10	D4050 (6350)	311.6	336.4	427.9	**533.1**	503.4	427.8	359.4	239.4
20	D4050 (6350)	394.6	429.8	544.3	**659.1**	624.1	527.2	441	291.3
50	D4050 (6350)	497.7	543.1	675	**833.6**	787	667.5	556.2	365.9
100	D4050 (6350)	603.7	651.9	801.3	**972.2**	929.3	790	659	433.7
2	D3775.5 (6075.5)	153.8	154.4	197.6	**274.9**	256.4	225.2	191.3	127.5
5	D3775.5 (6075.5)	252.3	268.9	343.7	**441.2**	416.4	356.3	301.9	201.2
10	D3775.5 (6075.5)	312.5	336.4	428.9	**533.1**	503.8	427.2	359.8	238.3
20	D3775.5 (6075.5)	395.5	429.2	545.7	**657.3**	624.7	527.3	441.5	290.1
50	D3775.5 (6075.5)	498.5	542.6	676.5	**835.5**	787.6	668.7	556.8	364.4
100	D3775.5 (6075.5)	604.5	651.5	803.3	**972.7**	930.1	791.3	659.8	432.3
2	L3060 (5360)	11.05	18.86	30.28	19.48	29.28	32.74	42.96	**48.44**
5	L3060 (5360)	17.24	29.76	45.1	31.43	44.29	48.88	64.89	**74.67**
10	L3060 (5360)	20.97	35.78	53.2	37.95	52.15	57.15	75.98	**87.36**
20	L3060 (5360)	25.97	43.77	63.93	46.72	62.86	68.43	91.29	**104.9**
50	L3060 (5360)	28.71	48.28	71.16	53.34	69.49	76.84	102.9	**126.9**
100	L3060 (5360)	33.99	56.42	87.38	61.35	80.31	88.52	119.9	**147.3**
2	D920 (3220)	156.8	160.2	201.2	**280.7**	259.4	231.4	193.4	123.5
5	D920 (3220)	266.8	277.7	344.4	**461.1**	421.5	366.2	305.4	197.2
10	D920 (3220)	317.7	346.7	429.2	**547.8**	509.6	438.5	364.3	234.3
20	D920 (3220)	402.1	442.1	546.6	**678.9**	632	540.4	447.1	286.2
50	D920 (3220)	506.1	567.4	678.5	**863.6**	789.7	683.2	562.6	360.2
100	D920 (3220)	614.5	679.3	807.2	**1008**	943.9	807.7	666.8	428.1
2	Dam Inflow	340	351.1	455.8	**604.9**	563.1	526.7	440.7	423.4
5	Dam Inflow	556.2	607.2	770.4	**980.2**	892.1	833.7	691.9	649.1
10	Dam Inflow	687.6	756.8	954.3	**1158**	1070	997.4	824	760.6
20	Dam Inflow	866.7	961.7	1207	**1425**	1316	1226	1011	914.7
50	Dam Inflow	1088	1178	1451	**1796**	1657	1550	1284	1120
100	Dam Inflow	1316	1410	1720	**2090**	1957	1827	1521	1313
2	Dam Outflow	230.3	231.6	289.3	**317.6**	290.2	251.3	185.8	43.1
5	Dam Outflow	380.8	400.3	488.6	**624**	477.1	412.4	323.9	106.6
10	Dam Outflow	464.9	493.7	954.3	**636**	572	486.9	384	129.3
20	Dam Outflow	583.5	628	744	**782**	699	593	466	154
50	Dam Outflow	730	825	958	**990**	868	733	581	190
100	Dam Outflow	873	985	1113	**1145**	1015	853	681	228
2	Dam Water Level	27.46	27.47	27.7	**27.81**	27.7	27.55	27.27	26.48
5	Dam Water Level	28.05	28.11	28.41	**28.52**	28.37	28.15	27.83	26.88
10	Dam Water Level	28.33	28.42	599.3	**28.88**	28.67	28.4	28.06	26.99
20	Dam Water Level	28.71	28.85	29.2	**29.3**	29.07	28.74	28.33	27.11
50	Dam Water Level	29.16	29.42	29.77	**29.86**	29.53	29.17	28.7	27.29
100	Dam Water Level	29.55	29.85	30.18	**30.26**	29.93	29.49	29.02	27.45

GHD
GHD Brisbane
Lenthalls Dam RORB
41 19335

www.ghd.com.au
sydmail@ghd.com.au
Tel. 02 9239 7000 Fax 02 9239 7199
10 Bond St Sydney 2000

Gates Operational									
ARI	Cross section name	GHD RORB 72hr	GHD RORB 48hr	GHD RORB 24hr	GHD RORB 18hr	GHD RORB 12hr	GHD RORB 6hr	GHD RORB 3hr	GHD RORB 1hr
2	Doongul	119.4	130.6	173.3	205.8	**216.1**	194.5	157.9	67.36
5	Doongul	201.4	228.7	298.6	328.4	**347.3**	309.5	249.8	112.1
10	Doongul	251.2	284.8	370.4	395.4	**418.5**	371.8	298.1	135.4
20	Doongul	320.2	360.1	470.4	487.2	**516.6**	458.4	366.5	166.4
50	Doongul	408.5	418.7	575.9	620.1	**645.9**	577.7	461.8	216.2
100	Doongul	494.7	508.2	684.7	722.4	**758.6**	681.9	548.2	261.2
2	12490	30.7	48.59	70.44	48.1	73.42	74.2	**83.07**	80.5
5	12490	49.62	79.95	112.1	72.61	109	110.7	**125.7**	125.1
10	12490	60.74	97.71	135.7	86.19	127.8	129.7	**147.7**	147.5
20	12490	75.48	121.7	167.5	106.3	153.3	155.8	**178.3**	178.3
50	12490	87.06	134.6	188.6	127	173.9	183	211	**219.7**
100	12490	103.2	159.4	219.9	147	201.1	211.8	246.3	**258.4**
2	D5890 (8183)	53.11	72.39	99.13	77.47	110.2	114.5	**118.2**	108.1
5	D5890 (8183)	87.03	121.1	160.6	117.1	168.2	174.2	**182.1**	167.1
10	D5890 (8183)	107.2	149	195.9	139.1	199.3	205.3	**214.4**	196.4
20	D5890 (8183)	134.1	186.9	244.1	169	242	248.2	**259.3**	237
50	D5890 (8183)	153.2	207.4	276.5	207.6	276.2	285.9	**319.5**	290.9
100	D5890 (8183)	182.8	247	324.7	240.4	322	344.1	**374.2**	342
2	D4050 (6350)	153.1	154.3	197.3	**274.1**	256.1	225.6	191.2	128.2
5	D4050 (6350)	251.4	268.9	343	**440.1**	416.2	357.1	301.6	202.2
10	D4050 (6350)	311.6	336.4	427.9	**553.1**	503.4	427.8	359.4	239.4
20	D4050 (6350)	394.6	429.8	544.3	**669.1**	624.1	527.2	441	291.3
50	D4050 (6350)	497.7	543.1	675	**833.6**	787	667.5	556.2	365.9
100	D4050 (6350)	603.7	651.9	801.3	**972.2**	929.3	790	659	433.7
2	D3775.5 (6075.5)	153.8	154.4	197.6	**274.9**	256.4	225.2	191.3	127.5
5	D3775.5 (6075.5)	252.3	268.9	343.7	**441.2**	416.4	356.3	301.9	201.2
10	D3775.5 (6075.5)	312.5	336.4	428.9	**553.1**	503.8	427.2	359.8	238.3
20	D3775.5 (6075.5)	395.5	429.2	545.7	**667.3**	624.7	527.3	441.5	290.1
50	D3775.5 (6075.5)	498.5	542.6	676.5	**835.5**	787.6	668.7	556.8	364.4
100	D3775.5 (6075.5)	604.5	651.5	803.3	**972.7**	930.1	791.3	659.8	432.3
2	L3060 (5360)	11.05	18.86	30.28	19.48	29.28	32.74	42.96	**48.44**
5	L3060 (5360)	17.24	29.76	45.1	31.43	44.29	48.88	64.89	**74.67**
10	L3060 (5360)	20.97	35.78	53.2	37.95	52.15	57.15	75.98	**87.36**
20	L3060 (5360)	25.97	43.77	63.93	46.72	62.86	68.43	91.29	**104.9**
50	L3060 (5360)	28.71	48.28	71.16	53.34	69.49	76.84	102.9	**126.9**
100	L3060 (5360)	33.99	56.42	81.38	61.35	80.31	88.52	119.9	**147.3**
2	D920 (3220)	156.8	160.2	201.2	**280.7**	259.4	231.4	193.4	123.5
5	D920 (3220)	256.6	277.2	344.4	**451.1**	421.5	366.2	305.4	197.2
10	D920 (3220)	317.7	346.7	429.2	**547.8**	509.6	438.5	364.3	234.3
20	D920 (3220)	402.1	442.1	546.6	**678.9**	632	540.4	447.1	286.2
50	D920 (3220)	506.1	567.4	678.5	**863.6**	798.7	683.2	562.6	360.2
100	D920 (3220)	614.5	679.3	807.2	**1008**	943.9	807.7	666.8	428.1
2	Dam Inflow	340	351.1	455.8	**604.9**	563.1	526.7	440.7	423.4
5	Dam Inflow	556.2	607.2	770.4	**960.2**	892.1	833.7	691.9	649.1
10	Dam Inflow	687.6	756.8	954.3	**1158**	1070	997.4	824	760.6
20	Dam Inflow	866.7	961.7	1207	**1425**	1316	1226	1011	914.7
50	Dam Inflow	1088	1178	1451	**1786**	1657	1550	1284	1120
100	Dam Inflow	1316	1410	1720	**2090**	1947	1827	1521	1313
2	Dam Outflow	301.8	319.8	421	**638.1**	534.8	526.3	409.6	268
5	Dam Outflow	529.6	549.4	**770.4**	743.4	739.9	672.1	574.4	409.7
10	Dam Outflow	588.1	635.5	779.9	**877**	861	778.9	653	478
20	Dam Outflow	715	775.6	945	**1072**	1035	916	770	545
50	Dam Outflow	870	958	1169	**1339**	1269	1117	918	603
100	Dam Outflow	1030	1139	1348	**1536**	1452	1285	1061	670
2	Dam Water Level	26.3	26.3	26.35	**26.39**	26.38	26.35	26.31	26.25
5	Dam Water Level	26.36	26.44		**26.94**	26.93	26.77	26.53	26.31
10	Dam Water Level	26.56	26.68	27.02	**27.23**	27.2	27.02	26.73	26.35
20	Dam Water Level	26.87	27.01	27.38	**27.63**	27.56	27.32	27	26.42
50	Dam Water Level	27.22	27.39	27.81	**28.16**	28.02	27.71	27.32	26.6
100	Dam Water Level	27.55	27.75	28.17	**28.52**	28.36	28.05	27.61	26.77

Appendix C

HEC-RAS Model Results

HEC-RAS Plan: Plan 13

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Tributary	2	5360	2y 72h	11.05	25.94	27.54	26.08	27.54	0.000046	0.03	406.85	528.12	0.01
Tributary	2	5360	2y 48h	18.86	25.94	27.58	26.13	27.58	0.000121	0.04	428.18	558.49	0.02
Tributary	2	5360	2y 24h	30.28	25.94	27.86	26.18	27.86	0.000134	0.05	608.80	710.81	0.02
Tributary	2	5360	2y 18h	19.48	25.94	28.01	26.13	28.01	0.000035	0.03	721.74	778.28	0.01
Tributary	2	5360	2y 12h	29.28	25.94	27.94	26.18	27.94	0.000099	0.04	666.50	744.74	0.01
Tributary	2	5360	2y 6h	32.74	25.94	27.78	26.19	27.78	0.000205	0.06	551.07	676.47	0.02
Tributary	2	5360	2y 3h	42.96	25.94	27.62	26.23	27.62	0.000573	0.10	448.63	582.87	0.03
Tributary	2	5360	2y 1h	48.44	25.94	27.43	26.25	27.43	0.001115	0.14	352.09	437.39	0.05
Tributary	2	5360	5y 72h	17.24	25.94	28.20	26.12	28.20	0.000016	0.02	880.23	921.34	0.01
Tributary	2	5360	5y 48h	29.76	25.94	28.29	26.18	28.29	0.000040	0.03	867.62	943.54	0.01
Tributary	2	5360	5y 24h	45.10	25.94	28.63	26.24	28.63	0.000038	0.03	1295.67	996.39	0.01
Tributary	2	5360	5y 18h	31.43	25.94	28.81	26.18	28.81	0.000013	0.02	1473.93	1035.67	0.01
Tributary	2	5360	5y 12h	44.29	25.94	28.69	26.23	28.69	0.000032	0.03	1352.72	1009.70	0.01
Tributary	2	5360	5y 6h	48.88	25.94	28.45	26.25	28.45	0.000069	0.04	1121.56	968.82	0.01
Tributary	2	5360	5y 3h	64.89	25.94	28.21	26.29	28.21	0.000249	0.07	886.55	922.97	0.02
Tributary	2	5360	5y 1h	74.57	25.94	27.83	26.33	27.83	0.000907	0.13	584.47	696.42	0.04
Tributary	2	5360	10y 72h	20.97	25.94	28.49	26.14	28.49	0.000012	0.02	1155.53	974.00	0.01
Tributary	2	5360	10y 48h	35.78	25.94	28.65	26.20	28.65	0.000023	0.03	1318.04	1001.78	0.01
Tributary	2	5360	10y 24h	53.20	25.94	29.06	26.26	29.06	0.000022	0.03	1747.09	1084.59	0.01
Tributary	2	5360	10y 18h	37.95	25.94	29.27	26.21	29.27	0.000005	0.02	1976.83	1120.49	0.00
Tributary	2	5360	10y 12h	52.15	25.94	29.07	26.26	29.07	0.000021	0.03	1753.10	1085.59	0.01
Tributary	2	5360	10y 6h	57.15	25.94	28.76	26.27	28.76	0.000046	0.04	1423.81	1025.32	0.01
Tributary	2	5360	10y 3h	75.98	25.94	28.47	26.33	28.47	0.000162	0.07	1132.00	970.41	0.02
Tributary	2	5360	10y 1h	87.36	25.94	27.93	26.38	27.93	0.000916	0.13	655.50	738.31	0.05
Tributary	2	5360	20y 72h	25.97	25.94	28.94	26.16	28.94	0.000007	0.02	1608.87	1061.27	0.00
Tributary	2	5360	20y 48h	43.77	25.94	29.13	26.23	29.13	0.000013	0.02	1823.37	1097.23	0.01
Tributary	2	5360	20y 24h	63.93	25.94	29.55	26.29	29.55	0.000014	0.03	2293.78	1161.52	0.01
Tributary	2	5360	20y 18h	46.72	25.94	29.73	26.24	29.73	0.000006	0.02	2508.63	1187.05	0.00
Tributary	2	5360	20y 12h	62.86	25.94	29.64	26.29	29.64	0.000012	0.03	2398.06	1173.84	0.01
Tributary	2	5360	20y 6h	68.43	25.94	29.08	26.31	29.08	0.000035	0.04	1763.97	1087.40	0.01
Tributary	2	5360	20y 3h	91.29	25.94	28.80	26.37	28.80	0.000108	0.06	1465.14	1033.88	0.02
Tributary	2	5360	20y 1h	104.90	25.94	28.13	26.40	28.13	0.000787	0.13	813.39	857.41	0.04
Tributary	2	5360	50y 72h	28.71	25.94	29.44	26.17	29.44	0.000003	0.01	2168.67	1146.58	0.00
Tributary	2	5360	50y 48h	48.28	25.94	29.73	26.25	29.73	0.000005	0.02	2502.96	1186.36	0.00
Tributary	2	5360	50y 24h	71.16	25.94	30.17	28.32	30.17	0.000007	0.02	3050.47	1345.42	0.00
Tributary	2	5360	50y 18h	53.34	25.94	30.41	26.26	30.41	0.000003	0.02	3394.62	1380.89	0.00
Tributary	2	5360	50y 12h	69.49	25.94	30.11	26.31	30.11	0.000007	0.02	2981.67	1335.71	0.00
Tributary	2	5360	50y 6h	76.84	25.94	29.68	26.33	29.68	0.000016	0.03	2444.24	1179.34	0.01
Tributary	2	5360	50y 3h	102.90	25.94	29.23	26.40	29.23	0.000060	0.05	1928.13	1113.60	0.01
Tributary	2	5360	50y 1h	125.90	25.94	28.41	26.45	28.41	0.000521	0.12	1075.10	961.69	0.04
Tributary	2	5360	100y 72h	33.99	25.94	29.91	26.20	29.91	0.000002	0.01	2721.99	1272.33	0.00
Tributary	2	5360	100y 48h	56.42	25.94	30.23	26.27	30.23	0.000004	0.02	3144.05	1354.56	0.00
Tributary	2	5360	100y 24h	87.38	25.94	30.64	26.36	30.64	0.000006	0.02	3717.13	1414.40	0.00
Tributary	2	5360	100y 18h	61.35	25.94	30.91	26.29	30.91	0.000002	0.02	4104.42	1457.39	0.00
Tributary	2	5360	100y 12h	80.31	25.94	30.60	26.34	30.60	0.000005	0.02	3657.62	1408.26	0.00
Tributary	2	5360	100y 6h	88.52	25.94	30.10	26.36	30.10	0.000012	0.03	2972.93	1335.74	0.01
Tributary	2	5360	100y 3h	119.90	25.94	29.64	26.44	29.64	0.000043	0.05	2396.22	1173.63	0.01
Tributary	2	5360	100y 1h	147.30	25.94	28.56	26.49	28.58	0.000474	0.12	1226.72	984.78	0.03
Tributary	2	5360	Feb2005	33.77	25.94	27.72	26.19	27.72	0.000264	0.07	511.55	648.31	0.02
Tributary	2	4920	2y 72h	11.05	25.84	27.53		27.53	0.000005	0.02	690.26	556.14	0.00
Tributary	2	4920	2y 48h	18.86	25.84	27.56		27.56	0.000023	0.03	706.31	560.43	0.01
Tributary	2	4920	2y 24h	30.28	25.84	27.83		27.83	0.000034	0.04	864.98	607.78	0.01
Tributary	2	4920	2y 18h	19.48	25.84	28.00		28.00	0.000010	0.02	972.20	653.49	0.01
Tributary	2	4920	2y 12h	29.28	25.84	27.92		27.92	0.000027	0.03	917.53	628.24	0.01
Tributary	2	4920	2y 6h	32.74	25.84	27.74		27.74	0.000047	0.04	808.20	589.26	0.01
Tributary	2	4920	2y 3h	42.96	25.84	27.51		27.51	0.000136	0.06	675.84	552.26	0.02
Tributary	2	4920	2y 1h	48.44	25.84	27.11		27.11	0.000589	0.10	467.35	493.05	0.03
Tributary	2	4920	5y 72h	17.24	25.84	28.20		28.20	0.000006	0.02	1099.28	675.78	0.00
Tributary	2	4920	5y 48h	29.76	25.84	28.28		28.28	0.000014	0.03	1159.36	687.66	0.01
Tributary	2	4920	5y 24h	45.10	25.84	28.62		28.62	0.000018	0.03	1397.16	720.25	0.01
Tributary	2	4920	5y 18h	31.43	25.84	28.80		28.80	0.000007	0.02	1530.02	735.72	0.00
Tributary	2	4920	5y 12h	44.29	25.84	28.68		28.68	0.000016	0.03	1439.32	725.03	0.01
Tributary	2	4920	5y 6h	48.88	25.84	28.44		28.44	0.000029	0.04	1265.31	705.26	0.01
Tributary	2	4920	5y 3h	64.89	25.84	28.15		28.15	0.000088	0.06	1068.13	670.08	0.02
Tributary	2	4920	5y 1h	74.57	25.84	27.60		27.60	0.000333	0.10	726.76	565.84	0.03
Tributary	2	4920	10y 72h	20.97	25.84	28.49		28.49	0.000005	0.02	1301.05	709.35	0.00
Tributary	2	4920	10y 48h	35.78	25.84	28.65		28.65	0.000011	0.03	1416.48	722.42	0.01
Tributary	2	4920	10y 24h	53.20	25.84	29.06		29.06	0.000013	0.03	1719.67	756.94	0.01
Tributary	2	4920	10y 18h	37.95	25.84	29.27		29.27	0.000005	0.02	1882.65	774.24	0.00
Tributary	2	4920	10y 12h	52.15	25.84	29.06		29.06	0.000012	0.03	1724.13	757.43	0.01
Tributary	2	4920	10y 6h	57.15	25.84	28.74		28.74	0.000024	0.04	1486.88	730.66	0.01
Tributary	2	4920	10y 3h	75.98	25.84	28.42		28.42	0.000072	0.06	1254.02	703.96	0.01
Tributary	2	4920	10y 1h	87.36	25.84	27.68		27.68	0.000366	0.11	771.25	578.40	0.03
Tributary	2	4920	20y 72h	25.97	25.84	28.93		28.93	0.000004	0.02	1626.67	746.68	0.00
Tributary	2	4920	20y 48h	43.77	25.84	29.13		29.13	0.000008	0.03	1774.98	762.98	0.01
Tributary	2	4920	20y 24h	63.93	25.84	29.55		29.55	0.000010	0.03	2098.50	794.88	0.01
Tributary	2	4920	20y 18h	46.72	25.84	29.73		29.73	0.000004	0.02	2247.83	811.14	0.00
Tributary	2	4920	20y 12h	62.86	25.84	29.64		29.64	0.000009	0.03	2170.41	802.68	0.01
Tributary	2	4920	20y 6h	68.43	25.84	29.07		29.07	0.000021	0.04	1728.03	757.85	0.01
Tributary	2	4920	20y 3h	91.29	25.84	28.76		28.77	0.000058	0.06	1501.65	732.39	0.01
Tributary	2	4920	20y 1h	104.90	25.84	27.90		27.90	0.000359	0.12	906.50	623.61	0.03
Tributary	2	4920	50y 72h	28.71	25.84	29.44		29.44	0.000002	0.01	2016.03	787.06	0.00
Tributary	2	4920	50y 48h	48.28	25.84	29.73		29.73	0.000005	0.02	2243.83	810.71	0.00
Tributary	2	4920	50y 24h	71.16	25.84	30.16		30.16	0.000006	0.03	2606.01	847.61	0.00
Tributary	2	4920	50y 18h	53.34	25.84	30.41		30.41	0.000003	0.02	2817.93	870.08	0.00
Tributary	2	4920	50y 12h	69.49	25.84	30.10		30.10	0.000007	0.03	2556.30	842.36	0.00
Tributary	2	4920	50y 6h	76.84	25.84	29.67		29.67	0.000013	0.04	2200.48	805.97	0.01
Tributary	2	4920	50y 3h	102.90	25.84	29.21		29.21	0.000040	0.06	1834.63	769.44	0.01
Tributary	2	4920	50y 1h	125.90	25.84	28.25		28.25	0.000275	0.11	1133.25	681.98	0.03
Tributary	2	4920	100y 72h	33.99	25.84	29.91		29.91	0.000002	0.01	2382.52	826.13	0.00
Tributary	2	4920	100y 48h	56.42	25.84	30.23		30.23	0.000004	0.02	2659.70	853.24	0.00

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Tributary	2	4920	100y 24h	87.36	25.84	30.84		30.64	0.000006	0.03	3020.08	894.48	0.00
Tributary	2	4920	100y 18h	61.35	25.84	30.91		30.91	0.000002	0.02	3268.35	842.79	0.00
Tributary	2	4920	100y 12h	80.31	25.84	30.60		30.60	0.000006	0.03	2982.77	888.83	0.00
Tributary	2	4920	100y 6h	86.52	25.84	30.10		30.10	0.000011	0.04	2549.17	841.61	0.01
Tributary	2	4920	100y 3h	119.90	25.84	29.62		29.62	0.000032	0.06	2159.62	801.52	0.01
Tributary	2	4920	100y 1h	147.30	25.84	28.41		28.41	0.000277	0.12	1243.96	702.80	0.03
Tributary	2	4920	Feb2008	33.77	25.84	27.67		27.67	0.000058	0.04	768.00	577.43	0.01
Tributary	2	4823.5	2y 72h	11.05	24.12	27.53		27.53	0.000018	0.03	341.03	180.00	0.01
Tributary	2	4823.5	2y 48h	16.86	24.12	27.56		27.56	0.000051	0.06	345.49	180.00	0.01
Tributary	2	4823.5	2y 24h	30.28	24.12	27.82		27.82	0.000088	0.08	393.67	180.00	0.02
Tributary	2	4823.5	2y 18h	19.48	24.12	28.00		28.00	0.000028	0.05	425.76	180.00	0.01
Tributary	2	4823.5	2y 12h	29.28	24.12	27.91		27.91	0.000072	0.08	409.52	180.00	0.02
Tributary	2	4823.5	2y 6h	32.74	24.12	27.73		27.73	0.000119	0.09	376.10	180.00	0.02
Tributary	2	4823.5	2y 3h	42.86	24.12	27.47		27.47	0.000308	0.14	330.09	180.00	0.03
Tributary	2	4823.5	2y 1h	48.44	24.12	26.98		26.98	0.001025	0.21	241.38	180.00	0.05
Tributary	2	4823.5	5y 72h	17.24	24.12	28.19		28.19	0.000017	0.04	460.41	180.00	0.01
Tributary	2	4823.5	5y 48h	29.76	24.12	28.28		28.28	0.000046	0.07	475.78	180.00	0.01
Tributary	2	4823.5	5y 24h	45.10	24.12	28.61		28.62	0.000072	0.09	536.11	180.00	0.02
Tributary	2	4823.5	5y 18h	31.43	24.12	28.80		28.80	0.000029	0.06	569.66	180.00	0.01
Tributary	2	4823.5	5y 12h	44.29	24.12	28.67		28.67	0.000065	0.09	546.73	180.00	0.01
Tributary	2	4823.5	5y 6h	46.88	24.12	28.43		28.43	0.000105	0.10	502.19	180.00	0.02
Tributary	2	4823.5	5y 3h	64.89	24.12	28.12		28.12	0.000269	0.15	446.80	180.00	0.03
Tributary	2	4823.5	5y 1h	74.57	24.12	27.50		27.50	0.000880	0.23	336.81	180.00	0.05
Tributary	2	4823.5	10y 72h	20.97	24.12	28.48		28.49	0.000018	0.04	512.74	180.00	0.01
Tributary	2	4823.5	10y 48h	35.78	24.12	28.64		28.64	0.000044	0.07	541.37	180.00	0.01
Tributary	2	4823.5	10y 24h	53.20	24.12	29.05		29.05	0.000064	0.09	614.93	180.00	0.02
Tributary	2	4823.5	10y 18h	37.95	24.12	29.27		29.27	0.000027	0.06	653.78	180.00	0.01
Tributary	2	4823.5	10y 12h	52.15	24.12	29.06		29.06	0.000062	0.09	616.03	180.00	0.01
Tributary	2	4823.5	10y 6h	57.15	24.12	28.74		28.74	0.000102	0.11	557.97	180.00	0.02
Tributary	2	4823.5	10y 3h	75.98	24.12	28.40		28.40	0.000262	0.16	496.70	180.00	0.03
Tributary	2	4823.5	10y 1h	87.36	24.12	27.56		27.56	0.001095	0.27	346.46	180.00	0.06
Tributary	2	4823.5	20y 72h	25.97	24.12	28.93		28.93	0.000017	0.05	593.31	180.00	0.01
Tributary	2	4823.5	20y 48h	43.77	24.12	29.13		29.13	0.000041	0.07	628.37	180.00	0.01
Tributary	2	4823.5	20y 24h	63.93	24.12	29.54		29.54	0.000060	0.10	702.90	180.00	0.01
Tributary	2	4823.5	20y 18h	46.72	24.12	29.73		29.73	0.000028	0.07	738.80	180.00	0.01
Tributary	2	4823.5	20y 12h	62.86	24.12	29.63		29.63	0.000054	0.09	719.20	180.00	0.01
Tributary	2	4823.5	20y 6h	68.43	24.12	29.06		29.06	0.000106	0.12	616.36	180.00	0.02
Tributary	2	4823.5	20y 3h	91.29	24.12	28.74		28.75	0.000258	0.17	559.31	180.00	0.03
Tributary	2	4823.5	20y 1h	104.90	24.12	27.79		27.79	0.001104	0.29	387.81	180.00	0.06
Tributary	2	4823.5	50y 72h	28.71	24.12	29.44		29.44	0.000013	0.04	684.72	180.00	0.01
Tributary	2	4823.5	50y 48h	48.26	24.12	29.72		29.72	0.000030	0.07	735.88	180.00	0.01
Tributary	2	4823.5	50y 24h	71.16	24.12	30.16		30.16	0.000046	0.09	814.34	180.00	0.01
Tributary	2	4823.5	50y 18h	53.34	24.12	30.41		30.41	0.000022	0.07	859.05	180.00	0.01
Tributary	2	4823.5	50y 12h	69.49	24.12	30.10		30.10	0.000048	0.09	803.75	180.00	0.01
Tributary	2	4823.5	50y 6h	76.84	24.12	29.67		29.67	0.000079	0.11	725.63	180.00	0.02
Tributary	2	4823.5	50y 3h	102.90	24.12	29.19		29.19	0.000212	0.17	640.13	180.00	0.03
Tributary	2	4823.5	50y 1h	125.90	24.12	28.16		28.16	0.000965	0.29	453.55	180.00	0.06
Tributary	2	4823.5	100y 72h	33.99	24.12	29.81		29.81	0.000013	0.05	766.79	180.00	0.01
Tributary	2	4823.5	100y 48h	56.42	24.12	30.22		30.23	0.000028	0.07	825.92	180.00	0.01
Tributary	2	4823.5	100y 24h	87.36	24.12	30.64		30.64	0.000050	0.10	900.03	180.00	0.01
Tributary	2	4823.5	100y 18h	61.35	24.12	30.91		30.91	0.000021	0.07	949.20	180.00	0.01
Tributary	2	4823.5	100y 12h	80.31	24.12	30.60		30.60	0.000044	0.09	892.57	180.00	0.01
Tributary	2	4823.5	100y 6h	86.52	24.12	30.09		30.09	0.000075	0.12	801.89	180.00	0.02
Tributary	2	4823.5	100y 3h	119.90	24.12	29.61		29.61	0.000201	0.18	714.98	180.00	0.03
Tributary	2	4823.5	100y 1h	147.30	24.12	28.31		28.32	0.001091	0.32	481.37	180.00	0.06
Tributary	2	4823.5	Feb2008	33.77	24.12	27.65		27.65	0.000141	0.10	363.18	180.00	0.02
Tributary	2	4735.5	2y 72h	11.05	24.12	27.53	24.94	27.53	0.000018	0.03	340.74	180.00	0.01
Tributary	2	4735.5	2y 48h	16.86	24.12	27.55	25.30	27.55	0.000052	0.06	344.67	180.00	0.01
Tributary	2	4735.5	2y 24h	30.28	24.12	27.82	25.73	27.82	0.000089	0.08	392.48	180.00	0.02
Tributary	2	4735.5	2y 18h	19.48	24.12	28.00	25.32	28.00	0.000028	0.05	425.32	180.00	0.01
Tributary	2	4735.5	2y 12h	29.28	24.12	27.91	25.69	27.91	0.000073	0.08	408.37	180.00	0.02
Tributary	2	4735.5	2y 6h	32.74	24.12	27.72	25.81	27.72	0.000120	0.09	374.21	180.00	0.02
Tributary	2	4735.5	2y 3h	42.96	24.12	27.44	26.15	27.44	0.000323	0.14	325.09	180.00	0.03
Tributary	2	4735.5	2y 1h	48.44	24.12	26.88	26.31	26.88	0.001293	0.23	223.14	180.00	0.06
Tributary	2	4735.5	5y 72h	17.24	24.12	28.19	25.23	28.19	0.000017	0.04	460.14	180.00	0.01
Tributary	2	4735.5	5y 48h	29.76	24.12	28.28	25.70	28.28	0.000046	0.07	475.05	180.00	0.01
Tributary	2	4735.5	5y 24h	45.10	24.12	28.61	26.21	28.61	0.000073	0.09	534.96	180.00	0.02
Tributary	2	4735.5	5y 18h	31.43	24.12	28.80	25.77	28.80	0.000029	0.06	569.20	180.00	0.01
Tributary	2	4735.5	5y 12h	44.29	24.12	28.67	26.19	28.67	0.000066	0.09	545.69	180.00	0.02
Tributary	2	4735.5	5y 6h	46.88	24.12	28.42	26.32	28.42	0.000106	0.10	500.52	180.00	0.02
Tributary	2	4735.5	5y 3h	64.89	24.12	28.10	26.40	28.10	0.000277	0.15	442.58	180.00	0.03
Tributary	2	4735.5	5y 1h	74.57	24.12	27.42	26.40	27.42	0.001015	0.24	320.81	180.00	0.05
Tributary	2	4735.5	10y 72h	20.97	24.12	28.48	25.38	28.48	0.000018	0.04	512.45	180.00	0.01
Tributary	2	4735.5	10y 48h	35.78	24.12	28.64	25.91	28.64	0.000044	0.07	540.67	180.00	0.01
Tributary	2	4735.5	10y 24h	53.20	24.12	29.05	26.40	29.05	0.000065	0.09	613.91	180.00	0.02
Tributary	2	4735.5	10y 18h	37.95	24.12	29.27	25.99	29.27	0.000027	0.06	653.35	180.00	0.01
Tributary	2	4735.5	10y 12h	52.15	24.12	29.05	26.40	29.05	0.000062	0.09	615.06	180.00	0.01
Tributary	2	4735.5	10y 6h	57.15	24.12	28.73	26.40	28.73	0.000103	0.11	555.35	180.00	0.02
Tributary	2	4735.5	10y 3h	75.98	24.12	28.37	26.40	28.37	0.000270	0.16	492.48	180.00	0.03
Tributary	2	4735.5	10y 1h	87.36	24.12	27.46	26.40	27.46	0.001305	0.28	327.59	180.00	0.06
Tributary	2	4735.5	20y 72h	25.97	24.12	28.93	25.57	28.93	0.000017	0.05	593.04	180.00	0.01
Tributary	2	4735.5	20y 48h	43.77	24.12	29.12	26.17	29.12	0.000041	0.07	627.72	180.00	0.01
Tributary	2	4735.5	20y 24h	63.93	24.12	29.54	26.40	29.54	0.000061	0.10	701.94	180.00	0.02
Tributary	2	4735.5	20y 18h	46.72	24.12	29.73	26.26	29.73	0.000028	0.07	736.38	180.00	0.01
Tributary	2	4735.5	20y 12h	62.86	24.12	29.63	26.40	29.63	0.000054	0.09	718.34	180.00	0.01
Tributary	2	4735.5	20y 6h	68.43	24.12	29.05	26.40	29.05	0.000107	0.12	614.67	180.00	0.02
Tributary	2	4735.5	20y 3h	91.29	24.12	28.72	26.40	28.72	0.000264	0.17	555.17	180.00	0.03
Tributary	2	4735.5	20y 1h	104.90	24.12	27.69	26.40	27.69	0.001294	0.30	368.93	180.00	0.06
Tributary	2	4735.5	50y 72h	28.71	24.12	29.44	25.67	29.44	0.000013	0.04	684.51	180.00	0.01
Tributary	2	4735.5	50y 48h	48.26	24.12	29.72	26.31	29.72	0.000030	0.07	735.41	180.00	0.01

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Tributary	2	4735.5	50y 24h	71.16	24.12	30.16	26.40	30.16	0.000046	0.09	813.60	180.00	0.01
Tributary	2	4735.5	50y 18h	53.34	24.12	30.41	26.40	30.41	0.000022	0.07	858.70	180.00	0.01
Tributary	2	4735.5	50y 12h	69.49	24.12	30.10	26.40	30.10	0.000046	0.09	803.02	180.00	0.01
Tributary	2	4735.5	50y 6h	76.84	24.12	29.66	26.40	29.66	0.000078	0.11	724.38	180.00	0.02
Tributary	2	4735.5	50y 3h	102.90	24.12	29.17	26.40	29.18	0.000215	0.17	636.74	180.00	0.03
Tributary	2	4735.5	50y 1h	125.90	24.12	28.07	26.40	28.07	0.001083	0.30	437.41	180.00	0.06
Tributary	2	4735.5	100y 72h	33.99	24.12	29.91	25.85	29.91	0.000013	0.05	768.59	180.00	0.01
Tributary	2	4735.5	100y 48h	56.42	24.12	30.22	26.40	30.22	0.000028	0.07	825.48	180.00	0.01
Tributary	2	4735.5	100y 24h	87.38	24.12	30.63	26.40	30.63	0.000051	0.10	899.23	180.00	0.01
Tributary	2	4735.5	100y 18h	61.35	24.12	30.91	26.40	30.91	0.000021	0.07	948.87	180.00	0.01
Tributary	2	4735.5	100y 12h	80.31	24.12	30.59	26.40	30.59	0.000044	0.09	891.87	180.00	0.01
Tributary	2	4735.5	100y 6h	88.52	24.12	30.08	26.40	30.09	0.000076	0.12	800.69	180.00	0.02
Tributary	2	4735.5	100y 3h	119.90	24.12	29.59	26.40	29.59	0.000204	0.18	711.77	180.00	0.03
Tributary	2	4735.5	100y 1h	147.30	24.12	28.21	26.40	28.21	0.001236	0.34	462.96	180.00	0.06
Tributary	2	4735.5	Feb2008	33.77	24.12	27.64	25.84	27.64	0.000144	0.10	360.93	180.00	0.02
Tributary	2	4730		Culvert									
Tributary	2	4724.5	2y 72h	11.05	24.12	27.53	24.94	27.53	0.000018	0.03	340.52	180.00	0.01
Tributary	2	4724.5	2y 48h	18.86	24.12	27.55	25.30	27.55	0.000052	0.06	344.14	180.00	0.01
Tributary	2	4724.5	2y 24h	30.28	24.12	27.81	25.73	27.81	0.000089	0.08	392.04	180.00	0.02
Tributary	2	4724.5	2y 18h	19.48	24.12	27.99	25.32	27.99	0.000029	0.05	422.98	180.00	0.01
Tributary	2	4724.5	2y 12h	29.26	24.12	27.87	25.69	27.87	0.000077	0.08	402.39	180.00	0.02
Tributary	2	4724.5	2y 6h	32.74	24.12	27.71	25.61	27.71	0.000122	0.09	373.22	180.00	0.02
Tributary	2	4724.5	2y 3h	42.96	24.12	27.44	26.15	27.44	0.000323	0.14	325.03	180.00	0.03
Tributary	2	4724.5	2y 1h	48.44	24.12	26.86	26.31	26.87	0.001332	0.23	220.91	180.00	0.06
Tributary	2	4724.5	5y 72h	17.24	24.12	28.18	25.23	28.18	0.000017	0.04	458.48	180.00	0.01
Tributary	2	4724.5	5y 48h	29.76	24.12	28.27	25.70	28.27	0.000047	0.07	473.83	180.00	0.01
Tributary	2	4724.5	5y 24h	45.10	24.12	28.62	26.21	28.62	0.000072	0.09	537.33	180.00	0.02
Tributary	2	4724.5	5y 18h	31.43	24.12	28.83	25.77	28.83	0.000028	0.06	574.19	180.00	0.01
Tributary	2	4724.5	5y 12h	44.29	24.12	28.67	26.19	28.67	0.000066	0.09	546.39	180.00	0.02
Tributary	2	4724.5	5y 6h	48.88	24.12	28.42	26.32	28.42	0.000105	0.10	501.45	180.00	0.02
Tributary	2	4724.5	5y 3h	64.89	24.12	28.10	26.40	28.10	0.000276	0.15	442.94	180.00	0.03
Tributary	2	4724.5	5y 1h	74.57	24.12	27.30	26.40	27.30	0.001267	0.26	298.77	180.00	0.06
Tributary	2	4724.5	10y 72h	20.97	24.12	28.50	25.38	28.50	0.000018	0.04	516.13	180.00	0.01
Tributary	2	4724.5	10y 48h	35.78	24.12	28.63	25.91	28.63	0.000045	0.07	537.94	180.00	0.01
Tributary	2	4724.5	10y 24h	53.20	24.12	29.01	26.40	29.01	0.000067	0.09	606.86	180.00	0.02
Tributary	2	4724.5	10y 18h	37.95	24.12	29.25	25.99	29.25	0.000027	0.06	650.44	180.00	0.01
Tributary	2	4724.5	10y 12h	52.15	24.12	29.04	26.40	29.04	0.000063	0.09	612.35	180.00	0.01
Tributary	2	4724.5	10y 6h	57.15	24.12	28.73	26.40	28.73	0.000102	0.11	557.15	180.00	0.02
Tributary	2	4724.5	10y 3h	75.98	24.12	28.38	26.40	28.38	0.000267	0.16	493.70	180.00	0.03
Tributary	2	4724.5	10y 1h	87.36	24.12	27.46	26.40	27.46	0.001296	0.28	328.29	180.00	0.06
Tributary	2	4724.5	20y 72h	25.97	24.12	28.94	25.57	28.94	0.000017	0.05	593.83	180.00	0.01
Tributary	2	4724.5	20y 48h	43.77	24.12	29.11	26.17	29.11	0.000041	0.07	625.42	180.00	0.01
Tributary	2	4724.5	20y 24h	63.93	24.12	29.54	26.40	29.54	0.000061	0.10	701.85	180.00	0.02
Tributary	2	4724.5	20y 18h	46.72	24.12	29.75	26.26	29.75	0.000027	0.07	741.17	180.00	0.01
Tributary	2	4724.5	20y 12h	62.86	24.12	29.52	26.40	29.52	0.000059	0.09	699.27	180.00	0.01
Tributary	2	4724.5	20y 6h	68.43	24.12	29.15	26.40	29.15	0.000098	0.11	632.21	180.00	0.02
Tributary	2	4724.5	20y 3h	91.29	24.12	28.72	26.40	28.73	0.000264	0.17	555.71	180.00	0.03
Tributary	2	4724.5	20y 1h	104.90	24.12	27.67	26.40	27.67	0.001336	0.30	365.20	180.00	0.06
Tributary	2	4724.5	50y 72h	28.71	24.12	29.44	25.67	29.44	0.000013	0.04	684.66	180.00	0.01
Tributary	2	4724.5	50y 48h	48.28	24.12	29.74	26.31	29.74	0.000029	0.07	737.87	180.00	0.01
Tributary	2	4724.5	50y 24h	71.16	24.12	30.16	26.40	30.16	0.000047	0.09	813.51	180.00	0.01
Tributary	2	4724.5	50y 18h	53.34	24.12	30.41	26.40	30.41	0.000022	0.07	860.01	180.00	0.01
Tributary	2	4724.5	50y 12h	69.49	24.12	30.08	26.40	30.08	0.000047	0.09	799.48	180.00	0.01
Tributary	2	4724.5	50y 6h	76.84	24.12	29.68	26.40	29.68	0.000078	0.11	726.99	180.00	0.02
Tributary	2	4724.5	50y 3h	102.90	24.12	29.18	26.40	29.18	0.000215	0.17	637.29	180.00	0.03
Tributary	2	4724.5	50y 1h	125.90	24.12	27.94	26.40	27.95	0.001279	0.32	415.33	180.00	0.06
Tributary	2	4724.5	100y 72h	33.99	24.12	29.89	25.85	29.89	0.000013	0.05	765.52	180.00	0.01
Tributary	2	4724.5	100y 48h	56.42	24.12	30.22	26.40	30.22	0.000028	0.07	824.55	180.00	0.01
Tributary	2	4724.5	100y 24h	87.38	24.12	30.63	26.40	30.63	0.000051	0.10	899.02	180.00	0.01
Tributary	2	4724.5	100y 18h	61.35	24.12	30.89	26.40	30.89	0.000021	0.07	945.15	180.00	0.01
Tributary	2	4724.5	100y 12h	80.31	24.12	30.57	26.40	30.57	0.000045	0.10	888.00	180.00	0.01
Tributary	2	4724.5	100y 6h	88.52	24.12	30.08	26.40	30.08	0.000076	0.12	800.25	180.00	0.02
Tributary	2	4724.5	100y 3h	119.90	24.12	29.57	26.40	29.57	0.000207	0.18	708.38	180.00	0.03
Tributary	2	4724.5	100y 1h	147.30	24.12	28.20	26.40	28.21	0.001243	0.34	462.22	180.00	0.06
Tributary	2	4724.5	Feb2008	33.77	24.12	27.64	25.84	27.64	0.000144	0.10	360.73	180.00	0.02
Tributary	2	4612.5	2y 72h	11.05	24.12	27.53		27.53	0.000019	0.03	340.14	180.00	0.01
Tributary	2	4612.5	2y 48h	18.86	24.12	27.54		27.54	0.000053	0.06	343.08	180.00	0.01
Tributary	2	4612.5	2y 24h	30.28	24.12	27.80		27.80	0.000090	0.08	390.22	180.00	0.02
Tributary	2	4612.5	2y 18h	19.48	24.12	27.98		27.98	0.000029	0.05	422.39	180.00	0.01
Tributary	2	4612.5	2y 12h	29.26	24.12	27.86		27.86	0.000077	0.08	400.83	180.00	0.02
Tributary	2	4612.5	2y 6h	32.74	24.12	27.70		27.70	0.000124	0.09	370.73	180.00	0.02
Tributary	2	4612.5	2y 3h	42.96	24.12	27.40		27.41	0.000346	0.14	318.25	180.00	0.03
Tributary	2	4612.5	2y 1h	48.44	24.12	26.67		26.68	0.002146	0.26	187.23	172.17	0.07
Tributary	2	4612.5	5y 72h	17.24	24.12	28.18		28.18	0.000018	0.04	458.13	180.00	0.01
Tributary	2	4612.5	5y 48h	29.76	24.12	28.26		28.26	0.000047	0.07	472.88	180.00	0.01
Tributary	2	4612.5	5y 24h	45.10	24.12	28.61		28.61	0.000072	0.09	535.87	180.00	0.02
Tributary	2	4612.5	5y 18h	31.43	24.12	28.82		28.82	0.000028	0.06	573.63	180.00	0.01
Tributary	2	4612.5	5y 12h	44.29	24.12	28.66		28.66	0.000066	0.09	545.06	180.00	0.02
Tributary	2	4612.5	5y 6h	48.88	24.12	28.41		28.41	0.000107	0.10	499.31	180.00	0.02
Tributary	2	4612.5	5y 3h	64.89	24.12	28.07		28.07	0.000288	0.16	437.23	180.00	0.03
Tributary	2	4612.5	5y 1h	74.57	24.12	27.13		27.13	0.001755	0.29	268.74	180.00	0.07
Tributary	2	4612.5	10y 72h	20.97	24.12	28.50		28.50	0.000018	0.04	515.77	180.00	0.01
Tributary	2	4612.5	10y 48h	35.78	24.12	28.62		28.62	0.000045	0.07	537.03	180.00	0.01
Tributary	2	4612.5	10y 24h	53.20	24.12	29.00		29.00	0.000068	0.09	605.49	180.00	0.02
Tributary	2	4612.5	10y 18h	37.95	24.12	29.25		29.25	0.000027	0.06	649.89	180.00	0.01
Tributary	2	4612.5	10y 12h	52.15	24.12	29.03		29.03	0.000063	0.09	611.08	180.00	0.02
Tributary	2	4612.5	10y 6h	57.15	24.12	28.72		28.72	0.000104	0.11	555.06	180.00	0.02
Tributary	2	4612.5	10y 3h	75.98	24.12	28.35		28.35	0.000277	0.16	488.19	180.00	0.03
Tributary	2	4612.5	10y 1h	87.36	24.12	27.29		27.30	0.001755	0.31	297.88	180.00	0.07

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Tributary	2	4612.5	20y 72h	25.97	24.12	28.93		28.93	0.000017	0.05	593.48	180.00	0.01
Tributary	2	4612.5	20y 48h	43.77	24.12	29.11		29.11	0.000042	0.07	624.58	180.00	0.01
Tributary	2	4612.5	20y 24h	63.93	24.12	29.53		29.53	0.000061	0.10	700.62	180.00	0.02
Tributary	2	4612.5	20y 18h	46.72	24.12	29.75		29.75	0.000027	0.07	740.62	180.00	0.01
Tributary	2	4612.5	20y 12h	62.86	24.12	29.51		29.52	0.000060	0.09	696.07	180.00	0.01
Tributary	2	4612.5	20y 6h	68.43	24.12	29.14		29.14	0.000099	0.11	630.23	180.00	0.02
Tributary	2	4612.5	20y 3h	91.29	24.12	28.69		28.70	0.000272	0.17	550.29	180.00	0.03
Tributary	2	4612.5	20y 1h	104.90	24.12	27.49		27.50	0.001768	0.33	334.19	180.00	0.07
Tributary	2	4612.5	50y 72h	28.71	24.12	29.44		29.44	0.000013	0.04	684.41	180.00	0.01
Tributary	2	4612.5	50y 48h	48.28	24.12	29.73		29.73	0.000029	0.07	737.27	180.00	0.01
Tributary	2	4612.5	50y 24h	71.16	24.12	30.15		30.15	0.000047	0.09	812.57	180.00	0.01
Tributary	2	4612.5	50y 18h	53.34	24.12	30.41		30.41	0.000022	0.07	859.57	180.00	0.01
Tributary	2	4612.5	50y 12h	69.49	24.12	30.07		30.07	0.000047	0.09	798.53	180.00	0.01
Tributary	2	4612.5	50y 6h	76.84	24.12	29.67		29.67	0.000079	0.11	725.41	180.00	0.02
Tributary	2	4612.5	50y 3h	102.90	24.12	29.15		29.15	0.000220	0.17	632.90	180.00	0.03
Tributary	2	4612.5	50y 1h	125.90	24.12	27.78		27.79	0.001610	0.34	386.34	180.00	0.07
Tributary	2	4612.5	100y 72h	33.99	24.12	29.89		29.89	0.000013	0.05	765.26	180.00	0.01
Tributary	2	4612.5	100y 48h	56.42	24.12	30.21		30.21	0.000028	0.07	823.98	180.00	0.01
Tributary	2	4612.5	100y 24h	87.38	24.12	30.63		30.63	0.000051	0.10	898.00	180.00	0.01
Tributary	2	4612.5	100y 18h	61.35	24.12	30.88		30.89	0.000021	0.07	944.72	180.00	0.01
Tributary	2	4612.5	100y 12h	80.31	24.12	30.56		30.57	0.000045	0.10	887.10	180.00	0.01
Tributary	2	4612.5	100y 6h	88.52	24.12	30.07		30.07	0.000076	0.12	798.71	180.00	0.02
Tributary	2	4612.5	100y 3h	119.90	24.12	29.55		29.55	0.000211	0.18	704.13	180.00	0.03
Tributary	2	4612.5	100y 1h	147.30	24.12	28.05		28.06	0.001515	0.36	434.47	180.00	0.07
Tributary	2	4612.5	Feb2008	33.77	24.12	27.62		27.62	0.000148	0.10	357.78	180.00	0.02
Tributary	2	4520.	2y 72h	11.05	23.76	27.53		27.53	0.000004	0.02	908.14	629.39	0.00
Tributary	2	4520.	2y 48h	18.86	23.76	27.54		27.54	0.000010	0.03	917.73	632.05	0.01
Tributary	2	4520.	2y 24h	30.28	23.76	27.80		27.80	0.000017	0.04	1088.56	678.58	0.01
Tributary	2	4520.	2y 18h	19.48	23.76	27.98		27.98	0.000005	0.02	1214.65	722.23	0.00
Tributary	2	4520.	2y 12h	29.28	23.76	27.86		27.86	0.000014	0.04	1129.19	690.52	0.01
Tributary	2	4520.	2y 6h	32.74	23.76	27.69		27.69	0.000024	0.05	1015.39	658.63	0.01
Tributary	2	4520.	2y 3h	42.66	23.76	27.39		27.39	0.000071	0.08	825.84	609.84	0.02
Tributary	2	4520.	2y 1h	48.44	23.76	26.57		26.57	0.000709	0.20	375.37	484.11	0.05
Tributary	2	4520.	5y 72h	17.24	23.76	28.18		28.18	0.000003	0.02	1401.27	982.49	0.00
Tributary	2	4520.	5y 48h	29.76	23.76	28.26		28.26	0.000008	0.03	1481.30	988.99	0.01
Tributary	2	4520.	5y 24h	45.10	23.76	28.61		28.61	0.000011	0.04	1829.81	1005.22	0.01
Tributary	2	4520.	5y 18h	31.43	23.76	28.82		28.82	0.000004	0.02	2042.87	1014.73	0.00
Tributary	2	4520.	5y 12h	44.29	23.76	28.66		28.66	0.000010	0.04	1881.43	1007.53	0.01
Tributary	2	4520.	5y 6h	48.88	23.76	28.41		28.41	0.000018	0.05	1625.42	995.80	0.01
Tributary	2	4520.	5y 3h	64.89	23.76	28.06		28.06	0.000059	0.08	1279.91	954.26	0.01
Tributary	2	4520.	5y 1h	74.57	23.76	27.06		27.06	0.000443	0.18	630.32	561.42	0.04
Tributary	2	4520.	10y 72h	20.97	23.76	28.50		28.50	0.000003	0.02	1719.25	1000.21	0.00
Tributary	2	4520.	10y 48h	35.78	23.76	28.62		28.62	0.000007	0.03	1836.99	1005.54	0.00
Tributary	2	4520.	10y 24h	53.20	23.76	29.00		29.00	0.000009	0.04	2222.39	1022.61	0.01
Tributary	2	4520.	10y 18h	37.95	23.76	29.25		29.25	0.000003	0.02	2476.91	1033.44	0.00
Tributary	2	4520.	10y 12h	52.15	23.76	29.03		29.03	0.000008	0.04	2254.26	1023.97	0.01
Tributary	2	4520.	10y 6h	57.15	23.76	28.72		28.72	0.000015	0.05	1936.56	1009.99	0.01
Tributary	2	4520.	10y 3h	75.98	23.76	28.34		28.34	0.000048	0.08	1558.86	992.67	0.01
Tributary	2	4520.	10y 1h	87.36	23.76	27.22		27.23	0.000417	0.18	725.09	585.92	0.04
Tributary	2	4520.	20y 72h	25.97	23.76	28.93		28.93	0.000002	0.02	2155.36	1019.72	0.00
Tributary	2	4520.	20y 48h	43.77	23.76	29.11		29.11	0.000005	0.03	2331.70	1027.28	0.00
Tributary	2	4520.	20y 24h	63.93	23.76	29.53		29.53	0.000006	0.03	2769.33	1045.40	0.01
Tributary	2	4520.	20y 18h	46.72	23.76	29.75		29.75	0.000003	0.02	3003.33	1054.58	0.00
Tributary	2	4520.	20y 12h	62.86	23.76	29.51		29.51	0.000006	0.03	2754.54	1044.82	0.00
Tributary	2	4520.	20y 6h	68.43	23.76	29.14		29.14	0.000012	0.04	2362.77	1028.60	0.01
Tributary	2	4520.	20y 3h	91.29	23.76	28.69		28.69	0.000040	0.08	1805.58	1008.61	0.01
Tributary	2	4520.	20y 1h	104.90	23.76	27.43		27.43	0.000393	0.19	848.06	615.01	0.04
Tributary	2	4520.	50y 72h	28.71	23.76	29.44		29.44	0.000001	0.02	2676.23	1041.73	0.00
Tributary	2	4520.	50y 48h	48.28	23.76	29.73		29.73	0.000003	0.02	2983.67	1053.81	0.00
Tributary	2	4520.	50y 24h	71.16	23.76	30.15		30.15	0.000004	0.03	3427.80	1070.05	0.00
Tributary	2	4520.	50y 18h	53.34	23.76	30.41		30.41	0.000002	0.02	3708.86	1079.67	0.00
Tributary	2	4520.	50y 12h	69.49	23.76	30.07		30.07	0.000004	0.03	3344.40	1067.10	0.00
Tributary	2	4520.	50y 6h	76.84	23.76	29.67		29.67	0.000008	0.04	2913.44	1051.06	0.01
Tributary	2	4520.	50y 3h	102.90	23.76	29.15		29.15	0.000026	0.07	2376.48	1029.14	0.01
Tributary	2	4520.	50y 1h	125.90	23.76	27.73		27.73	0.000327	0.18	1039.59	665.21	0.03
Tributary	2	4520.	100y 72h	33.99	23.76	29.89		29.89	0.000001	0.02	3148.31	1060.13	0.00
Tributary	2	4520.	100y 48h	56.42	23.76	30.21		30.21	0.000002	0.02	3495.89	1072.46	0.00
Tributary	2	4520.	100y 24h	87.38	23.76	30.62		30.62	0.000004	0.03	3939.77	1086.44	0.00
Tributary	2	4520.	100y 18h	61.35	23.76	30.88		30.88	0.000002	0.02	4223.22	1094.69	0.00
Tributary	2	4520.	100y 12h	80.31	23.76	30.56		30.56	0.000004	0.03	3874.10	1084.52	0.00
Tributary	2	4520.	100y 6h	88.52	23.76	30.07		30.07	0.000007	0.04	3345.05	1067.12	0.01
Tributary	2	4520.	100y 3h	119.90	23.76	29.54		29.54	0.000022	0.07	2787.00	1046.10	0.01
Tributary	2	4520.	100y 1h	147.30	23.76	28.00		28.00	0.000291	0.18	1229.44	879.85	0.03
Tributary	2	4520.	Feb2008	33.77	23.76	27.62		27.62	0.000028	0.05	967.95	645.77	0.01
LPds	4	6350.	2y 72h	153.10	21.81	27.98		27.98	0.000197	0.17	912.68	234.48	0.03
LPds	4	6350.	2y 48h	154.30	21.81	27.98		27.99	0.000199	0.17	914.71	234.77	0.03
LPds	4	6350.	2y 24h	197.30	21.81	28.34		28.34	0.000248	0.20	1000.11	250.79	0.03
LPds	4	6350.	2y 18h	274.10	21.81	28.78		28.78	0.000344	0.25	1114.70	268.82	0.04
LPds	4	6350.	2y 12h	256.10	21.81	28.63		28.63	0.000334	0.24	1075.00	263.47	0.04
LPds	4	6350.	2y 6h	225.60	21.81	28.40		28.40	0.000309	0.22	1015.15	253.89	0.03
LPds	4	6350.	2y 3h	191.20	21.81	28.07		28.07	0.000286	0.20	935.18	237.67	0.03
LPds	4	6350.	2y 1h	128.20	21.81	27.28		27.28	0.000241	0.17	766.69	217.61	0.03
LPds	4	6350.	5y 72h	251.40	21.81	28.80		28.80	0.000285	0.23	1120.68	269.53	0.03
LPds	4	6350.	5y 48h	268.90	21.81	28.91		28.92	0.000300	0.24	1152.27	273.23	0.03
LPds	4	6350.	5y 24h	343.00	21.81	29.39		29.39	0.000354	0.27	1285.22	286.73	0.04
LPds	4	6350.	5y 18h	440.10	21.81	29.84		29.84	0.000439	0.32	1417.38	300.35	0.04
LPds	4	6350.	5y 12h	416.10	21.81	29.67		29.68	0.000435	0.31	1368.16	295.24	0.04
LPds	4	6350.	5y 6h	357.10	21.81	29.32		29.33	0.000401	0.29	1266.04	284.88	0.04
LPds	4	6350.	5y 3h	301.60	21.81	28.92		28.92	0.000375	0.27	1153.93	273.43	0.04
LPds	4	6350.	5y 1h	202.20	21.81	27.97		27.97	0.000345	0.22	911.71	234.34	0.04

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LPds	4	6350.	10y 72h	311.60	21.81	29.22		29.22	0.000326	0.26	1237.43	282.22	0.04
LPds	4	6350.	10y 48h	336.40	21.81	29.37		29.38	0.000344	0.27	1280.87	286.28	0.04
LPds	4	6350.	10y 24h	427.90	21.81	29.88		29.89	0.000405	0.31	1429.95	301.64	0.04
LPds	4	6350.	10y 18h	533.10	21.81	30.33		30.33	0.000468	0.36	1606.58	446.79	0.05
LPds	4	6350.	10y 12h	503.40	21.81	30.13		30.14	0.000462	0.35	1521.45	430.19	0.05
LPds	4	6350.	10y 6h	427.80	21.81	29.74		29.74	0.000442	0.32	1386.83	297.19	0.04
LPds	4	6350.	10y 3h	359.40	21.81	29.29		29.29	0.000415	0.29	1256.92	284.03	0.04
LPds	4	6350.	10y 1h	239.40	21.81	28.24		28.24	0.000394	0.25	975.93	245.87	0.04
LPds	4	6350.	20y 72h	394.60	21.81	29.75		29.75	0.000373	0.29	1390.34	297.55	0.04
LPds	4	6350.	20y 48h	429.80	21.81	29.95		29.96	0.000392	0.31	1451.11	304.32	0.04
LPds	4	6350.	20y 24h	544.30	21.81	30.49		30.49	0.000460	0.35	1679.72	448.88	0.04
LPds	4	6350.	20y 18h	659.10	21.81	30.89		30.90	0.000528	0.39	1861.68	454.10	0.05
LPds	4	6350.	20y 12h	624.10	21.81	30.69		30.70	0.000535	0.39	1769.46	451.43	0.05
LPds	4	6350.	20y 6h	527.20	21.81	30.25		30.26	0.000499	0.36	1573.67	445.85	0.05
LPds	4	6350.	20y 3h	441.00	21.81	29.76		29.77	0.000463	0.33	1394.06	297.94	0.04
LPds	4	6350.	20y 1h	291.30	21.81	28.57		28.58	0.000451	0.28	1050.67	261.46	0.04
LPds	4	6350.	50y 72h	497.70	21.81	30.33		30.33	0.000425	0.33	1607.55	446.82	0.04
LPds	4	6350.	50y 48h	543.10	21.81	30.60		30.61	0.000427	0.34	1731.25	450.34	0.04
LPds	4	6350.	50y 24h	675.00	21.81	31.13		31.13	0.000483	0.39	1969.08	457.60	0.05
LPds	4	6350.	50y 18h	833.60	21.81	31.61		31.62	0.000561	0.43	2191.13	465.48	0.05
LPds	4	6350.	50y 12h	787.00	21.81	31.34		31.34	0.000583	0.43	2064.62	460.70	0.05
LPds	4	6350.	50y 6h	667.50	21.81	30.87		30.88	0.000548	0.40	1852.45	453.80	0.05
LPds	4	6350.	50y 3h	556.20	21.81	30.33		30.34	0.000528	0.37	1609.99	446.69	0.05
LPds	4	6350.	50y 1h	365.90	21.81	29.03		29.04	0.000511	0.31	1184.88	277.01	0.04
LPds	4	6350.	100y 72h	603.70	21.81	30.83		30.84	0.000459	0.37	1834.66	453.27	0.04
LPds	4	6350.	100y 48h	651.80	21.81	31.12		31.13	0.000452	0.37	1966.08	457.51	0.04
LPds	4	6350.	100y 24h	801.30	21.81	31.64		31.65	0.000509	0.42	2207.50	466.14	0.05
LPds	4	6350.	100y 18h	972.20	21.81	32.12		32.13	0.000582	0.46	2431.44	483.60	0.05
LPds	4	6350.	100y 12h	929.30	21.81	31.87		31.88	0.000606	0.46	2312.78	470.43	0.05
LPds	4	6350.	100y 6h	790.00	21.81	31.35		31.36	0.000582	0.43	2071.55	460.92	0.05
LPds	4	6350.	100y 3h	659.00	21.81	30.78		30.79	0.000564	0.40	1812.40	452.64	0.05
LPds	4	6350.	100y 1h	433.70	21.81	29.41		29.41	0.000559	0.35	1280.83	287.29	0.05
LPds	4	6350.	Feb2008	208.80	21.81	28.28		28.29	0.000289	0.21	987.26	248.12	0.03
LPds	4	6075.5	2y 72h	153.80	20.75	27.90		27.90	0.000399	0.22	711.90	203.78	0.04
LPds	4	6075.5	2y 48h	154.40	20.75	27.91		27.91	0.000400	0.22	713.59	204.02	0.04
LPds	4	6075.5	2y 24h	197.60	20.75	28.24		28.24	0.000508	0.25	783.14	214.13	0.04
LPds	4	6075.5	2y 18h	274.90	20.75	28.64		28.64	0.000754	0.32	872.01	234.02	0.05
LPds	4	6075.5	2y 12h	256.40	20.75	28.50		28.50	0.000715	0.31	839.00	225.39	0.05
LPds	4	6075.5	2y 6h	225.20	20.75	28.28		28.28	0.000642	0.28	790.70	215.39	0.05
LPds	4	6075.5	2y 3h	191.30	20.75	27.98		27.98	0.000589	0.26	724.27	205.47	0.04
LPds	4	6075.5	2y 1h	127.50	20.75	27.19		27.19	0.000511	0.22	572.91	188.86	0.04
LPds	4	6075.5	5y 72h	252.30	20.75	28.69		28.69	0.000621	0.29	882.85	237.68	0.05
LPds	4	6075.5	5y 48h	268.90	20.75	28.79		28.80	0.000667	0.30	909.38	246.39	0.05
LPds	4	6075.5	5y 24h	343.70	20.75	29.25		29.25	0.000783	0.34	1025.47	262.85	0.05
LPds	4	6075.5	5y 18h	441.20	20.75	29.66		29.67	0.000974	0.39	1159.14	375.64	0.06
LPds	4	6075.5	5y 12h	416.40	20.75	29.50		29.51	0.000993	0.38	1098.41	358.26	0.06
LPds	4	6075.5	5y 6h	356.30	20.75	29.16		29.17	0.000899	0.36	1002.82	260.48	0.06
LPds	4	6075.5	5y 3h	301.90	20.75	28.77		28.78	0.000852	0.34	903.11	244.36	0.05
LPds	4	6075.5	5y 1h	201.20	20.75	27.84		27.84	0.000717	0.29	699.26	202.04	0.05
LPds	4	6075.5	10y 72h	312.50	20.75	29.09		29.10	0.000730	0.32	984.41	258.55	0.05
LPds	4	6075.5	10y 48h	336.40	20.75	29.24		29.24	0.000757	0.33	1022.64	262.56	0.05
LPds	4	6075.5	10y 24h	428.90	20.75	29.72		29.73	0.000879	0.37	1180.71	381.63	0.06
LPds	4	6075.5	10y 18h	533.10	20.75	30.14		30.15	0.000979	0.42	1355.02	456.67	0.06
LPds	4	6075.5	10y 12h	503.80	20.75	29.94		29.95	0.001015	0.42	1269.35	418.36	0.06
LPds	4	6075.5	10y 6h	427.20	20.75	29.56		29.57	0.000994	0.39	1120.58	364.70	0.06
LPds	4	6075.5	10y 3h	359.80	20.75	29.12		29.13	0.000944	0.36	992.74	259.42	0.06
LPds	4	6075.5	10y 1h	238.30	20.75	28.09		28.09	0.000831	0.32	750.23	208.97	0.05
LPds	4	6075.5	20y 72h	395.50	20.75	29.60		29.61	0.000824	0.36	1135.41	366.95	0.05
LPds	4	6075.5	20y 48h	429.20	20.75	29.80		29.80	0.000827	0.37	1210.43	389.72	0.06
LPds	4	6075.5	20y 24h	545.70	20.75	30.31		30.32	0.000892	0.41	1436.22	463.39	0.06
LPds	4	6075.5	20y 18h	657.30	20.75	30.70		30.71	0.000958	0.45	1616.06	478.17	0.06
LPds	4	6075.5	20y 12h	624.70	20.75	30.49		30.50	0.001024	0.45	1516.53	469.94	0.06
LPds	4	6075.5	20y 6h	527.30	20.75	30.06		30.07	0.001017	0.42	1318.60	448.85	0.06
LPds	4	6075.5	20y 3h	441.50	20.75	29.58		29.58	0.001048	0.40	1126.16	366.30	0.06
LPds	4	6075.5	20y 1h	290.10	20.75	28.39		28.40	0.000979	0.36	816.39	220.36	0.06
LPds	4	6075.5	50y 72h	498.50	20.75	30.17		30.17	0.000837	0.39	1367.63	457.72	0.06
LPds	4	6075.5	50y 48h	542.60	20.75	30.44		30.45	0.000798	0.39	1496.70	468.33	0.06
LPds	4	6075.5	50y 24h	676.50	20.75	30.95		30.96	0.000850	0.43	1739.57	488.67	0.06
LPds	4	6075.5	50y 18h	835.50	20.75	31.41		31.42	0.000944	0.48	1967.33	508.22	0.06
LPds	4	6075.5	50y 12h	787.60	20.75	31.12		31.14	0.001020	0.48	1824.51	495.77	0.06
LPds	4	6075.5	50y 6h	668.70	20.75	30.67		30.68	0.001024	0.46	1602.01	476.96	0.06
LPds	4	6075.5	50y 3h	556.80	20.75	30.13		30.14	0.001075	0.44	1350.78	456.32	0.06
LPds	4	6075.5	50y 1h	364.40	20.75	28.82		28.83	0.001207	0.40	916.55	248.70	0.07
LPds	4	6075.5	100y 72h	604.50	20.75	30.66		30.67	0.000839	0.42	1599.90	476.78	0.06
LPds	4	6075.5	100y 48h	651.50	20.75	30.96		30.97	0.000785	0.42	1742.37	488.91	0.06
LPds	4	6075.5	100y 24h	803.30	20.75	31.46		31.47	0.000841	0.46	1995.47	510.73	0.06
LPds	4	6075.5	100y 18h	972.70	20.75	31.92		31.93	0.000917	0.50	2231.37	525.00	0.06
LPds	4	6075.5	100y 12h	930.10	20.75	31.66		31.67	0.000993	0.51	2094.08	519.40	0.06
LPds	4	6075.5	100y 6h	791.30	20.75	31.14		31.15	0.001018	0.49	1832.07	496.39	0.06
LPds	4	6075.5	100y 3h	659.80	20.75	30.57		30.58	0.001071	0.46	1556.59	473.17	0.06
LPds	4	6075.5	100y 1h	432.30	20.75	29.18		29.19	0.001303	0.43	1007.80	261.02	0.07
LPds	4	6075.5	Feb2008	208.50	20.75	28.17		28.18	0.000595	0.27	768.74	211.71	0.05
LPds	4	5927.	2y 72h	153.80	23.00	27.78	25.24	27.79	0.002120	0.32	488.76	300.72	0.08
LPds	4	5927.	2y 48h	154.40	23.00	27.79	25.25	27.79	0.002102	0.32	491.32	301.07	0.08
LPds	4	5927.	2y 24h	197.60	23.00	28.10	25.63	28.11	0.001978	0.35	586.35	314.30	0.08
LPds	4	5927.	2y 18h	274.90	23.00	28.46	26.42	28.46	0.002250	0.41	701.55	331.70	0.08
LPds	4	5927.	2y 12h	256.40	23.00	28.31	26.40	28.32	0.002403	0.41	655.03	323.40	0.09
LPds	4	5927.	2y 6h	225.20	23.00	28.10	25.87	28.11	0.002580	0.40	587.56	314.19	0.09
LPds	4	5927.	2y 3h	191.30	23.00	27.78	25.58	27.79	0.003275	0.40	488.98	300.75	0.10
LPds	4	5927.	2y 1h	127.50	23.00	26.97	24.99	26.98	0.010938	0.50	258.29	267.62	0.16

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LPds	4	5927.	5y 72h	252.30	23.00	28.54	26.43	28.55	0.001690	0.37	729.56	338.51	0.07
LPds	4	5927.	5y 48h	268.90	23.00	28.64	26.42	28.65	0.001672	0.37	765.12	346.96	0.07
LPds	4	5927.	5y 24h	343.70	23.00	29.09	26.51	29.09	0.001583	0.40	926.48	382.96	0.07
LPds	4	5927.	5y 18h	441.20	23.00	29.47	26.62	29.48	0.001728	0.45	1083.11	447.54	0.08
LPds	4	5927.	5y 12h	416.40	23.00	29.30	26.61	29.31	0.001820	0.45	1011.07	400.66	0.08
LPds	4	5927.	5y 6h	356.30	23.00	28.97	26.52	28.98	0.001951	0.44	882.50	373.49	0.08
LPds	4	5927.	5y 3h	301.90	23.00	28.57	26.46	28.58	0.002325	0.43	739.62	340.92	0.09
LPds	4	5927.	5y 1h	201.20	23.00	27.60	25.67	27.61	0.005188	0.47	435.60	293.42	0.12
LPds	4	5927.	10y 72h	312.50	23.00	28.94	26.47	28.94	0.001563	0.39	869.83	370.72	0.07
LPds	4	5927.	10y 48h	336.40	23.00	29.08	26.50	29.09	0.001525	0.39	924.54	382.55	0.07
LPds	4	5927.	10y 24h	428.90	23.00	29.55	26.60	29.56	0.001494	0.43	1118.45	447.94	0.07
LPds	4	5927.	10y 18h	533.10	23.00	29.96	26.71	29.97	0.001496	0.46	1306.75	479.22	0.07
LPds	4	5927.	10y 12h	503.80	23.00	29.75	26.68	29.76	0.001657	0.47	1209.29	461.35	0.08
LPds	4	5927.	10y 6h	427.20	23.00	29.36	26.60	29.37	0.001788	0.45	1036.61	412.07	0.08
LPds	4	5927.	10y 3h	359.80	23.00	28.92	26.53	28.93	0.002116	0.45	863.49	369.32	0.08
LPds	4	5927.	10y 1h	238.30	23.00	27.83	25.97	27.85	0.004612	0.49	504.57	302.86	0.11
LPds	4	5927.	20y 72h	395.50	23.00	29.44	26.57	29.45	0.001410	0.41	1069.03	426.11	0.07
LPds	4	5927.	20y 48h	429.20	23.00	29.64	26.60	29.65	0.001355	0.42	1158.76	451.80	0.07
LPds	4	5927.	20y 24h	545.70	23.00	30.16	26.72	30.16	0.001299	0.44	1401.21	484.54	0.07
LPds	4	5927.	20y 18h	657.30	23.00	30.53	26.82	30.54	0.001329	0.48	1584.06	494.31	0.07
LPds	4	5927.	20y 12h	624.70	23.00	30.31	26.80	30.32	0.001475	0.48	1474.05	488.46	0.07
LPds	4	5927.	20y 6h	527.30	23.00	29.87	26.70	29.88	0.001605	0.47	1263.82	471.45	0.08
LPds	4	5927.	20y 3h	441.50	23.00	29.37	26.61	29.38	0.001904	0.47	1037.77	412.58	0.08
LPds	4	5927.	20y 1h	290.10	23.00	28.12	26.44	28.14	0.004143	0.51	593.96	315.08	0.11
LPds	4	5927.	50y 72h	498.50	23.00	30.02	26.67	30.02	0.001246	0.43	1333.23	480.66	0.07
LPds	4	5927.	50y 48h	542.60	23.00	30.31	26.72	30.31	0.001113	0.42	1473.98	488.45	0.06
LPds	4	5927.	50y 24h	676.50	23.00	30.81	26.84	30.82	0.001105	0.45	1723.39	501.63	0.07
LPds	4	5927.	50y 18h	835.50	23.00	31.25	27.01	31.26	0.001179	0.49	1948.94	513.26	0.07
LPds	4	5927.	50y 12h	787.60	23.00	30.95	26.94	30.96	0.001329	0.50	1795.82	505.39	0.07
LPds	4	5927.	50y 6h	668.70	23.00	30.49	26.82	30.50	0.001427	0.49	1564.14	493.26	0.07
LPds	4	5927.	50y 3h	556.80	23.00	29.93	26.76	29.94	0.001683	0.48	1292.46	476.65	0.08
LPds	4	5927.	50y 1h	364.40	23.00	28.53	26.56	28.54	0.003571	0.53	726.30	337.72	0.11
LPds	4	5927.	100y 72h	604.50	23.00	30.52	26.78	30.53	0.001135	0.44	1578.83	494.03	0.07
LPds	4	5927.	100y 48h	651.50	23.00	30.83	26.82	30.83	0.001010	0.43	1732.09	502.08	0.06
LPds	4	5927.	100y 24h	803.30	23.00	31.33	26.96	31.34	0.001031	0.47	1986.73	515.18	0.06
LPds	4	5927.	100y 18h	972.70	23.00	31.77	27.10	31.78	0.001095	0.51	2217.52	526.76	0.07
LPds	4	5927.	100y 12h	930.10	23.00	31.49	27.06	31.51	0.001220	0.52	2072.80	519.53	0.07
LPds	4	5927.	100y 6h	791.30	23.00	30.97	26.94	30.98	0.001325	0.50	1803.73	505.80	0.07
LPds	4	5927.	100y 3h	659.80	23.00	30.38	26.81	30.39	0.001531	0.50	1511.56	490.46	0.08
LPds	4	5927.	100y 1h	432.30	23.00	28.89	26.60	28.90	0.003172	0.55	852.07	366.80	0.10
LPds	4	5927.	Feb2006	208.50	23.00	28.01	25.73	28.01	0.002590	0.39	556.02	310.08	0.09
LPds	4	5920.		Mult Open									
LPds	4	5913.	2y 72h	153.80	23.00	27.77		27.77	0.001996	0.32	497.08	300.23	0.07
LPds	4	5913.	2y 48h	154.40	23.00	27.78		27.79	0.001986	0.32	500.77	300.73	0.07
LPds	4	5913.	2y 24h	197.60	23.00	28.10		28.11	0.001850	0.34	598.76	314.08	0.07
LPds	4	5913.	2y 18h	274.90	23.00	28.45		28.46	0.002138	0.41	711.45	331.18	0.08
LPds	4	5913.	2y 12h	256.40	23.00	28.31		28.32	0.002277	0.40	665.01	323.12	0.08
LPds	4	5913.	2y 6h	225.20	23.00	28.10		28.10	0.002429	0.39	597.73	313.93	0.08
LPds	4	5913.	2y 3h	181.30	23.00	27.78		27.78	0.003047	0.40	499.25	300.52	0.09
LPds	4	5913.	2y 1h	127.50	23.00	26.97		26.98	0.009491	0.48	269.47	267.55	0.15
LPds	4	5913.	5y 72h	252.30	23.00	28.54		28.54	0.001603	0.36	740.47	338.23	0.07
LPds	4	5913.	5y 48h	268.90	23.00	28.64		28.64	0.001594	0.37	775.15	346.48	0.07
LPds	4	5913.	5y 24h	343.70	23.00	29.08		29.09	0.001522	0.40	936.03	382.43	0.07
LPds	4	5913.	5y 18h	441.20	23.00	29.46		29.47	0.001674	0.45	1091.41	447.50	0.08
LPds	4	5913.	5y 12h	416.40	23.00	29.29		29.30	0.001760	0.45	1018.50	399.81	0.08
LPds	4	5913.	5y 6h	356.30	23.00	28.96		28.97	0.001874	0.43	891.95	372.93	0.08
LPds	4	5915.	5y 3h	301.90	23.00	28.56		28.57	0.002229	0.43	747.87	340.01	0.08
LPds	4	5913.	5y 1h	201.20	23.00	27.59		27.61	0.004796	0.46	445.60	293.16	0.11
LPds	4	5913.	10y 72h	312.50	23.00	28.93		28.94	0.001499	0.38	879.59	370.21	0.07
LPds	4	5913.	10y 48h	336.40	23.00	29.07		29.08	0.001466	0.39	934.15	382.03	0.07
LPds	4	5913.	10y 24h	428.90	23.00	29.55		29.55	0.001447	0.43	1127.29	447.90	0.07
LPds	4	5913.	10y 18h	533.10	23.00	29.95		29.96	0.001457	0.46	1315.02	478.54	0.07
LPds	4	5913.	10y 12h	503.80	23.00	29.74		29.75	0.001610	0.47	1217.69	460.66	0.08
LPds	4	5913.	10y 6h	427.20	23.00	29.35		29.36	0.001734	0.45	1044.24	410.11	0.08
LPds	4	5913.	10y 3h	359.80	23.00	28.91		28.92	0.002031	0.44	872.89	368.74	0.08
LPds	4	5913.	10y 1h	238.30	23.00	27.82		27.83	0.004330	0.48	513.63	302.47	0.11
LPds	4	5913.	20y 72h	395.50	23.00	29.43		29.44	0.001363	0.40	1078.20	424.87	0.07
LPds	4	5913.	20y 48h	429.20	23.00	29.63		29.64	0.001314	0.41	1167.37	451.14	0.07
LPds	4	5913.	20y 24h	545.70	23.00	30.15		30.16	0.001267	0.44	1409.59	484.34	0.07
LPds	4	5913.	20y 18h	657.30	23.00	30.52		30.53	0.001302	0.47	1591.67	494.08	0.07
LPds	4	5913.	20y 12h	624.70	23.00	30.30		30.31	0.001438	0.48	1483.07	488.29	0.07
LPds	4	5913.	20y 6h	527.30	23.00	29.86		29.87	0.001562	0.47	1272.18	470.76	0.08
LPds	4	5913.	20y 3h	441.50	23.00	29.36		29.37	0.001849	0.46	1044.94	410.43	0.08
LPds	4	5913.	20y 1h	290.10	23.00	28.11		28.13	0.003918	0.50	603.28	314.70	0.11
LPds	4	5913.	50y 72h	498.50	23.00	30.01		30.02	0.001213	0.42	1341.81	480.67	0.07
LPds	4	5913.	50y 48h	542.60	23.00	30.30		30.31	0.001086	0.42	1482.39	488.26	0.06
LPds	4	5913.	50y 24h	676.50	23.00	30.80		30.81	0.001084	0.45	1730.87	501.39	0.06
LPds	4	5913.	50y 18h	835.50	23.00	31.25		31.26	0.001157	0.49	1958.07	513.11	0.07
LPds	4	5913.	50y 12h	787.60	23.00	30.94		30.95	0.001307	0.50	1802.49	505.11	0.07
LPds	4	5913.	50y 6h	668.70	23.00	30.48		30.49	0.001397	0.49	1571.67	493.02	0.07
LPds	4	5913.	50y 3h	556.80	23.00	29.92		29.93	0.001639	0.48	1300.55	475.93	0.08
LPds	4	5913.	50y 1h	364.40	23.00	28.52		28.54	0.003408	0.52	735.59	337.06	0.10
LPds	4	5913.	100y 72h	604.50	23.00	30.51		30.52	0.001111	0.44	1586.83	493.82	0.07
LPds	4	5913.	100y 48h	651.50	23.00	30.82		30.83	0.000991	0.43	1739.79	501.86	0.06
LPds	4	5913.	100y 24h	803.30	23.00	31.32		31.33	0.001013	0.46	1994.63	514.97	0.06
LPds	4	5913.	100y 18h	972.70	23.00	31.76		31.77	0.001080	0.51	2224.39	526.51	0.07
LPds	4	5913.	100y 12h	930.10	23.00	31.48		31.50	0.001202	0.52	2079.88	519.28	0.07
LPds	4	5913.	100y 6h	791.30	23.00	30.95		30.96	0.001308	0.50	1807.66	505.38	0.07
LPds	4	5913.	100y 3h	659.80	23.00	30.36		30.39	0.001495	0.50	1520.51	490.29	0.08
LPds	4	5913.	100y 1h	432.30	23.00	28.88		28.89	0.003055	0.54	860.38	365.96	0.10

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LPds	4	5913	Feb2008	208.50	23.00	27.99		28.00	0.002462	0.38	565.81	309.48	0.08
LPds	4	5724	2y 72h	153.60	20.75	27.60		27.60	0.000506	0.24	652.13	195.63	0.04
LPds	4	5724	2y 48h	154.40	20.75	27.61		27.62	0.000504	0.24	654.81	195.85	0.04
LPds	4	5724	2y 24h	197.60	20.75	27.91		27.91	0.000656	0.28	713.08	203.95	0.05
LPds	4	5724	2y 18h	274.90	20.75	28.18		28.19	0.001030	0.36	769.98	211.92	0.06
LPds	4	5724	2y 12h	256.40	20.75	28.03		28.04	0.001000	0.35	739.78	207.57	0.06
LPds	4	5724	2y 6h	225.20	20.75	27.83		27.84	0.000900	0.32	698.73	201.97	0.06
LPds	4	5724	2y 3h	191.30	20.75	27.60		27.61	0.000856	0.30	632.77	193.99	0.05
LPds	4	5724	2y 1h	127.50	20.75	26.62		26.63	0.000753	0.27	477.06	159.60	0.05
LPds	4	5724	5y 72h	252.30	20.75	28.33		28.34	0.000771	0.31	803.17	217.45	0.05
LPds	4	5724	5y 48h	266.80	20.75	28.43		28.43	0.000823	0.33	823.80	222.02	0.05
LPds	4	5724	5y 24h	343.70	20.75	28.84		28.85	0.001065	0.37	920.67	250.01	0.06
LPds	4	5724	5y 18h	441.20	20.75	29.18		29.19	0.001358	0.44	1007.72	261.00	0.07
LPds	4	5724	5y 12h	416.40	20.75	29.00		29.01	0.001393	0.44	960.46	256.00	0.07
LPds	4	5724	5y 6h	356.30	20.75	28.68		28.69	0.001243	0.41	880.88	237.02	0.07
LPds	4	5724	5y 3h	301.90	20.75	28.26		28.27	0.001166	0.38	787.68	214.89	0.06
LPds	4	5724	5y 1h	201.20	20.75	27.18		27.18	0.001284	0.35	570.57	186.26	0.06
LPds	4	5724	10y 72h	312.50	20.75	28.71		28.71	0.000942	0.35	888.17	239.45	0.06
LPds	4	5724	10y 48h	336.40	20.75	28.85		28.85	0.001017	0.37	921.88	250.40	0.06
LPds	4	5724	10y 24h	428.90	20.75	29.30		29.31	0.001174	0.42	1038.97	264.25	0.07
LPds	4	5724	10y 18h	533.10	20.75	29.68		29.69	0.001403	0.47	1165.12	377.31	0.07
LPds	4	5724	10y 12h	503.80	20.75	29.45		29.46	0.001516	0.47	1080.50	341.53	0.07
LPds	4	5724	10y 6h	427.20	20.75	29.06		29.07	0.001396	0.44	976.55	257.71	0.07
LPds	4	5724	10y 3h	359.60	20.75	28.61		28.62	0.001313	0.42	864.28	231.38	0.07
LPds	4	5724	10y 1h	238.30	20.75	27.38		27.39	0.001487	0.39	609.16	191.98	0.07
LPds	4	5724	20y 72h	395.50	20.75	29.21		29.22	0.001069	0.39	1014.84	261.74	0.06
LPds	4	5724	20y 48h	429.20	20.75	29.40		29.41	0.001124	0.41	1067.74	263.85	0.06
LPds	4	5724	20y 24h	545.70	20.75	29.91		29.92	0.001222	0.45	1255.84	411.06	0.07
LPds	4	5724	20y 18h	657.30	20.75	30.27		30.28	0.001343	0.50	1414.38	461.59	0.07
LPds	4	5724	20y 12h	624.70	20.75	30.02		30.03	0.001470	0.51	1302.44	438.52	0.07
LPds	4	5724	20y 6h	527.30	20.75	29.57		29.58	0.001501	0.48	1124.49	365.82	0.07
LPds	4	5724	20y 3h	441.50	20.75	29.04		29.05	0.001515	0.46	971.20	257.15	0.07
LPds	4	5724	20y 1h	290.10	20.75	27.64		27.65	0.001739	0.44	660.32	196.58	0.08
LPds	4	5724	50y 72h	498.50	20.75	29.79		29.79	0.001127	0.43	1205.60	388.42	0.06
LPds	4	5724	50y 48h	542.60	20.75	30.09		30.10	0.001050	0.43	1335.02	455.00	0.06
LPds	4	5724	50y 24h	676.50	20.75	30.59		30.60	0.001110	0.47	1565.31	473.87	0.07
LPds	4	5724	50y 18h	835.50	20.75	31.02		31.03	0.001237	0.53	1772.02	491.39	0.07
LPds	4	5724	50y 12h	787.60	20.75	30.68		30.70	0.001404	0.54	1609.31	477.59	0.07
LPds	4	5724	50y 6h	668.70	20.75	30.21		30.22	0.001458	0.52	1386.44	459.28	0.07
LPds	4	5724	50y 3h	556.80	20.75	29.61		29.62	0.001618	0.50	1139.60	370.14	0.08
LPds	4	5724	50y 1h	364.40	20.75	28.03		28.05	0.002019	0.49	739.81	207.58	0.08
LPds	4	5724	100y 72h	604.50	20.75	30.30		30.31	0.001109	0.46	1428.77	462.76	0.07
LPds	4	5724	100y 48h	651.50	20.75	30.63		30.64	0.001001	0.46	1582.97	475.31	0.06
LPds	4	5724	100y 24h	803.30	20.75	31.12		31.13	0.001064	0.49	1822.12	495.57	0.07
LPds	4	5724	100y 18h	972.70	20.75	31.54		31.56	0.001169	0.54	2036.40	514.34	0.07
LPds	4	5724	100y 12h	930.10	20.75	31.24		31.26	0.001310	0.56	1883.36	500.69	0.07
LPds	4	5724	100y 6h	791.30	20.75	30.69		30.71	0.001407	0.54	1613.99	477.99	0.07
LPds	4	5724	100y 3h	659.80	20.75	30.08		30.10	0.001566	0.53	1329.96	454.58	0.08
LPds	4	5724	100y 1h	432.30	20.75	28.39		28.41	0.002176	0.53	816.13	220.30	0.09
LPds	4	5724	Feb2008	208.50	20.75	27.74		27.75	0.000828	0.31	680.61	199.45	0.05
LogbridgePowell	1	12490	2y 72h	30.70	33.79	35.16	34.13	35.16	0.001074	0.16	191.33	183.48	0.05
LogbridgePowell	1	12490	2y 48h	46.59	33.79	35.53	34.20	35.53	0.001026	0.19	261.77	194.90	0.05
LogbridgePowell	1	12490	2y 24h	70.44	33.79	35.89	34.26	35.89	0.001041	0.21	333.00	205.98	0.05
LogbridgePowell	1	12490	2y 18h	48.10	33.79	35.52	34.20	35.52	0.001026	0.18	260.01	194.62	0.05
LogbridgePowell	1	12490	2y 12h	73.42	33.79	35.93	34.27	35.93	0.001044	0.21	342.00	207.38	0.05
LogbridgePowell	1	12490	2y 6h	74.20	33.79	35.94	34.27	35.94	0.001045	0.22	344.35	207.74	0.05
LogbridgePowell	1	12490	2y 3h	83.07	33.79	36.06	34.30	36.07	0.001055	0.22	370.20	211.70	0.05
LogbridgePowell	1	12490	2y 1h	80.50	33.79	36.03	34.29	36.03	0.001052	0.22	362.84	210.58	0.05
LogbridgePowell	1	12490	5y 72h	49.62	33.79	35.55	34.20	35.55	0.001026	0.19	265.39	195.47	0.05
LogbridgePowell	1	12490	5y 48h	79.93	33.79	36.02	34.29	36.02	0.001051	0.22	361.18	210.33	0.05
LogbridgePowell	1	12490	5y 24h	112.10	33.79	36.42	34.37	36.42	0.001097	0.25	447.18	222.90	0.06
LogbridgePowell	1	12490	5y 18h	72.61	33.79	35.92	34.27	35.92	0.001043	0.21	339.56	207.00	0.05
LogbridgePowell	1	12490	5y 12h	109.00	33.79	36.38	34.36	36.39	0.001092	0.25	439.39	221.82	0.06
LogbridgePowell	1	12490	5y 6h	110.70	33.79	36.40	34.37	36.41	0.001094	0.25	443.72	222.42	0.06
LogbridgePowell	1	12490	5y 3h	125.70	33.79	36.57	34.40	36.57	0.001115	0.28	480.53	227.50	0.06
LogbridgePowell	1	12490	5y 1h	125.10	33.79	36.56	34.40	36.56	0.001114	0.28	479.09	227.31	0.06
LogbridgePowell	1	12490	10y 72h	60.74	33.79	35.74	34.23	35.74	0.001031	0.20	302.74	201.28	0.05
LogbridgePowell	1	12490	10y 48h	97.97	33.79	36.25	34.34	36.26	0.001075	0.24	411.15	217.82	0.06
LogbridgePowell	1	12490	10y 24h	135.70	33.79	36.67	34.42	36.67	0.001128	0.27	504.10	230.70	0.06
LogbridgePowell	1	12490	10y 18h	86.19	33.79	36.10	34.30	36.11	0.001059	0.23	379.03	213.04	0.05
LogbridgePowell	1	12490	10y 12h	127.80	33.79	36.59	34.41	36.59	0.001118	0.26	485.55	228.19	0.06
LogbridgePowell	1	12490	10y 6h	129.70	33.79	36.61	34.41	36.61	0.001120	0.26	490.05	228.80	0.06
LogbridgePowell	1	12490	10y 3h	147.70	33.79	36.79	34.45	36.79	0.001144	0.28	531.50	234.23	0.06
LogbridgePowell	1	12490	10y 1h	147.50	33.79	36.78	34.45	36.79	0.001143	0.28	531.06	234.18	0.06
LogbridgePowell	1	12490	20y 72h	75.46	33.79	35.96	34.27	35.96	0.001046	0.22	348.14	208.33	0.05
LogbridgePowell	1	12490	20y 48h	121.70	33.79	36.52	34.39	36.53	0.001109	0.26	470.95	226.19	0.06
LogbridgePowell	1	12490	20y 24h	167.50	33.79	36.97	34.49	36.97	0.001168	0.29	574.73	239.50	0.06
LogbridgePowell	1	12490	20y 18h	106.30	33.79	36.35	34.35	36.35	0.001088	0.25	432.58	220.86	0.06
LogbridgePowell	1	12490	20y 12h	153.30	33.79	36.84	34.46	36.84	0.001150	0.28	543.96	235.77	0.06
LogbridgePowell	1	12490	20y 6h	155.80	33.79	36.86	34.46	36.87	0.001154	0.28	549.45	236.45	0.06
LogbridgePowell	1	12490	20y 3h	178.30	33.79	37.06	34.51	37.07	0.001180	0.30	597.41	242.19	0.06
LogbridgePowell	1	12490	20y 1h	178.30	33.79	37.06	34.51	37.07	0.001180	0.30	597.40	242.19	0.06
LogbridgePowell	1	12490	50y 72h	87.06	33.79	36.12	34.30	36.12	0.001060	0.23	381.47	213.41	0.05
LogbridgePowell	1	12490	50y 48h	134.60	33.79	36.66	34.42	36.66	0.001127	0.27	501.55	230.36	0.06
LogbridgePowell	1	12490	50y 24h	188.60	33.79	37.15	34.53	37.15	0.001192	0.30	618.55	244.67	0.06
LogbridgePowell	1	12490	50y 18h	127.00	33.79	36.58	34.40	36.58	0.001116	0.26	483.68	227.93	0.06
LogbridgePowell	1	12490	50y 12h	173.90	33.79	37.02	34.50	37.03	0.001175	0.30	588.23	241.11	0.06
LogbridgePowell	1	12490	50y 6h	183.00	33.79	37.10	34.52	37.11	0.001186	0.30	607.10	243.33	0.06
LogbridgePowell	1	12490	50y 3h	211.00	33.79	37.33	34.57	37.33	0.001216	0.32	663.06	249.67	0.06
LogbridgePowell	1	12490	50y 1h	219.70	33.79	37.40	34.59	37.40	0.001225	0.32	679.85	251.47	0.06

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	1	12490	100y 72h	103.20	33.79	36.32	34.35	36.32	0.001082	0.24	424.77	219.76	0.06
LogbridgePowell	1	12490	100y 48h	159.40	33.79	36.90	34.48	36.90	0.001156	0.29	557.31	237.41	0.06
LogbridgePowell	1	12490	100y 24h	219.90	33.79	37.40	34.59	37.40	0.001225	0.32	680.20	251.51	0.06
LogbridgePowell	1	12490	100y 18h	147.00	33.79	36.78	34.45	36.78	0.001142	0.28	529.99	234.04	0.06
LogbridgePowell	1	12490	100y 12h	201.10	33.79	37.25	34.55	37.26	0.001206	0.31	643.61	247.56	0.06
LogbridgePowell	1	12490	100y 6h	211.80	33.79	37.34	34.57	37.34	0.001217	0.32	664.59	249.83	0.06
LogbridgePowell	1	12490	100y 3h	246.30	33.79	37.59	34.63	37.60	0.001250	0.34	729.70	256.75	0.06
LogbridgePowell	1	12490	100y 1h	258.40	33.79	37.68	34.65	37.68	0.001261	0.34	751.73	259.05	0.06
LogbridgePowell	1	12490	Feb2008	73.27	33.79	35.93	34.27	35.93	0.001044	0.21	341.57	207.31	0.05
LogbridgePowell	1	11770	2y 72h	30.70	31.80	34.74		34.74	0.000358	0.11	281.80	211.73	0.03
LogbridgePowell	1	11770	2y 48h	48.59	31.80	35.07		35.07	0.000434	0.14	358.27	250.17	0.03
LogbridgePowell	1	11770	2y 24h	70.44	31.80	35.39		35.39	0.000494	0.16	442.61	284.15	0.04
LogbridgePowell	1	11770	2y 18h	48.10	31.80	35.06		35.06	0.000433	0.14	356.17	249.22	0.03
LogbridgePowell	1	11770	2y 12h	73.42	31.80	35.43		35.43	0.000500	0.17	453.84	287.97	0.04
LogbridgePowell	1	11770	2y 6h	74.20	31.80	35.44		35.44	0.000502	0.17	456.84	288.97	0.04
LogbridgePowell	1	11770	2y 3h	83.07	31.80	35.55		35.55	0.000518	0.18	489.75	289.56	0.04
LogbridgePowell	1	11770	2y 1h	80.50	31.80	35.52		35.52	0.000513	0.18	480.31	298.64	0.04
LogbridgePowell	1	11770	5y 72h	49.62	31.80	35.09		35.09	0.000438	0.14	362.35	252.01	0.03
LogbridgePowell	1	11770	5y 48h	79.93	31.80	35.51		35.51	0.000512	0.17	478.16	295.97	0.04
LogbridgePowell	1	11770	5y 24h	112.10	31.80	35.87		35.87	0.000565	0.20	589.60	326.74	0.04
LogbridgePowell	1	11770	5y 18h	72.61	31.80	35.42		35.42	0.000499	0.17	450.77	286.94	0.04
LogbridgePowell	1	11770	5y 12h	109.00	31.80	35.84		35.84	0.000560	0.20	579.33	324.17	0.04
LogbridgePowell	1	11770	5y 6h	110.70	31.80	35.85		35.86	0.000562	0.20	585.14	325.62	0.04
LogbridgePowell	1	11770	5y 3h	125.70	31.80	36.00		36.00	0.000580	0.21	634.52	336.88	0.04
LogbridgePowell	1	11770	5y 1h	125.10	31.80	36.00		36.00	0.000580	0.21	632.58	336.45	0.04
LogbridgePowell	1	11770	10y 72h	60.74	31.80	35.26		35.26	0.000470	0.15	405.99	270.35	0.04
LogbridgePowell	1	11770	10y 48h	97.97	31.80	35.72		35.72	0.000541	0.19	542.90	314.85	0.04
LogbridgePowell	1	11770	10y 24h	135.70	31.80	36.10		36.10	0.000590	0.22	666.62	342.65	0.04
LogbridgePowell	1	11770	10y 18h	86.19	31.80	35.59		35.59	0.000523	0.18	501.13	303.08	0.04
LogbridgePowell	1	11770	10y 12h	127.80	31.80	36.02		36.02	0.000583	0.22	641.34	338.37	0.04
LogbridgePowell	1	11770	10y 6h	129.70	31.80	36.04		36.04	0.000584	0.22	647.49	339.46	0.04
LogbridgePowell	1	11770	10y 3h	147.70	31.80	36.21		36.21	0.000601	0.23	704.24	349.42	0.04
LogbridgePowell	1	11770	10y 1h	147.50	31.80	36.20		36.21	0.000601	0.23	703.65	349.31	0.04
LogbridgePowell	1	11770	20y 72h	75.48	31.80	35.45		35.45	0.000504	0.17	461.61	290.56	0.04
LogbridgePowell	1	11770	20y 48h	121.70	31.80	35.96		35.97	0.000575	0.21	621.76	334.04	0.04
LogbridgePowell	1	11770	20y 24h	167.50	31.80	36.37		36.38	0.000616	0.24	764.08	357.31	0.05
LogbridgePowell	1	11770	20y 18h	106.30	31.80	35.81		35.81	0.000556	0.20	570.47	321.95	0.04
LogbridgePowell	1	11770	20y 12h	153.30	31.80	36.25		36.26	0.000605	0.23	721.48	351.96	0.04
LogbridgePowell	1	11770	20y 6h	155.80	31.80	36.28		36.28	0.000607	0.23	729.06	352.92	0.04
LogbridgePowell	1	11770	20y 3h	178.30	31.80	36.46		36.46	0.000623	0.25	795.38	361.24	0.05
LogbridgePowell	1	11770	20y 1h	178.30	31.80	36.46		36.46	0.000623	0.25	795.36	361.24	0.05
LogbridgePowell	1	11770	50y 72h	87.06	31.80	35.60		35.60	0.000524	0.18	504.29	304.04	0.04
LogbridgePowell	1	11770	50y 48h	134.60	31.80	36.09		36.09	0.000589	0.22	663.17	342.24	0.04
LogbridgePowell	1	11770	50y 24h	188.80	31.80	36.54		36.55	0.000630	0.25	824.60	364.89	0.05
LogbridgePowell	1	11770	50y 18h	127.00	31.80	36.02		36.02	0.000581	0.22	638.90	337.85	0.04
LogbridgePowell	1	11770	50y 12h	173.90	31.80	36.43		36.43	0.000620	0.25	782.69	359.65	0.05
LogbridgePowell	1	11770	50y 6h	183.00	31.80	36.50		36.50	0.000627	0.25	808.77	362.92	0.05
LogbridgePowell	1	11770	50y 3h	211.00	31.80	36.71		36.71	0.000643	0.27	886.43	371.79	0.05
LogbridgePowell	1	11770	50y 1h	219.70	31.80	36.77		36.78	0.000648	0.27	909.79	374.29	0.05
LogbridgePowell	1	11770	100y 72h	103.20	31.80	35.76		35.76	0.000550	0.20	560.59	319.45	0.04
LogbridgePowell	1	11770	100y 48h	159.40	31.80	36.31		36.31	0.000610	0.24	739.95	354.29	0.04
LogbridgePowell	1	11770	100y 24h	219.90	31.80	36.77		36.78	0.000648	0.27	910.20	374.33	0.05
LogbridgePowell	1	11770	100y 18h	147.00	31.80	36.20		36.20	0.000600	0.23	702.30	349.08	0.04
LogbridgePowell	1	11770	100y 12h	201.10	31.80	36.64		36.64	0.000638	0.26	859.31	368.87	0.05
LogbridgePowell	1	11770	100y 6h	211.80	31.80	36.72		36.72	0.000644	0.27	888.49	372.01	0.05
LogbridgePowell	1	11770	100y 3h	246.30	31.80	36.96		36.96	0.000661	0.28	979.14	381.55	0.05
LogbridgePowell	1	11770	100y 1h	258.40	31.80	37.04		37.04	0.000666	0.29	1009.84	384.73	0.05
LogbridgePowell	1	11770	Feb2008	73.27	31.80	35.42		35.43	0.000500	0.17	453.36	287.81	0.04
LogbridgePowell	1	11340	2y 72h	30.70	31.86	34.45		34.46	0.001641	0.25	173.46	260.91	0.07
LogbridgePowell	1	11340	2y 48h	48.59	31.86	34.76		34.76	0.001469	0.27	254.17	271.42	0.06
LogbridgePowell	1	11340	2y 24h	70.44	31.86	35.05		35.05	0.001387	0.29	335.95	281.64	0.06
LogbridgePowell	1	11340	2y 18h	48.10	31.86	34.75		34.75	0.001477	0.27	251.88	271.13	0.06
LogbridgePowell	1	11340	2y 12h	73.42	31.86	35.09		35.09	0.001376	0.29	346.62	282.94	0.06
LogbridgePowell	1	11340	2y 6h	74.20	31.86	35.10		35.10	0.001371	0.29	349.52	283.30	0.06
LogbridgePowell	1	11340	2y 3h	83.07	31.86	35.21		35.21	0.001342	0.30	380.34	287.16	0.06
LogbridgePowell	1	11340	2y 1h	80.50	31.86	35.18		35.18	0.001349	0.29	371.59	286.02	0.06
LogbridgePowell	1	11340	5y 72h	49.62	31.86	34.77		34.77	0.001465	0.27	258.23	271.94	0.06
LogbridgePowell	1	11340	5y 48h	79.93	31.86	35.17		35.17	0.001352	0.29	369.53	285.75	0.06
LogbridgePowell	1	11340	5y 24h	112.10	31.86	35.51		35.51	0.001321	0.32	468.85	298.45	0.06
LogbridgePowell	1	11340	5y 18h	72.61	31.86	35.08		35.08	0.001379	0.29	343.89	282.59	0.06
LogbridgePowell	1	11340	5y 12h	109.00	31.86	35.48		35.48	0.001322	0.32	459.91	297.33	0.06
LogbridgePowell	1	11340	5y 6h	110.70	31.86	35.50		35.50	0.001319	0.32	465.10	297.96	0.06
LogbridgePowell	1	11340	5y 3h	125.70	31.86	35.64		35.64	0.001309	0.33	508.22	303.16	0.06
LogbridgePowell	1	11340	5y 1h	125.10	31.86	35.64		35.64	0.001309	0.33	506.53	302.97	0.06
LogbridgePowell	1	11340	10y 72h	60.74	31.86	34.93		34.93	0.001415	0.28	301.24	277.35	0.06
LogbridgePowell	1	11340	10y 48h	97.97	31.86	35.37		35.38	0.001314	0.31	428.65	293.38	0.06
LogbridgePowell	1	11340	10y 24h	135.70	31.86	35.73		35.74	0.001302	0.34	536.10	308.57	0.06
LogbridgePowell	1	11340	10y 18h	86.19	31.86	35.24		35.25	0.001334	0.30	390.85	288.52	0.06
LogbridgePowell	1	11340	10y 12h	127.80	31.86	35.66		35.66	0.001307	0.33	514.15	303.90	0.06
LogbridgePowell	1	11340	10y 6h	129.70	31.86	35.68		35.68	0.001305	0.33	519.51	304.58	0.06
LogbridgePowell	1	11340	10y 3h	147.70	31.86	35.84		35.84	0.001295	0.34	568.88	310.49	0.06
LogbridgePowell	1	11340	10y 1h	147.50	31.86	35.84		35.84	0.001295	0.34	568.20	310.43	0.06
LogbridgePowell	1	11340	20y 72h	75.48	31.86	35.12		35.12	0.001367	0.29	354.00	283.84	0.06
LogbridgePowell	1	11340	20y 48h	121.70	31.86	35.61		35.61	0.001308	0.33	497.30	301.84	0.06
LogbridgePowell	1	11340	20y 24h	167.50	31.86	36.00		36.01	0.001287	0.36	620.39	316.52	0.07
LogbridgePowell	1	11340	20y 18h	106.30	31.86	35.45		35.46	0.001321	0.31	452.30	296.37	0.06
LogbridgePowell	1	11340	20y 12h	153.30	31.86	35.89		35.89	0.001292	0.35	583.58	312.26	0.07
LogbridgePowell	1	11340	20y 6h	155.80	31.86	35.91		35.91	0.001291	0.35	590.12	313.04	0.07
LogbridgePowell	1	11340	20y 3h	178.30	31.86	36.09		36.09	0.001283	0.36	647.35	319.01	0.07
LogbridgePowell	1	11340	20y 1h	178.30	31.86	36.09		36.09	0.001283	0.36	647.32	319.01	0.07

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	1	11340	50y 72h	87.06	31.86	35.25		35.26	0.001332	0.30	393.77	288.90	0.06
LogbridgePowell	1	11340	50y 48h	134.60	31.86	35.72		35.73	0.001302	0.33	533.14	306.21	0.06
LogbridgePowell	1	11340	50y 24h	188.60	31.86	36.17		36.17	0.001280	0.37	672.44	321.32	0.07
LogbridgePowell	1	11340	50y 18h	127.00	31.86	35.65		35.66	0.001306	0.33	512.13	303.66	0.06
LogbridgePowell	1	11340	50y 12h	173.90	31.86	36.05		36.06	0.001285	0.36	636.42	318.00	0.07
LogbridgePowell	1	11340	50y 6h	183.00	31.86	36.12		36.13	0.001282	0.36	658.85	320.07	0.07
LogbridgePowell	1	11340	50y 3h	211.00	31.86	36.33		36.34	0.001275	0.38	725.51	326.15	0.07
LogbridgePowell	1	11340	50y 1h	219.70	31.86	36.39		36.40	0.001274	0.38	745.52	327.95	0.07
LogbridgePowell	1	11340	100y 72h	103.20	31.86	35.43		35.43	0.001314	0.31	444.12	295.34	0.06
LogbridgePowell	1	11340	100y 48h	159.40	31.86	35.94		35.94	0.001290	0.35	599.53	314.15	0.07
LogbridgePowell	1	11340	100y 24h	219.90	31.86	36.39		36.40	0.001275	0.38	745.81	327.98	0.07
LogbridgePowell	1	11340	100y 18h	147.00	31.86	35.83		35.84	0.001293	0.34	567.15	310.30	0.06
LogbridgePowell	1	11340	100y 12h	201.10	31.86	36.26		36.26	0.001278	0.37	702.19	324.04	0.07
LogbridgePowell	1	11340	100y 6h	211.80	31.86	36.34		36.34	0.001276	0.38	727.22	326.30	0.07
LogbridgePowell	1	11340	100y 3h	246.30	31.86	36.57		36.58	0.001273	0.40	804.75	333.22	0.07
LogbridgePowell	1	11340	100y 1h	258.40	31.86	36.65		36.65	0.001271	0.40	830.98	335.33	0.07
LogbridgePowell	1	11340	Feb2006	73.27	31.86	35.09		35.09	0.001374	0.29	346.24	282.90	0.06
LogbridgePowell	1	10280	2y 72h	30.70	29.73	32.87		32.87	0.001362	0.21	149.55	142.22	0.06
LogbridgePowell	1	10280	2y 48h	48.59	29.73	33.25		33.26	0.001357	0.25	213.48	180.26	0.06
LogbridgePowell	1	10280	2y 24h	70.44	29.73	33.63		33.63	0.001293	0.28	294.17	236.83	0.06
LogbridgePowell	1	10280	2y 18h	48.10	29.73	33.25		33.25	0.001343	0.24	212.66	189.71	0.06
LogbridgePowell	1	10280	2y 12h	73.42	29.73	33.67		33.67	0.001302	0.28	303.50	241.51	0.06
LogbridgePowell	1	10280	2y 6h	74.20	29.73	33.68		33.68	0.001312	0.28	305.17	242.34	0.06
LogbridgePowell	1	10280	2y 3h	83.07	29.73	33.78		33.78	0.001347	0.29	331.14	254.75	0.06
LogbridgePowell	1	10280	2y 1h	80.50	29.73	33.75		33.75	0.001340	0.29	323.41	251.13	0.06
LogbridgePowell	1	10280	5y 72h	49.62	29.73	33.27		33.28	0.001347	0.25	217.72	193.04	0.06
LogbridgePowell	1	10280	5y 48h	79.93	29.73	33.75		33.75	0.001332	0.29	322.29	250.60	0.06
LogbridgePowell	1	10280	5y 24h	112.10	29.73	34.14		34.15	0.001279	0.32	429.71	285.03	0.06
LogbridgePowell	1	10280	5y 18h	72.61	29.73	33.66		33.66	0.001297	0.28	301.20	240.37	0.06
LogbridgePowell	1	10280	5y 12h	109.00	29.73	34.10		34.11	0.001290	0.32	419.38	283.85	0.06
LogbridgePowell	1	10280	5y 6h	110.70	29.73	34.12		34.12	0.001300	0.32	422.98	284.26	0.06
LogbridgePowell	1	10280	5y 3h	125.70	29.73	34.26		34.26	0.001278	0.33	468.43	289.40	0.06
LogbridgePowell	1	10280	5y 1h	125.10	29.73	34.27		34.27	0.001260	0.33	466.46	289.18	0.06
LogbridgePowell	1	10280	10y 72h	60.74	29.73	33.47		33.47	0.001328	0.26	257.70	217.20	0.06
LogbridgePowell	1	10280	10y 48h	97.97	29.73	33.86		33.86	0.001354	0.31	378.49	275.72	0.06
LogbridgePowell	1	10280	10y 24h	135.70	29.73	34.37		34.38	0.001274	0.34	496.11	292.23	0.06
LogbridgePowell	1	10280	10y 18h	86.19	29.73	33.82		33.82	0.001358	0.30	340.20	258.91	0.06
LogbridgePowell	1	10280	10y 12h	127.80	29.73	34.30		34.30	0.001278	0.33	474.15	290.03	0.06
LogbridgePowell	1	10280	10y 6h	129.70	29.73	34.31		34.32	0.001281	0.33	478.93	290.56	0.06
LogbridgePowell	1	10280	10y 3h	147.70	29.73	34.47		34.48	0.001288	0.35	525.63	295.25	0.06
LogbridgePowell	1	10280	10y 1h	147.50	29.73	34.46		34.47	0.001300	0.35	523.32	295.01	0.07
LogbridgePowell	1	10280	20y 72h	75.48	29.73	33.69		33.70	0.001314	0.28	309.29	244.36	0.06
LogbridgePowell	1	10280	20y 48h	121.70	29.73	34.21		34.22	0.001333	0.33	450.08	287.33	0.07
LogbridgePowell	1	10280	20y 24h	167.50	29.73	34.63		34.64	0.001302	0.36	573.38	300.18	0.07
LogbridgePowell	1	10280	20y 18h	106.30	29.73	34.07		34.07	0.001316	0.32	408.26	282.58	0.06
LogbridgePowell	1	10280	20y 12h	153.30	29.73	34.51		34.52	0.001305	0.35	537.50	296.48	0.07
LogbridgePowell	1	10280	20y 6h	155.80	29.73	34.54		34.54	0.001296	0.35	545.08	297.27	0.07
LogbridgePowell	1	10280	20y 3h	178.30	29.73	34.71		34.72	0.001317	0.37	597.07	302.60	0.07
LogbridgePowell	1	10280	20y 1h	178.30	29.73	34.70		34.71	0.001328	0.37	595.32	302.42	0.07
LogbridgePowell	1	10280	50y 72h	87.06	29.73	33.83		33.83	0.001362	0.30	342.61	260.00	0.06
LogbridgePowell	1	10280	50y 48h	134.60	29.73	34.36		34.36	0.001286	0.34	491.53	291.79	0.06
LogbridgePowell	1	10280	50y 24h	188.60	29.73	34.78		34.78	0.001339	0.38	617.91	304.73	0.07
LogbridgePowell	1	10280	50y 18h	127.00	29.73	34.27		34.28	0.001309	0.33	467.81	289.33	0.06
LogbridgePowell	1	10280	50y 12h	173.90	29.73	34.67		34.67	0.001330	0.37	584.44	301.30	0.07
LogbridgePowell	1	10280	50y 6h	183.00	29.73	34.74		34.74	0.001334	0.37	605.46	303.46	0.07
LogbridgePowell	1	10280	50y 3h	211.00	29.73	34.94		34.95	0.001350	0.39	667.22	309.71	0.07
LogbridgePowell	1	10280	50y 1h	219.70	29.73	35.00		35.00	0.001357	0.40	685.14	311.51	0.07
LogbridgePowell	1	10280	100y 72h	103.20	29.73	34.04		34.04	0.001309	0.31	399.83	281.61	0.06
LogbridgePowell	1	10280	100y 48h	159.40	29.73	34.56		34.56	0.001314	0.36	551.52	297.63	0.07
LogbridgePowell	1	10280	100y 24h	219.90	29.73	34.99		35.00	0.001373	0.40	682.86	311.28	0.07
LogbridgePowell	1	10280	100y 18h	147.00	29.73	34.43		34.43	0.001363	0.35	513.15	293.95	0.07
LogbridgePowell	1	10280	100y 12h	201.10	29.73	34.86		34.87	0.001364	0.39	642.40	307.22	0.07
LogbridgePowell	1	10280	100y 6h	211.80	29.73	34.94		34.94	0.001365	0.39	666.34	309.63	0.07
LogbridgePowell	1	10280	100y 3h	246.30	29.73	35.16		35.17	0.001390	0.41	736.32	316.50	0.07
LogbridgePowell	1	10280	100y 1h	258.40	29.73	35.24		35.24	0.001393	0.42	760.91	318.86	0.07
LogbridgePowell	1	10280	Feb2006	73.27	29.73	33.66		33.67	0.001310	0.28	302.17	240.85	0.06
LogbridgePowell	1	9140	2y 72h	30.70	28.06	31.07		31.07	0.001837	0.23	133.00	110.31	0.07
LogbridgePowell	1	9140	2y 48h	48.59	28.06	31.61		31.62	0.001526	0.24	200.79	135.05	0.06
LogbridgePowell	1	9140	2y 24h	70.44	28.06	32.10		32.10	0.001388	0.26	277.25	291.31	0.06
LogbridgePowell	1	9140	2y 18h	48.10	28.06	31.58		31.58	0.001604	0.25	195.94	133.86	0.06
LogbridgePowell	1	9140	2y 12h	73.42	28.06	32.16		32.16	0.001349	0.26	293.07	296.02	0.06
LogbridgePowell	1	9140	2y 6h	74.20	28.06	32.18		32.18	0.001321	0.26	299.20	297.83	0.06
LogbridgePowell	1	9140	2y 3h	83.07	28.06	32.34		32.34	0.001192	0.26	348.54	311.81	0.06
LogbridgePowell	1	9140	2y 1h	80.50	28.06	32.30		32.30	0.001214	0.26	336.98	308.33	0.06
LogbridgePowell	1	9140	5y 72h	49.62	28.06	31.63		31.63	0.001558	0.25	202.32	135.42	0.06
LogbridgePowell	1	9140	5y 48h	79.93	28.06	32.28		32.28	0.001246	0.26	329.91	306.60	0.06
LogbridgePowell	1	9140	5y 24h	112.10	28.06	32.45		32.46	0.001722	0.33	385.68	321.97	0.07
LogbridgePowell	1	9140	5y 18h	72.61	28.06	32.14		32.14	0.001371	0.26	287.53	294.36	0.06
LogbridgePowell	1	9140	5y 12h	109.00	28.06	32.43		32.44	0.001703	0.32	378.34	319.99	0.07
LogbridgePowell	1	9140	5y 6h	110.70	28.06	32.47		32.48	0.001629	0.32	390.79	323.33	0.07
LogbridgePowell	1	9140	5y 3h	125.70	28.06	32.52		32.53	0.001911	0.35	406.72	327.55	0.08
LogbridgePowell	1	9140	5y 1h	125.10	28.06	32.53		32.53	0.001867	0.35	409.11	328.18	0.07
LogbridgePowell	1	9140	10y 72h	60.74	28.06	31.89		31.89	0.001465	0.25	238.71	145.07	0.06
LogbridgePowell	1	9140	10y 48h	97.97	28.06	32.48		32.48	0.001265	0.28	392.19	323.71	0.06
LogbridgePowell	1	9140	10y 24h	135.70	28.06	32.59		32.60	0.001947	0.36	430.24	333.69	0.08
LogbridgePowell	1	9140	10y 18h	86.19	28.06	32.39		32.39	0.001157	0.26	364.69	316.32	0.06
LogbridgePowell	1	9140	10y 12h	127.80	28.06	32.53		32.54	0.001929	0.36	410.81	328.63	0.08
LogbridgePowell	1	9140	10y 6h	129.70	28.06	32.56		32.56	0.001920	0.35	416.78	330.19	0.08
LogbridgePowell	1	9140	10y 3h	147.70	28.06	32.69		32.69	0.001935	0.37	462.50	341.92	0.08
LogbridgePowell	1	9140	10y 1h	147.50	28.06	32.69		32.70	0.001905	0.37	464.87	342.52	0.08

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	1	9140	20y 72h	75.48	28.06	32.19		32.20	0.001316	0.26	304.75	299.44	0.06
LogbridgePowell	1	9140	20y 48h	121.70	28.06	32.63		32.64	0.001448	0.32	444.41	337.33	0.07
LogbridgePowell	1	9140	20y 24h	167.50	28.06	32.82		32.83	0.001951	0.39	510.15	353.77	0.08
LogbridgePowell	1	9140	20y 18h	106.30	28.06	32.48		32.49	0.001474	0.30	393.95	324.17	0.07
LogbridgePowell	1	9140	20y 12h	153.30	28.06	32.73		32.74	0.001922	0.37	477.96	345.80	0.08
LogbridgePowell	1	9140	20y 6h	155.80	28.06	32.75		32.75	0.001935	0.38	482.86	347.03	0.08
LogbridgePowell	1	9140	20y 3h	178.30	28.06	32.90		32.90	0.001953	0.39	535.95	360.23	0.08
LogbridgePowell	1	9140	20y 1h	178.30	28.06	32.90		32.91	0.001937	0.39	537.72	360.67	0.08
LogbridgePowell	1	9140	50y 72h	87.06	28.06	32.41		32.41	0.001143	0.26	370.05	317.73	0.06
LogbridgePowell	1	9140	50y 48h	134.60	28.06	32.59		32.60	0.001921	0.36	429.74	333.56	0.08
LogbridgePowell	1	9140	50y 24h	188.60	28.06	32.87		32.88	0.001924	0.40	563.65	367.09	0.08
LogbridgePowell	1	9140	50y 18h	127.00	28.06	32.62		32.63	0.001615	0.33	439.98	336.19	0.07
LogbridgePowell	1	9140	50y 12h	173.90	28.06	32.90		32.91	0.001837	0.38	538.37	360.83	0.08
LogbridgePowell	1	9140	50y 6h	183.00	28.06	32.94		32.94	0.001917	0.39	551.16	364.01	0.08
LogbridgePowell	1	9140	50y 3h	211.00	28.06	33.10		33.10	0.001966	0.42	610.31	378.43	0.08
LogbridgePowell	1	9140	50y 1h	219.70	28.06	33.15		33.15	0.001972	0.42	628.99	382.87	0.08
LogbridgePowell	1	9140	100y 72h	103.20	28.06	32.44		32.45	0.001497	0.30	381.48	320.84	0.07
LogbridgePowell	1	9140	100y 48h	159.40	28.06	32.79		32.79	0.001881	0.38	497.51	350.68	0.08
LogbridgePowell	1	9140	100y 24h	219.90	28.06	33.19		33.19	0.001854	0.41	644.78	386.56	0.08
LogbridgePowell	1	9140	100y 18h	147.00	28.06	32.88		32.89	0.001357	0.33	531.24	359.05	0.07
LogbridgePowell	1	9140	100y 12h	201.10	28.06	33.13		33.13	0.001708	0.39	620.98	380.98	0.07
LogbridgePowell	1	9140	100y 6h	211.80	28.06	33.14		33.14	0.001862	0.41	625.18	381.97	0.08
LogbridgePowell	1	9140	100y 3h	246.30	28.06	33.30		33.31	0.001949	0.43	680.22	397.04	0.08
LogbridgePowell	1	9140	100y 1h	258.40	28.06	33.36		33.37	0.001974	0.44	712.65	402.13	0.08
LogbridgePowell	1	9140	Feb2008	73.27	28.06	32.16		32.17	0.001325	0.26	295.14	296.63	0.06
LogbridgePowell	1	8850	2y 72h	30.70	27.79	30.78	28.33	30.78	0.000836	0.19	160.30	79.21	0.04
LogbridgePowell	1	8850	2y 48h	46.59	27.79	31.30	28.47	31.30	0.000836	0.24	203.71	88.90	0.05
LogbridgePowell	1	8850	2y 24h	70.44	27.79	31.75	28.62	31.76	0.001056	0.29	246.16	97.38	0.06
LogbridgePowell	1	8850	2y 18h	48.10	27.79	31.24	28.48	31.25	0.000872	0.24	199.07	87.93	0.05
LogbridgePowell	1	8850	2y 12h	73.42	27.79	31.80	28.64	31.81	0.001084	0.29	251.36	98.37	0.06
LogbridgePowell	1	8850	2y 6h	74.20	27.79	31.83	28.65	31.84	0.001084	0.29	253.98	99.45	0.06
LogbridgePowell	1	8850	2y 3h	83.07	27.79	31.99	28.70	32.00	0.001198	0.31	270.66	107.29	0.06
LogbridgePowell	1	8850	2y 1h	80.50	27.79	31.95	28.69	31.96	0.001160	0.30	266.55	105.42	0.06
LogbridgePowell	1	8850	5y 72h	49.62	27.79	31.29	28.48	31.30	0.000873	0.24	203.60	88.88	0.05
LogbridgePowell	1	8850	5y 48h	79.93	27.79	31.93	28.68	31.93	0.001169	0.30	263.66	104.08	0.06
LogbridgePowell	1	8850	5y 24h	112.10	27.79	31.86	28.67	31.87	0.002413	0.44	257.30	101.06	0.09
LogbridgePowell	1	8850	5y 18h	72.61	27.79	31.78	28.64	31.79	0.001085	0.29	249.25	97.97	0.06
LogbridgePowell	1	8850	5y 12h	109.00	27.79	31.86	28.85	31.87	0.002292	0.42	256.68	100.77	0.08
LogbridgePowell	1	8850	5y 6h	110.70	27.79	31.91	28.86	31.92	0.002263	0.42	262.40	103.49	0.08
LogbridgePowell	1	8850	5y 3h	125.70	27.79	32.18	28.93	32.18	0.000811	0.26	640.88	414.51	0.05
LogbridgePowell	1	8850	5y 1h	125.10	27.79	32.20	28.94	32.20	0.000777	0.26	648.36	414.78	0.05
LogbridgePowell	1	8850	10y 72h	60.74	27.79	31.54	28.56	31.54	0.000988	0.27	225.97	93.44	0.06
LogbridgePowell	1	8850	10y 48h	97.97	27.79	32.29	28.79	32.29	0.000405	0.19	684.92	418.08	0.04
LogbridgePowell	1	8850	10y 24h	135.70	27.79	32.24	28.89	32.24	0.000851	0.27	664.41	415.35	0.05
LogbridgePowell	1	8850	10y 18h	86.19	27.79	32.04	28.72	32.05	0.001240	0.31	275.80	109.64	0.06
LogbridgePowell	1	8850	10y 12h	127.80	27.79	32.18	28.94	32.19	0.000832	0.26	642.49	414.57	0.05
LogbridgePowell	1	8850	10y 6h	129.70	27.79	32.21	28.95	32.21	0.000819	0.26	652.60	414.93	0.05
LogbridgePowell	1	8850	10y 3h	147.70	27.79	32.34	29.04	32.34	0.000840	0.28	706.67	416.90	0.05
LogbridgePowell	1	8850	10y 1h	147.50	27.79	32.35	29.04	32.35	0.000819	0.27	712.09	417.11	0.05
LogbridgePowell	1	8850	20y 72h	75.48	27.79	31.84	28.65	31.85	0.001112	0.30	255.19	100.04	0.06
LogbridgePowell	1	8850	20y 48h	121.70	27.79	32.11	28.91	32.12	0.002279	0.43	283.54	118.34	0.08
LogbridgePowell	1	8850	20y 24h	167.50	27.79	32.46	29.13	32.47	0.000873	0.29	759.06	418.96	0.05
LogbridgePowell	1	8850	20y 18h	106.30	27.79	31.99	28.84	31.99	0.001972	0.39	269.82	106.96	0.08
LogbridgePowell	1	8850	20y 12h	153.30	27.79	32.38	29.06	32.39	0.000835	0.28	725.93	417.66	0.05
LogbridgePowell	1	8850	20y 6h	155.80	27.79	32.39	29.05	32.40	0.000847	0.28	730.51	417.84	0.05
LogbridgePowell	1	8850	20y 3h	178.30	27.79	32.54	29.16	32.54	0.000878	0.30	789.64	420.16	0.05
LogbridgePowell	1	8850	20y 1h	178.30	27.79	32.54	29.18	32.55	0.000867	0.29	793.00	420.29	0.05
LogbridgePowell	1	8850	50y 72h	87.06	27.79	32.06	28.72	32.06	0.001244	0.31	277.88	111.06	0.06
LogbridgePowell	1	8850	50y 48h	134.60	27.79	32.25	28.98	32.25	0.000822	0.27	668.46	415.50	0.05
LogbridgePowell	1	8850	50y 24h	188.60	27.79	32.62	29.22	32.62	0.000864	0.30	823.78	421.49	0.05
LogbridgePowell	1	8850	50y 18h	127.00	27.79	32.35	28.94	32.36	0.000603	0.23	713.79	417.18	0.04
LogbridgePowell	1	8850	50y 12h	173.90	27.79	32.57	29.16	32.57	0.000792	0.28	803.51	420.70	0.05
LogbridgePowell	1	8850	50y 6h	183.00	27.79	32.58	29.20	32.59	0.000855	0.29	810.34	420.97	0.05
LogbridgePowell	1	8850	50y 3h	211.00	27.79	32.73	29.32	32.73	0.000917	0.31	869.97	423.29	0.06
LogbridgePowell	1	8850	50y 1h	219.70	27.79	32.77	29.35	32.78	0.000929	0.32	889.27	424.04	0.06
LogbridgePowell	1	8850	100y 72h	103.20	27.79	31.95	28.82	31.96	0.001911	0.39	266.25	105.28	0.08
LogbridgePowell	1	8850	100y 48h	159.40	27.79	32.45	29.09	32.45	0.000811	0.28	752.47	418.70	0.05
LogbridgePowell	1	8850	100y 24h	219.90	27.79	32.84	29.35	32.84	0.000842	0.31	918.89	425.19	0.05
LogbridgePowell	1	8850	100y 18h	147.00	27.79	32.66	29.04	32.67	0.000489	0.23	843.42	422.26	0.04
LogbridgePowell	1	8850	100y 12h	201.10	27.79	32.82	29.28	32.82	0.000729	0.29	908.64	424.79	0.05
LogbridgePowell	1	8850	100y 6h	211.80	27.79	32.79	29.32	32.79	0.000843	0.31	896.21	424.31	0.05
LogbridgePowell	1	8850	100y 3h	246.30	27.79	32.93	29.45	32.93	0.000937	0.33	955.66	426.61	0.06
LogbridgePowell	1	8850	100y 1h	258.40	27.79	32.98	29.50	32.98	0.000965	0.34	976.38	427.41	0.06
LogbridgePowell	1	8850	Feb2008	73.27	27.79	31.82	28.65	31.82	0.001067	0.29	252.81	98.88	0.06
LogbridgePowell	1	8197	2y 72h	30.70	24.81	30.10	26.19	30.11	0.001974	0.27	115.04	96.22	0.07
LogbridgePowell	1	8197	2y 48h	46.59	24.81	30.48	26.53	30.49	0.002028	0.32	155.56	119.18	0.08
LogbridgePowell	1	8197	2y 24h	70.44	24.81	30.73	26.90	30.73	0.002549	0.39	187.89	146.82	0.09
LogbridgePowell	1	8197	2y 18h	48.10	24.81	30.17	26.52	30.18	0.004089	0.40	121.69	99.51	0.10
LogbridgePowell	1	8197	2y 12h	73.42	24.81	30.73	26.94	30.74	0.002744	0.41	188.50	147.22	0.09
LogbridgePowell	1	8197	2y 6h	74.20	24.81	30.88	26.95	30.89	0.002038	0.37	211.27	161.56	0.08
LogbridgePowell	1	8197	2y 3h	83.07	24.81	31.02	27.09	31.02	0.001912	0.37	234.21	174.58	0.08
LogbridgePowell	1	8197	2y 1h	80.50	24.81	31.05	27.05	31.06	0.001654	0.35	241.18	178.44	0.07
LogbridgePowell	1	8197	5y 72h	49.62	24.81	30.33	26.55	30.34	0.002989	0.37	138.04	108.21	0.09
LogbridgePowell	1	8197	5y 48h	79.93	24.81	30.74	27.04	30.75	0.003176	0.44	190.12	148.28	0.10
LogbridgePowell	1	8197	5y 24h	112.10	24.81	30.97	27.50	30.99	0.003797	0.51	227.10	170.63	0.11
LogbridgePowell	1	8197	5y 18h	72.61	24.81	30.60	26.93	30.61	0.003540	0.44	170.51	133.80	0.10
LogbridgePowell	1	8197	5y 12h	109.00	24.81	31.03	27.46	31.04	0.003210	0.48	236.33	175.77	0.10
LogbridgePowell	1	8197	5y 6h	110.70	24.81	31.10	27.48	31.11	0.002865	0.46	248.80	182.58	0.09
LogbridgePowell	1	8197	5y 3h	125.70	24.81	31.30	27.65	31.31	0.002631	0.47	282.97	251.66	0.09
LogbridgePowell	1	8197	5y 1h	125.10	24.81	31.41	27.67	31.42	0.002039	0.42	322.11	273.63	0.08

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	1	8197	10y 72h	69.74	24.81	30.45	26.74	30.46	0.003392	0.41	151.89	116.64	0.10
LogbridgePowell	1	8197	10y 48h	97.97	24.81	30.87	27.31	30.88	0.003625	0.49	209.77	160.67	0.10
LogbridgePowell	1	8197	10y 24h	135.70	24.81	31.22	27.81	31.23	0.003599	0.53	273.70	229.24	0.11
LogbridgePowell	1	8197	10y 18h	86.19	24.81	30.91	27.14	30.92	0.002557	0.41	216.81	164.79	0.09
LogbridgePowell	1	8197	10y 12h	127.80	24.81	31.22	27.71	31.24	0.003164	0.50	274.88	231.15	0.10
LogbridgePowell	1	8197	10y 6h	129.70	24.81	31.30	27.73	31.31	0.002776	0.48	294.04	252.72	0.09
LogbridgePowell	1	8197	10y 3h	147.70	24.81	31.41	27.95	31.42	0.002845	0.50	321.97	273.55	0.10
LogbridgePowell	1	8197	10y 1h	147.50	24.81	31.53	27.96	31.54	0.002157	0.45	355.95	291.80	0.08
LogbridgePowell	1	8197	20y 72h	75.48	24.81	30.74	26.97	30.75	0.002850	0.41	189.69	148.01	0.09
LogbridgePowell	1	8197	20y 48h	121.70	24.81	31.14	27.63	31.15	0.003315	0.50	256.00	199.05	0.10
LogbridgePowell	1	8197	20y 24h	167.50	24.81	31.47	28.20	31.49	0.003154	0.53	340.04	283.50	0.10
LogbridgePowell	1	8197	20y 18h	106.30	24.81	31.34	27.43	31.35	0.001720	0.38	303.61	261.05	0.07
LogbridgePowell	1	8197	20y 12h	153.30	24.81	31.52	28.03	31.53	0.002398	0.47	352.26	289.90	0.09
LogbridgePowell	1	8197	20y 6h	155.80	24.81	31.48	28.06	31.49	0.002686	0.49	342.02	284.55	0.09
LogbridgePowell	1	8197	20y 3h	178.30	24.81	31.60	28.33	31.61	0.002714	0.51	375.73	301.52	0.09
LogbridgePowell	1	8197	20y 1h	178.30	24.81	31.66	28.33	31.67	0.002331	0.48	396.78	311.42	0.09
LogbridgePowell	1	8197	50y 72h	87.06	24.81	30.98	27.15	30.99	0.002271	0.40	227.80	171.02	0.08
LogbridgePowell	1	8197	50y 48h	134.60	24.81	31.34	27.80	31.35	0.002738	0.48	304.48	251.73	0.09
LogbridgePowell	1	8197	50y 24h	188.60	24.81	31.80	28.44	31.81	0.001950	0.45	440.17	330.66	0.08
LogbridgePowell	1	8197	50y 18h	127.00	24.81	31.95	27.70	31.95	0.000650	0.27	492.84	388.97	0.05
LogbridgePowell	1	8197	50y 12h	173.90	24.81	31.92	28.29	31.92	0.001301	0.36	480.95	372.56	0.07
LogbridgePowell	1	8197	50y 6h	183.00	24.81	31.78	28.38	31.79	0.001923	0.44	432.98	327.72	0.08
LogbridgePowell	1	8197	50y 3h	211.00	24.81	31.79	28.71	31.80	0.002475	0.51	437.97	329.80	0.09
LogbridgePowell	1	8197	50y 1h	219.70	24.81	31.83	28.79	31.84	0.002500	0.51	449.12	336.34	0.09
LogbridgePowell	1	8197	100y 72h	103.20	24.81	31.35	27.38	31.35	0.001603	0.37	304.95	252.10	0.07
LogbridgePowell	1	8197	100y 48h	159.40	24.81	31.70	28.10	31.71	0.001710	0.41	408.12	317.08	0.08
LogbridgePowell	1	8197	100y 24h	219.80	24.81	32.19	28.79	32.19	0.001207	0.38	588.46	405.43	0.06
LogbridgePowell	1	8197	100y 18h	147.00	24.81	32.39	27.95	32.40	0.000351	0.21	673.89	416.93	0.04
LogbridgePowell	1	8197	100y 12h	201.10	24.81	32.34	28.60	32.34	0.000734	0.31	650.82	413.85	0.05
LogbridgePowell	1	8197	100y 6h	211.80	24.81	32.09	28.70	32.10	0.001384	0.40	550.09	400.26	0.07
LogbridgePowell	1	8197	100y 3h	246.30	24.81	32.04	29.07	32.05	0.002068	0.49	531.17	397.78	0.08
LogbridgePowell	1	8197	100y 1h	258.40	24.81	32.01	29.74	32.02	0.002493	0.53	517.47	395.97	0.09
LogbridgePowell	1	8197	Feb2008	73.27	24.81	30.92	26.94	30.93	0.001804	0.35	218.69	165.67	0.07
LogbridgePowell	1	8190		Culvert									
LogbridgePowell	1	8183	2y 72h	53.11	24.79	30.09		30.10	0.008057	0.47	114.08	95.67	0.13
LogbridgePowell	1	8183	2y 48h	72.39	24.79	30.47		30.48	0.004608	0.48	154.27	118.19	0.11
LogbridgePowell	1	8183	2y 24h	99.13	24.79	30.71		30.73	0.005178	0.55	186.15	145.55	0.12
LogbridgePowell	1	8183	2y 18h	77.47	24.79	30.15		30.17	0.011105	0.66	119.83	98.44	0.17
LogbridgePowell	1	8183	2y 12h	110.20	24.79	30.72		30.74	0.006363	0.62	186.53	145.80	0.14
LogbridgePowell	1	8183	2y 6h	114.50	24.79	30.86		30.88	0.004988	0.57	209.19	160.21	0.12
LogbridgePowell	1	8183	2y 3h	119.20	24.79	31.00		31.02	0.004025	0.53	232.34	173.44	0.11
LogbridgePowell	1	8183	2y 1h	108.10	24.79	31.05		31.06	0.003032	0.47	239.71	177.55	0.10
LogbridgePowell	1	8183	5y 72h	87.03	24.79	30.31		30.33	0.009567	0.65	136.19	107.18	0.16
LogbridgePowell	1	8183	5y 48h	121.10	24.79	30.72		30.74	0.007596	0.67	187.30	146.32	0.15
LogbridgePowell	1	8183	5y 24h	160.60	24.79	30.95		30.98	0.008165	0.75	223.34	188.43	0.16
LogbridgePowell	1	8183	5y 18h	117.10	24.79	30.58		30.61	0.009551	0.72	168.01	130.47	0.17
LogbridgePowell	1	8183	5y 12h	168.20	24.79	31.01		31.03	0.007989	0.75	232.60	173.59	0.16
LogbridgePowell	1	8183	5y 6h	174.20	24.79	31.08		31.10	0.007394	0.74	245.14	180.51	0.15
LogbridgePowell	1	8183	5y 3h	182.10	24.79	31.28		31.30	0.005748	0.69	268.13	246.67	0.13
LogbridgePowell	1	8183	5y 1h	187.10	24.79	31.39		31.41	0.003784	0.57	317.38	270.86	0.11
LogbridgePowell	1	8183	10y 72h	107.20	24.79	30.43		30.46	0.011087	0.74	149.30	114.71	0.18
LogbridgePowell	1	8183	10y 48h	149.00	24.79	30.85		30.88	0.008756	0.75	206.52	158.58	0.16
LogbridgePowell	1	8183	10y 24h	195.90	24.79	31.19		31.22	0.007652	0.78	267.51	218.44	0.16
LogbridgePowell	1	8183	10y 18h	139.10	24.79	30.89		30.91	0.006979	0.68	213.21	162.60	0.14
LogbridgePowell	1	8183	10y 12h	199.30	24.79	31.19		31.22	0.008075	0.80	268.41	220.14	0.16
LogbridgePowell	1	8183	10y 6h	205.30	24.79	31.28		31.30	0.007335	0.77	287.66	246.20	0.15
LogbridgePowell	1	8183	10y 3h	214.40	24.79	31.39		31.41	0.006246	0.73	317.08	270.68	0.14
LogbridgePowell	1	8183	10y 1h	196.40	24.79	31.50		31.52	0.004061	0.61	348.22	287.71	0.11
LogbridgePowell	1	8183	20y 72h	134.10	24.79	30.71		30.74	0.009464	0.76	186.23	145.60	0.17
LogbridgePowell	1	8183	20y 48h	186.90	24.79	31.11		31.14	0.007929	0.77	251.39	183.67	0.16
LogbridgePowell	1	8183	20y 24h	244.10	24.79	31.45		31.48	0.006974	0.79	335.01	280.73	0.15
LogbridgePowell	1	8183	20y 18h	169.00	24.79	31.33		31.34	0.004471	0.61	300.28	258.30	0.12
LogbridgePowell	1	8183	20y 12h	242.00	24.79	31.50		31.52	0.006221	0.75	347.10	287.13	0.14
LogbridgePowell	1	8183	20y 6h	248.20	24.79	31.46		31.49	0.007124	0.80	336.49	281.53	0.15
LogbridgePowell	1	8183	20y 3h	259.30	24.79	31.58		31.60	0.005989	0.75	369.97	298.68	0.14
LogbridgePowell	1	8183	20y 1h	237.00	24.79	31.64		31.66	0.004313	0.65	390.26	308.32	0.12
LogbridgePowell	1	8183	50y 72h	153.20	24.79	30.96		30.98	0.007332	0.71	224.39	169.02	0.15
LogbridgePowell	1	8183	50y 48h	207.40	24.79	31.32		31.34	0.006887	0.76	297.61	256.04	0.15
LogbridgePowell	1	8183	50y 24h	276.50	24.79	31.78		31.80	0.004367	0.67	433.74	327.96	0.12
LogbridgePowell	1	8183	50y 18h	207.60	24.79	31.93		31.94	0.001812	0.45	485.06	376.68	0.08
LogbridgePowell	1	8183	50y 12h	276.20	24.79	31.89		31.91	0.003430	0.61	473.00	365.74	0.11
LogbridgePowell	1	8183	50y 6h	295.90	24.79	31.76		31.78	0.005247	0.73	426.40	324.75	0.13
LogbridgePowell	1	8183	50y 3h	319.50	24.79	31.77		31.80	0.005904	0.78	431.82	327.14	0.14
LogbridgePowell	1	8183	50y 1h	290.90	24.79	31.81		31.83	0.004514	0.69	444.42	332.63	0.12
LogbridgePowell	1	8183	100y 72h	182.80	24.79	31.33		31.35	0.005221	0.66	300.48	258.47	0.13
LogbridgePowell	1	8183	100y 48h	247.00	24.79	31.66		31.70	0.004271	0.65	403.39	314.39	0.12
LogbridgePowell	1	8183	100y 24h	324.70	24.79	32.17		32.19	0.002715	0.57	582.62	404.62	0.10
LogbridgePowell	1	8183	100y 18h	240.40	24.79	32.39		32.39	0.000953	0.35	670.97	416.52	0.06
LogbridgePowell	1	8183	100y 12h	322.00	24.79	32.32		32.33	0.001954	0.50	643.25	412.81	0.08
LogbridgePowell	1	8183	100y 6h	344.10	24.79	32.08		32.10	0.003778	0.66	544.17	399.46	0.11
LogbridgePowell	1	8183	100y 3h	374.20	24.79	32.01		32.04	0.005165	0.77	519.48	396.21	0.13
LogbridgePowell	1	8183	100y 1h	342.00	24.79	31.99		32.02	0.004517	0.71	511.67	395.20	0.12
LogbridgePowell	1	8183	Feb2008	115.30	24.79	30.91		30.92	0.004615	0.56	216.13	164.30	0.12
LogbridgePowell	1	7540	2y 72h	53.11	25.81	28.18		28.18	0.001776	0.28	195.24	146.44	0.07
LogbridgePowell	1	7540	2y 48h	72.39	25.81	28.28		28.29	0.002623	0.35	211.06	155.82	0.09
LogbridgePowell	1	7540	2y 24h	99.13	25.81	28.70		28.70	0.002114	0.36	283.31	198.75	0.08
LogbridgePowell	1	7540	2y 18h	77.47	25.81	29.00		29.00	0.000710	0.23	350.51	235.21	0.05
LogbridgePowell	1	7540	2y 12h	110.20	25.81	28.98		28.98	0.001500	0.33	345.55	233.86	0.07
LogbridgePowell	1	7540	2y 6h	114.50	25.81	28.83		28.83	0.002207	0.38	310.54	222.45	0.08

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	1	7540	2y 3h	119.20	25.81	28.55		28.66	0.003369	0.45	273.61	192.07	0.10
LogbridgePowell	1	7540	2y 1h	108.10	25.81	28.20		28.21	0.007098	0.55	197.62	147.88	0.14
LogbridgePowell	1	7540	5y 72h	87.03	25.81	29.03		29.03	0.000849	0.25	357.06	236.97	0.05
LogbridgePowell	1	7540	5y 48h	121.10	25.81	29.22		29.23	0.001126	0.31	405.11	249.51	0.06
LogbridgePowell	1	7540	5y 24h	160.60	25.81	29.72		29.72	0.000847	0.30	535.75	281.03	0.05
LogbridgePowell	1	7540	5y 18h	117.10	25.81	30.06		30.06	0.000293	0.19	643.96	360.31	0.03
LogbridgePowell	1	7540	5y 12h	168.20	25.81	29.99		30.00	0.000665	0.28	622.13	351.87	0.05
LogbridgePowell	1	7540	5y 6h	174.20	25.81	29.71		29.72	0.001008	0.32	533.72	280.55	0.06
LogbridgePowell	1	7540	5y 3h	182.10	25.81	29.45		29.45	0.001713	0.40	461.65	263.46	0.07
LogbridgePowell	1	7540	5y 1h	167.10	25.81	28.91		28.93	0.003917	0.53	330.86	229.66	0.11
LogbridgePowell	1	7540	10y 72h	107.20	25.81	29.45		29.45	0.000587	0.23	463.26	263.65	0.04
LogbridgePowell	1	7540	10y 48h	149.00	25.81	29.68		29.68	0.000779	0.28	524.22	278.32	0.05
LogbridgePowell	1	7540	10y 24h	195.90	25.81	30.21		30.21	0.000642	0.29	699.76	375.44	0.05
LogbridgePowell	1	7540	10y 18h	139.10	25.81	30.54		30.54	0.000192	0.17	829.79	398.26	0.03
LogbridgePowell	1	7540	10y 12h	199.30	25.81	30.46		30.46	0.000448	0.25	796.29	393.80	0.04
LogbridgePowell	1	7540	10y 6h	205.30	25.81	30.12		30.12	0.000811	0.32	667.31	367.24	0.05
LogbridgePowell	1	7540	10y 3h	214.40	25.81	29.80		29.80	0.001335	0.38	557.97	286.26	0.07
LogbridgePowell	1	7540	10y 1h	196.40	25.81	29.17		29.19	0.003254	0.51	392.60	248.32	0.10
LogbridgePowell	1	7540	20y 72h	134.10	25.81	29.98		29.98	0.000431	0.22	617.76	349.58	0.04
LogbridgePowell	1	7540	20y 48h	186.90	25.81	30.25		30.25	0.000546	0.26	715.70	379.13	0.04
LogbridgePowell	1	7540	20y 24h	244.10	25.81	30.79		30.80	0.000409	0.25	931.04	410.60	0.04
LogbridgePowell	1	7540	20y 18h	169.00	25.81	31.08		31.09	0.000136	0.15	1054.26	435.35	0.02
LogbridgePowell	1	7540	20y 12h	242.00	25.81	30.97		30.97	0.000318	0.23	1005.16	422.78	0.03
LogbridgePowell	1	7540	20y 6h	248.20	25.81	30.62		30.63	0.000539	0.28	862.72	402.54	0.04
LogbridgePowell	1	7540	20y 3h	259.30	25.81	30.25		30.26	0.001042	0.37	717.84	379.62	0.06
LogbridgePowell	1	7540	20y 1h	237.00	25.81	29.49		29.51	0.002666	0.50	474.68	266.58	0.09
LogbridgePowell	1	7540	50y 72h	153.20	25.81	30.54		30.55	0.000232	0.18	830.42	398.37	0.03
LogbridgePowell	1	7540	50y 48h	207.40	25.81	30.84		30.84	0.000277	0.21	950.18	412.83	0.03
LogbridgePowell	1	7540	50y 24h	276.50	25.81	31.36		31.37	0.000258	0.22	1178.14	453.28	0.03
LogbridgePowell	1	7540	50y 18h	207.60	25.81	31.77		31.78	0.000091	0.14	1369.87	478.71	0.02
LogbridgePowell	1	7540	50y 12h	276.20	25.81	31.57		31.57	0.000203	0.20	1271.61	464.83	0.03
LogbridgePowell	1	7540	50y 6h	295.90	25.81	31.18		31.18	0.000370	0.25	1095.21	442.04	0.04
LogbridgePowell	1	7540	50y 3h	319.50	25.81	30.79		30.80	0.000699	0.33	932.11	410.73	0.05
LogbridgePowell	1	7540	50y 1h	290.90	25.81	29.90		29.92	0.002099	0.49	590.93	329.64	0.09
LogbridgePowell	1	7540	100y 72h	182.80	25.81	31.03		31.03	0.000170	0.17	1026.77	429.91	0.03
LogbridgePowell	1	7540	100y 48h	247.00	25.81	31.33		31.33	0.000214	0.20	1162.76	451.25	0.03
LogbridgePowell	1	7540	100y 24h	324.70	25.81	31.86		31.86	0.000205	0.21	1408.89	484.67	0.03
LogbridgePowell	1	7540	100y 18h	240.40	25.81	32.27		32.28	0.000074	0.13	1617.00	508.25	0.02
LogbridgePowell	1	7540	100y 12h	322.00	25.81	32.08		32.08	0.000161	0.19	1517.77	498.09	0.03
LogbridgePowell	1	7540	100y 6h	344.10	25.81	31.63		31.63	0.000295	0.24	1299.12	468.63	0.03
LogbridgePowell	1	7540	100y 3h	374.20	25.81	31.19		31.20	0.000580	0.32	1102.31	443.15	0.05
LogbridgePowell	1	7540	100y 1h	342.00	25.81	30.28		30.27	0.001802	0.48	719.16	379.92	0.08
LogbridgePowell	1	7540	Feb2008	115.30	25.81	28.75		28.76	0.002577	0.41	294.51	208.33	0.09
LogbridgePowell	1	7030	2y 72h	53.11	21.85	28.05		28.08	0.000075	0.11	554.48	203.97	0.02
LogbridgePowell	1	7030	2y 48h	72.39	21.85	28.10		28.10	0.000136	0.14	560.13	209.34	0.02
LogbridgePowell	1	7030	2y 24h	99.13	21.85	28.49		28.49	0.000173	0.17	657.78	265.69	0.03
LogbridgePowell	1	7030	2y 18h	77.47	21.85	28.82		28.82	0.000086	0.11	776.16	277.41	0.02
LogbridgePowell	1	7030	2y 12h	110.20	21.85	28.80		28.80	0.000162	0.17	743.31	274.23	0.02
LogbridgePowell	1	7030	2y 6h	114.50	21.85	28.56		28.58	0.000209	0.19	682.88	268.24	0.03
LogbridgePowell	1	7030	2y 3h	119.20	21.85	28.27		28.27	0.000317	0.22	601.76	259.92	0.03
LogbridgePowell	1	7030	2y 1h	108.10	21.85	27.51		27.51	0.000557	0.28	450.98	173.47	0.04
LogbridgePowell	1	7030	5y 72h	87.03	21.85	28.93		28.93	0.000083	0.13	778.71	277.66	0.02
LogbridgePowell	1	7030	5y 48h	121.10	21.85	29.07		29.07	0.000139	0.17	818.20	281.43	0.02
LogbridgePowell	1	7030	5y 24h	160.60	21.85	29.57		29.57	0.000151	0.18	961.04	294.86	0.02
LogbridgePowell	1	7030	5y 18h	117.10	21.85	30.00		30.00	0.000055	0.12	1096.29	537.72	0.02
LogbridgePowell	1	7030	5y 12h	168.20	21.85	29.87		29.87	0.000126	0.17	1052.01	311.43	0.02
LogbridgePowell	1	7030	5y 6h	174.20	21.85	29.53		29.53	0.000184	0.20	949.56	293.82	0.03
LogbridgePowell	1	7030	5y 3h	182.10	21.85	29.15		29.16	0.000289	0.24	840.97	283.59	0.03
LogbridgePowell	1	7030	5y 1h	167.10	21.85	28.27		28.27	0.000626	0.31	600.98	259.84	0.05
LogbridgePowell	1	7030	10y 72h	107.20	21.85	29.36		29.37	0.000081	0.13	901.74	289.35	0.02
LogbridgePowell	1	7030	10y 48h	149.00	21.85	29.54		29.54	0.000133	0.17	953.66	294.19	0.02
LogbridgePowell	1	7030	10y 24h	195.90	21.85	30.07		30.07	0.000145	0.19	1140.14	597.55	0.02
LogbridgePowell	1	7030	10y 18h	139.10	21.85	30.50		30.50	0.000053	0.12	1410.69	657.44	0.02
LogbridgePowell	1	7030	10y 12h	199.30	21.85	30.35		30.35	0.000132	0.19	1312.53	646.60	0.02
LogbridgePowell	1	7030	10y 6h	205.30	21.85	29.95		29.96	0.000177	0.21	1080.32	356.87	0.03
LogbridgePowell	1	7030	10y 3h	214.40	21.85	29.53		29.54	0.000278	0.25	950.61	293.91	0.03
LogbridgePowell	1	7030	10y 1h	196.40	21.85	28.56		28.57	0.000625	0.33	676.49	267.80	0.05
LogbridgePowell	1	7030	20y 72h	134.10	21.85	29.90		29.90	0.000079	0.14	1062.99	334.60	0.02
LogbridgePowell	1	7030	20y 48h	186.90	21.85	30.13		30.13	0.000128	0.18	1176.39	623.23	0.02
LogbridgePowell	1	7030	20y 24h	244.10	21.85	30.69		30.69	0.000129	0.19	1536.79	670.32	0.02
LogbridgePowell	1	7030	20y 18h	169.00	21.85	31.05		31.05	0.000040	0.11	1785.70	694.13	0.01
LogbridgePowell	1	7030	20y 12h	242.00	21.85	30.89		30.89	0.000099	0.17	1673.89	683.26	0.02
LogbridgePowell	1	7030	20y 6h	248.20	21.85	30.48		30.48	0.000172	0.22	1401.91	656.43	0.03
LogbridgePowell	1	7030	20y 3h	259.30	21.85	30.02		30.02	0.000267	0.28	1107.30	578.17	0.03
LogbridgePowell	1	7030	20y 1h	237.00	21.85	28.92		28.93	0.000620	0.34	776.57	277.45	0.05
LogbridgePowell	1	7030	50y 72h	153.20	21.85	30.49		30.49	0.000065	0.13	1405.08	656.80	0.02
LogbridgePowell	1	7030	50y 48h	207.40	21.85	30.77		30.77	0.000084	0.16	1592.36	675.63	0.02
LogbridgePowell	1	7030	50y 24h	276.50	21.85	31.30		31.30	0.000081	0.16	1958.34	710.15	0.02
LogbridgePowell	1	7030	50y 18h	207.60	21.85	31.75		31.75	0.000028	0.10	2268.41	740.74	0.01
LogbridgePowell	1	7030	50y 12h	276.20	21.85	31.51		31.52	0.000064	0.15	2114.52	724.86	0.02
LogbridgePowell	1	7030	50y 6h	295.90	21.85	31.08		31.08	0.000118	0.19	1806.89	696.14	0.02
LogbridgePowell	1	7030	50y 3h	319.50	21.85	30.60		30.60	0.000246	0.26	1479.35	664.73	0.03
LogbridgePowell	1	7030	50y 1h	290.90	21.85	29.40		29.41	0.000580	0.35	911.99	290.32	0.05
LogbridgePowell	1	7030	100y 72h	182.80	21.85	30.98		30.98	0.000050	0.12	1738.93	689.60	0.01
LogbridgePowell	1	7030	100y 48h	247.00	21.85	31.27		31.28	0.000066	0.14	1842.56	708.72	0.02
LogbridgePowell	1	7030	100y 24h	324.70	21.85	31.80		31.80	0.000066	0.15	2326.18	744.60	0.02
LogbridgePowell	1	7030	100y 18h	240.40	21.85	32.26		32.26	0.000024	0.10	2676.54	809.89	0.01
LogbridgePowell	1	7030	100y 12h	322.00	21.85	32.04		32.04	0.000052	0.14	2501.64	765.64	0.02
LogbridgePowell	1	7030	100y 6h	344.10	21.85	31.55		31.55	0.000096	0.18	2139.03	727.23	0.02
LogbridgePowell	1	7030	100y 3h	374.20	21.85	31.04		31.04	0.000199	0.25	1774.85	693.08	0.03
LogbridgePowell	1	7030	100y 1h	342.00	21.85	29.79		29.80	0.000564	0.38	1027.43	395.54	0.05

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	1	7030	Feb2008	115.30	21.85	26.47		26.47	0.000239	0.20	653.29	265.24	0.03
LogbridgePowell	3	3220	2y 72h	156.80	15.86	27.50		27.50	0.000014	0.07	2122.69	309.93	0.01
LogbridgePowell	3	3220	2y 48h	160.20	15.86	27.51		27.51	0.000015	0.08	2126.28	310.59	0.01
LogbridgePowell	3	3220	2y 24h	201.20	15.86	27.75		27.76	0.000022	0.09	2264.57	324.61	0.01
LogbridgePowell	3	3220	2y 18h	280.70	15.86	27.91		27.91	0.000039	0.13	2258.16	373.77	0.01
LogbridgePowell	3	3220	2y 12h	259.40	15.86	27.79		27.79	0.000035	0.12	2216.05	326.66	0.01
LogbridgePowell	3	3220	2y 6h	231.40	15.86	27.63		27.63	0.000030	0.11	2163.51	317.34	0.01
LogbridgePowell	3	3220	2y 3h	193.40	15.86	27.33		27.33	0.000024	0.09	2072.03	300.41	0.01
LogbridgePowell	3	3220	2y 1h	123.50	15.86	26.52		26.52	0.000014	0.07	1847.76	254.94	0.01
LogbridgePowell	3	3220	5y 72h	256.80	15.86	28.13		28.13	0.000030	0.11	2366.34	615.94	0.01
LogbridgePowell	3	3220	5y 48h	277.70	15.86	28.20		28.20	0.000034	0.12	2409.87	618.33	0.01
LogbridgePowell	3	3220	5y 24h	344.40	15.86	28.53		28.53	0.000046	0.14	2616.58	627.20	0.01
LogbridgePowell	3	3220	5y 18h	451.10	15.86	28.71		28.71	0.000073	0.18	2731.17	630.70	0.02
LogbridgePowell	3	3220	5y 12h	421.50	15.86	28.55		28.55	0.000068	0.18	2628.15	627.56	0.02
LogbridgePowell	3	3220	5y 6h	366.20	15.86	28.30		28.30	0.000057	0.16	2472.80	621.76	0.02
LogbridgePowell	3	3220	5y 3h	305.40	15.86	27.95		27.95	0.000046	0.14	2279.07	406.66	0.01
LogbridgePowell	3	3220	5y 1h	197.20	15.86	26.96		26.96	0.000029	0.10	1964.69	275.92	0.01
LogbridgePowell	3	3220	10y 72h	317.70	15.86	28.43		28.44	0.000041	0.13	2557.25	625.39	0.01
LogbridgePowell	3	3220	10y 48h	345.70	15.86	28.54		28.54	0.000046	0.14	2623.14	627.40	0.02
LogbridgePowell	3	3220	10y 24h	429.20	15.86	28.90		28.90	0.000061	0.17	2850.79	634.33	0.02
LogbridgePowell	3	3220	10y 18h	547.80	15.86	29.12		29.12	0.000090	0.21	2991.63	638.54	0.02
LogbridgePowell	3	3220	10y 12h	509.60	15.86	28.90		28.90	0.000086	0.20	2849.08	634.27	0.02
LogbridgePowell	3	3220	10y 6h	438.50	15.86	28.59		28.59	0.000073	0.18	2655.60	628.40	0.02
LogbridgePowell	3	3220	10y 3h	364.30	15.86	28.21		28.21	0.000059	0.16	2419.14	618.83	0.02
LogbridgePowell	3	3220	10y 1h	234.30	15.86	27.10		27.10	0.000038	0.12	2002.94	285.05	0.01
LogbridgePowell	3	3220	20y 72h	402.10	15.86	28.85		28.85	0.000054	0.16	2820.44	633.41	0.02
LogbridgePowell	3	3220	20y 48h	442.10	15.86	29.01		29.01	0.000081	0.17	2921.98	636.46	0.02
LogbridgePowell	3	3220	20y 24h	546.60	15.86	29.42		29.42	0.000079	0.20	3179.82	644.03	0.02
LogbridgePowell	3	3220	20y 18h	678.90	15.86	29.61		29.61	0.000112	0.24	3306.20	647.69	0.02
LogbridgePowell	3	3220	20y 12h	632.00	15.86	29.37		29.37	0.000108	0.23	3147.36	643.09	0.02
LogbridgePowell	3	3220	20y 6h	540.40	15.86	28.99		28.99	0.000093	0.21	2907.86	636.05	0.02
LogbridgePowell	3	3220	20y 3h	447.10	15.86	28.53		28.54	0.000077	0.19	2619.47	627.29	0.02
LogbridgePowell	3	3220	20y 1h	286.20	15.86	27.26		27.26	0.000053	0.14	2050.15	296.12	0.02
LogbridgePowell	3	3220	50y 72h	506.10	15.86	29.35		29.35	0.000070	0.19	3136.26	642.77	0.02
LogbridgePowell	3	3220	50y 48h	567.40	15.86	29.63		29.63	0.000077	0.20	3319.51	648.08	0.02
LogbridgePowell	3	3220	50y 24h	678.50	15.86	30.03		30.04	0.000094	0.23	3581.97	656.24	0.02
LogbridgePowell	3	3220	50y 18h	863.60	15.86	30.26		30.26	0.000138	0.28	3731.27	661.10	0.03
LogbridgePowell	3	3220	50y 12h	789.70	15.86	29.91		29.91	0.000133	0.27	3500.82	653.63	0.03
LogbridgePowell	3	3220	50y 6h	683.20	15.86	29.50		29.51	0.000119	0.25	3236.29	645.67	0.02
LogbridgePowell	3	3220	50y 3h	562.60	15.86	28.97		28.98	0.000101	0.22	2897.80	635.75	0.02
LogbridgePowell	3	3220	50y 1h	360.20	15.86	27.50		27.50	0.000076	0.17	2124.38	310.24	0.02
LogbridgePowell	3	3220	100y 72h	614.50	15.86	29.79		29.79	0.000085	0.21	3420.01	651.02	0.02
LogbridgePowell	3	3220	100y 48h	679.30	15.86	30.11		30.11	0.000091	0.22	3629.39	657.79	0.02
LogbridgePowell	3	3220	100y 24h	807.20	15.86	30.50		30.50	0.000110	0.25	3889.20	666.08	0.02
LogbridgePowell	3	3220	100y 18h	1008.00	15.86	30.73		30.73	0.000158	0.30	4041.76	670.76	0.03
LogbridgePowell	3	3220	100y 12h	943.90	15.86	30.39		30.40	0.000156	0.30	3817.52	663.87	0.03
LogbridgePowell	3	3220	100y 6h	807.70	15.86	29.90		29.90	0.000140	0.28	3491.57	653.33	0.03
LogbridgePowell	3	3220	100y 3h	666.80	15.86	29.36		29.36	0.000120	0.25	3141.62	642.92	0.02
LogbridgePowell	3	3220	100y 1h	428.10	15.86	27.73		27.73	0.000099	0.20	2195.26	322.97	0.02
LogbridgePowell	3	3220	Feb2008	215.90	15.86	27.56		27.56	0.000027	0.10	2142.00	313.46	0.01
LogbridgePowell	3	2300	2y 72h	156.80	13.77	27.47		27.48	0.000043	0.14	1273.26	228.99	0.01
LogbridgePowell	3	2300	2y 48h	160.20	13.77	27.49		27.49	0.000045	0.15	1275.71	229.11	0.01
LogbridgePowell	3	2300	2y 24h	201.20	13.77	27.72		27.72	0.000064	0.18	1330.24	231.83	0.02
LogbridgePowell	3	2300	2y 18h	280.70	13.77	27.85		27.85	0.000116	0.24	1366.09	233.53	0.02
LogbridgePowell	3	2300	2y 12h	259.40	13.77	27.74		27.74	0.000106	0.23	1333.51	232.02	0.02
LogbridgePowell	3	2300	2y 6h	231.40	13.77	27.58		27.58	0.000090	0.21	1297.69	230.19	0.02
LogbridgePowell	3	2300	2y 3h	193.40	13.77	27.29		27.30	0.000071	0.18	1232.22	226.96	0.02
LogbridgePowell	3	2300	2y 1h	123.50	13.77	26.50		26.50	0.000041	0.13	1054.59	218.09	0.01
LogbridgePowell	3	2300	5y 72h	256.80	13.77	28.08		28.08	0.000090	0.21	1414.29	236.66	0.02
LogbridgePowell	3	2300	5y 48h	277.70	13.77	28.15		28.15	0.000102	0.23	1429.51	237.60	0.02
LogbridgePowell	3	2300	5y 24h	344.40	13.77	28.46		28.46	0.000139	0.27	1504.71	242.34	0.03
LogbridgePowell	3	2300	5y 18h	451.10	13.77	28.60		28.60	0.000226	0.35	1536.59	244.52	0.03
LogbridgePowell	3	2300	5y 12h	421.50	13.77	28.44		28.45	0.000210	0.33	1500.59	242.08	0.03
LogbridgePowell	3	2300	5y 6h	366.20	13.77	28.21		28.22	0.000174	0.30	1446.18	238.57	0.03
LogbridgePowell	3	2300	5y 3h	305.40	13.77	27.88		27.88	0.000138	0.26	1366.80	233.90	0.03
LogbridgePowell	3	2300	5y 1h	197.20	13.77	26.91		26.92	0.000087	0.19	1146.76	222.83	0.02
LogbridgePowell	3	2300	10y 72h	317.70	13.77	28.37		28.38	0.000122	0.25	1483.81	240.99	0.02
LogbridgePowell	3	2300	10y 48h	345.70	13.77	28.47		28.47	0.000140	0.27	1507.09	242.49	0.03
LogbridgePowell	3	2300	10y 24h	429.20	13.77	28.81		28.81	0.000189	0.32	1589.87	248.03	0.03
LogbridgePowell	3	2300	10y 18h	547.80	13.77	28.98		28.99	0.000288	0.40	1633.29	251.09	0.04
LogbridgePowell	3	2300	10y 12h	509.60	13.77	28.76		28.77	0.000270	0.39	1579.34	247.31	0.04
LogbridgePowell	3	2300	10y 6h	438.50	13.77	28.48		28.48	0.000224	0.35	1509.64	242.66	0.03
LogbridgePowell	3	2300	10y 3h	364.30	13.77	28.12		28.13	0.000178	0.30	1424.05	237.26	0.03
LogbridgePowell	3	2300	10y 1h	234.30	13.77	27.04		27.04	0.000116	0.23	1173.96	224.15	0.02
LogbridgePowell	3	2300	20y 72h	402.10	13.77	28.77		28.77	0.000168	0.30	1580.51	247.39	0.03
LogbridgePowell	3	2300	20y 48h	442.10	13.77	28.92		28.92	0.000192	0.33	1617.45	249.95	0.03
LogbridgePowell	3	2300	20y 24h	546.60	13.77	29.29		29.30	0.000255	0.39	1712.06	256.75	0.04
LogbridgePowell	3	2300	20y 18h	678.90	13.77	29.43		29.44	0.000374	0.47	1746.39	259.39	0.04
LogbridgePowell	3	2300	20y 12h	632.00	13.77	29.19		29.20	0.000354	0.45	1667.18	254.96	0.04
LogbridgePowell	3	2300	20y 6h	540.40	13.77	28.84		28.85	0.000295	0.41	1599.47	248.68	0.04
LogbridgePowell	3	2300	20y 3h	447.10	13.77	28.41		28.42	0.000239	0.36	1493.90	241.64	0.03
LogbridgePowell	3	2300	20y 1h	286.20	13.77	27.18		27.18	0.000164	0.27	1205.18	225.66	0.03
LogbridgePowell	3	2300	50y 72h	506.10	13.77	29.24		29.24	0.000223	0.36	1696.60	255.78	0.03
LogbridgePowell	3	2300	50y 48h	567.40	13.77	29.51		29.51	0.000254	0.39	1768.40	260.87	0.04
LogbridgePowell	3	2300	50y 24h	678.50	13.77	29.88		29.89	0.000317	0.45	1857.40	267.72	0.04
LogbridgePowell	3	2300	50y 18h	863.60	13.77	30.03		30.05	0.000487	0.56	1907.96	270.50	0.05
LogbridgePowell	3	2300	50y 12h	789.70	13.77	29.69		29.71	0.000460	0.53	1816.88	264.28	0.05
LogbridgePowell	3	2300	50y 6h	683.20	13.77	29.31		29.32	0.000395	0.48	1717.73	257.15	0.05
LogbridgePowell	3	2300	50y 3h	562.60	13.77	28.82		28.82	0.000323	0.42	1592.16	248.18	0.04
LogbridgePowell	3	2300	50y 1h	360.20	13.77	27.38		27.39	0.000237	0.33	1252.50	227.96	0.03

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	3	2300	100y 72h	614.50	13.77	29.65		29.66	0.000283	0.42	1805.55	263.50	0.04
LogbridgePowell	3	2300	100y 48h	679.30	13.77	29.96		29.97	0.000309	0.44	1887.83	269.12	0.04
LogbridgePowell	3	2300	100y 24h	807.20	13.77	30.32		30.33	0.000385	0.50	1985.83	275.75	0.05
LogbridgePowell	3	2300	100y 18h	1008.00	13.77	30.47		30.48	0.000571	0.62	2026.69	278.52	0.05
LogbridgePowell	3	2300	100y 12h	943.90	13.77	30.13		30.15	0.000562	0.60	1934.53	272.30	0.05
LogbridgePowell	3	2300	100y 6h	807.70	13.77	29.67		29.68	0.000486	0.55	1810.05	263.81	0.05
LogbridgePowell	3	2300	100y 3h	666.80	13.77	29.16		29.17	0.000398	0.48	1679.61	254.41	0.05
LogbridgePowell	3	2300	100y 1h	428.10	13.77	27.57		27.58	0.000306	0.38	1295.74	230.09	0.04
LogbridgePowell	3	2300	Feb2008	215.90	13.77	27.52		27.52	0.000080	0.19	1283.13	229.47	0.02
LogbridgePowell	3	2000	2y 72h	156.80	12.82	27.47		27.47	0.000008	0.06	3314.74	600.00	0.01
LogbridgePowell	3	2000	2y 48h	160.20	12.82	27.48		27.48	0.000009	0.06	3321.06	600.00	0.01
LogbridgePowell	3	2000	2y 24h	201.20	12.82	27.72		27.72	0.000012	0.07	3461.99	600.00	0.01
LogbridgePowell	3	2000	2y 18h	280.70	12.82	27.84		27.84	0.000022	0.10	3535.91	600.00	0.01
LogbridgePowell	3	2000	2y 12h	259.40	12.82	27.73		27.73	0.000020	0.09	3468.04	600.00	0.01
LogbridgePowell	3	2000	2y 6h	231.40	12.82	27.57		27.57	0.000017	0.08	3375.89	600.00	0.01
LogbridgePowell	3	2000	2y 3h	193.40	12.82	27.29		27.29	0.000014	0.07	3205.21	597.81	0.01
LogbridgePowell	3	2000	2y 1h	123.50	12.82	26.49		26.49	0.000008	0.05	2735.92	581.71	0.01
LogbridgePowell	3	2000	5y 72h	256.80	12.82	28.07		28.07	0.000016	0.08	3675.93	600.00	0.01
LogbridgePowell	3	2000	5y 48h	277.70	12.82	28.14		28.14	0.000019	0.09	3713.76	600.00	0.01
LogbridgePowell	3	2000	5y 24h	344.40	12.82	28.45		28.45	0.000025	0.11	3899.92	600.00	0.01
LogbridgePowell	3	2000	5y 18h	451.10	12.82	28.58		28.58	0.000040	0.14	3978.96	600.00	0.01
LogbridgePowell	3	2000	5y 12h	421.50	12.82	28.42		28.42	0.000038	0.13	3886.04	600.00	0.01
LogbridgePowell	3	2000	5y 6h	366.20	12.82	28.19		28.20	0.000032	0.12	3749.30	600.00	0.01
LogbridgePowell	3	2000	5y 3h	305.40	12.82	27.87		27.87	0.000026	0.10	3561.47	600.00	0.01
LogbridgePowell	3	2000	5y 1h	197.20	12.82	26.91		26.91	0.000017	0.08	2978.40	590.17	0.01
LogbridgePowell	3	2000	10y 72h	317.70	12.82	28.36		28.36	0.000022	0.10	3848.80	600.00	0.01
LogbridgePowell	3	2000	10y 48h	346.70	12.82	28.46		28.46	0.000025	0.11	3905.75	600.00	0.01
LogbridgePowell	3	2000	10y 24h	429.20	12.82	28.79		28.79	0.000033	0.13	4105.83	600.00	0.01
LogbridgePowell	3	2000	10y 18h	547.80	12.82	28.95		28.96	0.000051	0.16	4205.00	600.00	0.02
LogbridgePowell	3	2000	10y 12h	509.60	12.82	28.74		28.74	0.000048	0.15	4075.84	600.00	0.02
LogbridgePowell	3	2000	10y 6h	438.50	12.82	28.46		28.46	0.000040	0.14	3907.45	600.00	0.01
LogbridgePowell	3	2000	10y 3h	364.30	12.82	28.11		28.11	0.000033	0.12	3695.70	600.00	0.01
LogbridgePowell	3	2000	10y 1h	234.30	12.82	27.02		27.03	0.000023	0.09	3048.66	592.68	0.01
LogbridgePowell	3	2000	20y 72h	402.10	12.82	28.75		28.75	0.000030	0.12	4084.24	600.00	0.01
LogbridgePowell	3	2000	20y 48h	442.10	12.82	28.90		28.90	0.000034	0.13	4172.17	600.00	0.01
LogbridgePowell	3	2000	20y 24h	546.60	12.82	29.27		29.27	0.000044	0.15	4393.11	600.00	0.01
LogbridgePowell	3	2000	20y 18h	678.90	12.82	29.40		29.40	0.000065	0.18	4471.40	600.00	0.02
LogbridgePowell	3	2000	20y 12h	632.00	12.82	29.16		29.16	0.000062	0.18	4329.42	600.00	0.02
LogbridgePowell	3	2000	20y 6h	540.40	12.82	28.82		28.82	0.000052	0.16	4123.29	600.00	0.02
LogbridgePowell	3	2000	20y 3h	447.10	12.82	28.39		28.39	0.000043	0.14	3857.58	600.00	0.01
LogbridgePowell	3	2000	20y 1h	286.20	12.82	27.16		27.16	0.000032	0.11	3128.37	595.55	0.01
LogbridgePowell	3	2000	50y 72h	506.10	12.82	29.22		29.22	0.000039	0.14	4363.26	600.00	0.01
LogbridgePowell	3	2000	50y 48h	567.40	12.82	29.49		29.49	0.000044	0.15	4523.93	600.00	0.01
LogbridgePowell	3	2000	50y 24h	678.50	12.82	29.86		29.86	0.000054	0.17	4745.59	600.00	0.02
LogbridgePowell	3	2000	50y 18h	863.60	12.82	29.99		29.99	0.000083	0.22	4827.30	600.00	0.02
LogbridgePowell	3	2000	50y 12h	789.70	12.82	29.65		29.65	0.000079	0.21	4624.01	600.00	0.02
LogbridgePowell	3	2000	50y 6h	683.20	12.82	29.28		29.28	0.000069	0.19	4398.89	600.00	0.02
LogbridgePowell	3	2000	50y 3h	562.60	12.82	28.79		28.79	0.000057	0.17	4104.06	600.00	0.02
LogbridgePowell	3	2000	50y 1h	360.20	12.82	27.36		27.36	0.000046	0.13	3248.78	598.92	0.01
LogbridgePowell	3	2000	100y 72h	614.50	12.82	29.63		29.63	0.000046	0.16	4607.51	600.00	0.02
LogbridgePowell	3	2000	100y 48h	679.30	12.82	29.93		29.93	0.000053	0.17	4791.69	600.00	0.02
LogbridgePowell	3	2000	100y 24h	807.20	12.82	30.29		30.29	0.000085	0.19	5003.86	600.00	0.02
LogbridgePowell	3	2000	100y 18h	1008.00	12.82	30.42		30.42	0.000097	0.24	5082.89	600.00	0.02
LogbridgePowell	3	2000	100y 12h	943.90	12.82	30.08		30.09	0.000096	0.23	4882.23	600.00	0.02
LogbridgePowell	3	2000	100y 6h	807.70	12.82	29.62		29.63	0.000084	0.21	4607.12	600.00	0.02
LogbridgePowell	3	2000	100y 3h	666.80	12.82	29.13		29.13	0.000070	0.19	4309.18	600.00	0.02
LogbridgePowell	3	2000	100y 1h	428.10	12.82	27.54		27.54	0.000059	0.15	3357.93	600.00	0.02
LogbridgePowell	3	2000	Feb2008	215.90	12.82	27.51		27.51	0.000015	0.08	3336.41	600.00	0.01
LogbridgePowell	3	1600	2y 72h	156.80	12.52	27.47		27.47	0.000008	0.06	3304.05	585.83	0.01
LogbridgePowell	3	1600	2y 48h	160.20	12.52	27.48		27.48	0.000008	0.06	3310.14	585.96	0.01
LogbridgePowell	3	1600	2y 24h	201.20	12.52	27.71		27.71	0.000012	0.08	3447.30	588.84	0.01
LogbridgePowell	3	1600	2y 18h	280.70	12.52	27.83		27.83	0.000021	0.11	3517.59	590.32	0.01
LogbridgePowell	3	1600	2y 12h	259.40	12.52	27.72		27.72	0.000019	0.10	3451.40	588.93	0.01
LogbridgePowell	3	1600	2y 6h	231.40	12.52	27.57		27.57	0.000016	0.09	3361.77	587.05	0.01
LogbridgePowell	3	1600	2y 3h	193.40	12.52	27.28		27.28	0.000013	0.08	3195.90	583.55	0.01
LogbridgePowell	3	1600	2y 1h	123.50	12.52	26.49		26.49	0.000008	0.06	2736.95	573.75	0.01
LogbridgePowell	3	1600	5y 72h	256.80	12.52	28.07		28.07	0.000016	0.09	3658.98	593.22	0.01
LogbridgePowell	3	1600	5y 48h	277.70	12.52	28.13		28.13	0.000018	0.10	3693.88	593.98	0.01
LogbridgePowell	3	1600	5y 24h	344.40	12.52	28.44		28.44	0.000025	0.12	3877.25	597.75	0.01
LogbridgePowell	3	1600	5y 18h	451.10	12.52	28.56		28.56	0.000040	0.15	3952.38	599.25	0.01
LogbridgePowell	3	1600	5y 12h	421.50	12.52	28.41		28.41	0.000037	0.15	3860.36	597.41	0.01
LogbridgePowell	3	1600	5y 6h	366.20	12.52	28.18		28.18	0.000031	0.13	3726.01	594.65	0.01
LogbridgePowell	3	1600	5y 3h	305.40	12.52	27.85		27.86	0.000025	0.12	3532.03	590.62	0.01
LogbridgePowell	3	1600	5y 1h	197.20	12.52	26.90		26.90	0.000017	0.09	2973.25	578.81	0.01
LogbridgePowell	3	1600	10y 72h	317.70	12.52	28.35		28.35	0.000022	0.11	3827.16	598.73	0.01
LogbridgePowell	3	1600	10y 48h	346.70	12.52	28.45		28.45	0.000025	0.12	3883.00	597.86	0.01
LogbridgePowell	3	1600	10y 24h	429.20	12.52	28.78		28.78	0.000033	0.14	4080.92	600.00	0.01
LogbridgePowell	3	1600	10y 18h	547.80	12.52	28.93		28.94	0.000050	0.17	4176.93	600.00	0.02
LogbridgePowell	3	1600	10y 12h	509.60	12.52	28.72		28.72	0.000048	0.17	4047.40	600.00	0.02
LogbridgePowell	3	1600	10y 6h	438.50	12.52	28.44		28.44	0.000040	0.15	3881.09	597.83	0.01
LogbridgePowell	3	1600	10y 3h	364.30	12.52	28.09		28.09	0.000032	0.13	3672.70	593.54	0.01
LogbridgePowell	3	1600	10y 1h	234.30	12.52	27.02		27.02	0.000022	0.10	3040.79	580.25	0.01
LogbridgePowell	3	1600	20y 72h	402.10	12.52	28.74		28.74	0.000029	0.13	4060.21	600.00	0.01
LogbridgePowell	3	1600	20y 48h	442.10	12.52	28.89		28.89	0.000033	0.14	4147.17	600.00	0.01
LogbridgePowell	3	1600	20y 24h	546.60	12.52	29.25		29.25	0.000044	0.17	4365.58	600.00	0.02
LogbridgePowell	3	1600	20y 18h	678.90	12.52	29.37		29.37	0.000064	0.20	4438.92	600.00	0.02
LogbridgePowell	3	1600	20y 12h	632.00	12.52	29.14		29.14	0.000061	0.19	4297.65	600.00	0.02
LogbridgePowell	3	1600	20y 6h	540.40	12.52	28.80		28.80	0.000052	0.16	4093.84	600.00	0.02
LogbridgePowell	3	1600	20y 3h	447.10	12.52	28.37		28.38	0.000042	0.16	3840.71	597.01	0.01
LogbridgePowell	3	1600	20y 1h	286.20	12.52	27.15		27.15	0.000031	0.12	3116.67	581.87	0.01

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	3	1600	50y 72h	506.10	12.52	29.20		29.20	0.000038	0.15	4337.07	600.00	0.01
LogbridgePowell	3	1600	50y 48h	567.40	12.52	29.47		29.47	0.000043	0.17	4496.54	600.00	0.02
LogbridgePowell	3	1600	50y 24h	678.50	12.52	29.83		29.83	0.000054	0.19	4715.69	600.00	0.02
LogbridgePowell	3	1600	50y 18h	863.60	12.52	29.96		29.96	0.000083	0.24	4790.36	600.00	0.02
LogbridgePowell	3	1600	50y 12h	789.70	12.52	29.62		29.62	0.000079	0.23	4588.03	600.00	0.02
LogbridgePowell	3	1600	50y 6h	683.20	12.52	29.25		29.25	0.000068	0.21	4365.41	600.00	0.02
LogbridgePowell	3	1600	50y 3h	562.60	12.52	28.76		28.76	0.000057	0.18	4073.36	600.00	0.02
LogbridgePowell	3	1600	50y 1h	360.20	12.52	27.34		27.34	0.000044	0.15	3230.97	584.29	0.01
LogbridgePowell	3	1600	100y 72h	614.50	12.52	29.61		29.61	0.000048	0.18	4578.96	600.00	0.02
LogbridgePowell	3	1600	100y 48h	679.30	12.52	29.91		29.91	0.000052	0.19	4762.14	600.00	0.02
LogbridgePowell	3	1600	100y 24h	807.20	12.52	30.26		30.26	0.000065	0.21	4971.29	600.00	0.02
LogbridgePowell	3	1600	100y 18h	1008.00	12.52	30.38		30.38	0.000097	0.26	5042.63	600.00	0.02
LogbridgePowell	3	1600	100y 12h	943.90	12.52	30.04		30.05	0.000098	0.26	4842.17	600.00	0.02
LogbridgePowell	3	1600	100y 6h	807.70	12.52	29.59		29.59	0.000084	0.23	4570.02	600.00	0.02
LogbridgePowell	3	1600	100y 3h	666.80	12.52	29.10		29.10	0.000069	0.21	4275.49	600.00	0.02
LogbridgePowell	3	1600	100y 1h	428.10	12.52	27.52		27.52	0.000057	0.17	3334.37	586.47	0.02
LogbridgePowell	3	1600	Feb2008	215.90	12.52	27.50		27.50	0.000015	0.09	3325.52	586.28	0.01
LogbridgePowell	3	1200	2y 72h	156.80	12.50	27.48		27.47	0.000005	0.05	3398.01	459.51	0.00
LogbridgePowell	3	1200	2y 48h	160.20	12.50	27.48		27.48	0.000005	0.05	3400.74	459.55	0.00
LogbridgePowell	3	1200	2y 24h	201.20	12.50	27.71		27.71	0.000007	0.07	3507.66	460.48	0.01
LogbridgePowell	3	1200	2y 18h	280.70	12.50	27.82		27.82	0.000013	0.09	3561.21	460.94	0.01
LogbridgePowell	3	1200	2y 12h	259.40	12.50	27.71		27.71	0.000012	0.09	3509.81	460.50	0.01
LogbridgePowell	3	1200	2y 6h	231.40	12.50	27.56		27.56	0.000010	0.08	3440.07	459.89	0.01
LogbridgePowell	3	1200	2y 3h	193.40	12.50	27.28		27.28	0.000007	0.07	3310.39	458.77	0.01
LogbridgePowell	3	1200	2y 1h	123.50	12.50	26.49		26.49	0.000004	0.05	2946.53	456.61	0.00
LogbridgePowell	3	1200	5y 72h	256.80	12.50	28.06		28.06	0.000010	0.08	3670.60	461.89	0.01
LogbridgePowell	3	1200	5y 48h	277.70	12.50	28.12		28.12	0.000012	0.09	3698.99	462.13	0.01
LogbridgePowell	3	1200	5y 24h	344.40	12.50	28.43		28.43	0.000016	0.11	3840.42	463.35	0.01
LogbridgePowell	3	1200	5y 18h	451.10	12.50	28.55		28.55	0.000026	0.14	3898.30	463.83	0.01
LogbridgePowell	3	1200	5y 12h	421.50	12.50	28.40		28.40	0.000024	0.13	3825.46	463.22	0.01
LogbridgePowell	3	1200	5y 6h	366.20	12.50	28.17		28.17	0.000020	0.12	3722.12	462.33	0.01
LogbridgePowell	3	1200	5y 3h	305.40	12.50	27.85		27.85	0.000015	0.10	3571.98	461.04	0.01
LogbridgePowell	3	1200	5y 1h	197.20	12.50	26.89		26.89	0.000009	0.07	3134.54	457.24	0.01
LogbridgePowell	3	1200	10y 72h	317.70	12.50	28.35		28.35	0.000014	0.10	3802.01	463.02	0.01
LogbridgePowell	3	1200	10y 48h	346.70	12.50	28.44		28.44	0.000016	0.11	3844.84	463.39	0.01
LogbridgePowell	3	1200	10y 24h	429.20	12.50	28.76		28.77	0.000022	0.13	3986.75	464.70	0.01
LogbridgePowell	3	1200	10y 18h	547.80	12.50	28.92		28.92	0.000035	0.16	4067.68	465.31	0.01
LogbridgePowell	3	1200	10y 12h	509.60	12.50	28.70		28.71	0.000032	0.15	3968.60	464.46	0.01
LogbridgePowell	3	1200	10y 6h	438.50	12.50	28.43		28.43	0.000026	0.13	3841.16	463.36	0.01
LogbridgePowell	3	1200	10y 3h	364.30	12.50	28.08		28.08	0.000020	0.12	3680.55	461.97	0.01
LogbridgePowell	3	1200	10y 1h	234.30	12.50	27.01		27.01	0.000012	0.09	3187.12	457.70	0.01
LogbridgePowell	3	1200	20y 72h	402.10	12.50	28.73		28.73	0.000020	0.12	3981.26	464.57	0.01
LogbridgePowell	3	1200	20y 48h	442.10	12.50	28.88		28.88	0.000023	0.13	4047.98	465.14	0.01
LogbridgePowell	3	1200	20y 24h	546.60	12.50	29.24		29.24	0.000031	0.15	4215.80	466.58	0.01
LogbridgePowell	3	1200	20y 18h	678.90	12.50	29.35		29.35	0.000046	0.19	4289.54	467.04	0.02
LogbridgePowell	3	1200	20y 12h	632.00	12.50	29.12		29.12	0.000043	0.18	4160.30	466.11	0.02
LogbridgePowell	3	1200	20y 6h	540.40	12.50	28.78		28.78	0.000035	0.16	4003.88	464.76	0.01
LogbridgePowell	3	1200	20y 3h	447.10	12.50	28.36		28.36	0.000028	0.14	3809.46	463.09	0.01
LogbridgePowell	3	1200	20y 1h	286.20	12.50	27.14		27.14	0.000017	0.10	3245.72	458.21	0.01
LogbridgePowell	3	1200	50y 72h	506.10	12.50	29.19		29.19	0.000027	0.14	4194.52	466.49	0.01
LogbridgePowell	3	1200	50y 48h	567.40	12.50	29.45		29.45	0.000031	0.16	4317.74	467.45	0.01
LogbridgePowell	3	1200	50y 24h	678.50	12.50	29.82		29.82	0.000040	0.18	4486.90	468.90	0.01
LogbridgePowell	3	1200	50y 18h	863.60	12.50	29.93		29.93	0.000063	0.23	4540.39	469.38	0.02
LogbridgePowell	3	1200	50y 12h	789.70	12.50	29.59		29.60	0.000058	0.21	4383.24	468.01	0.02
LogbridgePowell	3	1200	50y 6h	683.20	12.50	29.23		29.23	0.000049	0.19	4211.78	466.55	0.02
LogbridgePowell	3	1200	50y 3h	562.60	12.50	28.74		28.75	0.000039	0.17	3987.25	464.62	0.01
LogbridgePowell	3	1200	50y 1h	360.20	12.50	27.33		27.33	0.000025	0.13	3333.72	458.97	0.01
LogbridgePowell	3	1200	100y 72h	614.50	12.50	29.59		29.59	0.000035	0.17	4361.16	468.00	0.01
LogbridgePowell	3	1200	100y 48h	679.30	12.50	29.89		29.89	0.000040	0.18	4523.41	469.21	0.01
LogbridgePowell	3	1200	100y 24h	807.20	12.50	30.24		30.24	0.000051	0.20	4684.95	470.59	0.02
LogbridgePowell	3	1200	100y 18h	1008.00	12.50	30.34		30.35	0.000076	0.25	4735.47	471.02	0.02
LogbridgePowell	3	1200	100y 12h	943.90	12.50	30.01		30.01	0.000074	0.24	4578.72	469.68	0.02
LogbridgePowell	3	1200	100y 6h	807.70	12.50	29.56		29.56	0.000062	0.22	4368.47	467.89	0.02
LogbridgePowell	3	1200	100y 3h	666.80	12.50	29.08		29.08	0.000049	0.19	4141.86	465.95	0.02
LogbridgePowell	3	1200	100y 1h	428.10	12.50	27.50		27.50	0.000034	0.15	3412.95	459.66	0.01
LogbridgePowell	3	1200	Feb2008	215.90	12.50	27.50		27.50	0.000009	0.07	3411.91	459.65	0.01
LogbridgePowell	3	800	2y 72h	156.80	12.26	27.46		27.46	0.000006	0.06	3005.27	355.00	0.01
LogbridgePowell	3	800	2y 48h	160.20	12.26	27.47		27.47	0.000006	0.06	3006.80	355.05	0.01
LogbridgePowell	3	800	2y 24h	201.20	12.26	27.70		27.70	0.000009	0.07	3091.19	356.03	0.01
LogbridgePowell	3	800	2y 18h	280.70	12.26	27.82		27.82	0.000016	0.10	3131.63	356.51	0.01
LogbridgePowell	3	800	2y 12h	259.40	12.26	27.71		27.71	0.000014	0.09	3092.12	356.04	0.01
LogbridgePowell	3	800	2y 6h	231.40	12.26	27.56		27.56	0.000012	0.08	3038.51	355.40	0.01
LogbridgePowell	3	800	2y 3h	193.40	12.26	27.28		27.28	0.000009	0.07	2938.70	354.20	0.01
LogbridgePowell	3	800	2y 1h	123.50	12.26	26.49		26.49	0.000005	0.05	2660.22	350.85	0.00
LogbridgePowell	3	800	5y 72h	256.80	12.26	28.06		28.06	0.000012	0.09	3216.74	357.52	0.01
LogbridgePowell	3	800	5y 48h	277.70	12.26	28.12		28.12	0.000014	0.09	3236.48	357.78	0.01
LogbridgePowell	3	800	5y 24h	344.40	12.26	28.42		28.42	0.000020	0.11	3347.29	359.08	0.01
LogbridgePowell	3	800	5y 18h	451.10	12.26	28.54		28.54	0.000033	0.14	3388.91	359.58	0.01
LogbridgePowell	3	800	5y 12h	421.50	12.26	28.38		28.39	0.000030	0.14	3334.37	358.92	0.01
LogbridgePowell	3	800	5y 6h	366.20	12.26	28.16		28.16	0.000024	0.12	3255.07	357.98	0.01
LogbridgePowell	3	800	5y 3h	305.40	12.26	27.84		27.84	0.000019	0.10	3139.58	356.61	0.01
LogbridgePowell	3	800	5y 1h	197.20	12.26	26.89		26.89	0.000011	0.07	2802.80	352.57	0.01
LogbridgePowell	3	800	10y 72h	317.70	12.26	28.34		28.34	0.000017	0.10	3317.87	358.73	0.01
LogbridgePowell	3	800	10y 48h	346.70	12.26	28.43		28.43	0.000020	0.11	3350.70	359.12	0.01
LogbridgePowell	3	800	10y 24h	429.20	12.26	28.75		28.76	0.000028	0.13	3467.48	360.51	0.01
LogbridgePowell	3	800	10y 18h	547.80	12.26	28.90		28.90	0.000043	0.17	3520.49	361.15	0.02
LogbridgePowell	3	800	10y 12h	509.60	12.26	28.69		28.69	0.000040	0.16	3444.05	360.24	0.01
LogbridgePowell	3	800	10y 6h	438.50	12.26	28.42		28.42	0.000032	0.14	3346.26	359.07	0.01
LogbridgePowell	3	800	10y 3h	364.30	12.26	28.07		28.07	0.000025	0.12	3222.63	357.60	0.01
LogbridgePowell	3	800	10y 1h	234.30	12.26	27.00		27.00	0.000015	0.09	2842.85	353.05	0.01

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	3	800	20y 72h	402.10	12.26	28.72		28.72	0.000025	0.13	3455.87	360.38	0.01
LogbridgePowell	3	800	20y 48h	442.10	12.26	28.86		28.87	0.000029	0.14	3507.14	360.99	0.01
LogbridgePowell	3	800	20y 24h	546.60	12.26	29.22		29.22	0.000039	0.16	3638.05	362.52	0.01
LogbridgePowell	3	800	20y 18h	678.90	12.26	29.33		29.33	0.000059	0.20	3675.28	362.96	0.02
LogbridgePowell	3	800	20y 12h	632.00	12.26	29.10		29.10	0.000055	0.19	3590.96	361.98	0.02
LogbridgePowell	3	800	20y 6h	540.40	12.26	28.76		28.77	0.000044	0.17	3470.90	360.56	0.02
LogbridgePowell	3	800	20y 3h	447.10	12.26	28.35		28.35	0.000034	0.14	3321.44	356.77	0.01
LogbridgePowell	3	800	20y 1h	286.20	12.26	27.13		27.13	0.000021	0.11	2887.25	353.59	0.01
LogbridgePowell	3	800	50y 72h	506.10	12.26	29.18		29.18	0.000034	0.15	3620.20	362.33	0.01
LogbridgePowell	3	800	50y 48h	567.40	12.26	29.44		29.44	0.000040	0.16	3715.23	363.46	0.01
LogbridgePowell	3	800	50y 24h	678.50	12.26	29.80		29.80	0.000051	0.19	3845.31	364.99	0.02
LogbridgePowell	3	800	50y 18h	863.60	12.26	29.90		29.90	0.000081	0.24	3883.09	365.44	0.02
LogbridgePowell	3	800	50y 12h	789.70	12.26	29.57		29.57	0.000074	0.23	3761.66	364.00	0.02
LogbridgePowell	3	800	50y 6h	683.20	12.26	29.20		29.21	0.000062	0.20	3630.00	362.45	0.02
LogbridgePowell	3	800	50y 3h	562.60	12.26	28.73		28.73	0.000048	0.17	3457.45	360.39	0.02
LogbridgePowell	3	800	50y 1h	360.20	12.26	27.32		27.32	0.000031	0.13	2953.86	354.39	0.01
LogbridgePowell	3	800	100y 72h	614.50	12.26	29.57		29.57	0.000045	0.18	3763.88	364.03	0.02
LogbridgePowell	3	800	100y 48h	679.30	12.26	29.87		29.88	0.000050	0.19	3873.87	365.33	0.02
LogbridgePowell	3	800	100y 24h	807.20	12.26	30.21		30.22	0.000065	0.22	3997.82	366.78	0.02
LogbridgePowell	3	800	100y 18h	1008.00	12.26	30.31		30.31	0.000099	0.27	4032.77	367.19	0.02
LogbridgePowell	3	800	100y 12h	943.90	12.26	29.98		29.98	0.000095	0.26	3911.14	365.77	0.02
LogbridgePowell	3	800	100y 6h	807.70	12.26	29.53		29.54	0.000079	0.23	3749.62	363.86	0.02
LogbridgePowell	3	800	100y 3h	666.80	12.26	29.05		29.06	0.000062	0.20	3575.73	361.80	0.02
LogbridgePowell	3	800	100y 1h	428.10	12.26	27.49		27.49	0.000042	0.15	3013.73	355.10	0.01
LogbridgePowell	3	800	Feb2008	215.90	12.26	27.50		27.50	0.000011	0.08	3016.92	355.14	0.01
LogbridgePowell	3	400	2y 72h	340.00	12.17	27.46	13.21	27.46	0.000008	0.06	5452.53	600.00	0.01
LogbridgePowell	3	400	2y 48h	351.10	12.17	27.47	13.22	27.47	0.000008	0.07	5458.56	600.00	0.01
LogbridgePowell	3	400	2y 24h	455.80	12.17	27.70	13.35	27.70	0.000013	0.08	5586.45	600.00	0.01
LogbridgePowell	3	400	2y 18h	604.90	12.17	27.81	13.53	27.81	0.000022	0.11	5862.47	600.00	0.01
LogbridgePowell	3	400	2y 12h	563.10	12.17	27.70	13.48	27.70	0.000020	0.10	5596.45	600.00	0.01
LogbridgePowell	3	400	2y 6h	526.70	12.17	27.55	13.44	27.55	0.000018	0.10	5506.48	600.00	0.01
LogbridgePowell	3	400	2y 3h	440.70	12.17	27.27	13.34	27.27	0.000014	0.09	5338.59	600.00	0.01
LogbridgePowell	3	400	2y 1h	423.40	12.17	26.48	13.31	26.48	0.000017	0.09	4884.57	600.00	0.01
LogbridgePowell	3	400	5y 72h	556.20	12.17	28.05	13.48	28.05	0.000017	0.10	5806.58	600.00	0.01
LogbridgePowell	3	400	5y 48h	607.20	12.17	28.11	13.53	28.11	0.000020	0.11	5842.43	600.00	0.01
LogbridgePowell	3	400	5y 24h	770.40	12.17	28.41	13.70	28.41	0.000030	0.13	6022.57	600.00	0.01
LogbridgePowell	3	400	5y 18h	960.20	12.17	28.52	13.89	28.52	0.000045	0.16	6088.59	600.00	0.02
LogbridgePowell	3	400	5y 12h	892.10	12.17	28.37	13.82	28.37	0.000041	0.15	5998.43	600.00	0.01
LogbridgePowell	3	400	5y 6h	833.70	12.17	28.15	13.76	28.15	0.000038	0.15	5866.57	600.00	0.01
LogbridgePowell	3	400	5y 3h	691.90	12.17	27.83	13.62	27.83	0.000029	0.13	5674.54	600.00	0.01
LogbridgePowell	3	400	5y 1h	649.10	12.17	26.88	13.57	26.88	0.000035	0.13	5104.51	600.00	0.01
LogbridgePowell	3	400	10y 72h	687.60	12.17	28.33	13.62	28.33	0.000024	0.12	5974.47	600.00	0.01
LogbridgePowell	3	400	10y 48h	756.80	12.17	28.42	13.69	28.42	0.000029	0.13	6028.42	600.00	0.01
LogbridgePowell	3	400	10y 24h	954.30	12.17	28.74	13.88	28.74	0.000042	0.16	6220.44	600.00	0.01
LogbridgePowell	3	400	10y 18h	1158.00	12.17	28.88	14.06	28.88	0.000059	0.19	6304.56	600.00	0.02
LogbridgePowell	3	400	10y 12h	1070.00	12.17	28.67	13.98	28.67	0.000053	0.18	6178.56	600.00	0.02
LogbridgePowell	3	400	10y 6h	997.40	12.17	28.40	13.92	28.40	0.000050	0.17	6016.53	600.00	0.02
LogbridgePowell	3	400	10y 3h	824.00	12.17	28.06	13.75	28.06	0.000038	0.15	5812.44	600.00	0.01
LogbridgePowell	3	400	10y 1h	760.60	12.17	26.89	13.69	26.89	0.000048	0.15	5170.53	600.00	0.02
LogbridgePowell	3	400	20y 72h	886.70	12.17	28.71	13.80	28.71	0.000035	0.15	6202.52	600.00	0.01
LogbridgePowell	3	400	20y 48h	961.70	12.17	28.85	13.89	28.85	0.000041	0.16	6286.46	600.00	0.01
LogbridgePowell	3	400	20y 24h	1207.00	12.17	29.20	14.10	29.20	0.000058	0.19	6496.59	600.00	0.02
LogbridgePowell	3	400	20y 18h	1425.00	12.17	29.30	14.28	29.30	0.000079	0.23	6556.57	600.00	0.02
LogbridgePowell	3	400	20y 12h	1316.00	12.17	29.07	14.20	29.07	0.000072	0.21	6418.50	600.00	0.02
LogbridgePowell	3	400	20y 6h	1226.00	12.17	28.74	14.12	28.74	0.000069	0.20	6220.44	600.00	0.02
LogbridgePowell	3	400	20y 3h	1011.00	12.17	28.33	13.93	28.33	0.000053	0.18	5974.47	600.00	0.02
LogbridgePowell	3	400	20y 1h	914.70	12.17	27.11	13.84	27.11	0.000064	0.18	5242.58	600.00	0.02
LogbridgePowell	3	400	50y 72h	1086.00	12.17	29.16	14.00	29.16	0.000048	0.17	6472.45	600.00	0.02
LogbridgePowell	3	400	50y 48h	1176.00	12.17	29.42	14.08	29.42	0.000052	0.19	6628.45	600.00	0.02
LogbridgePowell	3	400	50y 24h	1451.00	12.17	29.77	14.31	29.77	0.000072	0.22	6838.58	600.00	0.02
LogbridgePowell	3	400	50y 18h	1796.00	12.17	29.86	14.56	29.86	0.000107	0.27	6892.52	600.00	0.02
LogbridgePowell	3	400	50y 12h	1657.00	12.17	29.53	14.46	29.53	0.000100	0.26	6694.47	600.00	0.02
LogbridgePowell	3	400	50y 6h	1550.00	12.17	29.17	14.36	29.17	0.000097	0.25	6478.49	600.00	0.02
LogbridgePowell	3	400	50y 3h	1284.00	12.17	28.70	14.17	28.70	0.000076	0.22	6196.49	600.00	0.02
LogbridgePowell	3	400	50y 1h	1120.00	12.17	27.29	14.03	27.29	0.000091	0.22	5350.48	600.00	0.02
LogbridgePowell	3	400	100y 72h	1316.00	12.17	29.55	14.20	29.55	0.000063	0.20	6706.53	600.00	0.02
LogbridgePowell	3	400	100y 48h	1410.00	12.17	29.85	14.27	29.85	0.000066	0.21	6866.49	600.00	0.02
LogbridgePowell	3	400	100y 24h	1720.00	12.17	30.18	14.51	30.18	0.000090	0.25	7084.55	600.00	0.02
LogbridgePowell	3	400	100y 18h	2090.00	12.17	30.26	14.77	30.26	0.000130	0.31	7132.47	600.00	0.03
LogbridgePowell	3	400	100y 12h	1957.00	12.17	29.93	14.68	29.93	0.000125	0.29	6934.59	600.00	0.03
LogbridgePowell	3	400	100y 6h	1827.00	12.17	29.49	14.59	29.49	0.000123	0.29	6670.51	600.00	0.03
LogbridgePowell	3	400	100y 3h	1521.00	12.17	29.02	14.36	29.02	0.000097	0.25	6388.51	600.00	0.02
LogbridgePowell	3	400	100y 1h	1313.00	12.17	27.45	14.20	27.45	0.000118	0.25	5446.49	600.00	0.02
LogbridgePowell	3	400	Feb2008	492.20	12.17	27.49	13.40	27.49	0.000016	0.09	5470.45	600.00	0.01
Doongul	1	1200	2y 72h	119.40	22.81	29.12	25.60	29.13	0.001713	0.38	324.77	126.79	0.07
Doongul	1	1200	2y 48h	130.60	22.81	29.26	25.70	29.29	0.001703	0.39	346.37	131.64	0.07
Doongul	1	1200	2y 24h	173.30	22.81	29.80	26.00	29.81	0.001769	0.43	419.82	154.34	0.08
Doongul	1	1200	2y 18h	205.80	22.81	30.20	26.19	30.21	0.001755	0.44	486.38	180.73	0.08
Doongul	1	1200	2y 12h	216.10	22.81	30.25	26.24	30.26	0.001876	0.46	494.98	184.94	0.08
Doongul	1	1200	2y 6h	194.50	22.81	29.99	26.12	30.00	0.001863	0.45	449.52	163.58	0.08
Doongul	1	1200	2y 3h	157.90	22.81	29.61	25.91	29.62	0.001776	0.42	390.80	146.69	0.08
Doongul	1	1200	2y 1h	67.36	22.81	28.07	24.97	28.07	0.002196	0.34	199.45	108.25	0.08
Doongul	1	1200	5y 72h	201.40	22.81	30.18	26.17	30.18	0.001712	0.44	481.40	178.24	0.08
Doongul	1	1200	5y 48h	228.70	22.81	30.40	26.30	30.41	0.001904	0.48	522.78	197.95	0.08
Doongul	1	1200	5y 24h	298.60	22.81	30.93	26.63	30.94	0.002190	0.50	643.11	262.47	0.09
Doongul	1	1200	5y 18h	328.40	22.81	31.20	26.74	31.21	0.002133	0.50	720.90	306.98	0.09
Doongul	1	1200	5y 12h	347.30	22.81	31.25	26.82	31.26	0.002300	0.52	734.89	314.41	0.09
Doongul	1	1200	5y 6h	309.50	22.81	30.97	26.67	30.99	0.002274	0.51	654.80	269.51	0.09
Doongul	1	1200	5y 3h	249.80	22.81	30.54	26.41	30.55	0.002056	0.48	551.72	210.40	0.08
Doongul	1	1200	5y 1h	112.10	22.81	29.02	25.53	29.03	0.001684	0.37	312.70	127.18	0.07

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Doongul	1	1200	10y 72h	251.20	22.81	30.61	26.42	30.62	0.001969	0.47	567.98	217.00	0.08
Doongul	1	1200	10y 48h	284.80	22.81	30.65	26.57	30.66	0.002119	0.49	622.84	249.27	0.08
Doongul	1	1200	10y 24h	370.40	22.81	31.42	26.90	31.43	0.002310	0.52	790.67	343.92	0.09
Doongul	1	1200	10y 18h	395.40	22.81	31.66	26.94	31.67	0.002117	0.51	876.58	380.55	0.09
Doongul	1	1200	10y 12h	418.50	22.81	31.69	27.08	31.71	0.002300	0.53	891.84	384.88	0.09
Doongul	1	1200	10y 6h	371.80	22.81	31.38	26.90	31.39	0.002363	0.53	778.31	335.87	0.09
Doongul	1	1200	10y 3h	298.10	22.81	30.90	26.61	30.92	0.002226	0.51	636.49	256.28	0.09
Doongul	1	1200	10y 1h	135.40	22.81	28.42	25.74	28.43	0.001580	0.38	364.70	134.20	0.07
Doongul	1	1200	20y 72h	320.20	22.81	31.14	26.71	31.15	0.002141	0.50	700.67	295.97	0.09
Doongul	1	1200	20y 48h	360.10	22.81	31.39	26.86	31.40	0.002212	0.51	780.22	337.13	0.09
Doongul	1	1200	20y 24h	470.40	22.81	31.99	27.32	32.00	0.002200	0.54	1012.26	421.08	0.09
Doongul	1	1200	20y 18h	487.20	22.81	32.18	27.38	32.19	0.001962	0.52	1093.65	432.52	0.08
Doongul	1	1200	20y 12h	516.60	22.81	32.21	27.45	32.22	0.002150	0.55	1104.14	432.73	0.09
Doongul	1	1200	20y 6h	458.40	22.81	31.88	27.29	31.89	0.002312	0.55	966.00	410.41	0.09
Doongul	1	1200	20y 3h	366.50	22.81	31.36	26.86	31.38	0.002331	0.53	772.14	332.89	0.09
Doongul	1	1200	20y 1h	168.40	22.81	29.82	25.97	29.83	0.001644	0.41	422.35	154.99	0.07
Doongul	1	1200	50y 72h	408.50	22.81	31.71	27.01	31.73	0.002149	0.52	899.83	387.68	0.09
Doongul	1	1200	50y 48h	418.70	22.81	31.65	27.08	31.66	0.001992	0.50	952.18	406.00	0.08
Doongul	1	1200	50y 24h	575.90	22.81	32.58	27.56	32.59	0.001834	0.54	1264.82	440.55	0.08
Doongul	1	1200	50y 18h	620.10	22.81	32.85	27.64	32.86	0.001639	0.53	1389.85	483.39	0.08
Doongul	1	1200	50y 12h	645.10	22.81	32.82	27.70	32.84	0.001818	0.56	1377.14	473.52	0.08
Doongul	1	1200	50y 6h	577.70	22.81	32.47	27.57	32.48	0.002052	0.56	1217.85	435.07	0.09
Doongul	1	1200	50y 3h	461.80	22.81	31.92	27.30	31.93	0.002275	0.54	980.51	414.27	0.09
Doongul	1	1200	50y 1h	216.20	22.81	30.34	26.24	30.35	0.001771	0.45	511.35	192.69	0.08
Doongul	1	1200	100y 72h	494.70	22.81	32.18	27.39	32.20	0.002029	0.53	1094.33	432.53	0.09
Doongul	1	1200	100y 48h	508.20	22.81	32.37	27.43	32.38	0.001753	0.51	1175.24	434.20	0.08
Doongul	1	1200	100y 24h	684.70	22.81	33.01	27.75	33.03	0.001724	0.56	1473.09	535.19	0.08
Doongul	1	1200	100y 18h	722.40	22.81	33.26	27.84	33.29	0.001604	0.56	1522.46	574.34	0.08
Doongul	1	1200	100y 12h	758.60	22.81	33.26	27.90	33.27	0.001803	0.59	1610.36	573.76	0.08
Doongul	1	1200	100y 6h	681.90	22.81	32.92	27.75	32.93	0.001865	0.57	1422.75	508.83	0.08
Doongul	1	1200	100y 3h	548.20	22.81	32.33	27.51	32.34	0.002124	0.56	1158.20	433.85	0.09
Doongul	1	1200	100y 1h	261.20	22.81	30.72	26.46	30.73	0.001962	0.47	592.56	229.20	0.08
Doongul	1	1200	Feb2008	160.30	22.81	29.67	25.92	29.68	0.001713	0.41	400.59	149.32	0.07
Doongul	1	800	2y 72h	119.40	22.35	28.57		28.58	0.001069	0.29	422.29	176.61	0.06
Doongul	1	800	2y 48h	130.60	22.35	28.69		28.69	0.001258	0.30	443.61	197.87	0.06
Doongul	1	800	2y 24h	173.30	22.35	29.16		29.16	0.001402	0.33	548.62	242.60	0.07
Doongul	1	800	2y 18h	205.80	22.35	29.57		29.58	0.001350	0.33	658.74	291.92	0.06
Doongul	1	800	2y 12h	216.10	22.35	29.56		29.56	0.001527	0.34	654.50	290.95	0.07
Doongul	1	800	2y 6h	194.50	22.35	29.30		29.31	0.001496	0.35	585.47	253.54	0.07
Doongul	1	800	2y 3h	157.90	22.35	28.84		28.85	0.001481	0.33	498.46	227.10	0.07
Doongul	1	800	2y 1h	67.36	22.35	27.65		27.65	0.000900	0.24	298.17	112.93	0.04
Doongul	1	800	5y 72h	201.40	22.35	29.56		29.57	0.001320	0.32	655.64	291.21	0.06
Doongul	1	800	5y 48h	228.70	22.35	29.74		29.75	0.001367	0.34	708.58	303.15	0.07
Doongul	1	800	5y 24h	298.60	22.35	30.25		30.26	0.001318	0.37	872.29	342.43	0.07
Doongul	1	800	5y 18h	328.40	22.35	30.59		30.59	0.001137	0.38	992.77	370.67	0.06
Doongul	1	800	5y 12h	347.30	22.35	30.56		30.57	0.001304	0.38	982.62	368.09	0.07
Doongul	1	800	5y 6h	309.50	22.35	30.26		30.26	0.001405	0.38	874.79	343.03	0.07
Doongul	1	800	5y 3h	249.80	22.35	29.83		29.84	0.001456	0.36	737.72	309.54	0.07
Doongul	1	800	5y 1h	112.10	22.35	28.51		28.51	0.000979	0.28	411.64	169.65	0.06
Doongul	1	800	10y 72h	251.20	22.35	29.98		29.99	0.001240	0.34	784.60	319.47	0.06
Doongul	1	800	10y 48h	284.80	22.35	30.19		30.20	0.001275	0.36	852.50	337.38	0.06
Doongul	1	800	10y 24h	370.40	22.35	30.74		30.75	0.001259	0.38	1052.35	386.44	0.07
Doongul	1	800	10y 18h	395.40	22.35	31.07		31.08	0.001085	0.38	1183.62	420.74	0.06
Doongul	1	800	10y 12h	418.50	22.35	31.02		31.03	0.001263	0.39	1164.41	415.60	0.07
Doongul	1	800	10y 6h	371.80	22.35	30.67		30.68	0.001350	0.39	1024.99	379.04	0.07
Doongul	1	800	10y 3h	298.10	22.35	30.20		30.21	0.001354	0.37	855.30	338.09	0.07
Doongul	1	800	10y 1h	135.40	22.35	28.86		28.87	0.001176	0.29	481.06	219.57	0.06
Doongul	1	800	20y 72h	320.20	22.35	30.51		30.52	0.001161	0.36	964.84	384.16	0.06
Doongul	1	800	20y 48h	360.10	22.35	30.75		30.75	0.001186	0.37	1053.90	386.85	0.06
Doongul	1	800	20y 24h	470.40	22.35	31.36		31.36	0.001203	0.39	1307.01	438.29	0.07
Doongul	1	800	20y 18h	487.20	22.35	31.63		31.64	0.001026	0.37	1430.74	454.18	0.06
Doongul	1	800	20y 12h	516.60	22.35	31.58		31.59	0.001206	0.40	1406.43	452.03	0.07
Doongul	1	800	20y 6h	458.40	22.35	31.20		31.21	0.001308	0.40	1238.15	428.66	0.07
Doongul	1	800	20y 3h	366.50	22.35	30.67		30.68	0.001317	0.39	1023.32	378.58	0.07
Doongul	1	800	20y 1h	168.40	22.35	29.24		29.25	0.001202	0.31	570.23	249.00	0.06
Doongul	1	800	50y 72h	408.50	22.35	31.11		31.11	0.001126	0.37	1198.92	423.84	0.06
Doongul	1	800	50y 48h	418.70	22.35	31.30		31.30	0.001002	0.36	1281.37	434.35	0.06
Doongul	1	800	50y 24h	575.90	22.35	32.02		32.02	0.001144	0.38	1611.76	497.05	0.06
Doongul	1	800	50y 18h	620.10	22.35	32.37		32.37	0.000981	0.37	1788.43	506.97	0.06
Doongul	1	800	50y 12h	645.10	22.35	32.26		32.27	0.001155	0.39	1736.83	506.71	0.06
Doongul	1	800	50y 6h	577.70	22.35	31.84		31.85	0.001279	0.41	1525.17	476.92	0.07
Doongul	1	800	50y 3h	461.80	22.35	31.25		31.26	0.001289	0.40	1260.57	431.42	0.07
Doongul	1	800	50y 1h	216.20	22.35	29.74		29.75	0.001220	0.32	708.83	303.21	0.06
Doongul	1	800	100y 72h	494.70	22.35	31.61		31.62	0.001076	0.38	1421.20	453.34	0.06
Doongul	1	800	100y 48h	508.20	22.35	31.86		31.87	0.000984	0.35	1536.81	481.27	0.06
Doongul	1	800	100y 24h	684.70	22.35	32.49		32.50	0.001067	0.39	1853.64	507.31	0.06
Doongul	1	800	100y 18h	722.40	22.35	32.83		32.84	0.000895	0.38	2024.75	508.19	0.06
Doongul	1	800	100y 12h	758.60	22.35	32.74		32.75	0.001066	0.40	1976.72	507.94	0.06
Doongul	1	800	100y 6h	681.90	22.35	32.34		32.35	0.001217	0.40	1773.96	506.90	0.07
Doongul	1	800	100y 3h	548.20	22.35	31.70		31.71	0.001225	0.41	1463.13	457.07	0.07
Doongul	1	800	100y 1h	261.20	22.35	30.12		30.13	0.001155	0.34	829.10	331.35	0.06
Doongul	1	800	Feb2008	160.30	22.35	29.05		29.06	0.001348	0.32	523.77	235.06	0.06
Doongul	1	400	2y 72h	119.40	21.71	27.97		27.98	0.002547	0.50	249.64	84.99	0.09
Doongul	1	400	2y 48h	130.60	21.71	27.97		27.99	0.003025	0.55	250.25	85.04	0.10
Doongul	1	400	2y 24h	173.30	21.71	28.32		28.34	0.003785	0.65	280.33	87.30	0.11
Doongul	1	400	2y 18h	205.80	21.71	28.76		28.78	0.003616	0.68	319.31	90.15	0.11
Doongul	1	400	2y 12h	216.10	21.71	28.61		28.64	0.004543	0.74	305.66	89.16	0.12
Doongul	1	400	2y 6h	194.50	21.71	28.38		28.41	0.004522	0.72	285.31	87.67	0.12
Doongul	1	400	2y 3h	157.90	21.71	28.06		28.08	0.004063	0.65	257.36	85.58	0.12
Doongul	1	400	2y 1h	67.36	21.71	27.28		27.28	0.001782	0.37	182.59	80.53	0.07

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Doongul	1	400	5y 72h	201.40	21.71	28.79		28.81	0.003398	0.66	321.35	80.28	0.11
Doongul	1	400	5y 48h	228.70	21.71	28.90		28.92	0.003989	0.72	331.65	91.03	0.12
Doongul	1	400	5y 24h	298.60	21.71	29.37		29.40	0.004722	0.83	375.10	94.07	0.13
Doongul	1	400	5y 18h	328.40	21.71	29.82		29.85	0.004144	0.82	418.28	97.00	0.12
Doongul	1	400	5y 12h	347.30	21.71	29.65		29.69	0.005213	0.91	401.87	95.90	0.14
Doongul	1	400	5y 6h	309.50	21.71	29.30		29.34	0.005342	0.88	368.59	93.62	0.14
Doongul	1	400	5y 3h	249.80	21.71	28.90		28.93	0.004747	0.79	331.95	91.05	0.13
Doongul	1	400	5y 1h	112.10	21.71	27.97		27.98	0.002250	0.47	249.43	84.98	0.09
Doongul	1	400	10y 72h	251.20	21.71	29.21		29.23	0.003778	0.73	359.84	93.01	0.12
Doongul	1	400	10y 48h	284.80	21.71	29.36		29.39	0.004338	0.80	373.84	93.98	0.12
Doongul	1	400	10y 24h	370.40	21.71	29.86		29.90	0.005144	0.92	421.77	97.23	0.14
Doongul	1	400	10y 18h	395.40	21.71	30.30		30.34	0.004382	0.89	465.85	100.13	0.13
Doongul	1	400	10y 12h	418.50	21.71	30.11		30.15	0.005570	0.98	446.14	98.84	0.14
Doongul	1	400	10y 6h	371.80	21.71	29.71		29.75	0.005728	0.96	407.65	96.29	0.14
Doongul	1	400	10y 3h	298.10	21.71	29.27		29.30	0.005071	0.85	365.73	93.42	0.13
Doongul	1	400	10y 1h	135.40	21.71	28.23		28.25	0.002620	0.52	272.34	86.71	0.09
Doongul	1	400	20y 72h	320.20	21.71	29.73		29.76	0.004193	0.82	409.49	96.41	0.12
Doongul	1	400	20y 48h	360.10	21.71	29.93		29.97	0.004832	0.88	428.61	97.70	0.13
Doongul	1	400	20y 24h	470.40	21.71	30.48		30.51	0.005635	1.02	481.42	101.13	0.15
Doongul	1	400	20y 18h	487.20	21.71	30.87		30.91	0.004746	0.97	524.34	138.71	0.14
Doongul	1	400	20y 12h	516.60	21.71	30.65		30.71	0.006037	1.08	501.39	102.40	0.15
Doongul	1	400	20y 6h	458.40	21.71	30.22		30.27	0.006210	1.05	457.47	99.58	0.15
Doongul	1	400	20y 3h	366.50	21.71	29.74		29.78	0.005468	0.94	410.12	96.45	0.14
Doongul	1	400	20y 1h	168.40	21.71	28.56		28.58	0.002875	0.59	301.45	88.86	0.10
Doongul	1	400	50y 72h	408.50	21.71	30.30		30.34	0.004878	0.92	465.83	100.12	0.13
Doongul	1	400	50y 48h	418.70	21.71	30.58		30.62	0.004144	0.89	493.89	101.92	0.13
Doongul	1	400	50y 24h	575.90	21.71	31.09		31.15	0.006781	1.03	561.50	170.42	0.16
Doongul	1	400	50y 18h	620.10	21.71	31.58		31.63	0.005562	1.00	650.29	194.80	0.14
Doongul	1	400	50y 12h	645.10	21.71	31.30		31.36	0.007346	1.11	597.33	180.65	0.16
Doongul	1	400	50y 6h	577.70	21.71	30.83		30.90	0.006804	1.16	519.98	122.57	0.16
Doongul	1	400	50y 3h	481.80	21.71	30.30		30.35	0.005983	1.04	465.71	100.12	0.15
Doongul	1	400	50y 1h	216.20	21.71	29.02		29.04	0.003229	0.66	342.88	91.83	0.11
Doongul	1	400	100y 72h	494.70	21.71	30.80		30.85	0.005073	1.00	516.71	105.79	0.14
Doongul	1	400	100y 48h	508.20	21.71	31.10		31.14	0.005274	0.91	561.83	170.51	0.14
Doongul	1	400	100y 24h	684.70	21.71	31.61		31.67	0.006853	1.10	655.62	196.17	0.16
Doongul	1	400	100y 18h	722.40	21.71	32.09		32.14	0.005342	1.05	757.00	228.78	0.14
Doongul	1	400	100y 12h	758.60	21.71	31.83		31.90	0.007007	1.17	700.39	207.57	0.16
Doongul	1	400	100y 6h	681.90	21.71	31.31		31.38	0.008149	1.17	599.17	181.16	0.17
Doongul	1	400	100y 3h	548.20	21.71	30.75		30.81	0.006439	1.12	510.85	103.00	0.16
Doongul	1	400	100y 1h	261.20	21.71	29.40		29.42	0.003543	0.73	377.61	94.24	0.11
Doongul	1	400	Feb2008	160.30	21.71	28.27		28.29	0.003393	0.61	276.00	86.98	0.11

HEC-RAS Plan: Plan 13

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Tributary	2	5360	2y 72h	11.05	25.94	26.74	26.08	26.74	0.000710	0.08	132.06	246.66	0.04
Tributary	2	5360	2y 48h	18.86	25.94	26.93	26.13	26.93	0.000854	0.10	181.63	281.76	0.04
Tributary	2	5360	2y 24h	30.28	25.94	27.15	26.18	27.16	0.000974	0.12	249.76	338.91	0.05
Tributary	2	5360	2y 18h	19.48	25.94	27.00	26.13	27.00	0.000691	0.10	200.80	294.24	0.04
Tributary	2	5360	2y 12h	29.28	25.94	27.16	26.18	27.16	0.000906	0.12	250.25	339.27	0.04
Tributary	2	5360	2y 6h	32.74	25.94	27.20	26.19	27.20	0.000975	0.12	265.84	349.99	0.05
Tributary	2	5360	2y 3h	42.96	25.94	27.34	26.23	27.34	0.001044	0.14	317.59	385.35	0.05
Tributary	2	5360	2y 1h	48.44	25.94	27.42	26.25	27.42	0.001133	0.14	347.06	427.09	0.05
Tributary	2	5360	5y 72h	17.24	25.94	26.93	26.12	26.93	0.000727	0.10	180.41	280.95	0.04
Tributary	2	5360	5y 48h	29.76	25.94	27.20	26.18	27.20	0.000799	0.11	265.84	350.56	0.04
Tributary	2	5360	5y 24h	45.10	25.94	27.51	26.24	27.52	0.000817	0.11	393.34	508.87	0.04
Tributary	2	5360	5y 18h	31.43	25.94	27.64	26.18	27.65	0.000283	0.07	465.81	602.05	0.02
Tributary	2	5360	5y 12h	44.29	25.94	27.69	26.23	27.69	0.000496	0.09	492.05	629.01	0.03
Tributary	2	5360	5y 6h	48.88	25.94	27.59	26.25	27.59	0.000791	0.11	434.95	566.07	0.04
Tributary	2	5360	5y 3h	64.89	25.94	27.67	26.29	27.67	0.001116	0.13	481.86	618.67	0.05
Tributary	2	5360	5y 1h	74.57	25.94	27.74	26.33	27.74	0.001219	0.14	523.34	659.49	0.05
Tributary	2	5360	10y 72h	20.97	25.94	27.12	26.14	27.12	0.000512	0.09	239.01	325.26	0.03
Tributary	2	5360	10y 48h	35.78	25.94	27.39	26.20	27.39	0.000636	0.11	337.12	405.94	0.04
Tributary	2	5360	10y 24h	53.20	25.94	27.81	26.26	27.81	0.000487	0.09	572.87	689.49	0.03
Tributary	2	5360	10y 18h	37.95	25.94	28.04	26.21	28.04	0.000124	0.05	745.70	792.71	0.02
Tributary	2	5360	10y 12h	52.15	25.94	28.02	26.26	28.02	0.000251	0.07	726.30	781.05	0.02
Tributary	2	5360	10y 6h	57.15	25.94	27.86	26.27	27.86	0.000486	0.09	604.79	708.46	0.03
Tributary	2	5360	10y 3h	75.98	25.94	27.89	26.33	27.89	0.000784	0.12	626.17	720.92	0.04
Tributary	2	5360	10y 1h	87.36	25.94	27.86	26.36	27.86	0.001123	0.14	607.52	710.06	0.05
Tributary	2	5360	20y 72h	25.97	25.94	27.48	26.16	27.48	0.000294	0.07	374.20	477.69	0.03
Tributary	2	5360	20y 48h	43.77	25.94	27.76	26.23	27.75	0.000400	0.08	533.17	665.57	0.03
Tributary	2	5360	20y 24h	63.93	25.94	28.26	26.29	28.26	0.000207	0.07	933.65	935.02	0.02
Tributary	2	5360	20y 18h	46.72	25.94	28.57	26.24	28.57	0.000047	0.04	1231.33	985.45	0.01
Tributary	2	5360	20y 12h	62.86	25.94	28.55	26.29	28.55	0.000090	0.05	1212.72	982.65	0.01
Tributary	2	5360	20y 6h	68.43	25.94	28.21	26.31	28.21	0.000278	0.08	885.54	922.71	0.03
Tributary	2	5360	20y 3h	91.29	25.94	28.10	26.37	28.10	0.000630	0.12	787.54	824.77	0.04
Tributary	2	5360	20y 1h	104.90	25.94	27.97	26.40	27.98	0.001145	0.15	692.79	760.46	0.05
Tributary	2	5360	50y 72h	28.71	25.94	27.92	26.17	27.92	0.000102	0.04	646.23	733.99	0.02
Tributary	2	5360	50y 48h	48.28	25.94	28.23	26.25	28.23	0.000127	0.05	910.75	929.18	0.02
Tributary	2	5360	50y 24h	71.16	25.94	28.75	26.32	28.75	0.000072	0.05	1416.37	1023.77	0.01
Tributary	2	5360	50y 18h	53.34	25.94	29.24	26.26	29.24	0.000016	0.03	1942.40	1115.62	0.01
Tributary	2	5360	50y 12h	69.49	25.94	29.01	26.31	29.01	0.000041	0.04	1692.38	1075.42	0.01
Tributary	2	5360	50y 6h	76.84	25.94	28.71	26.33	28.71	0.000093	0.06	1371.29	1013.86	0.02
Tributary	2	5360	50y 3h	102.90	25.94	28.42	26.40	28.42	0.000335	0.09	1088.63	963.77	0.03
Tributary	2	5360	50y 1h	125.90	25.94	28.23	26.45	28.23	0.000878	0.14	908.40	928.07	0.04
Tributary	2	5360	100y 72h	33.99	25.94	28.37	26.20	28.37	0.000042	0.03	1037.66	955.91	0.01
Tributary	2	5360	100y 48h	56.42	25.94	28.66	26.27	28.66	0.000055	0.04	1324.25	1003.28	0.01
Tributary	2	5360	100y 24h	81.38	25.94	29.19	26.35	29.19	0.000041	0.04	1883.81	1106.85	0.01
Tributary	2	5360	100y 18h	61.35	25.94	29.72	26.29	29.72	0.000010	0.02	2488.56	1184.61	0.01
Tributary	2	5360	100y 12h	80.31	25.94	29.50	26.34	29.50	0.000023	0.04	2239.66	1155.07	0.01
Tributary	2	5360	100y 6h	86.52	25.94	29.13	26.36	29.13	0.000054	0.05	1813.00	1095.52	0.01
Tributary	2	5360	100y 3h	119.80	25.94	28.79	26.44	28.79	0.000190	0.08	1452.69	1031.30	0.02
Tributary	2	5360	100y 1h	147.30	25.94	28.42	26.49	28.42	0.000684	0.14	1090.11	964.00	0.04
Tributary	2	5360	Feb2005	33.77	25.94	27.22	26.19	27.22	0.000977	0.12	271.14	354.31	0.05
Tributary	2	4920	2y 72h	11.05	25.84	26.57		26.57	0.000243	0.05	223.94	413.41	0.02
Tributary	2	4920	2y 48h	18.86	25.84	26.69		26.69	0.000383	0.07	273.89	431.54	0.03
Tributary	2	4920	2y 24h	30.28	25.84	26.87		26.87	0.000452	0.09	364.85	458.27	0.03
Tributary	2	4920	2y 18h	19.48	25.84	26.84		26.84	0.000210	0.06	341.59	454.07	0.02
Tributary	2	4920	2y 12h	29.28	25.84	26.92		26.92	0.000355	0.08	375.86	465.02	0.03
Tributary	2	4920	2y 6h	32.74	25.84	26.92		26.92	0.000433	0.09	379.14	466.06	0.03
Tributary	2	4920	2y 3h	42.86	25.84	27.03		27.03	0.000518	0.10	428.51	481.37	0.03
Tributary	2	4920	2y 1h	48.44	25.84	27.07		27.07	0.000567	0.11	450.63	488.05	0.04
Tributary	2	4920	5y 72h	17.24	25.84	26.76		26.76	0.000236	0.06	302.97	441.36	0.02
Tributary	2	4920	5y 48h	29.76	25.84	27.01		27.01	0.000261	0.07	421.56	479.25	0.02
Tributary	2	4920	5y 24h	45.10	25.84	27.34		27.34	0.000226	0.08	587.10	527.86	0.02
Tributary	2	4920	5y 18h	31.43	25.84	27.60		27.60	0.000059	0.04	725.23	565.44	0.01
Tributary	2	4920	5y 12h	44.29	25.84	27.59		27.59	0.000119	0.06	724.03	565.12	0.02
Tributary	2	4920	5y 6h	48.88	25.84	27.43		27.43	0.000213	0.08	632.86	540.58	0.02
Tributary	2	4920	5y 3h	64.89	25.84	27.39		27.39	0.000415	0.11	611.54	534.71	0.03
Tributary	2	4920	5y 1h	74.57	25.84	27.39		27.39	0.000545	0.12	612.83	535.07	0.04
Tributary	2	4920	10y 72h	20.97	25.84	27.02		27.02	0.000125	0.05	426.15	480.65	0.02
Tributary	2	4920	10y 48h	35.78	25.84	27.26		27.26	0.000178	0.07	542.40	515.08	0.02
Tributary	2	4920	10y 24h	53.20	25.84	27.71		27.71	0.000134	0.07	789.36	583.75	0.02
Tributary	2	4920	10y 18h	37.95	25.84	28.02		28.02	0.000039	0.04	978.87	654.86	0.01
Tributary	2	4920	10y 12h	52.15	25.84	27.96		27.96	0.000080	0.06	943.79	639.95	0.01
Tributary	2	4920	10y 6h	57.15	25.84	27.75		27.75	0.000142	0.07	814.26	591.03	0.02
Tributary	2	4920	10y 3h	75.98	25.84	27.69		27.69	0.000283	0.10	779.53	580.85	0.03
Tributary	2	4920	10y 1h	87.36	25.84	27.53		27.53	0.000533	0.13	688.72	555.73	0.04
Tributary	2	4920	20y 72h	25.97	25.84	27.43		27.43	0.000061	0.04	631.10	540.10	0.01
Tributary	2	4920	20y 48h	43.77	25.84	27.67		27.67	0.000097	0.06	770.37	578.14	0.02
Tributary	2	4920	20y 24h	63.93	25.84	28.21		28.21	0.000077	0.06	1105.75	676.63	0.01
Tributary	2	4920	20y 18h	46.72	25.84	28.55		28.55	0.000021	0.03	1348.79	714.79	0.01
Tributary	2	4920	20y 12h	62.86	25.84	28.52		28.52	0.000041	0.05	1326.60	712.27	0.01
Tributary	2	4920	20y 6h	68.43	25.84	28.14		28.14	0.000099	0.06	1060.23	669.07	0.02
Tributary	2	4920	20y 3h	91.29	25.84	27.93		27.93	0.000261	0.10	921.35	629.84	0.03
Tributary	2	4920	20y 1h	104.90	25.84	27.60		27.60	0.000653	0.14	728.62	566.33	0.04
Tributary	2	4920	50y 72h	28.71	25.84	27.89		27.89	0.000027	0.03	901.90	621.66	0.01
Tributary	2	4920	50y 48h	48.28	25.84	28.20		28.20	0.000044	0.04	1103.62	676.51	0.01
Tributary	2	4920	50y 24h	71.16	25.84	28.73		28.73	0.000037	0.05	1475.60	729.33	0.01
Tributary	2	4920	50y 18h	53.34	25.84	29.24		29.24	0.000010	0.03	1856.63	771.72	0.01
Tributary	2	4920	50y 12h	69.49	25.84	29.00		29.00	0.000024	0.04	1676.75	752.22	0.01
Tributary	2	4920	50y 6h	76.84	25.84	28.68		28.68	0.000047	0.05	1439.05	725.00	0.01
Tributary	2	4920	50y 3h	102.90	25.84	28.32		28.32	0.000158	0.09	1186.83	693.54	0.02
Tributary	2	4920	50y 1h	125.90	25.84	27.95		27.95	0.000473	0.13	939.08	637.68	0.04
Tributary	2	4920	100y 72h	33.99	25.84	28.36		28.36	0.000016	0.03	1209.61	698.46	0.01
Tributary	2	4920	100y 48h	56.42	25.84	28.64		28.64	0.000027	0.04	1413.87	722.13	0.01

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Tributary	2	4920.	100y 24h	81.38	25.84	29.18		29.18	0.000026	0.05	1809.52	766.73	0.01
Tributary	2	4920.	100y 18h	61.35	25.84	29.71		29.71	0.000008	0.03	2232.78	809.50	0.01
Tributary	2	4920.	100y 12h	80.31	25.84	29.50		29.50	0.000017	0.04	2058.64	791.11	0.01
Tributary	2	4920.	100y 6h	66.52	25.84	29.11		29.11	0.000033	0.05	1757.08	761.03	0.01
Tributary	2	4920.	100y 3h	119.90	25.84	28.73		28.73	0.000107	0.08	1473.18	729.04	0.02
Tributary	2	4920.	100y 1h	147.30	25.84	28.19		28.19	0.000418	0.13	1095.53	675.13	0.03
Tributary	2	4920.	Feb2008	33.77	25.84	26.84		26.84	0.000433	0.09	387.14	468.58	0.03
Tributary	2	4823.5	2y 72h	11.05	24.12	26.53		26.53	0.000184	0.07	164.44	154.89	0.02
Tributary	2	4823.5	2y 48h	18.86	24.12	26.62		26.62	0.000376	0.11	178.07	165.91	0.03
Tributary	2	4823.5	2y 24h	30.28	24.12	26.77		26.77	0.000652	0.15	204.32	178.09	0.04
Tributary	2	4823.5	2y 18h	19.48	24.12	26.80		26.80	0.000252	0.10	209.33	179.79	0.03
Tributary	2	4823.5	2y 12h	29.28	24.12	26.84		26.84	0.000517	0.14	216.34	180.00	0.04
Tributary	2	4823.5	2y 6h	32.74	24.12	26.83		26.83	0.000657	0.16	214.05	180.00	0.04
Tributary	2	4823.5	2y 3h	42.96	24.12	26.90		26.90	0.000961	0.20	227.47	180.00	0.05
Tributary	2	4823.5	2y 1h	46.44	24.12	26.93		26.93	0.001145	0.22	232.55	180.00	0.06
Tributary	2	4823.5	5y 72h	17.24	24.12	26.71		26.71	0.000246	0.09	193.83	174.46	0.03
Tributary	2	4823.5	5y 48h	29.76	24.12	26.85		26.85	0.000406	0.13	237.00	180.00	0.03
Tributary	2	4823.5	5y 24h	45.10	24.12	27.28		27.28	0.000475	0.16	296.45	180.00	0.04
Tributary	2	4823.5	5y 18h	31.43	24.12	27.58		27.58	0.000138	0.09	349.71	180.00	0.02
Tributary	2	4823.5	5y 12h	44.29	24.12	27.56		27.58	0.000282	0.13	346.28	180.00	0.03
Tributary	2	4823.5	5y 6h	46.86	24.12	27.37		27.37	0.000475	0.16	312.23	180.00	0.04
Tributary	2	4823.5	5y 3h	64.89	24.12	27.27		27.28	0.001002	0.23	294.59	180.00	0.05
Tributary	2	4823.5	5y 1h	74.57	24.12	27.24		27.24	0.001417	0.27	288.13	180.00	0.06
Tributary	2	4823.5	10y 72h	20.97	24.12	27.00		27.00	0.000184	0.09	244.62	180.00	0.02
Tributary	2	4823.5	10y 48h	35.78	24.12	27.21		27.21	0.000343	0.13	283.57	180.00	0.03
Tributary	2	4823.5	10y 24h	53.20	24.12	27.67		27.67	0.000342	0.15	365.86	180.00	0.03
Tributary	2	4823.5	10y 18h	37.95	24.12	28.00		28.00	0.000107	0.09	426.07	180.00	0.02
Tributary	2	4823.5	10y 12h	52.15	24.12	27.94		27.94	0.000221	0.13	414.09	180.00	0.03
Tributary	2	4823.5	10y 6h	57.15	24.12	27.71		27.71	0.000371	0.16	373.01	180.00	0.03
Tributary	2	4823.5	10y 3h	75.98	24.12	27.61		27.61	0.000768	0.23	354.78	180.00	0.05
Tributary	2	4823.5	10y 1h	87.36	24.12	27.37		27.38	0.001513	0.29	312.48	180.00	0.07
Tributary	2	4823.5	20y 72h	25.97	24.12	27.41		27.41	0.000125	0.09	319.16	180.00	0.02
Tributary	2	4823.5	20y 48h	43.77	24.12	27.66		27.65	0.000239	0.13	361.80	180.00	0.03
Tributary	2	4823.5	20y 24h	63.93	24.12	28.18		28.18	0.000241	0.15	458.08	180.00	0.03
Tributary	2	4823.5	20y 18h	46.72	24.12	28.55		28.55	0.000084	0.09	523.77	180.00	0.02
Tributary	2	4823.5	20y 12h	62.86	24.12	28.51		28.51	0.000158	0.13	516.97	180.00	0.02
Tributary	2	4823.5	20y 6h	68.43	24.12	28.11		28.11	0.000304	0.16	444.67	180.00	0.03
Tributary	2	4823.5	20y 3h	91.29	24.12	27.85		27.85	0.000772	0.24	397.73	180.00	0.05
Tributary	2	4823.5	20y 1h	104.90	24.12	27.40		27.41	0.002080	0.35	317.29	180.00	0.08
Tributary	2	4823.5	50y 72h	28.71	24.12	27.89		27.89	0.000072	0.07	405.02	180.00	0.02
Tributary	2	4823.5	50y 48h	48.28	24.12	28.19		28.19	0.000136	0.11	459.40	180.00	0.02
Tributary	2	4823.5	50y 24h	71.16	24.12	28.72		28.72	0.000161	0.14	554.29	180.00	0.02
Tributary	2	4823.5	50y 18h	53.34	24.12	29.23		29.23	0.000055	0.09	647.35	180.00	0.01
Tributary	2	4823.5	50y 12h	69.49	24.12	28.89		28.89	0.000117	0.12	603.96	180.00	0.02
Tributary	2	4823.5	50y 6h	76.84	24.12	28.66		28.66	0.000199	0.15	544.63	180.00	0.03
Tributary	2	4823.5	50y 3h	102.90	24.12	28.27		28.27	0.000558	0.23	474.38	180.00	0.04
Tributary	2	4823.5	50y 1h	125.90	24.12	27.80		27.81	0.001562	0.34	390.01	180.00	0.07
Tributary	2	4823.5	100y 72h	33.99	24.12	28.35		28.35	0.000055	0.07	488.70	180.00	0.01
Tributary	2	4823.5	100y 48h	56.42	24.12	28.63		28.64	0.000111	0.11	539.69	180.00	0.02
Tributary	2	4823.5	100y 24h	81.38	24.12	29.17		29.17	0.000136	0.14	695.23	180.00	0.02
Tributary	2	4823.5	100y 18h	61.35	24.12	29.71		29.71	0.000048	0.09	733.20	180.00	0.01
Tributary	2	4823.5	100y 12h	80.31	24.12	29.49		29.49	0.000100	0.12	693.38	180.00	0.02
Tributary	2	4823.5	100y 6h	66.52	24.12	29.09		29.10	0.000172	0.15	622.36	180.00	0.02
Tributary	2	4823.5	100y 3h	119.90	24.12	28.69		28.69	0.000473	0.23	549.11	180.00	0.04
Tributary	2	4823.5	100y 1h	147.30	24.12	28.05		28.06	0.001511	0.35	434.87	180.00	0.07
Tributary	2	4823.5	Feb2008	33.77	24.12	26.84		26.84	0.000682	0.16	216.95	180.00	0.04
Tributary	2	4735.5	2y 72h	11.05	24.12	26.52	24.94	26.52	0.000171	0.07	162.18	152.99	0.02
Tributary	2	4735.5	2y 48h	18.86	24.12	26.59	25.30	26.59	0.000414	0.11	172.42	161.43	0.03
Tributary	2	4735.5	2y 24h	30.28	24.12	26.71	25.73	26.71	0.000763	0.16	193.44	174.34	0.04
Tributary	2	4735.5	2y 18h	19.48	24.12	26.78	25.32	26.78	0.000266	0.10	205.25	178.41	0.03
Tributary	2	4735.5	2y 12h	29.28	24.12	26.79	25.69	26.79	0.000581	0.15	207.74	179.25	0.04
Tributary	2	4735.5	2y 6h	32.74	24.12	26.76	25.81	26.76	0.000780	0.17	202.73	177.55	0.04
Tributary	2	4735.5	2y 3h	42.96	24.12	26.81	26.15	26.81	0.001207	0.21	210.41	180.00	0.06
Tributary	2	4735.5	2y 1h	46.44	24.12	26.81	26.31	26.82	0.001506	0.24	211.76	180.00	0.06
Tributary	2	4735.5	5y 72h	17.24	24.12	26.69	25.23	26.69	0.000261	0.09	189.97	173.13	0.03
Tributary	2	4735.5	5y 48h	29.76	24.12	26.92	25.70	26.92	0.000445	0.13	230.27	180.00	0.03
Tributary	2	4735.5	5y 24h	45.10	24.12	27.24	26.21	27.24	0.000516	0.16	286.63	180.00	0.04
Tributary	2	4735.5	5y 18h	31.43	24.12	27.57	25.77	27.57	0.000140	0.10	347.50	180.00	0.02
Tributary	2	4735.5	5y 12h	44.29	24.12	27.53	26.19	27.54	0.000294	0.14	341.72	180.00	0.03
Tributary	2	4735.5	5y 6h	46.86	24.12	27.33	26.32	27.33	0.000514	0.17	304.42	180.00	0.04
Tributary	2	4735.5	5y 3h	64.89	24.12	27.18	26.40	27.18	0.001208	0.25	277.25	180.00	0.06
Tributary	2	4735.5	5y 1h	74.57	24.12	27.09	26.40	27.10	0.001893	0.30	262.17	180.00	0.07
Tributary	2	4735.5	10y 72h	20.97	24.12	26.88	25.38	26.88	0.000191	0.09	241.65	180.00	0.02
Tributary	2	4735.5	10y 48h	35.78	24.12	27.18	25.91	27.18	0.000364	0.14	277.98	180.00	0.03
Tributary	2	4735.5	10y 24h	53.20	24.12	27.64	26.40	27.64	0.000359	0.16	360.31	180.00	0.03
Tributary	2	4735.5	10y 18h	37.95	24.12	27.99	25.99	27.99	0.000108	0.09	424.36	180.00	0.02
Tributary	2	4735.5	10y 12h	52.15	24.12	27.92	26.40	27.92	0.000228	0.13	410.53	180.00	0.03
Tributary	2	4735.5	10y 6h	57.15	24.12	27.68	26.40	27.68	0.000391	0.16	366.98	180.00	0.03
Tributary	2	4735.5	10y 3h	75.98	24.12	27.54	26.40	27.54	0.000863	0.23	341.95	180.00	0.05
Tributary	2	4735.5	10y 1h	87.36	24.12	27.22	26.40	27.22	0.002017	0.32	284.78	180.00	0.08
Tributary	2	4735.5	20y 72h	25.97	24.12	27.40	25.57	27.40	0.000128	0.09	317.15	180.00	0.02
Tributary	2	4735.5	20y 48h	43.77	24.12	27.63	26.17	27.63	0.000248	0.13	358.04	180.00	0.03
Tributary	2	4735.5	20y 24h	63.93	24.12	28.16	26.40	28.16	0.000248	0.15	454.21	180.00	0.03
Tributary	2	4735.5	20y 18h	46.72	24.12	28.54	26.26	28.54	0.000084	0.09	522.44	180.00	0.02
Tributary	2	4735.5	20y 12h	62.86	24.12	28.49	26.40	28.50	0.000160	0.13	514.45	180.00	0.02
Tributary	2	4735.5	20y 6h	68.43	24.12	28.08	26.40	28.08	0.000315	0.16	439.77	180.00	0.03
Tributary	2	4735.5	20y 3h	91.29	24.12	27.77	26.40	27.78	0.000857	0.25	384.91	180.00	0.05
Tributary	2	4735.5	20y 1h	104.90	24.12	27.17	26.40	27.18	0.003171	0.40	276.86	180.00	0.09
Tributary	2	4735.5	50y 72h	28.71	24.12	27.88	25.67	27.88	0.000073	0.08	403.87	180.00	0.02
Tributary	2	4735.5	50y 48h	48.28	24.12	28.18	26.31	28.18	0.000138	0.11	457.23	180.00	0.02

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Tributary	2	4735.5	50y 24h	71.16	24.12	28.70	26.40	28.70	0.000164	0.14	551.71	180.00	0.02
Tributary	2	4735.5	50y 18h	53.34	24.12	29.23	26.40	29.23	0.000055	0.09	646.48	180.00	0.01
Tributary	2	4735.5	50y 12h	69.49	24.12	28.98	26.40	28.98	0.000118	0.12	602.10	180.00	0.02
Tributary	2	4735.5	50y 6h	78.84	24.12	28.84	26.40	28.65	0.000203	0.15	541.45	180.00	0.03
Tributary	2	4735.5	50y 3h	102.90	24.12	28.22	26.40	28.22	0.000584	0.23	465.25	180.00	0.04
Tributary	2	4735.5	50y 1h	125.90	24.12	27.65	26.40	27.65	0.001978	0.37	362.06	180.00	0.08
Tributary	2	4735.5	100y 72h	33.99	24.12	28.35	25.85	28.35	0.000056	0.07	487.82	180.00	0.01
Tributary	2	4735.5	100y 48h	56.42	24.12	28.62	26.40	28.63	0.000112	0.11	537.93	180.00	0.02
Tributary	2	4735.5	100y 24h	81.38	24.12	29.15	26.40	29.15	0.000137	0.14	633.07	180.00	0.02
Tributary	2	4735.5	100y 18h	61.35	24.12	29.71	26.40	29.71	0.000049	0.09	732.43	180.00	0.01
Tributary	2	4735.5	100y 12h	80.31	24.12	29.48	26.40	29.48	0.000100	0.12	691.77	180.00	0.02
Tributary	2	4735.5	100y 6h	88.52	24.12	29.08	26.40	29.08	0.000174	0.15	619.52	180.00	0.02
Tributary	2	4735.5	100y 3h	119.90	24.12	28.64	26.40	28.65	0.000485	0.23	541.45	180.00	0.04
Tributary	2	4735.5	100y 1h	147.30	24.12	27.90	26.40	27.91	0.001648	0.38	408.30	180.00	0.08
Tributary	2	4735.5	Feb2008	33.77	24.12	26.78	25.84	26.78	0.000800	0.17	205.32	178.43	0.05
Tributary	2	4730		Culvert									
Tributary	2	4724.5	2y 72h	11.05	24.12	26.45	24.94	26.45	0.000210	0.07	151.76	144.86	0.02
Tributary	2	4724.5	2y 48h	18.86	24.12	26.52	25.30	26.52	0.000505	0.12	161.45	152.37	0.03
Tributary	2	4724.5	2y 24h	30.28	24.12	26.69	25.73	26.70	0.000795	0.16	190.75	173.41	0.04
Tributary	2	4724.5	2y 18h	19.48	24.12	26.77	25.32	26.77	0.000272	0.10	203.82	177.92	0.03
Tributary	2	4724.5	2y 12h	29.28	24.12	26.78	25.69	26.79	0.000590	0.15	206.66	178.89	0.04
Tributary	2	4724.5	2y 6h	32.74	24.12	26.75	25.81	26.75	0.000802	0.17	200.79	176.69	0.05
Tributary	2	4724.5	2y 3h	42.96	24.12	26.79	26.15	26.79	0.001265	0.21	206.99	179.00	0.06
Tributary	2	4724.5	2y 1h	48.44	24.12	26.79	26.31	26.79	0.001609	0.24	206.95	178.98	0.06
Tributary	2	4724.5	5y 72h	17.24	24.12	26.69	25.23	26.69	0.000261	0.09	188.94	173.13	0.03
Tributary	2	4724.5	5y 48h	29.76	24.12	26.86	25.70	26.86	0.000512	0.14	219.56	180.00	0.04
Tributary	2	4724.5	5y 24h	45.10	24.12	27.24	26.21	27.24	0.000515	0.16	288.79	180.00	0.04
Tributary	2	4724.5	5y 18h	31.43	24.12	27.57	25.77	27.57	0.000140	0.10	347.41	180.00	0.02
Tributary	2	4724.5	5y 12h	44.29	24.12	27.53	26.19	27.53	0.000296	0.14	340.84	180.00	0.03
Tributary	2	4724.5	5y 6h	48.88	24.12	27.33	26.32	27.33	0.000511	0.17	304.87	180.00	0.04
Tributary	2	4724.5	5y 3h	64.89	24.12	27.17	26.40	27.18	0.001218	0.25	276.52	180.00	0.06
Tributary	2	4724.5	5y 1h	74.57	24.12	27.08	26.40	27.09	0.001940	0.30	260.07	180.00	0.07
Tributary	2	4724.5	10y 72h	20.97	24.12	26.98	25.38	26.98	0.000192	0.09	241.22	180.00	0.02
Tributary	2	4724.5	10y 48h	35.78	24.12	27.18	25.91	27.18	0.000366	0.14	277.63	180.00	0.03
Tributary	2	4724.5	10y 24h	53.20	24.12	27.63	26.40	27.64	0.000351	0.16	359.66	180.00	0.03
Tributary	2	4724.5	10y 18h	37.95	24.12	27.99	25.99	27.99	0.000109	0.09	423.55	180.00	0.02
Tributary	2	4724.5	10y 12h	52.15	24.12	27.92	26.40	27.92	0.000228	0.13	410.34	180.00	0.03
Tributary	2	4724.5	10y 6h	57.15	24.12	27.66	26.40	27.67	0.000397	0.17	365.10	180.00	0.03
Tributary	2	4724.5	10y 3h	75.98	24.12	27.42	26.40	27.43	0.001047	0.25	321.53	180.00	0.06
Tributary	2	4724.5	10y 1h	87.36	24.12	27.21	26.40	27.22	0.002042	0.32	283.63	180.00	0.08
Tributary	2	4724.5	20y 72h	26.97	24.12	27.40	25.57	27.40	0.000127	0.09	317.33	180.00	0.02
Tributary	2	4724.5	20y 48h	43.77	24.12	27.63	26.17	27.63	0.000247	0.13	358.35	180.00	0.03
Tributary	2	4724.5	20y 24h	63.93	24.12	28.15	26.40	28.15	0.000252	0.15	451.59	180.00	0.03
Tributary	2	4724.5	20y 18h	46.72	24.12	28.54	26.26	28.54	0.000084	0.09	522.82	180.00	0.02
Tributary	2	4724.5	20y 12h	62.86	24.12	28.43	26.40	28.43	0.000173	0.13	502.34	180.00	0.02
Tributary	2	4724.5	20y 6h	66.43	24.12	28.10	26.40	28.11	0.000305	0.16	444.22	180.00	0.03
Tributary	2	4724.5	20y 3h	91.29	24.12	27.78	26.40	27.78	0.000852	0.25	385.64	180.00	0.05
Tributary	2	4724.5	20y 1h	104.90	24.12	27.39	26.40	27.39	0.002122	0.35	315.23	180.00	0.08
Tributary	2	4724.5	50y 72h	28.71	24.12	27.88	25.67	27.88	0.000073	0.08	403.74	180.00	0.02
Tributary	2	4724.5	50y 48h	48.28	24.12	28.16	26.31	28.16	0.000141	0.11	454.55	180.00	0.02
Tributary	2	4724.5	50y 24h	71.16	24.12	28.69	26.40	28.69	0.000167	0.14	549.03	180.00	0.02
Tributary	2	4724.5	50y 18h	53.34	24.12	29.21	26.40	29.21	0.000056	0.09	643.57	180.00	0.01
Tributary	2	4724.5	50y 12h	69.49	24.12	29.03	26.40	29.03	0.000112	0.12	611.36	180.00	0.02
Tributary	2	4724.5	50y 6h	78.84	24.12	28.84	26.40	28.65	0.000203	0.15	541.43	180.00	0.03
Tributary	2	4724.5	50y 3h	102.90	24.12	28.23	26.40	28.23	0.000589	0.23	466.42	180.00	0.04
Tributary	2	4724.5	50y 1h	125.90	24.12	27.63	26.40	27.64	0.002032	0.37	359.01	180.00	0.08
Tributary	2	4724.5	100y 72h	33.99	24.12	28.35	25.85	28.35	0.000055	0.07	488.19	180.00	0.01
Tributary	2	4724.5	100y 48h	56.42	24.12	28.63	26.40	28.63	0.000111	0.11	538.69	180.00	0.02
Tributary	2	4724.5	100y 24h	81.38	24.12	29.15	26.40	29.15	0.000137	0.14	633.08	180.00	0.02
Tributary	2	4724.5	100y 18h	61.35	24.12	29.69	26.40	29.69	0.000049	0.09	729.03	180.00	0.01
Tributary	2	4724.5	100y 12h	80.31	24.12	29.50	26.40	29.50	0.000099	0.12	695.47	180.00	0.02
Tributary	2	4724.5	100y 6h	88.52	24.12	29.09	26.40	29.09	0.000172	0.15	622.33	180.00	0.02
Tributary	2	4724.5	100y 3h	119.90	24.12	28.63	26.40	28.63	0.000503	0.23	538.68	180.00	0.04
Tributary	2	4724.5	100y 1h	147.30	24.12	27.88	26.40	27.89	0.001918	0.39	403.60	180.00	0.08
Tributary	2	4724.5	Feb2008	33.77	24.12	26.76	25.84	26.77	0.000826	0.17	203.02	177.65	0.05
Tributary	2	4612.5	2y 72h	11.05	24.12	26.43		26.43	0.000226	0.07	148.24	142.69	0.02
Tributary	2	4612.5	2y 48h	18.86	24.12	26.45		26.45	0.000607	0.12	152.14	145.09	0.04
Tributary	2	4612.5	2y 24h	30.28	24.12	26.56		26.59	0.001046	0.18	173.56	162.35	0.05
Tributary	2	4612.5	2y 18h	19.48	24.12	26.74		26.74	0.000295	0.10	198.17	175.98	0.03
Tributary	2	4612.5	2y 12h	29.28	24.12	26.71		26.71	0.000711	0.15	193.69	174.43	0.04
Tributary	2	4612.5	2y 6h	32.74	24.12	26.65		26.65	0.001047	0.18	183.00	169.71	0.05
Tributary	2	4612.5	2y 3h	42.96	24.12	26.61		26.61	0.002023	0.25	175.92	164.22	0.07
Tributary	2	4612.5	2y 1h	48.44	24.12	26.54		26.55	0.003094	0.29	165.40	155.69	0.09
Tributary	2	4612.5	5y 72h	17.24	24.12	26.66		26.66	0.000263	0.09	184.67	170.99	0.03
Tributary	2	4612.5	5y 48h	29.76	24.12	26.79		26.79	0.000596	0.15	208.31	179.44	0.04
Tributary	2	4612.5	5y 24h	45.10	24.12	27.18		27.18	0.000581	0.17	277.66	180.00	0.04
Tributary	2	4612.5	5y 18h	31.43	24.12	27.55		27.55	0.000144	0.10	344.51	180.00	0.02
Tributary	2	4612.5	5y 12h	44.29	24.12	27.50		27.50	0.000314	0.14	334.66	180.00	0.03
Tributary	2	4612.5	5y 6h	48.88	24.12	27.27		27.27	0.000573	0.17	293.85	180.00	0.04
Tributary	2	4612.5	5y 3h	64.89	24.12	27.01		27.02	0.001705	0.27	247.52	180.00	0.07
Tributary	2	4612.5	5y 1h	74.57	24.12	26.78		26.79	0.003868	0.37	205.91	178.63	0.10
Tributary	2	4612.5	10y 72h	20.97	24.12	26.95		26.95	0.000202	0.09	237.23	180.00	0.02
Tributary	2	4612.5	10y 48h	35.78	24.12	27.14		27.14	0.000399	0.14	268.87	180.00	0.03
Tributary	2	4612.5	10y 24h	53.20	24.12	27.59		27.59	0.000386	0.16	352.08	180.00	0.03
Tributary	2	4612.5	10y 18h	37.95	24.12	27.98		27.98	0.000111	0.10	421.42	180.00	0.02
Tributary	2	4612.5	10y 12h	52.15	24.12	27.89		27.89	0.000237	0.14	405.63	180.00	0.03
Tributary	2	4612.5	10y 6h	57.15	24.12	27.62		27.62	0.000427	0.17	356.73	180.00	0.04
Tributary	2	4612.5	10y 3h	75.98	24.12	27.29		27.29	0.001330	0.27	297.73	180.00	0.06
Tributary	2	4612.5	10y 1h	87.36	24.12	26.90		26.90	0.004007	0.40	226.85	180.00	0.10

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Tributary	2	4612.5	20y 72h	25.97	24.12	27.38		27.39	0.000131	0.09	314.70	180.00	0.02
Tributary	2	4612.5	20y 48h	43.77	24.12	27.60		27.60	0.000259	0.13	353.23	180.00	0.03
Tributary	2	4612.5	20y 24h	63.93	24.12	28.12		28.12	0.000262	0.15	446.39	180.00	0.03
Tributary	2	4612.5	20y 18h	46.72	24.12	28.53		28.53	0.000085	0.09	521.11	180.00	0.02
Tributary	2	4612.5	20y 12h	62.86	24.12	28.41		28.41	0.000177	0.13	498.80	180.00	0.02
Tributary	2	4612.5	20y 6h	68.43	24.12	28.07		28.07	0.000319	0.16	437.90	180.00	0.03
Tributary	2	4612.5	20y 3h	91.29	24.12	27.68		27.68	0.000998	0.26	367.04	180.00	0.06
Tributary	2	4612.5	20y 1h	104.90	24.12	27.07		27.07	0.003971	0.43	257.15	180.00	0.10
Tributary	2	4612.5	50y 72h	28.71	24.12	27.87		27.87	0.000074	0.08	402.26	180.00	0.02
Tributary	2	4612.5	50y 48h	48.28	24.12	28.15		28.15	0.000144	0.11	451.68	180.00	0.02
Tributary	2	4612.5	50y 24h	71.16	24.12	28.67		28.67	0.000176	0.14	545.63	180.00	0.02
Tributary	2	4612.5	50y 18h	53.34	24.12	29.21		29.21	0.000056	0.09	642.43	180.00	0.01
Tributary	2	4612.5	50y 12h	69.49	24.12	29.02		29.02	0.000113	0.12	609.08	180.00	0.02
Tributary	2	4612.5	50y 6h	76.84	24.12	28.62		28.62	0.000208	0.15	537.27	180.00	0.03
Tributary	2	4612.5	50y 3h	102.90	24.12	28.16		28.16	0.000642	0.24	453.99	180.00	0.05
Tributary	2	4612.5	50y 1h	125.90	24.12	27.34		27.35	0.003323	0.43	306.91	180.00	0.10
Tributary	2	4612.5	100y 72h	33.99	24.12	28.34		28.34	0.000056	0.07	487.06	180.00	0.01
Tributary	2	4612.5	100y 48h	56.42	24.12	28.62		28.62	0.000113	0.11	536.42	180.00	0.02
Tributary	2	4612.5	100y 24h	81.38	24.12	29.14		29.14	0.000139	0.14	630.26	180.00	0.02
Tributary	2	4612.5	100y 18h	61.35	24.12	29.68		29.68	0.000050	0.09	728.03	180.00	0.01
Tributary	2	4612.5	100y 12h	80.31	24.12	29.49		29.49	0.000100	0.12	693.47	180.00	0.02
Tributary	2	4612.5	100y 6h	88.52	24.12	29.07		29.08	0.000175	0.15	618.83	180.00	0.02
Tributary	2	4612.5	100y 3h	119.90	24.12	28.57		28.57	0.000536	0.24	528.20	180.00	0.04
Tributary	2	4612.5	100y 1h	147.30	24.12	27.62		27.63	0.002842	0.44	356.57	180.00	0.09
Tributary	2	4612.5	Feb2008	33.77	24.12	26.66		26.66	0.001086	0.19	184.53	170.88	0.05
Tributary	2	4520.	2y 72h	11.05	23.76	26.42		26.42	0.000062	0.08	302.51	463.53	0.01
Tributary	2	4520.	2y 48h	18.86	23.76	26.43		26.43	0.000173	0.09	307.11	464.66	0.02
Tributary	2	4520.	2y 24h	30.28	23.76	26.55		26.55	0.000299	0.13	364.04	480.97	0.03
Tributary	2	4520.	2y 18h	19.48	23.76	26.73		26.73	0.000072	0.07	452.32	505.85	0.01
Tributary	2	4520.	2y 12h	29.28	23.76	26.68		26.68	0.000184	0.11	430.60	499.66	0.02
Tributary	2	4520.	2y 6h	32.74	23.76	26.60		26.60	0.000291	0.13	392.01	486.69	0.03
Tributary	2	4520.	2y 3h	42.98	23.76	26.51		26.51	0.000683	0.19	345.28	475.72	0.04
Tributary	2	4520.	2y 1h	48.44	23.76	26.35		26.35	0.001500	0.27	271.91	453.42	0.06
Tributary	2	4520.	5y 72h	17.24	23.76	26.65		26.65	0.000071	0.06	413.55	494.74	0.01
Tributary	2	4520.	5y 48h	29.76	23.76	26.77		26.77	0.000147	0.10	475.20	512.29	0.02
Tributary	2	4520.	5y 24h	45.10	23.76	27.16		27.16	0.000129	0.10	686.50	576.60	0.02
Tributary	2	4520.	5y 18h	31.43	23.76	27.55		27.55	0.000026	0.05	920.85	632.91	0.01
Tributary	2	4520.	5y 12h	44.29	23.76	27.49		27.49	0.000063	0.08	862.85	623.03	0.01
Tributary	2	4520.	5y 6h	48.88	23.76	27.25		27.25	0.000124	0.10	739.37	589.33	0.02
Tributary	2	4520.	5y 3h	64.89	23.76	26.94		26.94	0.000447	0.18	585.26	541.70	0.04
Tributary	2	4520.	5y 1h	74.57	23.76	26.55		26.55	0.001805	0.32	364.47	481.09	0.07
Tributary	2	4520.	10y 72h	20.97	23.76	26.85		26.85	0.000046	0.06	568.33	542.75	0.01
Tributary	2	4520.	10y 48h	35.78	23.76	27.12		27.12	0.000088	0.08	685.49	571.46	0.02
Tributary	2	4520.	10y 24h	53.20	23.76	27.58		27.58	0.000076	0.09	942.50	638.85	0.02
Tributary	2	4520.	10y 18h	37.95	23.76	27.97		27.97	0.000020	0.05	1208.96	719.64	0.01
Tributary	2	4520.	10y 12h	52.15	23.76	27.88		27.88	0.000044	0.07	1144.26	694.89	0.01
Tributary	2	4520.	10y 6h	57.15	23.76	27.60		27.60	0.000084	0.09	956.21	643.13	0.02
Tributary	2	4520.	10y 3h	75.98	23.76	27.24		27.24	0.000304	0.16	734.98	588.26	0.03
Tributary	2	4520.	10y 1h	87.36	23.76	26.67		26.67	0.001695	0.32	424.54	497.92	0.07
Tributary	2	4520.	20y 72h	25.97	23.76	27.38		27.38	0.000027	0.05	818.36	608.09	0.01
Tributary	2	4520.	20y 48h	43.77	23.76	27.59		27.59	0.000050	0.07	949.30	640.71	0.01
Tributary	2	4520.	20y 24h	63.93	23.76	28.11		28.11	0.000052	0.08	1329.91	967.58	0.01
Tributary	2	4520.	20y 18h	46.72	23.76	28.53		28.53	0.000013	0.04	1747.16	1001.50	0.01
Tributary	2	4520.	20y 12h	62.86	23.76	28.40		28.40	0.000030	0.06	1620.65	995.57	0.01
Tributary	2	4520.	20y 6h	68.43	23.76	28.06		28.06	0.000065	0.09	1282.53	955.19	0.02
Tributary	2	4520.	20y 3h	91.29	23.76	27.64		27.64	0.000200	0.14	982.77	649.76	0.03
Tributary	2	4520.	20y 1h	104.90	23.76	26.86		26.87	0.001425	0.31	523.55	527.18	0.07
Tributary	2	4520.	50y 72h	28.71	23.76	27.87		27.87	0.000013	0.04	1134.77	692.14	0.01
Tributary	2	4520.	50y 48h	48.28	23.76	28.14		28.14	0.000028	0.06	1362.25	974.37	0.01
Tributary	2	4520.	50y 24h	71.16	23.76	28.66		28.66	0.000025	0.08	1881.99	1007.55	0.01
Tributary	2	4520.	50y 18h	53.34	23.76	29.20		29.20	0.000007	0.03	2433.54	1031.61	0.01
Tributary	2	4520.	50y 12h	69.49	23.76	29.02		29.02	0.000014	0.05	2241.78	1023.44	0.01
Tributary	2	4520.	50y 6h	76.84	23.76	28.62		28.62	0.000031	0.07	1834.15	1005.41	0.01
Tributary	2	4520.	50y 3h	102.90	23.76	28.14		28.14	0.000127	0.12	1358.91	973.67	0.02
Tributary	2	4520.	50y 1h	125.90	23.76	27.20		27.20	0.000912	0.27	711.61	582.68	0.05
Tributary	2	4520.	100y 72h	33.99	23.76	28.34		28.34	0.000010	0.04	1559.18	992.68	0.01
Tributary	2	4520.	100y 48h	56.42	23.76	28.61		28.61	0.000017	0.05	1831.86	1005.31	0.01
Tributary	2	4520.	100y 24h	81.38	23.76	29.14		29.14	0.000017	0.05	2362.22	1028.58	0.01
Tributary	2	4520.	100y 18h	61.35	23.76	29.68		29.68	0.000005	0.03	2929.24	1051.66	0.00
Tributary	2	4520.	100y 12h	80.31	23.76	29.49		29.49	0.000011	0.04	2727.10	1043.74	0.01
Tributary	2	4520.	100y 6h	88.52	23.76	29.07		29.07	0.000022	0.08	2296.03	1025.76	0.01
Tributary	2	4520.	100y 3h	119.90	23.76	28.56		28.56	0.000084	0.11	1774.63	1002.74	0.02
Tributary	2	4520.	100y 1h	147.30	23.76	27.51		27.51	0.000681	0.25	899.22	626.91	0.05
Tributary	2	4520.	Feb2008	33.77	23.76	26.61		26.61	0.000303	0.13	395.53	489.66	0.03
LPds	4	6350.	2y 72h	153.10	21.81	27.44		27.44	0.000302	0.19	791.05	220.74	0.03
LPds	4	6350.	2y 48h	154.30	21.81	27.45		27.45	0.000305	0.19	792.73	220.89	0.03
LPds	4	6350.	2y 24h	197.30	21.81	27.78		27.78	0.000383	0.23	867.81	227.97	0.04
LPds	4	6350.	2y 18h	274.10	21.81	28.31		28.31	0.000488	0.28	993.25	249.37	0.04
LPds	4	6350.	2y 12h	256.10	21.81	28.20		28.20	0.000465	0.27	965.39	243.74	0.04
LPds	4	6350.	2y 6h	225.60	21.81	27.98		27.98	0.000428	0.25	913.99	234.66	0.04
LPds	4	6350.	2y 3h	191.20	21.81	27.73		27.73	0.000374	0.22	856.54	226.60	0.04
LPds	4	6350.	2y 1h	126.20	21.81	27.20		27.20	0.000258	0.17	738.56	215.89	0.03
LPds	4	6350.	5y 72h	251.40	21.81	28.16		28.17	0.000460	0.26	957.54	242.13	0.04
LPds	4	6350.	5y 48h	268.90	21.81	28.29		28.29	0.000477	0.27	988.43	248.36	0.04
LPds	4	6350.	5y 24h	343.00	21.81	28.78		28.78	0.000537	0.31	1115.72	268.94	0.05
LPds	4	6350.	5y 18h	440.10	21.81	29.35		29.35	0.000600	0.35	1272.75	285.50	0.05
LPds	4	6350.	5y 12h	416.20	21.81	29.22		29.22	0.000584	0.34	1235.78	282.07	0.05
LPds	4	6350.	5y 6h	357.10	21.81	28.87		28.87	0.000547	0.32	1139.40	271.73	0.05
LPds	4	6350.	5y 3h	301.60	21.81	28.51		28.51	0.000506	0.29	1044.40	259.15	0.04
LPds	4	6350.	5y 1h	202.20	21.81	27.80		27.80	0.000397	0.23	871.17	228.46	0.04

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LPds	4	6350	10y 72h	311.60	21.81	28.58		28.58	0.000514	0.30	1061.47	261.57	0.04
LPds	4	6350	10y 48h	336.40	21.81	28.74		28.75	0.000531	0.31	1105.58	267.72	0.05
LPds	4	6350	10y 24h	427.90	21.81	29.29		29.30	0.000587	0.35	1257.48	284.09	0.05
LPds	4	6350	10y 18h	553.10	21.81	29.92		29.92	0.000662	0.40	1440.61	302.85	0.05
LPds	4	6350	10y 12h	503.40	21.81	29.70		29.71	0.000627	0.38	1375.20	295.96	0.05
LPds	4	6350	10y 6h	427.80	21.81	29.30		29.30	0.000585	0.35	1259.06	284.23	0.05
LPds	4	6350	10y 3h	359.40	21.81	28.87		28.88	0.000552	0.32	1140.44	271.85	0.05
LPds	4	6350	10y 1h	239.40	21.81	28.07		28.07	0.000449	0.26	934.33	237.55	0.04
LPds	4	6350	20y 72h	394.60	21.81	29.10		29.11	0.000567	0.33	1203.93	279.08	0.05
LPds	4	6350	20y 48h	429.80	21.81	29.30		29.31	0.000588	0.35	1260.53	284.37	0.05
LPds	4	6350	20y 24h	544.30	21.81	29.92		29.93	0.000638	0.39	1443.09	303.20	0.05
LPds	4	6350	20y 18h	659.10	21.81	30.46		30.46	0.000689	0.43	1663.14	448.40	0.05
LPds	4	6350	20y 12h	624.10	21.81	30.29		30.30	0.000683	0.42	1590.93	446.34	0.05
LPds	4	6350	20y 6h	527.20	21.81	29.84		29.85	0.000630	0.39	1417.36	300.34	0.05
LPds	4	6350	20y 3h	441.00	21.81	29.36		29.36	0.000598	0.35	1276.98	285.80	0.05
LPds	4	6350	20y 1h	291.30	21.81	28.42		28.42	0.000507	0.29	1020.54	254.99	0.04
LPds	4	6350	50y 72h	497.70	21.81	29.68		29.69	0.000620	0.38	1369.59	295.39	0.05
LPds	4	6350	50y 48h	543.10	21.81	29.94		29.94	0.000631	0.39	1446.44	303.67	0.05
LPds	4	6350	50y 24h	675.00	21.81	30.53		30.54	0.000687	0.43	1700.17	449.46	0.05
LPds	4	6350	50y 18h	833.60	21.81	31.16		31.17	0.000724	0.47	1982.13	458.03	0.06
LPds	4	6350	50y 12h	787.00	21.81	30.96		30.97	0.000723	0.46	1893.60	455.15	0.06
LPds	4	6350	50y 6h	667.50	21.81	30.50		30.51	0.000686	0.43	1684.89	449.02	0.05
LPds	4	6350	50y 3h	556.20	21.81	29.97		29.97	0.000651	0.40	1455.38	304.91	0.05
LPds	4	6350	50y 1h	365.90	21.81	28.87		28.88	0.000573	0.33	1140.00	271.80	0.05
LPds	4	6350	100y 72h	603.70	21.81	30.21		30.22	0.000671	0.42	1556.36	445.35	0.05
LPds	4	6350	100y 48h	651.90	21.81	30.46		30.47	0.000671	0.43	1666.43	448.50	0.05
LPds	4	6350	100y 24h	801.30	21.81	31.03		31.04	0.000719	0.47	1925.85	456.20	0.06
LPds	4	6350	100y 18h	972.20	21.81	31.64		31.65	0.000750	0.50	2206.47	466.10	0.06
LPds	4	6350	100y 12h	929.30	21.81	31.47		31.48	0.000754	0.50	2126.39	462.69	0.06
LPds	4	6350	100y 6h	790.00	21.81	30.99		31.00	0.000718	0.46	1904.28	455.50	0.06
LPds	4	6350	100y 3h	659.00	21.81	30.44		30.45	0.000694	0.43	1657.74	448.25	0.05
LPds	4	6350	100y 1h	433.70	21.81	29.26		29.27	0.000614	0.36	1249.73	283.37	0.05
LPds	4	6350	Feb2008	208.80	21.81	27.88		27.88	0.000397	0.23	869.50	231.14	0.04
LPds	4	6075.5	2y 72h	153.80	20.75	27.32		27.32	0.000655	0.26	597.88	191.02	0.05
LPds	4	6075.5	2y 48h	154.40	20.75	27.33		27.33	0.000656	0.26	599.21	191.13	0.05
LPds	4	6075.5	2y 24h	197.60	20.75	27.63		27.64	0.000814	0.30	658.17	196.28	0.05
LPds	4	6075.5	2y 18h	274.90	20.75	28.11		28.12	0.001083	0.36	756.21	209.77	0.06
LPds	4	6075.5	2y 12h	256.40	20.75	28.01		28.02	0.001018	0.35	734.82	206.90	0.06
LPds	4	6075.5	2y 6h	225.20	20.75	27.81		27.82	0.000915	0.32	694.36	201.36	0.06
LPds	4	6075.5	2y 3h	191.30	20.75	27.58		27.59	0.000794	0.29	649.18	195.38	0.05
LPds	4	6075.5	2y 1h	127.50	20.75	27.10		27.10	0.000522	0.23	556.60	178.51	0.04
LPds	4	6075.5	5y 72h	252.30	20.75	27.98		27.99	0.001009	0.35	728.55	206.06	0.06
LPds	4	6075.5	5y 48h	266.90	20.75	28.10		28.11	0.001047	0.36	753.29	209.38	0.06
LPds	4	6075.5	5y 24h	343.70	20.75	28.56		28.57	0.001229	0.40	854.18	228.71	0.07
LPds	4	6075.5	5y 18h	441.20	20.75	29.10		29.11	0.001447	0.45	986.19	258.73	0.07
LPds	4	6075.5	5y 12h	416.40	20.75	28.97		28.98	0.001420	0.44	954.20	255.33	0.07
LPds	4	6075.5	5y 6h	356.30	20.75	28.65		28.65	0.001283	0.41	873.41	234.50	0.07
LPds	4	6075.5	5y 3h	301.90	20.75	28.31		28.31	0.001127	0.38	797.43	216.50	0.06
LPds	4	6075.5	5y 1h	201.20	20.75	27.64		27.65	0.000837	0.30	660.11	196.55	0.05
LPds	4	6075.5	10y 72h	312.50	20.75	28.37		28.38	0.001156	0.39	810.79	219.09	0.06
LPds	4	6075.5	10y 48h	336.40	20.75	28.53		28.54	0.001205	0.40	846.34	227.00	0.07
LPds	4	6075.5	10y 24h	428.90	20.75	29.05		29.06	0.001419	0.44	973.65	257.41	0.07
LPds	4	6075.5	10y 18h	553.10	20.75	29.65		29.66	0.001553	0.49	1152.24	373.71	0.08
LPds	4	6075.5	10y 12h	503.80	20.75	29.44		29.45	0.001529	0.47	1077.21	290.76	0.07
LPds	4	6075.5	10y 6h	427.20	20.75	29.06		29.07	0.001400	0.44	975.64	257.62	0.07
LPds	4	6075.5	10y 3h	359.80	20.75	28.65		28.65	0.001267	0.41	873.53	234.54	0.07
LPds	4	6075.5	10y 1h	238.30	20.75	27.89		27.90	0.000985	0.34	710.00	203.52	0.06
LPds	4	6075.5	20y 72h	395.50	20.75	28.67		28.67	0.001392	0.43	926.94	252.00	0.07
LPds	4	6075.5	20y 48h	429.20	20.75	29.06		29.07	0.001409	0.44	976.60	257.72	0.07
LPds	4	6075.5	20y 24h	545.70	20.75	29.66		29.68	0.001489	0.48	1159.13	375.64	0.07
LPds	4	6075.5	20y 18h	657.30	20.75	30.18		30.20	0.001436	0.51	1375.49	458.37	0.07
LPds	4	6075.5	20y 12h	624.70	20.75	30.02		30.03	0.001471	0.51	1301.73	438.08	0.07
LPds	4	6075.5	20y 6h	527.30	20.75	29.58		29.59	0.001488	0.48	1128.28	366.91	0.07
LPds	4	6075.5	20y 3h	441.50	20.75	29.11		29.12	0.001435	0.45	989.48	259.08	0.07
LPds	4	6075.5	20y 1h	290.10	20.75	28.22		28.22	0.001116	0.37	777.70	213.22	0.06
LPds	4	6075.5	50y 72h	498.50	20.75	29.42		29.43	0.001511	0.47	1072.55	287.84	0.07
LPds	4	6075.5	50y 48h	542.60	20.75	29.68		29.69	0.001454	0.48	1164.97	377.27	0.07
LPds	4	6075.5	50y 24h	676.50	20.75	30.27		30.28	0.001424	0.51	1413.92	461.55	0.07
LPds	4	6075.5	50y 18h	835.50	20.75	30.89		30.90	0.001361	0.54	1707.01	485.92	0.07
LPds	4	6075.5	50y 12h	787.60	20.75	30.69		30.70	0.001397	0.54	1612.24	477.84	0.07
LPds	4	6075.5	50y 6h	668.70	20.75	30.23		30.25	0.001429	0.51	1396.18	460.25	0.07
LPds	4	6075.5	50y 3h	556.80	20.75	29.70		29.71	0.001505	0.49	1172.92	379.48	0.07
LPds	4	6075.5	50y 1h	364.40	20.75	28.84		28.85	0.001326	0.42	871.39	233.81	0.07
LPds	4	6075.5	100y 72h	604.50	20.75	29.95		29.96	0.001459	0.50	1270.17	418.79	0.07
LPds	4	6075.5	100y 48h	651.50	20.75	30.20		30.21	0.001394	0.50	1362.17	458.93	0.07
LPds	4	6075.5	100y 24h	803.30	20.75	30.76		30.78	0.001377	0.54	1647.37	480.85	0.07
LPds	4	6075.5	100y 18h	972.70	20.75	31.37		31.39	0.001313	0.57	1947.55	506.46	0.07
LPds	4	6075.5	100y 12h	930.10	20.75	31.19		31.21	0.001356	0.56	1858.57	498.56	0.07
LPds	4	6075.5	100y 6h	791.30	20.75	30.71		30.73	0.001384	0.54	1624.44	478.89	0.07
LPds	4	6075.5	100y 3h	659.80	20.75	30.17		30.18	0.001455	0.51	1368.29	457.78	0.07
LPds	4	6075.5	100y 1h	432.30	20.75	29.01		29.02	0.001486	0.45	963.83	256.38	0.07
LRds	4	6075.5	Feb2008	208.50	20.75	27.72		27.72	0.000844	0.31	675.76	198.77	0.05
LPds	4	5927	2y 72h	153.80	23.00	27.05	25.24	27.06	0.012440	0.56	278.82	270.73	0.17
LPds	4	5927	2y 48h	154.40	23.00	27.05	25.25	27.07	0.012242	0.56	280.80	271.04	0.17
LPds	4	5927	2y 24h	197.60	23.00	27.33	25.63	27.34	0.009373	0.56	356.67	282.23	0.15
LPds	4	5927	2y 18h	274.90	23.00	27.77	26.42	27.79	0.006909	0.58	485.62	300.30	0.14
LPds	4	5927	2y 12h	256.40	23.00	27.66	26.40	27.69	0.007201	0.58	458.14	296.54	0.14
LPds	4	5927	2y 6h	225.20	23.00	27.49	25.87	27.51	0.008232	0.57	403.89	288.97	0.15
LPds	4	5927	2y 3h	191.30	23.00	27.28	25.58	27.30	0.009817	0.57	344.36	280.44	0.16
LPds	4	5927	2y 1h	127.50	23.00	26.86	24.99	26.88	0.016167	0.56	228.97	263.11	0.19

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LPds	4	5927.	5y 72h	252.30	23.00	27.65	26.43	27.56	0.007428	0.58	448.91	295.27	0.14
LPds	4	5927.	5y 48h	269.90	23.00	27.77	26.42	27.76	0.006633	0.57	485.09	300.23	0.14
LPds	4	5927.	5y 24h	343.70	23.00	28.23	26.51	28.24	0.004927	0.57	627.19	319.63	0.12
LPds	4	5927.	5y 18h	441.20	23.00	28.76	26.62	28.77	0.003882	0.59	805.34	356.27	0.11
LPds	4	5927.	5y 12h	416.40	23.00	28.63	26.61	28.65	0.004076	0.58	760.73	345.93	0.11
LPds	4	5927.	5y 6h	356.30	23.00	28.31	26.52	28.33	0.004657	0.57	654.26	323.28	0.12
LPds	4	5927.	5y 3h	301.90	23.00	27.97	26.46	27.99	0.005753	0.57	547.60	308.61	0.13
LPds	4	5927.	5y 1h	201.20	23.00	27.33	25.67	27.35	0.009702	0.57	356.84	282.25	0.16
LPds	4	5927.	10y 72h	312.50	23.00	28.03	26.47	28.05	0.005570	0.57	566.00	311.20	0.13
LPds	4	5927.	10y 48h	336.40	23.00	28.20	26.50	28.21	0.004950	0.57	617.44	318.30	0.12
LPds	4	5927.	10y 24h	428.90	23.00	28.71	26.60	28.73	0.003865	0.58	789.47	352.63	0.11
LPds	4	5927.	10y 18h	553.10	23.00	29.32	26.73	29.34	0.003140	0.60	1019.25	404.35	0.10
LPds	4	5927.	10y 12h	503.80	23.00	29.11	26.68	29.13	0.003308	0.59	935.56	384.89	0.11
LPds	4	5927.	10y 6h	427.20	23.00	28.73	26.60	28.74	0.003786	0.57	794.41	353.77	0.11
LPds	4	5927.	10y 3h	359.80	23.00	28.30	26.53	28.32	0.004803	0.58	651.85	322.97	0.12
LPds	4	5927.	10y 1h	238.30	23.00	27.56	25.97	27.58	0.007941	0.58	423.60	291.74	0.15
LPds	4	5927.	20y 72h	395.50	23.00	28.52	26.57	28.54	0.004253	0.58	723.59	337.07	0.12
LPds	4	5927.	20y 48h	429.20	23.00	28.73	26.60	28.74	0.003814	0.58	794.90	353.88	0.11
LPds	4	5927.	20y 24h	545.70	23.00	29.36	26.72	29.37	0.002942	0.58	1033.47	410.68	0.10
LPds	4	5927.	20y 18h	657.30	23.00	29.91	26.82	29.92	0.002396	0.58	1282.39	474.82	0.09
LPds	4	5927.	20y 12h	624.70	23.00	29.73	26.80	29.75	0.002607	0.59	1199.30	459.48	0.10
LPds	4	5927.	20y 6h	527.30	23.00	29.27	26.70	29.29	0.003021	0.58	998.55	397.99	0.10
LPds	4	5927.	20y 3h	441.50	23.00	28.77	26.61	28.79	0.003804	0.58	811.46	357.67	0.11
LPds	4	5927.	20y 1h	290.10	23.00	27.87	26.44	27.89	0.006344	0.58	516.90	304.52	0.13
LPds	4	5927.	50y 72h	498.50	23.00	29.10	26.67	29.11	0.003286	0.58	930.60	383.84	0.10
LPds	4	5927.	50y 48h	542.60	23.00	29.36	26.72	29.40	0.002832	0.57	1043.66	415.17	0.10
LPds	4	5927.	50y 24h	676.50	23.00	30.00	26.84	30.01	0.002338	0.58	1324.39	480.37	0.09
LPds	4	5927.	50y 18h	835.50	23.00	30.64	27.01	30.66	0.001940	0.58	1641.24	497.33	0.09
LPds	4	5927.	50y 12h	787.60	23.00	30.44	26.94	30.45	0.002076	0.59	1536.25	491.88	0.09
LPds	4	5927.	50y 6h	668.70	23.00	29.96	26.86	29.98	0.002351	0.58	1307.45	479.35	0.09
LPds	4	5927.	50y 3h	556.80	23.00	29.39	26.73	29.41	0.002951	0.59	1047.65	416.90	0.10
LPds	4	5927.	50y 1h	364.40	23.00	28.28	26.56	28.30	0.005105	0.59	644.26	321.94	0.12
LPds	4	5927.	100y 72h	604.50	23.00	29.66	26.78	29.67	0.002645	0.58	1165.35	453.06	0.10
LPds	4	5927.	100y 48h	651.50	23.00	29.93	26.82	29.95	0.002297	0.57	1293.85	476.90	0.09
LPds	4	5927.	100y 24h	803.30	23.00	30.52	26.98	30.53	0.002010	0.58	1577.25	493.95	0.09
LPds	4	5927.	100y 18h	972.70	23.00	31.15	27.10	31.16	0.001736	0.59	1894.25	510.46	0.08
LPds	4	5927.	100y 12h	930.10	23.00	30.96	27.06	30.97	0.001845	0.59	1798.88	505.55	0.08
LPds	4	5927.	100y 6h	791.30	23.00	30.47	26.95	30.48	0.002041	0.58	1552.43	492.63	0.09
LPds	4	5927.	100y 3h	659.80	23.00	29.89	26.82	29.90	0.002471	0.59	1271.61	472.86	0.09
LPds	4	5927.	100y 1h	432.30	23.00	28.65	26.60	28.67	0.004271	0.60	768.16	347.67	0.12
LPds	4	5927.	Feb2008	208.50	23.00	27.42	25.73	27.43	0.008403	0.56	382.04	285.87	0.16
LPds	4	5920.		Mult Open									
LPds	4	5913.	2y 72h	153.80	23.00	27.04		27.05	0.011058	0.54	288.71	270.47	0.16
LPds	4	5913.	2y 48h	154.40	23.00	27.04		27.06	0.010936	0.54	290.42	270.73	0.16
LPds	4	5913.	2y 24h	197.60	23.00	27.32		27.34	0.008486	0.55	367.23	282.05	0.15
LPds	4	5913.	2y 18h	274.90	23.00	27.78		27.78	0.006423	0.57	495.92	300.07	0.13
LPds	4	5913.	2y 12h	256.40	23.00	27.66		27.68	0.006837	0.57	464.67	295.80	0.14
LPds	4	5913.	2y 6h	225.20	23.00	27.48		27.50	0.007627	0.56	412.84	286.57	0.14
LPds	4	5913.	2y 3h	191.30	23.00	27.27		27.28	0.009068	0.55	352.31	279.89	0.15
LPds	4	5913.	2y 1h	127.50	23.00	26.84		26.86	0.014502	0.54	238.48	262.48	0.18
LPds	4	5913.	5y 72h	252.30	23.00	27.63		27.65	0.006967	0.57	456.68	294.69	0.14
LPds	4	5913.	5y 48h	268.90	23.00	27.76		27.77	0.006250	0.56	493.24	299.71	0.13
LPds	4	5913.	5y 24h	343.70	23.00	28.21		28.23	0.004697	0.57	635.40	319.11	0.12
LPds	4	5913.	5y 18h	441.20	23.00	28.75		28.76	0.003728	0.58	813.95	355.48	0.11
LPds	4	5913.	5y 12h	416.40	23.00	28.63		28.64	0.003883	0.57	770.92	345.49	0.11
LPds	4	5913.	5y 6h	356.30	23.00	28.30		28.32	0.004430	0.56	663.37	322.90	0.12
LPds	4	5913.	5y 3h	301.90	23.00	27.96		27.98	0.005423	0.56	556.74	308.22	0.13
LPds	4	5913.	5y 1h	201.20	23.00	27.32		27.34	0.008773	0.56	367.56	282.10	0.15
LPds	4	5913.	10y 72h	312.50	23.00	28.03		28.04	0.005245	0.56	575.68	310.87	0.12
LPds	4	5913.	10y 48h	336.40	23.00	28.18		28.20	0.004745	0.56	624.37	317.60	0.12
LPds	4	5913.	10y 24h	428.90	23.00	28.70		28.72	0.003721	0.57	798.57	351.94	0.11
LPds	4	5913.	10y 18h	553.10	23.00	29.31		29.33	0.003040	0.59	1027.35	402.58	0.10
LPds	4	5913.	10y 12h	503.80	23.00	29.10		29.12	0.003194	0.58	943.90	384.10	0.10
LPds	4	5913.	10y 6h	427.20	23.00	28.71		28.73	0.003650	0.57	801.76	352.68	0.11
LPds	4	5913.	10y 3h	359.80	23.00	28.30		28.31	0.004541	0.57	662.20	322.74	0.12
LPds	4	5913.	10y 1h	238.30	23.00	27.55		27.56	0.007434	0.57	431.58	291.20	0.14
LPds	4	5913.	20y 72h	395.50	23.00	28.51		28.53	0.004064	0.57	732.48	336.31	0.11
LPds	4	5913.	20y 48h	429.20	23.00	28.72		28.74	0.003650	0.57	804.37	353.28	0.11
LPds	4	5913.	20y 24h	545.70	23.00	29.34		29.36	0.002867	0.58	1039.23	407.89	0.10
LPds	4	5913.	20y 18h	657.30	23.00	29.90		29.91	0.002337	0.58	1288.74	473.96	0.09
LPds	4	5913.	20y 12h	624.70	23.00	29.72		29.74	0.002536	0.58	1206.81	458.62	0.10
LPds	4	5913.	20y 6h	527.30	23.00	29.26		29.28	0.002922	0.57	1006.83	397.22	0.10
LPds	4	5913.	20y 3h	441.50	23.00	28.76		28.78	0.003667	0.58	819.02	356.64	0.11
LPds	4	5913.	20y 1h	290.10	23.00	27.86		27.88	0.005994	0.57	525.12	304.01	0.13
LPds	4	5913.	50y 72h	498.50	23.00	29.09		29.10	0.003175	0.58	938.81	383.02	0.10
LPds	4	5913.	50y 48h	542.60	23.00	29.37		29.39	0.002743	0.57	1051.82	413.45	0.10
LPds	4	5913.	50y 24h	676.50	23.00	29.99		30.00	0.002282	0.58	1331.63	480.11	0.09
LPds	4	5913.	50y 18h	835.50	23.00	30.63		30.65	0.001906	0.58	1647.54	497.03	0.09
LPds	4	5913.	50y 12h	787.60	23.00	30.43		30.44	0.002035	0.58	1544.62	491.60	0.09
LPds	4	5913.	50y 6h	668.70	23.00	29.95		29.97	0.002294	0.58	1314.71	478.49	0.09
LPds	4	5913.	50y 3h	556.80	23.00	29.38		29.40	0.002866	0.58	1054.84	414.78	0.10
LPds	4	5913.	50y 1h	364.40	23.00	28.27		28.29	0.004825	0.58	654.57	321.71	0.12
LPds	4	5913.	100y 72h	604.50	23.00	29.65		29.66	0.002573	0.58	1172.81	452.18	0.10
LPds	4	5913.	100y 48h	651.50	23.00	29.92		29.93	0.002251	0.57	1298.91	475.63	0.09
LPds	4	5913.	100y 24h	803.30	23.00	30.50		30.52	0.001972	0.58	1583.79	493.66	0.09
LPds	4	5913.	100y 18h	972.70	23.00	31.14		31.15	0.001709	0.59	1900.93	510.19	0.08
LPds	4	5913.	100y 12h	930.10	23.00	30.95		30.96	0.001815	0.59	1805.10	505.25	0.08
LPds	4	5913.	100y 6h	791.30	23.00	30.45		30.47	0.002002	0.58	1559.09	492.35	0.09
LPds	4	5913.	100y 3h	659.80	23.00	29.88		29.89	0.002410	0.58	1278.91	471.99	0.09
LPds	4	5913.	100y 1h	432.30	23.00	28.64		28.66	0.004095	0.59	776.73	346.85	0.11

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LPds	4	5913	Feb2008	208.50	23.00	27.40		27.42	0.007801	0.55	390.25	285.36	0.14
LPds	4	5724	2y 72h	153.80	20.75	26.54		26.54	0.001182	0.33	463.03	156.77	0.06
LPds	4	5724	2y 48h	154.40	20.75	26.54		26.55	0.001184	0.33	464.14	157.00	0.06
LPds	4	5724	2y 24h	197.60	20.75	26.72		26.73	0.001666	0.40	492.71	162.70	0.07
LPds	4	5724	2y 18h	274.90	20.75	27.06		27.07	0.002439	0.50	549.77	173.54	0.09
LPds	4	5724	2y 12h	256.40	20.75	26.97		26.98	0.002287	0.48	533.83	170.57	0.09
LPds	4	5724	2y 6h	225.20	20.75	26.83		26.84	0.001978	0.44	510.39	166.13	0.08
LPds	4	5724	2y 3h	191.30	20.75	26.66		26.67	0.001641	0.40	483.25	160.83	0.07
LPds	4	5724	2y 1h	127.50	20.75	26.41		26.41	0.000906	0.29	443.50	152.75	0.05
LPds	4	5724	5y 72h	252.30	20.75	26.94		26.95	0.002267	0.48	528.97	169.65	0.09
LPds	4	5724	5y 48h	268.90	20.75	27.08		27.09	0.002330	0.49	552.92	175.85	0.09
LPds	4	5724	5y 24h	343.70	20.75	27.57		27.58	0.002598	0.53	646.36	195.14	0.09
LPds	4	5724	5y 18h	441.20	20.75	28.15		28.17	0.002715	0.58	763.80	210.87	0.10
LPds	4	5724	5y 12h	416.40	20.75	28.02		28.04	0.002660	0.56	737.34	207.24	0.10
LPds	4	5724	5y 6h	356.30	20.75	27.68		27.70	0.002542	0.53	668.03	197.68	0.09
LPds	4	5724	5y 3h	301.90	20.75	27.27		27.29	0.002635	0.51	589.25	190.27	0.09
LPds	4	5724	5y 1h	201.20	20.75	26.68		26.70	0.001775	0.41	487.45	161.66	0.08
LPds	4	5724	10y 72h	312.50	20.75	27.34		27.36	0.002643	0.52	602.48	191.41	0.09
LPds	4	5724	10y 48h	336.40	20.75	27.54		27.55	0.002559	0.53	640.10	194.61	0.09
LPds	4	5724	10y 24h	428.90	20.75	28.12		28.13	0.002629	0.57	757.01	209.88	0.10
LPds	4	5724	10y 18h	553.10	20.75	28.75		28.77	0.002891	0.62	897.93	242.67	0.10
LPds	4	5724	10y 12h	503.80	20.75	28.56		28.58	0.002669	0.59	850.57	227.93	0.10
LPds	4	5724	10y 6h	427.20	20.75	28.14		28.16	0.002565	0.56	761.63	210.51	0.09
LPds	4	5724	10y 3h	359.80	20.75	27.66		27.67	0.002644	0.54	663.18	196.99	0.09
LPds	4	5724	10y 1h	238.30	20.75	26.86		26.87	0.002157	0.46	515.74	167.15	0.08
LPds	4	5724	20y 72h	395.50	20.75	27.90		27.92	0.002634	0.56	712.38	203.85	0.09
LPds	4	5724	20y 48h	429.20	20.75	28.15		28.16	0.002578	0.56	762.86	210.71	0.09
LPds	4	5724	20y 24h	545.70	20.75	28.81		28.83	0.002727	0.60	913.01	247.56	0.10
LPds	4	5724	20y 18h	657.30	20.75	29.43		29.45	0.002624	0.62	1073.92	288.97	0.10
LPds	4	5724	20y 12h	624.70	20.75	29.23		29.25	0.002625	0.62	1020.52	262.33	0.10
LPds	4	5724	20y 6h	527.30	20.75	28.73		28.75	0.002649	0.59	894.11	241.41	0.10
LPds	4	5724	20y 3h	441.50	20.75	28.17		28.19	0.002667	0.57	768.98	211.75	0.10
LPds	4	5724	20y 1h	290.10	20.75	27.13		27.15	0.002691	0.52	562.70	182.83	0.09
LPds	4	5724	50y 72h	498.50	20.75	28.54		28.56	0.002625	0.59	849.03	227.58	0.10
LPds	4	5724	50y 48h	542.60	20.75	28.86		28.88	0.002624	0.59	926.05	251.72	0.10
LPds	4	5724	50y 24h	676.50	20.75	29.52		29.54	0.002566	0.62	1107.70	360.87	0.10
LPds	4	5724	50y 18h	835.50	20.75	30.24		30.26	0.002221	0.64	1400.87	460.48	0.09
LPds	4	5724	50y 12h	787.60	20.75	30.00		30.03	0.002367	0.64	1295.06	433.82	0.09
LPds	4	5724	50y 6h	668.70	20.75	29.49		29.51	0.002588	0.62	1093.90	356.93	0.10
LPds	4	5724	50y 3h	556.80	20.75	28.84		28.86	0.002794	0.61	920.79	250.05	0.10
LPds	4	5724	50y 1h	364.40	20.75	27.58		27.60	0.002889	0.56	648.48	195.32	0.10
LPds	4	5724	100y 72h	604.50	20.75	29.15		29.17	0.002602	0.61	1000.82	260.27	0.10
LPds	4	5724	100y 48h	651.50	20.75	29.47		29.48	0.002499	0.61	1086.61	354.78	0.10
LPds	4	5724	100y 24h	803.30	20.75	30.10		30.12	0.002298	0.64	1335.76	455.06	0.09
LPds	4	5724	100y 18h	972.70	20.75	30.78		30.80	0.001990	0.65	1656.80	481.66	0.09
LPds	4	5724	100y 12h	930.10	20.75	30.57		30.59	0.002131	0.65	1555.49	473.08	0.09
LPds	4	5724	100y 6h	791.30	20.75	30.04		30.06	0.002323	0.64	1310.89	443.85	0.09
LPds	4	5724	100y 3h	659.80	20.75	29.39		29.41	0.002661	0.62	1064.31	280.96	0.10
LPds	4	5724	100y 1h	432.30	20.75	27.99		28.01	0.002941	0.59	730.42	206.31	0.10
LPds	4	5724	Feb2008	208.50	20.75	26.80		26.81	0.001735	0.41	505.83	185.25	0.08
LogbridgePowell	1	12490	2y 72h	30.70	33.79	35.16	34.13	35.16	0.001074	0.16	191.37	183.49	0.05
LogbridgePowell	1	12490	2y 48h	48.59	33.79	35.53	34.20	35.53	0.001026	0.19	261.81	194.90	0.05
LogbridgePowell	1	12490	2y 24h	70.44	33.79	35.89	34.26	35.89	0.001041	0.21	333.01	205.98	0.05
LogbridgePowell	1	12490	2y 18h	48.10	33.79	35.52	34.20	35.52	0.001026	0.18	260.02	194.62	0.05
LogbridgePowell	1	12490	2y 12h	73.42	33.79	35.93	34.27	35.93	0.001044	0.21	342.01	207.38	0.05
LogbridgePowell	1	12490	2y 6h	74.20	33.79	35.94	34.27	35.94	0.001045	0.22	344.35	207.74	0.05
LogbridgePowell	1	12490	2y 3h	63.07	33.79	36.06	34.30	36.07	0.001055	0.22	370.21	211.70	0.05
LogbridgePowell	1	12490	2y 1h	80.50	33.79	36.03	34.29	36.03	0.001052	0.22	362.84	210.58	0.05
LogbridgePowell	1	12490	5y 72h	49.62	33.79	35.55	34.20	35.55	0.001026	0.19	265.43	195.48	0.05
LogbridgePowell	1	12490	5y 48h	79.95	33.79	36.02	34.29	36.02	0.001051	0.22	361.24	210.34	0.05
LogbridgePowell	1	12490	5y 24h	112.10	33.79	36.42	34.37	36.42	0.001095	0.25	447.26	222.91	0.06
LogbridgePowell	1	12490	5y 18h	72.61	33.79	35.92	34.27	35.92	0.001043	0.21	339.56	207.00	0.05
LogbridgePowell	1	12490	5y 12h	109.00	33.79	36.38	34.36	36.39	0.001092	0.25	439.40	221.82	0.06
LogbridgePowell	1	12490	5y 6h	110.70	33.79	36.40	34.37	36.41	0.001094	0.25	443.74	222.42	0.06
LogbridgePowell	1	12490	5y 3h	125.70	33.79	36.57	34.40	36.57	0.001115	0.26	480.53	227.50	0.06
LogbridgePowell	1	12490	5y 1h	126.10	33.79	36.56	34.40	36.56	0.001114	0.26	479.09	227.31	0.06
LogbridgePowell	1	12490	10y 72h	60.74	33.79	35.74	34.23	35.74	0.001031	0.20	302.75	201.26	0.05
LogbridgePowell	1	12490	10y 48h	97.71	33.79	36.25	34.34	36.25	0.001074	0.24	410.43	217.72	0.06
LogbridgePowell	1	12490	10y 24h	135.70	33.79	36.67	34.42	36.67	0.001128	0.27	504.10	230.70	0.06
LogbridgePowell	1	12490	10y 18h	86.19	33.79	36.10	34.30	36.11	0.001059	0.23	378.03	213.04	0.05
LogbridgePowell	1	12490	10y 12h	127.80	33.79	36.59	34.41	36.59	0.001118	0.26	485.55	228.19	0.06
LogbridgePowell	1	12490	10y 6h	129.70	33.79	36.61	34.41	36.61	0.001120	0.26	490.05	228.80	0.06
LogbridgePowell	1	12490	10y 3h	147.70	33.79	36.79	34.45	36.79	0.001144	0.28	531.51	234.23	0.06
LogbridgePowell	1	12490	10y 1h	147.50	33.79	36.78	34.45	36.79	0.001143	0.28	531.06	234.18	0.06
LogbridgePowell	1	12490	20y 72h	75.48	33.79	35.96	34.27	35.96	0.001046	0.22	348.15	208.33	0.05
LogbridgePowell	1	12490	20y 48h	121.70	33.79	36.52	34.39	36.53	0.001110	0.26	470.86	226.18	0.06
LogbridgePowell	1	12490	20y 24h	167.50	33.79	36.97	34.49	36.97	0.001168	0.29	574.73	239.50	0.06
LogbridgePowell	1	12490	20y 18h	106.30	33.79	36.35	34.35	36.35	0.001088	0.25	432.54	220.85	0.06
LogbridgePowell	1	12490	20y 12h	153.30	33.79	36.84	34.46	36.84	0.001150	0.28	543.98	235.77	0.06
LogbridgePowell	1	12490	20y 6h	155.80	33.79	36.86	34.46	36.87	0.001154	0.28	549.45	236.45	0.06
LogbridgePowell	1	12490	20y 3h	178.30	33.79	37.06	34.51	37.07	0.001180	0.30	597.40	242.19	0.06
LogbridgePowell	1	12490	20y 1h	178.30	33.79	37.06	34.51	37.07	0.001180	0.30	597.40	242.19	0.06
LogbridgePowell	1	12490	50y 72h	87.06	33.79	36.12	34.30	36.12	0.001060	0.23	381.46	213.41	0.05
LogbridgePowell	1	12490	50y 48h	134.60	33.79	36.66	34.42	36.66	0.001127	0.27	501.54	230.35	0.06
LogbridgePowell	1	12490	50y 24h	188.60	33.79	37.15	34.53	37.15	0.001192	0.30	618.56	244.67	0.06
LogbridgePowell	1	12490	50y 18h	127.00	33.79	36.58	34.41	36.58	0.001117	0.26	483.65	227.93	0.06
LogbridgePowell	1	12490	50y 12h	173.90	33.79	37.02	34.50	37.03	0.001175	0.30	586.23	241.11	0.06
LogbridgePowell	1	12490	50y 6h	183.00	33.79	37.10	34.52	37.11	0.001186	0.30	607.11	243.33	0.06
LogbridgePowell	1	12490	50y 3h	211.00	33.79	37.33	34.57	37.33	0.001216	0.32	663.06	249.67	0.06
LogbridgePowell	1	12490	50y 1h	219.70	33.79	37.40	34.59	37.40	0.001225	0.32	679.85	251.47	0.06

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	1	12490	100y 72h	103.20	33.79	36.32	34.35	36.32	0.001081	0.24	424.93	219.78	0.06
LogbridgePowell	1	12490	100y 48h	159.40	33.79	36.90	34.48	36.90	0.001158	0.29	557.31	237.41	0.06
LogbridgePowell	1	12490	100y 24h	219.90	33.79	37.40	34.59	37.40	0.001225	0.32	680.22	251.51	0.06
LogbridgePowell	1	12490	100y 18h	147.00	33.79	36.78	34.45	36.78	0.001143	0.28	529.95	234.04	0.06
LogbridgePowell	1	12490	100y 12h	201.10	33.79	37.25	34.55	37.26	0.001206	0.31	643.62	247.56	0.06
LogbridgePowell	1	12490	100y 6h	211.80	33.79	37.34	34.57	37.34	0.001217	0.32	664.59	249.83	0.06
LogbridgePowell	1	12490	100y 3h	246.30	33.79	37.59	34.63	37.60	0.001250	0.34	728.73	256.75	0.06
LogbridgePowell	1	12490	100y 1h	258.40	33.79	37.68	34.65	37.68	0.001261	0.34	751.73	259.05	0.06
LogbridgePowell	1	12490	Feb2008	73.27	33.79	35.93	34.27	35.93	0.001044	0.21	341.58	207.32	0.05
LogbridgePowell	1	11770	2y 72h	30.70	31.80	34.74		34.74	0.000357	0.11	281.92	211.79	0.03
LogbridgePowell	1	11770	2y 48h	46.59	31.80	35.07		35.07	0.000434	0.14	358.43	250.24	0.03
LogbridgePowell	1	11770	2y 24h	70.44	31.80	35.39		35.39	0.000494	0.16	442.54	284.16	0.04
LogbridgePowell	1	11770	2y 18h	46.10	31.80	35.06		35.06	0.000433	0.14	356.24	249.25	0.03
LogbridgePowell	1	11770	2y 12h	73.42	31.80	35.43		35.43	0.000500	0.17	453.90	287.99	0.04
LogbridgePowell	1	11770	2y 6h	74.20	31.80	35.44		35.44	0.000501	0.17	456.87	288.99	0.04
LogbridgePowell	1	11770	2y 3h	83.07	31.80	35.55		35.55	0.000518	0.18	488.77	299.58	0.04
LogbridgePowell	1	11770	2y 1h	80.50	31.80	35.52		35.52	0.000513	0.18	480.32	296.64	0.04
LogbridgePowell	1	11770	5y 72h	49.62	31.80	35.09		35.09	0.000437	0.14	362.51	252.07	0.03
LogbridgePowell	1	11770	5y 48h	79.95	31.80	35.51		35.51	0.000512	0.17	478.26	296.00	0.04
LogbridgePowell	1	11770	5y 24h	112.10	31.80	35.87		35.87	0.000564	0.20	589.91	326.81	0.04
LogbridgePowell	1	11770	5y 18h	72.61	31.80	35.42		35.42	0.000499	0.17	450.78	286.94	0.04
LogbridgePowell	1	11770	5y 12h	109.00	31.80	35.84		35.84	0.000560	0.20	579.35	324.18	0.04
LogbridgePowell	1	11770	5y 6h	110.70	31.80	35.85		35.86	0.000562	0.20	585.24	325.65	0.04
LogbridgePowell	1	11770	5y 3h	125.70	31.80	36.00		36.00	0.000580	0.21	634.53	336.88	0.04
LogbridgePowell	1	11770	5y 1h	125.10	31.80	36.00		36.00	0.000580	0.21	632.58	336.45	0.04
LogbridgePowell	1	11770	10y 72h	60.74	31.80	35.26		35.26	0.000470	0.15	406.06	270.38	0.04
LogbridgePowell	1	11770	10y 48h	97.71	31.80	35.72		35.72	0.000541	0.19	541.90	314.58	0.04
LogbridgePowell	1	11770	10y 24h	135.70	31.80	36.10		36.10	0.000590	0.22	666.62	342.85	0.04
LogbridgePowell	1	11770	10y 18h	86.19	31.80	35.59		35.59	0.000523	0.18	501.13	303.08	0.04
LogbridgePowell	1	11770	10y 12h	127.80	31.80	36.02		36.02	0.000583	0.22	641.34	338.37	0.04
LogbridgePowell	1	11770	10y 6h	129.70	31.80	36.04		36.04	0.000584	0.22	647.49	339.46	0.04
LogbridgePowell	1	11770	10y 3h	147.70	31.80	36.21		36.21	0.000601	0.23	704.27	349.42	0.04
LogbridgePowell	1	11770	10y 1h	147.50	31.80	36.20		36.21	0.000601	0.23	703.65	349.31	0.04
LogbridgePowell	1	11770	20y 72h	75.48	31.80	35.45		35.45	0.000504	0.17	461.62	290.56	0.04
LogbridgePowell	1	11770	20y 48h	121.70	31.80	35.96		35.97	0.000576	0.21	621.42	333.96	0.04
LogbridgePowell	1	11770	20y 24h	167.50	31.80	36.37		36.38	0.000616	0.24	764.08	357.31	0.05
LogbridgePowell	1	11770	20y 18h	106.30	31.80	35.81		35.81	0.000556	0.20	570.32	321.91	0.04
LogbridgePowell	1	11770	20y 12h	153.30	31.80	36.25		36.26	0.000605	0.23	721.46	351.96	0.04
LogbridgePowell	1	11770	20y 6h	155.80	31.80	36.28		36.28	0.000607	0.23	729.06	352.92	0.04
LogbridgePowell	1	11770	20y 3h	178.30	31.80	36.46		36.46	0.000623	0.25	795.36	361.24	0.05
LogbridgePowell	1	11770	20y 1h	178.30	31.80	36.46		36.46	0.000623	0.25	795.36	361.24	0.05
LogbridgePowell	1	11770	50y 72h	87.06	31.80	35.60		35.60	0.000524	0.18	504.28	304.04	0.04
LogbridgePowell	1	11770	50y 48h	134.60	31.80	36.09		36.09	0.000589	0.22	663.13	342.23	0.04
LogbridgePowell	1	11770	50y 24h	186.60	31.80	36.54		36.55	0.000630	0.25	824.63	364.90	0.05
LogbridgePowell	1	11770	50y 18h	127.00	31.80	36.02		36.02	0.000582	0.22	638.80	337.83	0.04
LogbridgePowell	1	11770	50y 12h	173.90	31.80	36.43		36.43	0.000620	0.25	782.69	359.65	0.05
LogbridgePowell	1	11770	50y 6h	183.00	31.80	36.50		36.50	0.000627	0.25	808.77	362.92	0.05
LogbridgePowell	1	11770	50y 3h	211.00	31.80	36.71		36.71	0.000643	0.27	886.42	371.79	0.05
LogbridgePowell	1	11770	50y 1h	219.70	31.80	36.77		36.78	0.000648	0.27	909.79	374.29	0.05
LogbridgePowell	1	11770	100y 72h	103.20	31.80	35.78		35.78	0.000548	0.20	561.21	319.61	0.04
LogbridgePowell	1	11770	100y 48h	159.40	31.80	36.31		36.31	0.000610	0.24	739.93	354.29	0.04
LogbridgePowell	1	11770	100y 24h	219.90	31.80	36.77		36.78	0.000648	0.27	910.25	374.33	0.05
LogbridgePowell	1	11770	100y 18h	147.00	31.80	36.20		36.20	0.000600	0.23	702.17	349.06	0.04
LogbridgePowell	1	11770	100y 12h	201.10	31.80	36.64		36.64	0.000638	0.26	859.34	368.87	0.05
LogbridgePowell	1	11770	100y 6h	211.80	31.80	36.72		36.72	0.000644	0.27	888.50	372.02	0.05
LogbridgePowell	1	11770	100y 3h	246.30	31.80	36.96		36.96	0.000661	0.28	979.25	381.57	0.05
LogbridgePowell	1	11770	100y 1h	258.40	31.80	37.04		37.04	0.000666	0.29	1009.84	384.73	0.05
LogbridgePowell	1	11770	Feb2008	73.27	31.80	35.42		35.43	0.000500	0.17	453.40	287.82	0.04
LogbridgePowell	1	11340	2y 72h	30.70	31.86	34.45		34.46	0.001634	0.25	173.78	260.95	0.07
LogbridgePowell	1	11340	2y 48h	46.59	31.86	34.76		34.76	0.001464	0.27	254.52	271.46	0.06
LogbridgePowell	1	11340	2y 24h	70.44	31.86	35.05		35.05	0.001386	0.29	336.01	281.64	0.06
LogbridgePowell	1	11340	2y 18h	46.10	31.86	34.75		34.75	0.001475	0.27	252.02	271.15	0.06
LogbridgePowell	1	11340	2y 12h	73.42	31.86	35.09		35.09	0.001374	0.29	346.74	282.96	0.06
LogbridgePowell	1	11340	2y 6h	74.20	31.86	35.10		35.10	0.001370	0.29	349.58	283.30	0.06
LogbridgePowell	1	11340	2y 3h	83.07	31.86	35.21		35.21	0.001342	0.30	380.37	287.16	0.06
LogbridgePowell	1	11340	2y 1h	80.50	31.86	35.18		35.18	0.001349	0.29	371.60	286.02	0.06
LogbridgePowell	1	11340	5y 72h	49.62	31.86	34.77		34.77	0.001460	0.27	258.57	271.98	0.06
LogbridgePowell	1	11340	5y 48h	79.95	31.86	35.17		35.17	0.001351	0.29	369.65	285.76	0.06
LogbridgePowell	1	11340	5y 24h	112.10	31.86	35.51		35.52	0.001317	0.32	469.35	298.51	0.06
LogbridgePowell	1	11340	5y 18h	72.61	31.86	35.08		35.08	0.001380	0.29	343.66	282.58	0.06
LogbridgePowell	1	11340	5y 12h	109.00	31.86	35.48		35.48	0.001322	0.32	459.86	297.34	0.06
LogbridgePowell	1	11340	5y 6h	110.70	31.86	35.50		35.50	0.001318	0.32	465.27	298.00	0.06
LogbridgePowell	1	11340	5y 3h	125.70	31.86	35.64		35.64	0.001308	0.33	508.24	303.18	0.06
LogbridgePowell	1	11340	5y 1h	125.10	31.86	35.64		35.64	0.001309	0.33	506.54	302.97	0.06
LogbridgePowell	1	11340	10y 72h	60.74	31.86	34.93		34.93	0.001413	0.28	301.39	277.36	0.06
LogbridgePowell	1	11340	10y 48h	97.71	31.86	35.37		35.37	0.001316	0.31	427.67	293.25	0.06
LogbridgePowell	1	11340	10y 24h	135.70	31.86	35.73		35.74	0.001302	0.34	536.11	306.57	0.06
LogbridgePowell	1	11340	10y 18h	86.19	31.86	35.24		35.25	0.001334	0.30	390.86	288.52	0.06
LogbridgePowell	1	11340	10y 12h	127.80	31.86	35.66		35.66	0.001307	0.33	514.15	303.90	0.06
LogbridgePowell	1	11340	10y 6h	129.70	31.86	35.68		35.68	0.001305	0.33	519.51	304.56	0.06
LogbridgePowell	1	11340	10y 3h	147.70	31.86	35.84		35.84	0.001295	0.34	568.73	310.49	0.06
LogbridgePowell	1	11340	10y 1h	147.50	31.86	35.84		35.84	0.001295	0.34	568.20	310.43	0.06
LogbridgePowell	1	11340	20y 72h	75.48	31.86	35.12		35.12	0.001367	0.29	354.02	283.84	0.06
LogbridgePowell	1	11340	20y 48h	121.70	31.86	35.60		35.61	0.001312	0.33	496.77	301.78	0.06
LogbridgePowell	1	11340	20y 24h	167.50	31.86	36.00		36.01	0.001287	0.36	620.39	316.52	0.07
LogbridgePowell	1	11340	20y 18h	106.30	31.86	35.45		35.46	0.001323	0.31	452.06	296.34	0.06
LogbridgePowell	1	11340	20y 12h	153.30	31.86	35.89		35.89	0.001292	0.35	583.55	312.26	0.07
LogbridgePowell	1	11340	20y 6h	155.80	31.86	35.91		35.91	0.001291	0.35	590.12	313.04	0.07
LogbridgePowell	1	11340	20y 3h	178.30	31.86	36.09		36.09	0.001283	0.36	647.32	319.01	0.07
LogbridgePowell	1	11340	20y 1h	178.30	31.86	36.09		36.09	0.001283	0.36	647.32	319.01	0.07

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	1	11340	50y 72h	87.06	31.86	35.25		35.26	0.001332	0.30	393.74	288.90	0.06
LogbridgePowell	1	11340	50y 48h	134.60	31.86	35.72		35.73	0.001303	0.33	533.07	306.20	0.06
LogbridgePowell	1	11340	50y 24h	188.60	31.86	36.17		36.17	0.001280	0.37	672.49	321.33	0.07
LogbridgePowell	1	11340	50y 18h	127.00	31.86	35.65		35.66	0.001307	0.33	511.97	303.64	0.06
LogbridgePowell	1	11340	50y 12h	173.90	31.86	36.05		36.06	0.001265	0.36	636.42	318.00	0.07
LogbridgePowell	1	11340	50y 6h	183.00	31.86	36.12		36.13	0.001282	0.36	658.85	320.07	0.07
LogbridgePowell	1	11340	50y 3h	211.00	31.86	36.33		36.34	0.001275	0.38	725.50	326.15	0.07
LogbridgePowell	1	11340	50y 1h	219.70	31.86	36.39		36.40	0.001274	0.38	745.51	327.95	0.07
LogbridgePowell	1	11340	100y 72h	103.20	31.86	35.43		35.43	0.001305	0.31	445.16	295.47	0.06
LogbridgePowell	1	11340	100y 48h	159.40	31.86	35.94		35.94	0.001290	0.35	599.51	314.15	0.07
LogbridgePowell	1	11340	100y 24h	219.90	31.86	36.39		36.40	0.001274	0.38	745.88	327.98	0.07
LogbridgePowell	1	11340	100y 18h	147.00	31.86	35.83		35.84	0.001294	0.34	566.96	310.28	0.06
LogbridgePowell	1	11340	100y 12h	201.10	31.86	36.26		36.26	0.001276	0.37	702.24	324.04	0.07
LogbridgePowell	1	11340	100y 6h	211.80	31.86	36.34		36.34	0.001276	0.38	727.24	326.30	0.07
LogbridgePowell	1	11340	100y 3h	246.30	31.86	36.57		36.58	0.001272	0.40	804.90	333.24	0.07
LogbridgePowell	1	11340	100y 1h	258.40	31.86	36.65		36.65	0.001271	0.40	830.97	335.33	0.07
LogbridgePowell	1	11340	Feb2008	73.27	31.86	35.09		35.09	0.001374	0.29	346.32	282.91	0.06
LogbridgePowell	1	10280	2y 72h	30.70	29.73	32.86		32.86	0.001383	0.21	148.70	141.42	0.06
LogbridgePowell	1	10280	2y 48h	48.59	29.73	33.25		33.25	0.001377	0.25	212.28	189.46	0.06
LogbridgePowell	1	10280	2y 24h	70.44	29.73	33.63		33.63	0.001296	0.28	293.84	236.66	0.06
LogbridgePowell	1	10280	2y 18h	48.10	29.73	33.25		33.25	0.001351	0.25	212.16	189.38	0.06
LogbridgePowell	1	10280	2y 12h	73.42	29.73	33.67		33.67	0.001308	0.28	302.84	241.16	0.06
LogbridgePowell	1	10280	2y 6h	74.20	29.73	33.67		33.68	0.001315	0.28	304.81	242.15	0.06
LogbridgePowell	1	10280	2y 3h	83.07	29.73	33.78		33.78	0.001350	0.30	330.91	254.65	0.06
LogbridgePowell	1	10280	2y 1h	80.50	29.73	33.75		33.75	0.001341	0.29	323.34	251.10	0.06
LogbridgePowell	1	10280	5y 72h	49.62	29.73	33.27		33.27	0.001366	0.25	216.50	192.24	0.06
LogbridgePowell	1	10280	5y 48h	79.95	29.73	33.74		33.75	0.001336	0.29	322.04	250.48	0.06
LogbridgePowell	1	10280	5y 24h	112.10	29.73	34.13		34.13	0.001309	0.32	425.92	284.60	0.06
LogbridgePowell	1	10280	5y 18h	72.61	29.73	33.66		33.66	0.001295	0.28	301.38	240.46	0.06
LogbridgePowell	1	10280	5y 12h	109.00	29.73	34.10		34.11	0.001293	0.32	418.89	283.80	0.06
LogbridgePowell	1	10280	5y 6h	110.70	29.73	34.11		34.12	0.001316	0.32	421.11	284.05	0.06
LogbridgePowell	1	10280	5y 3h	125.70	29.73	34.27		34.28	0.001280	0.33	468.10	289.36	0.06
LogbridgePowell	1	10280	5y 1h	125.10	29.73	34.27		34.27	0.001280	0.33	466.43	289.17	0.06
LogbridgePowell	1	10280	10y 72h	60.74	29.73	33.47		33.47	0.001337	0.27	257.10	216.86	0.06
LogbridgePowell	1	10280	10y 48h	97.71	29.73	33.96		33.97	0.001341	0.31	376.06	275.97	0.06
LogbridgePowell	1	10280	10y 24h	135.70	29.73	34.37		34.37	0.001275	0.34	495.84	292.20	0.06
LogbridgePowell	1	10280	10y 18h	86.19	29.73	33.82		33.82	0.001359	0.30	340.12	258.87	0.06
LogbridgePowell	1	10280	10y 12h	127.80	29.73	34.30		34.30	0.001278	0.33	474.13	290.03	0.06
LogbridgePowell	1	10280	10y 6h	129.70	29.73	34.31		34.32	0.001282	0.33	478.86	290.55	0.06
LogbridgePowell	1	10280	10y 3h	147.70	29.73	34.47		34.47	0.001299	0.35	523.97	295.06	0.07
LogbridgePowell	1	10280	10y 1h	147.50	29.73	34.46		34.47	0.001300	0.35	523.31	295.01	0.07
LogbridgePowell	1	10280	20y 72h	75.48	29.73	33.69		33.70	0.001315	0.28	309.18	244.30	0.06
LogbridgePowell	1	10280	20y 48h	121.70	29.73	34.24		34.24	0.001272	0.33	458.00	288.23	0.06
LogbridgePowell	1	10280	20y 24h	167.50	29.73	34.63		34.64	0.001302	0.36	573.37	300.17	0.07
LogbridgePowell	1	10280	20y 18h	106.30	29.73	34.08		34.08	0.001293	0.31	411.04	282.80	0.06
LogbridgePowell	1	10280	20y 12h	153.30	29.73	34.52		34.52	0.001294	0.35	539.11	296.65	0.07
LogbridgePowell	1	10280	20y 6h	155.80	29.73	34.54		34.54	0.001298	0.35	544.91	297.25	0.07
LogbridgePowell	1	10280	20y 3h	178.30	29.73	34.70		34.71	0.001328	0.37	595.31	302.42	0.07
LogbridgePowell	1	10280	20y 1h	178.30	29.73	34.70		34.71	0.001328	0.37	595.31	302.42	0.07
LogbridgePowell	1	10280	50y 72h	87.06	29.73	33.83		33.83	0.001361	0.30	342.79	260.08	0.06
LogbridgePowell	1	10280	50y 48h	134.60	29.73	34.36		34.37	0.001275	0.34	493.02	291.93	0.06
LogbridgePowell	1	10280	50y 24h	188.60	29.73	34.78		34.79	0.001328	0.38	619.69	304.91	0.07
LogbridgePowell	1	10280	50y 18h	127.00	29.73	34.28		34.29	0.001288	0.33	470.59	289.64	0.06
LogbridgePowell	1	10280	50y 12h	173.90	29.73	34.67		34.68	0.001327	0.37	584.97	301.36	0.07
LogbridgePowell	1	10280	50y 6h	183.00	29.73	34.74		34.74	0.001333	0.37	605.66	303.48	0.07
LogbridgePowell	1	10280	50y 3h	211.00	29.73	34.94		34.95	0.001350	0.39	667.10	309.70	0.07
LogbridgePowell	1	10280	50y 1h	219.70	29.73	35.00		35.00	0.001358	0.40	685.10	311.50	0.07
LogbridgePowell	1	10280	100y 72h	103.20	29.73	34.01		34.01	0.001380	0.32	391.79	280.69	0.07
LogbridgePowell	1	10280	100y 48h	159.40	29.73	34.57		34.57	0.001295	0.35	554.32	298.22	0.07
LogbridgePowell	1	10280	100y 24h	219.90	29.73	34.99		35.00	0.001366	0.40	683.97	311.39	0.07
LogbridgePowell	1	10280	100y 18h	147.00	29.73	34.45		34.45	0.001324	0.35	518.67	294.52	0.07
LogbridgePowell	1	10280	100y 12h	201.10	29.73	34.86		34.87	0.001357	0.39	643.68	307.35	0.07
LogbridgePowell	1	10280	100y 6h	211.80	29.73	34.94		34.94	0.001364	0.39	666.54	309.65	0.07
LogbridgePowell	1	10280	100y 3h	246.30	29.73	35.17		35.17	0.001381	0.41	738.06	316.67	0.07
LogbridgePowell	1	10280	100y 1h	258.40	29.73	35.24		35.24	0.001394	0.42	760.88	318.85	0.07
LogbridgePowell	1	10280	Feb2008	73.27	29.73	33.66		33.67	0.001314	0.28	301.76	240.65	0.06
LogbridgePowell	1	9140	2y 72h	30.70	28.06	31.11		31.12	0.001706	0.22	137.71	113.87	0.06
LogbridgePowell	1	9140	2y 48h	48.59	28.06	31.64		31.64	0.001449	0.24	204.50	135.95	0.06
LogbridgePowell	1	9140	2y 24h	70.44	28.06	32.11		32.11	0.001366	0.26	279.34	291.94	0.06
LogbridgePowell	1	9140	2y 18h	48.10	28.06	31.59		31.59	0.001562	0.24	197.77	134.31	0.06
LogbridgePowell	1	9140	2y 12h	73.42	28.06	32.16		32.16	0.001334	0.26	294.76	296.52	0.06
LogbridgePowell	1	9140	2y 6h	74.20	28.06	32.18		32.19	0.001303	0.26	301.27	298.44	0.06
LogbridgePowell	1	9140	2y 3h	83.07	28.06	32.34		32.35	0.001182	0.26	349.84	312.17	0.06
LogbridgePowell	1	9140	2y 1h	80.50	28.06	32.30		32.30	0.001211	0.26	336.46	308.44	0.06
LogbridgePowell	1	9140	5y 72h	49.62	28.06	31.65		31.66	0.001475	0.24	206.25	136.38	0.06
LogbridgePowell	1	9140	5y 48h	79.95	28.06	32.28		32.29	0.001232	0.26	331.74	307.12	0.06
LogbridgePowell	1	9140	5y 24h	112.10	28.06	32.51		32.51	0.001563	0.32	401.94	326.29	0.07
LogbridgePowell	1	9140	5y 18h	72.61	28.06	32.13		32.14	0.001362	0.26	286.45	294.06	0.06
LogbridgePowell	1	9140	5y 12h	109.00	28.06	32.44		32.45	0.001676	0.32	380.89	320.68	0.07
LogbridgePowell	1	9140	5y 6h	110.70	28.06	32.51		32.52	0.001503	0.31	404.35	326.93	0.07
LogbridgePowell	1	9140	5y 3h	125.70	28.06	32.53		32.54	0.001872	0.35	410.24	326.48	0.07
LogbridgePowell	1	9140	5y 1h	125.10	28.06	32.53		32.53	0.001863	0.35	409.42	326.26	0.07
LogbridgePowell	1	9140	10y 72h	60.74	28.06	31.91		31.91	0.001422	0.25	241.56	146.20	0.06
LogbridgePowell	1	9140	10y 48h	97.71	28.06	32.45		32.46	0.001318	0.29	384.52	321.66	0.06
LogbridgePowell	1	9140	10y 24h	135.70	28.06	32.80		32.80	0.001932	0.36	431.63	334.05	0.08
LogbridgePowell	1	9140	10y 18h	86.19	28.06	32.39		32.39	0.001154	0.26	365.33	316.44	0.06
LogbridgePowell	1	9140	10y 12h	127.80	28.06	32.53		32.54	0.001927	0.35	411.04	326.69	0.08
LogbridgePowell	1	9140	10y 6h	129.70	28.06	32.55		32.56	0.001910	0.35	417.67	330.42	0.08
LogbridgePowell	1	9140	10y 3h	147.70	28.06	32.69		32.70	0.001916	0.37	464.35	342.39	0.08
LogbridgePowell	1	9140	10y 1h	147.50	28.06	32.69		32.70	0.001904	0.37	464.99	342.55	0.08

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	1	9140	20y 72h	75.48	28.06	32.20		32.20	0.001311	0.26	305.36	299.62	0.06
LogbridgePowell	1	9140	20y 48h	121.70	28.06	32.48		32.49	0.001927	0.35	394.34	324.28	0.08
LogbridgePowell	1	9140	20y 24h	167.50	28.06	32.82		32.83	0.001950	0.39	510.23	353.79	0.08
LogbridgePowell	1	9140	20y 18h	106.30	28.06	32.42		32.43	0.001648	0.32	375.48	319.21	0.07
LogbridgePowell	1	9140	20y 12h	153.30	28.06	32.73		32.73	0.001934	0.37	476.74	345.49	0.08
LogbridgePowell	1	9140	20y 6h	155.80	28.06	32.75		32.75	0.001926	0.38	483.87	347.28	0.08
LogbridgePowell	1	9140	20y 3h	178.30	28.06	32.90		32.91	0.001935	0.39	537.90	360.72	0.08
LogbridgePowell	1	9140	20y 1h	178.30	28.06	32.90		32.91	0.001934	0.39	538.09	360.77	0.08
LogbridgePowell	1	9140	50y 72h	87.06	28.06	32.40		32.41	0.001151	0.26	369.01	317.45	0.06
LogbridgePowell	1	9140	50y 48h	134.60	28.06	32.59		32.59	0.001930	0.36	428.90	333.34	0.08
LogbridgePowell	1	9140	50y 24h	188.60	28.06	32.96		32.97	0.001963	0.40	559.20	365.89	0.08
LogbridgePowell	1	9140	50y 18h	127.00	28.06	32.57		32.57	0.001790	0.34	421.69	331.47	0.07
LogbridgePowell	1	9140	50y 12h	173.90	28.06	32.88		32.89	0.001900	0.39	531.23	359.05	0.08
LogbridgePowell	1	9140	50y 6h	183.00	28.06	32.93		32.94	0.001933	0.40	549.36	363.56	0.08
LogbridgePowell	1	9140	50y 3h	211.00	28.06	33.10		33.11	0.001958	0.42	611.30	378.67	0.08
LogbridgePowell	1	9140	50y 1h	219.70	28.06	33.15		33.15	0.001970	0.42	629.32	382.85	0.08
LogbridgePowell	1	9140	100y 72h	103.20	28.06	32.57		32.57	0.001172	0.28	423.08	331.83	0.06
LogbridgePowell	1	9140	100y 48h	159.40	28.06	32.77		32.78	0.001938	0.38	491.58	349.19	0.08
LogbridgePowell	1	9140	100y 24h	219.90	28.06	33.15		33.16	0.001949	0.42	632.32	383.65	0.08
LogbridgePowell	1	9140	100y 18h	147.00	28.06	32.78		32.78	0.001632	0.35	493.47	349.66	0.07
LogbridgePowell	1	9140	100y 12h	201.10	28.06	33.08		33.09	0.001826	0.40	605.04	377.17	0.08
LogbridgePowell	1	9140	100y 6h	211.80	28.06	33.13		33.13	0.001890	0.41	621.60	381.12	0.08
LogbridgePowell	1	9140	100y 3h	246.30	28.06	33.29		33.30	0.001992	0.44	684.43	395.72	0.08
LogbridgePowell	1	9140	100y 1h	258.40	28.06	33.36		33.37	0.001972	0.44	712.99	402.20	0.08
LogbridgePowell	1	9140	Feb2008	73.27	28.06	32.17		32.17	0.001304	0.26	287.43	287.31	0.06
LogbridgePowell	1	8850	2y 72h	30.70	27.79	30.65	28.33	30.85	0.000583	0.19	165.55	80.45	0.04
LogbridgePowell	1	8850	2y 48h	48.59	27.79	31.34	28.47	31.34	0.000797	0.23	207.32	89.65	0.05
LogbridgePowell	1	8850	2y 24h	70.44	27.79	31.77	28.62	31.77	0.001040	0.28	247.51	97.64	0.06
LogbridgePowell	1	8850	2y 18h	48.10	27.79	31.27	28.48	31.27	0.000849	0.24	201.06	88.34	0.05
LogbridgePowell	1	8850	2y 12h	73.42	27.79	31.82	28.64	31.82	0.001073	0.29	252.62	98.75	0.06
LogbridgePowell	1	8850	2y 6h	74.20	27.79	31.84	28.65	31.84	0.001077	0.29	254.91	99.91	0.06
LogbridgePowell	1	8850	2y 3h	83.07	27.79	32.00	28.70	32.00	0.001192	0.31	271.25	107.56	0.06
LogbridgePowell	1	8850	2y 1h	80.50	27.79	31.96	28.69	31.96	0.001158	0.30	266.74	105.59	0.06
LogbridgePowell	1	8850	5y 72h	49.62	27.79	31.34	28.48	31.34	0.000828	0.24	207.83	89.76	0.05
LogbridgePowell	1	8850	5y 48h	79.95	27.79	31.94	28.68	31.94	0.001158	0.30	264.95	104.68	0.06
LogbridgePowell	1	8850	5y 24h	112.10	27.79	31.96	28.87	31.97	0.002232	0.42	267.56	105.88	0.08
LogbridgePowell	1	8850	5y 18h	72.61	27.79	31.78	28.64	31.78	0.001092	0.29	248.65	97.85	0.06
LogbridgePowell	1	8850	5y 12h	109.00	27.79	31.87	28.85	31.88	0.002264	0.42	258.29	101.54	0.08
LogbridgePowell	1	8850	5y 6h	110.70	27.79	31.89	28.86	32.00	0.002123	0.41	270.89	107.40	0.08
LogbridgePowell	1	8850	5y 3h	125.70	27.79	32.20	28.93	32.20	0.000781	0.26	649.23	414.81	0.05
LogbridgePowell	1	8850	5y 1h	125.10	27.79	32.20	28.94	32.20	0.000774	0.26	649.06	414.81	0.05
LogbridgePowell	1	8850	10y 72h	60.74	27.79	31.57	28.56	31.58	0.000952	0.27	229.11	94.07	0.05
LogbridgePowell	1	8850	10y 48h	97.71	27.79	32.25	28.79	32.25	0.000428	0.19	670.98	415.59	0.04
LogbridgePowell	1	8850	10y 24h	135.70	27.79	32.24	28.99	32.25	0.000837	0.27	668.01	415.48	0.05
LogbridgePowell	1	8850	10y 18h	86.19	27.79	32.04	28.72	32.05	0.001238	0.31	276.13	109.74	0.06
LogbridgePowell	1	8850	10y 12h	127.80	27.79	32.19	28.94	32.19	0.000824	0.26	644.82	414.65	0.05
LogbridgePowell	1	8850	10y 6h	129.70	27.79	32.21	28.95	32.21	0.000812	0.26	654.63	415.00	0.05
LogbridgePowell	1	8850	10y 3h	147.70	27.79	32.35	29.04	32.35	0.000827	0.27	710.46	417.05	0.05
LogbridgePowell	1	8850	10y 1h	147.50	27.79	32.35	29.04	32.35	0.000818	0.27	712.27	417.12	0.05
LogbridgePowell	1	8850	20y 72h	75.48	27.79	31.85	28.65	31.85	0.001109	0.30	255.51	100.20	0.06
LogbridgePowell	1	8850	20y 48h	121.70	27.79	32.14	28.91	32.14	0.000823	0.26	623.65	413.90	0.05
LogbridgePowell	1	8850	20y 24h	167.50	27.79	32.46	29.13	32.47	0.000872	0.29	759.24	416.97	0.05
LogbridgePowell	1	8850	20y 18h	106.30	27.79	31.88	28.84	31.89	0.002149	0.41	258.56	101.66	0.08
LogbridgePowell	1	8850	20y 12h	153.30	27.79	32.38	29.06	32.38	0.000844	0.28	723.45	417.56	0.05
LogbridgePowell	1	8850	20y 6h	155.80	27.79	32.40	29.08	32.40	0.000840	0.28	732.49	417.92	0.05
LogbridgePowell	1	8850	20y 3h	178.30	27.79	32.54	29.16	32.55	0.000866	0.29	793.35	420.31	0.05
LogbridgePowell	1	8850	20y 1h	178.30	27.79	32.55	29.16	32.55	0.000864	0.29	793.73	420.32	0.05
LogbridgePowell	1	8850	50y 72h	87.06	27.79	32.05	28.72	32.06	0.001253	0.31	277.25	110.24	0.06
LogbridgePowell	1	8850	50y 48h	134.60	27.79	32.24	28.98	32.24	0.000835	0.27	664.89	415.37	0.05
LogbridgePowell	1	8850	50y 24h	188.60	27.79	32.60	29.22	32.60	0.000894	0.30	814.69	421.14	0.05
LogbridgePowell	1	8850	50y 18h	127.00	27.79	32.25	28.94	32.26	0.000722	0.25	671.52	415.61	0.05
LogbridgePowell	1	8850	50y 12h	173.90	27.79	32.53	29.16	32.54	0.000838	0.29	788.79	420.13	0.05
LogbridgePowell	1	8850	50y 6h	183.00	27.79	32.58	29.20	32.58	0.000868	0.30	806.36	420.81	0.05
LogbridgePowell	1	8850	50y 3h	211.00	27.79	32.73	29.32	32.73	0.000911	0.31	871.76	423.36	0.06
LogbridgePowell	1	8850	50y 1h	219.70	27.79	32.77	29.35	32.78	0.000927	0.32	889.87	424.06	0.06
LogbridgePowell	1	8850	100y 72h	103.20	27.79	32.39	28.82	32.40	0.000371	0.19	730.66	417.85	0.03
LogbridgePowell	1	8850	100y 48h	159.40	27.79	32.42	29.09	32.42	0.000851	0.28	740.38	418.23	0.05
LogbridgePowell	1	8850	100y 24h	219.90	27.79	32.79	29.35	32.79	0.000910	0.32	895.94	424.30	0.06
LogbridgePowell	1	8850	100y 18h	147.00	27.79	32.50	29.04	32.50	0.000633	0.25	774.26	419.56	0.05
LogbridgePowell	1	8850	100y 12h	201.10	27.79	32.75	29.28	32.75	0.000805	0.30	879.50	423.66	0.05
LogbridgePowell	1	8850	100y 6h	211.80	27.79	32.77	29.32	32.77	0.000864	0.31	869.13	424.04	0.05
LogbridgePowell	1	8850	100y 3h	246.30	27.79	32.90	29.45	32.91	0.000969	0.33	945.27	426.21	0.06
LogbridgePowell	1	8850	100y 1h	258.40	27.79	32.98	29.50	32.98	0.000964	0.34	976.84	427.42	0.06
LogbridgePowell	1	8850	Feb2008	73.27	27.79	31.83	28.65	31.83	0.001058	0.29	253.87	99.40	0.06
LogbridgePowell	1	8197	2y 72h	30.70	24.81	30.33	26.19	30.33	0.001156	0.23	137.57	107.97	0.06
LogbridgePowell	1	8197	2y 48h	48.59	24.81	30.66	26.53	30.66	0.001420	0.28	177.58	139.81	0.06
LogbridgePowell	1	8197	2y 24h	70.44	24.81	30.88	26.90	30.89	0.001823	0.35	211.82	161.88	0.07
LogbridgePowell	1	8197	2y 18h	48.10	24.81	30.37	26.52	30.38	0.002544	0.34	142.72	110.58	0.08
LogbridgePowell	1	8197	2y 12h	73.42	24.81	30.88	26.94	30.88	0.002011	0.36	210.68	161.21	0.08
LogbridgePowell	1	8197	2y 6h	74.20	24.81	30.98	26.95	30.99	0.001640	0.34	226.26	171.27	0.07
LogbridgePowell	1	8197	2y 3h	83.07	24.81	31.08	27.09	31.09	0.001659	0.35	246.32	181.24	0.07
LogbridgePowell	1	8197	2y 1h	80.50	24.81	31.07	27.05	31.08	0.001600	0.34	244.01	179.99	0.07
LogbridgePowell	1	8197	5y 72h	49.62	24.81	30.60	26.55	30.60	0.001681	0.30	169.39	132.41	0.07
LogbridgePowell	1	8197	5y 48h	79.95	24.81	30.96	27.04	30.97	0.001981	0.37	225.09	169.50	0.08
LogbridgePowell	1	8197	5y 24h	112.10	24.81	31.14	27.50	31.15	0.002793	0.46	258.82	200.36	0.09
LogbridgePowell	1	8197	5y 18h	72.61	24.81	30.53	26.93	30.54	0.004078	0.46	161.39	123.10	0.11
LogbridgePowell	1	8197	5y 12h	109.00	24.81	31.06	27.48	31.08	0.002968	0.47	242.99	179.44	0.10
LogbridgePowell	1	8197	5y 6h	110.70	24.81	31.23	27.48	31.24	0.002324	0.43	277.46	234.70	0.09
LogbridgePowell	1	8197	5y 3h	125.70	24.81	31.40	27.66	31.41	0.002117	0.43	316.78	271.75	0.08
LogbridgePowell	1	8197	5y 1h	125.10	24.81	31.42	27.67	31.43	0.001981	0.42	325.54	275.56	0.08

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	1	8197	10y 72h	60.74	24.81	30.69	26.74	30.70	0.002041	0.35	182.96	143.51	0.08
LogbridgePowell	1	8197	10y 48h	97.71	24.81	31.06	27.30	31.07	0.002419	0.42	241.79	178.78	0.09
LogbridgePowell	1	8197	10y 24h	135.70	24.81	31.28	27.81	31.29	0.003214	0.51	287.39	246.09	0.10
LogbridgePowell	1	8197	10y 18h	86.19	24.81	30.80	27.14	30.81	0.003229	0.45	199.48	154.31	0.10
LogbridgePowell	1	8197	10y 12h	127.80	24.81	31.26	27.71	31.27	0.002939	0.49	283.76	242.08	0.10
LogbridgePowell	1	8197	10y 6h	129.70	24.81	31.34	27.73	31.35	0.002556	0.46	303.81	261.21	0.09
LogbridgePowell	1	8197	10y 3h	147.70	24.81	31.49	27.96	31.50	0.002357	0.46	344.98	286.10	0.09
LogbridgePowell	1	8197	10y 1h	147.50	24.81	31.53	27.96	31.54	0.002135	0.44	357.27	292.48	0.08
LogbridgePowell	1	8197	20y 72h	75.48	24.81	30.79	26.97	30.79	0.002572	0.40	196.81	152.61	0.09
LogbridgePowell	1	8197	20y 48h	121.70	24.81	31.20	27.63	31.22	0.002963	0.48	270.64	224.22	0.10
LogbridgePowell	1	8197	20y 24h	167.50	24.81	31.48	28.20	31.49	0.003122	0.53	341.30	284.17	0.10
LogbridgePowell	1	8197	20y 18h	106.30	24.81	31.13	27.43	31.14	0.002539	0.44	255.48	198.23	0.09
LogbridgePowell	1	8197	20y 12h	153.30	24.81	31.46	28.03	31.47	0.002702	0.49	337.23	282.01	0.09
LogbridgePowell	1	8197	20y 6h	155.80	24.81	31.52	28.06	31.53	0.002440	0.47	354.16	290.88	0.09
LogbridgePowell	1	8197	20y 3h	178.30	24.81	31.67	28.33	31.68	0.002298	0.48	398.81	312.36	0.09
LogbridgePowell	1	8197	20y 1h	178.30	24.81	31.68	28.33	31.69	0.002284	0.47	400.92	313.33	0.09
LogbridgePowell	1	8197	50y 72h	87.06	24.81	30.90	27.15	30.91	0.002671	0.42	215.01	163.75	0.09
LogbridgePowell	1	8197	50y 48h	134.60	24.81	31.27	27.80	31.29	0.003170	0.51	287.11	245.81	0.10
LogbridgePowell	1	8197	50y 24h	188.80	24.81	31.63	28.44	31.65	0.002782	0.52	387.74	307.23	0.10
LogbridgePowell	1	8197	50y 18h	127.00	24.81	31.64	27.70	31.65	0.001239	0.35	390.27	308.41	0.06
LogbridgePowell	1	8197	50y 12h	173.90	24.81	31.75	28.29	31.76	0.001830	0.43	424.93	324.17	0.08
LogbridgePowell	1	8197	50y 6h	183.00	24.81	31.72	28.36	31.73	0.002196	0.47	412.93	318.80	0.09
LogbridgePowell	1	8197	50y 3h	211.00	24.81	31.83	28.71	31.84	0.002308	0.49	448.97	336.12	0.09
LogbridgePowell	1	8197	50y 1h	219.70	24.81	31.84	28.79	31.85	0.002441	0.51	453.02	342.08	0.09
LogbridgePowell	1	8197	100y 72h	103.20	24.81	31.13	27.38	31.14	0.002389	0.43	255.69	198.56	0.09
LogbridgePowell	1	8197	100y 48h	159.40	24.81	31.50	28.10	31.51	0.002684	0.49	347.83	287.60	0.09
LogbridgePowell	1	8197	100y 24h	219.90	24.81	31.93	28.79	31.94	0.002004	0.47	487.71	380.48	0.08
LogbridgePowell	1	8197	100y 18h	147.00	24.81	32.06	27.95	32.06	0.000716	0.29	537.75	398.64	0.05
LogbridgePowell	1	8197	100y 12h	201.10	24.81	32.12	28.60	32.12	0.001174	0.37	560.92	401.68	0.06
LogbridgePowell	1	8197	100y 6h	211.80	24.81	31.98	28.70	31.99	0.001780	0.45	507.37	394.63	0.08
LogbridgePowell	1	8197	100y 3h	246.30	24.81	31.92	29.67	31.93	0.002585	0.53	482.62	373.96	0.09
LogbridgePowell	1	8197	100y 1h	258.40	24.81	32.03	29.74	32.04	0.002383	0.52	526.04	396.97	0.09
LogbridgePowell	1	8197	Feb2008	73.27	24.81	31.02	28.94	31.02	0.001483	0.32	234.45	174.72	0.07
LogbridgePowell	1	8190		Culvert									
LogbridgePowell	1	8183	2y 72h	53.11	24.79	30.32		30.32	0.003516	0.40	136.79	107.49	0.10
LogbridgePowell	1	8183	2y 48h	72.39	24.79	30.64		30.65	0.003214	0.43	176.28	138.79	0.10
LogbridgePowell	1	8183	2y 24h	99.13	24.79	30.87		30.88	0.003687	0.49	210.23	160.84	0.10
LogbridgePowell	1	8183	2y 18h	77.47	24.79	30.36		30.37	0.006782	0.56	141.39	109.83	0.14
LogbridgePowell	1	8183	2y 12h	110.20	24.79	30.86		30.87	0.004665	0.55	208.46	159.77	0.12
LogbridgePowell	1	8183	2y 6h	114.50	24.79	30.97		30.98	0.004015	0.53	226.00	169.92	0.11
LogbridgePowell	1	8183	2y 3h	118.20	24.79	31.07		31.08	0.003508	0.51	244.00	179.90	0.10
LogbridgePowell	1	8183	2y 1h	108.10	24.79	31.05		31.06	0.002984	0.47	241.09	178.31	0.10
LogbridgePowell	1	8183	5y 72h	87.03	24.79	30.58		30.60	0.005285	0.54	167.89	130.32	0.12
LogbridgePowell	1	8183	5y 48h	121.10	24.79	30.84		30.86	0.004707	0.57	222.26	167.81	0.12
LogbridgePowell	1	8183	5y 24h	160.60	24.79	31.12		31.14	0.005743	0.66	253.13	184.79	0.13
LogbridgePowell	1	8183	5y 18h	117.10	24.79	30.51		30.54	0.011147	0.76	158.57	121.11	0.18
LogbridgePowell	1	8183	5y 12h	168.20	24.79	31.04		31.07	0.007399	0.73	239.05	177.18	0.15
LogbridgePowell	1	8183	5y 6h	174.20	24.79	31.22		31.24	0.005937	0.69	273.46	228.59	0.14
LogbridgePowell	1	8183	5y 3h	182.10	24.79	31.37		31.39	0.004676	0.63	312.70	267.94	0.12
LogbridgePowell	1	8183	5y 1h	167.10	24.79	31.41		31.43	0.003613	0.56	322.87	273.97	0.11
LogbridgePowell	1	8183	10y 72h	107.20	24.79	30.68		30.69	0.006594	0.62	180.54	141.75	0.14
LogbridgePowell	1	8183	10y 48h	149.00	24.79	31.04		31.06	0.005879	0.65	237.98	176.59	0.13
LogbridgePowell	1	8183	10y 24h	195.90	24.79	31.25		31.28	0.007010	0.75	281.87	239.70	0.15
LogbridgePowell	1	8183	10y 18h	139.10	24.79	30.78		30.80	0.008888	0.74	195.53	151.69	0.16
LogbridgePowell	1	8183	10y 12h	199.30	24.79	31.23		31.26	0.007548	0.78	277.15	234.12	0.15
LogbridgePowell	1	8183	10y 6h	205.30	24.79	31.32		31.34	0.006731	0.75	297.91	256.33	0.15
LogbridgePowell	1	8183	10y 3h	214.40	24.79	31.47		31.49	0.005184	0.68	339.60	283.18	0.13
LogbridgePowell	1	8183	10y 1h	196.40	24.79	31.52		31.53	0.003908	0.60	353.11	290.25	0.11
LogbridgePowell	1	8183	20y 72h	134.10	24.79	30.76		30.79	0.008539	0.72	193.23	150.21	0.16
LogbridgePowell	1	8183	20y 48h	186.90	24.79	31.18		31.20	0.007282	0.75	264.89	213.41	0.15
LogbridgePowell	1	8183	20y 24h	244.10	24.79	31.45		31.48	0.006988	0.79	334.74	280.59	0.15
LogbridgePowell	1	8183	20y 18h	169.00	24.79	31.11		31.13	0.006497	0.70	251.20	183.77	0.14
LogbridgePowell	1	8183	20y 12h	242.00	24.79	31.43		31.46	0.007242	0.80	328.30	277.02	0.15
LogbridgePowell	1	8183	20y 6h	248.20	24.79	31.50		31.52	0.006551	0.77	346.95	287.05	0.15
LogbridgePowell	1	8183	20y 3h	259.30	24.79	31.65		31.67	0.005098	0.70	392.01	309.13	0.13
LogbridgePowell	1	8183	20y 1h	237.00	24.79	31.66		31.67	0.004189	0.64	394.35	310.22	0.12
LogbridgePowell	1	8183	50y 72h	153.20	24.79	30.88		30.90	0.008707	0.76	211.08	161.35	0.16
LogbridgePowell	1	8183	50y 48h	207.40	24.79	31.25		31.28	0.007946	0.80	280.52	238.12	0.16
LogbridgePowell	1	8183	50y 24h	276.50	24.79	31.61		31.64	0.006280	0.78	380.91	303.93	0.14
LogbridgePowell	1	8183	50y 18h	207.60	24.79	31.63		31.65	0.003399	0.57	386.52	306.58	0.11
LogbridgePowell	1	8183	50y 12h	276.20	24.79	31.73		31.76	0.004795	0.70	419.21	321.55	0.13
LogbridgePowell	1	8183	50y 6h	285.90	24.79	31.69		31.71	0.006105	0.78	403.96	314.65	0.14
LogbridgePowell	1	8183	50y 3h	319.50	24.79	31.80		31.82	0.005636	0.77	439.00	330.28	0.14
LogbridgePowell	1	8183	50y 1h	290.90	24.79	31.82		31.84	0.004430	0.68	447.39	333.91	0.12
LogbridgePowell	1	8183	100y 72h	182.80	24.79	31.11		31.13	0.007643	0.76	250.72	183.51	0.15
LogbridgePowell	1	8183	100y 48h	247.00	24.79	31.47		31.50	0.006859	0.79	339.97	283.38	0.15
LogbridgePowell	1	8183	100y 24h	324.70	24.79	31.91		31.94	0.004564	0.71	479.77	371.44	0.12
LogbridgePowell	1	8183	100y 18h	240.40	24.79	32.04		32.05	0.002009	0.48	528.45	397.53	0.08
LogbridgePowell	1	8183	100y 12h	322.00	24.79	32.10		32.12	0.003144	0.61	553.12	400.64	0.10
LogbridgePowell	1	8183	100y 6h	344.10	24.79	31.96		31.98	0.004694	0.72	497.26	392.26	0.13
LogbridgePowell	1	8183	100y 3h	347.20	24.79	31.88		31.91	0.005528	0.77	469.55	362.78	0.14
LogbridgePowell	1	8183	100y 1h	342.00	24.79	32.01		32.03	0.004365	0.70	517.53	395.95	0.12
LogbridgePowell	1	8183	Feb2008	115.30	24.79	31.00		31.02	0.003760	0.52	232.46	173.51	0.11
LogbridgePowell	1	7540	2y 72h	53.11	25.81	27.78		27.78	0.004447	0.37	143.27	113.45	0.11
LogbridgePowell	1	7540	2y 48h	72.39	25.81	27.94		27.95	0.005769	0.45	162.67	124.78	0.12
LogbridgePowell	1	7540	2y 24h	99.13	25.81	28.37		28.38	0.004125	0.45	224.18	163.24	0.11
LogbridgePowell	1	7540	2y 18h	77.47	25.81	28.65		28.65	0.001419	0.29	273.91	192.27	0.06
LogbridgePowell	1	7540	2y 12h	110.20	25.81	28.71		28.72	0.002531	0.40	286.60	201.03	0.09
LogbridgePowell	1	7540	2y 6h	114.50	25.81	28.60		28.61	0.003399	0.44	265.03	186.42	0.10

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	1	7540	2y 3h	119.20	25.81	28.48		28.50	0.004653	0.50	244.18	173.58	0.12
LogbridgePowell	1	7540	2y 1h	108.10	25.81	28.18		28.19	0.007406	0.56	194.81	146.19	0.14
LogbridgePowell	1	7540	5y 72h	87.03	25.81	28.57		28.58	0.002081	0.34	259.63	182.92	0.08
LogbridgePowell	1	7540	5y 48h	121.10	25.81	28.83		28.84	0.002447	0.41	311.50	222.79	0.09
LogbridgePowell	1	7540	5y 24h	160.60	25.81	29.32		29.33	0.001667	0.38	428.75	255.43	0.07
LogbridgePowell	1	7540	5y 18h	117.10	25.81	29.65		29.66	0.000500	0.23	517.60	276.76	0.04
LogbridgePowell	1	7540	5y 12h	168.20	25.81	29.66		29.67	0.001018	0.32	519.91	277.30	0.06
LogbridgePowell	1	7540	5y 6h	174.20	25.81	29.42		29.43	0.001624	0.39	456.32	262.17	0.07
LogbridgePowell	1	7540	5y 3h	162.10	25.81	29.24		29.25	0.002471	0.46	409.08	250.52	0.09
LogbridgePowell	1	7540	5y 1h	167.10	25.81	28.86		28.88	0.004361	0.55	318.78	225.39	0.12
LogbridgePowell	1	7540	10y 72h	107.20	25.81	28.98		28.98	0.001426	0.32	345.00	233.71	0.07
LogbridgePowell	1	7540	10y 48h	149.00	25.81	29.25		29.26	0.001625	0.37	411.55	251.14	0.07
LogbridgePowell	1	7540	10y 24h	195.90	25.81	29.79		29.80	0.001124	0.35	556.32	285.88	0.06
LogbridgePowell	1	7540	10y 18h	139.10	25.81	30.21		30.22	0.000320	0.20	702.48	376.07	0.03
LogbridgePowell	1	7540	10y 12h	199.30	25.81	30.12		30.13	0.000760	0.31	668.74	367.65	0.05
LogbridgePowell	1	7540	10y 6h	205.30	25.81	29.82		29.83	0.001182	0.36	564.36	293.78	0.06
LogbridgePowell	1	7540	10y 3h	214.40	25.81	29.57		29.58	0.001928	0.43	494.35	271.24	0.08
LogbridgePowell	1	7540	10y 1h	196.40	25.81	29.13		29.14	0.003550	0.53	381.38	243.41	0.11
LogbridgePowell	1	7540	20y 72h	134.10	25.81	29.48		29.48	0.000875	0.29	470.78	265.65	0.05
LogbridgePowell	1	7540	20y 48h	186.90	25.81	29.77		29.78	0.001048	0.33	552.01	284.87	0.06
LogbridgePowell	1	7540	20y 24h	244.10	25.81	30.42		30.42	0.000714	0.31	781.08	391.74	0.05
LogbridgePowell	1	7540	20y 18h	169.00	25.81	30.73		30.73	0.000214	0.18	905.50	407.61	0.03
LogbridgePowell	1	7540	20y 12h	242.00	25.81	30.69		30.69	0.000468	0.26	887.65	405.50	0.04
LogbridgePowell	1	7540	20y 6h	248.20	25.81	30.33		30.34	0.000843	0.33	747.77	385.70	0.06
LogbridgePowell	1	7540	20y 3h	259.30	25.81	30.01		30.02	0.001534	0.42	626.75	354.47	0.07
LogbridgePowell	1	7540	20y 1h	237.00	25.81	29.45		29.46	0.002893	0.52	462.07	263.56	0.10
LogbridgePowell	1	7540	50y 72h	153.20	25.81	30.02		30.02	0.000531	0.25	630.57	355.17	0.04
LogbridgePowell	1	7540	50y 48h	207.40	25.81	30.36		30.36	0.000567	0.28	757.21	387.57	0.05
LogbridgePowell	1	7540	50y 24h	276.50	25.81	30.92		30.92	0.000444	0.27	983.15	418.78	0.04
LogbridgePowell	1	7540	50y 18h	207.60	25.81	31.39		31.39	0.000141	0.16	1190.37	454.84	0.02
LogbridgePowell	1	7540	50y 12h	276.20	25.81	31.27		31.27	0.000287	0.23	1136.95	447.81	0.03
LogbridgePowell	1	7540	50y 6h	295.90	25.81	30.92		30.92	0.000510	0.29	982.25	418.61	0.04
LogbridgePowell	1	7540	50y 3h	319.50	25.81	30.59		30.60	0.000941	0.37	849.00	400.83	0.06
LogbridgePowell	1	7540	50y 1h	290.90	25.81	29.84		29.85	0.002285	0.50	570.85	305.40	0.09
LogbridgePowell	1	7540	100y 72h	182.80	25.81	30.54		30.54	0.000331	0.22	829.66	398.27	0.03
LogbridgePowell	1	7540	100y 48h	247.00	25.81	30.82		30.82	0.000403	0.25	942.55	411.94	0.04
LogbridgePowell	1	7540	100y 24h	324.70	25.81	31.37		31.38	0.000352	0.25	1182.03	453.80	0.04
LogbridgePowell	1	7540	100y 18h	240.40	25.81	31.86		31.86	0.000113	0.15	1408.86	484.66	0.02
LogbridgePowell	1	7540	100y 12h	322.00	25.81	31.75		31.75	0.000226	0.21	1356.59	476.65	0.03
LogbridgePowell	1	7540	100y 6h	344.10	25.81	31.35		31.36	0.000405	0.27	1172.54	452.54	0.04
LogbridgePowell	1	7540	100y 3h	347.20	25.81	30.94		30.95	0.000679	0.33	993.48	420.66	0.05
LogbridgePowell	1	7540	100y 1h	342.00	25.81	30.20		30.21	0.001991	0.50	695.63	374.48	0.08
LogbridgePowell	1	7540	Feb2008	115.30	25.81	28.54		28.55	0.003923	0.47	253.19	178.81	0.11
LogbridgePowell	1	7030	2y 72h	53.11	21.85	27.60		27.60	0.000123	0.12	465.88	175.91	0.02
LogbridgePowell	1	7030	2y 48h	72.39	21.85	27.63		27.63	0.000219	0.17	472.27	176.95	0.03
LogbridgePowell	1	7030	2y 24h	99.13	21.85	28.01		28.02	0.000278	0.20	542.33	192.26	0.03
LogbridgePowell	1	7030	2y 18h	77.47	21.85	28.52		28.52	0.000102	0.13	667.19	266.65	0.02
LogbridgePowell	1	7030	2y 12h	110.20	21.85	28.44		28.45	0.000224	0.19	646.98	264.59	0.03
LogbridgePowell	1	7030	2y 6h	114.50	21.85	28.24		28.24	0.000304	0.22	593.03	258.94	0.03
LogbridgePowell	1	7030	2y 3h	119.20	21.85	27.99		28.00	0.000410	0.24	538.54	190.80	0.04
LogbridgePowell	1	7030	2y 1h	108.10	21.85	27.44		27.45	0.000598	0.27	439.56	171.41	0.05
LogbridgePowell	1	7030	5y 72h	87.03	21.85	28.39		28.39	0.000149	0.16	631.35	262.99	0.02
LogbridgePowell	1	7030	5y 48h	121.10	21.85	28.55		28.55	0.000242	0.20	674.36	267.38	0.03
LogbridgePowell	1	7030	5y 24h	160.60	21.85	29.06		29.06	0.000248	0.22	814.48	281.08	0.03
LogbridgePowell	1	7030	5y 18h	117.10	21.85	29.57		29.57	0.000069	0.13	961.88	294.94	0.02
LogbridgePowell	1	7030	5y 12h	168.20	21.85	29.48		29.48	0.000179	0.20	935.87	292.56	0.03
LogbridgePowell	1	7030	5y 6h	174.20	21.85	29.15		29.16	0.000264	0.23	841.62	283.65	0.03
LogbridgePowell	1	7030	5y 3h	162.10	21.85	28.83		28.83	0.000405	0.27	749.97	274.85	0.04
LogbridgePowell	1	7030	5y 1h	167.10	21.85	28.14		28.14	0.000705	0.33	567.36	229.86	0.05
LogbridgePowell	1	7030	10y 72h	107.20	21.85	28.81		28.81	0.000143	0.16	745.52	274.45	0.02
LogbridgePowell	1	7030	10y 48h	149.00	21.85	29.01		29.01	0.000224	0.21	801.07	279.80	0.03
LogbridgePowell	1	7030	10y 24h	195.90	21.85	29.58		29.58	0.000223	0.22	963.37	295.08	0.03
LogbridgePowell	1	7030	10y 18h	139.10	21.85	30.15		30.15	0.000070	0.13	1186.78	627.62	0.02
LogbridgePowell	1	7030	10y 12h	199.30	21.85	29.97		29.97	0.000165	0.20	1085.78	363.51	0.03
LogbridgePowell	1	7030	10y 6h	205.30	21.85	29.59		29.59	0.000242	0.23	966.83	295.39	0.03
LogbridgePowell	1	7030	10y 3h	214.40	21.85	29.20		29.20	0.000383	0.28	853.99	284.81	0.04
LogbridgePowell	1	7030	10y 1h	196.40	21.85	28.44		28.44	0.000718	0.34	645.05	284.39	0.05
LogbridgePowell	1	7030	20y 72h	134.10	21.85	29.34		29.34	0.000130	0.17	895.66	286.77	0.02
LogbridgePowell	1	7030	20y 48h	186.90	21.85	29.56		29.58	0.000202	0.21	964.32	295.16	0.03
LogbridgePowell	1	7030	20y 24h	244.10	21.85	30.23		30.23	0.000230	0.24	1237.96	638.85	0.03
LogbridgePowell	1	7030	20y 18h	169.00	21.85	30.68		30.68	0.000062	0.13	1530.89	669.73	0.02
LogbridgePowell	1	7030	20y 12h	242.00	21.85	30.56		30.57	0.000147	0.20	1455.60	662.40	0.03
LogbridgePowell	1	7030	20y 6h	248.20	21.85	30.14		30.14	0.000225	0.24	1178.76	624.24	0.03
LogbridgePowell	1	7030	20y 3h	259.30	21.85	29.69		29.69	0.000352	0.28	998.79	298.10	0.04
LogbridgePowell	1	7030	20y 1h	237.00	21.85	28.81		28.82	0.000697	0.36	745.76	274.47	0.05
LogbridgePowell	1	7030	50y 72h	153.20	21.85	29.92		29.92	0.000102	0.16	1068.12	341.80	0.02
LogbridgePowell	1	7030	50y 48h	207.40	21.85	30.21		30.22	0.000170	0.21	1228.30	637.46	0.03
LogbridgePowell	1	7030	50y 24h	276.50	21.85	30.80		30.80	0.000143	0.20	1614.22	677.70	0.02
LogbridgePowell	1	7030	50y 18h	207.60	21.85	31.35		31.35	0.000043	0.12	1999.42	713.86	0.01
LogbridgePowell	1	7030	50y 12h	276.20	21.85	31.20		31.20	0.000090	0.17	1888.29	703.75	0.02
LogbridgePowell	1	7030	50y 6h	295.90	21.85	30.78		30.78	0.000169	0.22	1599.59	676.32	0.03
LogbridgePowell	1	7030	50y 3h	319.50	21.85	30.32		30.32	0.000353	0.30	1293.64	644.67	0.04
LogbridgePowell	1	7030	50y 1h	290.90	21.85	29.28		29.29	0.000650	0.37	877.63	287.08	0.05
LogbridgePowell	1	7030	100y 72h	182.80	21.85	30.46		30.46	0.000096	0.18	1386.99	654.71	0.02
LogbridgePowell	1	7030	100y 48h	247.00	21.85	30.72		30.72	0.000127	0.19	1556.57	672.23	0.02
LogbridgePowell	1	7030	100y 24h	324.70	21.85	31.28		31.28	0.000114	0.19	1945.97	709.03	0.02
LogbridgePowell	1	7030	100y 18h	240.40	21.85	31.83		31.83	0.000035	0.11	2344.58	746.48	0.01
LogbridgePowell	1	7030	100y 12h	322.00	21.85	31.69		31.69	0.000073	0.16	2241.58	736.27	0.02
LogbridgePowell	1	7030	100y 6h	344.10	21.85	31.24		31.24	0.000133	0.20	1920.50	706.72	0.02
LogbridgePowell	1	7030	100y 3h	347.20	21.85	30.75		30.76	0.000240	0.26	1581.84	674.64	0.03
LogbridgePowell	1	7030	100y 1h	342.00	21.85	29.68		29.69	0.000615	0.38	995.12	297.95	0.05

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	1	7030	Feb2008	115.30	21.85	28.13		28.13	0.000336	0.22	566.00	224.78	0.04
LogbridgePowell	3	3220	2y 72h	156.80	15.86	26.36		26.36	0.000024	0.09	1808.36	247.17	0.01
LogbridgePowell	3	3220	2y 48h	160.20	15.86	26.36		26.36	0.000025	0.09	1809.02	247.23	0.01
LogbridgePowell	3	3220	2y 24h	201.20	15.86	26.45		26.45	0.000037	0.11	1829.93	251.28	0.01
LogbridgePowell	3	3220	2y 18h	280.70	15.86	26.57		26.57	0.000089	0.15	1861.43	257.71	0.02
LogbridgePowell	3	3220	2y 12h	259.40	15.86	26.54		26.54	0.000080	0.14	1852.58	255.92	0.02
LogbridgePowell	3	3220	2y 6h	231.40	15.86	26.48		26.48	0.000049	0.13	1837.61	252.86	0.01
LogbridgePowell	3	3220	2y 3h	193.40	15.86	26.40		26.40	0.000035	0.11	1816.54	248.62	0.01
LogbridgePowell	3	3220	2y 1h	123.50	15.86	26.29		26.29	0.000015	0.07	1791.29	245.78	0.01
LogbridgePowell	3	3220	5y 72h	256.60	15.86	26.51		26.52	0.000059	0.14	1846.86	254.77	0.02
LogbridgePowell	3	3220	5y 48h	277.20	15.86	26.61		26.61	0.000066	0.15	1872.36	259.66	0.02
LogbridgePowell	3	3220	5y 24h	344.40	15.86	26.95		26.96	0.000088	0.18	1963.27	275.59	0.02
LogbridgePowell	3	3220	5y 18h	451.10	15.86	27.29		27.30	0.000130	0.22	2060.64	298.19	0.02
LogbridgePowell	3	3220	5y 12h	421.50	15.86	27.24		27.24	0.000116	0.21	2045.56	295.22	0.02
LogbridgePowell	3	3220	5y 6h	366.20	15.86	27.03		27.03	0.000096	0.19	1983.81	280.20	0.02
LogbridgePowell	3	3220	5y 3h	305.40	15.86	26.73		26.73	0.000076	0.16	1903.40	264.60	0.02
LogbridgePowell	3	3220	5y 1h	197.20	15.86	26.41		26.41	0.000036	0.11	1820.78	249.39	0.01
LogbridgePowell	3	3220	10y 72h	317.70	15.86	26.77		26.77	0.000081	0.17	1914.52	266.35	0.02
LogbridgePowell	3	3220	10y 48h	346.70	15.86	26.92		26.92	0.000090	0.18	1954.03	273.49	0.02
LogbridgePowell	3	3220	10y 24h	429.20	15.86	27.33		27.34	0.000116	0.21	2072.66	300.53	0.02
LogbridgePowell	3	3220	10y 18h	547.80	15.86	27.68		27.68	0.000164	0.26	2186.43	320.35	0.03
LogbridgePowell	3	3220	10y 12h	509.60	15.86	27.50		27.60	0.000147	0.24	2154.57	315.73	0.03
LogbridgePowell	3	3220	10y 6h	438.50	15.86	27.35		27.35	0.000121	0.21	2076.75	301.33	0.02
LogbridgePowell	3	3220	10y 3h	364.30	15.86	26.99		26.99	0.000097	0.19	1973.09	277.81	0.02
LogbridgePowell	3	3220	10y 1h	234.30	15.86	26.49		26.49	0.000050	0.13	1840.19	253.39	0.01
LogbridgePowell	3	3220	20y 72h	402.10	15.86	27.16		27.17	0.000109	0.20	2022.46	290.16	0.02
LogbridgePowell	3	3220	20y 48h	442.10	15.86	27.34		27.34	0.000123	0.22	2075.14	301.02	0.02
LogbridgePowell	3	3220	20y 24h	546.60	15.86	27.81		27.81	0.000156	0.25	2221.10	330.74	0.03
LogbridgePowell	3	3220	20y 18h	678.90	15.86	28.20		28.21	0.000206	0.30	2412.06	618.45	0.03
LogbridgePowell	3	3220	20y 12h	632.00	15.86	28.08		28.08	0.000188	0.28	2334.56	614.19	0.03
LogbridgePowell	3	3220	20y 6h	540.40	15.86	27.75		27.75	0.000156	0.25	2202.27	324.21	0.03
LogbridgePowell	3	3220	20y 3h	447.10	15.86	27.34		27.34	0.000126	0.22	2075.13	301.01	0.02
LogbridgePowell	3	3220	20y 1h	286.20	15.86	26.62		26.62	0.000070	0.15	1873.12	259.78	0.02
LogbridgePowell	3	3220	50y 72h	506.10	15.86	27.61		27.61	0.000144	0.24	2158.60	316.46	0.03
LogbridgePowell	3	3220	50y 48h	567.40	15.86	27.84		27.84	0.000165	0.26	2233.02	342.78	0.03
LogbridgePowell	3	3220	50y 24h	678.50	15.86	28.35		28.35	0.000193	0.29	2501.33	623.31	0.03
LogbridgePowell	3	3220	50y 18h	863.60	15.86	28.87		28.88	0.000249	0.34	2631.50	633.74	0.03
LogbridgePowell	3	3220	50y 12h	798.70	15.86	28.68		28.68	0.000232	0.33	2719.40	630.07	0.03
LogbridgePowell	3	3220	50y 6h	683.20	15.86	28.28		28.28	0.000202	0.30	2458.13	620.98	0.03
LogbridgePowell	3	3220	50y 3h	562.60	15.86	27.78		27.78	0.000167	0.26	2212.95	326.11	0.03
LogbridgePowell	3	3220	50y 1h	360.20	15.86	26.88		26.88	0.000099	0.19	1943.09	270.99	0.02
LogbridgePowell	3	3220	100y 72h	614.50	15.86	28.05		28.05	0.000179	0.27	2318.38	537.85	0.03
LogbridgePowell	3	3220	100y 48h	679.30	15.86	28.30		28.30	0.000198	0.29	2471.05	621.66	0.03
LogbridgePowell	3	3220	100y 24h	807.20	15.86	28.81		28.81	0.000224	0.32	2792.04	632.55	0.03
LogbridgePowell	3	3220	100y 18h	1008.00	15.86	29.35		29.35	0.000276	0.37	3134.96	642.73	0.04
LogbridgePowell	3	3220	100y 12h	943.90	15.86	29.14		29.15	0.000265	0.36	3002.67	638.86	0.04
LogbridgePowell	3	3220	100y 6h	807.70	15.86	28.72		28.73	0.000233	0.33	2737.08	630.88	0.03
LogbridgePowell	3	3220	100y 3h	666.80	15.86	28.17		28.18	0.000201	0.29	2394.22	617.47	0.03
LogbridgePowell	3	3220	100y 1h	428.10	15.86	27.13		27.13	0.000126	0.21	2012.83	287.65	0.02
LogbridgePowell	3	3220	Feb2008	215.90	15.86	26.50		26.50	0.000042	0.12	1843.17	254.00	0.01
LogbridgePowell	3	2300	2y 72h	156.80	13.77	26.32		26.33	0.000072	0.17	1017.19	215.92	0.02
LogbridgePowell	3	2300	2y 48h	160.20	13.77	26.33		26.33	0.000075	0.17	1017.44	215.94	0.02
LogbridgePowell	3	2300	2y 24h	201.20	13.77	26.39		26.39	0.000115	0.21	1031.29	216.74	0.02
LogbridgePowell	3	2300	2y 18h	280.70	13.77	26.46		26.47	0.000216	0.30	1047.45	217.68	0.03
LogbridgePowell	3	2300	2y 12h	259.40	13.77	26.44		26.45	0.000186	0.27	1043.10	217.43	0.03
LogbridgePowell	3	2300	2y 6h	231.40	13.77	26.40		26.41	0.000151	0.25	1034.04	216.90	0.03
LogbridgePowell	3	2300	2y 3h	193.40	13.77	26.35		26.35	0.000108	0.21	1022.16	216.21	0.02
LogbridgePowell	3	2300	2y 1h	123.50	13.77	26.27		26.27	0.000045	0.13	1005.19	206.58	0.01
LogbridgePowell	3	2300	5y 72h	256.60	13.77	26.42		26.43	0.000184	0.27	1038.55	217.17	0.03
LogbridgePowell	3	2300	5y 48h	277.20	13.77	26.51		26.51	0.000206	0.29	1057.68	218.26	0.03
LogbridgePowell	3	2300	5y 24h	344.40	13.77	26.82		26.82	0.000277	0.34	1124.98	221.73	0.04
LogbridgePowell	3	2300	5y 18h	451.10	13.77	27.09		27.10	0.000422	0.43	1185.33	224.70	0.04
LogbridgePowell	3	2300	5y 12h	421.50	13.77	27.06		27.07	0.000373	0.41	1179.07	224.40	0.04
LogbridgePowell	3	2300	5y 6h	366.20	13.77	26.88		26.88	0.000305	0.36	1138.42	222.41	0.04
LogbridgePowell	3	2300	5y 3h	305.40	13.77	26.61		26.62	0.000239	0.31	1089.12	219.42	0.03
LogbridgePowell	3	2300	5y 1h	197.20	13.77	26.35		26.36	0.000112	0.21	1023.68	216.30	0.02
LogbridgePowell	3	2300	10y 72h	317.70	13.77	26.65		26.65	0.000254	0.33	1057.68	219.81	0.03
LogbridgePowell	3	2300	10y 48h	346.70	13.77	26.78		26.79	0.000286	0.35	1116.64	221.30	0.04
LogbridgePowell	3	2300	10y 24h	429.20	13.77	27.15		27.16	0.000372	0.41	1199.62	225.39	0.04
LogbridgePowell	3	2300	10y 18h	547.80	13.77	27.42		27.43	0.000539	0.50	1260.60	228.36	0.05
LogbridgePowell	3	2300	10y 12h	509.60	13.77	27.37		27.38	0.000477	0.47	1248.57	227.77	0.05
LogbridgePowell	3	2300	10y 6h	438.50	13.77	27.16		27.17	0.000387	0.42	1201.07	225.46	0.04
LogbridgePowell	3	2300	10y 3h	364.30	13.77	26.84		26.84	0.000307	0.36	1129.67	221.97	0.04
LogbridgePowell	3	2300	10y 1h	234.30	13.77	26.41		26.41	0.000154	0.25	1035.91	217.01	0.03
LogbridgePowell	3	2300	20y 72h	402.10	13.77	26.99		27.00	0.000350	0.39	1163.89	223.66	0.04
LogbridgePowell	3	2300	20y 48h	442.10	13.77	27.15		27.16	0.000395	0.42	1199.04	225.36	0.04
LogbridgePowell	3	2300	20y 24h	546.60	13.77	27.56		27.57	0.000506	0.49	1292.70	229.94	0.05
LogbridgePowell	3	2300	20y 18h	678.90	13.77	27.87		27.89	0.000684	0.58	1365.25	233.82	0.06
LogbridgePowell	3	2300	20y 12h	632.00	13.77	27.78		27.79	0.000617	0.55	1342.98	232.56	0.05
LogbridgePowell	3	2300	20y 6h	540.40	13.77	27.50		27.51	0.000507	0.49	1278.42	229.29	0.05
LogbridgePowell	3	2300	20y 3h	447.10	13.77	27.14		27.15	0.000405	0.43	1198.01	225.31	0.04
LogbridgePowell	3	2300	20y 1h	286.20	13.77	26.51		26.51	0.000220	0.30	1056.85	218.22	0.03
LogbridgePowell	3	2300	50y 72h	506.10	13.77	27.38		27.39	0.000467	0.46	1252.51	227.96	0.05
LogbridgePowell	3	2300	50y 48h	567.40	13.77	27.58		27.59	0.000541	0.51	1297.16	230.16	0.05
LogbridgePowell	3	2300	50y 24h	678.50	13.77	28.04		28.05	0.000639	0.57	1403.84	236.01	0.06
LogbridgePowell	3	2300	50y 18h	863.60	13.77	28.46		28.48	0.000873	0.68	1505.71	242.40	0.07
LogbridgePowell	3	2300	50y 12h	798.70	13.77	28.30		28.32	0.000796	0.64	1467.17	239.93	0.06
LogbridgePowell	3	2300	50y 6h	683.20	13.77	27.95		27.97	0.000671	0.58	1384.15	234.89	0.06
LogbridgePowell	3	2300	50y 3h	562.60	13.77	27.52		27.53	0.000546	0.51	1282.85	229.46	0.05
LogbridgePowell	3	2300	50y 1h	360.20	13.77	26.72		26.73	0.000316	0.36	1104.62	220.68	0.04

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	3	2300	100y 72h	614.50	13.77	27.76		27.78	0.000587	0.53	1339.68	232.37	0.05
LogbridgePowell	3	2300	100y 48h	679.30	13.77	27.88		28.00	0.000655	0.57	1390.63	235.25	0.06
LogbridgePowell	3	2300	100y 24h	807.20	13.77	28.44		28.46	0.000768	0.64	1501.42	242.13	0.06
LogbridgePowell	3	2300	100y 18h	1008.00	13.77	28.89		28.91	0.001010	0.75	1609.64	249.39	0.07
LogbridgePowell	3	2300	100y 12h	943.90	13.77	28.70		28.73	0.000950	0.72	1564.07	246.26	0.07
LogbridgePowell	3	2300	100y 6h	807.70	13.77	28.34		28.36	0.000801	0.65	1476.87	240.54	0.06
LogbridgePowell	3	2300	100y 3h	666.80	13.77	27.85		27.87	0.000666	0.57	1380.43	233.55	0.06
LogbridgePowell	3	2300	100y 1h	428.10	13.77	26.93		26.94	0.000407	0.42	1150.50	223.01	0.04
LogbridgePowell	3	2300	Feb2008	215.90	13.77	26.43		26.44	0.000129	0.23	1041.09	217.31	0.02
LogbridgePowell	3	2000	2y 72h	156.80	12.82	26.32		26.32	0.000014	0.07	2634.19	577.61	0.01
LogbridgePowell	3	2000	2y 48h	160.20	12.82	26.32		26.32	0.000015	0.07	2634.66	577.63	0.01
LogbridgePowell	3	2000	2y 24h	201.20	12.82	26.38		26.38	0.000023	0.09	2668.33	578.03	0.01
LogbridgePowell	3	2000	2y 18h	280.70	12.82	26.44		26.44	0.000043	0.12	2706.44	580.52	0.01
LogbridgePowell	3	2000	2y 12h	259.40	12.82	26.42		26.43	0.000037	0.11	2696.61	580.13	0.01
LogbridgePowell	3	2000	2y 6h	231.40	12.82	26.39		26.39	0.000030	0.10	2674.52	579.24	0.01
LogbridgePowell	3	2000	2y 3h	193.40	12.82	26.34		26.34	0.000022	0.08	2645.31	578.06	0.01
LogbridgePowell	3	2000	2y 1h	123.50	12.82	26.28		26.28	0.000009	0.05	2603.38	576.83	0.01
LogbridgePowell	3	2000	5y 72h	256.60	12.82	26.40		26.40	0.000037	0.11	2684.60	579.65	0.01
LogbridgePowell	3	2000	5y 48h	277.20	12.82	26.49		26.49	0.000041	0.12	2734.31	581.65	0.01
LogbridgePowell	3	2000	5y 24h	344.40	12.82	26.79		26.79	0.000055	0.14	2909.19	588.45	0.02
LogbridgePowell	3	2000	5y 18h	451.10	12.82	27.04		27.05	0.000083	0.18	3060.36	593.11	0.02
LogbridgePowell	3	2000	5y 12h	421.50	12.82	27.02		27.02	0.000074	0.17	3046.79	592.62	0.02
LogbridgePowell	3	2000	5y 6h	366.20	12.82	26.85		26.85	0.000060	0.15	2943.20	589.29	0.02
LogbridgePowell	3	2000	5y 3h	305.40	12.82	26.59		26.59	0.000048	0.13	2792.15	583.97	0.01
LogbridgePowell	3	2000	5y 1h	197.20	12.82	26.34		26.34	0.000022	0.09	2649.14	578.22	0.01
LogbridgePowell	3	2000	10y 72h	317.70	12.82	26.62		26.62	0.000051	0.13	2811.29	584.73	0.02
LogbridgePowell	3	2000	10y 48h	346.70	12.82	26.75		26.75	0.000057	0.14	2886.52	587.73	0.02
LogbridgePowell	3	2000	10y 24h	429.20	12.82	27.11		27.11	0.000073	0.17	3101.18	594.57	0.02
LogbridgePowell	3	2000	10y 18h	547.80	12.82	27.37		27.37	0.000106	0.20	3251.84	598.99	0.02
LogbridgePowell	3	2000	10y 12h	509.60	12.82	27.32		27.32	0.000093	0.19	3223.93	598.29	0.02
LogbridgePowell	3	2000	10y 6h	438.50	12.82	27.12		27.12	0.000076	0.17	3104.11	594.68	0.02
LogbridgePowell	3	2000	10y 3h	364.30	12.82	26.81		26.81	0.000061	0.15	2919.84	588.71	0.02
LogbridgePowell	3	2000	10y 1h	234.30	12.82	26.40		26.40	0.000031	0.10	2679.33	579.43	0.01
LogbridgePowell	3	2000	20y 72h	402.10	12.82	26.96		26.96	0.000069	0.16	3008.02	591.22	0.02
LogbridgePowell	3	2000	20y 48h	442.10	12.82	27.11		27.11	0.000078	0.17	3098.25	594.47	0.02
LogbridgePowell	3	2000	20y 24h	546.60	12.82	27.51		27.51	0.000098	0.20	3338.17	600.00	0.02
LogbridgePowell	3	2000	20y 18h	676.90	12.82	27.81		27.81	0.000131	0.23	3516.06	600.00	0.02
LogbridgePowell	3	2000	20y 12h	632.00	12.82	27.72		27.72	0.000118	0.22	3462.52	600.00	0.02
LogbridgePowell	3	2000	20y 6h	540.40	12.82	27.45		27.45	0.000099	0.20	3303.28	600.00	0.02
LogbridgePowell	3	2000	20y 3h	447.10	12.82	27.10		27.10	0.000080	0.17	3094.93	594.35	0.02
LogbridgePowell	3	2000	20y 1h	286.20	12.82	26.48		26.49	0.000044	0.12	2731.25	581.52	0.01
LogbridgePowell	3	2000	50y 72h	506.10	12.82	27.34		27.34	0.000091	0.19	3234.93	598.57	0.02
LogbridgePowell	3	2000	50y 48h	567.40	12.82	27.53		27.53	0.000105	0.21	3347.76	600.00	0.02
LogbridgePowell	3	2000	50y 24h	678.50	12.82	27.98		27.98	0.000120	0.23	3617.76	600.00	0.02
LogbridgePowell	3	2000	50y 18h	863.60	12.82	28.38		28.38	0.000161	0.27	3860.87	600.00	0.03
LogbridgePowell	3	2000	50y 12h	798.70	12.82	28.23		28.23	0.000148	0.26	3769.01	600.00	0.03
LogbridgePowell	3	2000	50y 6h	663.20	12.82	27.89		27.89	0.000127	0.23	3565.49	600.00	0.02
LogbridgePowell	3	2000	50y 3h	562.60	12.82	27.46		27.46	0.000106	0.21	3309.91	600.00	0.02
LogbridgePowell	3	2000	50y 1h	360.20	12.82	26.69		26.69	0.000063	0.15	2852.71	586.39	0.02
LogbridgePowell	3	2000	100y 72h	614.50	12.82	27.71		27.71	0.000112	0.22	3455.75	600.00	0.02
LogbridgePowell	3	2000	100y 48h	679.30	12.82	27.92		27.92	0.000124	0.23	3583.00	600.00	0.02
LogbridgePowell	3	2000	100y 24h	807.20	12.82	28.37		28.38	0.000142	0.25	3856.27	600.00	0.03
LogbridgePowell	3	2000	100y 18h	1008.00	12.82	28.79		28.80	0.000183	0.30	4108.03	600.00	0.03
LogbridgePowell	3	2000	100y 12h	943.90	12.82	28.61		28.62	0.000174	0.29	4000.52	600.00	0.03
LogbridgePowell	3	2000	100y 6h	807.70	12.82	28.27		28.27	0.000149	0.26	3793.07	600.00	0.03
LogbridgePowell	3	2000	100y 3h	666.80	12.82	27.79		27.79	0.000127	0.23	3504.70	600.00	0.02
LogbridgePowell	3	2000	100y 1h	428.10	12.82	26.89		26.89	0.000081	0.17	2989.07	589.94	0.02
LogbridgePowell	3	2000	Feb2008	215.90	12.82	26.42		26.42	0.000026	0.09	2694.63	580.05	0.01
LogbridgePowell	3	1600	2y 72h	156.80	12.52	26.31		26.31	0.000014	0.08	2635.01	571.53	0.01
LogbridgePowell	3	1600	2y 48h	160.20	12.52	26.31		26.31	0.000015	0.08	2635.33	571.54	0.01
LogbridgePowell	3	1600	2y 24h	201.20	12.52	26.37		26.37	0.000023	0.10	2667.79	572.24	0.01
LogbridgePowell	3	1600	2y 18h	280.70	12.52	26.42		26.43	0.000043	0.14	2699.75	572.94	0.01
LogbridgePowell	3	1600	2y 12h	259.40	12.52	26.41		26.41	0.000037	0.13	2691.44	572.76	0.01
LogbridgePowell	3	1600	2y 6h	231.40	12.52	26.37		26.38	0.000030	0.11	2671.25	572.32	0.01
LogbridgePowell	3	1600	2y 3h	193.40	12.52	26.33		26.33	0.000022	0.10	2644.34	571.73	0.01
LogbridgePowell	3	1600	2y 1h	123.50	12.52	26.26		26.26	0.000009	0.06	2605.72	570.89	0.01
LogbridgePowell	3	1600	5y 72h	256.60	12.52	26.39		26.39	0.000037	0.13	2679.67	572.50	0.01
LogbridgePowell	3	1600	5y 48h	277.20	12.52	26.47		26.47	0.000041	0.14	2727.73	573.55	0.01
LogbridgePowell	3	1600	5y 24h	344.40	12.52	26.77		26.77	0.000054	0.16	2896.56	577.16	0.02
LogbridgePowell	3	1600	5y 18h	451.10	12.52	27.01		27.01	0.000082	0.20	3038.15	580.20	0.02
LogbridgePowell	3	1600	5y 12h	421.50	12.52	26.99		26.99	0.000072	0.19	3027.14	579.96	0.02
LogbridgePowell	3	1600	5y 6h	366.20	12.52	26.82		26.82	0.000059	0.17	2928.67	577.86	0.02
LogbridgePowell	3	1600	5y 3h	305.40	12.52	26.57		26.57	0.000047	0.15	2783.24	574.75	0.02
LogbridgePowell	3	1600	5y 1h	197.20	12.52	26.33		26.33	0.000022	0.10	2647.95	571.81	0.01
LogbridgePowell	3	1600	10y 72h	317.70	12.52	26.60		26.60	0.000050	0.15	2801.36	575.14	0.02
LogbridgePowell	3	1600	10y 48h	346.70	12.52	26.73		26.73	0.000056	0.16	2873.90	576.69	0.02
LogbridgePowell	3	1600	10y 24h	429.20	12.52	27.08		27.09	0.000071	0.19	3080.49	581.10	0.02
LogbridgePowell	3	1600	10y 18h	547.80	12.52	27.32		27.33	0.000103	0.23	3219.85	584.05	0.02
LogbridgePowell	3	1600	10y 12h	509.60	12.52	27.28		27.28	0.000091	0.21	3195.59	583.54	0.02
LogbridgePowell	3	1600	10y 6h	438.50	12.52	27.09		27.09	0.000074	0.19	3082.65	581.14	0.02
LogbridgePowell	3	1600	10y 3h	364.30	12.52	26.78		26.78	0.000060	0.17	2905.62	577.37	0.02
LogbridgePowell	3	1600	10y 1h	234.30	12.52	26.38		26.38	0.000031	0.12	2675.85	572.42	0.01
LogbridgePowell	3	1600	20y 72h	402.10	12.52	26.93		26.93	0.000068	0.18	2990.22	579.18	0.02
LogbridgePowell	3	1600	20y 48h	442.10	12.52	27.08		27.08	0.000076	0.19	3076.54	581.01	0.02
LogbridgePowell	3	1600	20y 24h	546.60	12.52	27.47		27.47	0.000096	0.22	3305.94	585.87	0.02
LogbridgePowell	3	1600	20y 18h	676.90	12.52	27.75		27.76	0.000129	0.26	3472.31	589.37	0.03
LogbridgePowell	3	1600	20y 12h	632.00	12.52	27.67		27.67	0.000117	0.25	3422.76	588.33	0.02
LogbridgePowell	3	1600	20y 6h	540.40	12.52	27.41		27.41	0.000096	0.22	3271.76	585.15	0.02
LogbridgePowell	3	1600	20y 3h	447.10	12.52	27.07		27.07	0.000078	0.19	3072.63	580.94	0.02
LogbridgePowell	3	1600	20y 1h	286.20	12.52	26.47		26.47	0.000044	0.14	2724.05	573.47	0.01

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	3	1600	50y 72h	506.10	12.52	27.30		27.30	0.000089	0.21	3206.80	583.78	0.02
LogbridgePowell	3	1600	50y 48h	567.40	12.52	27.48		27.49	0.000103	0.23	3313.70	586.03	0.02
LogbridgePowell	3	1600	50y 24h	676.50	12.52	27.93		27.93	0.000119	0.25	3574.82	591.51	0.02
LogbridgePowell	3	1600	50y 18h	863.60	12.52	28.32		28.32	0.000183	0.30	3805.34	596.28	0.03
LogbridgePowell	3	1600	50y 12h	798.70	12.52	28.17		28.17	0.000146	0.29	3717.50	594.47	0.03
LogbridgePowell	3	1600	50y 6h	683.20	12.52	27.84		27.84	0.000126	0.26	3521.72	590.40	0.03
LogbridgePowell	3	1600	50y 3h	562.60	12.52	27.42		27.42	0.000104	0.23	3276.41	585.25	0.02
LogbridgePowell	3	1600	50y 1h	360.20	12.52	26.67		26.67	0.000062	0.17	2839.24	575.95	0.02
LogbridgePowell	3	1600	100y 72h	614.50	12.52	27.66		27.66	0.000111	0.24	3417.52	588.22	0.02
LogbridgePowell	3	1600	100y 48h	679.30	12.52	27.87		27.87	0.000123	0.26	3539.72	590.78	0.02
LogbridgePowell	3	1600	100y 24h	807.20	12.52	28.32		28.32	0.000142	0.28	3805.64	596.29	0.03
LogbridgePowell	3	1600	100y 18h	1008.00	12.52	28.72		28.72	0.000186	0.33	4046.42	600.00	0.03
LogbridgePowell	3	1600	100y 12h	943.90	12.52	28.54		28.55	0.000178	0.32	3941.33	599.03	0.03
LogbridgePowell	3	1600	100y 6h	807.70	12.52	28.21		28.21	0.000149	0.29	3741.19	594.96	0.03
LogbridgePowell	3	1600	100y 3h	666.80	12.52	27.74		27.74	0.000126	0.26	3462.00	589.15	0.02
LogbridgePowell	3	1600	100y 1h	428.10	12.52	26.86		26.86	0.000080	0.19	2949.29	578.30	0.02
LogbridgePowell	3	1600	Feb2008	215.90	12.52	26.41		26.41	0.000028	0.11	2692.12	572.77	0.01
LogbridgePowell	3	1200	2y 72h	156.80	12.50	26.31		26.31	0.000007	0.06	2867.31	446.62	0.01
LogbridgePowell	3	1200	2y 48h	160.20	12.50	26.31		26.31	0.000007	0.06	2867.49	446.94	0.01
LogbridgePowell	3	1200	2y 24h	201.20	12.50	26.36		26.36	0.000011	0.08	2891.99	450.22	0.01
LogbridgePowell	3	1200	2y 18h	280.70	12.50	26.41		26.41	0.000022	0.11	2914.70	453.23	0.01
LogbridgePowell	3	1200	2y 12h	259.40	12.50	26.40		26.40	0.000019	0.10	2908.87	452.46	0.01
LogbridgePowell	3	1200	2y 6h	231.40	12.50	26.37		26.37	0.000015	0.09	2893.82	450.46	0.01
LogbridgePowell	3	1200	2y 3h	193.40	12.50	26.32		26.32	0.000011	0.08	2873.74	447.78	0.01
LogbridgePowell	3	1200	2y 1h	123.50	12.50	26.26		26.26	0.000004	0.05	2845.10	443.93	0.00
LogbridgePowell	3	1200	5y 72h	256.60	12.50	26.38		26.38	0.000018	0.10	2899.64	451.23	0.01
LogbridgePowell	3	1200	5y 48h	277.20	12.50	26.46		26.46	0.000021	0.11	2937.13	455.51	0.01
LogbridgePowell	3	1200	5y 24h	344.40	12.50	26.75		26.75	0.000029	0.13	3069.11	456.67	0.01
LogbridgePowell	3	1200	5y 18h	451.10	12.50	26.99		26.99	0.000045	0.16	3177.13	457.61	0.02
LogbridgePowell	3	1200	5y 12h	421.50	12.50	26.97		26.97	0.000040	0.15	3169.75	457.54	0.01
LogbridgePowell	3	1200	5y 6h	366.20	12.50	26.81		26.81	0.000032	0.14	3093.78	456.88	0.01
LogbridgePowell	3	1200	5y 3h	305.40	12.50	26.56		26.56	0.000024	0.12	2980.35	455.89	0.01
LogbridgePowell	3	1200	5y 1h	197.20	12.50	26.33		26.33	0.000011	0.08	2876.47	448.15	0.01
LogbridgePowell	3	1200	10y 72h	317.70	12.50	26.59		26.59	0.000026	0.12	2994.31	456.01	0.01
LogbridgePowell	3	1200	10y 48h	346.70	12.50	26.71		26.71	0.000030	0.13	3050.97	456.51	0.01
LogbridgePowell	3	1200	10y 24h	429.20	12.50	27.06		27.06	0.000040	0.15	3211.84	457.91	0.01
LogbridgePowell	3	1200	10y 18h	547.80	12.50	27.29		27.29	0.000060	0.19	3317.01	458.83	0.02
LogbridgePowell	3	1200	10y 12h	509.60	12.50	27.25		27.26	0.000052	0.18	3299.55	458.67	0.02
LogbridgePowell	3	1200	10y 6h	438.50	12.50	27.07		27.07	0.000041	0.16	3213.13	457.92	0.01
LogbridgePowell	3	1200	10y 3h	364.30	12.50	26.77		26.77	0.000032	0.14	3075.51	456.72	0.01
LogbridgePowell	3	1200	10y 1h	234.30	12.50	26.37		26.37	0.000015	0.09	2897.38	450.93	0.01
LogbridgePowell	3	1200	20y 72h	402.10	12.50	26.91		26.91	0.000037	0.15	3141.23	457.30	0.01
LogbridgePowell	3	1200	20y 48h	442.10	12.50	27.06		27.06	0.000042	0.16	3208.11	457.88	0.01
LogbridgePowell	3	1200	20y 24h	546.60	12.50	27.44		27.44	0.000056	0.19	3385.38	459.42	0.02
LogbridgePowell	3	1200	20y 18h	678.90	12.50	27.71		27.72	0.000079	0.23	3510.56	460.50	0.02
LogbridgePowell	3	1200	20y 12h	632.00	12.50	27.63		27.64	0.000070	0.21	3473.74	460.19	0.02
LogbridgePowell	3	1200	20y 6h	540.40	12.50	27.38		27.39	0.000056	0.19	3358.55	459.19	0.02
LogbridgePowell	3	1200	20y 3h	447.10	12.50	27.05		27.05	0.000043	0.16	3204.93	457.85	0.01
LogbridgePowell	3	1200	20y 1h	286.20	12.50	26.45		26.46	0.000022	0.11	2933.85	455.48	0.01
LogbridgePowell	3	1200	50y 72h	506.10	12.50	27.27		27.28	0.000051	0.18	3308.63	458.75	0.02
LogbridgePowell	3	1200	50y 48h	567.40	12.50	27.45		27.45	0.000060	0.19	3390.50	459.48	0.02
LogbridgePowell	3	1200	50y 24h	676.50	12.50	27.89		27.89	0.000074	0.22	3591.80	461.21	0.02
LogbridgePowell	3	1200	50y 18h	863.60	12.50	28.26		28.27	0.000106	0.27	3764.23	462.70	0.02
LogbridgePowell	3	1200	50y 12h	798.70	12.50	28.12		28.12	0.000095	0.25	3698.33	462.13	0.02
LogbridgePowell	3	1200	50y 6h	683.20	12.50	27.80		27.80	0.000078	0.23	3549.52	460.84	0.02
LogbridgePowell	3	1200	50y 3h	562.60	12.50	27.39		27.39	0.000061	0.19	3361.13	459.21	0.02
LogbridgePowell	3	1200	50y 1h	360.20	12.50	26.65		26.65	0.000033	0.14	3022.74	456.26	0.01
LogbridgePowell	3	1200	100y 72h	614.50	12.50	27.63		27.63	0.000067	0.21	3470.46	460.16	0.02
LogbridgePowell	3	1200	100y 48h	679.30	12.50	27.83		27.83	0.000076	0.22	3563.98	460.97	0.02
LogbridgePowell	3	1200	100y 24h	807.20	12.50	28.27		28.27	0.000093	0.25	3767.53	462.72	0.02
LogbridgePowell	3	1200	100y 18h	1008.00	12.50	28.66		28.66	0.000127	0.30	3946.66	464.27	0.03
LogbridgePowell	3	1200	100y 12h	943.90	12.50	28.49		28.49	0.000118	0.29	3867.23	463.58	0.03
LogbridgePowell	3	1200	100y 6h	807.70	12.50	28.16		28.16	0.000096	0.26	3716.58	462.29	0.02
LogbridgePowell	3	1200	100y 3h	666.80	12.50	27.70		27.70	0.000077	0.22	3503.03	460.44	0.02
LogbridgePowell	3	1200	100y 1h	428.10	12.50	26.84		26.84	0.000043	0.16	3107.40	457.00	0.01
LogbridgePowell	3	1200	Feb2008	215.90	12.50	26.40		26.40	0.000013	0.08	2910.80	452.72	0.01
LogbridgePowell	3	800	2y 72h	156.80	12.26	26.30		26.30	0.000008	0.06	2596.80	350.08	0.01
LogbridgePowell	3	800	2y 48h	160.20	12.26	26.30		26.30	0.000009	0.06	2596.90	350.08	0.01
LogbridgePowell	3	800	2y 24h	201.20	12.26	26.36		26.36	0.000014	0.08	2615.40	350.31	0.01
LogbridgePowell	3	800	2y 18h	280.70	12.26	26.40		26.40	0.000026	0.11	2631.43	350.50	0.01
LogbridgePowell	3	800	2y 12h	259.40	12.26	26.39		26.39	0.000022	0.10	2627.39	350.45	0.01
LogbridgePowell	3	800	2y 6h	231.40	12.26	26.36		26.36	0.000018	0.09	2616.27	350.32	0.01
LogbridgePowell	3	800	2y 3h	193.40	12.26	26.32		26.32	0.000013	0.08	2601.28	350.13	0.01
LogbridgePowell	3	800	2y 1h	123.50	12.26	26.26		26.26	0.000005	0.05	2579.74	349.87	0.01
LogbridgePowell	3	800	5y 72h	256.60	12.26	26.37		26.37	0.000022	0.10	2620.27	350.36	0.01
LogbridgePowell	3	800	5y 48h	277.20	12.26	26.45		26.45	0.000025	0.11	2648.86	350.71	0.01
LogbridgePowell	3	800	5y 24h	344.40	12.26	26.74		26.74	0.000035	0.13	2749.26	351.93	0.01
LogbridgePowell	3	800	5y 18h	451.10	12.26	26.97		26.97	0.000055	0.17	2829.98	352.90	0.02
LogbridgePowell	3	800	5y 12h	421.50	12.26	26.95		26.96	0.000048	0.16	2825.13	352.84	0.02
LogbridgePowell	3	800	5y 6h	366.20	12.26	26.79		26.79	0.000039	0.14	2767.80	352.15	0.01
LogbridgePowell	3	800	5y 3h	305.40	12.26	26.55		26.55	0.000029	0.12	2681.60	351.11	0.01
LogbridgePowell	3	800	5y 1h	197.20	12.26	26.32		26.32	0.000013	0.08	2603.35	350.18	0.01
LogbridgePowell	3	800	10y 72h	317.70	12.26	26.58		26.58	0.000031	0.12	2692.08	351.23	0.01
LogbridgePowell	3	800	10y 48h	346.70	12.26	26.70		26.70	0.000036	0.13	2735.17	351.75	0.01
LogbridgePowell	3	800	10y 24h	429.20	12.26	27.05		27.05	0.000048	0.16	2857.57	353.23	0.02
LogbridgePowell	3	800	10y 18h	547.80	12.26	27.27		27.27	0.000073	0.20	2935.56	354.17	0.02
LogbridgePowell	3	800	10y 12h	509.60	12.26	27.23		27.23	0.000064	0.18	2923.25	354.02	0.02
LogbridgePowell	3	800	10y 6h	438.50	12.26	27.05		27.05	0.000051	0.16	2858.30	353.24	0.02
LogbridgePowell	3	800	10y 3h	364.30	12.26	26.75		26.75	0.000039	0.14	2753.70	351.98	0.01
LogbridgePowell	3	800	10y 1h	234.30	12.26	26.37		26.37	0.000018	0.09	2618.97	350.35	0.01

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LogbridgePowell	3	800	20y 72h	402.10	12.26	26.89		26.89	0.000045	0.15	2803.57	352.58	0.01
LogbridgePowell	3	800	20y 48h	442.10	12.26	27.04		27.04	0.000052	0.16	2854.29	353.19	0.02
LogbridgePowell	3	800	20y 24h	546.80	12.26	27.42		27.42	0.000069	0.19	2986.86	354.81	0.02
LogbridgePowell	3	800	20y 18h	576.90	12.26	27.68		27.68	0.000096	0.23	3081.91	355.92	0.02
LogbridgePowell	3	800	20y 12h	532.00	12.26	27.60		27.60	0.000087	0.22	3054.84	355.59	0.02
LogbridgePowell	3	800	20y 6h	540.40	12.26	27.36		27.36	0.000069	0.19	2968.17	354.58	0.02
LogbridgePowell	3	800	20y 3h	447.10	12.26	27.03		27.03	0.000053	0.17	2851.67	353.16	0.02
LogbridgePowell	3	800	20y 1h	286.20	12.26	26.45		26.45	0.000027	0.11	2646.12	350.68	0.01
LogbridgePowell	3	800	50y 72h	506.10	12.26	27.25		27.25	0.000063	0.18	2930.43	354.11	0.02
LogbridgePowell	3	800	50y 48h	567.40	12.26	27.43		27.43	0.000074	0.20	2992.16	354.84	0.02
LogbridgePowell	3	800	50y 24h	678.50	12.26	27.86		27.86	0.000092	0.23	3145.45	356.68	0.02
LogbridgePowell	3	800	50y 18h	683.60	12.26	28.22		28.22	0.000133	0.28	3273.63	358.20	0.03
LogbridgePowell	3	800	50y 12h	798.70	12.26	28.08		28.08	0.000119	0.26	3224.43	357.61	0.02
LogbridgePowell	3	800	50y 6h	683.20	12.26	27.76		27.77	0.000096	0.23	3112.21	356.28	0.02
LogbridgePowell	3	800	50y 3h	562.60	12.26	27.36		27.36	0.000075	0.20	2969.43	354.57	0.02
LogbridgePowell	3	800	50y 1h	360.20	12.26	26.64		26.64	0.000039	0.14	2712.95	351.49	0.01
LogbridgePowell	3	800	100y 72h	614.50	12.26	27.60		27.60	0.000082	0.21	3052.92	355.57	0.02
LogbridgePowell	3	800	100y 48h	679.30	12.26	27.80		27.80	0.000094	0.23	3123.66	356.42	0.02
LogbridgePowell	3	800	100y 24h	807.20	12.26	28.23		28.23	0.000116	0.26	3278.41	358.26	0.02
LogbridgePowell	3	800	100y 18h	1008.00	12.26	28.60		28.60	0.000161	0.32	3411.39	359.85	0.03
LogbridgePowell	3	800	100y 12h	943.60	12.26	28.43		28.44	0.000149	0.30	3351.42	359.13	0.03
LogbridgePowell	3	800	100y 6h	807.70	12.26	28.12		28.12	0.000120	0.27	3238.40	357.78	0.02
LogbridgePowell	3	800	100y 3h	666.80	12.26	27.66		27.67	0.000095	0.23	3076.47	355.85	0.02
LogbridgePowell	3	800	100y 1h	426.10	12.26	26.82		26.82	0.000052	0.16	2776.55	352.25	0.02
LogbridgePowell	3	800	Feb2008	215.90	12.26	26.40		26.40	0.000015	0.09	2629.77	350.48	0.01
LogbridgePowell	3	400	2y 72h	340.00	12.17	26.30	13.21	26.30	0.000012	0.07	4758.49	600.00	0.01
LogbridgePowell	3	400	2y 48h	351.10	12.17	26.30	13.22	26.30	0.000013	0.08	4756.49	600.00	0.01
LogbridgePowell	3	400	2y 24h	455.80	12.17	26.35	13.35	26.35	0.000021	0.10	4786.48	600.00	0.01
LogbridgePowell	3	400	2y 18h	604.90	12.17	26.39	13.53	26.39	0.000036	0.13	4810.44	600.00	0.01
LogbridgePowell	3	400	2y 12h	563.10	12.17	26.38	13.48	26.38	0.000032	0.12	4804.58	600.00	0.01
LogbridgePowell	3	400	2y 6h	526.70	12.17	26.35	13.44	26.35	0.000028	0.11	4786.48	600.00	0.01
LogbridgePowell	3	400	2y 3h	440.70	12.17	26.31	13.34	26.31	0.000020	0.09	4762.52	600.00	0.01
LogbridgePowell	3	400	2y 1h	423.40	12.17	26.25	13.31	26.25	0.000019	0.09	4726.49	600.00	0.01
LogbridgePowell	3	400	5y 72h	556.20	12.17	26.38	13.48	26.36	0.000031	0.12	4792.51	600.00	0.01
LogbridgePowell	3	400	5y 48h	607.20	12.17	26.44	13.53	26.44	0.000036	0.13	4840.43	600.00	0.01
LogbridgePowell	3	400	5y 24h	770.40	12.17	26.72	13.70	26.72	0.000052	0.16	5008.60	600.00	0.02
LogbridgePowell	3	400	5y 18h	960.20	12.17	26.94	13.89	26.94	0.000075	0.19	5140.53	600.00	0.02
LogbridgePowell	3	400	5y 12h	892.10	12.17	26.93	13.82	26.93	0.000065	0.18	5134.50	600.00	0.02
LogbridgePowell	3	400	5y 6h	833.70	12.17	26.77	13.76	26.77	0.000060	0.17	5038.49	600.00	0.02
LogbridgePowell	3	400	5y 3h	691.90	12.17	26.53	13.62	26.53	0.000045	0.14	4894.56	600.00	0.01
LogbridgePowell	3	400	5y 1h	649.10	12.17	26.31	13.57	26.31	0.000043	0.14	4762.52	600.00	0.01
LogbridgePowell	3	400	10y 72h	687.60	12.17	26.56	13.62	26.56	0.000044	0.14	4912.48	600.00	0.01
LogbridgePowell	3	400	10y 48h	756.80	12.17	26.68	13.69	26.68	0.000051	0.16	4984.54	600.00	0.02
LogbridgePowell	3	400	10y 24h	954.30	12.17	27.02	13.88	27.02	0.000072	0.19	5188.45	600.00	0.02
LogbridgePowell	3	400	10y 18h	1158.00	12.17	27.23	14.06	27.23	0.000099	0.22	5314.45	600.00	0.02
LogbridgePowell	3	400	10y 12h	1070.00	12.17	27.20	13.98	27.20	0.000085	0.21	5296.53	600.00	0.02
LogbridgePowell	3	400	10y 6h	997.40	12.17	27.02	13.92	27.02	0.000079	0.20	5188.45	600.00	0.02
LogbridgePowell	3	400	10y 3h	824.00	12.17	26.73	13.75	26.73	0.000060	0.17	5014.53	600.00	0.02
LogbridgePowell	3	400	10y 1h	760.60	12.17	26.35	13.69	26.35	0.000056	0.16	4786.48	600.00	0.02
LogbridgePowell	3	400	20y 72h	866.70	12.17	26.67	13.80	26.67	0.000063	0.17	5098.47	600.00	0.02
LogbridgePowell	3	400	20y 48h	961.70	12.17	27.01	13.89	27.01	0.000074	0.19	5182.41	600.00	0.02
LogbridgePowell	3	400	20y 24h	1207.00	12.17	27.38	14.10	27.38	0.000102	0.23	5404.43	600.00	0.02
LogbridgePowell	3	400	20y 18h	1425.00	12.17	27.63	14.28	27.63	0.000131	0.27	5554.58	600.00	0.03
LogbridgePowell	3	400	20y 12h	1316.00	12.17	27.56	14.20	27.56	0.000114	0.25	5512.51	600.00	0.02
LogbridgePowell	3	400	20y 6h	1226.00	12.17	27.32	14.12	27.32	0.000108	0.24	5368.59	600.00	0.02
LogbridgePowell	3	400	20y 3h	1011.00	12.17	27.00	13.93	27.00	0.000082	0.20	5176.56	600.00	0.02
LogbridgePowell	3	400	20y 1h	914.70	12.17	26.42	13.84	26.42	0.000082	0.19	4828.54	600.00	0.02
LogbridgePowell	3	400	50y 72h	1086.00	12.17	27.22	14.00	27.22	0.000086	0.21	5308.42	600.00	0.02
LogbridgePowell	3	400	50y 48h	1178.00	12.17	27.39	14.08	27.39	0.000097	0.22	5410.46	600.00	0.02
LogbridgePowell	3	400	50y 24h	1451.00	12.17	27.81	14.31	27.81	0.000128	0.27	5662.47	600.00	0.03
LogbridgePowell	3	400	50y 18h	1796.00	12.17	28.15	14.56	28.16	0.000176	0.32	5866.57	600.00	0.03
LogbridgePowell	3	400	50y 12h	1657.00	12.17	28.02	14.46	28.02	0.000158	0.30	5788.48	600.00	0.03
LogbridgePowell	3	400	50y 6h	1550.00	12.17	27.71	14.36	27.71	0.000151	0.29	5602.49	600.00	0.03
LogbridgePowell	3	400	50y 3h	1284.00	12.17	27.32	14.17	27.32	0.000118	0.25	5368.59	600.00	0.02
LogbridgePowell	3	400	50y 1h	1120.00	12.17	26.60	14.03	26.60	0.000115	0.23	4936.44	600.00	0.02
LogbridgePowell	3	400	100y 72h	1316.00	12.17	27.56	14.20	27.56	0.000115	0.25	5509.58	600.00	0.02
LogbridgePowell	3	400	100y 48h	1410.00	12.17	27.75	14.27	27.75	0.000123	0.26	5626.45	600.00	0.03
LogbridgePowell	3	400	100y 24h	1720.00	12.17	28.17	14.51	28.17	0.000161	0.30	5878.46	600.00	0.03
LogbridgePowell	3	400	100y 18h	2090.00	12.17	28.52	14.77	28.53	0.000213	0.36	6088.59	600.00	0.03
LogbridgePowell	3	400	100y 12h	1947.00	12.17	28.36	14.67	28.37	0.000194	0.34	5992.57	600.00	0.03
LogbridgePowell	3	400	100y 6h	1827.00	12.17	28.05	14.59	28.06	0.000186	0.33	5806.58	600.00	0.03
LogbridgePowell	3	400	100y 3h	1521.00	12.17	27.61	14.36	27.61	0.000150	0.28	5542.51	600.00	0.03
LogbridgePowell	3	400	100y 1h	1313.00	12.17	26.77	14.20	26.77	0.000149	0.27	5038.49	600.00	0.03
LogbridgePowell	3	400	Feb2008	492.20	12.17	26.39	13.40	26.39	0.000024	0.10	4810.44	600.00	0.01
Doongul	1	1200	2y 72h	119.40	22.81	28.94	25.60	28.95	0.002099	0.40	302.67	125.82	0.08
Doongul	1	1200	2y 48h	130.60	22.81	29.09	25.70	29.10	0.002105	0.41	321.74	128.39	0.08
Doongul	1	1200	2y 24h	173.30	22.81	29.71	26.09	29.72	0.001932	0.44	406.04	150.76	0.08
Doongul	1	1200	2y 18h	205.80	22.81	30.06	26.19	30.08	0.001943	0.46	462.17	169.34	0.08
Doongul	1	1200	2y 12h	216.10	22.81	30.14	26.24	30.15	0.002022	0.48	474.54	174.82	0.08
Doongul	1	1200	2y 6h	194.50	22.81	29.93	26.12	29.94	0.001977	0.46	439.36	159.33	0.08
Doongul	1	1200	2y 3h	157.90	22.81	29.54	25.91	29.55	0.001902	0.43	380.93	143.98	0.08
Doongul	1	1200	2y 1h	67.36	22.81	28.04	24.98	28.04	0.002303	0.35	198.15	107.59	0.08
Doongul	1	1200	5y 72h	201.40	22.81	30.01	26.17	30.02	0.001960	0.46	452.85	165.11	0.08
Doongul	1	1200	5y 48h	228.70	22.81	30.29	26.30	30.30	0.002045	0.48	502.49	188.53	0.08
Doongul	1	1200	5y 24h	298.60	22.81	30.82	26.63	30.83	0.002383	0.52	615.28	244.49	0.09
Doongul	1	1200	5y 18h	328.40	22.81	31.08	26.74	31.09	0.002357	0.52	684.01	286.51	0.09
Doongul	1	1200	5y 12h	347.30	22.81	31.15	26.82	31.17	0.002481	0.54	706.22	299.03	0.09
Doongul	1	1200	5y 6h	309.50	22.81	30.90	26.67	30.91	0.002415	0.53	634.35	256.92	0.09
Doongul	1	1200	5y 3h	249.80	22.81	30.47	26.41	30.48	0.002149	0.49	536.73	204.97	0.09
Doongul	1	1200	5y 1h	112.10	22.81	28.95	25.53	28.96	0.001835	0.38	303.54	125.94	0.08

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Doongul	1	1200	10y 72h	251.20	22.81	30.49	26.42	30.50	0.002146	0.49	542.48	206.55	0.09
Doongul	1	1200	10y 48h	284.80	22.81	30.73	26.57	30.74	0.002320	0.51	594.31	230.41	0.09
Doongul	1	1200	10y 24h	370.40	22.81	31.28	26.90	31.30	0.002543	0.55	745.89	320.13	0.09
Doongul	1	1200	10y 18h	395.40	22.81	31.54	26.94	31.55	0.002378	0.53	834.39	384.28	0.09
Doongul	1	1200	10y 12h	418.50	22.81	31.59	27.06	31.60	0.002543	0.55	852.25	370.94	0.09
Doongul	1	1200	10y 6h	371.80	22.81	31.29	26.90	31.30	0.002547	0.55	746.37	321.40	0.09
Doongul	1	1200	10y 3h	298.10	22.81	30.83	26.61	30.84	0.002357	0.52	617.72	246.06	0.09
Doongul	1	1200	10y 1h	135.40	22.81	29.37	25.74	29.38	0.001672	0.39	357.52	133.12	0.07
Doongul	1	1200	20y 72h	320.20	22.81	30.99	26.71	31.00	0.002399	0.53	659.69	272.38	0.09
Doongul	1	1200	20y 48h	360.10	22.81	31.23	26.86	31.25	0.002502	0.54	730.43	312.06	0.09
Doongul	1	1200	20y 24h	470.40	22.81	31.85	27.33	31.86	0.002511	0.57	952.78	406.20	0.09
Doongul	1	1200	20y 18h	487.20	22.81	32.04	27.37	32.05	0.002254	0.55	1032.55	425.17	0.09
Doongul	1	1200	20y 12h	516.60	22.81	32.10	27.43	32.11	0.002395	0.57	1057.40	429.51	0.09
Doongul	1	1200	20y 6h	458.40	22.81	31.78	27.29	31.80	0.002536	0.57	926.61	396.92	0.09
Doongul	1	1200	20y 3h	366.50	22.81	31.27	26.86	31.29	0.002507	0.55	743.31	318.80	0.09
Doongul	1	1200	20y 1h	168.40	22.81	29.78	25.87	29.79	0.001709	0.42	416.16	153.41	0.08
Doongul	1	1200	50y 72h	408.50	22.81	31.54	27.01	31.56	0.002535	0.55	834.86	384.48	0.09
Doongul	1	1200	50y 48h	418.70	22.81	31.64	27.08	31.66	0.002417	0.54	872.44	377.99	0.09
Doongul	1	1200	50y 24h	575.90	22.81	32.35	27.56	32.36	0.002308	0.58	1164.87	433.99	0.09
Doongul	1	1200	50y 18h	620.10	22.81	32.71	27.63	32.72	0.001875	0.55	1323.30	451.28	0.08
Doongul	1	1200	50y 12h	645.90	22.81	32.72	27.70	32.74	0.002002	0.57	1330.83	452.63	0.09
Doongul	1	1200	50y 6h	577.70	22.81	32.35	27.56	32.36	0.002324	0.58	1164.44	433.98	0.09
Doongul	1	1200	50y 3h	461.80	22.81	31.82	27.30	31.84	0.002481	0.56	942.17	402.73	0.09
Doongul	1	1200	50y 1h	216.20	22.81	30.30	26.24	30.31	0.001817	0.45	504.08	189.29	0.08
Doongul	1	1200	100y 72h	494.70	22.81	32.00	27.39	32.02	0.002407	0.56	1016.99	422.00	0.09
Doongul	1	1200	100y 48h	508.20	22.81	32.11	27.43	32.13	0.002283	0.56	1063.57	430.34	0.09
Doongul	1	1200	100y 24h	684.70	22.81	32.84	27.75	32.86	0.002012	0.59	1386.24	480.58	0.09
Doongul	1	1200	100y 18h	722.40	22.81	33.10	27.84	33.11	0.001779	0.57	1518.84	551.09	0.08
Doongul	1	1200	100y 12h	758.60	22.81	33.13	27.80	33.14	0.001912	0.59	1534.79	557.44	0.09
Doongul	1	1200	100y 6h	681.90	22.81	32.82	27.75	32.84	0.002031	0.59	1377.27	473.62	0.09
Doongul	1	1200	100y 3h	548.20	22.81	32.24	27.51	32.25	0.002340	0.58	1118.16	433.02	0.09
Doongul	1	1200	100y 1h	261.20	22.81	30.69	26.47	30.70	0.002019	0.46	584.01	224.10	0.08
Doongul	1	1200	Feb2008	160.30	22.81	29.59	25.92	29.60	0.001855	0.42	388.89	146.17	0.08
Doongul	1	800	2y 72h	119.40	22.35	28.28		28.29	0.001288	0.33	375.77	146.94	0.06
Doongul	1	800	2y 48h	130.60	22.35	28.39		28.40	0.001417	0.35	392.77	156.58	0.07
Doongul	1	800	2y 24h	173.30	22.35	28.95		28.96	0.001770	0.36	500.07	227.61	0.07
Doongul	1	800	2y 18h	205.80	22.35	29.34		29.35	0.001611	0.36	594.21	256.12	0.07
Doongul	1	800	2y 12h	216.10	22.35	29.36		29.37	0.001753	0.37	600.82	260.85	0.07
Doongul	1	800	2y 6h	194.50	22.35	29.16		29.16	0.001765	0.37	548.74	242.64	0.07
Doongul	1	800	2y 3h	157.90	22.35	28.81		28.81	0.001677	0.35	468.38	212.37	0.07
Doongul	1	800	2y 1h	67.36	22.35	27.59		27.60	0.000635	0.25	292.04	111.92	0.05
Doongul	1	800	5y 72h	201.40	22.35	29.26		29.27	0.001883	0.36	574.79	250.36	0.07
Doongul	1	800	5y 48h	228.70	22.35	29.50		29.51	0.001819	0.37	637.65	285.01	0.07
Doongul	1	800	5y 24h	298.60	22.35	30.00		30.00	0.001729	0.40	788.49	320.56	0.08
Doongul	1	800	5y 18h	328.40	22.35	30.34		30.34	0.001457	0.39	902.34	349.54	0.07
Doongul	1	800	5y 12h	347.30	22.35	30.35		30.36	0.001599	0.41	908.67	351.03	0.07
Doongul	1	800	5y 6h	309.50	22.35	30.07		30.08	0.001706	0.41	813.68	327.31	0.07
Doongul	1	800	5y 3h	249.80	22.35	29.68		29.69	0.001748	0.38	691.32	299.31	0.07
Doongul	1	800	5y 1h	112.10	22.35	28.40		28.40	0.001042	0.30	393.22	156.89	0.06
Doongul	1	800	10y 72h	251.20	22.35	29.71		29.72	0.001706	0.38	706.13	301.28	0.07
Doongul	1	800	10y 48h	284.80	22.35	29.92		29.93	0.001710	0.40	765.04	315.34	0.07
Doongul	1	800	10y 24h	370.40	22.35	30.47		30.48	0.001619	0.42	949.73	360.85	0.07
Doongul	1	800	10y 18h	395.40	22.35	30.84		30.85	0.001318	0.39	1090.39	396.52	0.07
Doongul	1	800	10y 12h	418.50	22.35	30.81		30.82	0.001519	0.42	1077.44	393.12	0.07
Doongul	1	800	10y 6h	371.80	22.35	30.48		30.48	0.001620	0.42	952.35	361.47	0.07
Doongul	1	800	10y 3h	298.10	22.35	30.03		30.03	0.001667	0.40	798.34	323.31	0.07
Doongul	1	800	10y 1h	135.40	22.35	28.77		28.78	0.001268	0.30	461.38	208.58	0.06
Doongul	1	800	20y 72h	320.20	22.35	30.20		30.21	0.001587	0.40	857.32	338.61	0.07
Doongul	1	800	20y 48h	360.10	22.35	30.44		30.44	0.001582	0.41	937.84	358.04	0.07
Doongul	1	800	20y 24h	470.40	22.35	31.07		31.08	0.001531	0.43	1184.95	421.09	0.07
Doongul	1	800	20y 18h	487.20	22.35	31.38		31.39	0.001266	0.40	1317.10	439.85	0.07
Doongul	1	800	20y 12h	516.60	22.35	31.37		31.38	0.001435	0.43	1313.00	439.22	0.07
Doongul	1	800	20y 6h	458.40	22.35	31.00		31.01	0.001549	0.43	1153.79	412.93	0.07
Doongul	1	800	20y 3h	366.50	22.35	30.48		30.49	0.001566	0.41	954.09	361.88	0.07
Doongul	1	800	20y 1h	168.40	22.35	29.17		29.17	0.001311	0.32	550.88	243.27	0.06
Doongul	1	800	50y 72h	408.50	22.35	30.77		30.78	0.001500	0.42	1061.32	388.84	0.07
Doongul	1	800	50y 48h	418.70	22.35	30.92		30.93	0.001379	0.40	1122.57	405.10	0.07
Doongul	1	800	50y 24h	575.90	22.35	31.64		31.65	0.001429	0.44	1432.35	454.32	0.07
Doongul	1	800	50y 18h	620.10	22.35	32.13		32.13	0.001209	0.39	1666.71	501.52	0.07
Doongul	1	800	50y 12h	645.90	22.35	32.09		32.09	0.001359	0.41	1645.72	499.89	0.07
Doongul	1	800	50y 6h	577.70	22.35	31.63		31.64	0.001449	0.44	1428.35	453.97	0.07
Doongul	1	800	50y 3h	461.80	22.35	31.06		31.07	0.001486	0.43	1180.65	419.95	0.07
Doongul	1	800	50y 1h	216.20	22.35	29.66		29.67	0.001341	0.33	685.58	298.02	0.06
Doongul	1	800	100y 72h	494.70	22.35	31.28		31.28	0.001426	0.42	1271.36	432.87	0.07
Doongul	1	800	100y 48h	508.20	22.35	31.44		31.44	0.001315	0.41	1341.90	443.66	0.07
Doongul	1	800	100y 24h	684.70	22.35	32.20		32.20	0.001390	0.42	1702.28	504.28	0.07
Doongul	1	800	100y 18h	722.40	22.35	32.56		32.56	0.001125	0.40	1885.08	507.47	0.06
Doongul	1	800	100y 12h	758.60	22.35	32.53		32.54	0.001272	0.43	1870.68	507.40	0.07
Doongul	1	800	100y 6h	681.90	22.35	32.17		32.18	0.001410	0.43	1668.64	503.24	0.07
Doongul	1	800	100y 3h	548.20	22.35	31.52		31.53	0.001422	0.43	1381.49	449.68	0.07
Doongul	1	800	100y 1h	261.20	22.35	30.05		30.05	0.001252	0.35	804.79	324.97	0.06
Doongul	1	800	Feb2008	160.30	22.35	28.88		28.89	0.001626	0.34	484.78	221.49	0.07
Doongul	1	400	2y 72h	119.40	21.71	27.43		27.45	0.004651	0.62	204.68	81.49	0.12
Doongul	1	400	2y 48h	130.60	21.71	27.43		27.45	0.005528	0.67	205.11	81.53	0.13
Doongul	1	400	2y 24h	173.30	21.71	27.76		27.79	0.006664	0.79	232.35	83.67	0.15
Doongul	1	400	2y 18h	205.80	21.71	28.29		28.32	0.005501	0.78	277.53	87.09	0.14
Doongul	1	400	2y 12h	216.10	21.71	28.18		28.21	0.006783	0.85	267.39	86.34	0.15
Doongul	1	400	2y 6h	194.50	21.71	27.96		27.99	0.006806	0.82	249.05	84.95	0.15
Doongul	1	400	2y 3h	157.90	21.71	27.72		27.74	0.005825	0.73	228.44	83.38	0.14
Doongul	1	400	2y 1h	67.36	21.71	27.19		27.20	0.001987	0.38	185.85	79.98	0.08

HEC-RAS Plan: Plan 13 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Doongul	1	400	5y 72h	201.40	21.71	28.15		28.18	0.006064	0.80	264.83	86.14	0.14
Doongul	1	400	5y 48h	228.70	21.71	28.27		28.30	0.006952	0.87	275.40	86.93	0.15
Doongul	1	400	5y 24h	298.60	21.71	28.75		28.80	0.007888	0.98	318.26	90.07	0.16
Doongul	1	400	5y 18h	328.40	21.71	29.32		29.36	0.005916	0.93	370.66	93.77	0.15
Doongul	1	400	5y 12h	347.30	21.71	29.19		29.23	0.007335	1.02	357.96	92.88	0.16
Doongul	1	400	5y 6h	309.50	21.71	28.84		28.89	0.007681	1.00	326.13	90.64	0.16
Doongul	1	400	5y 3h	249.80	21.71	28.49		28.52	0.006773	0.89	294.65	88.36	0.15
Doongul	1	400	5y 1h	112.10	21.71	27.79		27.80	0.002709	0.50	234.58	83.84	0.09
Doongul	1	400	10y 72h	251.20	21.71	28.55		28.59	0.006456	0.88	300.53	88.79	0.15
Doongul	1	400	10y 48h	284.80	21.71	28.72		28.76	0.007208	0.95	315.06	89.84	0.16
Doongul	1	400	10y 24h	370.40	21.71	29.26		29.31	0.007889	1.06	364.79	93.36	0.17
Doongul	1	400	10y 18h	395.40	21.71	29.89		29.94	0.005728	0.97	425.08	97.45	0.14
Doongul	1	400	10y 12h	418.50	21.71	29.66		29.72	0.007498	1.09	403.16	95.98	0.16
Doongul	1	400	10y 6h	371.80	21.71	29.26		29.32	0.007917	1.07	365.29	93.39	0.17
Doongul	1	400	10y 3h	298.10	21.71	28.85		28.89	0.007088	0.95	326.70	90.68	0.16
Doongul	1	400	10y 1h	135.40	21.71	28.06		28.07	0.002965	0.55	257.43	85.59	0.10
Doongul	1	400	20y 72h	320.20	21.71	29.08		29.12	0.006794	0.97	347.75	92.17	0.15
Doongul	1	400	20y 48h	360.10	21.71	29.27		29.32	0.007383	1.03	366.03	93.44	0.16
Doongul	1	400	20y 24h	470.40	21.71	29.89		29.95	0.008136	1.16	424.59	97.42	0.17
Doongul	1	400	20y 18h	497.20	21.71	30.42		30.47	0.006187	1.07	477.59	100.88	0.15
Doongul	1	400	20y 12h	516.60	21.71	30.25		30.32	0.007733	1.17	460.57	99.78	0.17
Doongul	1	400	20y 6h	458.40	21.71	29.80		29.86	0.008184	1.15	416.34	96.87	0.17
Doongul	1	400	20y 3h	366.50	21.71	29.33		29.38	0.007343	1.04	371.09	93.79	0.16
Doongul	1	400	20y 1h	166.40	21.71	28.41		28.43	0.003308	0.62	287.66	87.84	0.11
Doongul	1	400	50y 72h	408.50	21.71	29.66		29.70	0.007232	1.07	401.49	95.87	0.16
Doongul	1	400	50y 48h	418.70	21.71	29.91		29.96	0.008357	1.03	426.60	97.55	0.15
Doongul	1	400	50y 24h	575.90	21.71	30.49		30.56	0.008287	1.24	484.57	101.33	0.18
Doongul	1	400	50y 18h	620.10	21.71	31.12		31.18	0.007719	1.11	565.66	171.69	0.17
Doongul	1	400	50y 12h	645.90	21.71	30.82		30.99	0.009708	1.20	532.05	161.52	0.19
Doongul	1	400	50y 6h	577.70	21.71	30.45		30.53	0.008519	1.26	481.01	101.10	0.18
Doongul	1	400	50y 3h	461.80	21.71	29.93		29.99	0.007618	1.13	428.78	97.70	0.17
Doongul	1	400	50y 1h	216.20	21.71	28.86		28.88	0.003689	0.69	327.86	90.76	0.11
Doongul	1	400	100y 72h	494.70	21.71	30.18		30.24	0.007440	1.14	453.07	99.30	0.17
Doongul	1	400	100y 48h	508.20	21.71	30.42		30.48	0.006716	1.11	477.98	100.91	0.16
Doongul	1	400	100y 24h	684.70	21.71	30.98		31.06	0.010394	1.26	542.84	164.83	0.19
Doongul	1	400	100y 18h	722.40	21.71	31.60		31.67	0.007429	1.16	654.75	195.94	0.17
Doongul	1	400	100y 12h	758.60	21.71	31.42		31.50	0.009311	1.27	619.85	186.80	0.19
Doongul	1	400	100y 6h	681.90	21.71	30.93		31.02	0.010680	1.27	534.95	162.41	0.20
Doongul	1	400	100y 3h	548.20	21.71	30.40		30.47	0.007943	1.21	475.32	100.74	0.17
Doongul	1	400	100y 1h	261.20	21.71	29.25		29.28	0.003949	0.75	364.00	93.30	0.12
Doongul	1	400	Feb2008	160.30	21.71	27.86		27.88	0.005128	0.70	240.64	84.30	0.13

Appendix D

Additional Runs

CLIENTS|PEOPLE|PERFORMANCE

25 March 2009

Wide Bay Water
29-31 Ellengowan Street
Urangan Qld 4655

Our ref: 41/19335/387777
Your ref:

Attn: Peter Care

Dear Peter

Lenthalls Dam Raising
Upstream effect of raised dam levels

Based upon the modelling developed for the evaluation of the upstream effects of the raised dam level an additional scenario has been modelled of the dam in its pre raised state. The results are given in Table 1.

The following scenarios are included in the summarised results:

- **Scenario 1:** Dam in Pre-development Condition. Full Supply Level (FSL) = 24m and spillway rating curve for pre-development condition.
- **Scenario 2:** Dam Upgraded with Gates Closed and Not Operational. FSL = 26m and spillway rating curve with gates not operational.
- **Scenario 3:** Dam Upgraded with Gates Fully Operational. FSL = 26m and spillway rating curve with gates fully operational.

Table 1 Flood Levels at Farmhouse

Event	Flood levels with dam not raised (FSL 24m AHD)	Flood levels with dam raised (FSL 26m AHD)	
	Scenario 1	Crest gates closed and not operational	Crest gates open and fully operational
		Scenario 2	Scenario 3
February 2008	28.11	28.47	28.13
50% AEP	28.51	28.93	28.52
20% AEP	29.55	30.01	29.58
10% AEP	30.05	30.51	30.18
5% AEP	30.65	31.07	30.70
2% AEP	31.34	31.78	31.39
1% AEP	31.81	32.29	31.87

The results in Table 1 show the estimated flood levels at the farmhouse for the February 2008 flood event as well as the flood levels for the 50%, 20%, 10%, 5%, 2% and 1% AEP design events.

Based on these results, it is estimated that the flood level at the farmhouse would have reached a level of approximately 28.1m AHD, for the February 2008 storm event, if the dam had not been upgraded or raised (Scenario 1). This is practically the same level that would have been reached (28.1m AHD) if the crest gates had been fully functional during the February 2008 storm (Scenario 2).

It is further noted in Table 1, that the predicted flood levels for Scenarios 1 and 3 are essentially the same for the full range of storm events assessed, up to the 1% AEP event. This is reasonable and suggests that the dam was adequately designed and upgraded such that there would have been minimal or no adverse impacts on existing flood levels at the farmhouse up to the 1% AEP event, if the crest gates had operated as intended.

It is evident that the increased upstream flood levels at the farmhouse are attributed to the failure of the gates to function during the February 2008 storm. Comparing the results for Scenario 1 and Scenario 2, it is estimated that the failure of the gates resulted in elevated levels at the farmhouse of about 0.36m for the February 2008 event, and between 0.4-0.5m for the design flood events.

Please note that these results are based upon the model that has not yet been calibrated against actual measured water levels at the farmhouse.

Yours faithfully
GHD Pty Ltd

[redacted]

[redacted]
Principal Tunnelling Engineer
[redacted]

GHD

OfficeAddressLine1
OfficeAddressLine2
T: OfficeTelephone F: OfficeFax E: OfficeEmail

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
B	[redacted]	[redacted]		[redacted]		