Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project SEIS

Report for Preliminary Flood Mitigation and Creek Diversion Design

21 October 2013

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Executive summary

Adani Mining Pty Ltd (Adani, the Proponent), commenced an Environmental Impact Statement (EIS) process for the Carmichael Coal Mine and Rail Project (the Project) in 2010. On 26 November 2010, the Queensland (Qld) Office of the Coordinator General declared the Project a 'significant project' and the Project was referred to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (referral No. 2010/5736). The Project was assessed to be a controlled action on the 6 January 2011 under section 75 and section 87 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Flood modelling of the proposed Carmichael Coal Mine and Rail Project (the Project) was undertaken for the Carmichael River corridor and for minor waterways intersecting the mine through the north and the south. The purpose of this study is to inform the Supplementary Environmental Impact Assessment (SEIS) and to make recommendations for flood mitigation works.

The Carmichael River was found to flood within a relatively narrow extent upstream of the mine area, growing in width towards the downstream boundary of the mine area where the flattening terrain allows effluent flows into the head of Cabbage Tree Creek under flood conditions. Multiple minor waterways were found to intersect the mine area from the western boundary both to the north and to the south of the Carmichael River, flooding across the proposed mine site to discharge into waterways to the east.

Based on the existing conditions results and analysis of the predicted change in hydrological conditions post-development, a conceptual staged drainage scheme was proposed for the mine site. Recommended infrastructure is presented at a preliminary design stage within this report, including the following format:

- 1 in 1,000 year ARI-immune flood protection levees for the Carmichael River corridor
- 1 in 100 year ARI-capacity local waterway diversion drains with the ability to provide 1 in 1,000 year ARI flood immunity to the pits through the mine site (through the use of supplementary adjacent levees); maintaining natural flow paths and hydrology to the maximum extent practicable
- 1 in 50 year ARI-immune haul road and conveyor crossing of the Carmichael River, comprising a bridge to pass the 1 in 50 year ARI flood level plus 500 mm freeboard while the road is at a height of at least above the 1 in 50 year ARI flood level plus 600 mm freeboard. The bridge height was sufficient to avoid direct overtopping in the 1 in 100 year ARI event, but water does bypass the haul road constriction via one of the proposed diversion drains, which needs adjustment during future design stages. Scour protection must be considered due to potentially large head loss from overtopping by the 1 in 1,000 year ARI event.

Subsequent modelling of the Carmichael River corridor with this proposed infrastructure in place and modelling of all the diversion drains indicated the ability of this infrastructure to protect the mine site from large flood events.

Afflux was found to be significant within the mine area due to the combined effect of minor increased inflows from some of the diverted waterways, reduced runoff coming from the developed mine internal areas and hydraulic constriction by the flood protection levees, haul road and conveyor crossing. Upstream of the haul road crossing afflux was modelled to peak at 0.98 m for the 1 in 1,000 year ARI event, but at the downstream eastern boundary this had already reduced to peak at 0.09 m adjacent to the Carmichael River and 0.27 m downstream of Cabbage Tree Creek. These values are reduced in

smaller events, with afflux at the mine area boundaries generally being relatively insignificant (0 to 0.09 m, with the higher values being confined to the eastern boundary downstream of Cabbage Tree Creek). It is believed that the significant reduction in afflux values over this short distance indicates that neighbouring properties are likely to experience minimal increase in flood extents both downstream and, especially, upstream of the MLA. The most significant afflux is confined within the mine lease.

The concept design of the flood protection infrastructure contained within this report requires further detailing during future design stages before implementation. A number of recommendations are made as to which aspects require future analysis, and which aspects must be considered for their potential impact on the planning of the mine infrastructure. These include issues of scour and erosion control and interfaces with other infrastructure.

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1. Introduction

1.1 Project overview

Adani Mining Pty Ltd (Adani, the Proponent), commenced an Environmental Impact Statement (EIS) process for the Carmichael Coal Mine and Rail Project (the Project) in 2010. On 26 November 2010, the Queensland (Qld) Office of the Coordinator General declared the Project a 'significant project' and the Project was referred to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (referral No. 2010/5736). The Project was assessed to be a controlled action on the 6 January 2011 under section 75 and section 87 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The controlling provisions for the Project include:

- World Heritage properties (sections 12 & 15A)
- National Heritage places (sections 15B & 15C)
- Wetlands (Ramsar) (sections 16 & 17B)
- Listed threatened species and communities (sections 18 & 18A)
- Listed migratory species (sections 20 & 20A)
- The Great Barrier Reef Marine Park (GBRMP) (sections 24B & 24C)
- Protection of water resources (sections 24D & 24E)

The Qld Government's EIS process has been accredited for the assessment under Part 8 of the EPBC Act 1999 in accordance with the bilateral agreement between the Commonwealth of Australia and the State of Queensland.

The Proponent prepared an EIS in accordance with the Terms of Reference (ToR) issued by the Qld Coordinator-General in May 2011 (Qld Government, 2011). The EIS process is managed under section 26(1) (a) of the *State Development and Public Works Act 1971* (SDPWO Act), which is administered by the Department of State Development, Infrastructure and Planning (DSDIP).

The EIS, submitted in December 2012, assessed the environmental, social and economic impacts associated with developing a 60 million tonne (product) per annum (Mtpa) thermal coal mine in the northern Galilee Basin, approximately 160 kilometres (km) north-west of Clermont, Central Queensland, Australia. Coal from the Project will be transported by rail to the existing Goonyella and Newlands rail systems, operated by Aurizon Operations Limited (Aurizon). The coal will be exported via the Port of Hay Point and the Point of Abbot Point over the 60 year (90 years in the EIS) mine life.

Project components are as follows:

- The mine: a greenfield coal mine over EPC 1690 and the eastern portion of EPC 1080, which includes both open cut and underground mining, on mine infrastructure and associated mine processing facilities (the Mine) and the Mine (offsite) infrastructure including a workers accommodation village and associated facilities, a permanent airport site, an industrial area and water supply infrastructure.

- The Project (Rail): a greenfield rail line connecting to mine to the existing Goonyella and Newlands rail systems to provide for the export of coal via the Port of Hay Point (Dudgeon Point expansion) and the Port of Abbot Point, respectively including:
  - Rail (west): a 120 kilometre (km) dual gauge portion running west from the Mine site east to Diamond Creek
  - Rail (east): a 69 km narrow gauge portion running east from Diamond Creek connecting to the Goonyella rail system south of Moranbah
  - Quarries: The use of five local quarries to extract quarry materials for construction and operational purposes.

Figure 1 shows the project location.

1.2 Report objectives

The Project (Mine) will affect local stormwater runoff and henceforth impact regional flows in downstream waterways. The overall flood study objective is to demonstrate that the development does not result in unacceptable risk to people or property, according to the Queensland State Planning Policy 1/03. The outcomes will be used to inform the Supplementary Environmental Impact Assessment (SEIS) for the Project.

This study provides an update of the previous flood study that formed part of the EIS submission for the Project. This study includes changes in the mine plan and mine duration, in particular for the local stormwater component. The report provides preliminary locations and design information for the required flood diversion channels and assesses the potential impact of ponding due to subsidence over the proposed underground mines.

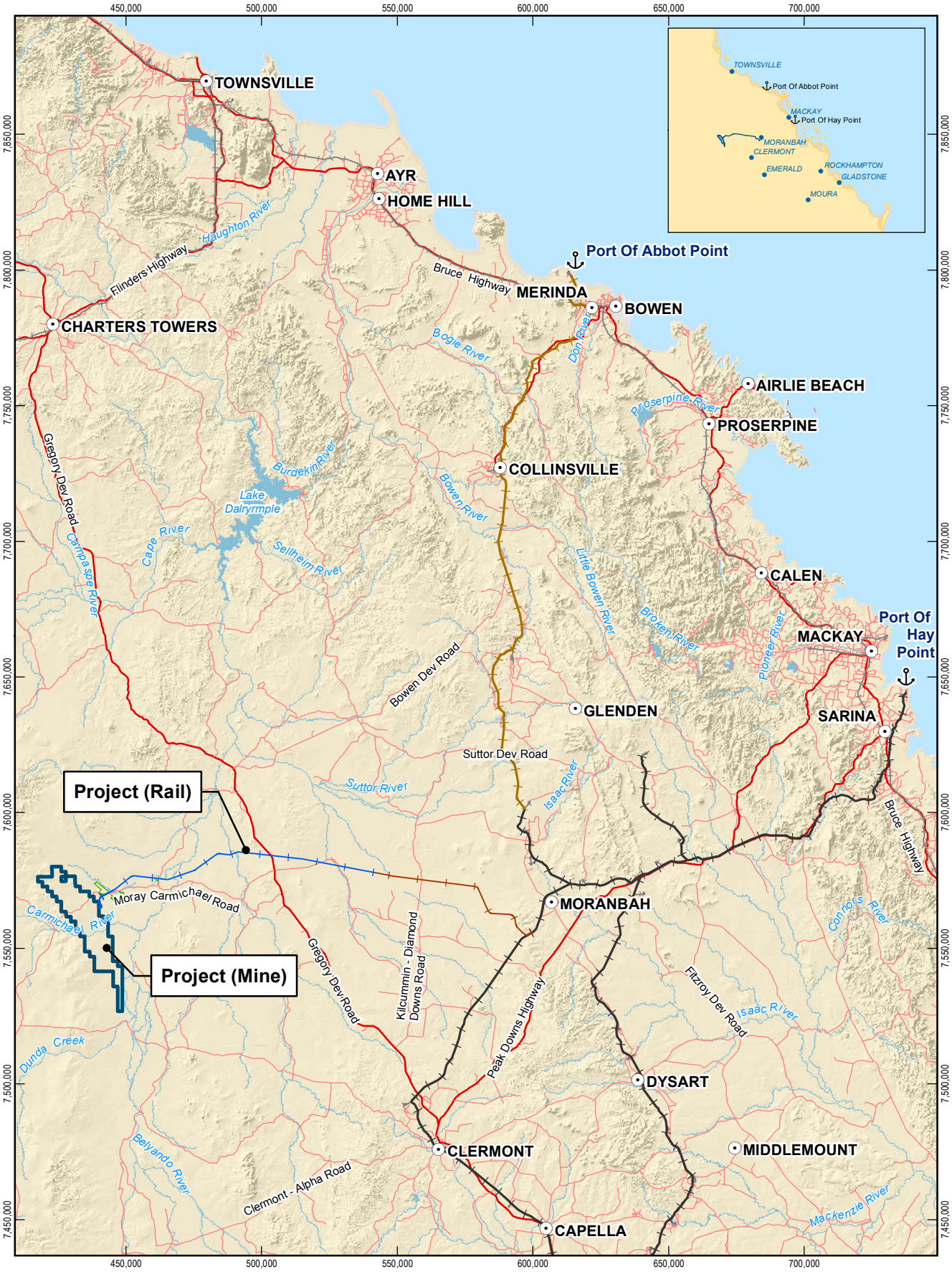
This report also provides supporting information to inform further mine planning as this flood study identifies and qualifies flood protection infrastructure for the mine. The site water management principles described in the Water Balance Report (SEIS Volume 4 Appendix K2) influence the flood study as the flood mitigation works prevent uncontaminated surface runoff from entering the mine workings and thereby either becoming “mine affected water” that requires treatment, or flooding the mine.

The necessary flood protection infrastructure identified includes the following:

- Levees to protect the adjacent pits from the flooding of the Carmichael River
- A bridge to allow passage of haul vehicles and the conveyor from the south to the north of the mine during relatively frequent flood events
- Diversion drains to allow local waterways to pass through the site without causing flooding.

This study does not assess any ecological impacts of changes in flows with this study focussing on changes in stormwater runoff, regional flows and required flood protection infrastructure on potentially impact regional have depending on regional and local.

The assessment of flooding issues for offsite infrastructure is not included within the scope of this report, nor is the management of minor local flooding and drainage within the mine site itself.



LEGEND

- Major Port
- Other Rail Network
- Goonyella System
- Newlands System
- Local Road
- Watercourse
- Project (Rail)
  - Rail (West)
  - Rail (East)
- Mine (Offsite)
- Project (Mine)

Based on or contains data provided by the State of QLD (DERM) [2010]. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for marketing or be used in breach of the privacy laws.

1:2,000,000 (at A4)

0 10 20 30 40 50

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project SEIS

Job Number 41-26422
Revision B
Date 14-10-2013

Project Location

Figure 1

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Data Source: © Commonwealth of Australia (Geoscience Australia): Town, Railways, Watercourses (2007); DNRM: LGA, (2011), Hillshade (2009); DMR: State Roads (2008); DME: EPC1690 (2010), EPC1080 (2011); Adani: Mine Offsite, Alignment SP1 Opt11 Rev2, SP2 Opt 9 Rev 3 (2013). Created by: MS

1.3 Report structure

In order to achieve the objectives, this report has been broken down in to following nine interconnected sections:

- Section 2 – Design methodology
  - Provides an overview of the overall design methodology employed, the adopted design criteria, the background information and data utilised in this study and the qualifications and limitations of the report contents.
- Section 3 – Hydrologic assessment
  - Presents the results of the hydrologic assessment of the Carmichael River catchment upstream of the Study Area, and local sub-catchment s of the Study Area under 'existing' and 'post-development' conditions.
- Section 4 – Existing flood conditions
  - Outlines the 'existing' conditions flood modelling approach and outcomes within the study area.
- Section 5 – Conceptual staged drainage and flood protection scheme
  - Details the preliminary drainage and flood protection concept developed as part of this study and how this could be staged over the mine's life based on the available staged plans.
- Section 6 – Preliminary levee design
  - Outlines the proposed alignment and required crest height of the levees along the Carmichael River floodplain within the Study Area.
- Section 7 – Preliminary haul road and conveyor crossing design
  - Presents the impact and preliminary sizing of the waterway openings required under the proposed haul road across the Carmichael River floodplain.
- Section 8 – Diversion drain sizing
  - Provides preliminary details of the proposed diversion drains and flood protection measures identified in Section 5 and the approach used to determine these in accordance with the design criteria.
- Section 9 – Ponding Assessment
  - Presents the proposed approach to surface water management within the areas of predicted subsidence and a brief assessment of the how the ponds in these areas would perform as storage (i.e. how long they may be full).
- Section 10 – Post-development flood conditions
  - Outlines the 'post-development' conditions flood modelling approach and outcomes within the study area in terms of afflux.
- Section 11 – Conclusions
  - Summarises the conceptual design of the flood protection infrastructure and diversion drains and recommends directions and considerations during the future design phases.

1.4 Mine plan status

During the flood study small sections of the mine plan were still in the development phase as they relied on outcomes from this study to determine characteristics and/or footprints of the water management infrastructure. As such in order to meet timeframes and allow these features to be incorporated in the mine plan, this study was based on some assumptions regarding these sections. These assumptions included:

- The levee location of the flood study is partly based upon the location as part of the EIS and the flood study for the EIS. While the levee locations have been corrected for the sections at a direct angle of the Carmichael River, along the Carmichael River the EIS location was continued. Later in the process it became clear that, based on the current mine plan, along the Carmichael the northern levee can be moved away from the river, thereby likely reducing impacts.
- The current location of the haul road crossing (of the Carmichael River) is approximately 500 metre downstream of the modelled crossing location. It is expected that changes in afflux and velocities will not be very different but will be occurring at a different location (500 metre downstream). The implications of this should however be reviewed during later design stages.

2. Design methodology

2.1 Overview

The Project (Mine) represents a major change to the topography, likely to impact the hydrology and hydraulic conditions of the waterways and river in the vicinity. Flood modelling of the Carmichael River and local waterways under existing and developed conditions was performed in order to:

a) Assess the hydrological and hydraulic impacts of the proposed mine on the adjacent watercourses

b) Inform the design of flood protection infrastructure, such as diversion drains and levees, to protect the proposed mine from a range of storm events

These two components were achieved as described in the following steps:

- *Develop a hydrologic (rainfall-runoff) model of the existing conditions in the Carmichael River catchment*– This model allowed estimation of critical storm durations and resulting design flow rates for the 1 in 10 year, 1 in 50 year, 1 in 100 year and 1 in 1,000 year average recurrence interval (ARI) events. These events were selected to match the design criteria set by Adani.
- *Develop a hydrologic model of the developed condition in the Carmichael River catchment* – This model allowed estimation of critical storm durations and resulting design flow rates for the 1 in 10 year, 50 year, 100 year and 1,000 year ARI events within the Carmichael River and within the diversion drains. It demonstrates the hydrologic impact of the proposed development on contributing catchment areas and peak flows. This model uses the existing conditions model as a starting point, which was modified to include the development changes due to the works.
- *Develop a two-dimensional (2D) hydraulic model of the Carmichael River and floodplain in the vicinity of the mine site under existing conditions* – This model was used to define existing hydraulic conditions, namely velocities, peak flood levels and extents, for the critical storm duration (based on hydrologic modelling) in the 10 year, 50 year, 100 year and 1,000 year ARI events.
- *Develop a one-dimensional (1D) hydraulic model of the minor watercourses within the mine area that are not draining to the Carmichael River, existing conditions* – This model was used to define existing hydraulic conditions, namely velocities, peak flood levels and extents, for the critical storm duration (based on hydrologic modelling) in the 10 year, 50 year, 100 year and 1,000 year ARI events at the northern most and southern most extents of the mine area. The model also demonstrates the volume of flow entering the ephemeral creeks outside of the mine lease area during flood conditions.
- *Plan a conceptual Project (Mine) flood protection and creek diversion plan that progresses throughout the Project (Mine) life* – This step identifies a drainage scheme that progresses throughout the lifetime of the mine based on operational requirements. It provides a concept and alignment for preliminary sizing of flood protection infrastructure and diversion drains.

- *Undertake preliminary design of a haul road & conveyor crossing at the Carmichael River (developed conditions)* – Hydraulic analysis of the crossing and an associated bridge was undertaken to design a bridge that provided the required flood immunity to the bridge structure. Modelling was also used to determine the likely flooding of the bridge during storm events greater than the design event.
- *Undertake preliminary design of a flood protection levee containing the Carmichael River (developed conditions)* – The levee bank alignments and heights were determined to provide 1 in 1,000 year ARI flood immunity to the internal mine areas. The alignment was chosen to minimise hydraulic impact on the Carmichael River and the effluent Cabbage Tree Creek.
- *Undertake a conceptual design of all the proposed creek diversion drains (developed conditions)* – Horizontal and vertical alignments of the drains were optimised to take flow through the mine site within allowable design constraints and re-join existing natural channels. The design incorporates consideration of eventual subsidence on the surface of the underground mining region. Current 1D modelling of diversion drains isn't setup to plot flood extents, as these diversion drains do not extend in to the existing waterways.
- *Develop 2D hydraulic models to show flooding under developed conditions* – This model demonstrated the impact of the development and preliminary designs for flood protection infrastructure on the flooding of the Carmichael River. It also demonstrates the flood immunity to the mine footprint provided by the proposed infrastructure and diversion drains.

2.2 Design criteria

Design criteria for the conceptual staged drainage scheme and the preliminary flood protection infrastructure design were discussed with Adani and are summarised below.

2.2.1 General criteria

General criteria used for the study comprise the following:

- All infrastructure is to be contained within the mine area
- Open cut pits are to have 1,000 year ARI flood immunity provided
- Waste rock heap areas are to have 100 year ARI flood immunity
- Haul road crossing to have 50 year ARI immunity
- Minimum freeboard of 600 mm is to be provided above the design immunity water level.

2.2.2 Diversion drain design

Diversion drain design was based on the following criteria:

- Drains to carry 100 year ARI capacity
- Drain banks to have 1 to 3 slope batters
- Drain to have a minimum grade of 0.2 precent

- Hydraulic constraints as described in the departmental regional guideline entitled Central West Water Management and Use Regional Guideline: Watercourse Diversions – Central Queensland Mining Industry Version 5 (DERM, 2011), namely:
  - A channel flow velocity that doesn't exceed 2.5 m/s
  - A peak shear stress that doesn't exceed 80 N/m^2

2.2.3 Levee design

Levee design was based on the following criteria:

- The alignment should not block the effluent flow path from the Carmichael River to Cabbage Tree Creek
- For the purposes of this design, and without any consideration of the geotechnical engineering issues at this stage, the batter slopes on the levees have been set at 1 vertical to 3 horizontal. If depth is greater than 5 – 6 m, sides should be benched;
- Levee top width of 6 m
- Levees to provide required immunity to open cut pits and waste heap areas
- Minimum levee height of 2 m.

2.2.4 Haul road and conveyor crossing design

Haul road and conveyor crossing design was based on the following criteria:

- The haul road and conveyor crossing was to align with the concept haul road and overland conveyor design, being constrained to the central corridor of the mine area
- Haul road and conveyor crossing width is to be 40 m
- Conveyor is not expected to affect the flood hydraulics. For this reason it is not represented in the crossing for the purposes of modelling.

2.3 Watercourse determination

In a desktop assessment by DNRM in May 2013 of the mine area and the "Moray Downs" property), the following features were determined as watercourses as defined under the Water Act:

- Carmichael River
- Belyando River
- Logan Creek
- Dyllingo Creek
- Surprise Creek
- Mistake Creek.

There is currently no proposal to divert any of these watercourses. There is however a proposal to divert the upper reach of Eight Mile Creek and this waterway has not been categorized at this stage. A site inspection is required to finalise the assessment on Eight Mile Creek, Cabbage Tree Creek and North Creek.

In the case that Eight Mile Creek is defined as a watercourse then the Australian Coal Association Research Program (ACARP) standards and the departmental regional guideline entitled Central West Water Management and Use Regional Guideline: Watercourse Diversions – Central Queensland Mining Industry Version 5 (DERM, 2011) will apply. Design criteria of this guideline are applied for this study.

The guidelines state that for the diversion of watercourses the engineering design of the diversion should include consideration of:

- The channel capacity must be at least equivalent to the natural stream channel capacity
- The length of the channel should be nearly the equivalent length of the watercourse it replaces
- The diversion channel must exhibit features similar to the natural existing watercourses such as meanders, terraces, benches, etc.
- Assessment of the stability and erosion characteristics of the diversion design;
- The capacity of the floodplain to deal with out of channel flows
- Potential hydraulic and geomorphic impacts of the diversion channel on the adjoining natural reaches of the watercourse both upstream and downstream of the diversion.

Stream powers, velocities and shear stress upper limits will also apply to the diversion design. The design should also adopt the principles outlined in the ACARP report – “Maintenance of Geomorphic Processes in Bowen Basin River Diversions, Stages 1, 2 & 3”.

2.4 Data collection

The following data was collected as input to the flood modelling and preliminary design:

- *Digital Elevation Model (DEM)* – A 10 m digital elevation model (DEM) was created by GHD, based on LiDAR collected by Vekta. The DEM extends just outside of the mine area
- *Regional Elevation Model* – 10 m contour intervals of Queensland
- *Mine Site Layout* – staged mine plans provided by the Proponent
- *Aerial Photograph* – Aerial photography from Adani Mining Pty Ltd of mine site location and extending just outside the boundary of the mine area
- *Intensity-Frequency-Duration (IFD) Rainfall Data* – Obtained from the Bureau of Meteorology (BOM IFD 2011) for the location of the mine site. FORGE (CRC-FORGE 2000) data was also obtained for rare rainfall events
- *Stream Gauge Data* – Daily stream flow data was provided by DERM for nearby stream gauges (DERM 2011)
- *Watercourse Locations* – Watercourse locations in the vicinity of the mine lease area were provided by DERM as geospatial files.

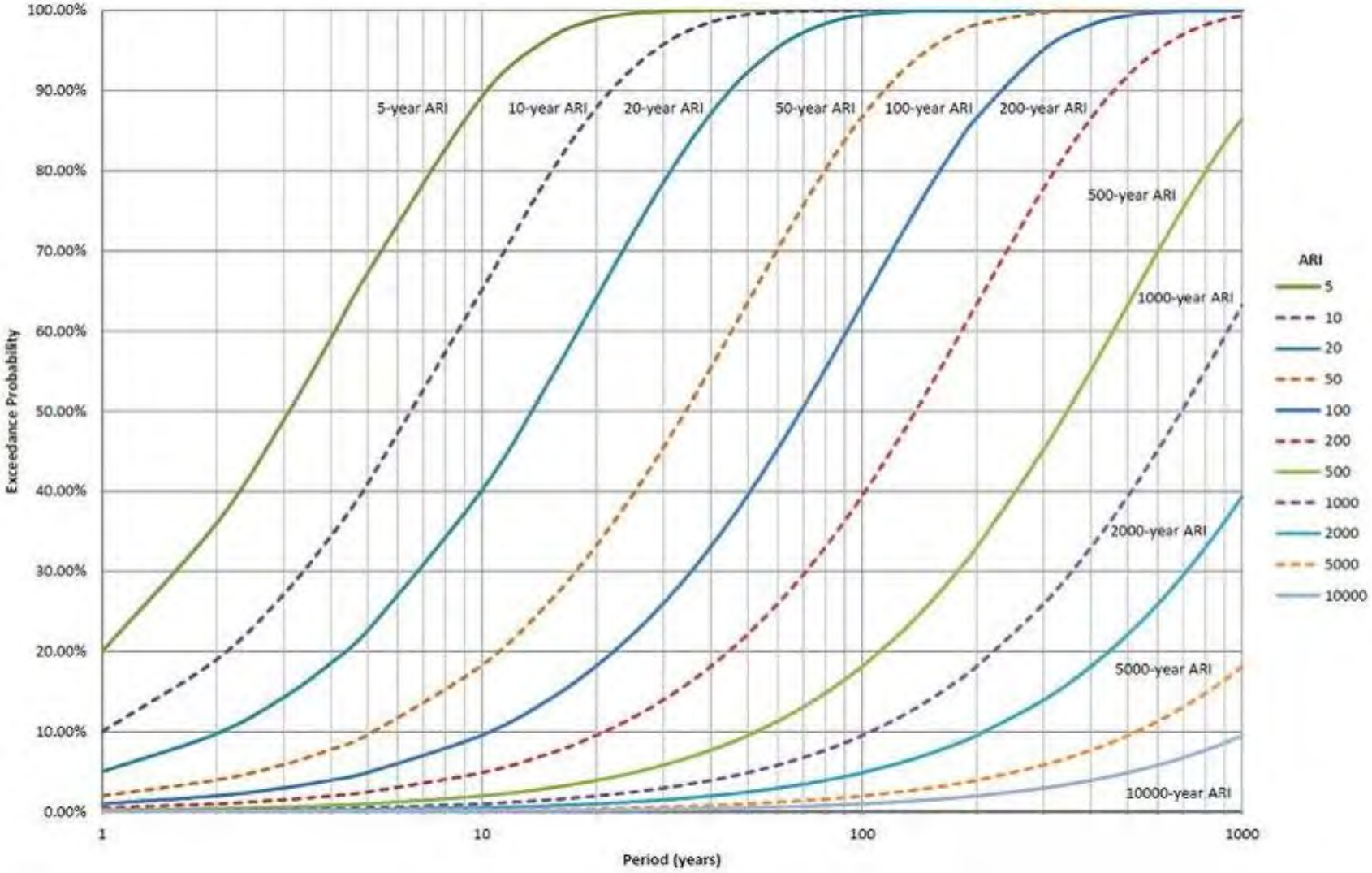
2.5 Consideration of risk

The design criteria outlined in the above sections were selected in consultation with the Proponent for the purposes of this conceptual study. Notwithstanding the assumptions made as part of this conceptual design, it is necessary to consider the various surface water-related risks on a continuing basis during further planning activities, as well as during the construction, operation and decommissioning phases of the mine.

This study has presented its analyses of risk in terms of the so-called Return Period (or Average Recurrence Interval ARI) adopted in the various design criteria. The return period is the "average" number of years between successive events of the same or greater magnitude. For example, if the 100-year return period flood level is 230 m AHD at a certain location then on average, a 230 m AHD flood level or greater can be expected to occur once every 100 years. In reality this level is likely to be reached by flooding in periods more and less frequently than 100 years. It is important to note that in any 100-year period, the 100-year return period event has a 64 percent chance of being equalled or exceeded. This means that the example 230 m AHD flood level has a better-than-even chance of being exceeded by the end of any 100-year period. If the 100-year event were to occur, then there is still a finite possibility that it could occur again soon, even in the same year, or that the 1,000 year event could occur, for example, next year. Clearly if such multiple events continue unchecked then the basis for the estimate of, say, the 100 year event might then need to be questioned, but statistically this type of behaviour can be expected.

The level of risk acceptable beyond regulatory limits is a corporate decision. Figure 2 is provided to assist in this decision making process by showing a selection of risk options.

Figure 2 Probability chart



3. Hydrological assessment

3.1 Existing drainage

Under existing conditions, most regions of the Project Area drain into a series of ephemeral creeks at the east of the mine area including Pear Gully and Eight Mile Creek. There are also a number of ill-defined watercourses across the northern and southern parts of the study area that drain generally in the easterly direction towards the Belyando River. The balance of the site drains overland into the Carmichael River.

The Carmichael River catchment upstream of the mine area is approximately 2,000 km^2 and lies within the Burdekin Basin. Tributaries within the Carmichael River catchment include Cattle Creek, Dylingo Creek and Surprise Creek which converge into the Carmichael River just upstream of the mine area. Under normal conditions, the Carmichael River maintains a modest baseflow in the dry season. Once storm events reach the river, it rapidly fills and overflows the channel onto the relatively flat floodplain and contributes effluent flow south east to Cabbage Tree Creek. Downstream of the Project Area the Carmichael River catchment drains into the Belyando River.

3.2 Model selection

Two hydrologic rainfall models were created, one for existing catchment conditions and one for post-development catchment conditions. A comparison of the two models was required to quantify the change in flood flows in the Carmichael River due to the mine project, and provide design flows in the diversion drains. The resulting runoff hydrographs were used as input to the existing and developed conditions hydraulic flood models as described in Section 4 and Section 10.

CatchmentSIM software was used to define the regional contributing catchment, delineate sub-catchments and identify stream networks. XP-RAFTS software was used to route the runoff from the contributing catchments into the Carmichael River and produce peak flows hydrographs.

XP-RAFTS hydrologic modelling software is based on the RSWM model developed by the Snowy Mountains Engineering Corporation (SMEC) and is an industry standard rainfall-runoff routing analysis package. It is capable of modelling changes due to development for both rural and urban sub-catchments and is an accepted model used to quantify flood flows from catchments as specified in Australian Rainfall & Runoff (1999).

XP-RAFTS estimates the runoff hydrograph from an individual sub-catchment based on rainfall intensities, temporal patterns and the definition of parameters describing the sub-catchment characteristics. These parameters include the sub-catchment area, slope, roughness and fraction of impervious area. Sub-catchment outflow hydrographs are routed downstream through the model via links (either lag links or routing links) that connect these sub-catchments.

3.3 Model inputs

3.3.1 Rainfall

Design rainfall coefficients are summarised in Table 1. The coefficients describe the Log-Pearson Type III distribution which generates design rainfall intensities for up to and including 100 year ARI as recommended by Book 6, Volume 1 AR&R (1998). For the rainfall intensities of greater than 100 year ARI, the FORGE method was used for the regional hydrologic model. For the local, FORGE data was used but adjusted to remove the aerial reduction factor. FORGE method results are presented in Appendix A.

Table 1 Rainfall intensity variables for the Project (BOM IFD, 2011)

	Duration (hr)	Intensity (mm\hr)
2 Year ARI	1	38.83
	12	6.21
	72	1.86
50 Year ARI	1	80.66
	12	12.42
	72	3.75
G (skewness) coefficient		0.05
F2 (2 Year ARI) coefficient		3.98
F50 (50 Year ARI) coefficient		16.40

3.3.2 Other parameters

The following model parameters were adopted as inputs for the hydrologic model:

- *Design Rainfall Losses* – 25 mm initial loss and 2.5 mm/hr continuing loss were adopted based on the acceptable ranges recommended in Volume 1 AR&R 1998
- *Design Temporal Patterns* – Design temporal patterns for Zone 3 from AR&R 1989 were adopted for up to the 100 year ARI event. For the 1,000 year event the GSDM and GSTMR temporal patterns were applied depending on the storm duration (BOM, 2003; BOM, 2005)
- *Manning's 'n'* – A coefficient of 0.045 was adopted for the floodplain (Institute of Engineers Australia, volume 1, book 7 AR&R, Table 1.1)
- *Imperviousness* – An imperviousness of 2 percent was chosen as an estimate for "grazing" rural surfaces
- *Lag Times* – Lag times were calculated by CatchmentSIM (Catchment Simulation Solutions 2009) using the Bransby-Williams equation on the generated sub-catchment s and their corresponding longest flow paths.

3.3.3 Sub-catchment delineation

Identification and delineation of the Carmichael River catchment was undertaken using the software CatchmentSIM. A GIS-based terrain analysis system, CatchmentSIM enables the creation of a DEM and the mapping of drainage paths from any point. From this it automatically delineates sub-catchment and stream networks including hydrologic attributes such as area,

equal area slope and maximum flow path length. It also generates files to input to hydrologic models including XP-RAFTS.

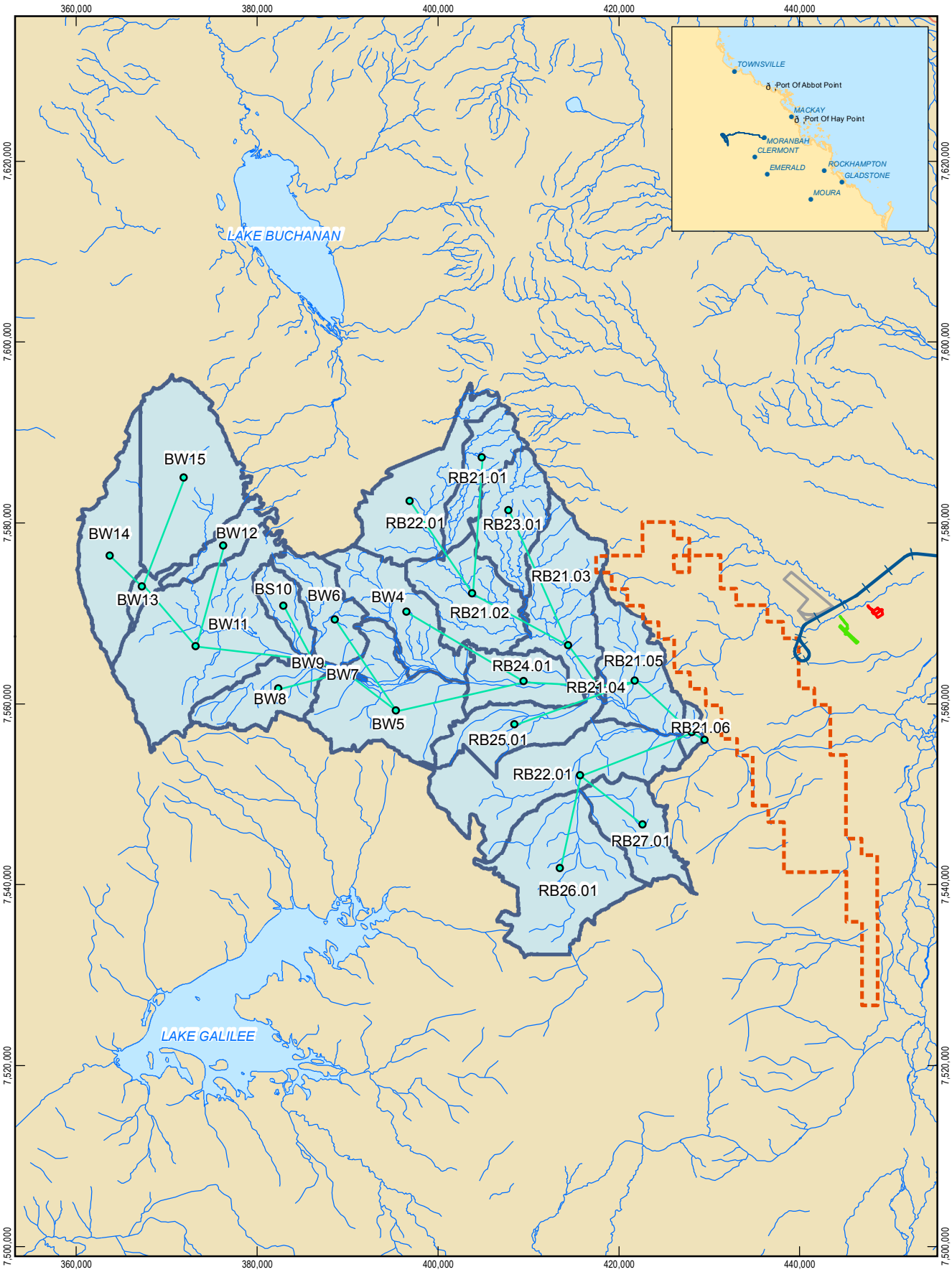
For the Carmichael River catchment, a 20 m grid was generated in CatchmentSIM using both regional 10 m contour and the mapped regional streamlines from the Department of Environment and Resource Management (DERM). Horton Order delineation was used to generate the sub-catchments using second-order streamlines.

Sub-catchment areas as summarised in Appendix A (refer to Figure 3 for the Carmichael River and Figure 4 for the local waterways) were identified as being contributors to the flooding of the Carmichael River within the mine site using CatchmentSIM analysis. These sub-catchments formed the basis for the hydrologic model of existing conditions.

In order to determine the post-development hydrologic conditions, ArcGIS was used to intersect the proposed mine layout with the existing sub-catchment areas. This allowed the change in sub-catchment area to be calculated, taking into account the development of new terrain and diverted or collected runoff areas. In order to protect the internal mine area from receiving the runoff of sub-catchments outside of the mine area, those streams currently passing through the mine area will be diverted. The post-development condition for the mine can be seen in Figure 5 which shows the sub-catchment areas to be diverted through the mine site at various stages of the mine operation.

For the purposes of this study, the change in sub-catchment area was assumed to not impact the equal area sub-catchment slope which helps define catchment response time.

Upstream of the mine area boundary, flows in the Carmichael River will be unaffected by the mine development. However, within the mine area boundary the Carmichael River will receive additional flood flows from a few of the proposed diversion drains which collects local runoff along part of the western boundary of the mine. In addition, the development of the internal mine areas will change or remove a number of sub-catchment areas that previously contributed to the Carmichael River.



LEGEND

- XP-RAFTS Model Node
- XP-RAFTS Model Link
- Watercourse
- Project (Rail)
- Project (Mine)
- Carmichael Regional Subcatchments
- Waterbody

Mine (Offsite)

- Pump Station
- Storage Facility
- Airport
- Industrial Area
- Accommodation Village

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0 5 10 15 20

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Preliminary Flood Mitigation and Creek Diversion Design
Catchment
Delineation for Existing Conditions

Job Number	41-26630
Revision	C
Date	15-10-2013

Figure 3

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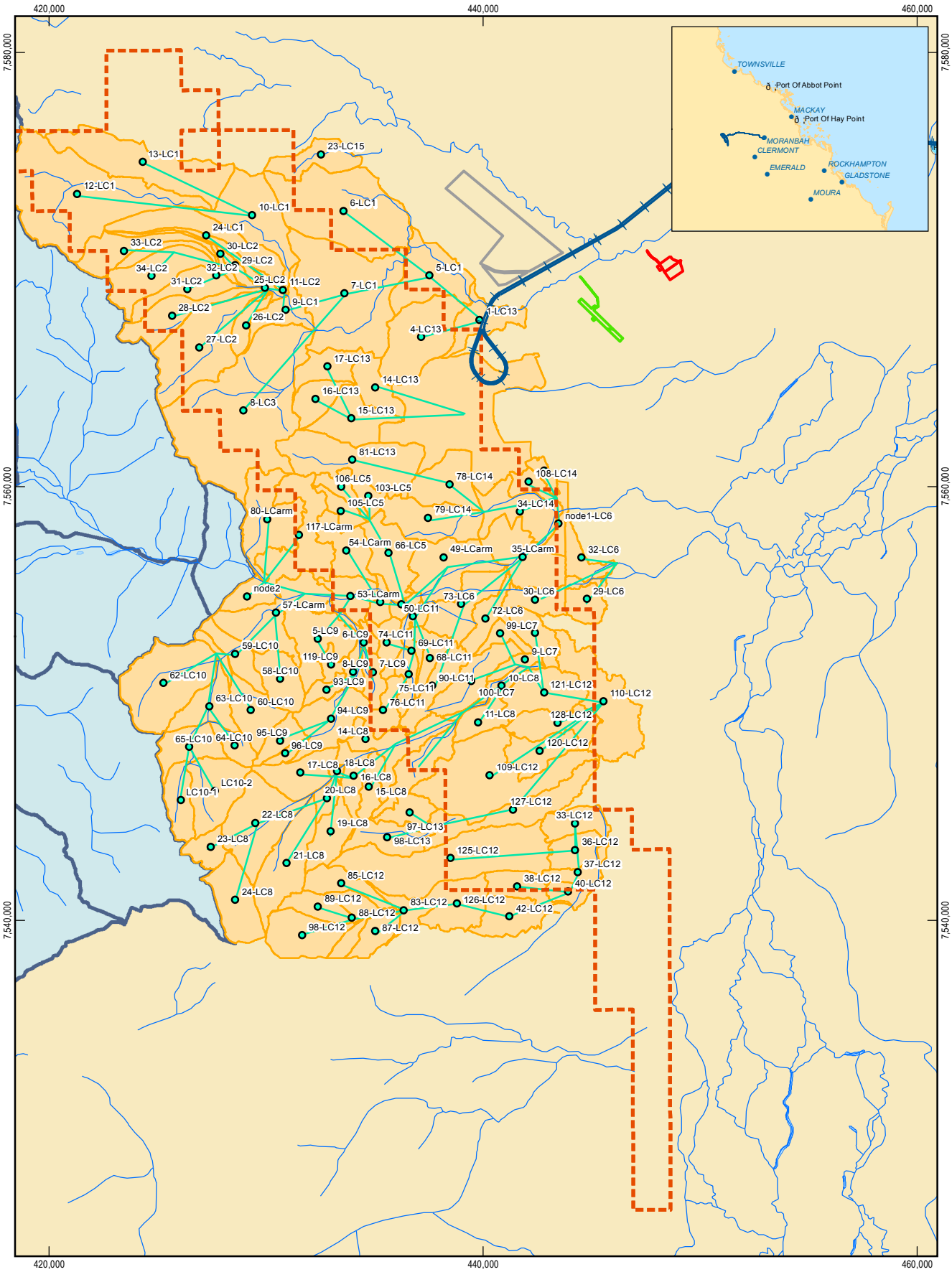
Data Source: DNRM: State Road (2010); DME: EPC1690 (2010), EPC1080 (2011); © Copyright Commonwealth of Australia - Geoscience Australia: Mainland, Locality, Rail, Watercourse, Waterbody (2007); GHD: Subcatchment Boundaries, XP-RAFTS Model Data (2011); Created by: BW, CA



LEGEND

- XP-RAFTS Node
- XP-RAFTS Link
- Watercourse
- Mine Lease Area
- Carmichael Regional Subcatchments
- Mine Local Subcatchment
- Mine (Offsite)
- Pump Station
- Storage Facility
- Airport
- Industrial Area
- Accommodation Village

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Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

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Catchment Delineation for Local Catchments

Figure 4

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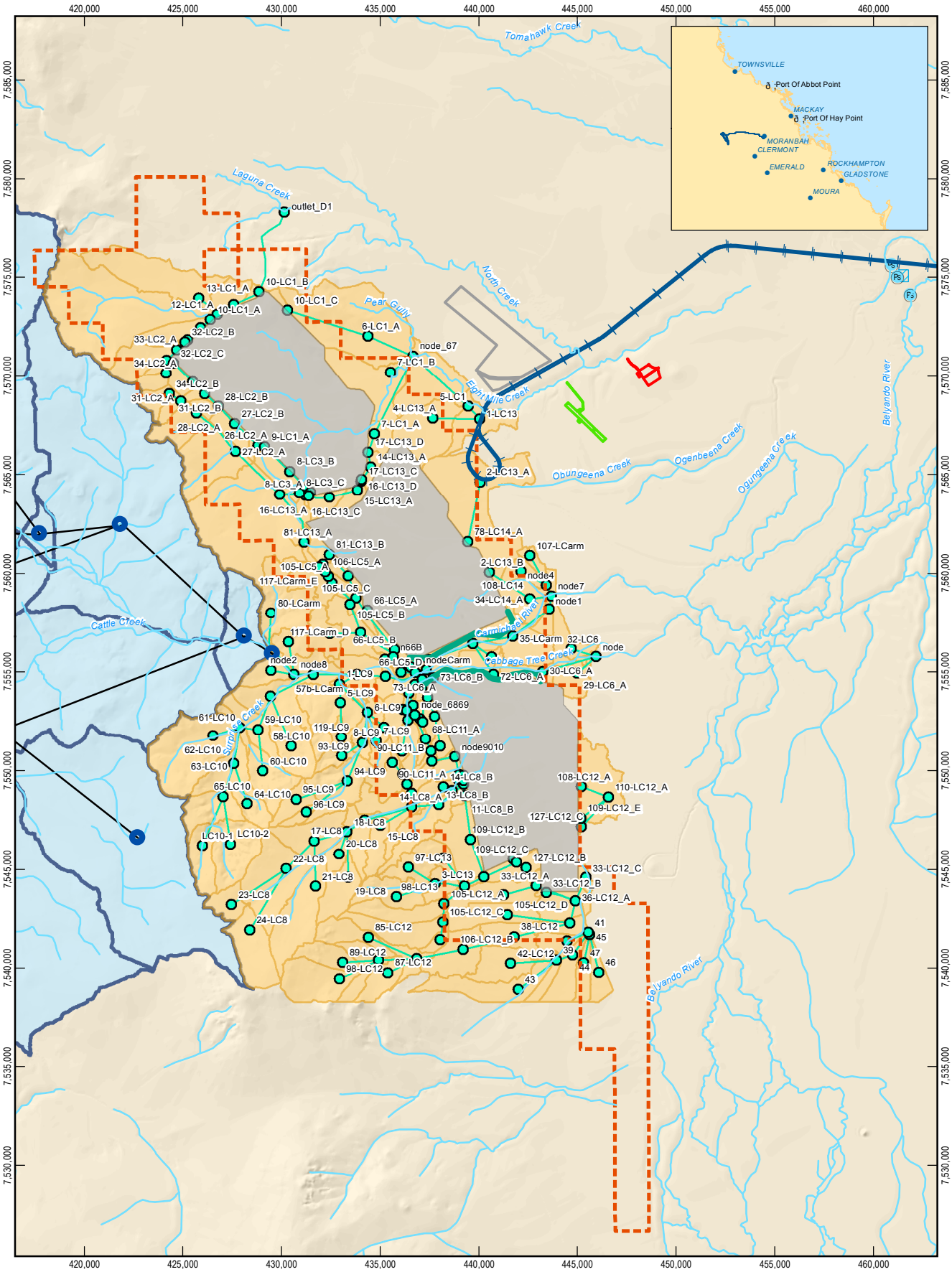
Data Source: DERM: State Road (2010); DME: EPC1690 (2010), EPC1080 (2011); © Copyright Commonwealth of Australia - Geoscience Australia: Mainland, Locality, Rail, Watercourse, Waterbody (2007); GHD: Subcatchment Boundaries, XP-RAFTS Model Data (2011); Created by: BW, CA



LEGEND

- Carmichael Catchment Node
- Local XP-RAFTS Node
- Local XP-RAFTS Link
- Carmichael Catchment Link
- Watercourse
- Carmichael Regional Subcatchments
- Local Diverted Subcatchment
- Proposed Carmichael River Levees
- Project (Rail)
- Mine Lease Area
- Mine Plan Layout
- Mine (Offsite)
- Pump Station
- Storage Facility
- Airport
- Industrial Area
- Accommodation Village

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1:275,000 (at A4)

0 1 2 3 4 5

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

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Catchment Delineation for Developed Conditions Figure 5

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Data Source: DME: EPC1690 (2010), EPC1080 (2011); © Copyright Commonwealth of Australia - Geoscience Australia: Mainland, Locality, Rail, Watercourse(2007);
Adani: Alignment Opt9 Rev3, Open Cut Areas, Waste Areas (2012); GHD: Subcatchment Boundaries, XP-RAFTS Model Data, Leveesl (2012). Created by: BW, CA

3.4 Verification of Carmichael River flow estimates

3.4.1 Comparison to 1 percent AEP flood peaks for Queensland

It should be noted that for comparison purposes a 1 percent AEP corresponds to a 1 in 100 year ARI. Comparing the 100 year ARI design flow estimate predicted by the hydrologic model to the 1 percent AEP Flood Peaks obtained for a range of catchments throughout Queensland (from the chart in Appendix A) shows that the flow estimate of 2,600 m^3/s in this study, lies in the lower range of the typical flows per area for Queensland rivers. Typical flows indicated by the chart lay between 2,000 – 5,000 m^3/s for an equivalent catchment size of 2,000 km^2, which is the catchment area of the Carmichael River at the mine area boundary. Factors such as the relatively flat terrain and the relatively low rainfall are consistent with the flow estimate falling at the lower end of the typical range.

3.4.2 Flood frequency analysis

A flood frequency analysis was undertaken on recorded data from five DERM stream gauges and scaled by ratio of catchment area to the mine site using the method given in *Hydrologic Recipes* (Grayson, 1963) to enable the estimation of a 100 year ARI design flow for the Carmichael catchment. No historical stream gauges exist on the Carmichael River but the following three DNRM stream gauge data stations are in the vicinity of the Adani Mine site:

- Mistake Creek at Twin Hills, Station 120309A
- Belyando River at Gregory Development Rd., Station 120301B
- Cornish Creek at Bowen Downs, Station 003204A.

The following two gauges are located further away but have been used to extract comparative data:

- Cape River at Pentlands, Station 120307
- Cape River at Taemas, Station 120302.

The analysis of each record, which was undertaken by fitting a Log-Pearson Type III distribution to an annual maximum peak series found that the 100 year ARI flows were much lower than those generally found for the contributing catchment size according to the chart of 1 percent AEP Flood Peaks for Queensland (excepting the gauge Cape River at Pentlands, 120307). Comparatively the Carmichael River 100 year ARI peak flow calculated by the hydrologic model developed as part of this study is high.

It is difficult to extrapolate rare flood events with confidence based on the flood frequency of these gauges due to the following reasons:

- These gauges have low quality data according to their DNRM data quality codes, with only 56 percent of the record being considered ‘normal’ or ‘good’ on average
- The majority of records have been obtained during a relatively dry period
- The period of data collection is relatively short (the longest record commences in 1976).

For this reason, the much higher flows predicted by this hydrologic study were maintained as a more likely estimate of peak design flows in the Carmichael River.

It is noted that Adani has recently installed a number of stream gauges in the vicinity of the proposed mine site, however, they have not yet produced enough data to validate the model flow predictions.

3.5 Peak flow estimates

3.5.1 Carmichael River

Storms of durations ranging from 1 hour to 72 hours were modelled in the XP-RAFTS hydrologic model. The resulting peak flow rates were analysed to determine the critical storm duration and hence the peak flow for each ARI event.

For the Carmichael River, peak flows at the location of the proposed haul road and conveyor crossing are summarised for the existing conditions in Table 2 and for the post-development conditions in Table 3. Verification of the modelled peak flows is discussed in Section 5.

Table 2 Peak flows in the Carmichael River at the location of the proposed haul road and conveyor crossing – existing conditions

ARI	Critical Duration	Peak Flow (m^3/s)
10 year	30 hr	1196.0
50 year	18 hr	2152.4
100 year	18 hr	2616.4
1,000 year	36 hr	5614.2

Table 3 Peak flows in the Carmichael River at the location of the proposed haul road and conveyor crossing – post-development conditions

ARI	Critical Duration	Peak Flow (m^3/s)
10 year	30 hr	1195.0
50 year	18 hr	2150.7
100 year	18 hr	2614.6
1,000 year	36 hr	5606.9

Results indicate that the contribution of the diversion drains has a negligible influence on the approximate peak flow at the haul road crossing. This is because the timing of the peak flow from the reasonably small diverted catchments relative to that of the larger Carmichael River, which will result in the combined peak flow downstream of their confluence being no higher than the current peak at the haul road. This also results in the diversion channels having no influence on the storm event producing the peak flow, or critical duration, at this location.

For the waterways local to the mine area, but excluding the Carmichael River, peak flows at the downstream end of each modelled runoff path for the existing conditions are summarised in Table 8 and Table 9 and at the outlet of each diversion drain for the post-development conditions in Table 10 and Table 11. Critical durations were between 2-6 hours for these sub-catchments.

3.5.2 Local waterways

Table 4 gives the peak outflows in the proposed diversion drains. These peak flows give an indication of the likely required diversion drain dimensions and form the basis of design flows for conceptual sizing outlined in Section 8.

Table 4 Peak outflows from proposed diversion drains

Diversion Drain/XP-RAFTS node		100 yr ARI	1,000 yr ARI
1	10B	161	336
2	7A	223	482
3	16B	55	123
4	81A	6	14
5	66B	50	109
6	50B	18	41
7	36A	414	759
8	49A	153	330
9	74A	2	4
10	13A	233	446
11	n105A	104	228
12	127A	71	159

3.6 Climate change impacts assessment for local waterways

According to the Queensland Government Scientific Advisory Group (SAG) guidelines (DERM 2010a and DERM 2010b), rainfall is likely to increase or decrease by 5 percent per degree of global warming. The Carmichael Mine is designed to be operational until 2071 (final rehabilitation in 2074). The SAG recommends adopting a 4 degree increase in temperature by 2100. This corresponds to a 10 to 15 percent increase in rainfall intensity over the mine design life. By inputting these increased intensities to the hydrologic model it is possible to estimate potential peak flow rates under climate change conditions. The increase in rainfall intensity is expected to produces an estimated 20 percent increase in runoff. However, this estimated increase in runoff is highly discussable and other climate change scenarios are possible as well. The risk of climate change over the period of the mine infrastructure and operations should be considered during future mine planning and design. Potential increases in peak flow rates and the resultant impact they may have on the operation of the flood protection infrastructure are of particular risk in this regard. However, considering the large uncertainties regarding climate change in general at this stage climate change has not been incorporated.

4. Existing flood conditions

4.1 Model selection

Hydraulic modelling (i.e. determination of water levels from flood flows and terrain data) has been undertaken for existing (pre-development) using both one-dimensional (HEC-RAS) and two dimensional (TUFLOW) hydraulic modelling software packages. A one-dimensional hydraulic modelling approach has been used to simulate minor waterways whilst a two-dimensional modelling approach has been used to model the more complex Carmichael River floodplain. The location and extent of the 2D hydraulic models is shown in Figure 6.

4.1.1 TUFLOW

TUFLOW (WBM-BMT, 2010) is a 2D unsteady flow hydrodynamic modelling tool developed by WBM-BMT. TUFLOW is specifically oriented towards establishing flow and inundation patterns in coastal waters, rivers and floodplains as well as urban areas. TUFLOW solves the depth-averaged 2D shallow water equations for flows such as for the free-surface flows occurring from floods and tides based on the creation of an appropriate-resolution DEM, surface inflows, surface roughness and boundary conditions. TUFLOW is recognised as an industry standard 2D hydrodynamic modelling package within Australia and is well-suited to the modelling of the Carmichael River regional floodplain.

4.1.2 HECRAS

HEC-RAS was developed by the US Army Corps of Engineers Hydrologic Research Center. The software performs one-dimensional steady and unsteady flow calculations. For this study, HEC-RAS models were run in a combination of 'mixed' and 'subcritical' regimes depending on an assessment of preliminary results, such that any drain that has part of the flow supercritical is modelled with the 'mixed' regime setting. HEC-RAS utilises cross sections to represent the geometry and conveyance capacity of the waterways and is capable of both subcritical and supercritical hydraulic analyses. This makes it suitable for analysis of existing minor watercourses and design diversion drains where a variety of slopes may create subcritical or supercritical flows.

4.2 Carmichael River hydrodynamic model

Hydraulic modelling was undertaken for the 10, 50, 100 and 1,000 year ARI design events with a model time step of two seconds. All the inflow hydrographs were sourced from the hydrologic models described in Section 3.

4.2.1 Digital elevation model

In order to represent the Carmichael River floodplain in the vicinity of the mine site, a 10 m x 10 m digital elevation model was developed over an area of approximately 17,700 ha (refer Figure 6) using aerial survey data provided by Adani.

A cell size of 10 m by 10 m was adopted to adequately represent the bathymetry and topography of the study area whilst limiting model run times to an acceptable length of time. The extent of the digital elevation model (which forms the basis of the 2D hydraulic model) was selected to:

- Accommodate the post development flood flows and levels as well as existing conditions
- Cover likely upstream and downstream development impacts, noting that the flood extent is only known after the modelling has been done
- Include key hydraulic controls, including significant existing upstream and downstream road and railway alignments
- Allow for modelling of complex flow interactions
- Enable appropriate boundary conditions to be applied
- Reduce boundary condition effects in areas of the model where results are more important.

4.2.2 Inflow boundaries

A major inflow boundary condition was applied at the western (upstream) boundary of the hydraulic model. This boundary simulates the in-channel flow of the Carmichael River that arises from its natural catchment at that point. Additional 'source point' inflows representing runoff from the minor local sub-catchments internal to the model area were also applied. The location of these boundaries is shown in Figure 6.

4.2.3 Tailwater conditions

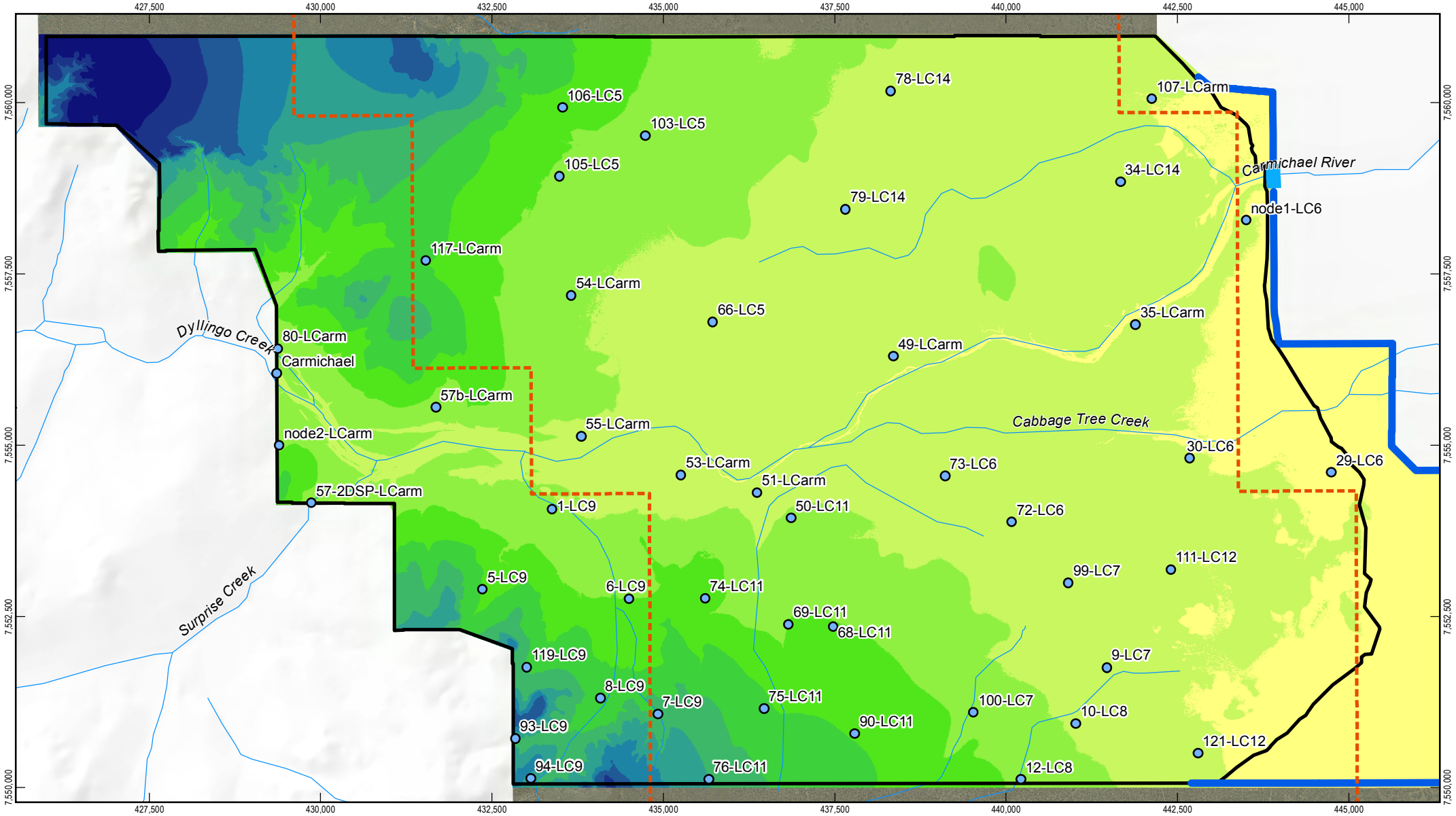
A 'free outfall' method was adopted for the tailwater conditions around the boundary of the model. The water surface profile was analysed and showed that boundary effects were localised to approximately 200 m from the edge of the model and therefore the flooding within the mine area was not significantly affected.

The existing conditions 2D hydraulic model was tested for sensitivity to tailwater conditions by simulating the 1,000 year ARI flood event with various higher and lower tailwater levels. The effects of these changes were again limited to the proximity of the model boundary and did not affect flood conditions within the mine area.

4.2.4 Hydraulic roughness

Manning's roughness coefficients were determined through a field inspection of the floodplain. In addition, recent aerial photographs were used for further assessment and comparison of the assigned roughness values. It is noted that the adopted values were selected based on recognised references and engineering judgement. There are no sets of recorded flood levels for a gauged flood flow close enough to the mine site to be of use in the calibration. As the gauges mentioned in Section 3 were far away, verification and / or calibration of the hydraulic model was not possible.

The adopted roughness coefficient for the floodplain surface was 0.045 as per Institute of Engineers Australia, volume 1, book 7 AR&R, Table 1.1.



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Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Inflow Source Point
- Watercourse
- 2D Model Extent
- Mine Lease Area

m (AHD)

- 210 - 220
- 220 - 230
- 230 - 240
- 240 - 250
- 250 - 260
- 260 - 270
- 270 - 280
- 280 - 290
- 290 - 300
- 300 - 310
- 310 - 320

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Inflow Source Points for Existing Conditions

Figure 6

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GHD: Inflow Source Points, DEM (2011); Created by: BW, CA

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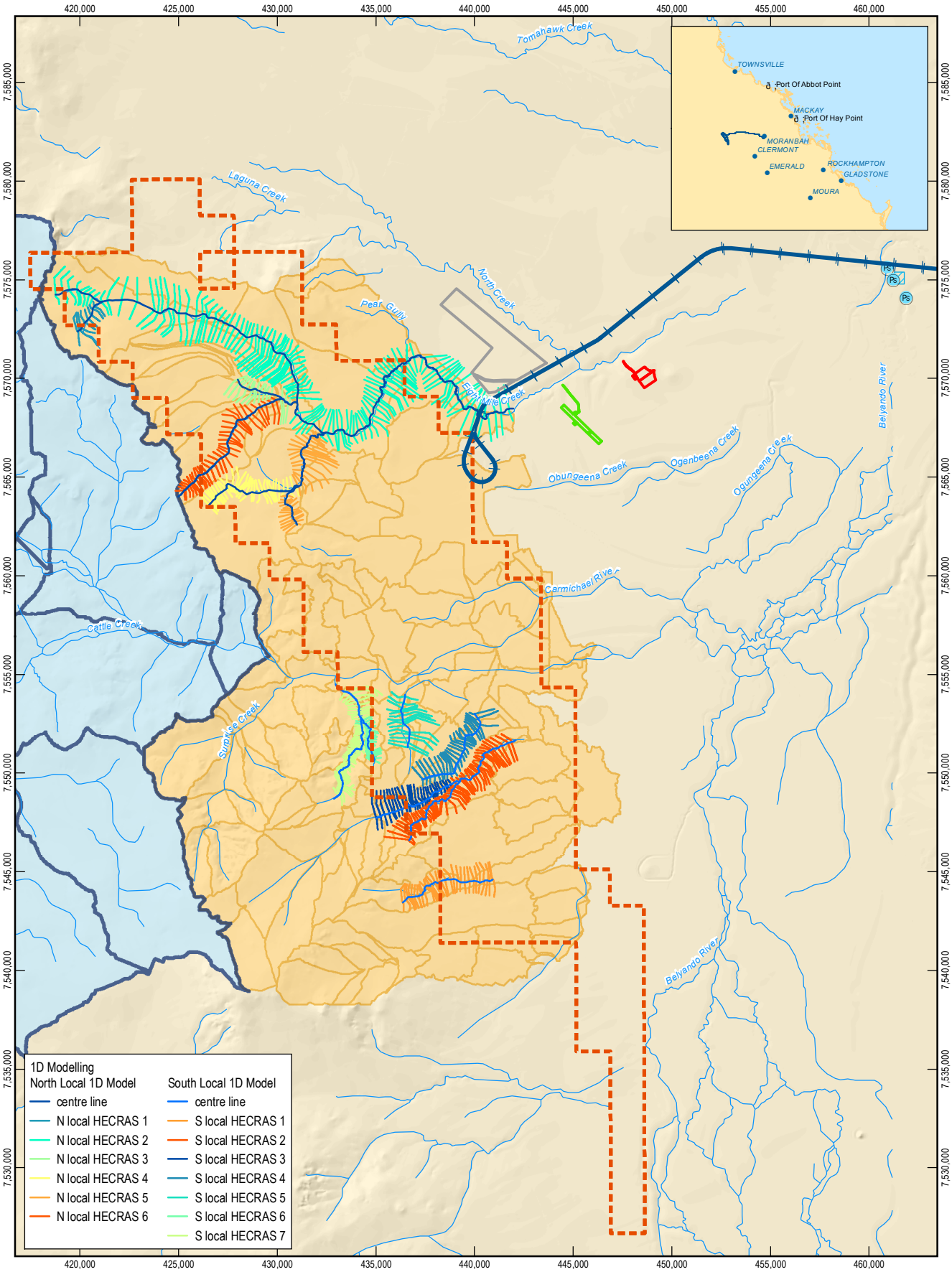
4.3 Minor waterways flood assessment

4.3.1 Topographical analysis

Some regions within the mine area have a flat topography with undefined drainage paths during major flood events. A rough “rain-on-grid” 2D hydraulic model was created to clarify the likely drainage pattern. This was run with dummy rainfall applied directly to each grid cell within the model to assess the likely patterns of flow in waterways and over open land. Results from this informed the HEC-RAS modelling and also the conceptual diversion drain design as proposed in Section 5.

4.3.2 1D model overview

A one dimensional hydraulic model (i.e. HEC-RAS model) was developed to determine existing flood condition water levels in waterways within the mine footprint, but not in the Carmichael River. These creeks or gullies generally traverse the mine site from west to east. A HEC-RAS model was established that included all five of the creeks or gullies that were modelled. The extent of the waterways assessed using a 1D hydraulic modelling approach and the location of the each HEC-RAS cross section is shown on Figure 7.



LEGEND

- Watercourse
- Carmichael Regional Subcatchments
- Mine Local Subcatchment
- Project (Rail)
- Project (Mine)
- Mine (Offsite)
- Pump Station
- Storage Facility
- Airport
- Industrial Area
- Accommodation Village

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Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

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HEC-RAS Network Schematic
for Existing Conditions

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Figure 7

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Data Source: DME: EPC1690 (2010), EPC1080 (2011); © Copyright Commonwealth of Australia - Geoscience Australia: Mainland, Locality, Watercourse (2007); GHD: Subcatchment Boundaries, Model Data (2012); Created by: BW, CA

4.3.3 Model parameters

In order to represent the surface roughness, a Manning's roughness coefficient of 0.045 was applied globally. (Institute of Engineers Australia, volume 1, book 7 AR&R, Table 1.1).

The boundary conditions applied to the hydraulic model include steady state peak inflows at the upstream boundary, changing along the chainage of the stream to represent inflows. A normal depth tailwater condition was adopted at the downstream extent as no other overriding hydraulic control is expected to influence these waterways during local flooding. Peak inflows are summarised in Table 5 and Table 6 as calculated by the hydrologic models described in Section 3.

Table 5 Peak flow conditions in minor waterways north of the Carmichael River– existing conditions

		Total Q (m^3/s)			
HEC-RAS Stream No	Applied Chainage	10 yr	50 yr	100 yr	1,000 yr
S1	2053	10	16	17	40
S10	6928	9	14	15	36
S10	4269	35	56	60	144
S2	3590	36	65	71	168
S2	2337	49	88	98	229
S2	1790	53	96	107	250
S2	1571	100	173	192	446
S2	777	100	173	192	498
S2	476	113	194	214	498
S3	7573	10	16	17	41
S3	4692	20	32	34	82
S4	5510	18	28	30	72
S5	34907	10	16	17	41
S5	32245	30	48	50	121
S5	29242	48	76	81	196
S5	25497	60	99	106	51
S5	24078	60	99	106	251
S5	18254	165	266	294	638
S5	16254	217	348	380	831
S5	7033	242	386	419	905
S5	6008	242	386	417	905
S5	3463	253	343	401	930

Table 6 Peak flow conditions in minor waterways south of the Carmichael River– existing conditions

		Total Q (m^3/s)			
HEC-RAS Stream NO	Applied Chainage	10 yr	50 yr	100 yr	1,000 yr
N1	5323	14	27	32	74
N1	3713	22	44	53	122
N1	3299	23	45	54	124
N2	9187	6	12	13	31
N2	7874	13	24	26	62
N2	5121	133	232	161	551
N2	4214	133	232	161	551
N3	4937	100	178	200	434
N3	3692	117	207	234	499
N3	1684	128	233	252	532
N4	5464	9	15	17	40
N5	8860	15	28	33	75
N5	7325	23	43	50	113
N5	6386	30	56	65	147
N6	2614	7	14	19	40
N7	7381	31	61	74	166
N7	5082	39	77	95	208
N7	2383	40	98	118	257
N7	1450	64	122	144	318

4.4 Existing flooding results

Existing conditions flood maps are provided in Appendix B.

4.4.1 10 year ARI event

Flooding is largely contained within the river channel with some localised overbank flooding at the major inflow gullies. For all recurrence intervals modelled (i.e. the 10 year ARI and greater floods), an effluent flow path exists that feeds into Cabbage Tree Creek to the south-east of the Carmichael River. This contributes to widespread overland flooding averaging 0.5 m deep in this region to the east of the mine area boundary. A southerly breakout from Cabbage Tree Creek also creates substantial localised flooding along the eastern boundary of the proposed open cut pits immediately south of the Carmichael River. In terms of velocity, it can be seen that the faster flow is generally confined to the known watercourses, especially the Carmichael River (which has numerous local areas in excess of 4 m/s), and overbank flows throughout the model are generally relatively slow moving (with a velocity of less than 1 m/s).

Runoff from the north of the proposed mine site is concentrated in the natural gullies on the western side of the site. Within the proposed open-cut pit areas the terrain becomes flatter,

causing this runoff to flood more extensively within every proposed pit area. Runoff from the north of the mine site eventually discharges to Eight Mile Creek.

To the south, the local flood model indicates flooding along the unnamed creeks intersected by Pit F and pit G.

4.4.2 50 year ARI event

An approximately 1.5 km-wide flood corridor occurs within the mine area, with overbank depths between 0.3 – 1.5 m. To the east of the mine area boundary the effluent flow into Cabbage Tree Creek enlarges the floodplain substantially to an inundated area about 2.5 km wide, with overland flow depths of approximately 0.5 m to the edge of the 2D model domain. The velocity results are very similar to the 10 year ARI results, although slightly higher and wider along the watercourses, particularly the Carmichael River. This minimal change is likely due to the significant increase in the extent of overbank flow.

The nature of flooding of minor waterways to the north and south does not change significantly from the 10 year ARI event; however extents along the defined runoff paths typically increase by 6 m and up to 45 m in the larger flat inundated area to the east.

4.4.3 100 year ARI event

Wide-spread flooding is evident to the north of the Carmichael River, as also is extensive flooding in the region surrounding and to the south of Cabbage Tree Creek. Overbank depths of the range between 0.3 – 1.7 m, with 0.3 – 1.3 m surrounding Cabbage Tree Creek and 0.3 – 1.3 m along the south-eastern mine area boundary. The velocity results in the 100 year ARI event show a similar trend to that described in the 50 year ARI event, although the magnitude of the change is generally less as the change in extent between the 100 and 50 year ARI events is less than that between the 50 and 10 year ARI events.

Runoff from the north of the proposed mine site is concentrated in the natural gullies on the western side of the site. Within the proposed open-cut pit areas the terrain becomes flatter, causing this runoff to flood more extensively within every proposed pit area. Runoff from the north of the mine site eventually discharges to Eight Mile Creek.

To the south, the local flood model indicates flooding along the unnamed creeks intersected by Pit F and pit G.

The nature of flooding of minor waterways to the north and south does not change significantly from the 10 year ARI event, however extents along the defined runoff paths typically increase by 7 to 20 m either side and up to 60 m either side in the larger flat inundated area to the east compared to the 10 year ARI flood.

4.4.4 1,000 year ARI event

To the south of the Project Mine flooding is still relatively contained to the Carmichael River corridor. However, the combined effect of incoming overland runoff over a flat plain and Carmichael River breakout flow creates flooding a distance of 3 km across proposed Pit E to the north of the main channel, much of it between 0.5 – 1.5 m deep. As with the 100 year ARI event, the velocity results for the 1,000 year event continue the trend of increasing the magnitude and width of the zone of higher velocities along the watercourses, although given the

increase flow the magnitude of change is higher. The change is also more evident in the local watercourses immediately adjacent to the Carmichael River.

To the east of the mine area, almost the entire 2D model extent is inundated to 0.5 m or more, with a large part of proposed Pit F experiencing depths up to 1.2 m. The local flooding model indicates substantial flooding across the mine site along the unnamed creeks south of the Carmichael River.

The nature of flooding of minor waterways to the north and south does not change significantly from the 10 year ARI event, however extents along the defined runoff paths typically increase by 25 m and up to 250 m in the larger flat inundated area to the east.

4.4.5 Sensitivity analysis

A sensitivity analysis was undertaken on a 1,000 year ARI existing condition event by raising and lowering the applied tailwater condition. This event was selected for sensitivity testing as it has the most significant bearing on the design of the flood protection levees. Results indicate that changing the tailwater level by plus or minus 1 m did not have a significant impact on flood levels in the vicinity of the mine site, with a maximum difference of 7 mm over the predicted flood level. Therefore it was concluded that the flood extents are relatively insensitive to the adopted tailwater conditions.

5. Conceptual staged drainage and flood protection scheme

5.1 Design philosophy

The overall philosophy behind the drainage concept is based on diverting flow around the bunded areas of the proposed open cut mines and limiting the required management of flows and influence in the areas of predicted subsidence over the underground mines. This was achieved using a staged approach consisting of diversion channels, levees and culverts and an allowance for the provision of low flow channels to provide continuity along the proposed diversion drains and/or connectivity between ponds in the areas of predicted subsidence.

5.2 Mine stages analysed

To be consistent with other technical reports and the EIS, the conceptual staged drainage and flood protection scheme was prepared with consideration of the selected staged mine plans. Based on the development progress the stages assessed for this concept are: Year 2 (2016), Year 5 (2019), Year 10 (2024), Year 15 (2029), Year 20 (2034), Year 25 (2039), Year 30 (2044), Year 37 (2051), Year 47 (2061), Year 57 (2071).).Total mine life is 60 years with final rehabilitation in year 2074.

5.3 Description of recommended drainage concept

Based on the philosophy outlined in section 5.1, the recommended drainage concept consists of the following components:

- 1,000 year ARI bund around the open cut mine areas
- Numerous top soil spoil piles, which direct flow upstream of the bunded open cut mine areas
- Twelve channels to collect local runoff and divert existing local watercourses - these will be established in three stages of 8, 3 and 2 channels and may cross areas of predicted subsidence
- Local levees along proposed drains to contain flows within the diversion channels
- Five sets of culverts within the diversion drain network (plus two sets of culverts and a bridge under the proposed haul road)
- A series of low flow connection drains both within the diversion channels and between ponds in the area of predicted subsidence.

The progression of this drainage concept across the mine life for the selected mine stages outlined in section 5.2 is presented in Figure 8 to Figure 16 Details of the individual components of this concept are outlined in the proceeding sections.

As the mine plan is still in the development phases, it is important to note the following limitations regarding the proposed drainage concept:

- Design is based on the current mine development plans, which may change over time, and as such will need to be considered and reviewed as necessary during all subsequent phases of mine design, construction, operation and maintenance
- The mine stages considered as part of this study are separated by a number of years, it is important to note that additional works or consideration may need to be considered to address drainage and flooding issues that may occur in the intervening years
- Given the reliance on constructed drainage measures to manage surface water and local floods within the mine site the performance of the concept will require ongoing monitoring and maintenance throughout the mine's life, especially in relation to impacts of subsidence.

5.3.1 1,000 year ARI bund for open cut mines

As required by legislation, the open cut mine areas have been removed from the assessment for events up to the 1,000 year ARI through the use of a bund. For this assessment this bund was sized using the modelling conducted for the diversion drains and was assumed to be established when the relevant open cut mine was set up.

5.3.2 Top soil spoil pile

Based on communication with Adani, similarly to the 1,000 year ARI bund around the open cut mines the top soil spoil piles were assumed to be established as part of the mine set up. As these spoils will not be compacted they are unsuitable to function as flood protection infrastructure, henceforth a levee/bund will be required against which the topsoil material can be placed. In general this approach has resulted in much reduced local catchments for the sizing of the 1,000 year ARI bund around the open cut mines.

5.3.3 Diversion drains

Diversion drains that cater for external catchment flows have been proposed at various locations as shown on the progress plots (see Figure 8 to Figure 16). These have been designed with consideration given to the current mine plan and the existing topography, following existing grades to reduce the amount of excavation. At times these drains are located between open cut pit areas and so need to be considered during any subsequent design of the pits. Diversion drain alignments have been chosen with due consideration of conceptual infrastructure such as haul roads and conveyors where such information is known. However, this conceptual study has been undertaken before any detailed consideration of such infrastructure has been undertaken.

The existing watercourses have been maintained where possible, as can be seen in the top north east corner of the mine area. Drain discharge points have also been designed to closely mimic existing drainage paths and where possible maintain inflows to waterways to the east of the mine area.

The preliminary conceptual design of the required diversion drains is outlined in Section 8.

Other diversion drains not shown on the progress plots will be required to cater for internal and local runoff, and so will drains necessitated by the development of mine infrastructure in the intervening years between mine stages.

5.3.4 Levees

Minor levees are suggested where necessary to form the required channel to divert the 100 year ARI flows around the open cut mines and/or around the areas of predicted subsidence with the required freeboard. These levees have been assumed to have a 1 in 3 side slope and a minimum height of 2 m.

Major levees either side of the Carmichael River corridor are included from Year 10 or 2024 (southern levee) and Year 2 or 2016 (northern levee). These extend out from the bunded area to protect additional area for the mine from river flooding and to improve the shaping of the constriction, whilst allow allowing flows to enter the head of the Cabbage Tree Creek effluent flow path.

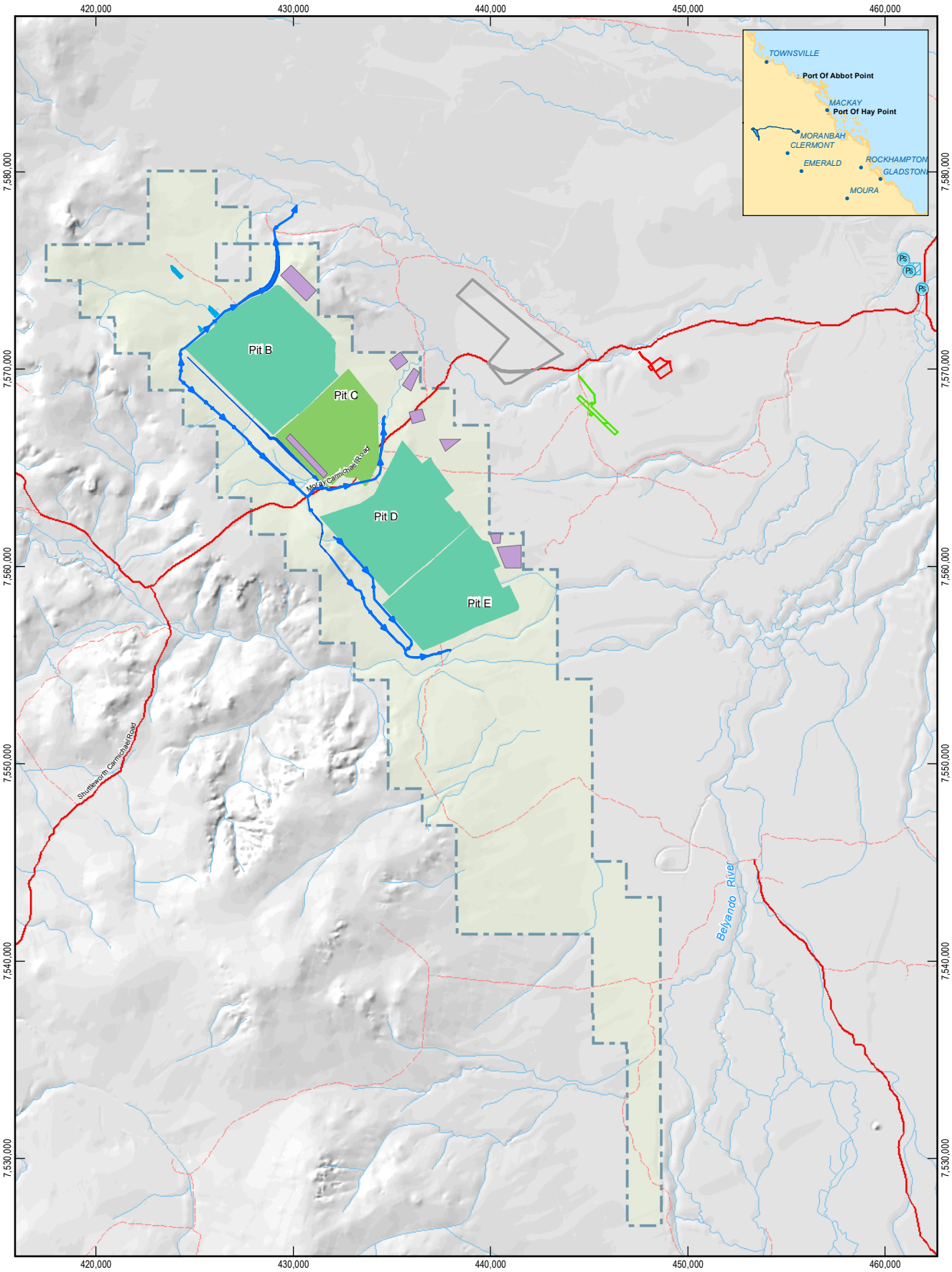
5.3.5 Culverts and crossings

Culverts and creek crossings will occur at multiple locations along the haul road and overland conveyor. Based on the location of mapped creeks and watercourses, seven crossings will be needed at completion of the mine's life (five along the diversion drain network and 2 on the haul road crossing the Carmichael River floodplain). Details of these are provided in Section 7.

A bridge will be required to pass the haul road and conveyor across the Carmichael River and connect the southern mine area with the northern. This is first required in Year 10 or 2024. Preliminary design of this bridge is described in Section 7.

5.3.6 Subsidence management

Subsided areas over the underground mining area will generally drain into one of the proposed diversion drains once any localised ponds are filled up. The location of these ponds is presented in the staged plans (see Figure 8 to Figure 16). In the short term whilst the mining and subsidence in that area as occurring, the current concept is to leave the ponds to simply evaporate and/or infiltrate. However, in the long term to minimise changes to the existing waterways, it is thought these localised ponds will be connected with a series of low flow channels at minimum grade to the closest diversion drain or natural channel. The location and timing of these are also shown in Figure 8 to Figure 16. A brief assessment of the ponding time is provided in Section 9.



LEGEND

- Minor Road
- Track
- Watercourse
- Ponding
- Diversion Drain
- Top Soil Storage
- Mine Site
- Pit
  - 2015 (B,D,E)
  - 2016 (C)
- Mine (Offsite)
  - Pump Station
  - Storage Facility
- Airport
- Industrial Area
- Accommodation Village

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Creek Diversion Layout Progress
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Figure 8

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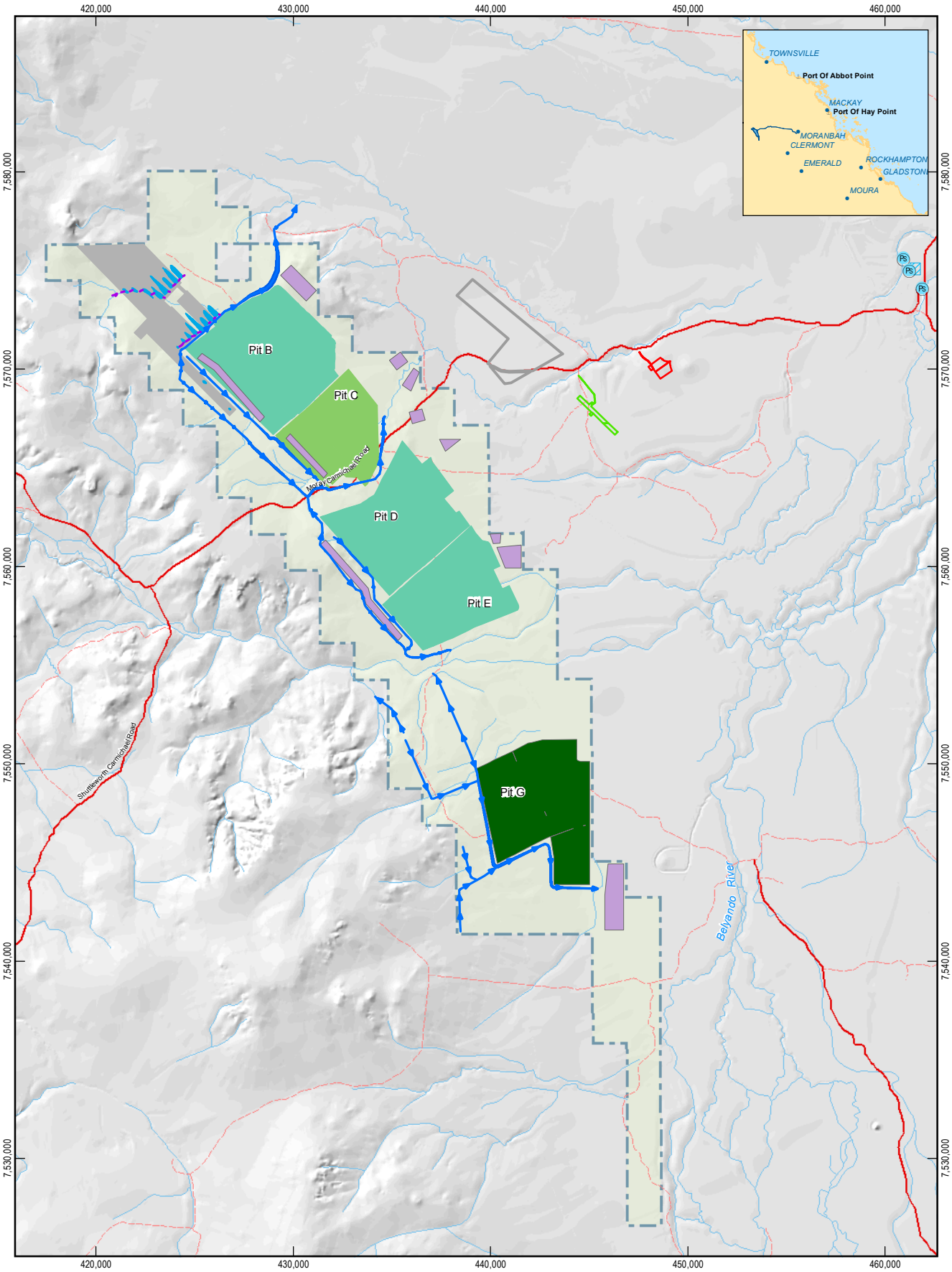

LEGEND

- Minor Road
- Track
- Watercourse
- Ponding Link
- Ponding
- Diversion Drain
- Top Soil Storage
- Underground Mining
- Mine Site
- Pit
  - 2015 (B,D,E)
  - 2016 (C)
  - 2024 (G)
- Mine (Offsite)
  - Pump Station
  - Storage Facility
- Airport
- Industrial Area
- Accommodation Village

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Figure 9

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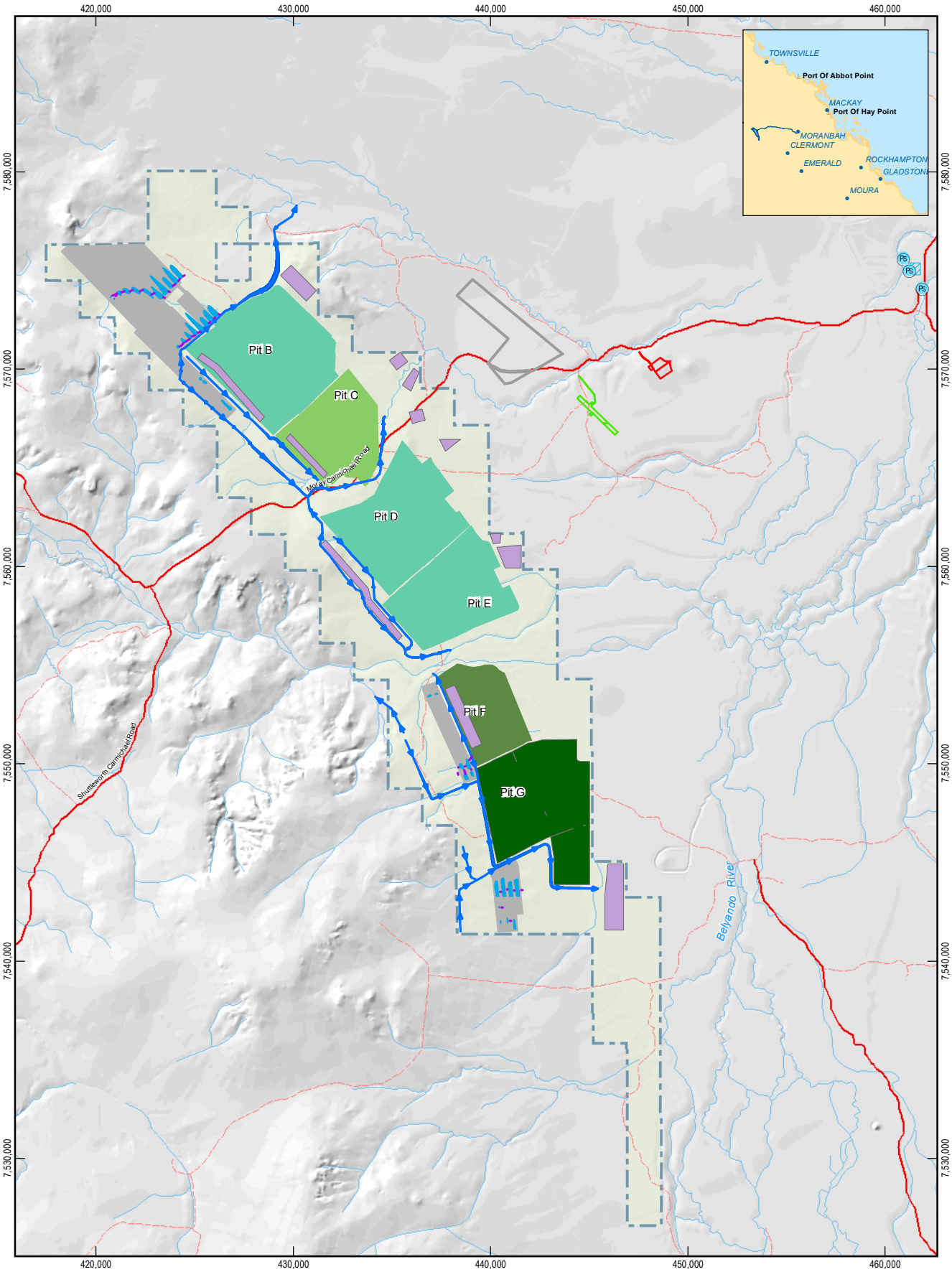

LEGEND

- Minor Road
- Track
- Railway
- Watercourse
- Ponding Link
- Ponding
- Diversion Drain
- Top Soil Storage
- Underground Mining
- Mine Site
- Pit
  - 2015 (B,D,E)
  - 2016 (C)
  - 2024 (G)
  - 2029 (F)
- Mine (Offsite)
  - Pump Station
  - Storage Facility
- Airport
- Industrial Area
- Accommodation Village

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0 2 4 6 8 10

Kilometres

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Figure 10

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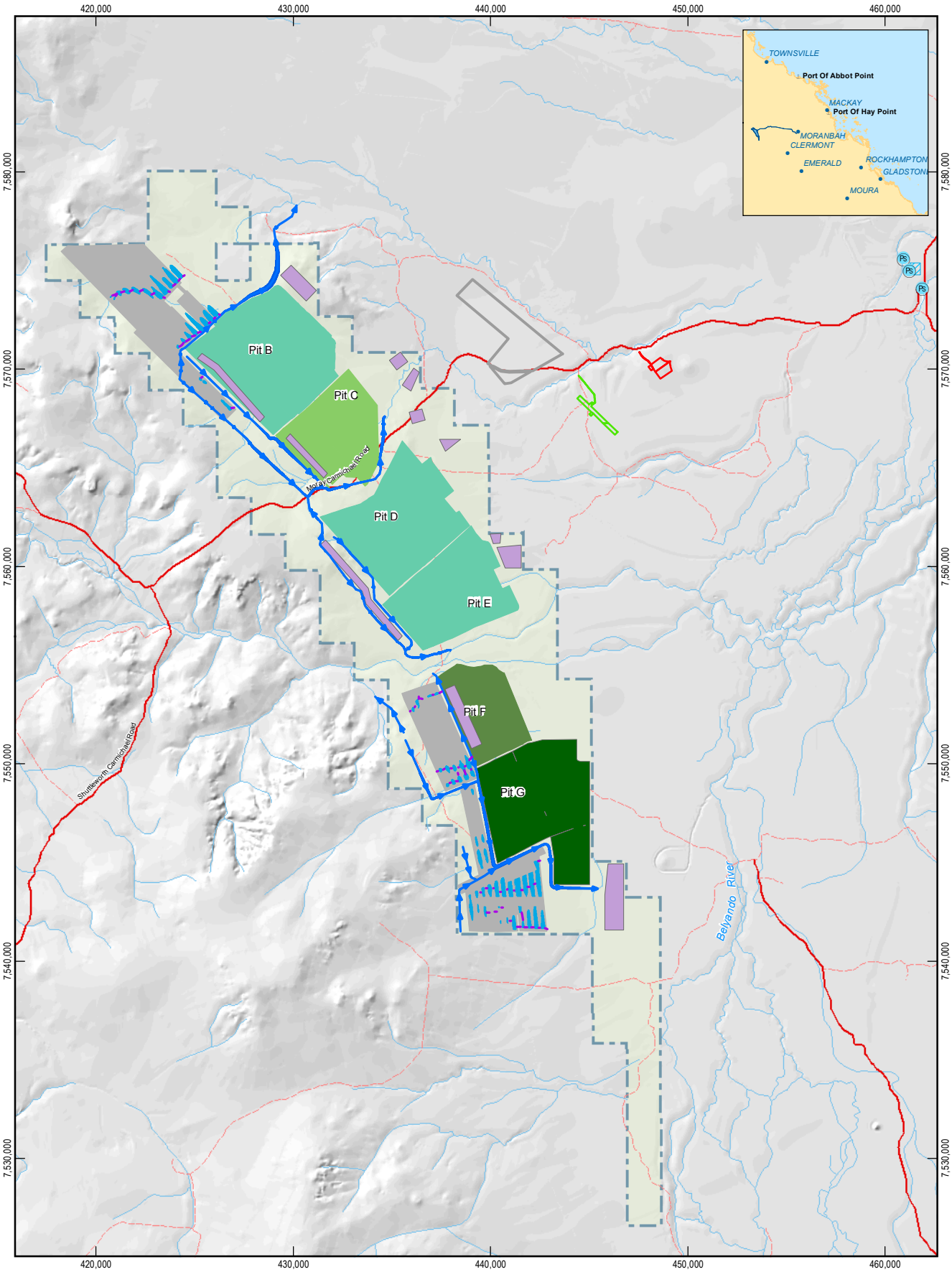

LEGEND

- Minor Road
- Track
- Watercourse
- Ponding Link
- Ponding
- Diversion Drain
- Top Soil Storage
- Underground Mining
- Mine Site
- Pit
  - 2015 (B,D,E)
  - 2016 (C)
  - 2024 (G)
  - 2029 (F)
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Figure 11

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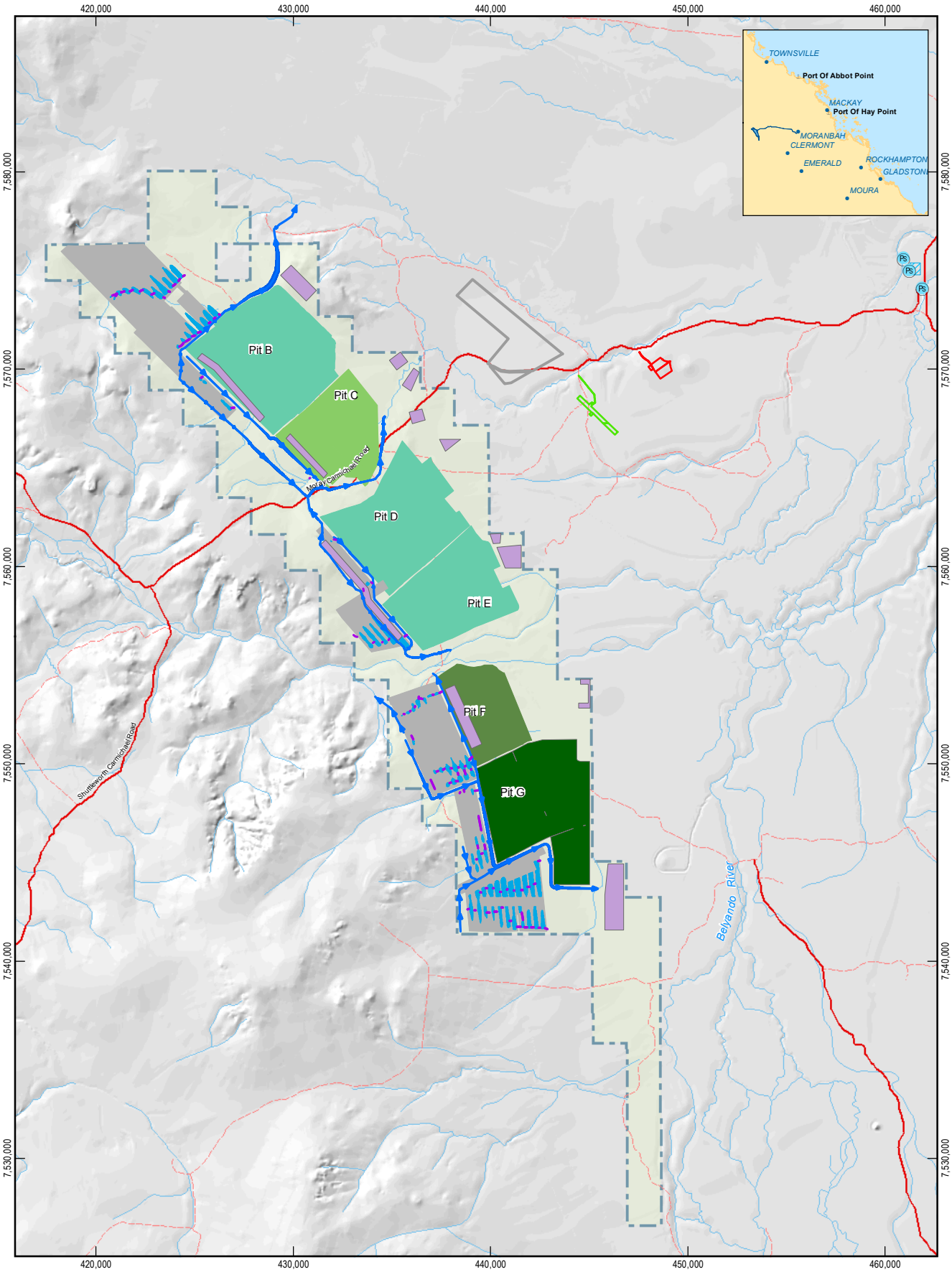

LEGEND

- Minor Road
- Track
- Watercourse
- Ponding Link
- Ponding
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- Mine Site
- Pit
  - 2015 (B,D,E)
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0 2 4 6 8 10

Kilometres

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Figure 12

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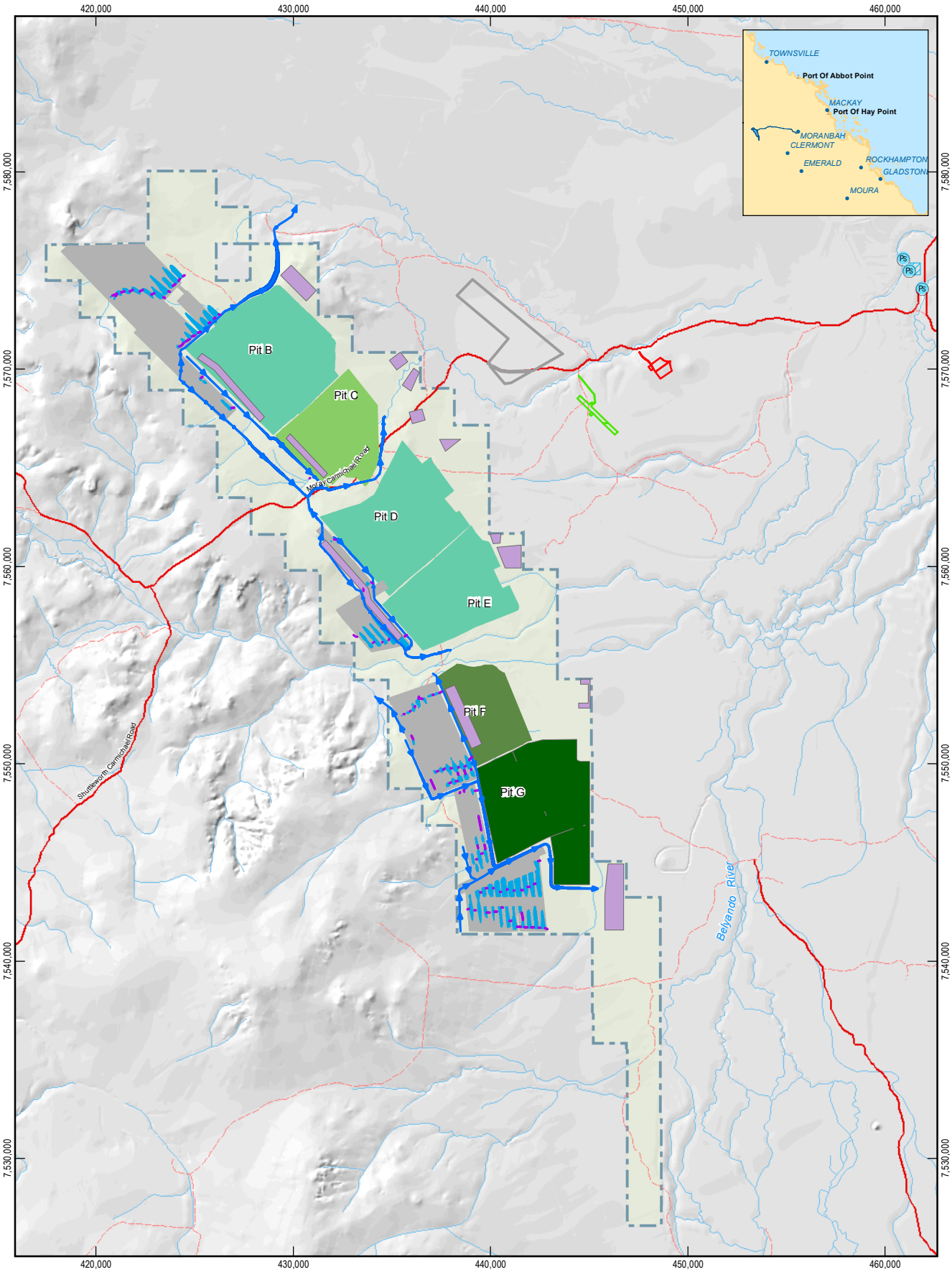

LEGEND

- Minor Road
- Track
- Watercourse
- Ponding Link
- Ponding
- Diversion Drain
- Top Soil Storage
- Underground Mining
- Mine Site
- Pit
  - 2015 (B,D,E)
  - 2016 (C)
  - 2024 (G)
  - 2029 (F)
- Mine (Offsite)
  - Pump Station
  - Storage Facility (Offstream)
- Airport
- Industrial Area
- Accommodation Village

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0 2 4 6 8 10

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

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Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Preliminary Flood Mitigation and Creek Diversion Design
Creek Diversion Layout Progress
Years 2015-2044

Job Number	41-26630
Revision	C
Date	24-10-2013

Figure 13

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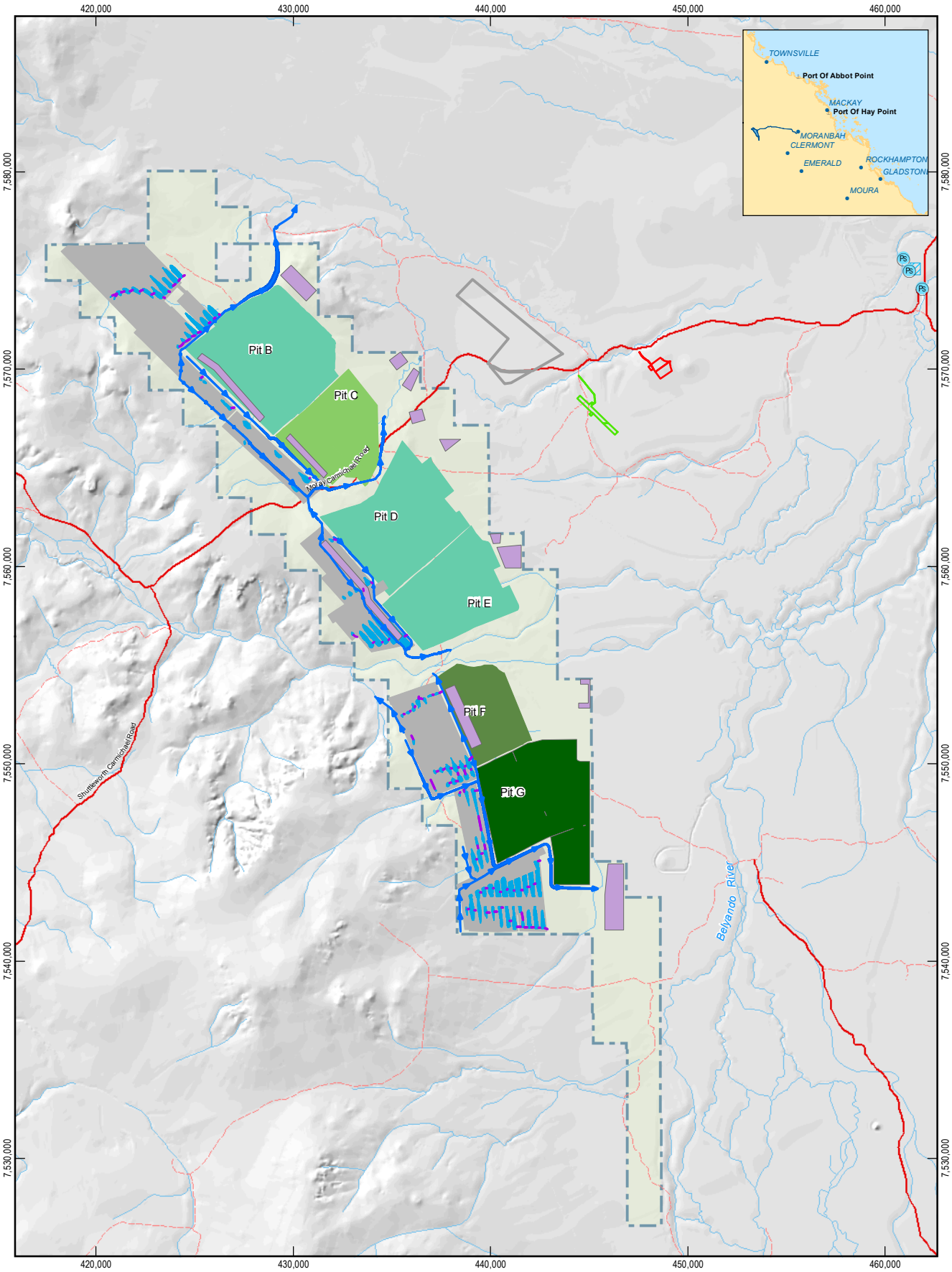

LEGEND

- Minor Road
- Track
- Watercourse
- Ponding Link
- Ponding
- Diversion Drain
- Top Soil Storage
- Underground Mining
- Mine Site
- Pit
  - 2015 (B,D,E)
  - 2016 (C)
  - 2024 (G)
  - 2029 (F)
- Mine (Offsite)
  - Pump Station
  - Storage Facility
- Airport
- Industrial Area
- Accommodation Village

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Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project SEIS
Preliminary Flood Mitigation and Creek Diversion Design
Creek Diversion Layout Progress
Years 2015-2051

Job Number	41-26630
Revision	C
Date	24-10-2013

Figure 14

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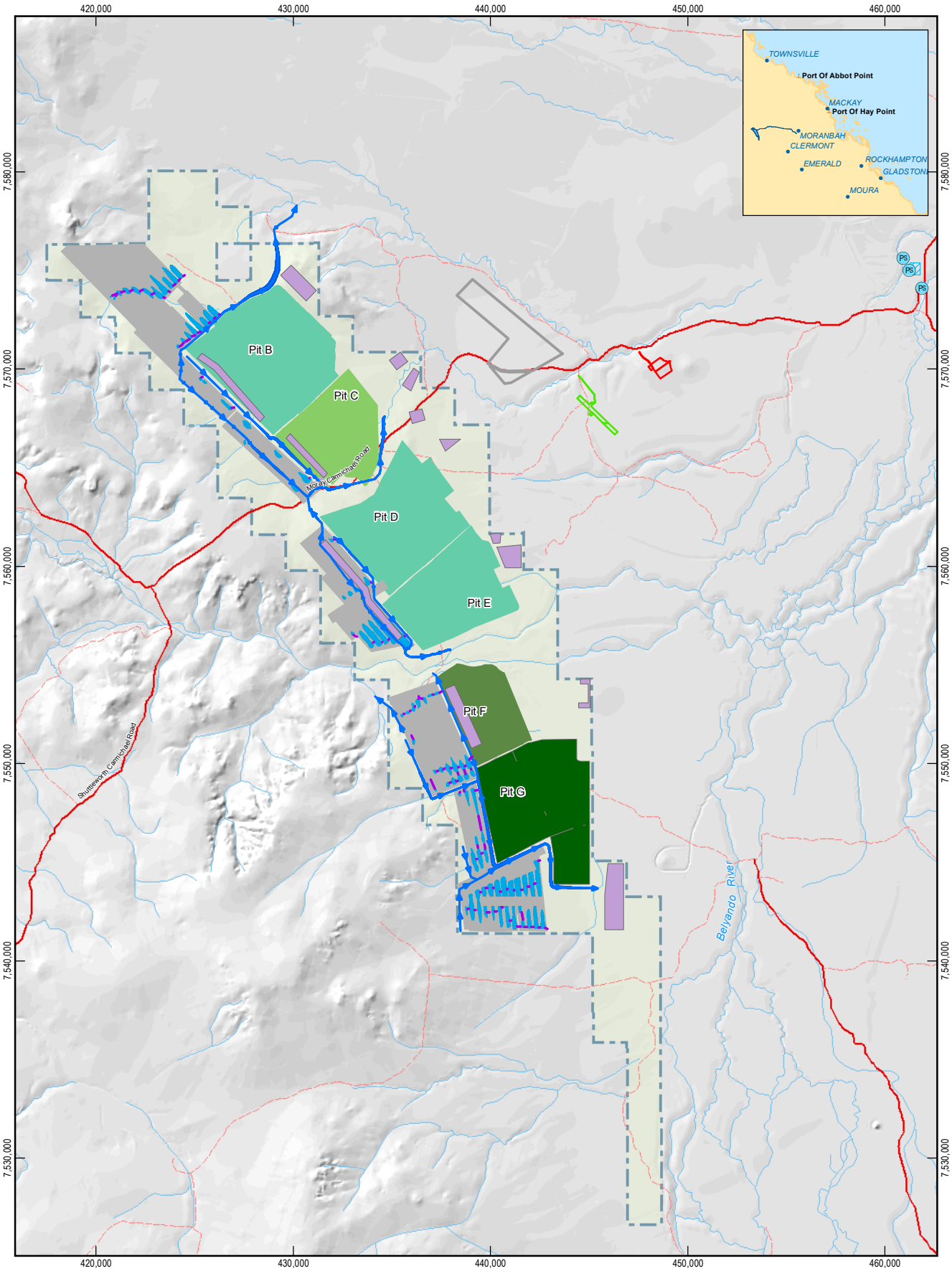

LEGEND

- Minor Road
- Track
- Watercourse
- Ponding Link
- Ponding
- Diversion Drain
- Top Soil Storage
- Underground Mining
- Mine Site
- Pit
  - 2015 (B,D,E)
  - 2016 (C)
  - 2024 (G)
  - 2029 (F)
- Mine (Offsite)
  - Pump Station
  - Storage Facility (Offstream)
- Airport
- Industrial Area
- Accommodation Village

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1:275,000 (at A4)

0 2 4 6 8 10

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project SEIS
Preliminary Flood Mitigation and Creek Diversion Design
Creek Diversion Layout Progress
Years 2015-2061

Job Number	41-26630
Revision	C
Date	25-10-2013

Figure 15

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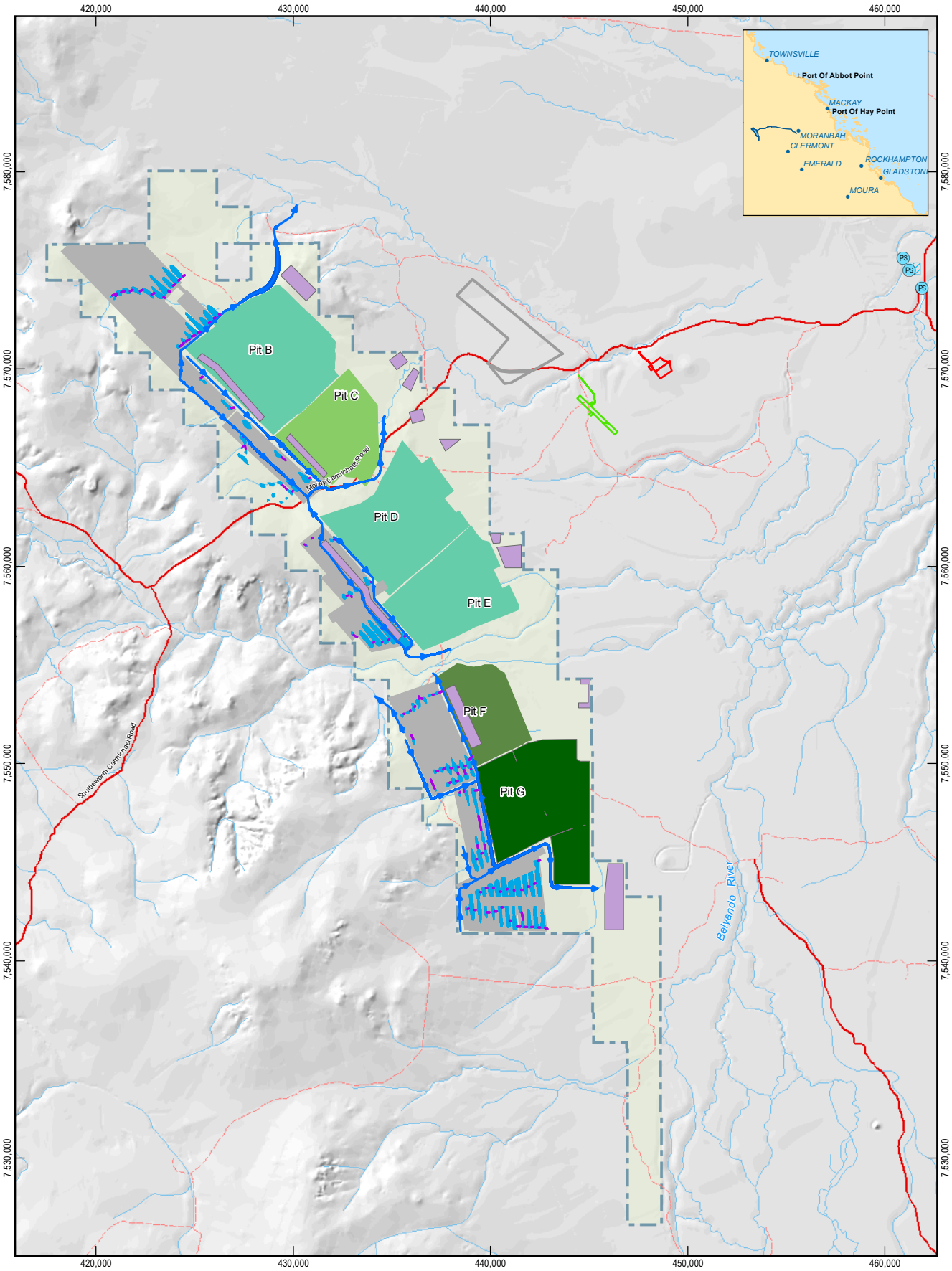

LEGEND

- Minor Road
- Track
- Watercourse
- Ponding Link
- Ponding
- Diversion Drain
- Top Soil Storage
- Underground Mining
- Mine Site
- Pit
  - 2015 (B,D,E)
  - 2016 (C)
  - 2024 (G)
  - 2029 (F)
- Mine (Offsite)
  - Pump Station
  - Storage Facility (Offstream)
- Airport
- Industrial Area
- Accommodation Village

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1:275,000 (at A4)

0 2 4 6 8 10

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

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Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Preliminary Flood Mitigation and Creek Diversion Design
Creek Diversion Layout Progress
Years 2015-2071

Job Number	41-26630
Revision	C
Date	25-10-2013

Figure 16

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Data Source: GA: Road, River / Watercourse (2007); DME:EPC1690 (2010), EPC1080 (2011); Adani: Mine Layout(2013). Created by: MS

6. Preliminary levee design

6.1 Levee alignment

The Carmichael River levee alignment has been kept at the same location for this study as proposed during the EIS stage, with the exception of the shortening of the levee at both ends to tie in with the bund around the open cut mine areas as per the available mine plan at the time. The shortening of the upstream end also incorporated a gradual transition to the point of greatest constriction.

The design criteria as listed in Section 2.2 required the levee to provide 1,000 year ARI flood immunity to the open cut pits, and 100 year ARI immunity to the waste dump areas. The alignment was chosen to curve around the open cut pits and waste dump areas to provide protection from local overland flow as well as flooding from the Carmichael River. The alignment was also designed to allow for the effluent flow path from the Carmichael River into Cabbage Tree Creek.

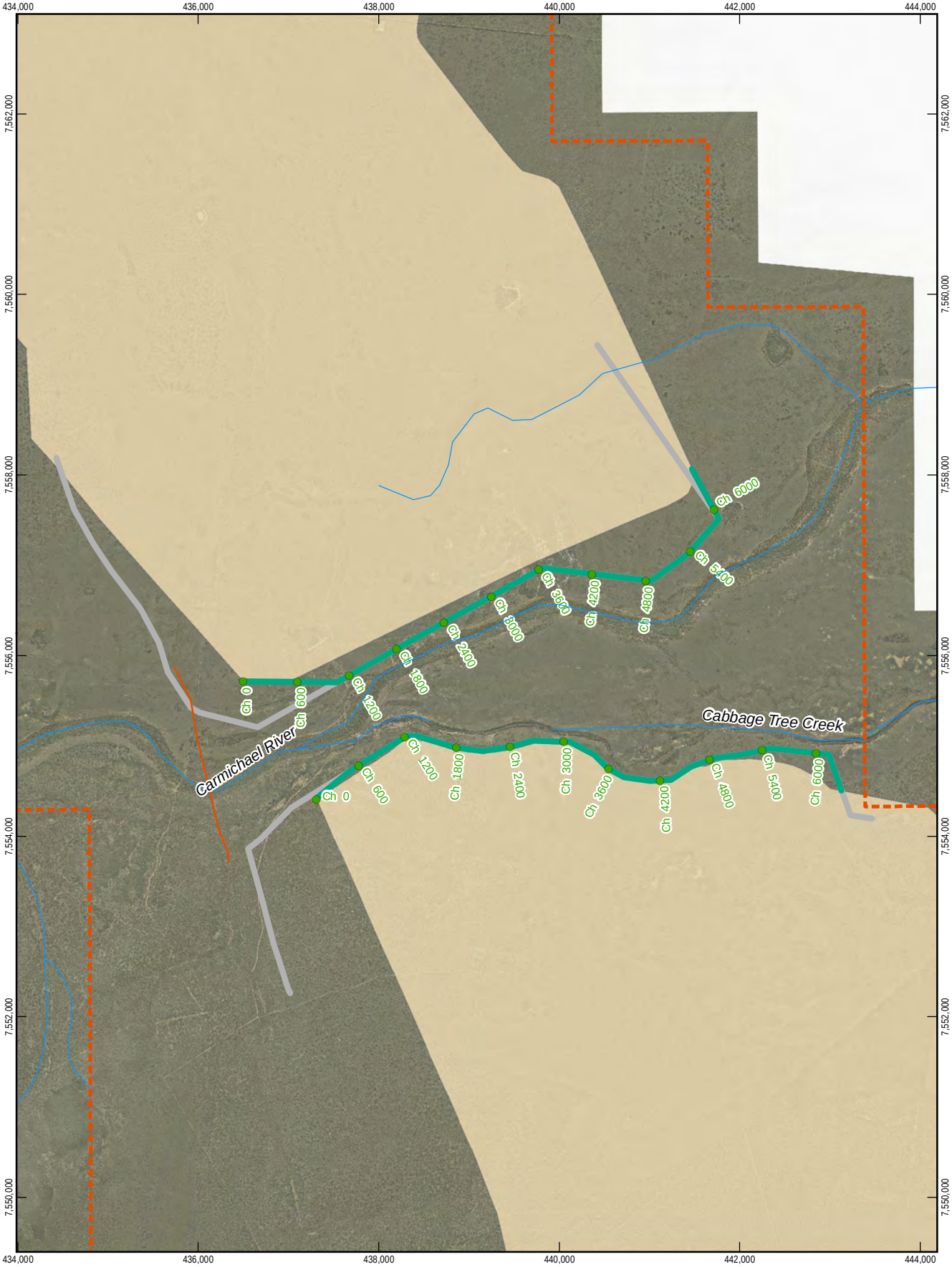
The levee alignment adopted in this study is shown in Figure 17. However, with further development of the mine plan and modelling results it has become clear that the levee, in particular on the north side of the Carmichael River, could be relocated further away from the Carmichael River. This would have a positive impact (i.e. reduce the change between the existing and developed conditions) on the outcomes of the flood study - refer to Section 11.

6.2 Levee crest height

The hydraulic model of the Carmichael River under developed conditions was used to determine the design levee height. The model was run for the 1,000 year ARI design event with infinitely high levees in place. The levee height was then calculated as the 1,000 year ARI water level plus freeboard. Long sections of the Carmichael River levees showing crest elevations are presented in drawing W001 in Appendix F.

For the northern Carmichael River levee the height of the levee above natural ground level averages approximately 2.2 m with a maximum height of 6.4 m. The maximum height occurs in a localised area where the levee crosses a natural depression or gully.

For the southern Carmichael River levee the height of the levee above natural ground level averages at approximately 2.4 m with a maximum height of 3.6 m.



LEGEND

- Existing Watercourse
- Haul Rd & Conveyor Crossing
- EIS Proposed Levee
- SEIS Proposed Levee
- Mine Lease Area
- Mine Plan Layout

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1:60,000 (at A4)

0 500 1,000 1,500 2,000

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Preliminary Flood Mitigation and Creek Diversion Design
Carmichael River
Proposed Infrastructure

Job Number	41-26630
Revision	A
Date	31-07-2013

Figure 17

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7. Preliminary haul road and conveyor crossing design

7.1 Methodology

A bridge is proposed to allow passage of the haul road and conveyor over the Carmichael River (reference Figure 18). The bridge length was designed to allow the passage of flows within the Carmichael River main channel and maintain reasonable flood afflux levels with due consideration of the surrounding land use. The haul road was raised on an embankment above the floodplain either side of the bridge. Both the bridge height and the haul road elevation were sized to provide 50 year ARI flood immunity to the haul road across the Carmichael River, as required by Adani. In addition to the bridge, two sets of culverts were sized and included in the design to allow for the maintenance of natural flow paths within the corridor and reduce afflux due to the crossing.

A HEC-RAS model was developed to size the haul road and conveyor crossing bridge and associated culverts, based on the design flows generated by the hydrologic model as described in Section 3.5.1. Adopted design criteria were as described in Section 2.2. Output from this model can be seen in Figure 19.

7.2 Design summary

A drawing of the proposed haul road and conveyor crossing of the Carmichael River is provided in drawing W002 in Appendix F and the performance of this structure is summarised in Table 7.

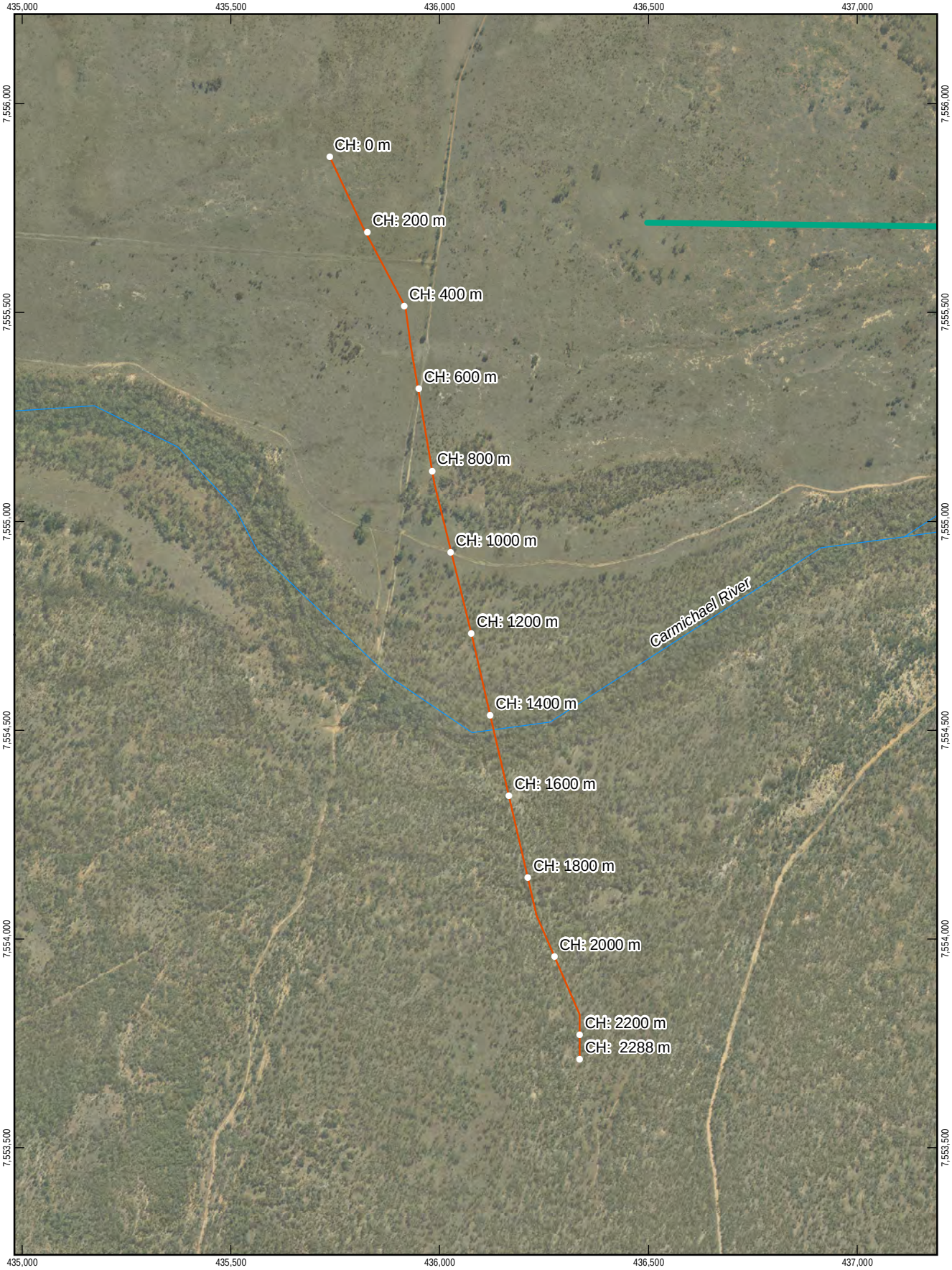
Key features of the concept hydraulic design of the crossing include:

- The alignment shown in Figure 18
- A 180 m bridge comprising 7 x 25 m bridge spans located over the river channel (refer to Figure 19)
- Six cylindrical piers of 1 m diameter aligned in the direction of flow for each bridge support
- Bridge deck level of 230 m AHD
- The bridge soffit level of 228.8 m AHD (i.e. a 1.2 m deep bridge deck structure). At this stage the soffit level is approximately 0.5 – 0.9 m above the 50 year ARI flood level (based on the 1D and 2D modelling respectively) to allow for debris passage
- Four culverts of 3.1 m diameter located approximately at a low point in the floodplain approximately 250 m from the centreline of the Carmichael River (refer to Figure 19)
- Four culverts of 2.75 m diameter located at approximately 175 m from the centreline of the Carmichael River (refer to Figure 19)
- Riprap placement at and just downstream of the bridge to minimise scour potential and protect the abutments and piers due to high velocities through the bridge
- Haul road has a maximum longitudinal gradient of 10 percent.

Table 7 Summary hydraulic analysis of proposed design (from 2D results)

ARI (Yrs)	Q (m^3/s)	U/S WSL (m AHD)	Headwater Afflux (m)	Tailwater Afflux (m)	Max Velocity Through Bridge (m/s)
10	1182	227.19	0.11	0.03	2.20
50	1793	227.90	0.19	-0.04	2.79
100	2079	228.16	0.23	-0.08	3.06
1,000	5071	229.82	0.98	0.31	4.47

For a detailed analysis of the afflux created by the proposed design, refer to Section 10.2.



LEGEND

- Existing Watercourse
- Haul Rd & Conveyor Crossing
- Proposed Carmichael River Levees

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1:13,000 (at A4)

0 100 200 300 400 500

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
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Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Preliminary Flood Mitigation and Creek Diversion Design
Carmichael River Haul Road & Conveyor Crossing Alignment

Job Number	41-26630
Revision	A
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Figure 18

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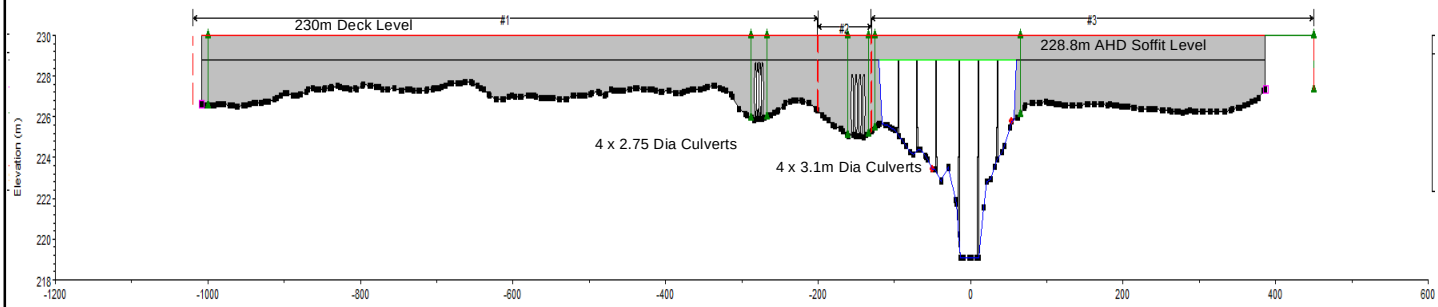
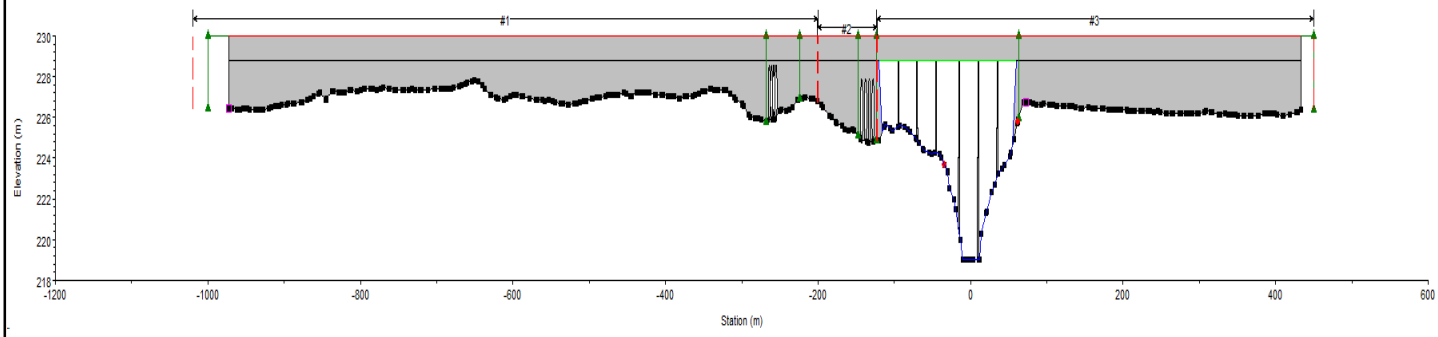
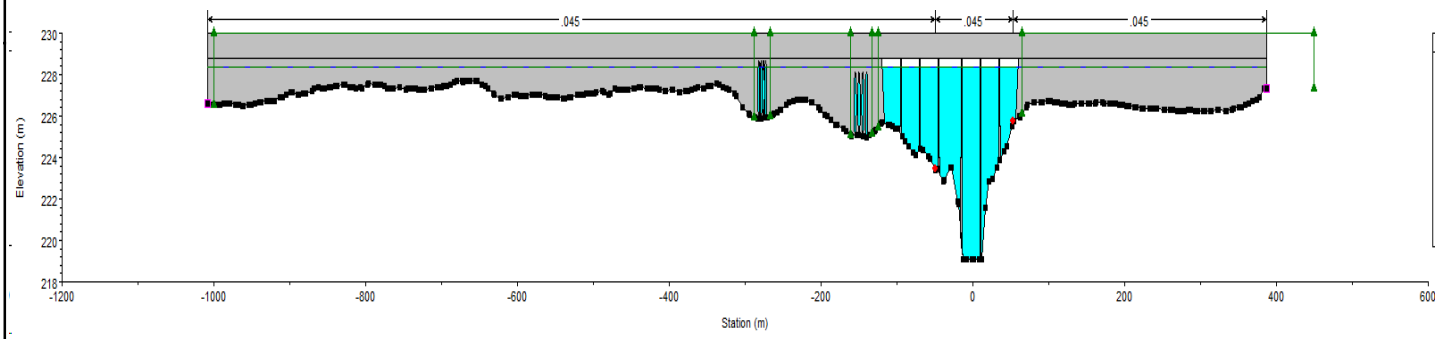
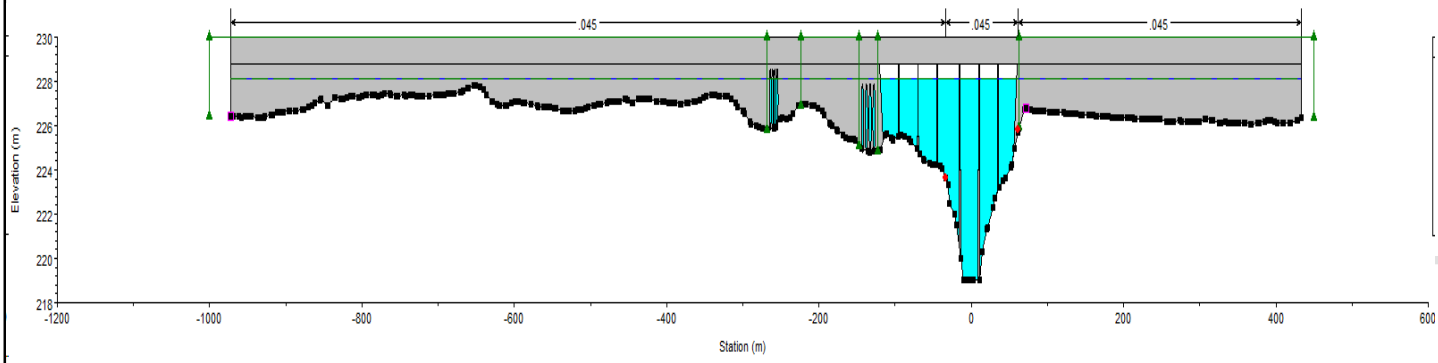
Proposed Bridge Design - 170m span, approximately 7 x 25m spans
40m wide Haul Road







Proposed Bridge In 50 Year ARI Flood Conditions
Q = 2204m3/s, U/S WSL = 228.24m, Headwater Afflux = 0.52m



Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Preliminary Flood Mitigation and Creek Diversion Design
1D Hydraulic Model Results of Proposed Haul Road & Conveyor Crossing

Job Number	41-26630
Revision	A
Date	31 Jul 2013

Figure 19

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Data source: GHD, Proposed Haul Road And Conveyor Crossing Conceptual Design (2012), Haul Road Crossing 1D HEC-RAS Results (2012).

8. Diversion drain sizing

8.1 Methodology

This section outlines the preliminary hydraulic design of the 12 diversion drains that form the basis of the conceptual surface water management system described in Section 5. Please note this is a concept design only and further work will be required at later design stages.

These diversions have been sized based on a combination of preliminary hydraulic calculations to size a trapezoidal channel to convey the required flows, terrain analysis to fit the channel to the base terrain, and 1D hydraulic modelling using HEC-RAS to check the design in relation to the design criteria (see section 2.2.2). Given the preliminary nature of this concept, where necessary some variance from the criteria, namely velocity and shear stress, has been allowed on the understanding that these issues will be resolved during the detailed design process. This approach was deemed appropriate as it is understood that refinements or engineering measures, such as armouring and/or energy dissipaters, could be used to achieve the desired design criteria when the design of other infrastructure is progressed sufficiently to enable refinement of the hydraulic modelling.

To minimise the number of cross section changes along the diversion channels and simplify the process of merging the design cross-section with the terrain, design flows were extracted from the diverted hydrologic model at 1 km intervals along each of the diversion drains and the trapezoidal channel shape was selected from a list of typical sections of varying base widths (2 m to 40 m) and depths.

Once initially designed the long-section of the diversion drains was compared to the terrain post predicted subsidence for the relevant mine stages and areas identified where a low flow channel will need to be introduced to provide continuity along the drain were identified. At this stage these low flow channels have been assumed to:

- Run at a nominal grade of 0.2% from the base of the subsided terrain within the diversion channel until it re-joins the vertical profile of the designed diversion channel
- Consist of a trapezoidal section with a nominal base width of 1 m and side slopes of 1 in 3.

Full hydraulic results of 1D HEC-RAS modelling of these channels for the 100 year and 1,000 year ARI can be found in Appendix E and preliminary drawings are provided in Appendix F.

8.1.1 Determining flows

Flows were sourced from the hydrologic model as described in Section 3.5.2. Table 8 provides an overview of the number and magnitude of flows used to size the proposed diversion drains – for full details of these flows and how they change along the proposed drain refer to Appendix E.

Table 8 Design flows for diversion drain sizing

Diversion Drain	Year Required	No. of flow change locations along drain	100 yr Total Flow (m3/s)	1,000 yr Total Flow (m3/s)
1	Year 2	6	161	336
2	Year 2	9	223	482
3	Year 2	8	55	123
4	Year 2	1	6	14
5	Year 2	5	50	109
6	Year 10	4	18	41
7	Year 10	10	414	759
8	Year 2	7	153	330
9	Year 15	1	2	4
10	Year 15	4	233	446
11	Year 15	3	104	228
12	Year 20	2	71	159

8.1.2 Diversion alignment

The diversion drain alignments were selected based on the existing terrain, known infrastructure (including mine protection bund and top soil spoil piles) that alter the existing flow paths through the mine lease area, and an aim to minimise the change in ultimate discharge point for the diverted catchments. The chosen alignments were generally based on a balancing of the following factors:

- Intersecting low points upstream of both the open cut mine protection bund and the top soil spoil piles
- Minimising cut
- Limiting the catchment area draining in to the areas of predicted subsidence
- Avoiding drains intersecting predicted subsidence panels and haul roads to reduce potential maintenance issues and the number of additional culverts required
- Preferred discharge location.

This process resulted in the twelve diversion drain alignments shown in Figure 8 to Figure 16.

8.2 1D hydraulic model

The 1D hydraulic modelling of the diversion drains was undertaken using HEC-RAS, which was developed using the following:

- Model inflows were sourced from the post-development hydrologic model
- The model geometry was adopted from the terrain analysis using 12D, which generates cross sections incorporating the design channel and surrounding terrain
- The cross-section locations for the diversion drain models were taken approximately every 100 m
- Downstream boundary conditions were assumed to be normal depth based on the channel slope.

8.3 Design summary

8.3.1 Diversion Channel Geometry

A longitudinal and cross section profile of all the diversion drains are provided in preliminary drawings W003 to W028 in Appendix F and a full table of results from HEC-RAS are presented in Appendix E. Table 9 provides a summary of the key drain characteristics and performance against the design criteria (see section 2.2.2). These drains have aimed to meet the design criteria in a 100 year ARI event to be more conservative. As such at this concept stage some additional allowances for not meeting the criteria in localised sections of some of the drains was considered appropriate.

The concept designs for the proposed diversion drains involve a considerable amount of cut due to the following two factors:

- The alignment of the drain: The open cut pits are located on low-lying land intercepting the natural watercourses, meaning that drains along the edges of these pits must cut through higher ground.
- The allowance for minimum 600 mm freeboard in the low lying areas intersected by the diversion drains.

Drawings W003 to W008 in Appendix F include provision for a preliminary channel grading that does not account for any subsidence. This profile could be constructed initially, with the introduction of a low flow channels to reconnect the ponded areas along the diversion drains once subsidence occurs above the underground mining areas. The location of these areas in the relevant diversion drains are highlighted in the second long section profile for each diversion drain – refer to W029 to W042 in Appendix F.

Table 9 Characteristics of proposed diversion channels for 100 Year ARI flows

Diversion Drain	Range of Base Widths (m)	Range of Longitudinal Slopes (%)	% of drain with ≥ 600 mm freeboard in channel[1]	% of drain with a velocity of ≤ 2.5 m/s in channel	% of drain with a shear stress of ≤ 80 N/m^2 in channel	Detailed design considerations to meet design criteria	Drawing Reference in Appendix F
1	2 – 40	0.2 – 0.9	100.0	95.4	93.6	Local drain refinement and/or scour protection measures	W003 – W004
2	2 – 40	0.05 – 1.4	88.52	73.7	70.5	Local drain refinement, including drop structures and/or scour protection measures between Chainage 7000 and 3000.	W005 – W007
3	2 – 20	0.3 – 1.5	100.0	100.0	89.6	Local drain refinement and/or scour protection measures	W008 – W010
4	2	0.2	100.0	91.7	83.3	Local drain refinement and/or scour protection measures	W011 – W012
5	2 – 30	0.2 – 1.0	100.0	84.9	83.6	Local drain refinement, including drop structures and/or scour protection measures	W013 – W014
6	2	0.3 – 0.5	100.0	100	97.7	Local drain refinement and/or scour protection measures	W015 – W016
7	2 - 40	0.2	96.3	59.0	97.8	Local drain refinement and/or scour protection measures along much of drain (velocities are generally within 10% of criteria).	W017 – W018
8	2 - 40	0.2 – 1.9	100.0	98.9	80.5	Local drain refinement, including drop structures and/or scour protection measures	W019 – W020
9	2	0.2 – 0.3	100.0	100.0	100.0	-	W021 – W022

Diversion Drain	Range of Base Widths (m)	Range of Longitudinal Slopes (%)	% of drain with ≥ 600 mm freeboard in channel[1]	% of drain with a velocity of ≤ 2.5 m/s in channel	% of drain with a shear stress of ≤ 80 N/m^2 in channel	Detailed design considerations to meet design criteria	Drawing Reference in Appendix F
10	5 – 40	0.2 – 1.0	100.0	77.2	77.2	Local drain refinement, including drop structures, and/or scour protection measures in last 1.5 km of drain	W023 – W024
11	2 – 20	0.2 – 2.1	100.0	55.8	55.8	Local drain refinement, including drop structures, and/or scour protection measures in last 2 km of drain	W025 – W026
12	2 – 20	0.4	100.0	100.0	100.0	-	W027 – W028

Note:

[1] indicates that the freeboard criterion is reported in reference to the side of the drain adjacent to the proposed mine site only. This was done because some portions of the diversion channels were allowed to have less than 600 mm freeboard to allow flows to enter the drain freely from the upstream side and avoid complex terrain manipulation at this preliminary stage. In general the channel does however have some degree of freeboard on the upstream side of the channel.

[2] indicates that this drain was allowed to spill out of the channel in a localised depression, due to the diversion drain alignment being confined between two of the open cut areas that are bounded by a 1,000 year ARI bund.

Table 10 Location of low flow channels along diversion drains

Diversion Drain	Number of (and Chainage of) Low Flow Connection Channels along the diversion drains at various Mine Stages								
	Year 5	Year 10	Year 15	Year 20	Year 25	Year 30	Year 35	Year 40	Year 45
1	-	1 (CH 10900)	2 (CH 11400, 10850)	2 (CH 11400, 10850)	2 (CH 11400, 10850)	2 (CH 11400, 10850)	2 (CH 11400, 10850)	2 (CH 11400, 10850)	2 (CH 11400, 10850)
2	-	-	-	-	-	-	-	1 CH 7700)	1 (CH 7700)
3	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	1 (CH 2500)	1 (CH 2400)	1 (CH 2400)	1 (CH 2400)
5	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-
8	-	-	-	-	1 (CH 4400)	2 (CH 4400, 6650)	2 (CH 4400, 6600)	2 (CH 4400, 6600)	2 (CH 4400, 6600)
9	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-

8.3.2 Culverts along diversion drain

Using current plans regarding haul roads, the proposed diversion channels will require culverts in 5 locations (see Figure 8 to Figure 16). These culverts have been sized using the HEC-RAS models of the diversion drain and are designed to pass sufficient flow to maintain the channels performance against the design criteria in the 100 year ARI event. At this preliminary stage, the following assumptions were made to determine the required culvert size:

- The haul road completely fills up the diversion channel, which would provide 100 year ARI immunity
- Minimise change in cross-sectional area
- Preferentially utilise pipes over box culverts (maximum pipe diameter of 3 m)
- Maintain at least 600 mm cover to haul road above culverts
- Downstream boundary conditions were assumed to be normal depth based on the channel slope.

As a result, provided that the design criteria were met in the 100 year ARI event some afflux upstream of the proposed structure was considered acceptable. This assessment identified the need for the culverts presented in Table 11, the culvert along 'diversion drain 8' was reduced in number from 11 – 9 to minimise back flow from the Carmichael River.

The design of these culverts should be refined at later design stages, once further details are known in relation to the required haul roads. At this point, details relating to potential blockage, inlet and outlet works, and the need for scour protection will need to be considered and addressed.

Table 11 Characteristics of culverts along proposed diversion channels

Diversion Drain	Chainage (m)	Culvert Type	Number of	Diameter or Width (m)	Height (m)
1	10490	RCP	2	2.4	-
2	6050	RCP	12	3.0	-
4	130	RCP	1	1.8	-
61	2490	RCBC	2	2.1	1.8
8	2150	RCP	9	3.0	-

Note:
[1] indicates that this drain will need some local shaping to allow for the proposed culvert width.

8.3.3 1,000 year ARI Bund to protect open cut mines

Based on the assessment of the 1,000 year ARI flows, it was found that due to their alignment a number of the diversion drains would contain these flows with freeboard and as such parts of the open cut mine may not need a 1,000 year bund to protect the area from external flows. The areas where these flows are not contained within the diversion drain and a bund would therefore be required are shown in Figure 8 to Figure 16. Based on discussions with Adani regarding minimum levee height and the legislative need to contain and treat all flows within the disturbed areas of the open cut mines, at this preliminary stage it is assumed that a 2 m bund will be required around the entire disturbed area for the proposed open cut mines (see Figure 8 to Figure 16), with the following exceptions:

- Either side of ‘diversion drain 2’ between chainages of 2200 and 4500, where the height will increase to a maximum of 5.6 m due to the drain crossing a valley (refer to preliminary drawing W043 in Appendix F)
- Immediately north of the Carmichael River where the proposed river levees connect in to the bund for approximately 2.5 km and then at localised depressions(refer to preliminary drawing W044 in Appendix F)
- Local areas along the mine bund at the upstream and downstream end of the southern Carmichael River levees (refer to preliminary drawing W045 in Appendix F)
- Adjacent to Carmichael River if proposed river levees are not in place or combined with this protection bund.

9. Ponding assessment

9.1 Introduction

Due to subsidence the topography within the mine area above the underground workings will change. With the topography drainage patterns will change as well. In general, the proposed drainage concept diverts as much water around the areas of predicted subsidence to reduce the importance of surface water management in these areas. There are however some areas of predicted subsidence where diversions aren't practical and water will pass through these areas leaving permanent pools that will rely on either evaporation and infiltration losses to remove it or the provision of a series of low flow connection channels to provide an outlet.

9.2 Methodology

As subsidence is expected to be relatively comparable within a longwall section the subsided surface will largely follow existing topography. Henceforth ponding will happen at various locations within a longwall section. However, the largest ponds can be expected at the end sections of each longwall section and in particular around exiting waterways/drainage lines. As part of the ponding assessment the future ponding around the existing drainage lines has been assessed. The volumes and surface areas of the ponds were identified within 12D software and are shown in Figure 8 to Figure 16.

The likely performance of these ponds was assessed using MUSIC (or the Model for Urban Stormwater Improvement Conceptualisation), which is a conceptual design tool commonly used to assess stormwater hydrology and pollution impacts based on a long-term simulation of historic climate data. It was used in this application to quantify the likely performance of the ponds, because it is able to quickly simulate the catchment runoff process and monitor the level in the storage over time based on the available historic climate data.

A high level MUSIC model was developed, using:

- Climate data used is based on approximately 10 years of rainfall and evaporation data from the Bygana BOM Station (No 36089) and 1.5 years of pluviograph data from the Blair Athol BOM Station (No 35010)
- An assumed infiltration rate of 50 mm/hr (which is at the low end of the range for the soil type in this area).

9.3 Results

Potential pond performance is outlined in Table 12. The results indicate that ponds are unlikely to remain wet for long periods with all the modelled pond sizes being empty for more than 59 percent of the year due to evaporation and infiltration and most ponds empty in less than a day if there is no additional rainfall. A scenario in which no infiltration is allowed is also provided in Table 12 as a form of sensitivity analysis to understand the implications of this parameter on the performance of these ponds – this scenario is however unlikely to occur.

Considering the relatively small size of the permanent pools in the areas of predicted subsidence together with the likely performance of these ponds (based on the assessment above) and the limited mine life, the current management approach in this area involves:

- Leaving the ponds isolated to have their levels controlled by evaporation and infiltration losses until the predicted subsidence in that area is complete
- Introducing a series of low flow connection channels to provide a continuous path for flows to pass through the areas of predicted subsidence and in to a diversion channel and/or existing waterway.

This approach to surface water management in this area was adopted to minimise the time there is a discontinuous flow path through these areas and to reduce the overall required works at each stage of the mine life.

As with the diversion channels the low flow connection channels will be assumed to:

- Run at a nominal grade of 0.2 percent from the base of the subsided terrain within the permanent pool until it re-joins the surrounding terrain
- Consist of a trapezoidal section with a nominal base width of 1 m and side slopes of 1 in 3.

Table 12 Potential pond performance in a 'dry' and 'wet' year

	Infiltration rate: 50 mm/h			Infiltration rate: 0 mm/h		
Dry year (2005)	500 m^2 pond	10,000 m^2 pond	150,000 m^2 pond	500 m^2 pond	10,000 m^2 pond	150,000 m^2 pond
Fraction of time full (%)	14%	0.5%	0%	55%	16%	8%
Fraction of time more than 1/4 full (%)	16%	0.8%	0%	93%	18%	75%
Fraction of time empty (%)	84%	99.2%	100%	1%	82%	23%
Days to empty from full (assuming no rainfall)	less than 1*	less than 1*	less than 1*	312	310	262
Wet year (2010)	500 m^2 pond	10,000 m^2 pond	150,000 m^2 pond	500 m^2 pond	10,000 m^2 pond	150,000 m^2 pond
Fraction of time full (%)	39%	32%	1%	70%	55%	34%
Fraction of time more than 1/4 full (%)	40%	18%	1%	100%	100%	100%
Fraction of time empty (%)	59%	82%	99%	0%	0%	0%
Days to empty from full (assuming no rainfall)	less than 1*	less than 1*	less than 1*	>365	>365	>365
Note: * indicates that the daily seepage exceeds storage volume						

10. Post-development flooding conditions

10.1 Post-development hydraulic model

In order to determine the impact of the Project (Mine), hydraulic modelling has been undertaken for post-development conditions which includes proposed mine infrastructure.

10.1.1 DEM

The terrain was raised to represent the proposed levees adjacent to the Carmichael River, in accordance with the preliminary levee design (refer Section 6).

Terrain modification and a layered 2D flow bridge structure were incorporated to represented the proposed haul road and conveyor crossing of the Carmichael River, in accordance with the preliminary design (refer Section 1.4).

The modelling does not currently include the predicted subsidence, as in terms of levee design the scenario without subsidence (which simply adds flood plain storage) is likely to be more conservative.

10.1.2 Catchment Roughness

The global application of a Manning's 'n' of 0.045 was maintained from the 'Existing' scenario model, with the exception of the proposed diversion drains. A Manning's 'n' value of 0.03 has been adopted within the boundary of the proposed diversion drains to represent the smoother nature of the constructed channels.

10.1.3 Inflow boundaries

Model inflows were sourced from the post-development hydrologic model (i.e. with the external diversion drain in place) as described in Section 3.

10.1.4 Tailwater conditions

No change was made to tailwater conditions of the hydraulic model.

10.2 Flooding results

Flood inundation maps indicating the depth and velocity of flooding and the predicted change in flood level (afflux) and velocity (velocity afflux) for the 10, 50, 100 and 1,000 year ARI design events under post development site conditions are provided in Appendix D.

10.2.1 General Observations

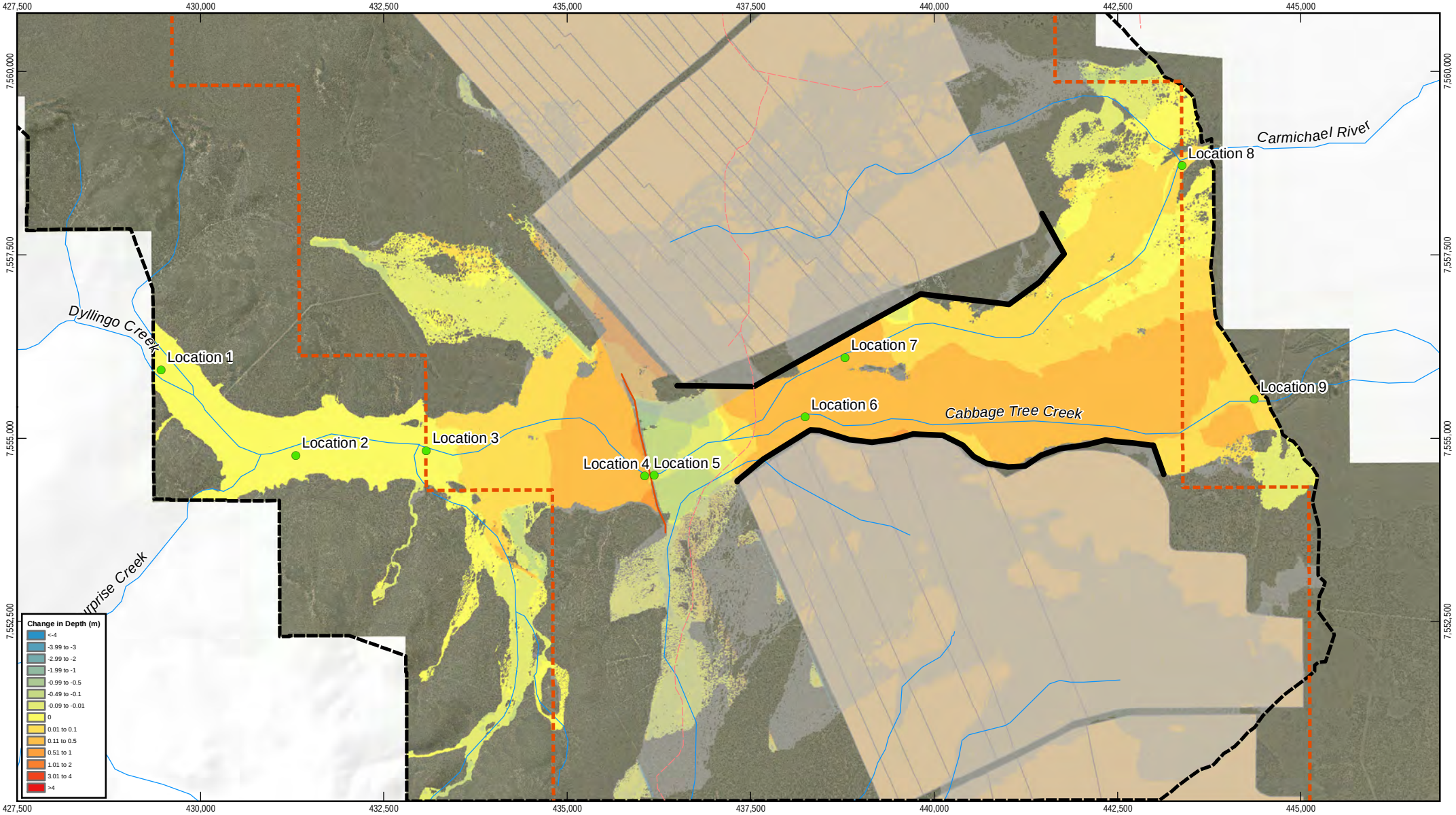
With the establishment of the mine site and accompanying flood mitigation infrastructure, the Carmichael River is now confined to the corridor between the flood levees with no runoff being received from the area internal to the mine area, excepting the new contribution from the diversion channels. The contraction of the floodplain causes an insignificant increase in flood extent upstream of the mine area for any of the simulated flood events. This outcome reflects the relative distance of the contraction from the western mine area boundary.

The proposed levees successfully prevent flooding of either the underground mining area or the open cut pit areas. The haul road crossing bridge is immune to the 10 year, 50 year ARI, and 100 year events, but is overtopped by the 1,000 year ARI event. As discussed elsewhere the water level difference across the crossing for the current design is significant (ranging up to 0.7 m in the 1,000 year ARI event) and this leads to a potential high risk of scour in floods larger than the 50 year ARI flood.

Table 15 shows the afflux value at a range of locations of interest within the study area for comparative purposes. Figure 20 shows the points of interest and afflux for a 100 year ARI event.

Table 13 Afflux due to proposed development, at locations of interest

Location	Description	Afflux (m) For ARI			
		10 year	50 year	100 year	1,000 year
1	Carmichael River Model Inflow Boundary	0.01	0.00	0.00	0.00
2	2 km Downstream of Carmichael River Model Inflow	0.02	0.00	0.00	0.01
3	Western mine area Boundary	0.02	0.01	0.01	0.06
4	Upstream of Haul Road Crossing	0.11	0.19	0.23	0.98
5	Downstream of Haul Road Crossing	0.03	-0.04	-0.08	0.31
6	Upstream Cabbage Tree Creek	0.04	0.16	0.23	0.70
7	Midway through mine area	0.02	0.14	0.21	0.59
8	Eastern mine area Boundary	0.01	0.00	0.01	0.07
9	Downstream Cabbage Tree Creek	0.01	0.07	0.09	0.17



1:70,000 (at A4)

0 0.5 1 1.5 2 2.5

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- POI
- Track
- Minor Road
- Watercourse
- Proposed Carmichael River Levee
- 2D Model Extent
- Mine Lease Area
- Mine Layout Plan
- Flood Extent Change

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Preliminary Flood Mitigation and Creek Diversion Design

Afflux with Points of Interest,
100 Year ARI Event

Job Number	41-26630
Revision	A
Date	31-07-2013

Figure 20

G:\41\26630\GIS\Maps\MXD\NewMaps\41_26630_Fig20.mxd

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Data source: DME: EPC1690 (2010)/EPC1080 (2011); © Commonwealth of Australia (Geoscience Australia): Roads, Watercourse (2007); Adani Pty Ltd: Waste Dump Area, Open Cut Area (2012); GHD: Modelling, Levees (2012); Created by: BW, CA

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10.2.2 10 Year ARI

The redistribution of flows due to the diversion drains and bunds, together with the restriction of the haul road on the Carmichael River floodplain has generally resulted in a reduction or only marginal afflux (less than 0.1 m) in the 10 year ARI event. A few notable exceptions to this are:

- The area immediately upstream of the haul road – which experiences between 0.1 and 0.5 m afflux (with the higher afflux south of the bridge and along the local drainage path at the second set of culverts north of the bridge)
- A localised area midway along the southern levee in Cabbage Tree Creek which experience up to 0.3 m afflux
- A local drainage path adjacent to the northern levee midway along the constriction – which also experiences up to 0.3 m afflux.

Importantly afflux was shown to be negligible at both the western and eastern boundary of the mine area (afflux was up to 20 mm an 10 mm respectively).

In terms of velocity afflux, the results show that the proposed mine infrastructure will generally reduce or cause only a minor increase (less than 0.1 m/s) in the velocity throughout the model, except in some localised areas. The areas of increase are generally along the proposed diversion drains (and/or upstream of the proposed top soil spoil piles), through the crossings (bridge and culverts) under the haul road, and immediately downstream of the crossings (especially along the Carmichael River). The most significant change in terms of magnitude is along the diversion drains, which generally show increases in excess of 0.5 m/s, and the biggest change in terms of area is at and downstream of the Carmichael River bridge (which generally shows an increase of between 0.1 and 0.5 m/s).

10.2.3 50 Year ARI

The overall pattern of afflux in the 50 year ARI event is similar to that in the 10 year ARI, with the majority of the afflux being confined to the immediate floodplain of the Carmichael River and proposed diversion drains. The magnitude and extent of the afflux has however increased as follows:

- The pond upstream of the haul road has expanded to cover the bridge and three culvert crossings to the north and now experiences afflux of between 0.1 and 0.6 m afflux (with the higher afflux being either side of the bridge)
- The entire length of the Cabbage Tree Creek effluent path adjacent to the southern Carmichael River levee experiences afflux of between around 0.1 to 0.4 m (a likely result of the levee redirecting some water that would have otherwise left the creek as overland flow to the south)
- The full first half of the area confined by the Carmichael River levees experiences between 0.1 and 0.2 m afflux
- The area midway along the northern levee experiencing higher afflux (now up to 0.4 m) has grown and shifted upstream
- Connection to the Carmichael River has resulted in afflux of up to 0.5 m in a localised area near the downstream end of proposed diversion drain 5.

The results also show a reduction in flood levels immediately downstream of the bridge, due to the restriction of flow along the floodplain. Similarly to the 10 year ARI event, the afflux was shown to be negligible at the western mine area boundary (up to 10 mm) and relatively insignificant at the eastern mine area boundary (afflux was close to 0 mm near the Carmichael River, but up to up to 70 mm downstream of Cabbage Tree Creek).

The velocity afflux in the 50 year ARI event shows a similar trend to the 10 year ARI event, with an increase in the magnitude of the changes in velocity in the localised areas of increase. At the Carmichael River bridge, the velocities increase by up to 0.9 m/s. This event also identifies two additional areas of increased velocities, one immediately upstream of the haul road crossing along diversion drain 8 and one just downstream of the point of greatest constriction between the Carmichael River levees.

10.2.4 100 Year ARI

As expected, the impacts expected for the 50-year ARI event are marginally worsened in the 100-year ARI event. The key changes in this event are:

- The pond upstream of the haul road has expanded to connect in with the downstream end of proposed diversion drain 5 and now experiences afflux of between 0.1 – 1.0 m (with the higher afflux being either side of the bridge and along the downstream end of diversion drain 5)
- The afflux along the Cabbage Tree Creek effluent path has increased to be between around 0.1 to 0.6 m
- The area midway along the northern levee experiencing higher afflux has grown in the upstream direction
- The area of reduced afflux downstream of the haul road has reduced due to flows overtopping the terrain between diversion drain 5 and the Carmichael River downstream of the haul road.

These changed conditions did not significantly change the afflux at the mine area boundary compared to the 50 year ARI event, with the western boundary and eastern boundary near the Carmichael River experiencing afflux up to 10 mm and the eastern boundary downstream of Cabbage Tree Creek experiencing up to 120 mm afflux.

The velocity afflux in the 100 year ARI event shows the same general areas of change as the 50 year ARI event, with an increase in the magnitude of the velocity changes in these localised areas. The largest increases are as follows:

- At the Carmichael River bridge and culverts, which show a velocity increase of up to 1.5 m/s and in excess of 2 m/s respectively
- Just downstream of the point of greatest constriction between the Carmichael River levees.

These results also identify an additional area of increased velocities where flow bypasses the modelled haul road via the marginally lower terrain between diversion drain 5 and the Carmichael River.

10.2.5 1,000 Year ARI

Due to the haul road being overtopped in the 1,000 year ARI event the afflux shown in the study areas is more extensive and significant than the other events throughout. The key properties of the 1,000 year ARI results are:

- Minimal afflux (less than 0.1 m) from approximately 3 km upstream of the haul road
- Afflux of between 0.5 and 1.9 m from immediately upstream of the haul road to approximately 3 km upstream (with the higher afflux being either side of the bridge and along a significant portion of diversion drains 5 and 8)
- Afflux of between 0.1 and 1.1 m in the Carmichael River levee corridor.

These changed conditions increase the afflux at the mine area boundary compared to the 100 year ARI event, with the western mine area boundary showing afflux up to 70 mm and the eastern mine area boundary showing afflux of up to 90 mm near the Carmichael River and 270 mm downstream of Cabbage Tree Creek.

Although the 1,000 year ARI event overtops the haul road the areas of change in relation to the velocity afflux are quite similar to the 100 year ARI event, with the exception of the area immediately upstream of the haul road outside the banks of the Carmichael River which generally experiences a reduction in velocities. In terms of magnitude, the area along the Carmichael River around the bridge has not really changed, but there has been further increases just downstream of the point of greatest constriction between the Carmichael River levees (the majority of the area experiences an increase of between 0.25 m/s and 0.5 m/s) and downstream of the lower terrain between diversion drain 5 and the Carmichael River (a large portion of which experiences increases of in excess of 0.5 m/s).

10.3 Discussion

The 1D modelling results of the proposed diversion drains show successful diversion of the relevant minor waterways currently intersecting the open cut pits. The preliminary design of these drains serves as an indication of what would be required to divert these waterways to meet the design criteria, but are in no way a complete detailed design. With incorporation of low flow channels, these drains will accommodate drainage from subsided ground over the underground mining areas, and will safely convey flood flows up to the design event through the mine and into the existing natural watercourses downstream.

Compared to the existing flood conditions in the Carmichael River corridor, under developed conditions there is an increase in flood level arising from two sources:

- An increase in flood flows due to the proposed diversions from both north and south of the Carmichael River
- Hydraulic constraints in the form levees and haul roads, which may:
  - Reduce the available flow area along a drainage path
  - Remove floodplain storage
  - Block of drainage paths that were previously available (i.e. the flow path to the south of the Cabbage Tree Creek effluent path.

In addition to the above, the following general observations apply:

- The proposed flood protection levees successfully prevent flooding of the underground mining and open cut pit areas for all ARI events modelled
- The potential for external “clean” surface water flows into mine affected areas is minimised, with a series of bunds and diversion drains to convey that runoff through the mine site and to the downstream receiving waters
- Post-subsidence surface flooding in areas proposed for underground mining will be managed by intercepting surface runoff in diversion drains or providing low flow connections between permanent pools post subsidence
- Levees will be required adjacent to diversion drains within the mine site to meet design criteria and/or protect open cut pits
- The haul road and bridge crossing remains flood-free for the 10 year and 50 year events, but is circumvented in the 100 year ARI event via diversion drain 5 and 8 and is overtopped by the 1,000 year ARI event
- At the eastern mine area boundary the afflux varies from 0.02 - 0.59 m depending on the event simulated
- At the western extremity of the 2D model the afflux is negligible (varying between 0.00 and 0.01 m depending on the ARI)
- Afflux just upstream of the crossing varies between 0.11 to 0.98 m depending on the ARI
- The difference in water level between the upstream and downstream side of the haul road crossing is relatively significant in the 50, 100 and 1,000 year ARI events (ranging from 0.3 to 0.73 m), indicating a substantial potential for scour. This is especially true for those lower parts of the crossing that may be overtopped in floods marginally larger than the 100 year ARI design flood.

11. Conclusion and recommendations

11.1 Conclusion

11.1.1 Carmichael River

The Carmichael River flood extent was found to be relatively narrow, until the latter part of the mine area where it widens out over the flat terrain that conveys flood water into an effluent flow path contributing to Cabbage Tree Creek. To the north and south of the Carmichael River corridor, the flooding of local waterways was similarly contained up until the region proposed for open cut mining. In this region the flatter terrain causes quite wide-spread overland flooding.

Based on the modelling of the Carmichael River corridor with the proposed drainage, road and flood mitigation infrastructure in place the following was found in relation to flows and required infrastructure:

- Hydrologic impacts on the Carmichael River corridor were found to be relatively minimal, with a small decrease in peak flows at the haul road in all ARIs assessed
- An increase in the flood flow at all locations downstream of the mine area western boundary due to:
  - (1) the diversion of some runoff from local catchments to the south of the river
  - (2) the reduction in floodplain storage due to the Carmichael River levees
  - (3) the reduction in flow lost to flooding to the south of the Cabbage Tree Creek effluent flow path
- The Carmichael River levees require an average height of 2.2 – 2.4 m with a maximum height of 6.4 m on the northern levee and 3.6 m for the southern levee, based on the 1,000 year ARI flood level plus 600 mm freeboard. refer to preliminary drawing W001 in Appendix F for long sections.
- The need to increase the height of a local section of the open mine protection bund immediately upstream of the northern and both upstream and downstream of the southern Carmichael River levee to meet the 1,000 year ARI protection requirement of the open cut mines.
- The need for three sets of culverts to the north of the bridge are recommended under the haul road in order to allow some continuity of two existing flow paths and one diversion drain, and to reduce the likely afflux due to the dam-like effect of the haul road (which based on modelling as part of the EIS was set to 230 m AHD). refer to preliminary drawing W002 for the long section of the proposed haul road.

Afflux due to the combined effect of the altered flows from the diversion drain discharging to the Carmichael River, reduced runoff from the developed mine internal areas and hydraulic constriction by the flood protection levees and haul road (and conveyor crossing) is summarised in the Table 13 in Section 10.2. While the afflux within the levee corridor is large, up to 1.1 m for the 1,000 year ARI event, at the upper and lower limits of the modelled Carmichael River the afflux has been attenuated by the terrain such that the properties upstream and downstream of the mine lease area are not likely to experience greatly increased flood extents (a maximum increase of 7 cm based on the modelled events).

In terms of velocity afflux, the results show that the proposed mine infrastructure will generally reduce or cause only a minor increase (less than 0.1 m/s) in the velocity throughout the model, except in some localised areas. The areas of increase are generally along the proposed diversion drains (and/or upstream of the proposed top soil spoil piles), through and immediately downstream of the crossings (especially along the Carmichael River), and downstream of the point of greatest constriction between the Carmichael River levees. The velocities through the haul road and conveyor crossing were found to be somewhat high, reaching 2.79 m/s for the 50 year ARI event and 4.47 m/s for the 1,000 year ARI event and may result in scour issues.

The new location for the haul road crossing on the Carmichael River, approximately 500 metre downstream, will obviously have an effect on the location of any afflux changes. However, based upon the relatively minor changes in flood levels and extent shown within the existing model it is fully expected that with some optimisations, if required, the new haul road crossing location will have comparable effects.

11.1.2 Conceptual Drainage Plan

Multiple minor waterways were found to intersect the mine area from the western boundary, with flows generally ranging from as little as 20 m^3/s for the 10 year ARI event to 930 m^3/s for the 1,000 year ARI event. Where these waterways intersect the proposed open cut mining areas, they were diverted using drains (and/or levees) that were sized to convey the peak 100 year ARI flow around the protected area to either the Carmichael River or an 'existing' local waterway.

The twelve proposed diversion drain alignments were selected based on consideration of the overall design philosophy in conjunction with the existing terrain and known infrastructure (including mine protection bund and top soil spoil piles) that alter the existing flow paths through the mine lease area. The existing watercourses have been maintained where possible and drainage outflow points have also been designed to closely mimic existing drainage paths and maintain inflows where practical to waterways to the east of the mine area. The proposed conceptual drainage scheme for selected mine stages shows that (clean) runoff from upstream areas can be diverted along the proposed open cut areas.

The open cut pit areas need to be protected up to the 1,000 year ARI event, with a minimum levee height of 2 m (refer to Section 2.2.3). The 2 m high levee is sufficient to provide this level of protection to all the open cut mine areas, except on either side of the Carmichael River (along diversion drains 5 and 6) and either side of diversion drain 2 as it passes through the valley between the two northern bunded open cut mining areas.

The impact of predicted subsidence will be addressed through the provision of a low flow channel connecting the subsided ground surface at minimum grade back to the design surface of the diversion drain once subsidence in that area occurs, requiring frequent maintenance during periods with subsidence. This approach is considered appropriate given the relatively small nature of the likely ponds that would form along the diversion drains and the outcome of the ponding assessment outlined in section 11.1.3.

11.1.3 Ponding Assessment

The catchments draining to the permanent pools in the subsidence areas are relatively small and will drain quickly without additional rain (less than a day). It is proposed that ponded areas will be left isolated and have their levels controlled by evaporation and infiltration losses until the

predicted subsidence in that area is complete. Once subsidence is complete a series of low flow connection channels is proposed to provide a continuous path for flows to pass through the areas of predicted subsidence and in to a diversion channel and/or existing waterway.

11.2 Recommendations

In general, the various requirements for the management of surface water, including flooding and drainage, need to be considered during all mine development stages as these requirements have the potential to influence or dictate the design of other infrastructure.

11.2.1 Haul road and conveyor crossing

It is suggested that the following areas require special consideration during future design stages for the haul road and conveyor crossing:

- *Ramp areas* – The current design of the ramp areas on both sides of the Carmichael River is insufficient and needs further optimising. Any changes in these locations may alter the afflux results and will require further modelling.
- *Haul road crossing* – There is a substantial head drop across the structure which may cause scour, particularly in combination with the relatively high velocities through the bridge. Particular care should be taken for those parts of the haul road that can be overtopped in the floods marginally bigger than the 100 year ARI flood.
- *Location of haul road crossing* – In the mine plan included in the project descriptioon the haul road location is approximately 500 meters downstream of the location included in this study. Henceforth the location of the haul road needs optimising in future flood studies.

11.2.2 Levees

It is suggested that the following areas require special consideration during future design stages for the levees:

- *Refinement of levee location* – The location of the levee on both sides of the Carmichael River will maintain the stated 500 m buffer, however there may be opportunities to further refine the levee away from the Carmichael River.
- *Interfaces with other infrastructure* – It is understood that as some locations flood protection infrastructure will be combined with mine infrastructure (roads). This combined use has not been considered in this study.
- *Levees to protect underground mine access areas* – With currently no design information available regarding the underground access areas future studies will need to assess flood protection measures for these areas
- *Detailed design consideration of side slope stability* – The adopted 1 vertical to 3 horizontal side slopes on the proposed levees will benefit from further design refinement based upon geological data.
- *Detailed analysis of velocities* – The requirement for protection of the levee face from scour due to the velocity of flood waters needs to be investigated based once the construction material is known.

11.2.3 Diversion drains

It is suggested that the following areas require special consideration during future design stages of the diversion drains:

- *Design of inlets into the diversion drains* – The management of drainage, scour and erosion down the upstream bank of the diversion drains requires on-going attention and refinement as the mine design progresses.
- *Design of waterway crossings and culverts* – The design of all waterway crossings and culverts requires on-going attention as the mine design progresses.
- *Calculation of appropriate channel side slope* – The adopted 1 vertical to 3 horizontal side slopes on the proposed drains will benefit from further design refinement based upon geotechnical data.
- *Benching of large cuts*- The proposed design is based on an assumed channel side slope of 1 vertical to 3 horizontal with no benches. Further developments to the design should include benching of deeper cuts. As for the analysis of appropriate channel side slope, a full geotechnical analysis of appropriate benching must be undertaken upon the provision of geotechnical data.
- *Potential erosion at outlet gully* – Detailed consideration of the flow velocities at the outlets into the existing natural minor waterway is required, including the need for any erosion protection measures if needed.
- *Energy dissipation structures* – The requirement of energy dissipation structures may have to be considered in order to reduce velocity and/or shear stress to an acceptable level.

11.2.4 Other

As the mine planning progresses, it is important to note the following limitations regarding the proposed drainage concept:

- Design is based on the current mine development plans, which may change over time, and as such will need to be considered and reviewed as necessary during all subsequent phases of the mine development
- The mine stages considered as part of this study are separated by a number of years, it is important to note that additional works or consideration may need to be considered to address drainage and flooding issues that may occur in the intervening years.

LEGEND

- Existing Watercourse
- Haul Rd & Conveyor Crossing
- SEIS Proposed Levee
- Recommended Levee (Carmichael North)
- Mine Lease Area
- Mine Plan Layout

Based on or contains data provided by the State of QLD (DERM) [2010]. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for marketing or be used in breach of the privacy laws.

1:56,629 (at A4)

0 500 1,000 1,500 2,000

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Preliminary Flood Mitigation and Creek Diversion Design

Recommended Location (Indicative) of the Carmichael North Levee

Job Number	41-26630
Revision	A
Date	31-07-2013

Figure 21

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Data Source: DME: EPC1690 (2010), EPC1080 (2011); © Copyright Commonwealth of Australia - Geoscience Australia: Watercourse(2007); Adani: Mine Plan Layout (2012); GHD: Proposed Haul Road (2012, Levees (2013); Created by: LS

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Appendices

Appendix A Hydrologic Data

Local sub-catchment parameters – 'Existing' Conditions

Peak flow in minor waterway sub-catchments to the north of the Carmichael River – existing

Local sub-catchment parameters – 'Post-development' Conditions

Carmichael catchment rainfall intensity data

Plot of 1 % AEP Flood Peaks in m^3/km^2 (for Queensland)

Carmichael River Sub-Catchment Parameters – Existing Conditions

Sub-catchment Label	Total Area (km2)	Catchment Slope (%)
RB21.06	9.55	0.47
RB28.02	184.89	0.10
RB21.05	98.24	0.16
RB27.01	83.26	0.15
RB21.04	3.14	0.22
RB24.03	68.86	0.13
RB21.03	127.55	0.20
RB23.01	87.92	0.27
RB21.02	102.87	0.17
RB29.01	76.31	0.35
RB28.01	182.14	0.20
RB21.01	61.68	0.40
RB22.01	120.86	0.31
CC1.10	0.00	0.00
BW5	155.80	0.17
BW6	67.87	0.23
BW7	1.46	0.13
BW8	70.49	0.28
BW9	1.95	0.11
BW10	36.17	0.40
BW11	243.19	0.33
BW12	34.44	0.26
BW13	13.29	0.34
BW14	115.96	0.33
BW15	185.04	0.25
57-2DSP-LCarm	4.64	0.32
12-LC8	0.38	0.61
12-LC8	0.38	0.61
94-LC9	6.35	1.26
93-LC9	1.50	1.55
80-LCarm	8.61	0.75
Node2-Lcarm	2.46	0.32
5-LC9	7.14	0.28
6-LC9	1.37	0.63
8-LC9	1.05	0.94
7-LC9	2.28	0.98
50-LC11	1.15	0.97
119-LC9	1.17	0.28
75-LC11	2.24	1.02
90-LC11	4.12	0.99
68-LC11	2.73	0.28
69-C11	0.67	0.70
76-LC11	2.95	0.75

Sub-catchment Label	Total Area (km2)	Catchment Slope (%)
74-LC11	2.58	0.45
100-LC7	5.60	0.36
10-LC8	1.45	0.32
9-LC7	1.44	0.13
110-LC12	10.57	0.30
121-LC12	6.47	0.30
72-LC6	2.98	0.24
29-LC6	2.89	0.06
30-LC6	4.11	0.06
99-LC7	1.59	0.14
111-LC12	3.47	0.30
73-LC6	6.03	0.21
49-LCarm	8.22	0.17
35-LCarm	7.59	0.68
79-LC14	7.08	0.14
103-LC5	1.56	0.28
78-LC14	6.03	0.13
Node1-LC6	1.81	0.10
34-LC14	6.34	0.15
107-LCarm	1.15	0.10
54-LCarm	4.97	0.45
51-LCarm	1.04	0.55
106-LC5	2.03	0.58
105-LC5	1.95	0.48
117-LCarm	8.94	0.75
53-LCarm	1.59	0.56
55-LCarm	3.70	0.39
57b-LCarm	4.64	0.32
1-LC9	0.64	0.49

Peak flows in minor waterway subcatchments to the north of the Carmichael River - Existing

ARI	10 year	50 year	100 year	1000 year
Critical Duration	6 hr	3 hr	2 hr	2 hr
12-LC1	29.543	47.612	50.456	121.358
13-LC1	18.1	28.809	30.964	74.262
10-LC1	60.244	98.796	105.798	251.217
9-LC1	164.851	266.08	293.816	637.857
7-LC1	216.67	347.717	380.34	830.877
5-LC1	241.581	385.77	419.011	905.102
4-LC13	13.011	20.805	22.182	52.529
1-LC10	252.654	401.043	434.074	930.161
27-LC2	19.731	31.857	34.276	81.656
32-LC2	35.877	64.671	71.384	167.924
29LC2	49.176	87.813	98.157	228.824
30-LC2	4.151	7.863	8.748	20.939
25-LC2	100.267	173.237	191.882	445.91
11-LC2	112.868	193.881	214.024	497.65
8-LC3	35.351	55.687	59.592	143.739
6-LC1	23.508	37.915	40.808	96.055

Developed scenario, local catchments

Subcatchment Number	Total Area (ha)	Catchment Slope (%)	Peak Total Flow (m3/s)			
			10 year ARI	50 year ARI	100 year ARI	1000 year ARI
3	9.0	1.2	24.7	45.1	54.5	124.1
8	2637.3	0.4	34.5	61.6	76.0	145.9
9	67.2	0.3	87.6	154.9	191.3	401.2
12	2283.0	0.4	30.5	55.5	68.6	129.5
14	577.9	0.7	131.0	234.1	283.5	577.4
15	260.7	1.2	9.7	17.6	21.7	48.9
16	323.7	1.1	101.2	181.9	220.4	453.6
17	530.4	0.9	14.2	26.4	32.2	70.3
18	34.8	0.9	79.1	142.4	172.7	353.9
19	420.0	1.3	14.4	26.1	31.5	72.5
20	150.4	1.3	67.3	118.8	145.8	301.8
21	820.5	1.0	21.3	39.7	48.1	103.6
22	1002.9	0.7	44.1	77.1	95.4	200.9
23	249.9	0.6	6.4	11.9	14.6	31.3
25	1.8	0.4	0.1	0.2	0.2	0.5

Subcatchment Number	Total Area (ha)	Catchment Slope (%)	Peak Total Flow (m3/s)			
			10 year ARI	50 year ARI	100 year ARI	1000 year ARI
26	172.3	0.5	86.0	152.1	187.8	394.0
27	1211.9	0.5	81.8	144.6	178.5	374.2
28	535.7	0.6	62.5	112.8	138.5	292.9
30	24.8	0.5	6.0	11.0	13.5	29.3
31	438.2	0.6	51.0	92.6	113.9	241.7
32	181.4	0.4	40.7	74.1	91.2	194.1
33	469.5	0.7	18.9	35.1	42.8	92.2
34	713.0	0.8	17.5	32.0	39.8	83.5
39	382.1	0.4	63.1	115.8	140.9	277.3
40	408.2	0.2	87.3	158.7	192.3	378.8
41	168.7	0.5	4.4	8.3	10.1	22.1
43	152.6	0.2	2.8	5.2	6.3	12.5
44	185.4	0.5	63.1	112.6	136.0	284.1
46	454.0	0.5	47.2	88.4	107.9	208.4
47	501.6	0.5	10.3	18.6	22.4	46.6
48	515.1	0.5	10.5	19.1	22.9	47.4
49	483.9	0.5	10.0	18.1	21.9	45.6
50	467.3	0.5	96.9	170.9	210.0	439.4
51	356.6	0.5	8.0	14.2	17.7	37.2
52	467.2	0.5	9.8	17.5	21.4	44.6
53	402.0	0.5	8.7	15.5	19.3	40.6
54	425.2	0.5	9.1	16.2	20.2	42.0
55	477.1	0.5	9.9	17.9	21.7	45.2
56	422.9	0.5	9.1	16.2	20.1	41.9
57	466.4	0.5	9.7	17.5	21.4	44.6
58	1284.1	0.2	258.8	466.2	563.0	1122.3
59	839.8	0.5	15.2	27.9	33.8	66.5
60	724.0	0.5	76.6	137.2	165.7	340.6
61	673.5	0.5	12.9	23.5	28.3	56.4
62	619.9	0.5	12.1	22.1	26.6	53.4
68	52.2	0.3	136.1	242.2	293.5	596.4
69	57.8	0.7	147.2	259.0	314.0	631.2
75	224.1	1.0	16.0	29.1	35.3	79.7
76	294.5	0.8	8.3	15.6	19.0	42.2
81	279.1	0.4	14.5	25.9	31.8	66.7
90	175.5	0.4	135.0	240.6	291.4	592.6
97	293.2	1.0	9.5	17.5	21.2	48.3
98	444.7	1.2	14.9	27.1	32.7	74.8

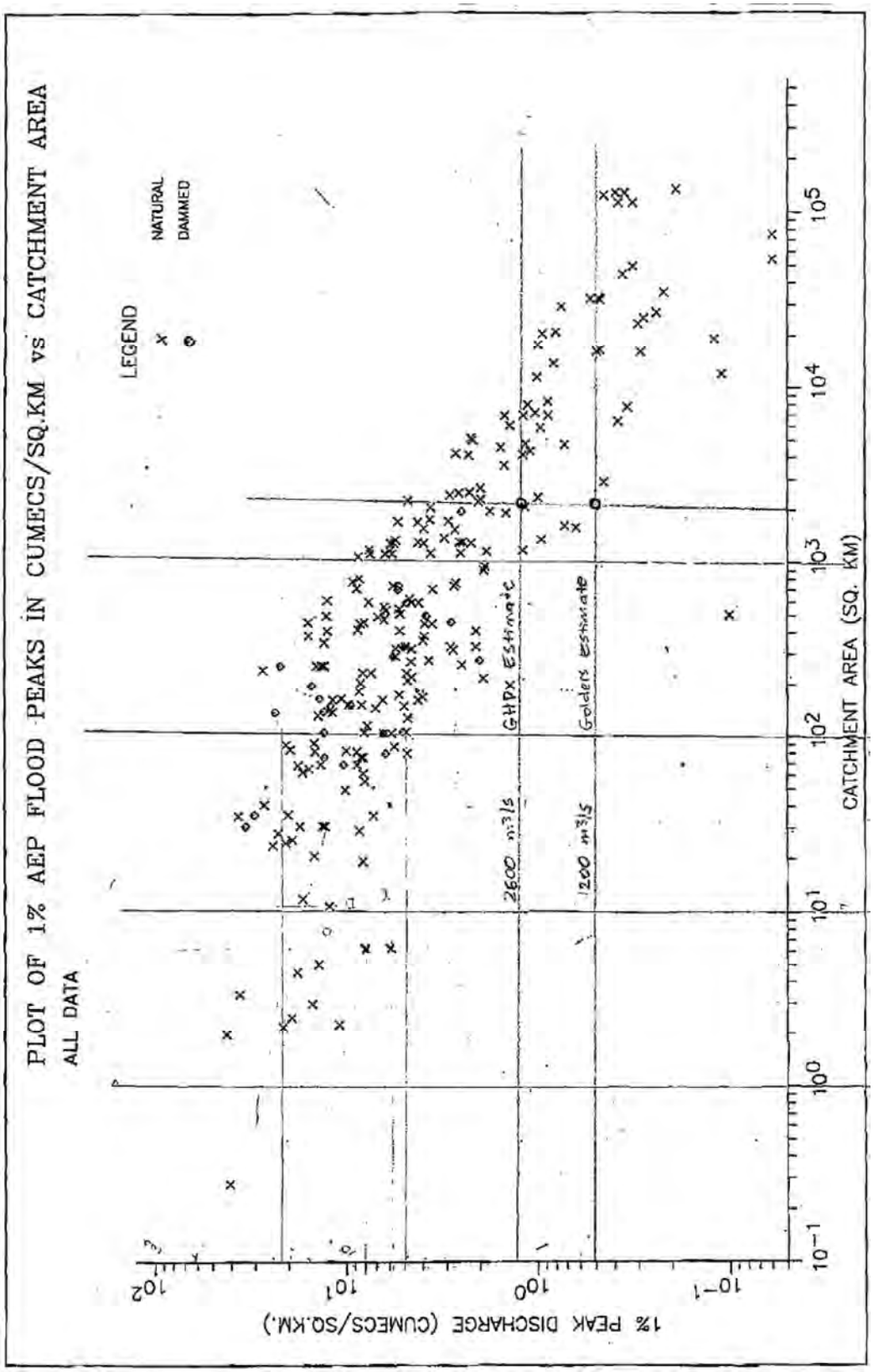
Subcatchment Number	Total Area (ha)	Catchment Slope (%)	Peak Total Flow (m3/s)			
			10 year ARI	50 year ARI	100 year ARI	1000 year ARI
100	18.1	0.4	131.4	234.6	284.2	578.6
106	50.1	0.6	15.8	28.1	34.8	74.2
127	188.5	0.3	28.2	52.1	63.1	142.6
13n	544.8	0.4	9.7	18.0	21.8	43.1
13s	439.2	0.8	11.8	22.3	26.9	58.5
24n	243.0	0.4	5.3	9.5	11.8	24.8
24s	651.9	0.9	16.5	30.3	37.5	79.7
32a	46.1	0.4	7.4	13.7	16.7	36.8
68a	6.4	0.3	147.2	259.1	314.1	631.4
node1	0.0	0.0	47.2	88.4	107.9	208.4
node10	0.0	0.0	95.5	172.6	208.3	409.4
node11	0.0	0.0	76.6	137.2	165.7	340.6
node12	0.0	0.0	41.9	77.1	94.1	179.9
node13	0.0	0.0	147.2	259.1	314.1	631.4
node14	0.0	0.0	8.7	15.5	19.3	40.6
node15	0.0	0.0	51.3	94.9	115.6	250.9
node16	0.0	0.0	51.3	94.9	115.6	250.9
node17	0.0	0.0	34.7	61.5	74.8	158.2
node19	0.0	0.0	51.3	94.9	115.6	250.9
node2	0.0	0.0	150.9	269.9	325.8	668.6
node3	0.0	0.0	519.0	916.8	1102.6	2209.9
node4	0.0	0.0	76.6	137.2	165.7	340.6
node5	0.0	0.0	148.1	264.9	319.8	657.3
node6	0.0	0.0	258.8	466.2	563.0	1122.3
node7	0.0	0.0	34.5	61.6	76.0	145.9
node8	0.0	0.0	38.9	73.1	89.7	169.7
node9	0.0	0.0	56.5	104.0	126.7	247.6

Subcatchment Number	100 year ARI peak flow, climate change (m3/s)	% increase in flow
3	73.7	35
8	104.1	37
9	258.7	35
12	93.3	36
14	374.9	32
15	29.2	34
16	295.0	34
17	43.5	35
18	230.9	34
19	43.3	37
20	197.8	36
21	64.6	34
22	128.7	35
23	19.8	35
25	0.3	35
26	254.1	35
27	241.4	35
28	186.9	35
30	18.4	36
31	153.3	35
32	123.2	35
33	57.8	35
34	53.2	34
39	189.2	34
40	257.0	34
41	13.6	35
43	8.7	38
44	187.3	38
46	145.5	35
47	30.8	37
48	31.5	37
49	29.9	37
50	284.4	35
51	24.1	37
52	29.2	36
53	26.2	36
54	27.3	35
55	29.6	36
56	27.2	35
57	29.1	36
58	761.1	35
59	46.4	37
60	227.5	37
61	39.1	38

Subcatchment Number	100 year ARI peak flow, climate change (m3/s)	% increase in flow
62	36.5	37
68	388.2	32
69	413.7	32
75	47.3	34
76	25.4	33
81	43.4	36
90	385.4	32
97	28.5	34
98	44.6	36
100	375.7	32
106	47.2	35
127	84.3	34
13n	29.5	35
13s	36.3	35
24n	16.2	38
24s	50.3	34
32a	22.5	35
68a	413.9	32
node1	145.5	35
node10	278.7	34
node11	227.5	37
node12	127.7	36
node13	413.9	32
node14	26.2	36
node15	157.3	36
node16	157.3	36
node17	102.4	37
node19	157.3	36
node2	444.4	36
node3	1471.7	33
node4	227.5	37
node5	436.7	37
node6	761.1	35
node7	104.1	37
node8	121.2	35
node9	170.8	35

Return Period (yrs)	Duration (hrs)	Rainfall (mm)	Areal Rainfall (mm)	Intensity (mm/hr)
		IFD Rainfall Data		
10	0.25	28.900	28.900	115.6
10	0.5	41.900	41.900	83.8
10	0.75	51.225	51.225	68.3
10	1	58.700	58.700	58.7
10	1.5	65.549	65.549	43.7
10	2	70.601	70.601	35.3
10	3	78.000	78.000	26
10	6	92.401	92.401	15.4
10	12	110.399	110.399	9.2
10	18	127.804	127.804	7.1
10	24	141.603	141.603	5.9
50	0.25	40.434	40.434	161.735
50	0.5	58.489	58.489	116.978
50	0.75	71.304	71.304	95.072
50	1	81.557	81.557	81.557
50	1.5	90.863	90.863	60.576
50	2	97.677	97.677	48.838
50	3	107.784	107.784	35.928
50	6	127.261	127.261	21.21
50	12	150.623	150.623	12.552
50	18	175.163	175.163	9.731
50	24	194.5	194.5	8.104
100	0.25	45.577	45.577	182.31
100	0.5	65.856	65.856	131.712
100	0.75	80.229	80.229	106.972
100	1	91.717	91.717	91.717
100	1.5	102.098	102.098	68.066
100	2	109.688	109.688	54.844
100	3	120.934	120.934	40.311
100	6	142.579	142.579	23.763
100	12	168.507	168.507	14.042
100	18	196.006	196.006	10.889
100	24	217.681	217.681	9.07
		FORGE Rainfall*		
1000	1	142.5878474		142.5878474
1000	1.5	183.7570964		122.5047309
1000	2	204.8432289		102.4216145
1000	3	186.7661445		62.25538151
1000	4.5	222.3447189		49.40993754
1000	6	219.318574		36.55309566
1000	9	261.2742787		29.03047541
1000	12	258.094262		21.50785516
1000	18	300.5628726		16.69793737
1000	24	334.004339		13.91684746

*Note that the ARF (0.877) that is incorporated into the FORGE results (based on the Carmichael River catchment area) has been removed for the local catchment hydrology.


PLOT OF 1% AEP FLOOD PEAKS IN CUMECS/SQ.KM vs CATCHMENT AREA
ALL DATA
LEGEND
NATURAL
DAMMED
GHPX Estimate
Golders estimate
2600 m³/s
1200 m³/s
1% PEAK DISCHARGE (CUMECS/SQ.KM.)
CATCHMENT AREA (SQ. KM)

Appendix B Carmichael River Model Results – Existing Conditions

Figure B1: 10 Year ARI Design Flood Map, Existing Conditions

Figure B2: 50 Year ARI Design Flood Map, Existing Conditions

Figure B3: 100 Year ARI Design Flood Map, Existing Conditions

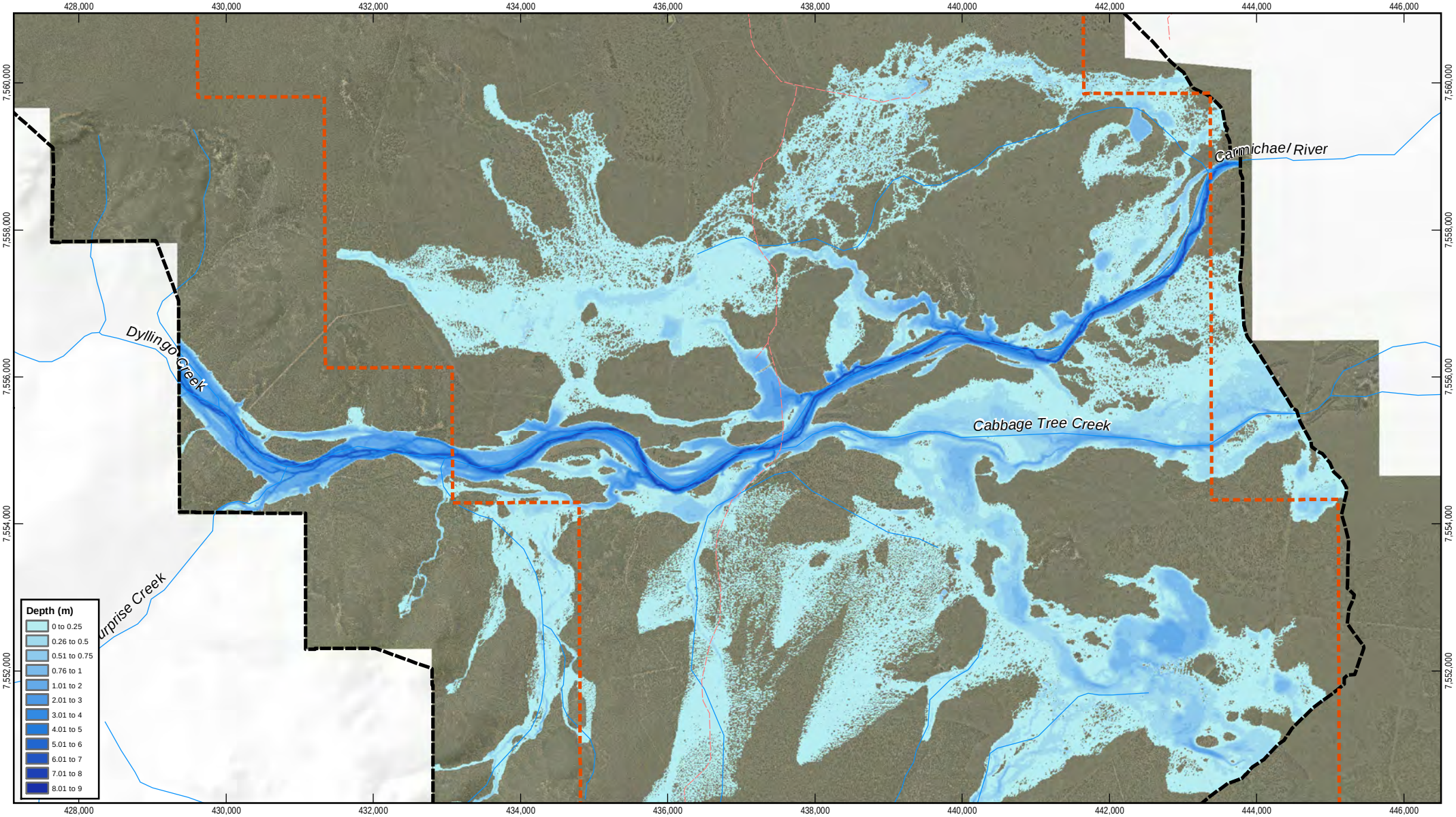
Figure B4: 1,000 Year ARI Design Flood Map, Existing Conditions

Figure B5: 10 Year ARI Design Flood Map Velocities, Existing Conditions

Figure B6: 50 Year ARI Design Flood Map Velocities, Existing Conditions

Figure B7: 100 Year ARI Design Flood Map Velocities, Existing Conditions

Figure B8: 1,000 Year ARI Design Flood Map Velocities, Existing Conditions



1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
10 Year ARI Design Flood
Existing Conditions - Depth

Job Number 41-26630
Revision A
Date 25-07-2013

Figure B1

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_B1_2013_10yr_Depth_Carmichael.mxd

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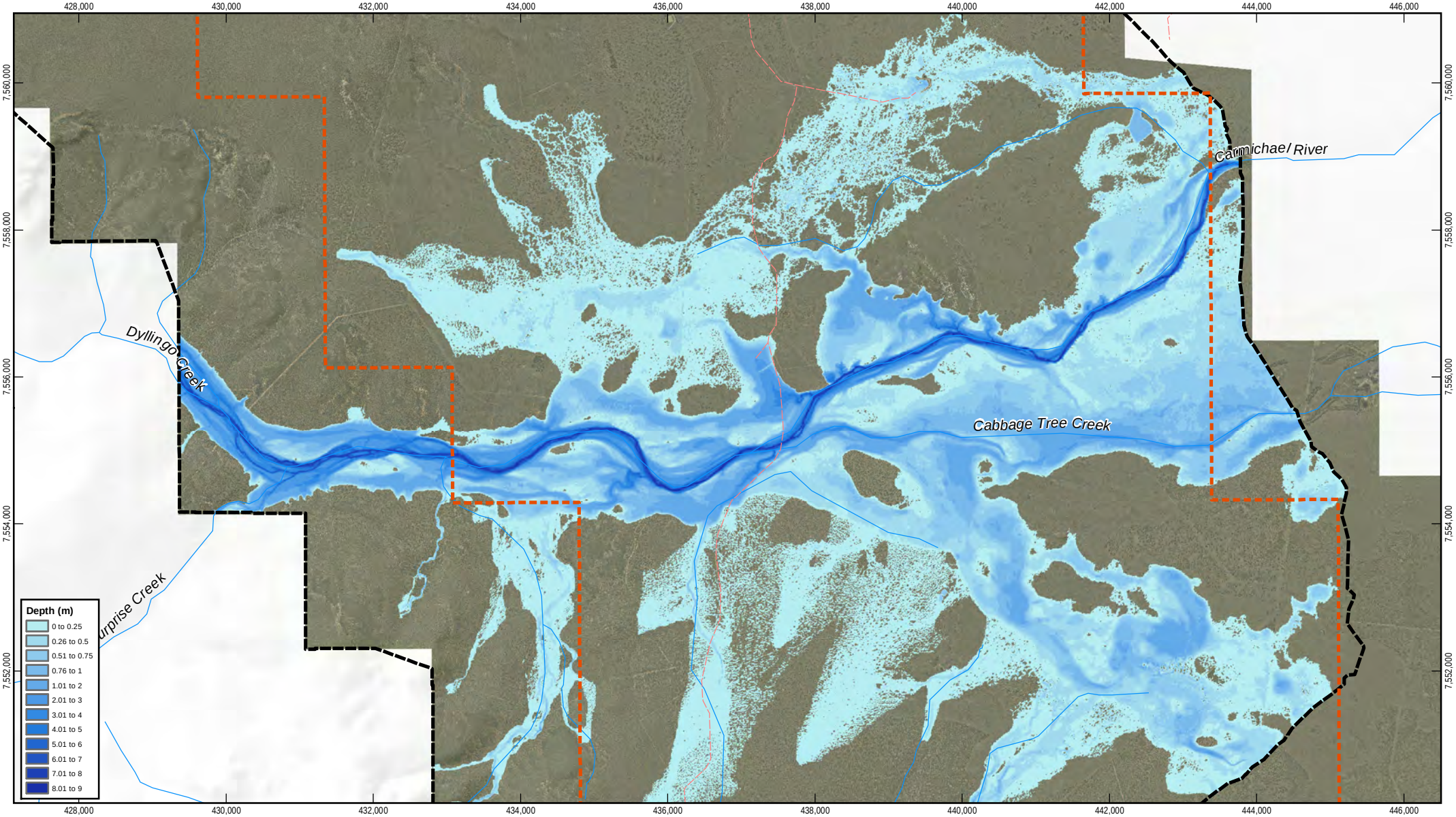

1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
50 Year ARI Design Flood
Existing Conditions - Depth

Job Number 41-26630
Revision A
Date 25-07-2013

Figure B2

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_B2_2013_50yr_Depth_Carmichael.mxd

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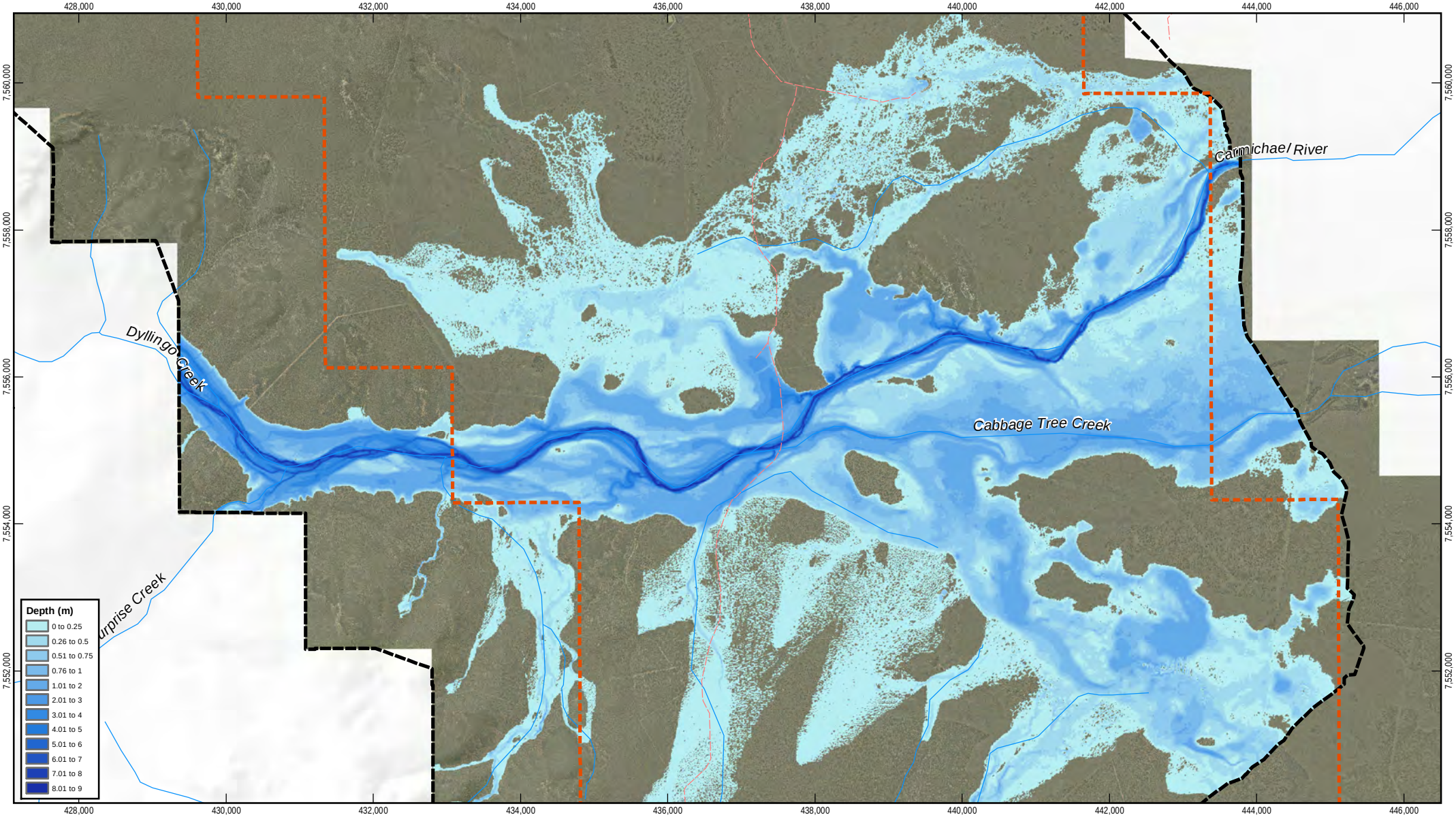

1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design

100 Year ARI Design Flood
Existing Conditions - Depth

Job Number 41-26630
Revision A
Date 25-07-2013

Figure B3

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_B3_2013_100yr_Depth_Carmichael.mxd

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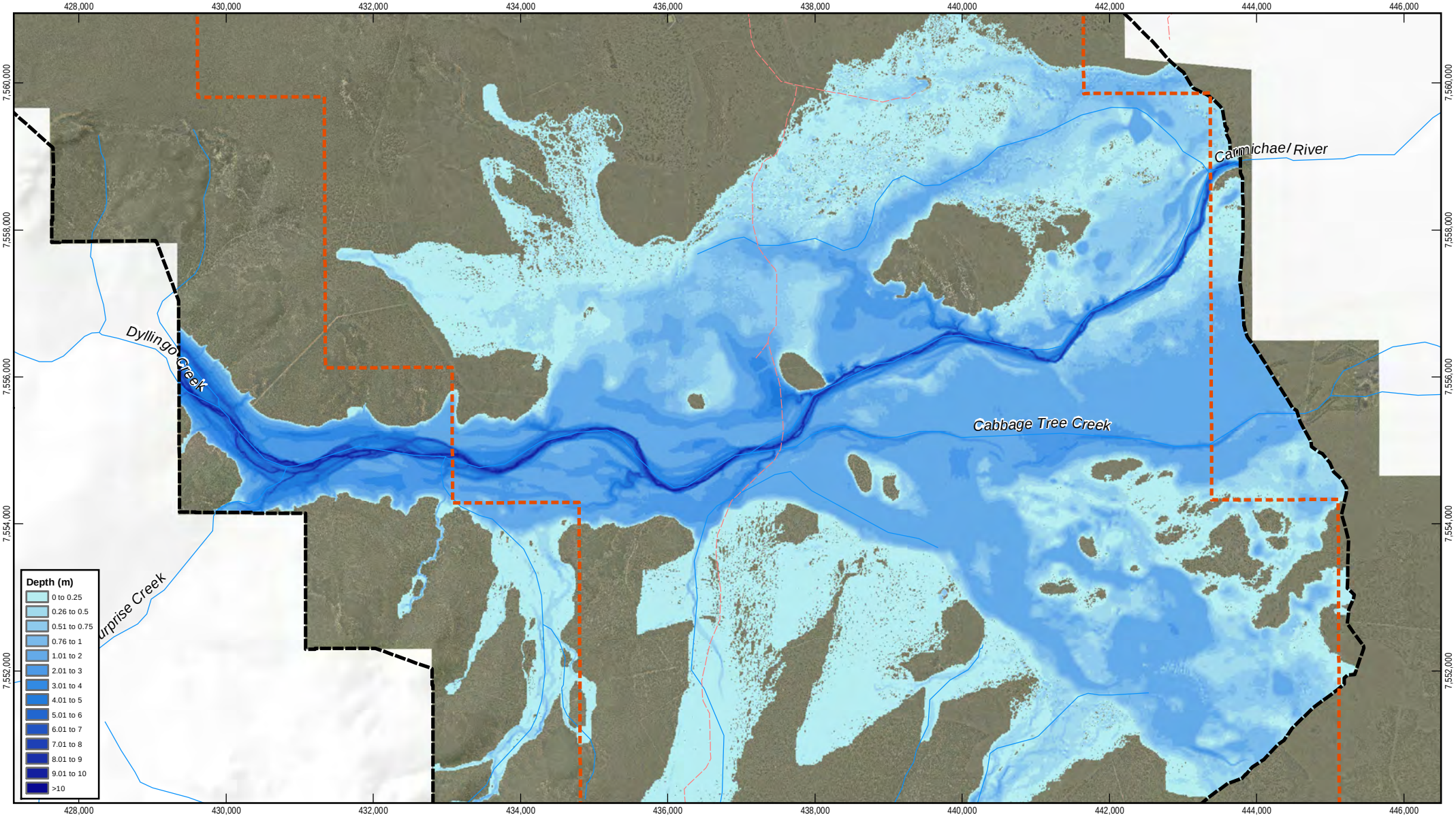

1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design

1000 Year ARI Design Flood
Existing Conditions - Depth

Job Number	41-26630
Revision	A
Date	25-07-2013

Figure B4

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_B4_2013_1000yr_Depth_Carmichael.mxd

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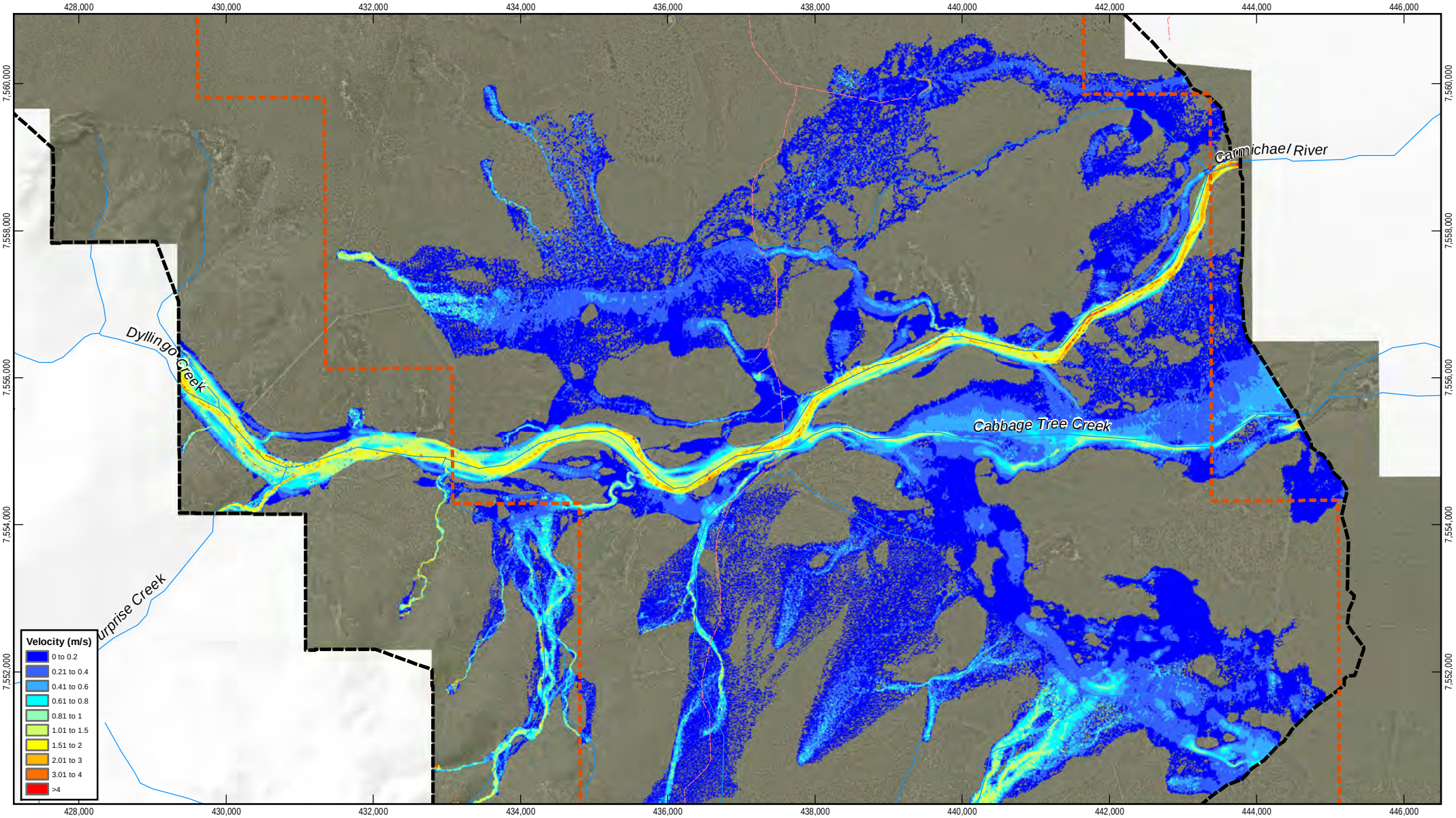

1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
10 Year ARI Design Flood
Existing Conditions - Velocity

Job Number 41-26630
Revision A
Date 25-07-2013

Figure B5

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_B5_2013_10yr_Vel_Carmichael.mxd

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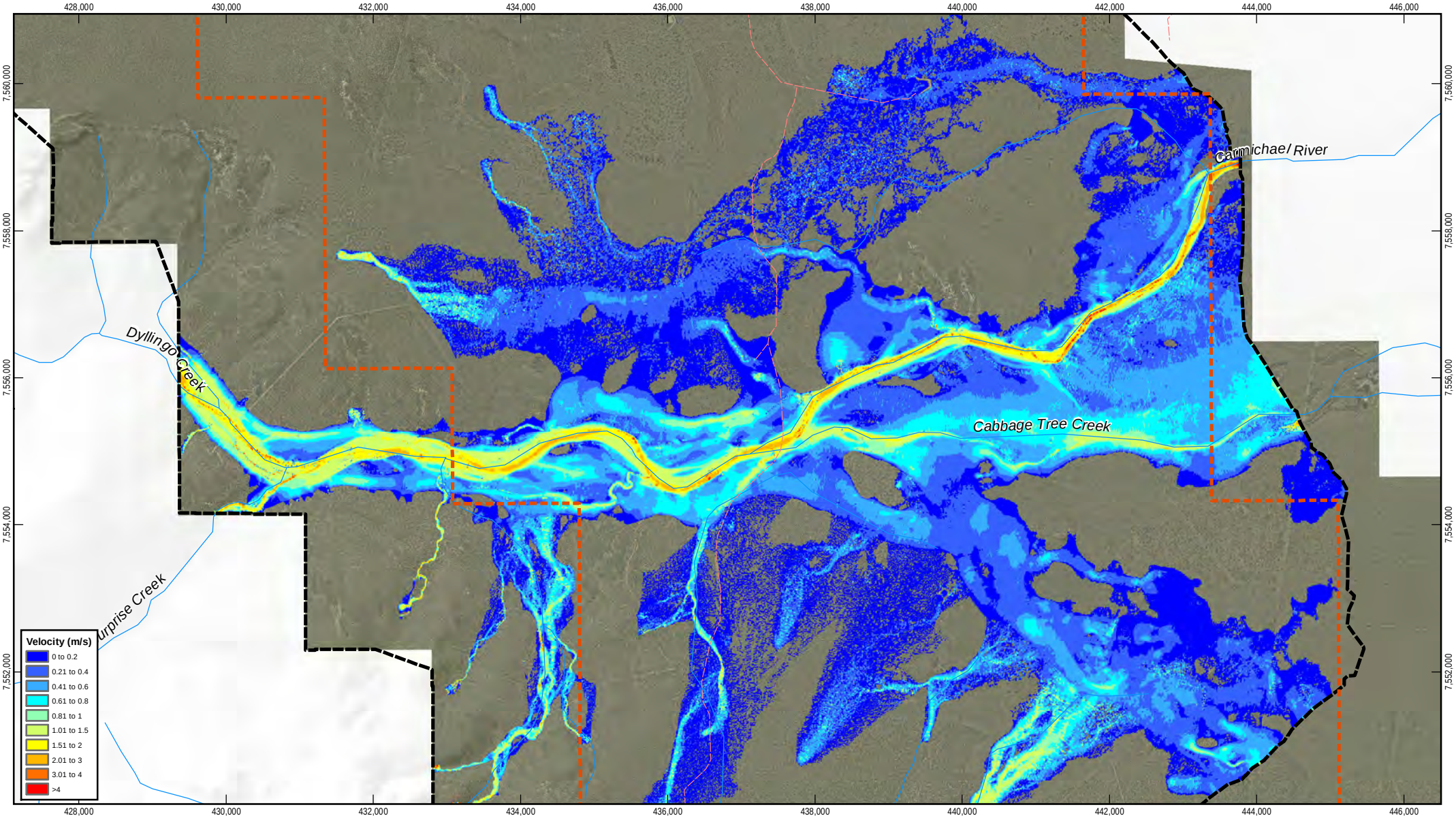

1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
50 Year ARI Design Flood
Existing Conditions - Velocity

Job Number 41-26630
Revision A
Date 25-07-2013

Figure B6

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_B6_2013_50yr_Vel_Carmichael.mxd

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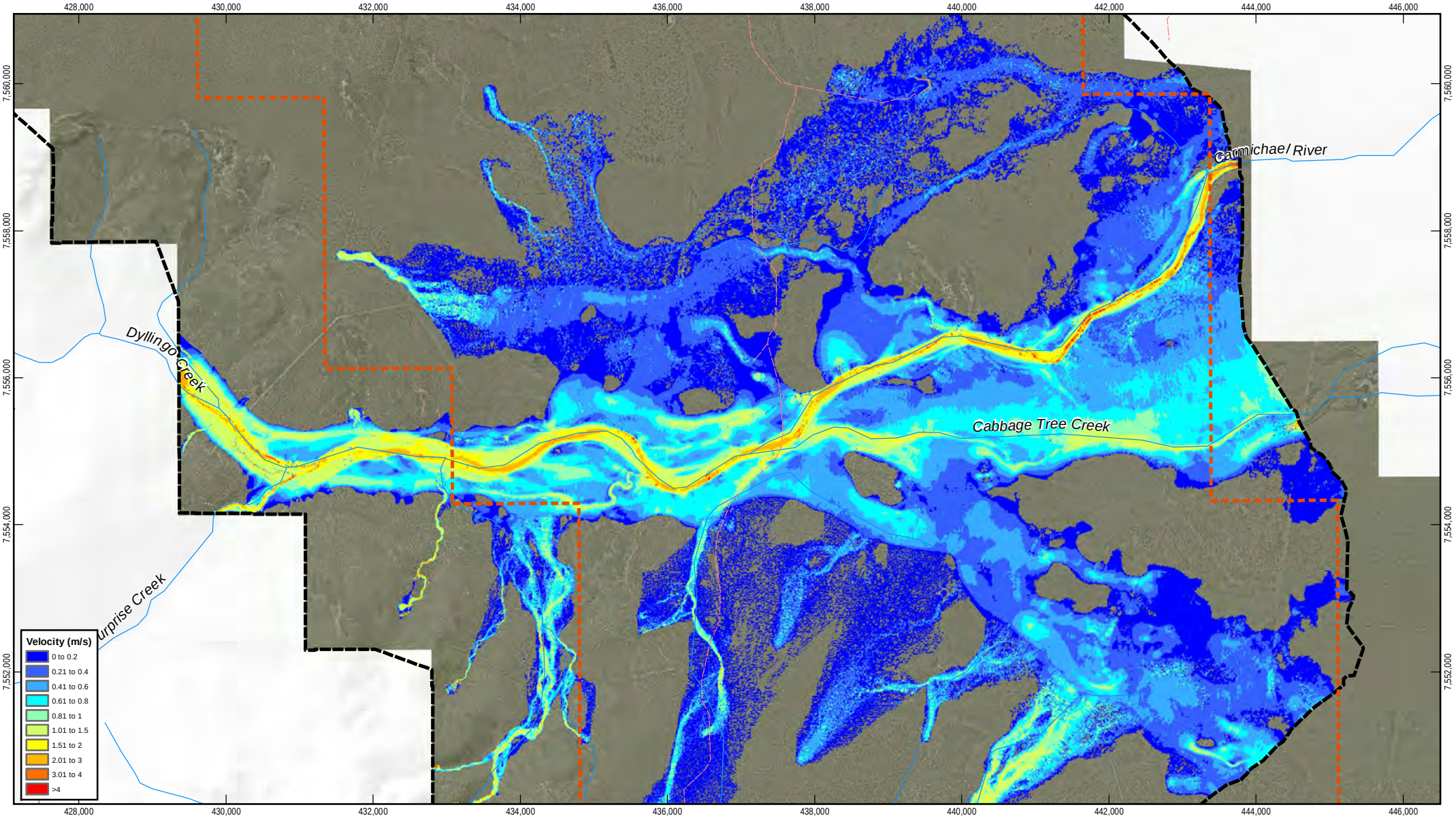
Data source: DME: EPC1690 (2010)/EPC1080 (2011); ESRI: Hillshade (2008); © Commonwealth of Australia (Geoscience Australia): Watercourse, Roads, Tracks (2007); GHD: 2D Model Extent, Flood Surface (2013). Created by: LS



1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
100 Year ARI Design Flood
Existing Conditions - Velocity

Job Number 41-26630
Revision A
Date 25-07-2013

Figure B7

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_B7_2013_100yr_Vel_Carmichael.mxd

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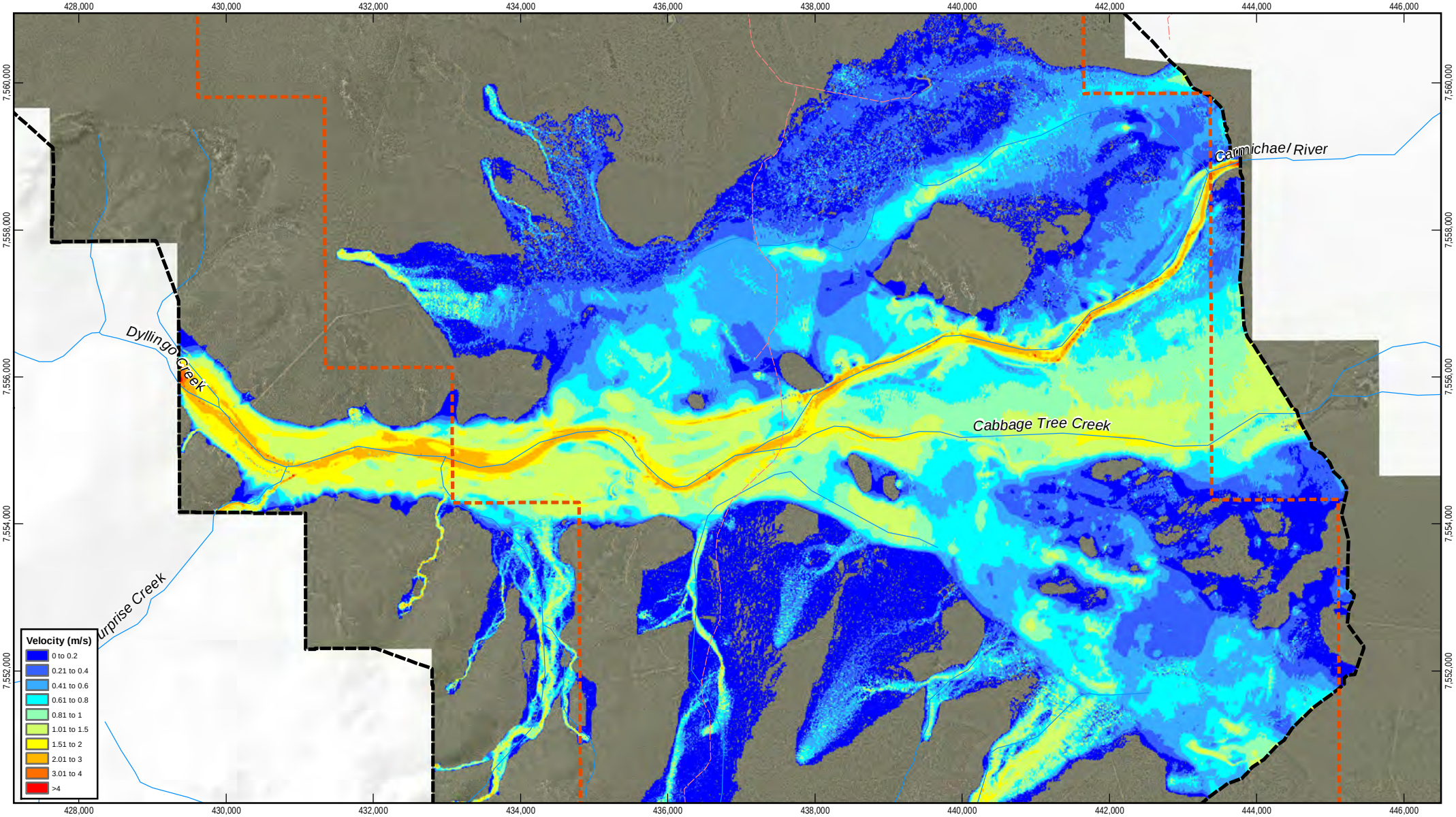

1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
1000 Year ARI Design Flood
Existing Conditions - Velocity

Job Number 41-26630
Revision A
Date 25-07-2013

Figure B8

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_B8_2013_1000yr_Vel_Carmichael.mxd

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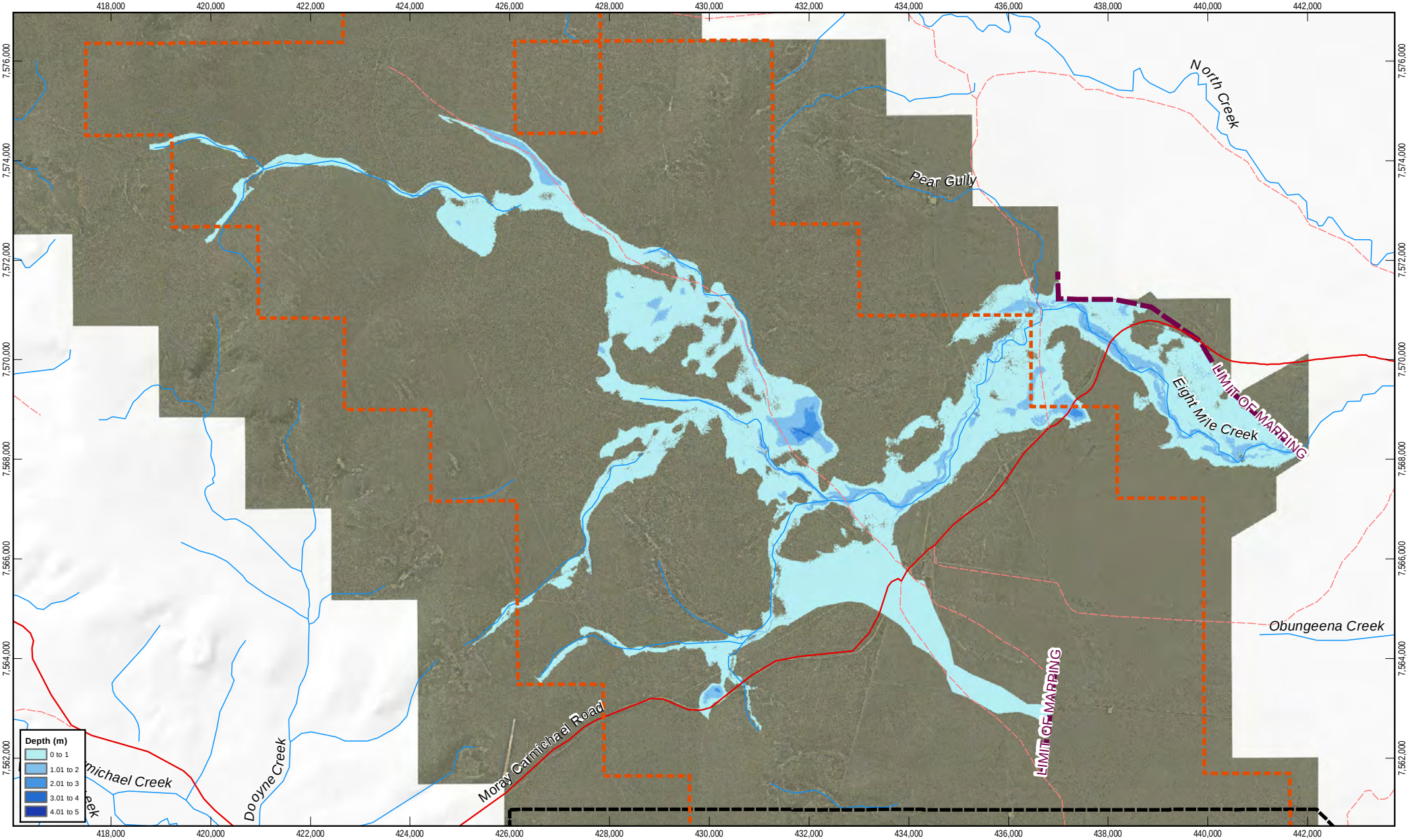
Appendix C Local Waterway Model Results – Existing Conditions

Figure C1: 100 Year ARI Design Flood, Minor Waterways Intersection the MLA, North

Figure C2: 100 Year ARI Design Flood, Minor Waterways Intersection the MLA, South



1:100,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Minor Road
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design

100 Year ARI Flood Event, North
Existing Waterways Intersecting the MLA

Job Number	41-26630
Revision	A
Date	25-07-2013

Figure C1

G:\41\26630\GIS\Maps\MXD\NewMaps\41_26630_FigC1.mxd

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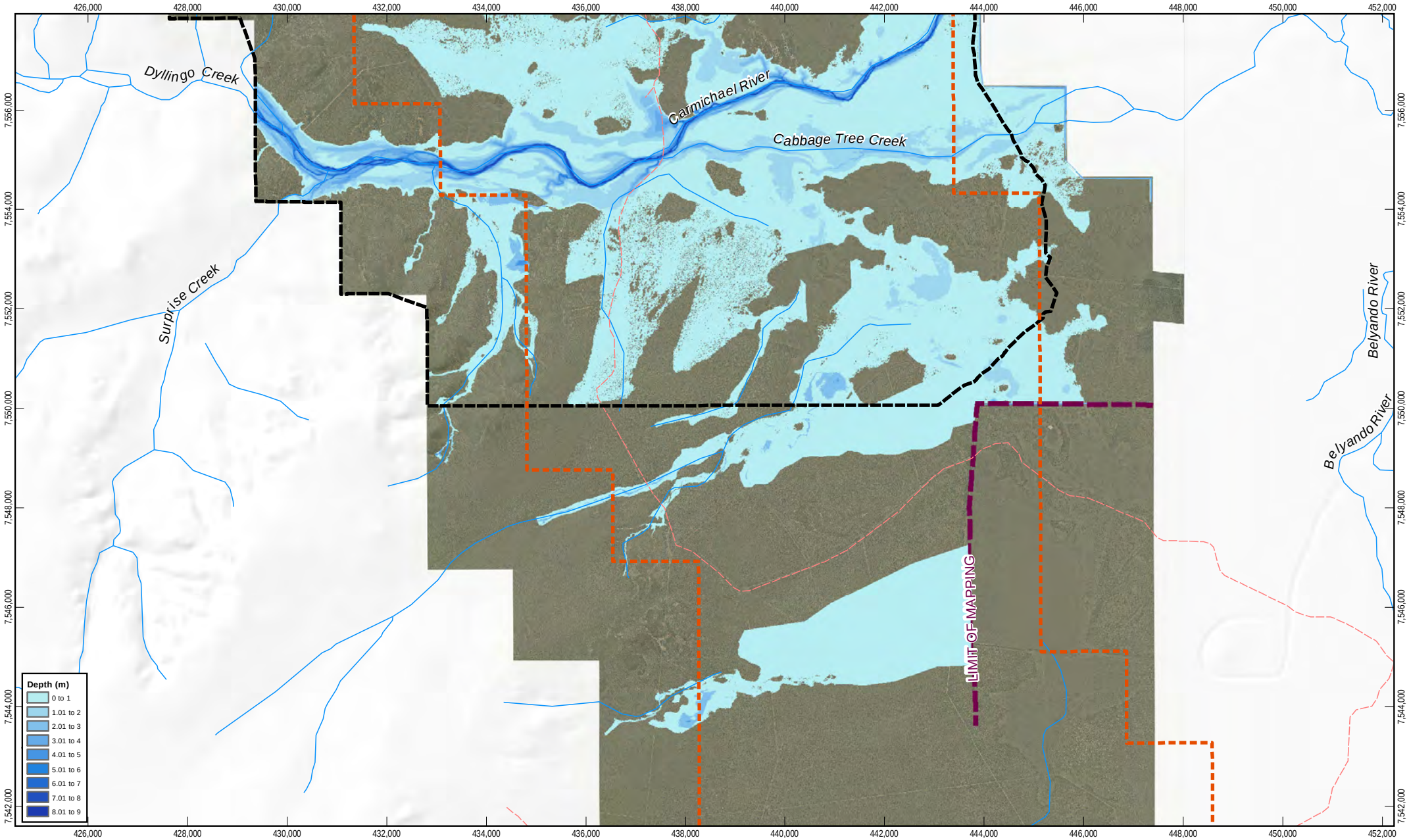

1:100,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

Watercourse
Track
2D Model Extent
Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design

100 Year ARI Flood Event, South
Existing Waterways Intersecting the MLA

Job Number	41-26630
Revision	A
Date	25-07-2013

Figure C2

G:\41\26630\GIS\Maps\MXD\NewMaps\41_26630_FigC2.mxd

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Appendix D Carmichael River Model Results – Developed Conditions

Figure D1: 10 Year ARI Design Flood (Post-Development Conditions)

Figure D2: 50 Year ARI Design Flood (Post-Development Conditions)

Figure D3: 100 Year ARI Design Flood (Post-Development Conditions)

Figure D4: 1,000 Year ARI Design Flood (Post-Development Conditions)

Figure D5: 10 Year ARI Afflux Map (Post-Development Conditions)

Figure D6: 50 Year ARI Afflux Map (Post-Development Conditions)

Figure D7: 100 Year ARI Afflux Map (Post-Development Conditions)

Figure D8: 1,000 Year ARI Afflux Map (Post-Development Conditions)

Figure D9: 10 Year ARI Design Flood Velocities (Post-Development Conditions)

Figure D10: 50 Year ARI Design Flood Velocities (Post-Development Conditions)

Figure D11: 100 Year ARI Design Flood Velocities (Post-Development Conditions)

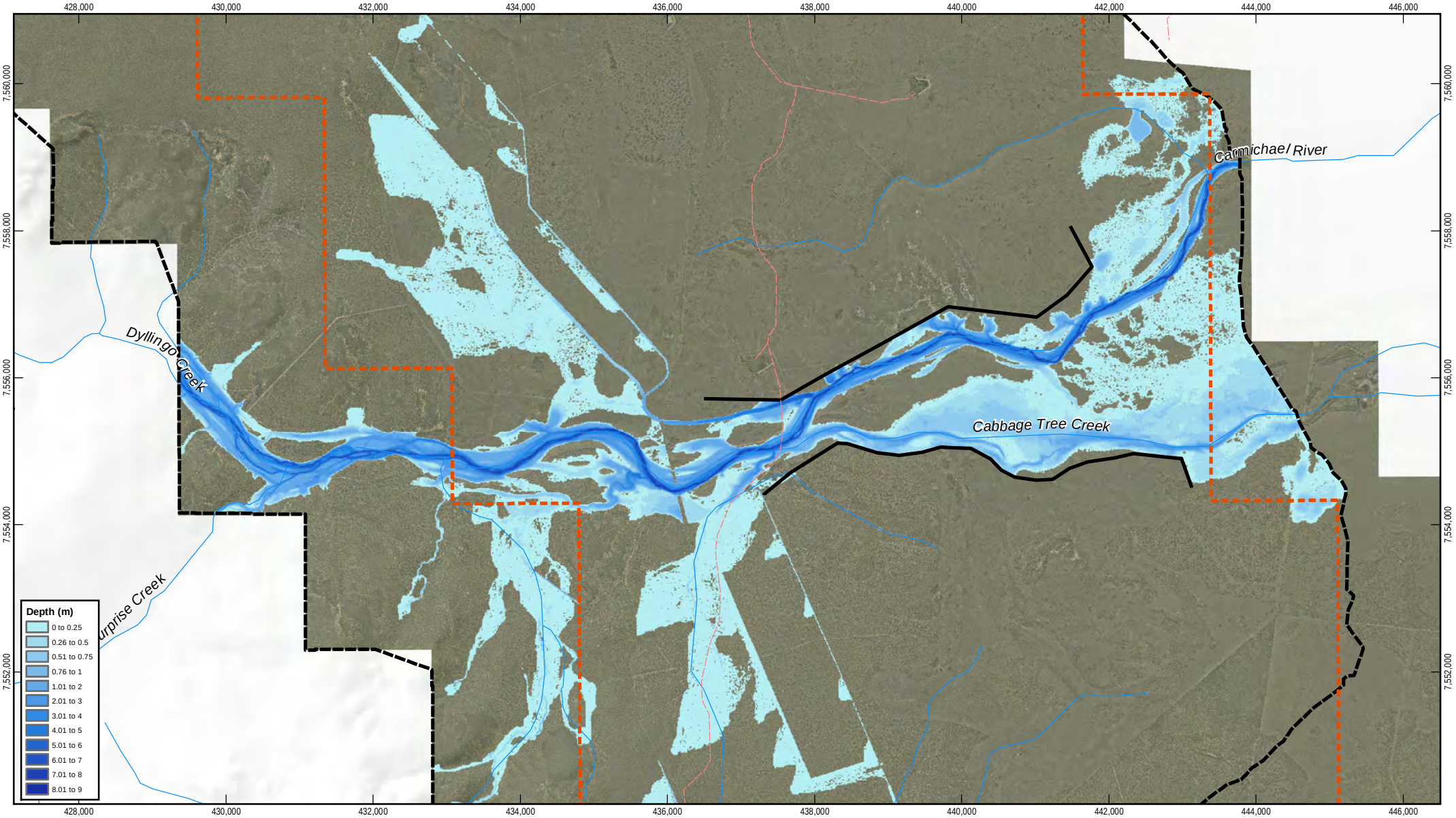
Figure D12: 1,000 Year ARI Design Flood Velocities (Post-Development Conditions)

Figure D13: 10 Year ARI Design Flood Velocities Afflux (Post-Development Conditions)

Figure D14: 50 Year ARI Design Flood Velocities Afflux (Post-Development Conditions)

Figure D15: 100 Year ARI Design Flood Velocities Afflux (Post-Development Conditions)

Figure D16: 1,000 Year ARI Design Flood Velocities Afflux (Post-Development Conditions)



1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
10 Year ARI Design Flood
Post Development - Depth

Job Number 41-26630
Revision A
Date 25-07-2013

Figure D1

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D1_2013_10yr_Depth_Carmichael.mxd

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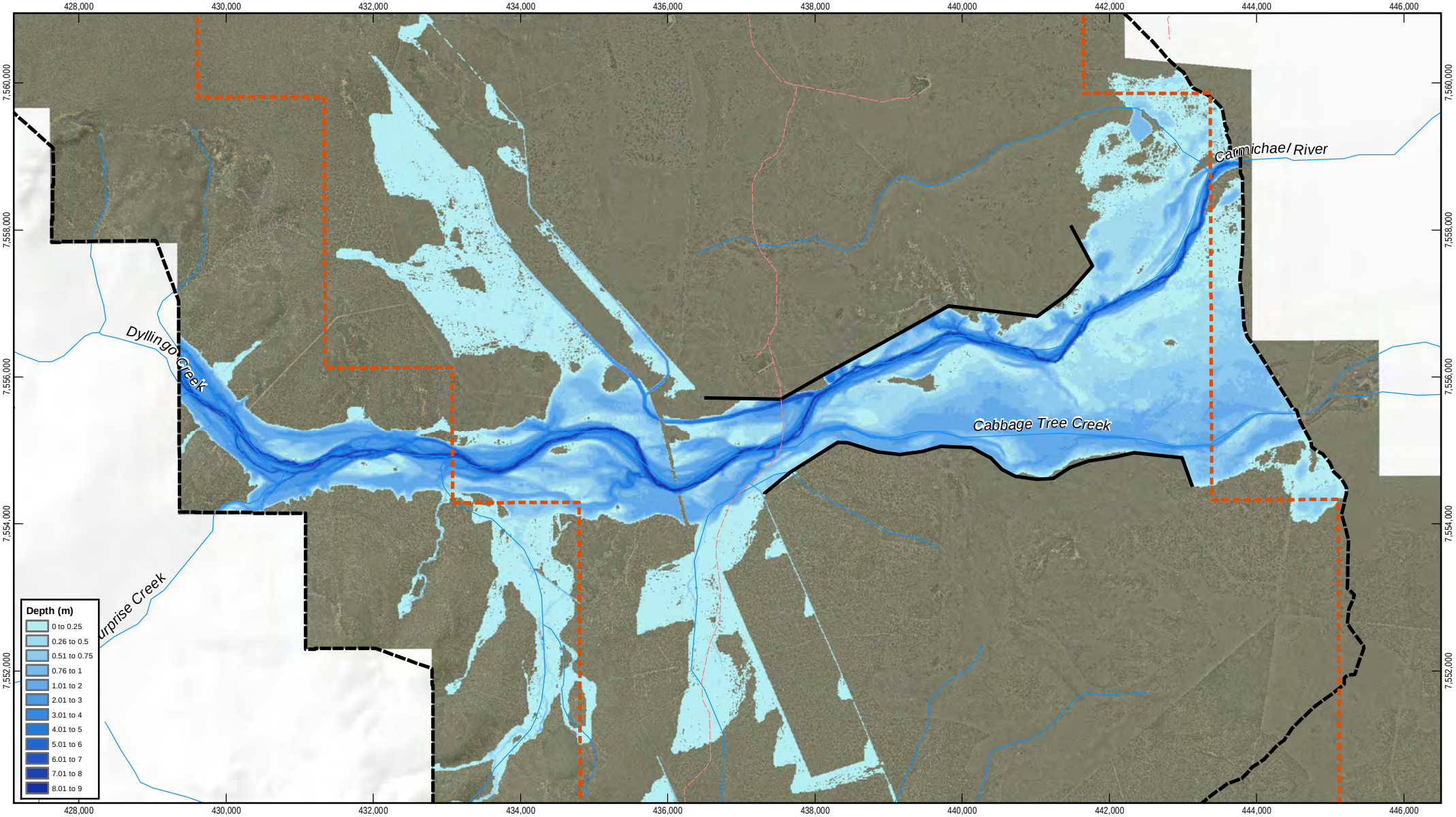
Data source: DME: EPC1690 (2010)/EPC1080 (2011); ESRI: Hillshade (2008); © Commonwealth of Australia (Geoscience Australia): Watercourse, Roads, Tracks (2007); GHD: 2D Model Extent, Flood Surface (2013). Created by: LS



1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
50 Year ARI Design Flood
Post Development - Depth

Job Number 41-26630
Revision A
Date 25-07-2013

Figure D2

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D2_2013_50yr_Depth_Carmichael.mxd

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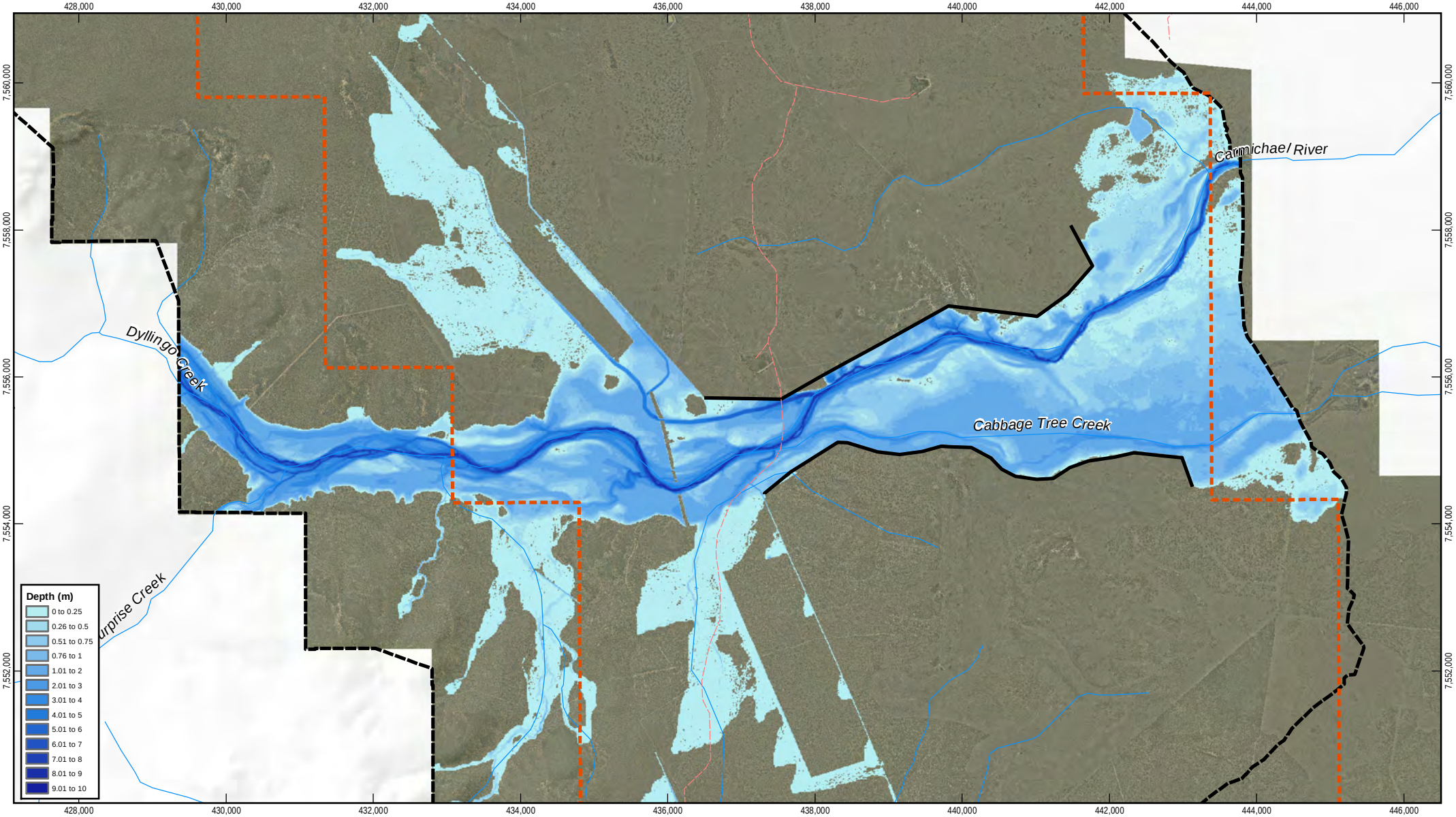
Data source: DME: EPC1690 (2010)/EPC1080 (2011); ESRI: Hillshade (2008); © Commonwealth of Australia (Geoscience Australia): Watercourse, Roads, Tracks (2007); GHD: 2D Model Extent, Flood Surface (2013). Created by: LS



1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design

100 Year ARI Design Flood
Post Development - Depth

Job Number	41-26630
Revision	A
Date	25-07-2013

Figure D3

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D3_2013_100yr_Depth_Carmichael.mxd

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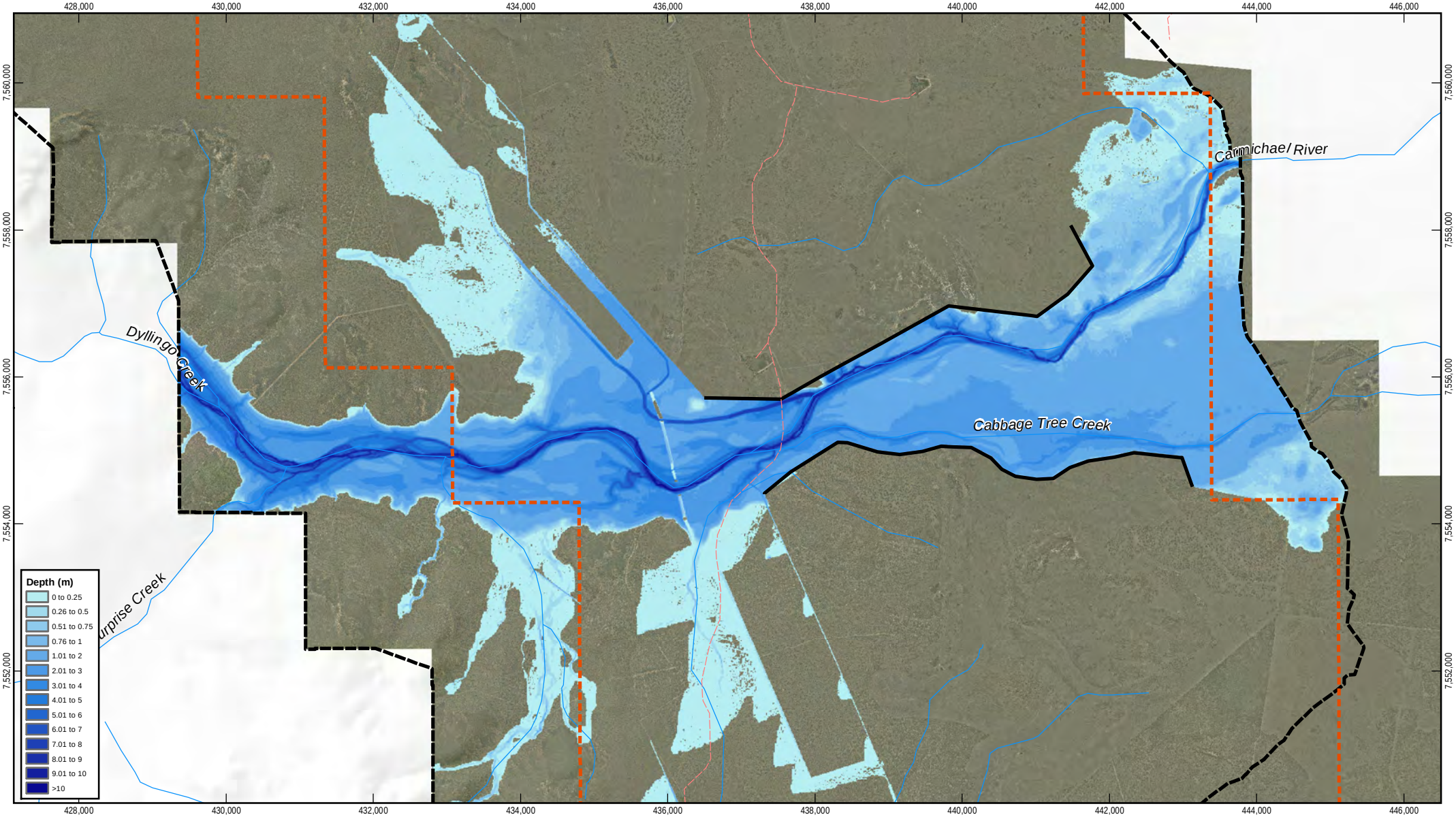

1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
1000 Year ARI Design Flood
Post Development - Depth

Job Number 41-26630
Revision A
Date 25-07-2013

Figure D4

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D4_2013_1000yr_Depth_Carmichael.mxd

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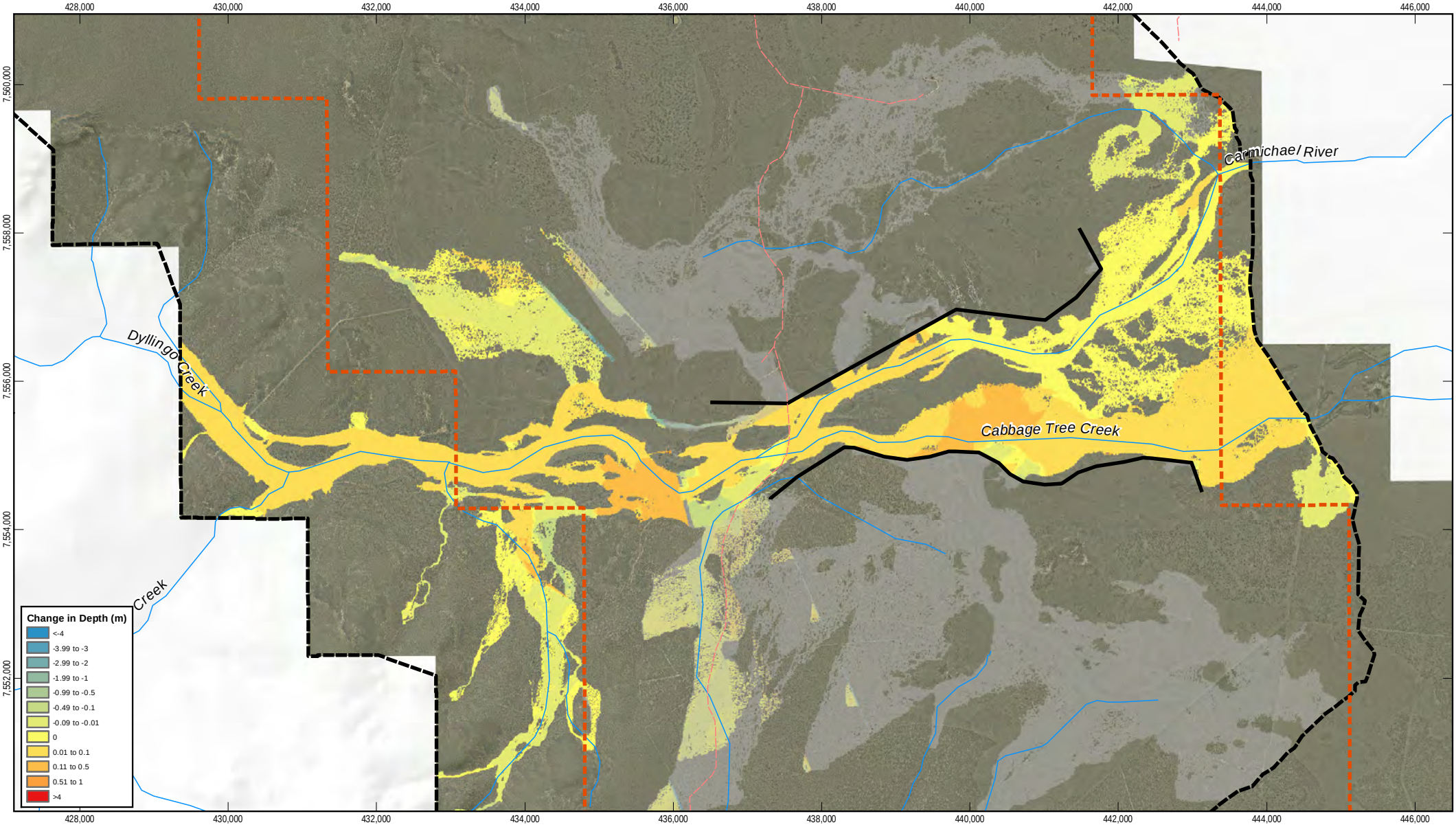

1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area
- Flood Extent Change

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design

10 Year ARI Design Flood
Post Development - Depth Afflux

Job Number 41-26630
Revision A
Date 25-07-2013

Figure D5

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D5_2013_10yr_DepthAff_Carmichael.mxd

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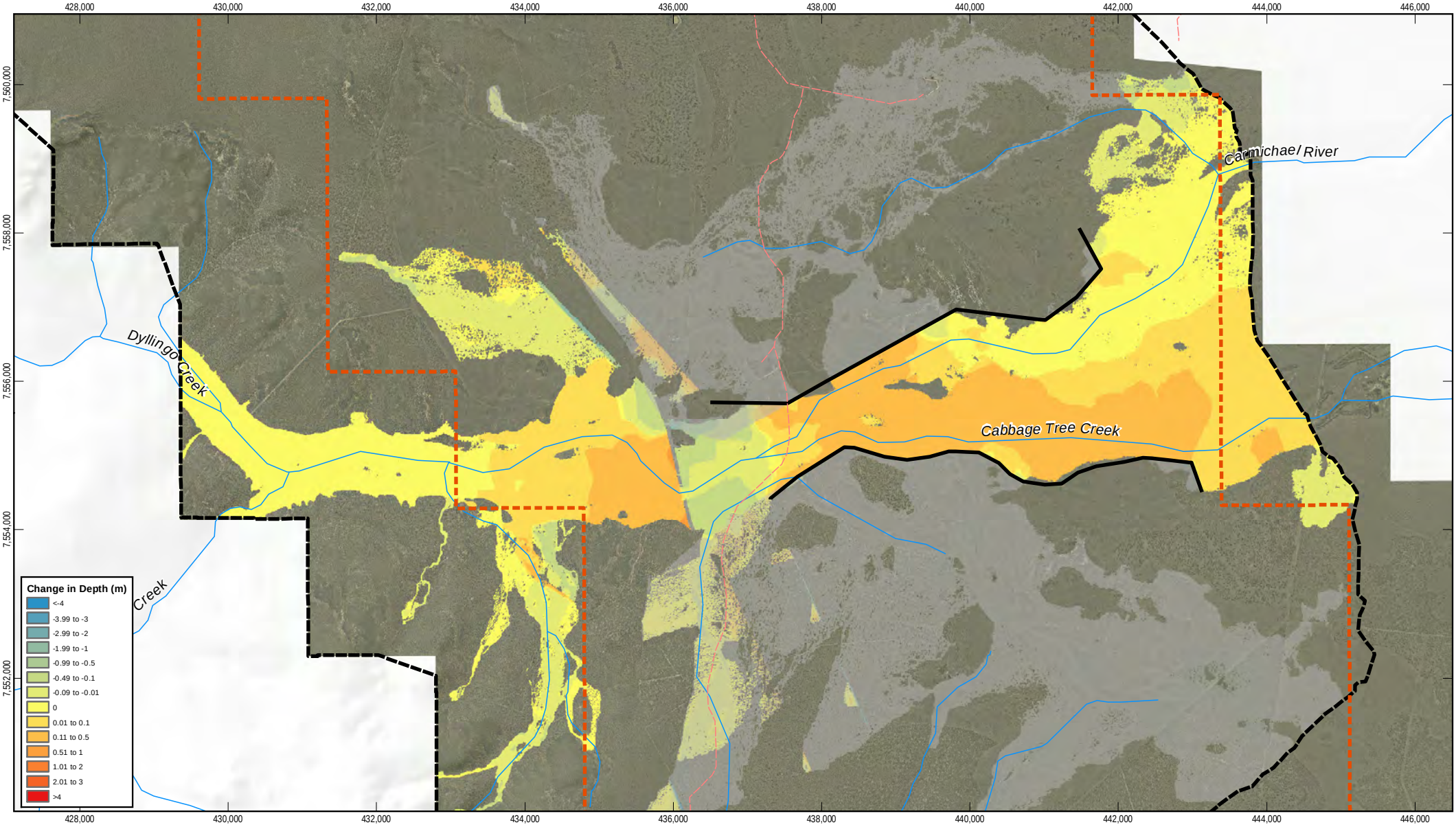

1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area
- Flood Extent Change

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design

50 Year ARI Design Flood
Post Development - Depth Afflux

Job Number 41-26630
Revision A
Date 25-07-2013

Figure D6

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D6_2013_50yr_DepthAff_Carmichael.mxd

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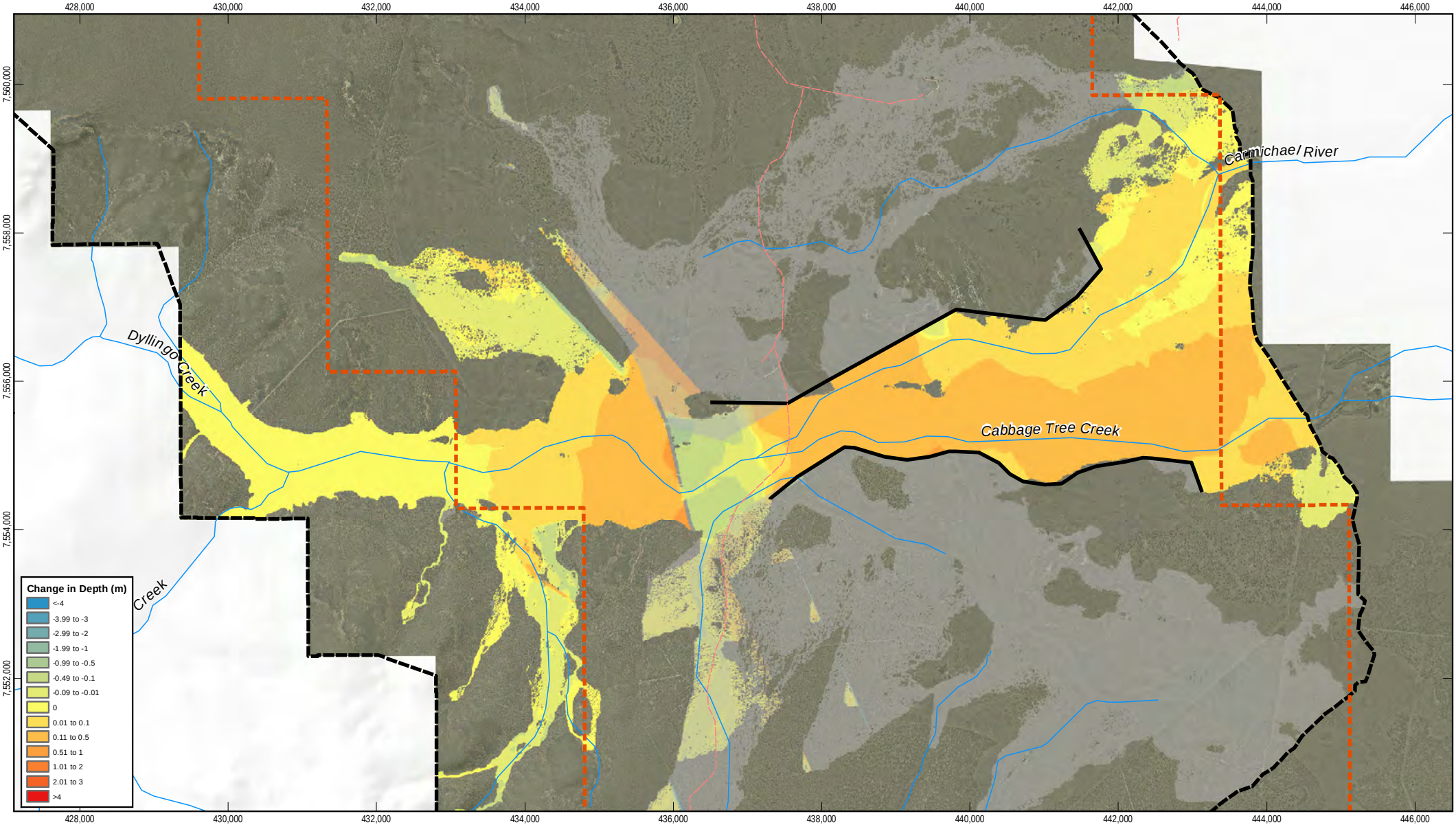
Data source: DME: EPC1690 (2010)/EPC1080 (2011); ESRI: Hillshade (2008); © Commonwealth of Australia (Geoscience Australia): Watercourse, Roads, Tracks (2007); GHD: 2D Model Extent, Flood Surface (2013). Created by: LS



1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area
- Flood Extent Change

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design

100 Year ARI Design Flood
Post Development - Depth Afflux

Job Number 41-26630
Revision A
Date 25-07-2013

Figure D7

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D7_2013_100yr_DepthAff_Carmichael.mxd

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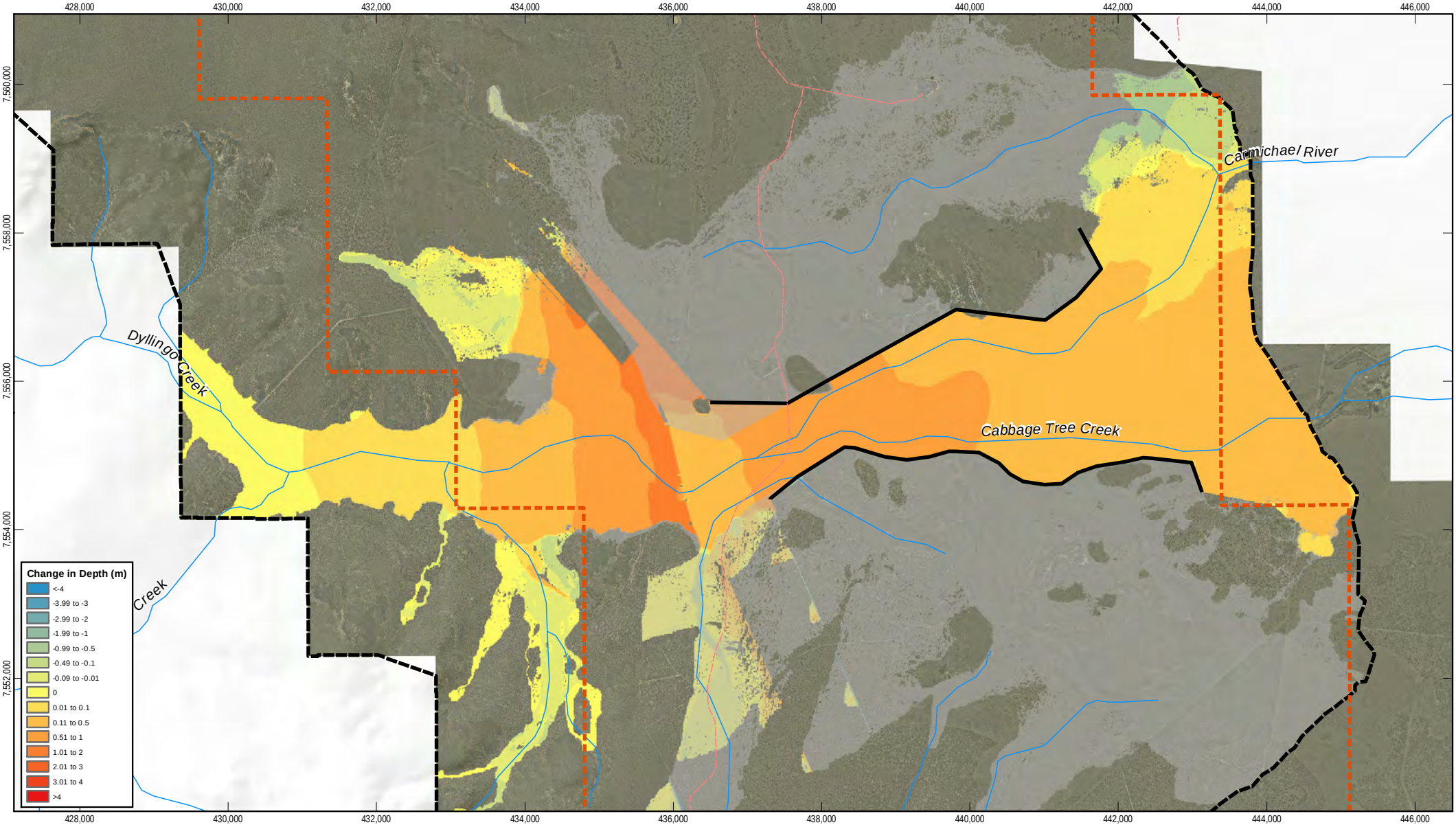
Data source: DME: EPC1690 (2010)/EPC1080 (2011); ESRI: Hillshade (2008); © Commonwealth of Australia (Geoscience Australia): Watercourse, Roads, Tracks (2007); GHD: 2D Model Extent, Flood Surface (2013). Created by: LS



1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area
- Flood Extent Change

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Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design

1000 Year ARI Design Flood
Post Development - Depth Afflux

Job Number 41-26630
Revision A
Date 25-07-2013

Figure D8

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D8_2013_1000yr_DepthAff_Carmichael.mxd

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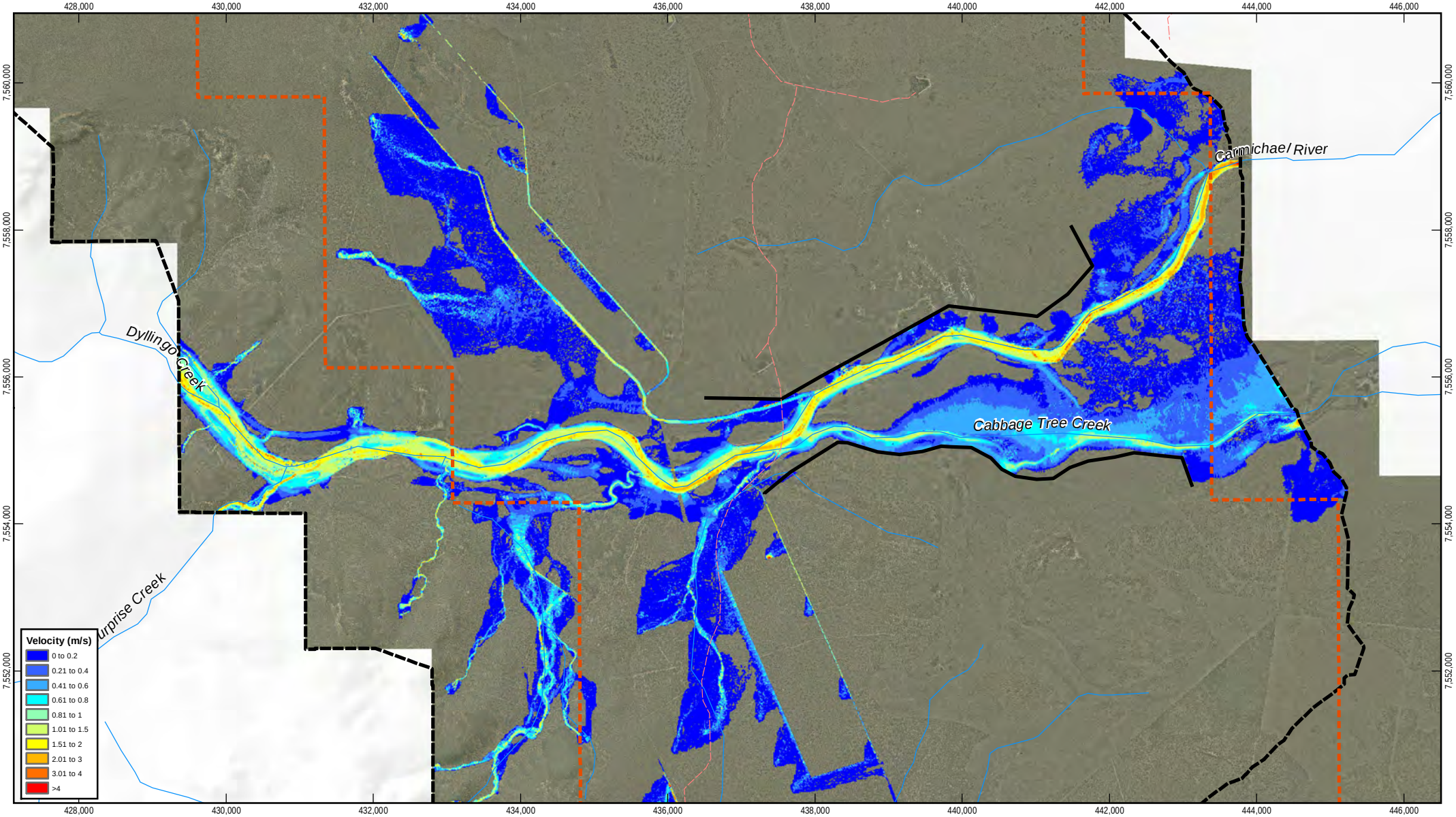
Data source: DME: EPC1690 (2010)/EPC1080 (2011); ESRI: Hillshade (2008); © Commonwealth of Australia (Geoscience Australia): Watercourse, Roads, Tracks (2007); GHD: 2D Model Extent, Flood Surface (2013). Created by: LS



1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
10 Year ARI Design Flood
Post Development - Velocity

Job Number 41-26630
Revision A
Date 25-07-2013

Figure D9

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D9_2013_10yr_Vel_Carmichael.mxd

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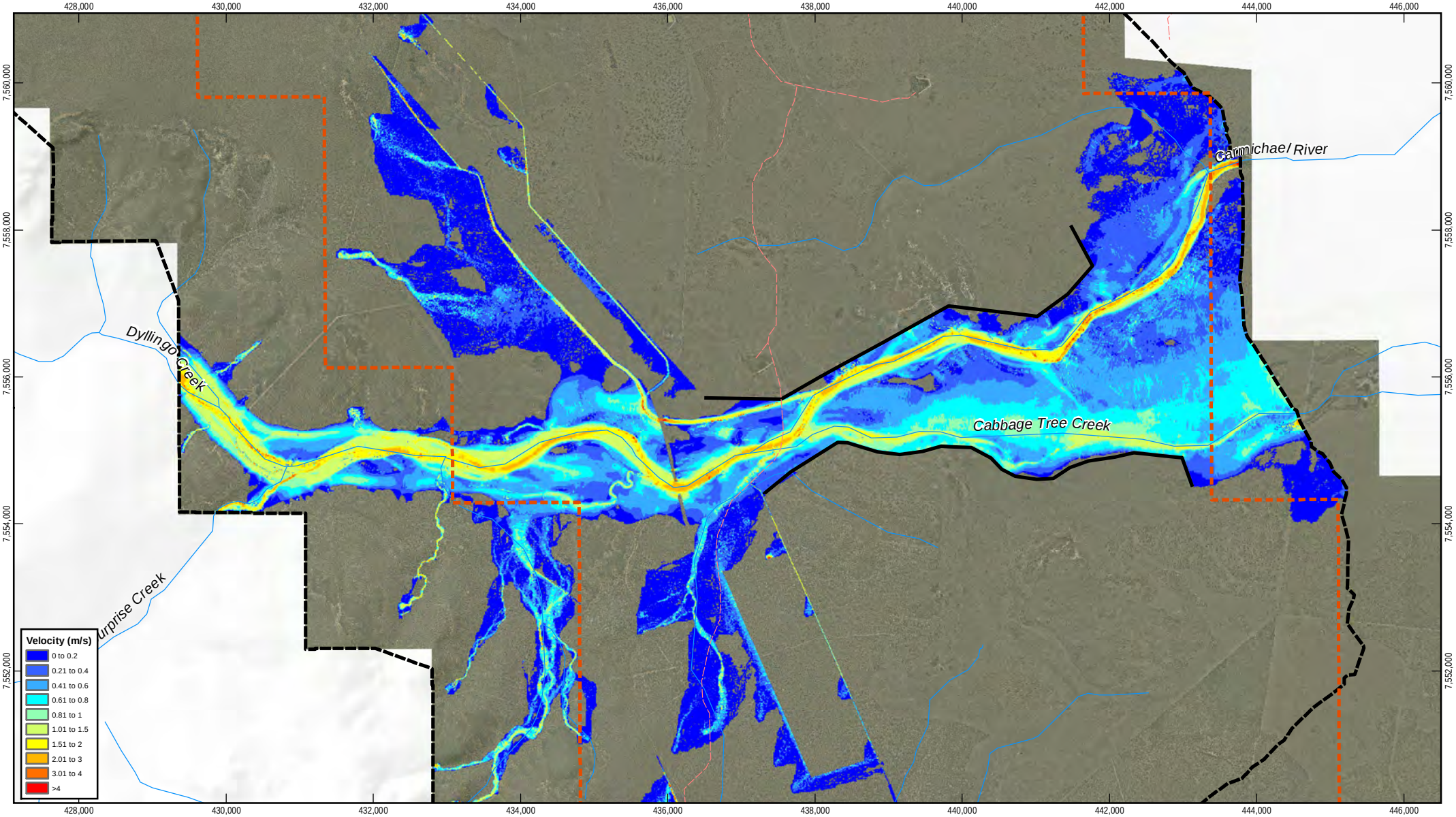

1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
50 Year ARI Design Flood
Post Development - Velocity

Job Number	41-26630
Revision	A
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Figure D10

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D10_2013_50yr_Vel_Carmichael.mxd

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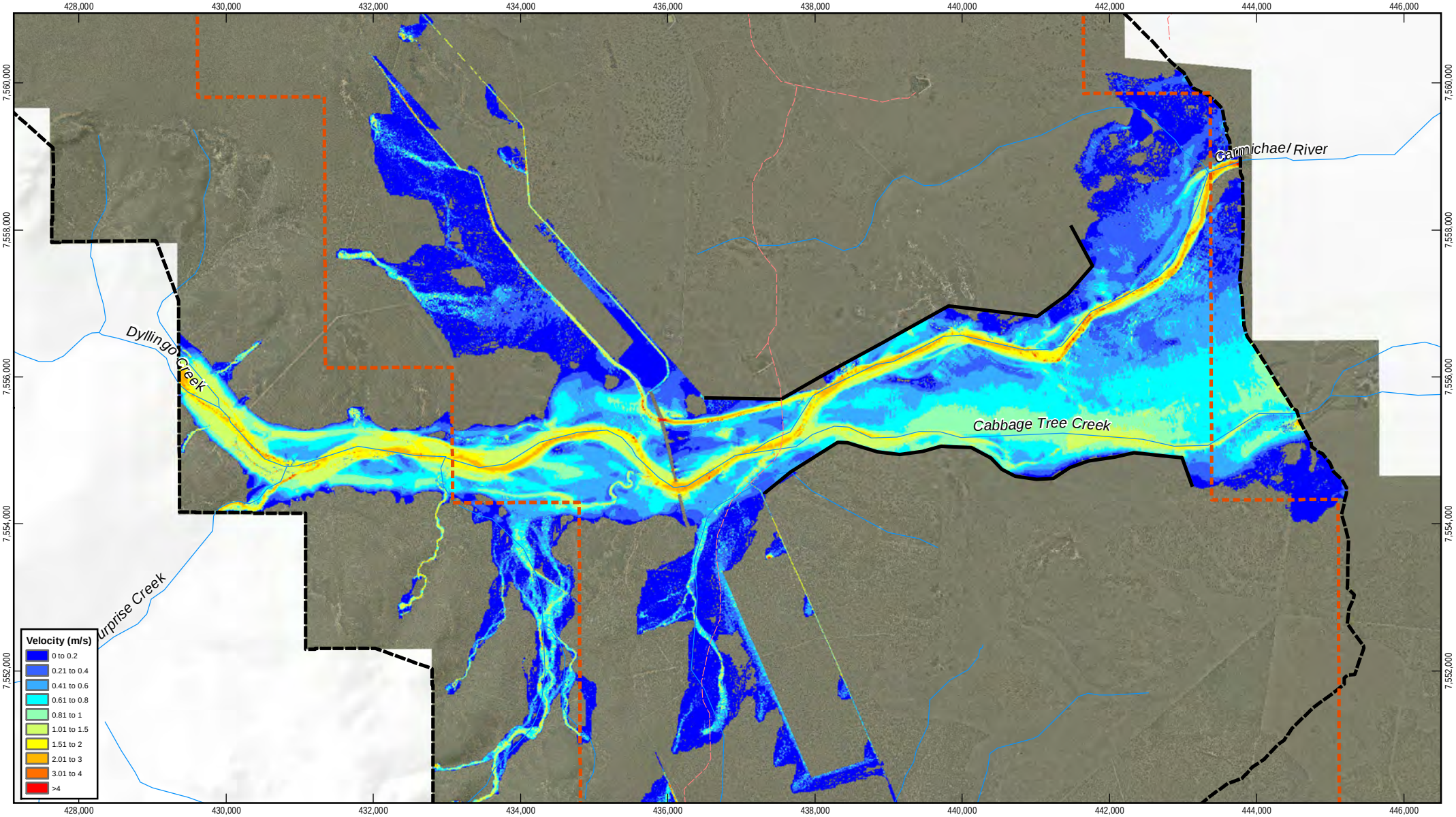

1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
100 Year ARI Design Flood
Post Development - Velocity

Job Number 41-26630
Revision A
Date 25-07-2013

Figure D11

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D11_2013_100yr_Vel_Carmichael.mxd

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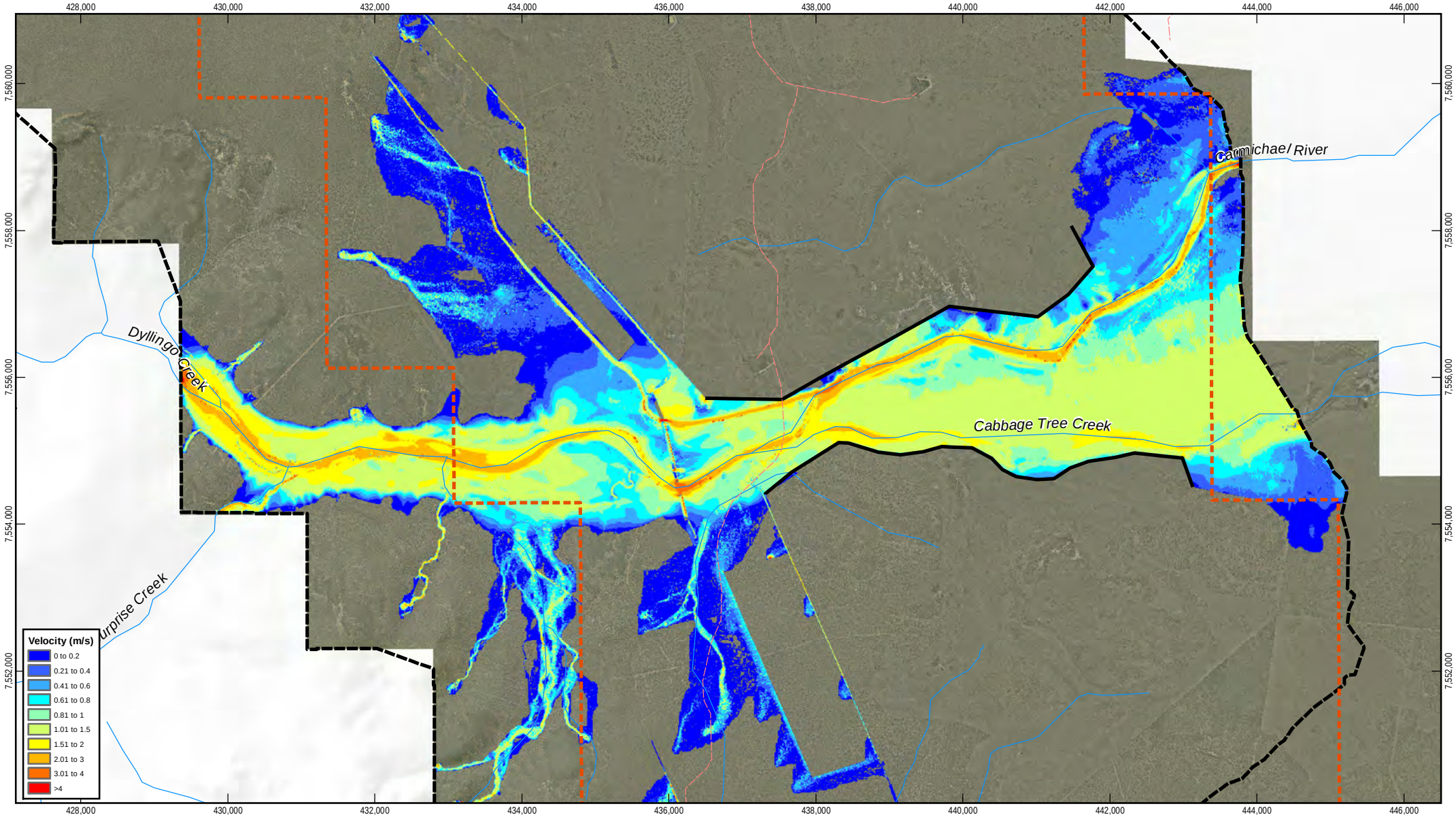

1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
1000 Year ARI Design Flood
Post Development - Velocity

Job Number 41-26630
Revision A
Date 25-07-2013

Figure D12

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D12_2013_1000yr_Vel_Carmichael.mxd

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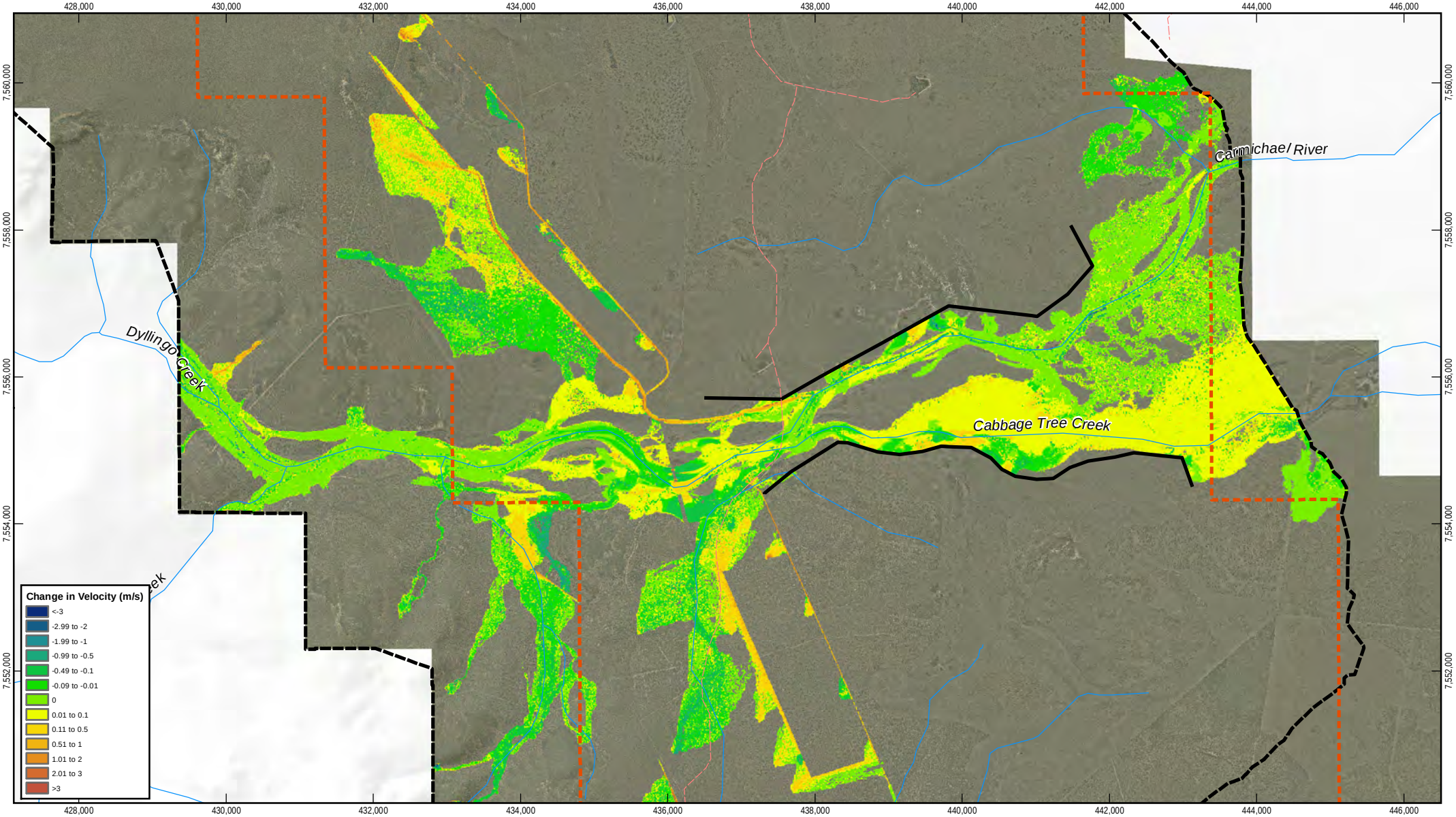

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0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
10 Year ARI Design Flood
Post Development - Velocity Afflux

Job Number 41-26630
Revision A
Date 25-07-2013

Figure D13

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D13_2013_10yr_VelAff_Carmichael.mxd

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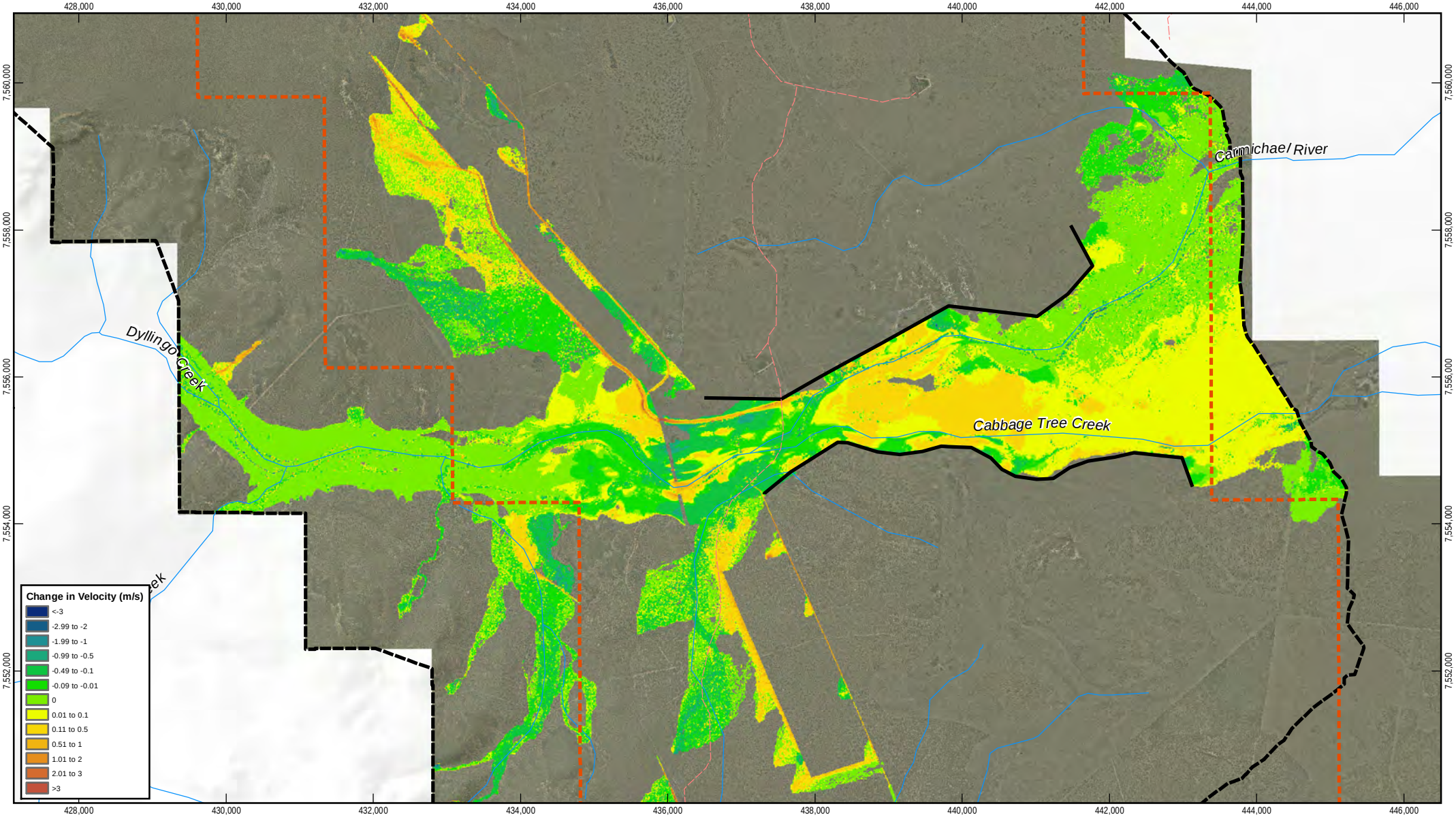

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Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
50 Year ARI Design Flood
Post Development - Velocity Afflux

Job Number	41-26630
Revision	A
Date	25-07-2013

Figure D14

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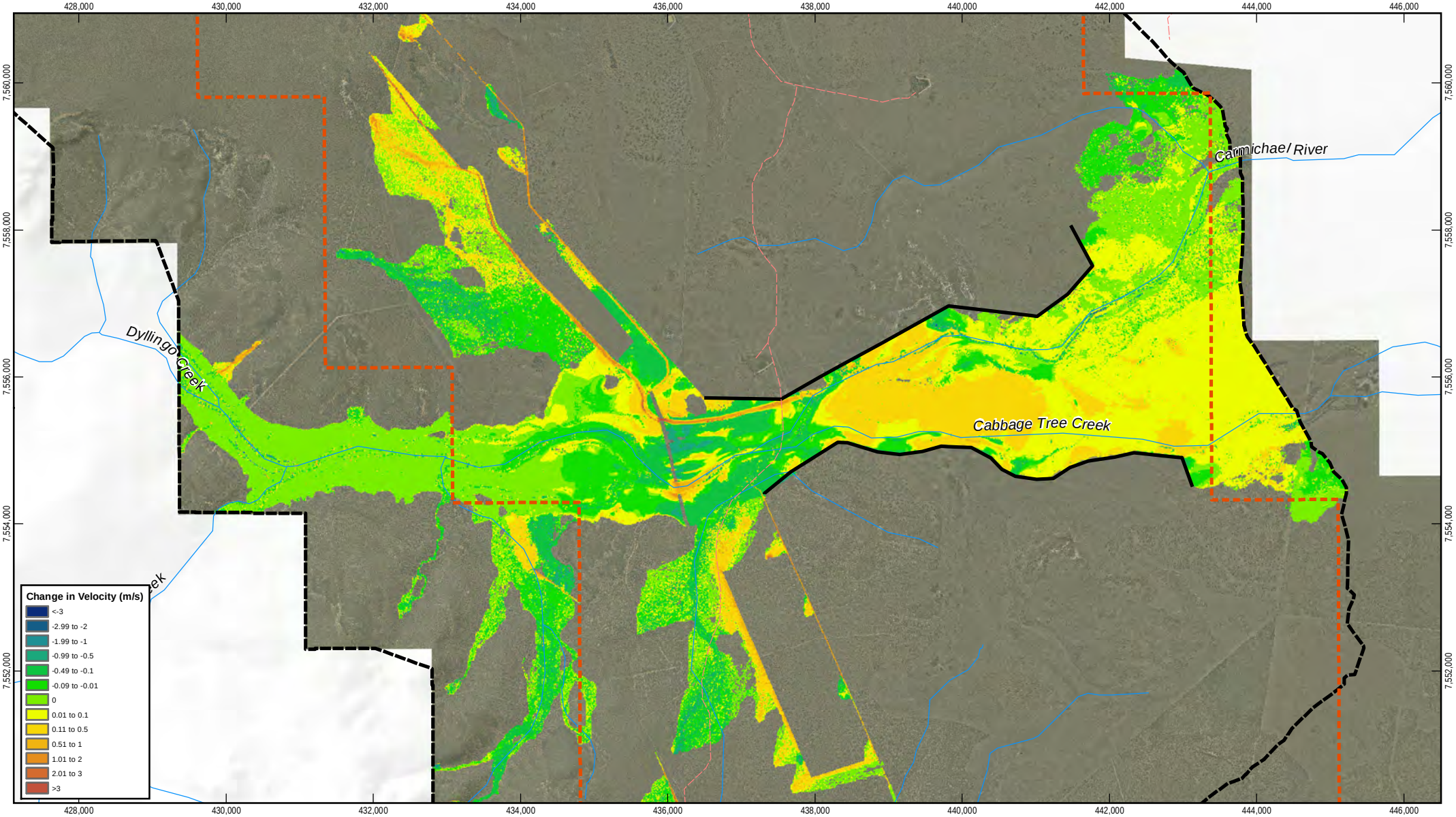

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Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
100 Year ARI Design Flood
Post Development - Velocity Afflux

Job Number 41-26630
Revision A
Date 25-07-2013

Figure D15

G:\41\26630\GIS\Maps\MXD\Flood_Automaps\Fig_D15_2013_100yr_VelAff_Carmichael.mxd

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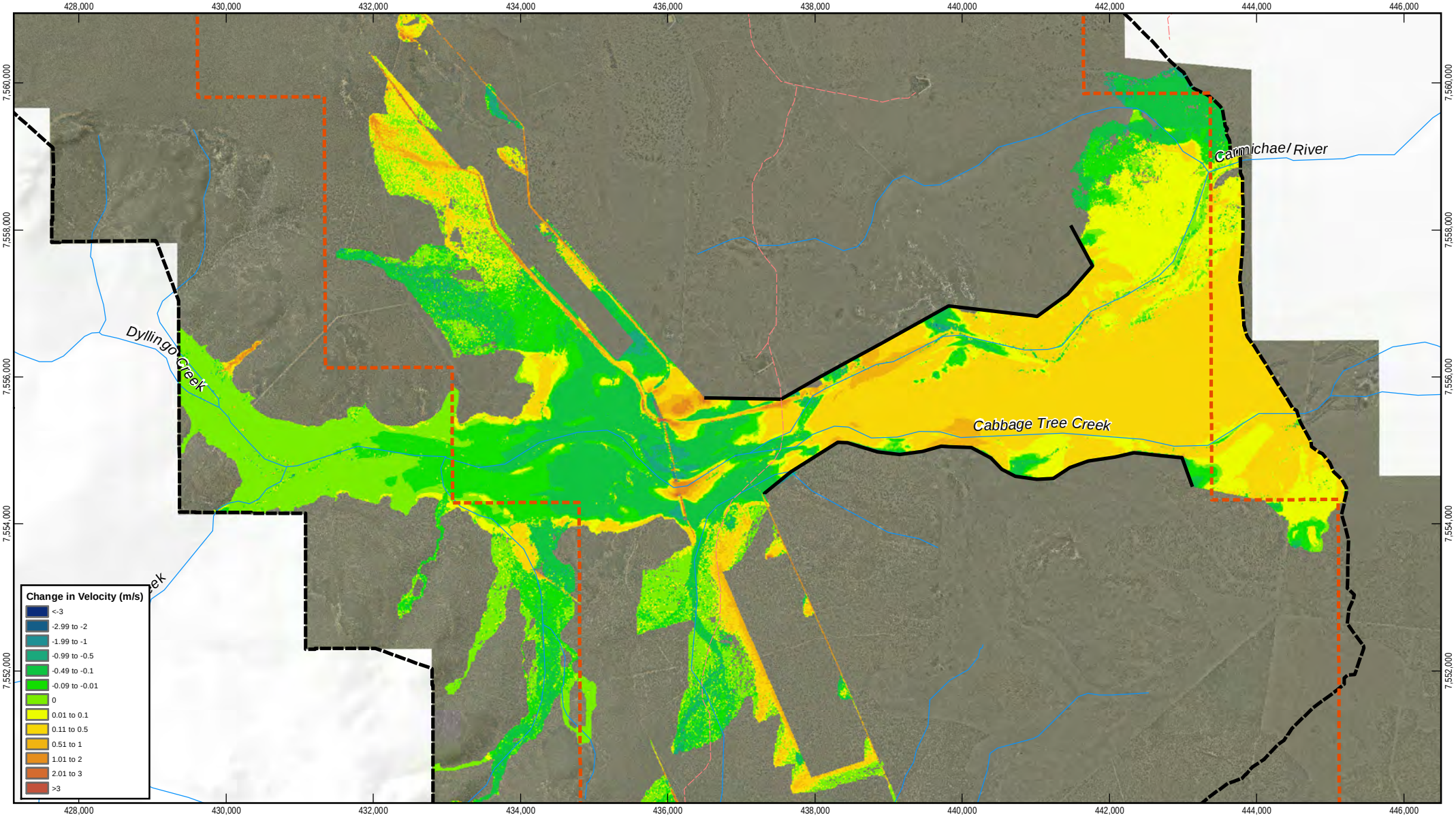

1:70,000 (at A4)

0 1 2

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Watercourse
- Track
- Proposed Levee
- 2D Model Extent
- Mine Lease Area

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Adani Mining Pty Ltd
Carmichael Coal Mine Preliminary
Flood Mitigation and Creek Diversion Design
1000 Year ARI Design Flood
Post Development - Velocity Afflux

Job Number 41-26630
Revision A
Date 25-07-2013

Figure D16

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Appendix E Local Waterway Model Results – Developed Conditions

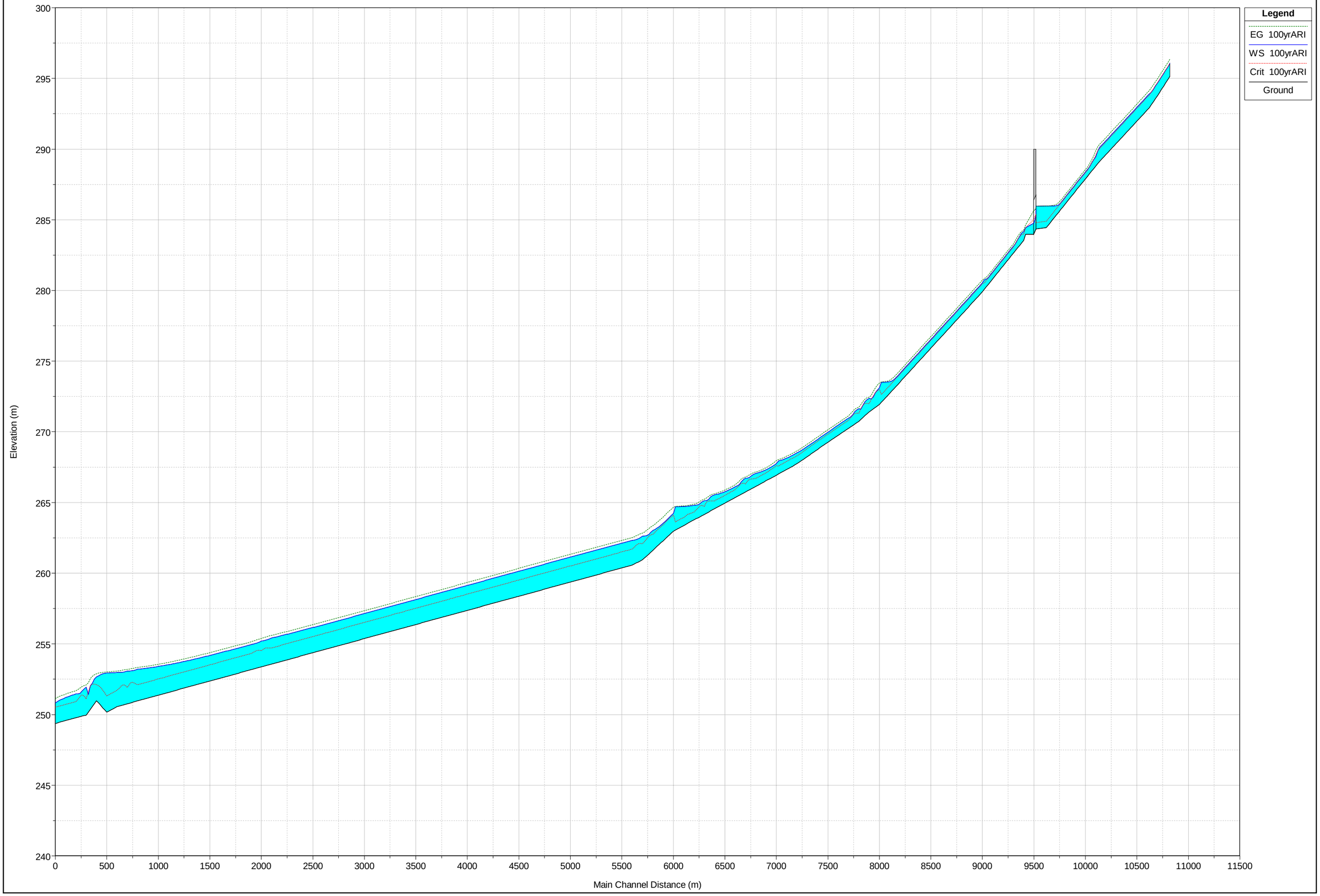
HEC-RAS modelling results for each diversion drain:

- 100 Year ARI longitudinal section
- 100 Year ARI table of results
- 1,000 Year longitudinal section
- 1,000 Year ARI table of results

HEC-RAS MODELLING RESULTS FOR DIVERSION DRAIN 1

- 100 Year ARI longsection
- 100 Year ARI Table of Results
- 1000 Year longsection
- 1000 Year ARI Table of Results

S1D1 Plan: FINAL 5/07/2013



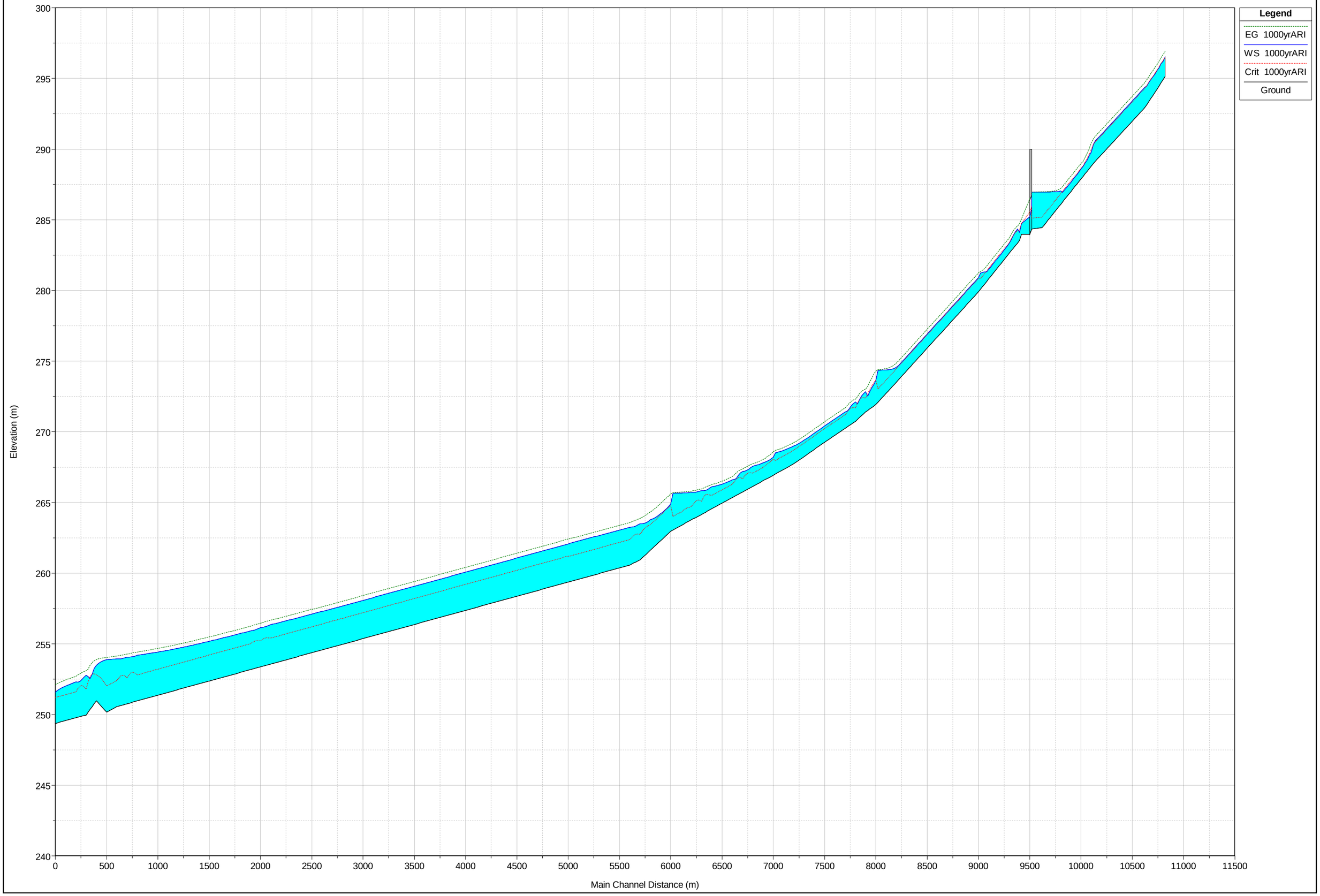
HEC-RAS Plan: Final River: S1D1 Reach: 1000 Profile: 100yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
1000	11700.00	100yrARI	10.28	295.15	296.07	296.07	296.35	0.011023	2.37	4.34	7.48	0.99	60.26	142.86	1.25	1.08
1000	11600.00	100yrARI	10.28	294.00	294.90	294.91	295.20	0.011886	2.44	4.22	7.38	1.03	64.06	156.19	1.53	1.22
1000	11500.00	100yrARI	10.28	292.92	293.91	293.83	294.13	0.007825	2.09	4.92	7.94	0.85	45.72	95.46	1.38	1.12
1000	11400.00	100yrARI	10.28	292.13	293.12	293.04	293.34	0.007707	2.08	4.95	7.96	0.84	45.19	93.85	1.02	1.01
1000	11300.00	100yrARI	10.28	291.34	292.33	292.25	292.55	0.007844	2.09	4.92	7.93	0.85	45.82	95.78	1.08	1.01
1000	11200.00	100yrARI	10.28	290.56	291.55	291.47	291.77	0.007654	2.07	4.97	7.99	0.84	44.88	92.89	1.37	1.05
1000	11100.00	100yrARI	10.28	289.77	290.76	290.68	290.98	0.007905	2.09	4.91	7.94	0.85	46.06	96.48	1.15	1.01
1000	11000.00	100yrARI	10.28	288.98	289.89	289.89	290.18	0.011026	2.37	4.34	7.49	0.99	60.26	142.83	1.25	1.09
1000	10900.00	100yrARI	10.28	288.07	288.57	288.52	288.73	0.009006	1.81	5.68	12.96	0.87	38.23	69.20	1.64	1.50
1000	10800.00	100yrARI	10.28	287.17	287.66	287.63	287.83	0.009094	1.82	5.66	12.96	0.88	38.49	69.88	1.76	1.51
1000	10700.00	100yrARI	10.28	286.26	286.75	286.72	286.92	0.009097	1.82	5.66	12.96	0.88	38.51	69.93	2.08	1.89
1000	10600.00	100yrARI	10.28	285.35	286.01	285.80	286.09	0.003399	1.31	7.84	13.93	0.56	18.48	24.23	2.19	2.07
1000	10500.00	100yrARI	10.28	284.44	285.97	284.89	285.98	0.000162	0.46	22.29	19.14	0.14	1.80	0.83	1.98	1.56
1000	10491	100yrARI	10.28	284.35	285.96	284.80	285.97	0.000135	0.43	23.78	19.60	0.13	1.56	0.67	1.90	1.48
1000	10490		Culvert													
1000	10449	100yrARI	10.28	283.98	284.44	284.44	284.64	0.012068	1.99	5.17	12.75	1.00	47.41	94.35	3.67	3.13
1000	10400.00	100yrARI	10.28	283.53	284.17	283.99	284.26	0.003861	1.37	7.52	13.81	0.59	20.31	27.77	3.49	2.95
1000	10300.00	100yrARI	10.28	282.63	283.12	283.08	283.29	0.009006	1.81	5.68	12.98	0.87	38.19	69.09	3.57	3.13
1000	10200.00	100yrARI	10.28	281.73	282.22	282.18	282.39	0.009097	1.82	5.66	12.97	0.88	38.49	69.88	3.01	2.97
1000	10000.00	100yrARI	14.52	279.91	280.53	280.47	280.73	0.008004	1.96	7.41	13.74	0.85	41.75	81.72	1.85	1.65
1000	9900.00	100yrARI	14.52	279.11	279.73	279.67	279.93	0.007993	1.96	7.42	13.76	0.85	41.67	81.51	1.61	1.40
1000	9800.00	100yrARI	14.52	278.31	278.94	278.88	279.13	0.008001	1.96	7.42	13.74	0.85	41.74	81.70	1.63	1.40
1000	9700.00	100yrARI	14.52	277.51	278.13	278.08	278.33	0.008004	1.96	7.41	13.73	0.85	41.76	81.76	1.73	1.60
1000	9600.00	100yrARI	14.52	276.71	277.34	277.27	277.53	0.007895	1.95	7.45	13.76	0.85	41.31	80.50	1.82	1.69
1000	9500.00	100yrARI	14.52	275.92	276.54	276.49	276.74	0.008002	1.96	7.42	13.76	0.85	41.70	81.59	1.79	1.59
1000	9400.00	100yrARI	14.52	275.12	275.74	275.68	275.94	0.007996	1.96	7.42	13.76	0.85	41.68	81.53	1.61	1.49
1000	9300.00	100yrARI	14.52	274.32	274.94	274.89	275.14	0.007996	1.96	7.42	13.75	0.85	41.69	81.56	1.59	1.40
1000	9200.00	100yrARI	14.52	273.52	274.15	274.09	274.34	0.008000	1.96	7.42	13.74	0.85	41.73	81.69	1.56	1.41
1000	9100.00	100yrARI	14.52	272.72	273.55	273.28	273.65	0.002969	1.40	10.34	14.95	0.54	19.78	27.76	1.41	1.25
1000	9000.00	100yrARI	41.46	271.93	273.13	273.00	273.46	0.006483	2.55	16.28	17.22	0.84	58.78	149.72	0.97	0.86
1000	8900.00	100yrARI	41.46	271.41	272.37	271.99	272.46	0.001920	1.33	31.23	35.73	0.45	16.31	21.66	1.04	1.04
1000	8800.00	100yrARI	41.46	270.74	271.65	271.31	271.75	0.002332	1.41	29.35	35.40	0.50	18.80	26.56	0.68	1.10
1000	8700.00	100yrARI	41.46	270.25	270.97	270.81	271.13	0.004899	1.79	23.19	34.33	0.69	32.23	57.64	1.01	1.28
1000	8600.00	100yrARI	41.46	269.76	270.48	270.33	270.64	0.004997	1.80	23.05	34.32	0.70	32.69	58.81	0.67	1.27
1000	8500.00	100yrARI	41.46	269.26	269.98	269.83	270.14	0.004999	1.80	23.04	34.30	0.70	32.71	58.86	0.62	1.28
1000	8400.00	100yrARI	41.46	268.76	269.47	269.33	269.64	0.005192	1.82	22.77	34.25	0.71	33.62	61.23	0.75	1.29
1000	8300.00	100yrARI	41.46	268.24	268.96	268.80	269.12	0.004941	1.79	23.12	34.30	0.70	32.44	58.18	0.89	1.28
1000	8200.00	100yrARI	41.46	267.74	268.51	268.30	268.65	0.003922	1.67	24.88	34.62	0.63	27.44	45.73	1.10	1.23
1000	8100.00	100yrARI	41.46	267.34	268.14	267.90	268.27	0.003423	1.60	25.98	34.82	0.59	24.85	39.67	1.16	1.20
1000	8000.00	100yrARI	53.89	266.93	267.74	267.60	267.96	0.005485	2.04	26.40	34.86	0.75	40.43	82.53	1.38	1.24
1000	7900.00	100yrARI	53.89	266.54	267.32	267.10	267.46	0.003536	1.62	33.25	44.72	0.60	25.64	41.55	1.47	1.21
1000	7800.00	100yrARI	53.89	266.14	267.06	266.70	267.16	0.002033	1.36	39.56	45.56	0.47	17.20	23.43	1.63	1.38
1000	7700.00	100yrARI	53.89	265.74	266.72	266.31	266.80	0.001734	1.30	41.60	45.82	0.43	15.33	19.86	1.64	1.48
1000	7600.00	100yrARI	53.89	265.35	266.11	265.91	266.26	0.003880	1.67	32.29	44.57	0.63	27.42	45.75	1.95	1.72
1000	7500.00	100yrARI	53.89	264.95	265.76	265.51	265.89	0.003167	1.57	34.41	44.85	0.57	23.69	37.10	2.04	1.80
1000	7400.00	100yrARI	53.89	264.56	265.55	265.12	265.63	0.001620	1.27	42.51	45.95	0.42	14.59	18.50	1.82	1.80
1000	7300.00	100yrARI	53.89	264.15	265.14	264.72	265.22	0.001645	1.27	42.45	46.35	0.42	14.68	18.63	1.83	1.62
1000	7200.00	100yrARI	53.89	263.77	264.80	264.33	264.88	0.001403	1.21	44.48	46.19	0.39	13.15	15.94	1.63	1.31
1000	7100.00	100yrARI	53.89	263.37	264.72	263.93	264.76	0.000566	0.91	59.38	48.09	0.26	6.80	6.17	1.29	0.97
1000	7000.00	100yrARI	158.28	262.97	264.24	264.10	264.65	0.006047	2.85	55.48	47.64	0.84	68.47	195.36	1.58	1.50
1000	6900.00	100yrARI	158.28	262.29	263.54	263.43	263.97	0.006328	2.90	54.67	47.52	0.86	70.80	204.96	1.86	1.78
1000	6800.00	100yrARI	158.28	261.61	263.03	262.76	263.36	0.004130	2.52	62.70	48.54	0.71	51.82	130.82	1.84	1.72
1000	6700.00	100yrARI	158.28	260.94	262.62	262.08	262.84	0.002330	2.10	75.42	50.09	0.55	34.03	71.43	1.93	1.69
1000	6600.00	100yrARI	158.28	260.57	262.32	261.71	262.53	0.001992	1.99	79.34	50.53	0.51	30.33	60.52	2.20	2.05
1000	6500.00	100yrARI	158.28	260.37	262.12	261.51	262.33	0.001967	1.99	79.34	49.84	0.50	30.24	60.32	3.39	3.30
1000	6400.00	100yrARI	158.28	260.17	261.93	261.30	262.13	0.001977	1.99	79.55	50.58	0.51	30.16	60.01	3.92	4.96
1000	6300.00	100yrARI	158.28	259.97	261.73	261.10	261.93	0.001966	1.99	79.70	50.59	0.51	30.03	59.63	4.86	4.91
1000	6200.00	100yrARI	158.28	259.77	261.53	260.91	261.73	0.001951	1.98	79.90	50.62	0.50	29.86	59.15	6.95	6.53
1000	6100.00	100yrARI	158.28	259.57	261.34	260.70	261.54	0.001930	1.97	80.17	50.64	0.50	29.63	58.49	8.85	8.60
1000	6000.00	100yrARI	161.09	259.37	261.14	260.52	261.34	0.001999	2.01	80.16	50.62	0.51	30.69	61.67	10.19	10.56
1000	5900.00	100yrARI	161.09	259.17	260.94	260.32	261.14	0.001999	2.01	80.17	50.63	0.51	30.69	61.67	11.75	11.41
1000	5700.00	100yrARI	161.09	258.77	260.54	259.92	260.74	0.001999	2.01	80.16	50.62	0.51	30.70	61.69	16.10	14.14

HEC-RAS Plan: Final River: S1D1 Reach: 1000 Profile: 100yrARI (Continued)

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
1000	5600.00	100yrARI	161.09	258.57	260.34	259.72	260.54	0.001999	2.01	80.17	50.63	0.51	30.69	61.66	17.37	15.55
1000	5500.00	100yrARI	161.09	258.37	260.14	259.52	260.34	0.002000	2.01	80.14	50.62	0.51	30.71	61.72	18.62	16.99
1000	5400.00	100yrARI	161.09	258.17	259.94	259.32	260.14	0.001999	2.01	80.16	50.62	0.51	30.69	61.68	20.55	18.76
1000	5300.00	100yrARI	161.09	257.97	259.74	259.12	259.94	0.001999	2.01	80.15	50.62	0.51	30.70	61.70	22.07	20.60
1000	5200.00	100yrARI	161.09	257.77	259.54	258.91	259.74	0.002000	2.01	80.15	50.62	0.51	30.70	61.71	24.41	21.99
1000	5100.00	100yrARI	161.09	257.57	259.34	258.72	259.54	0.002000	2.01	80.15	50.62	0.51	30.70	61.70	26.47	23.82
1000	5000.00	100yrARI	161.09	257.37	259.14	258.52	259.34	0.001999	2.01	80.16	50.62	0.51	30.70	61.69	28.14	25.42
1000	4900.00	100yrARI	161.09	257.17	258.94	258.32	259.14	0.001999	2.01	80.17	50.63	0.51	30.69	61.67	29.65	27.53
1000	4800.00	100yrARI	161.09	256.97	258.74	258.12	258.94	0.001999	2.01	80.15	50.61	0.51	30.70	61.70	30.74	29.31
1000	4700.00	100yrARI	161.09	256.77	258.54	257.92	258.74	0.001999	2.01	80.15	50.62	0.51	30.70	61.70	32.81	30.69
1000	4600.00	100yrARI	161.09	256.57	258.34	257.72	258.54	0.002000	2.01	80.15	50.62	0.51	30.70	61.70	33.45	32.00
1000	4500.00	100yrARI	161.09	256.37	258.14	257.52	258.34	0.001996	2.01	80.20	50.63	0.51	30.66	61.59	33.89	31.92
1000	4400.00	100yrARI	161.09	256.17	257.94	257.32	258.15	0.001996	2.01	80.19	50.62	0.51	30.67	61.60	34.02	31.15
1000	4300.00	100yrARI	161.09	255.97	257.74	257.12	257.95	0.001998	2.01	80.17	50.61	0.51	30.68	61.65	33.65	31.52
1000	4200.00	100yrARI	161.09	255.77	257.54	256.92	257.75	0.001996	2.01	80.20	50.62	0.51	30.66	61.58	32.93	31.65
1000	4100.00	100yrARI	161.09	255.57	257.34	256.72	257.55	0.001994	2.01	80.22	50.62	0.51	30.64	61.52	30.67	30.90
1000	4000.00	100yrARI	161.09	255.37	257.14	256.52	257.35	0.001991	2.01	80.25	50.62	0.51	30.61	61.45	29.62	29.85
1000	3900.00	100yrARI	161.09	255.17	256.94	256.32	257.15	0.001987	2.01	80.30	50.63	0.51	30.57	61.31	28.48	28.94
1000	3800.00	100yrARI	161.09	254.97	256.74	256.11	256.95	0.001981	2.00	80.40	50.64	0.51	30.49	61.09	28.08	27.25
1000	3700.00	100yrARI	161.09	254.77	256.55	255.92	256.75	0.001971	2.00	80.53	50.67	0.51	30.37	60.75	27.71	25.57
1000	3600.00	100yrARI	161.09	254.57	256.35	255.71	256.55	0.001957	2.00	80.71	50.68	0.50	30.22	60.32	26.44	24.26
1000	3500.00	100yrARI	161.09	254.37	256.16	255.52	256.36	0.001937	1.99	80.98	50.71	0.50	29.99	59.66	25.16	23.37
1000	3400.00	100yrARI	161.09	254.17	255.96	255.31	256.16	0.001908	1.98	81.39	50.77	0.50	29.65	58.68	23.89	22.08
1000	3300.00	100yrARI	161.09	253.97	255.78	255.12	255.97	0.001858	1.96	82.12	50.89	0.49	29.06	57.01	22.51	21.46
1000	3200.00	100yrARI	161.09	253.77	255.59	254.92	255.79	0.001804	1.94	82.88	50.94	0.49	28.46	55.31	20.81	19.71
1000	3100.00	100yrARI	161.09	253.57	255.42	254.72	255.60	0.001724	1.92	84.11	51.08	0.48	27.52	52.71	18.72	18.52
1000	3000.00	100yrARI	161.09	253.37	255.19	254.51	255.38	0.001773	1.93	83.65	51.48	0.48	27.94	53.81	17.15	16.59
1000	2900.00	100yrARI	161.09	253.17	254.95	254.32	255.15	0.001961	2.00	80.67	50.68	0.51	30.26	60.42	15.45	15.38
1000	2800.00	100yrARI	161.09	252.97	254.75	254.12	254.96	0.001946	1.99	80.86	50.70	0.50	30.09	59.94	13.93	13.93
1000	2700.00	100yrARI	161.09	252.77	254.56	253.92	254.76	0.001921	1.98	81.20	50.73	0.50	29.81	59.13	12.68	12.60
1000	2600.00	100yrARI	161.09	252.57	254.37	253.72	254.57	0.001884	1.97	81.71	50.80	0.50	29.39	57.93	11.51	11.01
1000	2500.00	100yrARI	161.09	252.37	254.18	253.52	254.38	0.001833	1.95	82.45	50.89	0.49	28.79	56.26	10.08	9.79
1000	2400.00	100yrARI	161.09	252.17	254.01	253.32	254.20	0.001763	1.93	83.50	51.01	0.48	27.98	53.97	8.76	8.67
1000	2300.00	100yrARI	161.09	251.97	253.83	253.12	254.02	0.001671	1.90	84.99	51.19	0.47	26.88	50.95	7.83	7.58
1000	2200.00	100yrARI	161.09	251.77	253.67	252.91	253.85	0.001551	1.85	87.08	51.43	0.45	25.44	47.06	6.46	6.52
1000	2100.00	100yrARI	161.09	251.57	253.53	252.71	253.69	0.001404	1.79	89.95	51.76	0.43	23.64	42.33	5.80	5.50
1000	2000.00	100yrARI	161.09	251.37	253.41	252.52	253.56	0.001234	1.72	93.84	52.21	0.41	21.48	36.87	4.73	4.85
1000	1900.00	100yrARI	161.09	251.17	253.30	252.32	253.43	0.001056	1.63	98.82	52.84	0.38	19.12	31.17	4.75	3.98
1000	1800.00	100yrARI	161.09	250.97	253.21	252.12	253.33	0.000886	1.54	104.71	53.50	0.35	16.77	25.80	4.28	3.32
1000	1700.00	100yrARI	161.09	250.76	253.08	251.91	253.19	0.000781	1.47	109.30	54.18	0.33	15.24	22.46	2.11	2.62
1000	1600.00	100yrARI	161.09	250.57	252.98	251.71	253.08	0.000692	1.42	113.59	54.44	0.31	13.96	19.79	2.70	2.50
1000	1500.00	100yrARI	161.09	250.17	252.94	251.31	253.01	0.000422	1.20	133.97	56.68	0.25	9.63	11.58	2.34	2.41
1000	1400.00	100yrARI	161.09	250.97	252.66	252.11	252.89	0.002334	2.11	76.23	50.17	0.55	34.40	72.69	2.62	2.68
1000	1300.00	100yrARI	161.09	249.96	251.93	251.11	252.09	0.001380	1.78	90.58	52.00	0.43	23.29	41.42	2.55	2.61
1000	1200.00	100yrARI	161.09	249.77	251.47	250.92	251.69	0.002314	2.11	76.44	50.19	0.55	34.19	72.05	2.38	2.27
1000	1100.00	100yrARI	161.09	249.57	251.20	250.72	251.45	0.002642	2.20	73.23	49.81	0.58	37.69	82.90	1.98	1.54
1000	1000.00	100yrARI	161.09	249.37	250.81	250.52	251.14	0.004006	2.52	64.01	48.67	0.70	51.17	128.78	1.35	1.05

S1D1 Plan: FINAL 5/07/2013



HEC-RAS Plan: Final River: S1D1 Reach: 1000 Profile: 1000yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
1000	11700.00	1000yrARI	23.30	295.15	296.51	296.51	296.92	0.010002	2.82	8.25	10.15	1.00	76.43	215.74	0.81	0.64
1000	11600.00	1000yrARI	23.30	294.00	295.30	295.36	295.77	0.012375	3.06	7.62	9.76	1.10	90.80	277.51	1.13	0.82
1000	11500.00	1000yrARI	23.30	292.92	294.36	294.28	294.69	0.007786	2.57	9.06	10.62	0.89	62.40	160.44	0.93	0.67
1000	11400.00	1000yrARI	23.30	292.13	293.57	293.49	293.91	0.007645	2.55	9.12	10.64	0.88	61.53	157.20	0.57	0.56
1000	11300.00	1000yrARI	23.30	291.34	292.77	292.70	293.11	0.007850	2.58	9.03	10.60	0.89	62.83	162.08	0.64	0.57
1000	11200.00	1000yrARI	23.30	290.56	292.00	291.92	292.33	0.007594	2.55	9.15	10.67	0.88	61.15	155.74	0.92	0.60
1000	11100.00	1000yrARI	23.30	289.77	291.20	291.13	291.54	0.007906	2.58	9.01	10.61	0.89	63.13	163.15	0.71	0.57
1000	11000.00	1000yrARI	23.30	288.98	290.34	290.34	290.74	0.009948	2.82	8.27	10.15	1.00	76.14	214.58	0.80	0.64
1000	10900.00	1000yrARI	23.30	288.07	288.78	288.83	289.15	0.012959	2.69	8.66	14.27	1.10	75.86	204.08	1.42	1.29
1000	10800.00	1000yrARI	23.30	287.17	287.84	287.93	288.27	0.016352	2.91	8.01	14.01	1.23	90.34	262.66	1.58	1.33
1000	10700.00	1000yrARI	23.30	286.26	286.93	287.02	287.36	0.015940	2.88	8.08	14.03	1.21	88.63	255.50	1.90	1.71
1000	10600.00	1000yrARI	23.30	285.35	286.97	286.10	287.02	0.000663	0.96	24.14	19.74	0.28	7.75	7.48	1.23	1.11
1000	10500.00	1000yrARI	23.30	284.44	286.97	285.19	286.98	0.000122	0.53	44.35	25.12	0.13	2.04	1.07	0.98	0.56
1000	10491	1000yrARI	23.30	284.35	286.96	285.10	286.97	0.000107	0.50	46.39	25.60	0.12	1.85	0.93	0.90	0.48
1000	10490		Culvert													
1000	10449	1000yrARI	23.30	283.98	284.74	284.74	285.06	0.010427	2.50	9.32	14.58	1.00	64.31	160.68	3.36	2.82
1000	10400.00	1000yrARI	23.30	283.53	284.12	284.29	284.71	0.026894	3.43	6.80	13.49	1.54	130.98	449.04	3.54	3.00
1000	10300.00	1000yrARI	23.30	282.63	283.34	283.39	283.71	0.012854	2.68	8.69	14.31	1.10	75.33	202.00	3.35	2.91
1000	10200.00	1000yrARI	23.30	281.73	282.40	282.49	282.83	0.015928	2.88	8.08	14.04	1.21	88.54	255.14	2.83	2.79
1000	10000.00	1000yrARI	33.43	279.91	280.91	280.86	281.25	0.008007	2.57	13.03	16.00	0.91	62.66	160.80	1.47	1.27
1000	9900.00	1000yrARI	33.43	279.11	280.11	280.05	280.45	0.007984	2.56	13.05	16.03	0.91	62.47	160.07	1.23	1.02
1000	9800.00	1000yrARI	33.43	278.31	279.31	279.25	279.65	0.007999	2.56	13.03	16.01	0.91	62.59	160.54	1.26	1.03
1000	9700.00	1000yrARI	33.43	277.51	278.51	278.46	278.85	0.008005	2.57	13.02	15.99	0.91	62.67	160.86	1.35	1.22
1000	9600.00	1000yrARI	33.43	276.71	277.72	277.66	278.05	0.007900	2.55	13.09	16.02	0.90	62.01	158.39	1.44	1.31
1000	9500.00	1000yrARI	33.43	275.92	276.92	276.87	277.26	0.007998	2.56	13.04	16.03	0.91	62.54	160.33	1.41	1.21
1000	9400.00	1000yrARI	33.43	275.12	276.12	276.06	276.46	0.007993	2.56	13.04	16.02	0.91	62.54	160.32	1.23	1.11
1000	9300.00	1000yrARI	33.43	274.32	275.32	275.26	275.66	0.007972	2.56	13.05	16.02	0.91	62.41	159.84	1.21	1.02
1000	9200.00	1000yrARI	33.43	273.52	274.58	274.47	274.87	0.006631	2.40	13.90	16.33	0.83	54.22	130.37	1.13	0.98
1000	9100.00	1000yrARI	33.43	272.72	274.38	273.67	274.47	0.001263	1.35	24.81	19.91	0.39	15.02	20.24	0.58	0.42
1000	9000.00	1000yrARI	93.05	271.93	273.66	273.66	274.30	0.008391	3.55	26.24	20.41	1.00	102.97	365.13	0.44	0.33
1000	8900.00	1000yrARI	93.05	271.41	272.84	272.38	273.02	0.002447	1.91	48.69	38.55	0.54	29.94	57.22	0.57	0.57
1000	8800.00	1000yrARI	93.05	270.74	272.11	271.70	272.31	0.002831	2.00	46.41	38.17	0.58	33.36	66.89	0.22	0.64
1000	8700.00	1000yrARI	93.05	270.25	271.41	271.21	271.70	0.004905	2.40	38.83	36.96	0.75	50.03	119.89	0.57	0.84
1000	8600.00	1000yrARI	93.05	269.76	270.91	270.72	271.21	0.004995	2.41	38.60	36.93	0.75	50.69	122.18	0.24	0.84
1000	8500.00	1000yrARI	93.05	269.26	270.41	270.22	270.71	0.005003	2.41	38.58	36.92	0.75	50.76	122.41	0.19	0.85
1000	8400.00	1000yrARI	93.05	268.76	269.91	269.72	270.21	0.005118	2.43	38.30	36.87	0.76	51.62	125.41	0.31	0.85
1000	8300.00	1000yrARI	93.05	268.24	269.41	269.20	269.70	0.004741	2.37	39.25	37.02	0.73	48.80	115.69	0.44	0.83
1000	8200.00	1000yrARI	93.05	267.74	269.00	268.70	269.25	0.003646	2.18	42.74	37.59	0.65	40.21	87.54	0.61	0.74
1000	8100.00	1000yrARI	93.05	267.34	268.69	268.30	268.90	0.002946	2.03	45.81	38.08	0.59	34.37	69.81	0.61	0.65
1000	8000.00	1000yrARI	119.19	266.93	268.19	268.06	268.59	0.006048	2.80	42.58	37.55	0.84	66.54	186.25	0.93	0.79
1000	7900.00	1000yrARI	119.19	266.54	267.82	267.48	268.05	0.003331	2.13	55.98	47.66	0.63	38.03	80.97	0.97	0.71
1000	7800.00	1000yrARI	119.19	266.14	267.56	267.09	267.75	0.002307	1.89	62.97	48.54	0.53	29.08	55.04	1.13	0.88
1000	7700.00	1000yrARI	119.19	265.74	267.21	266.69	267.38	0.002111	1.84	64.80	48.76	0.51	27.24	50.11	1.15	0.99
1000	7600.00	1000yrARI	119.19	265.35	266.60	266.30	266.84	0.003579	2.18	54.71	47.50	0.65	40.08	87.32	1.46	1.23
1000	7500.00	1000yrARI	119.19	264.95	266.30	265.90	266.50	0.002762	2.01	59.44	48.09	0.58	33.17	66.52	1.50	1.26
1000	7400.00	1000yrARI	119.19	264.56	266.12	265.50	266.27	0.001695	1.71	69.56	49.35	0.46	23.19	39.74	1.25	1.23
1000	7300.00	1000yrARI	119.19	264.15	265.85	265.10	265.97	0.001271	1.56	76.64	50.67	0.40	18.66	29.02	1.12	0.91
1000	7200.00	1000yrARI	119.19	263.77	265.71	264.71	265.81	0.000791	1.34	89.12	51.67	0.33	13.22	17.67	0.72	0.40
1000	7100.00	1000yrARI	119.19	263.37	265.67	264.31	265.73	0.000443	1.11	107.82	53.81	0.25	8.59	9.50	0.34	0.02
1000	7000.00	1000yrARI	327.66	262.97	264.89	264.78	265.60	0.006201	3.72	88.08	51.59	0.91	102.59	381.63	0.93	0.85
1000	6900.00	1000yrARI	327.66	262.29	264.22	264.11	264.92	0.006203	3.72	88.06	51.57	0.91	102.63	381.87	1.18	1.10
1000	6800.00	1000yrARI	327.66	261.61	263.78	263.43	264.32	0.004148	3.26	100.50	53.00	0.76	76.13	248.19	1.09	0.97
1000	6700.00	1000yrARI	327.66	260.94	263.50	262.76	263.87	0.002314	2.69	121.94	55.38	0.58	49.22	132.26	1.05	0.81
1000	6600.00	1000yrARI	327.66	260.57	263.25	262.38	263.58	0.001957	2.54	128.94	56.11	0.54	43.41	110.33	1.27	1.12
1000	6500.00	1000yrARI	327.66	260.37	263.04	262.17	263.39	0.001964	2.59	126.47	52.60	0.53	44.73	115.89	2.47	2.38
1000	6400.00	1000yrARI	327.66	260.17	262.86	261.98	263.18	0.001945	2.54	129.23	56.18	0.53	43.20	109.52	2.99	4.03
1000	6300.00	1000yrARI	327.66	259.97	262.66	261.78	262.99	0.001928	2.53	129.59	56.19	0.53	42.93	108.53	3.93	3.98
1000	6200.00	1000yrARI	327.66	259.77	262.47	261.58	262.80	0.001908	2.52	130.05	56.25	0.53	42.59	107.30	6.01	5.59
1000	6100.00	1000yrARI	327.66	259.57	262.28	261.38	262.60	0.001884	2.51	130.58	56.30	0.53	42.20	105.89	7.91	7.66
1000	6000.00	1000yrARI	335.52	259.37	262.07	261.20	262.41	0.001999	2.58	130.06	56.23	0.54	44.64	115.17	9.26	9.63
1000	5900.00	1000yrARI	335.52	259.17	261.87	261.01	262.21	0.001999	2.58	130.05	56.22	0.54	44.65	115.18	10.82	10.48
1000	5700.00	1000yrARI	335.52	258.77	261.47	260.61	261.81	0.001999	2.58	130.05	56.22	0.54	44.65	115.18	15.17	13.21

HEC-RAS Plan: Final River: S1D1 Reach: 1000 Profile: 1000yrARI (Continued)

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
1000	5600.00	1000yrARI	335.52	258.57	261.27	260.41	261.61	0.001998	2.58	130.08	56.24	0.54	44.63	115.12	16.44	14.62
1000	5500.00	1000yrARI	335.52	258.37	261.07	260.21	261.41	0.002000	2.58	130.04	56.22	0.54	44.66	115.22	17.69	16.06
1000	5400.00	1000yrARI	335.52	258.17	260.87	260.01	261.21	0.001999	2.58	130.06	56.23	0.54	44.64	115.15	19.62	17.83
1000	5300.00	1000yrARI	335.52	257.97	260.67	259.81	261.01	0.001999	2.58	130.05	56.23	0.54	44.65	115.19	21.14	19.67
1000	5200.00	1000yrARI	335.52	257.77	260.47	259.61	260.81	0.001999	2.58	130.05	56.23	0.54	44.65	115.18	23.48	21.06
1000	5100.00	1000yrARI	335.52	257.57	260.27	259.41	260.61	0.001999	2.58	130.06	56.22	0.54	44.64	115.17	25.54	22.89
1000	5000.00	1000yrARI	335.52	257.37	260.07	259.21	260.41	0.001998	2.58	130.08	56.23	0.54	44.63	115.11	27.21	24.49
1000	4900.00	1000yrARI	335.52	257.17	259.87	259.01	260.21	0.001997	2.58	130.10	56.24	0.54	44.61	115.05	28.72	26.60
1000	4800.00	1000yrARI	335.52	256.97	259.67	258.80	260.01	0.001997	2.58	130.08	56.22	0.54	44.62	115.10	29.81	28.38
1000	4700.00	1000yrARI	335.52	256.77	259.47	258.61	259.81	0.001997	2.58	130.10	56.23	0.54	44.61	115.04	31.88	29.76
1000	4600.00	1000yrARI	335.52	256.57	259.27	258.41	259.61	0.001995	2.58	130.13	56.24	0.54	44.59	114.96	32.52	31.07
1000	4500.00	1000yrARI	335.52	256.37	259.08	258.21	259.41	0.001992	2.58	130.21	56.24	0.54	44.53	114.74	32.95	30.98
1000	4400.00	1000yrARI	335.52	256.17	258.88	258.00	259.21	0.001991	2.58	130.22	56.24	0.54	44.52	114.71	33.08	30.21
1000	4300.00	1000yrARI	335.52	255.97	258.68	257.81	259.01	0.001991	2.58	130.23	56.24	0.54	44.51	114.68	32.71	30.58
1000	4200.00	1000yrARI	335.52	255.77	258.48	257.61	258.82	0.001987	2.57	130.30	56.25	0.54	44.45	114.46	31.99	30.71
1000	4100.00	1000yrARI	335.52	255.57	258.28	257.40	258.62	0.001984	2.57	130.38	56.26	0.54	44.39	114.23	29.73	29.96
1000	4000.00	1000yrARI	335.52	255.37	258.08	257.21	258.42	0.001979	2.57	130.48	56.26	0.54	44.32	113.96	28.68	28.91
1000	3900.00	1000yrARI	335.52	255.17	257.88	257.01	258.22	0.001973	2.57	130.62	56.28	0.54	44.21	113.57	27.54	28.00
1000	3800.00	1000yrARI	335.52	254.97	257.69	256.80	258.02	0.001965	2.57	130.80	56.30	0.54	44.07	113.04	27.13	26.30
1000	3700.00	1000yrARI	335.52	254.77	257.49	256.61	257.82	0.001953	2.56	131.06	56.34	0.54	43.88	112.32	26.77	24.63
1000	3600.00	1000yrARI	335.52	254.57	257.30	256.41	257.63	0.001941	2.55	131.34	56.36	0.53	43.67	111.55	25.49	23.31
1000	3500.00	1000yrARI	335.52	254.37	257.10	256.21	257.43	0.001924	2.55	131.73	56.40	0.53	43.38	110.48	24.22	22.43
1000	3400.00	1000yrARI	335.52	254.17	256.91	256.00	257.24	0.001901	2.54	132.25	56.46	0.53	43.00	109.09	22.94	21.13
1000	3300.00	1000yrARI	335.52	253.97	256.72	255.81	257.05	0.001867	2.52	133.09	56.59	0.52	42.40	106.89	21.57	20.52
1000	3200.00	1000yrARI	335.52	253.77	256.54	255.61	256.86	0.001838	2.51	133.74	56.61	0.52	41.93	105.18	19.86	18.76
1000	3100.00	1000yrARI	335.52	253.57	256.36	255.41	256.67	0.001796	2.49	134.79	56.72	0.52	41.19	102.54	17.78	17.58
1000	3000.00	1000yrARI	335.52	253.37	256.14	255.20	256.46	0.001797	2.48	135.24	57.24	0.52	40.99	101.70	16.20	15.64
1000	2900.00	1000yrARI	335.52	253.17	255.91	255.01	256.24	0.001897	2.54	132.35	56.47	0.53	42.92	108.80	14.49	14.42
1000	2800.00	1000yrARI	335.52	252.97	255.73	254.81	256.05	0.001871	2.52	132.97	56.53	0.53	42.48	107.18	12.95	12.95
1000	2700.00	1000yrARI	335.52	252.77	255.54	254.61	255.86	0.001836	2.51	133.80	56.61	0.52	41.88	105.03	11.70	11.62
1000	2600.00	1000yrARI	335.52	252.57	255.36	254.41	255.67	0.001793	2.49	134.88	56.74	0.51	41.14	102.32	10.52	10.02
1000	2500.00	1000yrARI	335.52	252.37	255.18	254.21	255.49	0.001740	2.46	136.23	56.88	0.51	40.22	99.06	9.08	8.79
1000	2400.00	1000yrARI	335.52	252.17	255.01	254.01	255.31	0.001677	2.43	137.92	57.05	0.50	39.13	95.18	7.76	7.67
1000	2300.00	1000yrARI	335.52	251.97	254.85	253.81	255.14	0.001604	2.40	140.02	57.28	0.49	37.82	90.63	6.81	6.56
1000	2200.00	1000yrARI	335.52	251.77	254.69	253.60	254.98	0.001517	2.35	142.64	57.55	0.48	36.28	85.34	5.44	5.50
1000	2100.00	1000yrARI	335.52	251.57	254.55	253.41	254.82	0.001416	2.30	145.98	57.88	0.46	34.44	79.17	4.78	4.48
1000	2000.00	1000yrARI	335.52	251.37	254.42	253.20	254.68	0.001304	2.24	150.11	58.32	0.44	32.36	72.32	3.72	3.84
1000	1900.00	1000yrARI	335.52	251.17	254.31	253.01	254.55	0.001183	2.16	155.18	58.89	0.43	30.04	64.96	3.74	2.97
1000	1800.00	1000yrARI	335.52	250.97	254.20	252.80	254.42	0.001063	2.09	160.86	59.47	0.40	27.72	57.81	3.29	2.33
1000	1700.00	1000yrARI	335.52	250.76	254.06	252.59	254.27	0.000983	2.03	165.38	60.10	0.39	26.07	52.90	1.13	1.64
1000	1600.00	1000yrARI	335.52	250.57	253.94	252.41	254.14	0.000922	1.99	168.79	60.23	0.38	24.88	49.47	1.74	1.54
1000	1500.00	1000yrARI	335.52	250.17	253.89	252.01	254.05	0.000646	1.76	190.52	62.39	0.32	18.99	33.44	1.39	1.46
1000	1400.00	1000yrARI	335.52	250.97	253.48	252.81	253.89	0.002576	2.81	119.52	55.11	0.61	53.99	151.55	1.80	1.86
1000	1300.00	1000yrARI	335.52	249.96	252.79	251.80	253.09	0.001706	2.44	137.31	57.15	0.50	39.55	96.65	1.69	1.75
1000	1200.00	1000yrARI	335.52	249.77	252.31	251.61	252.70	0.002479	2.77	121.05	55.26	0.60	52.47	145.43	1.54	1.43
1000	1100.00	1000yrARI	335.52	249.57	252.02	251.41	252.44	0.002823	2.89	115.93	54.71	0.63	57.83	167.37	1.16	0.72
1000	1000.00	1000yrARI	335.52	249.37	251.58	251.21	252.12	0.004004	3.25	103.26	53.29	0.75	75.07	243.93	0.58	0.28

HEC-RAS MODELLING RESULTS FOR DIVERSION DRAIN 2

- 100 Year ARI longsection
- 100 Year ARI Table of Results
- 1000 Year longsection
- 1000 Year ARI Table of Results

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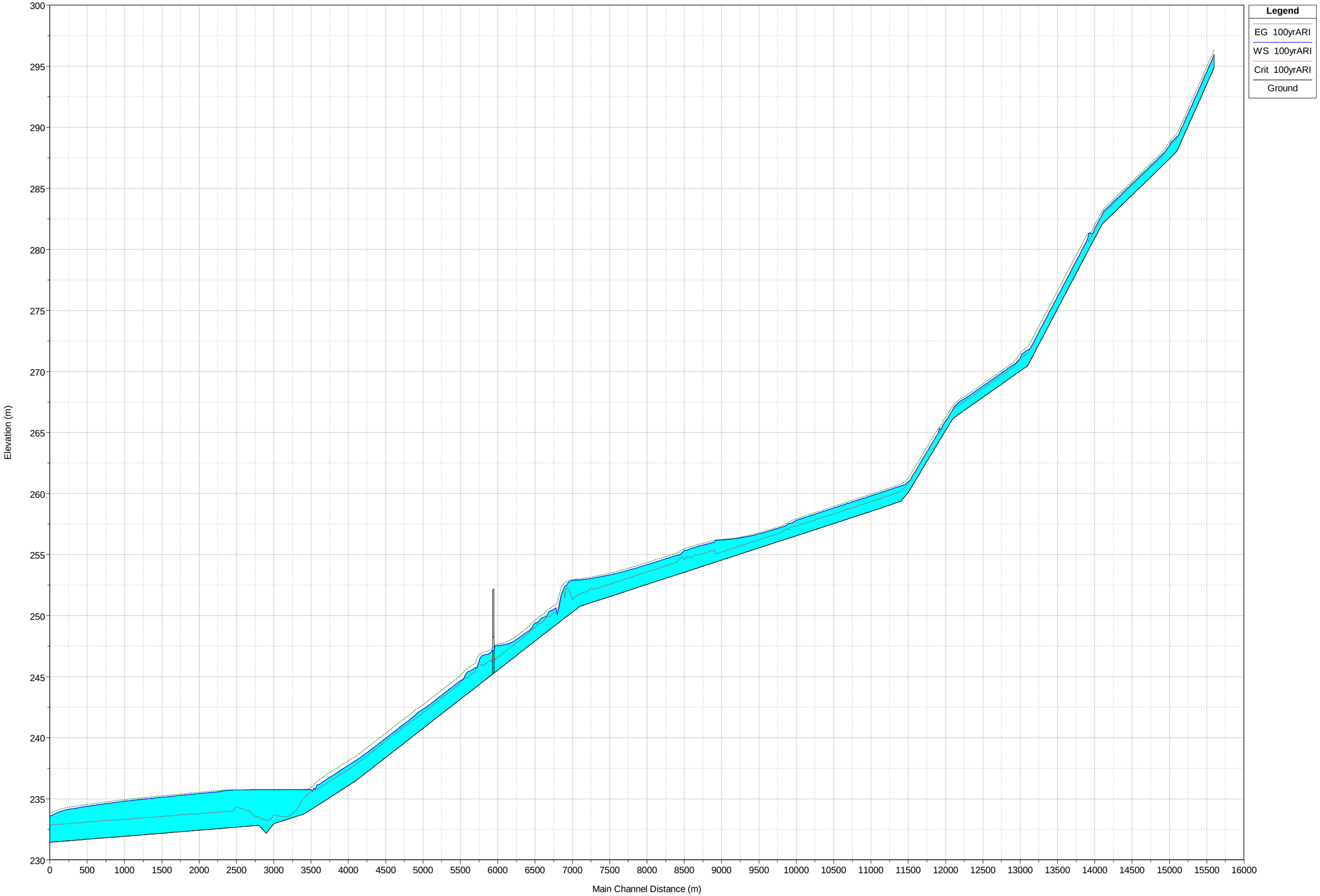

HEC-RAS Plan: Plan 02 River: S1D2 Reach: 100 Profile: 100yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	15700.00	100yrARI	14.22	294.91	295.92	295.98	296.32	0.013750	2.80	5.08	8.07	1.12	81.63	-374.88	0.99	0.95
100	15600.00	100yrARI	14.22	293.54	294.55	294.61	294.95	0.013896	2.81	5.07	8.06	1.13	82.32	-397.39	0.98	0.93
100	15500.00	100yrARI	14.22	292.16	293.17	293.23	293.57	0.013997	2.82	5.05	8.03	1.13	82.93	-395.48	0.99	0.92
100	15400.00	100yrARI	14.22	290.79	291.80	291.86	292.20	0.013942	2.81	5.06	8.05	1.13	82.56	-402.17	0.99	0.97
100	15300.00	100yrARI	14.22	289.42	290.43	290.49	290.83	0.013877	2.81	5.07	8.07	1.13	82.20	-419.89	0.98	1.11
100	15200.00	100yrARI	14.22	288.04	289.25	289.11	289.47	0.006298	2.09	6.79	9.24	0.78	43.52	-421.80	0.83	1.12
100	15100.00	100yrARI	14.22	287.41	288.51	288.48	288.81	0.009470	2.44	5.84	8.61	0.94	60.46	-423.71	0.90	0.95
100	15000.00	100yrARI	14.22	286.82	287.75	287.61	287.94	0.005966	1.96	7.25	10.60	0.76	38.91	-428.98	1.07	1.17
100	14900.00	100yrARI	14.22	286.22	287.15	287.01	287.35	0.005905	1.96	7.27	10.58	0.75	38.67	-453.41	1.09	1.34
100	14800.00	100yrARI	14.22	285.63	286.56	286.43	286.76	0.005905	1.96	7.27	10.59	0.75	38.64	-478.31	1.28	1.55
100	14700.00	100yrARI	14.22	285.04	285.97	285.83	286.17	0.005905	1.96	7.27	10.61	0.75	38.61	-502.72	1.47	1.73
100	14600.00	100yrARI	14.22	284.45	285.38	285.24	285.58	0.005981	1.96	7.24	10.59	0.76	39.00	-527.13	1.56	1.82
100	14500.00	100yrARI	14.22	283.85	284.78	284.64	284.98	0.005897	1.96	7.27	10.58	0.75	38.64	-519.95	1.69	2.03
100	14400.00	100yrARI	14.22	283.26	284.19	284.05	284.39	0.005919	1.96	7.26	10.57	0.75	38.75	-501.28	1.61	2.02
100	14300.00	100yrARI	14.22	282.67	283.60	283.46	283.80	0.005945	1.96	7.26	10.61	0.76	38.79	-483.09	1.33	1.74
100	14200.00	100yrARI	14.22	282.07	282.87	282.86	283.17	0.010430	2.40	5.93	9.79	0.98	60.41	-481.17	1.20	1.36
100	14100.00	100yrARI	14.22	280.94	281.73	281.73	282.03	0.011054	2.44	5.82	9.73	1.01	63.16	-484.52	1.21	1.28
100	14000.00	100yrARI	39.86	279.78	280.83	280.83	281.25	0.009444	2.87	13.90	16.35	0.99	77.12	-501.28	0.79	0.97
100	13900.00	100yrARI	39.86	278.61	279.61	279.66	280.09	0.011571	3.08	12.95	15.97	1.09	90.20	-597.52	1.00	0.88
100	13800.00	100yrARI	39.86	277.45	278.46	278.50	278.93	0.011227	3.04	13.10	16.05	1.08	88.05	-592.25	1.00	0.86
100	13700.00	100yrARI	39.86	276.28	277.28	277.33	277.76	0.011297	3.05	13.06	16.01	1.08	88.57	-594.64	1.00	1.08
100	13600.00	100yrARI	39.86	275.12	276.13	276.18	276.60	0.011042	3.03	13.16	16.04	1.07	87.05	-593.68	0.99	1.28
100	13500.00	100yrARI	39.86	273.96	274.96	275.01	275.44	0.011369	3.06	13.04	16.04	1.08	88.88	-584.59	0.99	1.23
100	13400.00	100yrARI	39.86	272.79	273.79	273.84	274.27	0.011570	3.08	12.95	15.97	1.09	90.21	-592.73	1.00	0.91
100	13300.00	100yrARI	39.86	271.63	272.63	272.68	273.11	0.011318	3.05	13.06	16.04	1.08	88.60	-602.30	1.00	0.84
100	13200.00	100yrARI	39.86	270.47	271.78	271.52	272.02	0.004336	2.19	18.20	17.84	0.69	42.37	-642.52	0.85	1.22
100	13100.00	100yrARI	39.86	270.04	271.10	271.09	271.51	0.009398	2.86	13.92	16.35	0.99	76.85	-749.77	1.95	2.40
100	13000.00	100yrARI	39.86	269.61	270.53	270.33	270.71	0.004380	1.91	20.84	25.51	0.68	34.68	-1077.25	2.91	3.51
100	12900.00	100yrARI	39.86	269.17	270.09	269.88	270.28	0.004300	1.90	20.95	25.51	0.67	34.23	-1134.23	3.10	3.77
100	12800.00	100yrARI	39.86	268.74	269.66	269.45	269.85	0.004300	1.90	20.95	25.51	0.67	34.24	-1116.51	3.10	3.61
100	12700.00	100yrARI	39.86	268.31	269.23	269.02	269.42	0.004298	1.90	20.96	25.52	0.67	34.22	-1043.73	2.76	3.39
100	12600.00	100yrARI	39.86	267.88	268.80	268.59	268.99	0.004295	1.90	20.96	25.52	0.67	34.20	-1003.05	2.57	3.11
100	12500.00	100yrARI	39.86	267.45	268.37	268.16	268.56	0.004278	1.90	20.99	25.53	0.67	34.09	-966.65	2.12	2.67
100	12400.00	100yrARI	39.86	267.02	267.95	267.73	268.13	0.004131	1.88	21.24	25.60	0.66	33.21	-915.90	1.79	2.23
100	12300.00	100yrARI	39.86	266.59	267.58	267.31	267.74	0.003368	1.76	22.71	25.96	0.60	28.55	-806.74	1.24	1.68
100	12200.00	100yrARI	39.86	266.15	266.90	266.87	267.19	0.008851	2.40	16.59	24.48	0.93	58.23	-774.18	1.25	1.45
100	12100.00	100yrARI	39.86	265.17	265.97	265.89	266.23	0.007158	2.24	17.76	24.78	0.85	49.81	-732.05	1.21	1.01
100	12000.00	100yrARI	69.78	264.16	264.95	264.95	265.33	0.010017	2.71	25.71	34.77	1.01	72.10	-906.32	1.21	0.55
100	11900.00	100yrARI	69.78	263.14	263.95	263.93	264.31	0.009543	2.67	26.11	34.84	0.99	69.61	-955.65	1.19	0.13
100	11800.00	100yrARI	69.78	262.12	262.91	262.91	263.29	0.010018	2.72	25.70	34.75	1.01	72.12	-961.87	1.21	0.48
100	11700.00	100yrARI	69.78	261.10	261.88	261.90	262.27	0.010706	2.77	25.17	34.65	1.04	75.69	-971.44	1.22	0.59
100	11600.00	100yrARI	69.78	260.08	260.97	260.88	261.26	0.006718	2.39	29.18	35.34	0.84	53.96	-987.24	1.11	0.98
100	11500.00	100yrARI	69.78	259.37	260.63	260.17	260.77	0.002083	1.64	42.53	37.55	0.49	22.88	-1029.86	0.74	1.13
100	11400.00	100yrARI	69.78	259.16	260.42	259.96	260.56	0.002068	1.64	42.63	37.58	0.49	22.76	-1107.42	1.88	1.51
100	11300.00	100yrARI	69.78	258.95	260.22	259.75	260.35	0.002045	1.63	42.78	37.59	0.49	22.58	-1288.39	2.60	2.54
100	11200.00	100yrARI	69.78	258.74	260.01	259.54	260.15	0.001999	1.62	43.10	37.64	0.48	22.20	-1500.97	3.98	3.48
100	11100.00	100yrARI	69.78	258.54	259.81	259.34	259.95	0.001999	1.62	43.10	37.65	0.48	22.19	-1757.60	5.64	4.95
100	11000.00	100yrARI	69.78	258.34	259.61	259.14	259.75	0.001999	1.62	43.10	37.65	0.48	22.20	-1980.70	7.09	6.38
100	10900.00	100yrARI	69.78	258.14	259.41	258.94	259.55	0.001999	1.62	43.10	37.65	0.48	22.20	-2247.86	8.47	7.68
100	10800.00	100yrARI	69.78	257.94	259.21	258.74	259.35	0.001998	1.62	43.11	37.67	0.48	22.19	-2311.54	9.55	8.91
100	10700.00	100yrARI	69.78	257.74	259.01	258.54	259.15	0.002001	1.62	43.08	37.63	0.48	22.22	-2524.61	10.77	10.00
100	10600.00	100yrARI	69.78	257.54	258.81	258.34	258.95	0.002002	1.62	43.08	37.64	0.48	22.22	-2653.39	11.77	10.94
100	10500.00	100yrARI	69.78	257.34	258.61	258.14	258.75	0.002002	1.62	43.07	37.63	0.48	22.23	-2762.55	12.80	11.98
100	10400.00	100yrARI	69.78	257.14	258.41	257.94	258.55	0.002006	1.62	43.05	37.63	0.48	22.26	-2875.54	13.83	12.95
100	10300.00	100yrARI	69.78	256.94	258.21	257.74	258.35	0.002012	1.62	43.00	37.63	0.48	22.31	-3034.02	14.77	13.88
100	10200.00	100yrARI	69.78	256.74	258.01	257.53	258.14	0.002025	1.63	42.91	37.61	0.49	22.42	-3149.41	15.66	14.71
100	10100.00	100yrARI	69.78	256.54	257.80	257.34	257.94	0.002057	1.63	42.69	37.57	0.49	22.68	-3293.52	16.57	15.52
100	10000.00	100yrARI	69.78	256.34	257.55	257.01	257.64	0.001378	1.32	52.72	47.26	0.40	14.95	-3571.70	16.99	15.96
100	9900.00	100yrARI	69.78	256.15	257.24	256.81	257.35	0.001940	1.48	47.29	46.57	0.47	19.17	-3561.64	17.24	16.64
100	9800.00	100yrARI	69.78	255.95	257.05	256.62	257.16	0.001890	1.46	47.68	46.61	0.46	18.81	-3258.57	15.10	15.93
100	9700.00	100yrARI	69.78	255.75	256.87	256.42	256.97	0.001799	1.44	48.43	46.70	0.45	18.15	-2686.91	11.09	11.66
100	9600.00	100yrARI	69.78	255.55	256.70	256.22	256.80	0.001652	1.40	49.76	46.88	0.43	17.06	-2332.62	8.44	9.96

HEC-RAS Plan: Plan 02 River: S1D2 Reach: 100 Profile: 100yrARI (Continued)

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	9500.00	100yrARI	69.78	255.35	256.54	256.02	256.64	0.001437	1.34	52.02	47.16	0.41	15.41	-2153.06	7.40	8.27
100	9400.00	100yrARI	69.78	255.15	256.42	255.82	256.50	0.001164	1.25	55.64	47.62	0.37	13.22	-2150.20	6.88	9.94
100	9300.00	100yrARI	69.78	254.95	256.32	255.62	256.39	0.000890	1.15	60.64	48.24	0.33	10.87	-2283.77	7.24	11.38
100	9200.00	100yrARI	69.78	254.75	256.25	255.42	256.31	0.000654	1.04	66.96	49.03	0.28	8.67	-2553.81	8.23	12.95
100	9100.00	100yrARI	69.78	254.55	256.20	255.21	256.25	0.000473	0.94	74.35	49.92	0.25	6.83	-2883.69	10.55	13.27
100	9000.00	100yrARI	134.63	254.35	256.02	255.37	256.18	0.001704	1.79	75.13	50.01	0.47	24.83	-2999.55	10.88	12.54
100	8900.00	100yrARI	134.63	254.15	255.86	255.17	256.01	0.001581	1.75	76.98	50.23	0.45	23.50	-2683.55	8.04	11.66
100	8800.00	100yrARI	134.63	253.95	255.71	254.97	255.86	0.001423	1.69	79.66	50.55	0.43	21.74	-3048.87	10.43	10.76
100	8700.00	100yrARI	134.63	253.75	255.53	254.77	255.68	0.001361	1.67	80.82	50.69	0.42	21.04	-2773.56	9.61	8.84
100	8600.00	100yrARI	134.63	253.55	255.34	254.58	255.48	0.001351	1.66	81.02	50.71	0.42	20.93	-2287.61	6.78	6.00
100	8500.00	100yrARI	134.63	253.36	254.96	254.38	255.14	0.001983	1.88	71.54	49.60	0.50	27.76	-1934.27	4.56	3.84
100	8400.00	100yrARI	134.63	253.16	254.76	254.19	254.94	0.001972	1.88	71.66	49.61	0.50	27.65	-1673.81	3.09	2.48
100	8300.00	100yrARI	134.63	252.96	254.56	253.98	254.74	0.001957	1.87	71.84	49.63	0.50	27.50	-1445.91	1.90	1.43
100	8200.00	100yrARI	134.63	252.76	254.37	253.78	254.55	0.001933	1.87	72.13	49.68	0.49	27.24	-1381.27	1.39	0.36
100	8100.00	100yrARI	134.63	252.56	254.18	253.58	254.35	0.001900	1.86	72.53	49.70	0.49	26.90	-1379.84	1.38	0.11
100	8000.00	100yrARI	134.63	252.36	253.99	253.38	254.16	0.001850	1.84	73.16	49.78	0.48	26.38	-1378.40	1.37	0.33
100	7900.00	100yrARI	134.63	252.16	253.81	253.18	253.98	0.001777	1.82	74.12	49.89	0.48	25.61	-1376.49	1.35	0.23
100	7800.00	100yrARI	134.63	251.96	253.64	252.98	253.80	0.001693	1.78	75.51	50.37	0.46	24.61	-1376.49	1.32	-0.02
100	7700.00	100yrARI	134.63	251.76	253.48	252.78	253.63	0.001529	1.72	78.05	50.20	0.44	22.83	-1384.15	1.28	-0.61
100	7600.00	100yrARI	134.63	251.56	253.34	252.58	253.48	0.001399	1.67	80.74	51.37	0.42	21.22	-1391.33	1.22	-0.26
100	7500.00	100yrARI	134.63	251.36	253.21	252.38	253.34	0.001194	1.60	84.34	51.10	0.40	19.11	-1398.99	1.15	0.49
100	7400.00	100yrARI	134.63	251.16	253.11	252.19	253.22	0.001002	1.51	89.31	51.67	0.37	16.78	-1406.17	1.05	1.23
100	7300.00	100yrARI	134.63	250.96	253.00	251.98	253.11	0.000858	1.43	94.01	52.26	0.34	14.94	-1504.32	1.61	1.67
100	7200.00	100yrARI	134.63	250.76	252.93	251.79	253.02	0.000693	1.34	100.84	53.04	0.31	12.75	-1812.18	2.79	2.36
100	7100.00	100yrARI	134.63	250.28	252.90	251.31	252.96	0.000362	1.08	125.08	55.72	0.23	7.85	-2170.78	3.78	3.14
100	7000.00	100yrARI	138.47	249.82	252.43	251.50	252.70	0.002262	2.30	60.13	31.42	0.53	38.84	-2133.92	4.93	0.82
100	6900.00	100yrARI	138.47	249.34	250.09	250.39	251.08	0.028569	4.43	31.27	44.65	1.69	195.18	-2562.90	8.58	9.61
100	6800.00	100yrARI	138.47	248.87	250.40	249.91	250.61	0.002435	2.03	68.16	49.16	0.55	32.78	-2708.45	8.90	10.19
100	6700.00	100yrARI	138.47	248.40	249.85	249.44	250.08	0.002930	2.16	64.22	48.70	0.60	37.53	-2833.89	9.29	10.80
100	6600.00	100yrARI	138.47	247.92	249.40	248.96	249.63	0.002707	2.10	65.94	49.02	0.58	35.36	-2561.95	9.47	10.96
100	6500.00	100yrARI	138.47	247.45	248.71	248.49	249.03	0.004710	2.51	55.15	47.55	0.74	53.11	-2516.46	9.69	11.03
100	6400.00	100yrARI	138.47	246.97	248.25	248.01	248.56	0.004429	2.46	56.24	47.69	0.72	50.78	-2692.18	9.90	11.34
100	6300.00	100yrARI	138.47	246.50	247.86	247.54	248.13	0.003659	2.32	59.80	48.15	0.66	44.16	-2693.13	10.02	11.41
100	6200.00	100yrARI	138.47	246.02	247.64	247.06	247.82	0.002015	1.91	72.48	49.71	0.51	28.51	-2695.52	9.65	11.12
100	6050		Culvert													
100	6000.00	100yrARI	191.95	245.06	246.95	246.35	247.20	0.002248	2.22	86.47	51.33	0.55	36.70	-2412.57	7.55	9.67
100	5900.00	100yrARI	191.95	244.59	246.76	245.90	246.97	0.001579	2.04	93.94	46.52	0.46	29.67	-2266.06	6.64	8.67
100	5800.00	100yrARI	191.95	244.10	245.77	245.39	246.10	0.003507	2.56	74.86	50.02	0.67	50.91	-2351.76	7.76	9.96
100	5700.00	100yrARI	191.95	243.63	245.42	244.92	245.71	0.002717	2.36	81.37	50.85	0.60	42.15	-2472.89	8.24	9.98
100	5600.00	100yrARI	191.95	243.16	244.68	244.44	245.09	0.004790	2.84	67.66	49.13	0.77	64.06	-2528.91	7.86	9.10
100	5500.00	100yrARI	191.95	242.68	244.20	243.97	244.61	0.004772	2.83	67.74	49.13	0.77	63.88	-2474.33	7.09	8.31
100	5400.00	100yrARI	191.95	242.20	243.73	243.48	244.13	0.004708	2.82	68.03	49.15	0.77	63.27	-2324.47	6.05	7.15
100	5300.00	100yrARI	191.95	241.73	243.25	243.01	243.66	0.004739	2.83	67.90	49.17	0.77	63.54	-2063.05	4.81	6.10
100	5200.00	100yrARI	191.95	241.25	242.78	242.53	243.18	0.004631	2.81	68.40	49.21	0.76	62.49	-1852.88	3.89	4.58
100	5100.00	100yrARI	191.95	240.77	242.34	242.06	242.72	0.004267	2.73	70.23	49.42	0.73	58.85	-1645.09	2.61	3.28
100	5000.00	100yrARI	202.74	240.30	241.87	241.63	242.29	0.004782	2.89	70.14	49.45	0.77	65.84	-1460.75	2.06	2.54
100	4900.00	100yrARI	202.74	239.82	241.39	241.15	241.81	0.004767	2.89	70.19	49.42	0.77	65.72	-1387.99	2.00	2.81
100	4800.00	100yrARI	202.74	239.34	240.92	240.68	241.34	0.004718	2.88	70.42	49.43	0.77	65.23	-1394.68	2.16	2.83
100	4700.00	100yrARI	202.74	238.87	240.44	240.20	240.86	0.004790	2.89	70.09	49.41	0.78	65.95	-1394.20	2.14	2.58
100	4600.00	100yrARI	202.74	238.39	239.96	239.72	240.38	0.004764	2.89	70.21	49.43	0.77	65.68	-1384.15	1.75	2.72
100	4500.00	100yrARI	202.74	237.91	239.49	239.24	239.91	0.004705	2.88	70.49	49.45	0.77	65.10	-1302.76	1.42	2.34
100	4400.00	100yrARI	202.74	237.44	239.02	238.77	239.44	0.004700	2.87	70.53	49.48	0.77	65.03	-1339.62	1.41	2.02
100	4300.00	100yrARI	202.74	236.96	238.56	238.29	238.97	0.004505	2.84	71.49	49.58	0.75	63.05	-1374.58	1.40	1.73
100	4200.00	100yrARI	202.74	236.48	238.14	237.81	238.52	0.003906	2.71	74.87	49.98	0.71	56.77	-1374.58	1.34	1.62
100	4100.00	100yrARI	202.74	236.09	237.75	237.42	238.13	0.003916	2.71	74.81	49.98	0.71	56.87	-1379.84	1.34	0.70
100	4000.00	100yrARI	202.74	235.70	237.36	237.03	237.73	0.003950	2.72	74.61	49.98	0.71	57.22	-3193.94	0.09	0.32
100	3900.00	100yrARI	202.74	235.30	236.96	236.63	237.34	0.003919	2.71	74.77	49.94	0.71	56.92	-1204.13	0.05	0.12
100	3800.00	100yrARI	202.74	234.91	236.56	236.24	236.94	0.003992	2.73	74.37	56.15	0.71	57.70	-2811.39	0.02	0.27
100	3700.00	100yrARI	202.74	234.52	236.18	235.85	236.51	0.003643	2.61	94.58	183.04	0.68	52.67	-2844.90	-0.12	0.03
100	3600.00	100yrARI	202.74	234.13	235.75	235.60	235.89	0.002097	1.93	183.80	340.20	0.51	29.23	-5124.85	-0.27	-0.29
100	3500.00	100yrARI	202.74	233.75	235.76	235.04	235.77	0.000226	0.75	493.16	457.38	0.18	4.06	-10489.08	-0.96	-0.91
100	3400.00	100yrARI	202.74	233.56	235.76	234.00	235.76	0.000023	0.26	1276.88	759.57	0.06	0.48	-13356.49	-1.59	-1.67

HEC-RAS Plan: Plan 02 River: S1D2 Reach: 100 Profile: 100yrARI (Continued)

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	3300.00	100yrARI	202.74	233.36	235.76	233.58	235.76	0.000022	0.28	1136.92	602.89	0.06	0.51	-15077.09	-1.67	-1.89
100	3200.00	100yrARI	202.74	233.16	235.75	233.52	235.76	0.000022	0.29	1113.97	565.40	0.06	0.54	-15369.24	-1.91	-2.17
100	3100.00	100yrARI	202.74	232.96	235.75	233.70	235.75	0.000017	0.26	1242.45	569.94	0.05	0.44	-16174.05	-2.19	-2.19
100	3000.00	100yrARI	210.06	232.18	235.75	233.28	235.75	0.000006	0.15	1426.90	590.79	0.03	0.14	-16978.43	-1.64	-3.52
100	2900.00	100yrARI	210.06	232.83	235.75	233.51	235.75	0.000010	0.18	1336.91	578.36	0.04	0.21	-16777.34	-1.98	-2.62
100	2800.00	100yrARI	210.06	232.78	235.75	233.85	235.75	0.000022	0.32	1160.45	560.93	0.06	0.61	-15771.43	-2.11	-2.22
100	2700.00	100yrARI	210.06	232.73	235.74	234.14	235.75	0.000036	0.40	963.56	552.26	0.08	1.00	-15610.47	-2.02	-2.03
100	2600.00	100yrARI	210.06	232.68	235.73	234.30	235.74	0.000066	0.53	719.64	463.59	0.10	1.78	-13035.70	-1.48	-1.36
100	2500.00	100yrARI	210.06	232.63	235.71	233.99	235.73	0.000146	0.78	471.60	371.76	0.15	3.83	-10489.08	-1.15	-1.03
100	2400.00	100yrARI	210.06	232.58	235.62	233.94	235.70	0.000444	1.29	217.63	251.16	0.26	10.79	-8048.27	-0.45	-0.11
100	2300.00	100yrARI	210.06	232.53	235.54	233.90	235.65	0.000536	1.42	147.73	58.08	0.28	13.15	-6053.21	0.16	0.39
100	2200.00	100yrARI	210.06	232.48	235.49	233.84	235.59	0.000539	1.42	147.45	58.03	0.29	13.20	-4170.16	0.80	1.07
100	2100.00	100yrARI	210.06	232.43	235.44	233.79	235.54	0.000535	1.42	148.11	58.36	0.28	13.09	-2473.85	1.65	2.17
100	2000.00	100yrARI	215.90	232.38	235.37	233.77	235.48	0.000579	1.47	146.58	57.94	0.30	14.13	-2886.56	3.10	3.34
100	1900.00	100yrARI	215.90	232.33	235.31	233.72	235.43	0.000585	1.48	146.08	57.91	0.30	14.24	-2107.59	4.40	5.07
100	1800.00	100yrARI	215.90	232.28	235.25	233.67	235.37	0.000592	1.48	145.53	57.85	0.30	14.36	-2320.17	6.22	7.02
100	1700.00	100yrARI	215.90	232.23	235.19	233.61	235.31	0.000600	1.49	144.88	57.77	0.30	14.50	-2563.38	7.97	8.82
100	1600.00	100yrARI	215.90	232.18	235.13	233.57	235.25	0.000608	1.50	144.22	57.70	0.30	14.65	-2722.81	9.15	9.73
100	1500.00	100yrARI	215.90	232.13	235.07	233.51	235.19	0.000617	1.50	143.53	57.64	0.30	14.81	-2829.11	9.77	9.97
100	1400.00	100yrARI	215.90	232.08	235.01	233.47	235.12	0.000627	1.51	142.77	57.56	0.31	14.99	-2896.13	9.83	10.08
100	1300.00	100yrARI	215.90	232.03	234.94	233.41	235.06	0.000637	1.52	141.93	57.46	0.31	15.19	-2936.35	10.21	10.16
100	1200.00	100yrARI	215.90	231.98	234.88	233.37	235.00	0.000651	1.53	140.94	57.36	0.31	15.43	-2949.28	10.23	10.02
100	1100.00	100yrARI	215.90	231.93	234.81	233.32	234.93	0.000665	1.54	139.96	57.26	0.31	15.68	-2910.97	9.91	9.52
100	1000.00	100yrARI	222.85	231.88	234.73	233.29	234.86	0.000733	1.61	138.33	57.08	0.33	17.14	-2843.95	9.20	8.77
100	900.00	100yrARI	222.85	231.84	234.65	233.26	234.79	0.000768	1.64	136.21	56.90	0.34	17.75	-2731.92	8.33	8.21
100	800.00	100yrARI	222.85	231.79	234.57	233.21	234.71	0.000801	1.66	134.33	56.68	0.34	18.32	-2567.22	7.28	7.09
100	700.00	100yrARI	222.85	231.74	234.48	233.15	234.63	0.000838	1.68	132.28	56.47	0.35	18.96	-2337.40	5.67	5.55
100	600.00	100yrARI	222.85	231.69	234.39	233.10	234.54	0.000884	1.71	129.95	56.22	0.36	19.73	-2068.80	3.94	4.11
100	500.00	100yrARI	222.85	231.64	234.29	233.05	234.45	0.000940	1.75	127.31	55.94	0.37	20.66	-1812.18	2.64	2.76
100	400.00	100yrARI	222.85	231.59	234.19	233.01	234.35	0.001012	1.79	124.23	55.61	0.38	21.83	-1737.01	1.38	1.54
100	300.00	100yrARI	222.85	231.54	234.07	232.95	234.25	0.001106	1.85	120.59	55.22	0.40	23.35	-1595.76	1.47	1.46
100	200.00	100yrARI	222.85	231.49	233.87	232.91	234.07	0.001378	1.99	112.11	54.29	0.44	27.51	-1664.72	1.62	1.61
100	100.00	100yrARI	222.85	231.44	233.57	232.85	233.83	0.002002	2.25	99.11	52.86	0.52	36.34	-1637.91	1.86	1.87

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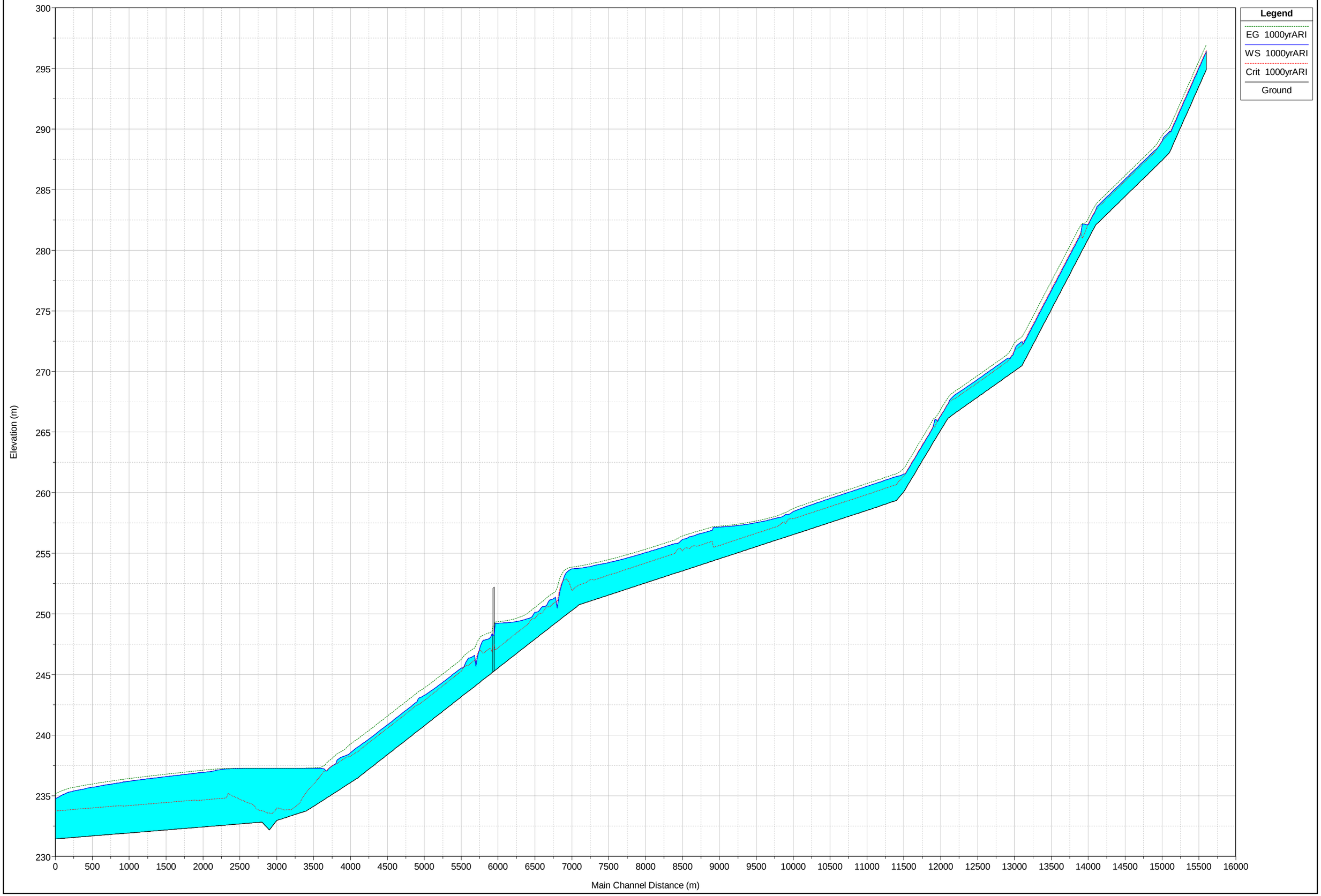

HEC-RAS Plan: Plan 02 River: S1D2 Reach: 100 Profile: 1000yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	15700.00	1000yrARI	32.34	294.91	296.37	296.49	296.98	0.013732	3.45	9.37	10.80	1.18	111.90	-374.88	0.54	0.50
100	15600.00	1000yrARI	32.34	293.54	295.02	295.12	295.61	0.013198	3.40	9.50	10.87	1.16	108.38	-397.39	0.51	0.46
100	15500.00	1000yrARI	32.34	292.16	293.63	293.75	294.23	0.013387	3.42	9.45	10.83	1.17	109.71	-395.48	0.53	0.46
100	15400.00	1000yrARI	32.34	290.79	292.26	292.38	292.86	0.013574	3.44	9.41	10.82	1.18	110.86	-402.17	0.53	0.51
100	15300.00	1000yrARI	32.34	289.42	290.89	291.00	291.49	0.013534	3.43	9.42	10.83	1.18	110.57	-419.89	0.52	0.65
100	15200.00	1000yrARI	32.34	288.04	289.78	289.62	290.12	0.006245	2.57	12.56	12.44	0.82	59.15	-421.80	0.30	0.59
100	15100.00	1000yrARI	32.34	287.41	289.00	288.99	289.46	0.009370	2.99	10.80	11.56	0.99	82.17	-423.71	0.41	0.46
100	15000.00	1000yrARI	32.34	286.82	288.24	288.08	288.55	0.005943	2.46	13.13	13.52	0.80	54.71	-428.98	0.58	0.68
100	14900.00	1000yrARI	32.34	286.22	287.64	287.48	287.95	0.005911	2.46	13.14	13.50	0.80	54.55	-453.41	0.60	0.85
100	14800.00	1000yrARI	32.34	285.63	287.05	286.89	287.36	0.005909	2.46	13.15	13.52	0.80	54.50	-478.31	0.79	1.06
100	14700.00	1000yrARI	32.34	285.04	286.46	286.30	286.77	0.005904	2.46	13.16	13.54	0.80	54.43	-502.72	0.98	1.24
100	14600.00	1000yrARI	32.34	284.45	285.87	285.71	286.18	0.005953	2.46	13.12	13.52	0.80	54.78	-527.13	1.07	1.33
100	14500.00	1000yrARI	32.34	283.85	285.27	285.10	285.58	0.005898	2.46	13.15	13.50	0.80	54.47	-519.95	1.20	1.54
100	14400.00	1000yrARI	32.34	283.26	284.68	284.52	284.99	0.005932	2.46	13.12	13.49	0.80	54.70	-501.28	1.12	1.53
100	14300.00	1000yrARI	32.34	282.67	284.09	283.92	284.40	0.005889	2.46	13.17	13.55	0.79	54.30	-483.09	0.84	1.25
100	14200.00	1000yrARI	32.34	282.07	283.33	283.33	283.77	0.009662	2.94	10.99	12.51	1.00	80.62	-481.17	0.74	0.90
100	14100.00	1000yrARI	32.34	280.94	282.13	282.20	282.64	0.011853	3.17	10.21	12.13	1.10	94.78	-484.52	0.81	0.88
100	14000.00	1000yrARI	89.12	279.78	281.46	281.46	282.09	0.008554	3.53	25.26	20.08	1.00	102.73	-501.28	0.16	0.34
100	13900.00	1000yrARI	89.12	278.61	280.17	280.30	280.94	0.011415	3.91	22.80	19.31	1.15	128.76	-597.52	0.44	0.32
100	13800.00	1000yrARI	89.12	277.45	279.01	279.13	279.78	0.011377	3.90	22.83	19.34	1.15	128.35	-592.25	0.45	0.31
100	13700.00	1000yrARI	89.12	276.28	277.84	277.96	278.61	0.011231	3.89	22.93	19.36	1.14	127.11	-594.64	0.44	0.52
100	13600.00	1000yrARI	89.12	275.12	276.68	276.81	277.45	0.011277	3.89	22.89	19.34	1.14	127.54	-593.68	0.44	0.73
100	13500.00	1000yrARI	89.12	273.96	275.51	275.64	276.29	0.011382	3.90	22.83	19.35	1.15	128.36	-584.59	0.44	0.68
100	13400.00	1000yrARI	89.12	272.79	274.35	274.47	275.12	0.011179	3.88	22.96	19.37	1.14	126.68	-592.73	0.44	0.35
100	13300.00	1000yrARI	89.12	271.63	273.18	273.31	273.96	0.011540	3.92	22.72	19.32	1.15	129.74	-602.30	0.45	0.29
100	13200.00	1000yrARI	89.12	270.47	272.47	272.15	272.86	0.004411	2.79	31.98	22.00	0.74	61.09	-642.52	0.16	0.53
100	13100.00	1000yrARI	89.12	270.04	271.73	271.73	272.35	0.008385	3.50	25.44	20.13	1.00	101.13	-749.77	1.32	1.77
100	13000.00	1000yrARI	89.12	269.61	271.07	270.80	271.39	0.004359	2.51	35.55	28.76	0.72	51.98	-1077.25	2.37	2.97
100	12900.00	1000yrARI	89.12	269.17	270.63	270.35	270.95	0.004299	2.50	35.70	28.77	0.72	51.47	-1134.23	2.56	3.23
100	12800.00	1000yrARI	89.12	268.74	270.20	269.92	270.52	0.004300	2.50	35.69	28.76	0.72	51.48	-1116.51	2.56	3.07
100	12700.00	1000yrARI	89.12	268.31	269.77	269.50	270.09	0.004292	2.49	35.72	28.78	0.71	51.40	-1043.73	2.22	2.85
100	12600.00	1000yrARI	89.12	267.88	269.35	269.07	269.66	0.004279	2.49	35.76	28.79	0.71	51.28	-1003.05	2.02	2.56
100	12500.00	1000yrARI	89.12	267.45	268.92	268.64	269.23	0.004238	2.48	35.88	28.81	0.71	50.91	-966.65	1.57	2.12
100	12400.00	1000yrARI	89.12	267.02	268.50	268.21	268.81	0.004094	2.45	36.30	28.92	0.70	49.58	-915.90	1.24	1.68
100	12300.00	1000yrARI	89.12	266.59	268.12	267.78	268.40	0.003704	2.37	37.56	29.19	0.67	45.95	-806.74	0.70	1.14
100	12200.00	1000yrARI	89.12	266.15	267.35	267.34	267.86	0.008755	3.16	28.16	27.17	0.99	87.75	-774.18	0.80	1.00
100	12100.00	1000yrARI	89.12	265.17	266.31	266.36	266.89	0.010597	3.37	26.44	26.80	1.08	101.16	-732.05	0.87	0.67
100	12000.00	1000yrARI	151.11	264.16	265.47	265.47	266.06	0.008563	3.40	44.39	37.86	1.00	97.37	-906.32	0.69	0.03
100	11900.00	1000yrARI	151.11	263.14	264.39	264.44	265.04	0.010113	3.57	42.36	37.88	1.08	108.89	-955.65	0.75	-0.31
100	11800.00	1000yrARI	151.11	262.12	263.39	263.42	264.02	0.009435	3.53	42.78	36.95	1.05	105.43	-961.87	0.73	0.00
100	11700.00	1000yrARI	151.11	261.10	262.36	262.41	263.00	0.009627	3.54	42.72	37.58	1.06	106.17	-971.44	0.74	0.11
100	11600.00	1000yrARI	151.11	260.08	261.56	261.39	262.01	0.005631	2.97	50.88	38.84	0.83	71.45	-987.24	0.52	0.39
100	11500.00	1000yrARI	151.11	259.37	261.34	260.68	261.57	0.002068	2.13	70.86	41.83	0.52	33.84	-1029.86	0.03	0.42
100	11400.00	1000yrARI	151.11	259.16	261.14	260.47	261.37	0.002052	2.13	71.06	41.87	0.52	33.63	-1107.42	1.16	0.79
100	11300.00	1000yrARI	151.11	258.95	260.93	260.26	261.16	0.002033	2.12	71.28	41.90	0.52	33.40	-1288.39	1.89	1.83
100	11200.00	1000yrARI	151.11	258.74	260.73	260.05	260.96	0.002001	2.11	71.65	41.94	0.52	33.01	-1500.97	3.26	2.76
100	11100.00	1000yrARI	151.11	258.54	260.53	259.85	260.76	0.002001	2.11	71.66	41.96	0.52	33.01	-1757.60	4.92	4.23
100	11000.00	1000yrARI	151.11	258.34	260.33	259.65	260.56	0.002003	2.11	71.63	41.94	0.52	33.04	-1980.70	6.37	5.66
100	10900.00	1000yrARI	151.11	258.14	260.13	259.45	260.36	0.002006	2.11	71.59	41.94	0.52	33.07	-2247.86	7.75	6.96
100	10800.00	1000yrARI	151.11	257.94	259.93	259.25	260.16	0.002008	2.11	71.59	41.98	0.52	33.08	-2311.54	8.83	8.19
100	10700.00	1000yrARI	151.11	257.74	259.73	259.05	259.96	0.002018	2.11	71.46	41.92	0.52	33.21	-2524.61	10.05	9.28
100	10600.00	1000yrARI	151.11	257.54	259.52	258.85	259.75	0.002027	2.12	71.35	41.91	0.52	33.33	-2653.39	11.06	10.23
100	10500.00	1000yrARI	151.11	257.34	259.32	258.65	259.55	0.002043	2.12	71.16	41.88	0.52	33.53	-2762.55	12.09	11.27
100	10400.00	1000yrARI	151.11	257.14	259.11	258.45	259.34	0.002071	2.13	70.84	41.84	0.52	33.87	-2875.54	13.13	12.25
100	10300.00	1000yrARI	151.11	256.94	258.90	258.26	259.14	0.002116	2.15	70.33	41.76	0.53	34.42	-3034.02	14.08	13.19
100	10200.00	1000yrARI	151.11	256.74	258.68	258.05	258.92	0.002196	2.18	69.46	41.63	0.54	35.40	-3149.41	14.99	14.04
100	10100.00	1000yrARI	151.11	256.54	258.44	257.85	258.69	0.002352	2.23	67.89	41.41	0.55	37.26	-3293.52	15.93	14.88
100	10000.00	1000yrARI	151.11	256.34	258.22	257.45	258.38	0.001443	1.77	85.50	51.24	0.44	23.33	-3571.70	16.32	15.29
100	9900.00	1000yrARI	151.11	256.15	257.95	257.25	258.12	0.001661	1.85	81.68	50.81	0.47	25.89	-3561.64	16.53	15.93
100	9800.00	1000yrARI	151.11	255.95	257.79	257.05	257.96	0.001538	1.80	83.74	51.04	0.45	24.46	-3258.57	14.36	15.19
100	9700.00	1000yrARI	151.11	255.75	257.65	256.85	257.80	0.001381	1.74	86.74	51.39	0.43	22.59	-2686.91	10.31	10.88
100	9600.00	1000yrARI	151.11	255.55	257.53	256.66	257.67	0.001203	1.67	90.75	51.86	0.40	20.39	-2332.62	7.61	9.13

HEC-RAS Plan: Plan 02 River: S1D2 Reach: 100 Profile: 1000yrARI (Continued)

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	9500.00	1000yrARI	151.11	255.35	257.42	256.45	257.55	0.001022	1.58	95.74	52.43	0.37	18.06	-2153.06	6.52	7.39
100	9400.00	1000yrARI	151.11	255.15	257.34	256.25	257.45	0.000849	1.48	101.77	53.12	0.34	15.74	-2150.20	5.96	9.02
100	9300.00	1000yrARI	151.11	254.95	257.27	256.05	257.36	0.000695	1.39	108.71	53.89	0.31	13.56	-2283.77	6.29	10.43
100	9200.00	1000yrARI	151.11	254.75	257.21	255.85	257.30	0.000564	1.30	116.54	54.76	0.28	11.59	-2553.81	7.27	11.99
100	9100.00	1000yrARI	151.11	254.55	257.17	255.65	257.24	0.000455	1.21	125.12	55.68	0.26	9.88	-2883.69	9.58	12.30
100	9000.00	1000yrARI	280.08	254.35	256.89	255.99	257.17	0.001725	2.31	121.09	55.26	0.50	36.53	-2999.55	10.01	11.67
100	8900.00	1000yrARI	280.08	254.15	256.72	255.79	256.99	0.001652	2.28	122.86	55.45	0.49	35.36	-2683.55	7.18	10.80
100	8800.00	1000yrARI	280.08	253.95	256.56	255.59	256.82	0.001566	2.24	125.06	55.69	0.48	33.97	-3048.87	9.58	9.91
100	8700.00	1000yrARI	280.08	253.75	256.38	255.39	256.63	0.001545	2.23	125.61	55.73	0.47	33.64	-2773.56	8.76	7.99
100	8600.00	1000yrARI	280.08	253.55	256.17	255.20	256.42	0.001577	2.24	124.76	55.64	0.48	34.16	-2287.61	5.95	5.17
100	8500.00	1000yrARI	280.08	253.36	255.82	255.00	256.11	0.001947	2.41	116.34	54.76	0.53	39.98	-1934.27	3.70	2.98
100	8400.00	1000yrARI	280.08	253.16	255.62	254.80	255.92	0.001929	2.40	116.69	54.79	0.52	39.70	-1673.81	2.23	1.62
100	8300.00	1000yrARI	280.08	252.96	255.43	254.60	255.72	0.001906	2.39	117.14	54.82	0.52	39.36	-1445.91	1.03	0.56
100	8200.00	1000yrARI	280.08	252.76	255.24	254.40	255.53	0.001871	2.37	118.10	54.75	0.52	38.70	-1381.27	0.52	-0.51
100	8100.00	1000yrARI	280.08	252.56	255.06	254.20	255.34	0.001816	2.36	118.93	54.23	0.51	38.02	-1379.84	0.50	-0.77
100	8000.00	1000yrARI	280.08	252.36	254.88	254.00	255.16	0.001770	2.35	119.31	53.73	0.50	37.59	-1378.40	0.48	-0.56
100	7900.00	1000yrARI	280.08	252.16	254.70	253.80	254.98	0.001700	2.33	120.36	53.26	0.49	36.73	-1376.49	0.46	-0.66
100	7800.00	1000yrARI	280.08	251.96	254.53	253.60	254.80	0.001631	2.30	121.91	53.05	0.48	35.65	-1376.49	0.43	-0.91
100	7700.00	1000yrARI	280.08	251.76	254.38	253.39	254.64	0.001537	2.25	124.41	52.91	0.47	34.08	-1384.15	0.38	-1.51
100	7600.00	1000yrARI	280.08	251.56	254.24	253.21	254.48	0.001420	2.18	128.28	54.08	0.45	31.91	-1391.33	0.32	-1.16
100	7500.00	1000yrARI	280.08	251.36	254.11	253.00	254.34	0.001319	2.11	133.00	56.73	0.44	29.67	-1398.99	0.25	-0.41
100	7400.00	1000yrARI	280.08	251.16	253.99	252.80	254.20	0.001189	2.04	137.14	56.97	0.42	27.61	-1406.17	0.17	0.35
100	7300.00	1000yrARI	280.08	250.96	253.86	252.60	254.06	0.001090	1.98	141.22	57.43	0.40	25.86	-1504.32	0.75	0.81
100	7200.00	1000yrARI	280.08	250.76	253.77	252.40	253.95	0.000961	1.90	147.31	58.07	0.38	23.52	-1812.18	1.95	1.52
100	7100.00	1000yrARI	280.08	250.28	253.72	251.92	253.86	0.000597	1.62	173.03	60.67	0.31	16.41	-2170.78	2.96	2.32
100	7000.00	1000yrARI	290.77	249.82	253.13	252.83	253.61	0.005730	3.08	94.50	67.13	0.83	75.67	-2133.92	4.23	0.12
100	6900.00	1000yrARI	290.77	249.34	250.54	251.03	252.13	0.025139	5.59	51.98	47.36	1.70	268.41	-2562.90	8.13	9.16
100	6800.00	1000yrARI	290.77	248.87	251.15	250.55	251.53	0.002727	2.73	106.65	53.66	0.62	52.42	-2708.45	8.15	9.44
100	6700.00	1000yrARI	290.77	248.40	250.60	250.07	251.01	0.003066	2.83	102.60	53.21	0.65	57.21	-2833.89	8.54	10.05
100	6600.00	1000yrARI	290.77	247.92	250.14	249.60	250.54	0.002975	2.80	103.72	53.46	0.64	55.86	-2561.95	8.73	10.22
100	6500.00	1000yrARI	290.77	247.45	249.62	249.13	250.04	0.003225	2.88	100.90	53.01	0.67	59.40	-2516.46	8.78	10.12
100	6400.00	1000yrARI	290.77	246.97	249.43	248.65	249.75	0.002087	2.50	116.52	54.74	0.55	42.93	-2692.18	8.72	10.16
100	6300.00	1000yrARI	290.77	246.50	249.33	248.18	249.56	0.001285	2.12	137.01	56.95	0.44	29.83	-2693.13	8.55	9.94
100	6200.00	1000yrARI	290.77	246.02	249.27	247.70	249.43	0.000785	1.80	161.74	59.51	0.35	20.56	-2695.52	8.02	9.49
100	6050		Culvert													
100	6000.00	1000yrARI	415.43	245.06	248.11	247.16	248.50	0.002011	2.77	149.79	58.28	0.55	49.84	-2412.57	6.39	8.51
100	5900.00	1000yrARI	415.43	244.59	247.83	246.75	248.25	0.001932	2.85	145.52	49.73	0.53	51.53	-2266.06	5.57	7.60
100	5800.00	1000yrARI	415.43	244.10	245.71	246.21	247.42	0.018746	5.79	71.72	49.65	1.54	262.83	-2351.76	7.82	10.02
100	5700.00	1000yrARI	415.43	243.63	246.35	245.74	246.86	0.003007	3.17	130.96	56.40	0.66	67.42	-2472.89	7.31	9.05
100	5600.00	1000yrARI	415.43	243.16	245.54	245.26	246.24	0.004763	3.70	112.30	54.31	0.82	95.24	-2528.91	7.00	8.24
100	5500.00	1000yrARI	415.43	242.68	245.07	244.78	245.76	0.004728	3.69	112.58	54.33	0.82	94.72	-2474.33	6.22	7.44
100	5400.00	1000yrARI	415.43	242.20	244.60	244.30	245.28	0.004655	3.67	113.14	54.37	0.81	93.65	-2324.47	5.18	6.28
100	5300.00	1000yrARI	415.43	241.73	244.14	243.83	244.82	0.004592	3.65	113.67	54.46	0.81	92.67	-2063.05	3.92	5.21
100	5200.00	1000yrARI	415.43	241.25	243.69	243.35	244.35	0.004403	3.60	115.27	54.63	0.79	89.80	-1852.88	2.98	3.67
100	5100.00	1000yrARI	415.43	240.77	243.28	242.88	243.90	0.003946	3.48	119.54	55.09	0.75	82.75	-1645.09	1.67	2.34
100	5000.00	1000yrARI	439.37	240.30	242.76	242.48	243.48	0.004768	3.77	116.54	54.80	0.83	98.02	-1460.75	1.17	1.65
100	4900.00	1000yrARI	439.37	239.82	242.28	242.00	243.00	0.004756	3.77	116.61	54.77	0.82	97.87	-1387.99	1.11	1.92
100	4800.00	1000yrARI	439.37	239.34	241.81	241.52	242.53	0.004726	3.76	116.84	54.78	0.82	97.42	-1394.68	1.27	1.94
100	4700.00	1000yrARI	439.37	238.87	241.33	241.05	242.05	0.004768	3.77	116.51	54.75	0.83	98.06	-1394.20	1.25	1.69
100	4600.00	1000yrARI	439.37	238.39	240.85	240.57	241.57	0.004731	3.76	116.82	54.80	0.82	97.48	-1384.15	0.86	1.83
100	4500.00	1000yrARI	439.37	237.91	240.38	240.10	241.10	0.004674	3.75	117.27	54.83	0.82	96.62	-1302.76	0.53	1.45
100	4400.00	1000yrARI	439.37	237.44	239.92	239.62	240.63	0.004633	3.74	117.63	54.89	0.81	95.97	-1339.62	0.51	1.12
100	4300.00	1000yrARI	439.37	236.96	239.46	239.13	240.16	0.004479	3.69	118.94	55.01	0.80	93.59	-1374.58	0.50	0.83
100	4200.00	1000yrARI	439.37	236.48	239.04	238.66	239.70	0.004155	3.60	121.97	55.36	0.77	88.45	-1374.58	0.44	0.72
100	4100.00	1000yrARI	439.37	236.09	238.55	238.27	239.27	0.005097	3.76	116.90	58.01	0.85	99.21	-1379.84	0.54	-0.10
100	4000.00	1000yrARI	439.37	235.70	238.24	238.01	238.74	0.003467	3.25	163.87	141.72	0.71	72.51	-3193.94	-0.79	-0.56
100	3900.00	1000yrARI	439.37	235.30	237.65	237.62	238.38	0.005141	3.83	130.04	116.55	0.85	102.29	-1204.13	-0.64	-0.57
100	3800.00	1000yrARI	439.37	234.91	237.21	237.22	237.84	0.004723	3.67	156.09	169.23	0.82	93.94	-2811.39	-0.63	-0.38
100	3700.00	1000yrARI	439.37	234.52	237.27	236.68	237.37	0.000868	1.83	415.04	303.02	0.36	21.65	-2844.90	-1.21	-1.06
100	3600.00	1000yrARI	439.37	234.13	237.28	235.95	237.30	0.000228	1.03	707.59	347.19	0.19	6.55	-5124.85	-1.80	-1.82
100	3500.00	1000yrARI	439.37	233.75	237.28	235.30	237.29	0.000066	0.60	1192.87	464.33	0.11	2.16	-10489.08	-2.48	-2.43
100	3400.00	1000yrARI	439.37	233.56	237.28	234.33	237.28	0.000012	0.27	2570.39	808.01	0.05	0.43	-13356.49	-3.11	-3.19

HEC-RAS Plan: Plan 02 River: S1D2 Reach: 100 Profile: 1000yrARI (Continued)

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	3300.00	1000yrARI	439.37	233.36	237.28	233.86	237.28	0.000016	0.33	2092.56	623.44	0.05	0.60	-15077.09	-3.19	-3.41
100	3200.00	1000yrARI	439.37	233.16	237.27	233.82	237.28	0.000017	0.35	1977.81	571.01	0.05	0.66	-15369.24	-3.43	-3.69
100	3100.00	1000yrARI	439.37	232.96	237.27	233.99	237.28	0.000013	0.32	2168.74	587.82	0.05	0.56	-16174.05	-3.71	-3.71
100	3000.00	1000yrARI	455.20	232.18	237.27	233.58	237.27	0.000006	0.20	2328.74	593.62	0.03	0.21	-16978.43	-3.16	-5.04
100	2900.00	1000yrARI	455.20	232.83	237.27	233.77	237.27	0.000009	0.23	2227.71	589.42	0.04	0.31	-16777.34	-3.50	-4.14
100	2800.00	1000yrARI	455.20	232.78	237.27	234.17	237.27	0.000017	0.37	2018.62	566.56	0.06	0.73	-15771.43	-3.63	-3.74
100	2700.00	1000yrARI	455.20	232.73	237.27	234.44	237.27	0.000023	0.43	1869.82	625.84	0.07	1.00	-15610.47	-3.55	-3.56
100	2600.00	1000yrARI	455.20	232.68	237.26	234.70	237.27	0.000038	0.54	1495.34	544.19	0.08	1.57	-13035.70	-3.01	-2.89
100	2500.00	1000yrARI	455.20	232.63	237.25	234.99	237.26	0.000070	0.72	1123.56	476.54	0.11	2.87	-10489.08	-2.69	-2.57
100	2400.00	1000yrARI	455.20	232.58	237.21	234.81	237.25	0.000168	1.10	716.56	366.64	0.17	6.65	-8048.27	-2.04	-1.70
100	2300.00	1000yrARI	455.20	232.53	237.13	234.76	237.22	0.000320	1.46	467.03	271.80	0.24	11.97	-6053.21	-1.43	-1.20
100	2200.00	1000yrARI	455.20	232.48	237.01	234.71	237.17	0.000540	1.82	283.13	163.23	0.30	19.02	-4170.16	-0.72	-0.45
100	2100.00	1000yrARI	455.20	232.43	236.93	234.65	237.11	0.000594	1.88	242.21	67.38	0.32	20.50	-2473.85	0.16	0.68
100	2000.00	1000yrARI	467.60	232.38	236.86	234.65	237.05	0.000647	1.96	239.11	66.84	0.33	22.23	-2886.56	1.61	1.85
100	1900.00	1000yrARI	467.60	232.33	236.79	234.60	236.99	0.000656	1.96	238.02	66.74	0.33	22.45	-2107.59	2.92	3.59
100	1800.00	1000yrARI	467.60	232.28	236.72	234.55	236.92	0.000666	1.97	236.84	66.65	0.33	22.70	-2320.17	4.75	5.55
100	1700.00	1000yrARI	467.60	232.23	236.65	234.50	236.85	0.000677	1.99	235.50	66.54	0.34	23.00	-2563.38	6.51	7.36
100	1600.00	1000yrARI	467.60	232.18	236.58	234.45	236.78	0.000688	2.00	234.12	66.40	0.34	23.30	-2722.81	7.70	8.28
100	1500.00	1000yrARI	467.60	232.13	236.51	234.40	236.72	0.000700	2.01	232.71	66.27	0.34	23.61	-2829.11	8.33	8.53
100	1400.00	1000yrARI	467.60	232.08	236.44	234.35	236.64	0.000714	2.02	231.18	66.14	0.35	23.96	-2896.13	8.40	8.65
100	1300.00	1000yrARI	467.60	232.03	236.36	234.30	236.57	0.000729	2.04	229.50	65.99	0.35	24.35	-2936.35	8.79	8.74
100	1200.00	1000yrARI	467.60	231.98	236.28	234.25	236.50	0.000747	2.05	227.65	65.82	0.35	24.80	-2949.28	8.83	8.62
100	1100.00	1000yrARI	467.60	231.93	236.20	234.20	236.42	0.000765	2.07	225.75	65.65	0.36	25.26	-2910.97	8.52	8.13
100	1000.00	1000yrARI	482.45	231.88	236.10	234.19	236.34	0.000849	2.17	222.49	65.35	0.38	27.78	-2843.95	7.83	7.40
100	900.00	1000yrARI	482.45	231.84	236.01	234.15	236.26	0.000888	2.20	219.16	65.06	0.38	28.73	-2731.92	6.97	6.85
100	800.00	1000yrARI	482.45	231.79	235.91	234.10	236.17	0.000926	2.23	215.98	64.74	0.39	29.67	-2567.22	5.94	5.75
100	700.00	1000yrARI	482.45	231.74	235.81	234.05	236.07	0.000969	2.27	212.59	64.42	0.40	30.74	-2337.40	4.34	4.22
100	600.00	1000yrARI	482.45	231.69	235.70	234.00	235.97	0.001021	2.31	208.82	64.07	0.41	31.99	-2068.80	2.63	2.80
100	500.00	1000yrARI	482.45	231.64	235.59	233.95	235.87	0.001083	2.36	204.64	63.68	0.42	33.46	-1812.18	1.34	1.46
100	400.00	1000yrARI	482.45	231.59	235.46	233.90	235.76	0.001160	2.41	199.88	63.24	0.43	35.27	-1737.01	0.11	0.27
100	300.00	1000yrARI	482.45	231.54	235.32	233.85	235.64	0.001260	2.48	194.34	62.72	0.45	37.55	-1595.76	0.22	0.21
100	200.00	1000yrARI	482.45	231.49	235.08	233.80	235.44	0.001513	2.64	182.58	61.59	0.49	43.17	-1664.72	0.41	0.40
100	100.00	1000yrARI	482.45	231.44	234.76	233.75	235.19	0.002000	2.90	166.09	59.98	0.56	53.35	-1637.91	0.67	0.68

HEC-RAS MODELLING RESULTS FOR DIVERSION DRAIN 3

- 100 Year ARI longsection
- 100 Year ARI Table of Results
- 1000 Year longsection
- 1000 Year ARI Table of Results

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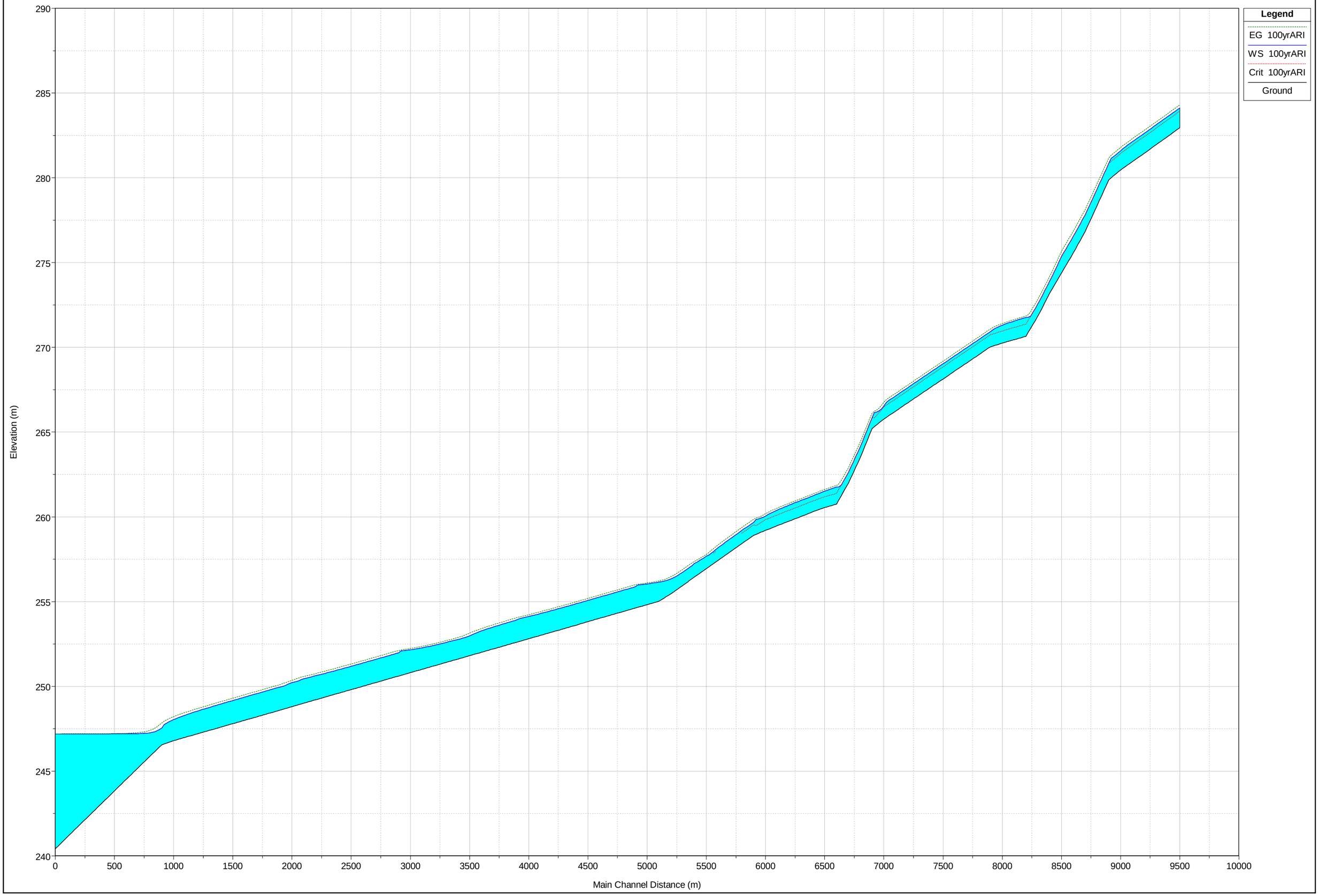

HEC-RAS Plan: Plan 01 River: S1D3 Reach: 100 Profile: 100yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	9600.00	100yrARI	11.91	282.95	284.12	283.93	284.30	0.005004	1.84	6.48	9.04	0.69	33.77	62.06	0.83	1.00
100	9500.00	100yrARI	11.91	282.45	283.63	283.43	283.80	0.004986	1.83	6.49	9.05	0.69	33.65	61.74	0.82	0.75
100	9400.00	100yrARI	11.91	281.95	283.13	282.94	283.30	0.004979	1.84	6.49	9.03	0.69	33.66	61.77	0.82	0.88
100	9300.00	100yrARI	11.91	281.45	282.63	282.43	282.80	0.004893	1.82	6.53	9.05	0.69	33.21	60.59	0.82	0.89
100	9200.00	100yrARI	11.91	280.96	282.14	281.94	282.31	0.004872	1.82	6.55	9.11	0.68	32.99	59.97	0.81	0.89
100	9100.00	100yrARI	11.91	280.46	281.60	281.44	281.79	0.005725	1.93	6.17	8.85	0.74	37.60	72.59	0.85	0.83
100	9000.00	100yrARI	11.91	279.88	280.86	280.86	281.17	0.010874	2.45	4.86	7.91	1.00	63.06	154.41	1.02	0.89
100	8900.00	100yrARI	11.91	278.35	279.33	279.33	279.64	0.010894	2.45	4.86	7.90	1.00	63.19	154.89	1.52	1.66
100	8800.00	100yrARI	11.91	276.82	277.80	277.80	278.11	0.010990	2.46	4.84	7.89	1.00	63.63	156.48	1.93	2.01
100	8700.00	100yrARI	11.91	275.56	276.54	276.54	276.85	0.010917	2.45	4.86	7.90	1.00	63.29	155.27	1.89	2.25
100	8600.00	100yrARI	11.91	274.38	275.37	275.37	275.67	0.010656	2.43	4.90	7.92	0.99	62.09	151.01	2.01	2.19
100	8500.00	100yrARI	11.91	273.19	273.91	273.91	274.18	0.010902	2.31	5.16	9.32	0.99	57.76	133.36	2.00	2.16
100	8400.00	100yrARI	11.91	271.82	272.54	272.54	272.81	0.011041	2.32	5.14	9.29	1.00	58.36	135.39	1.28	1.37
100	8300.00	100yrARI	11.91	270.65	271.77	271.37	271.85	0.002069	1.28	9.33	11.70	0.46	15.69	20.03	0.85	0.93
100	8200.00	100yrARI	11.91	270.45	271.55	271.17	271.64	0.002187	1.30	9.15	11.62	0.47	16.38	21.33	1.58	1.93
100	8100.00	100yrARI	11.91	270.25	271.30	270.96	271.40	0.002584	1.38	8.61	11.33	0.51	18.70	25.86	2.80	3.25
100	8000.00	100yrARI	11.91	270.03	270.93	270.74	271.08	0.004788	1.72	6.91	10.40	0.68	30.35	52.33	3.28	3.73
100	7900.00	100yrARI	11.91	269.55	270.45	270.26	270.60	0.004695	1.71	6.96	10.42	0.67	29.90	51.21	3.53	3.98
100	7800.00	100yrARI	11.91	269.08	269.98	269.80	270.13	0.004703	1.71	6.95	10.41	0.67	29.95	51.33	3.56	3.99
100	7700.00	100yrARI	11.91	268.61	269.51	269.33	269.66	0.004786	1.72	6.91	10.40	0.68	30.33	52.29	3.34	3.67
100	7600.00	100yrARI	11.91	268.13	269.03	268.85	269.18	0.004703	1.71	6.95	10.41	0.67	29.95	51.33	2.02	2.30
100	7500.00	100yrARI	11.91	267.66	268.56	268.38	268.71	0.004702	1.71	6.95	10.42	0.67	29.93	51.28	1.64	1.60
100	7400.00	100yrARI	11.91	267.19	268.09	267.91	268.24	0.004697	1.71	6.96	10.42	0.67	29.90	51.22	1.43	1.31
100	7300.00	100yrARI	11.91	266.72	267.62	267.44	267.77	0.004795	1.73	6.91	10.39	0.68	30.39	52.42	1.84	1.52
100	7200.00	100yrARI	11.91	266.24	267.14	266.95	267.29	0.004703	1.71	6.95	10.42	0.67	29.93	51.29	1.87	1.74
100	7100.00	100yrARI	11.91	265.77	266.52	266.49	266.77	0.009192	2.17	5.48	9.51	0.91	50.59	110.02	1.79	1.96
100	7000.00	100yrARI	17.64	265.20	265.84	265.84	266.11	0.010973	2.32	7.60	13.83	1.00	58.28	135.21	1.51	1.67
100	6900.00	100yrARI	17.64	263.49	264.13	264.13	264.40	0.011094	2.33	7.57	13.81	1.00	58.79	136.92	2.06	2.23
100	6800.00	100yrARI	17.64	261.99	262.63	262.63	262.90	0.010888	2.31	7.62	13.84	1.00	57.95	134.10	2.15	2.26
100	6700.00	100yrARI	17.64	260.75	261.76	261.39	261.85	0.002181	1.34	13.12	16.04	0.47	17.15	23.05	1.52	1.53
100	6600.00	100yrARI	17.64	260.55	261.51	261.18	261.62	0.002573	1.42	12.40	15.76	0.51	19.47	27.69	1.17	1.38
100	6500.00	100yrARI	17.64	260.30	261.24	260.94	261.35	0.002767	1.46	12.11	15.68	0.53	20.55	29.94	1.43	1.62
100	6400.00	100yrARI	17.64	260.02	260.97	260.66	261.08	0.002713	1.45	12.18	15.68	0.52	20.27	29.36	2.13	2.30
100	6300.00	100yrARI	17.64	259.75	260.69	260.38	260.80	0.002757	1.46	12.11	15.65	0.53	20.52	29.88	1.94	2.09
100	6200.00	100yrARI	17.64	259.48	260.41	260.11	260.52	0.002963	1.49	11.82	15.56	0.55	21.66	32.32	1.65	1.54
100	6100.00	100yrARI	17.64	259.20	260.04	259.84	260.19	0.004123	1.67	10.56	15.05	0.64	27.86	46.53	1.41	1.64
100	6000.00	100yrARI	24.32	258.91	259.69	259.53	259.85	0.004895	1.80	13.51	19.68	0.69	32.54	58.57	1.82	1.97
100	5900.00	100yrARI	24.32	258.42	259.20	259.04	259.36	0.004912	1.80	13.49	19.66	0.69	32.64	58.82	1.92	2.15
100	5800.00	100yrARI	24.32	257.93	258.70		258.87	0.005054	1.82	13.72	26.42	0.70	33.25	60.38	2.03	2.28
100	5700.00	100yrARI	24.32	257.43	258.18		258.35	0.005333	1.84	14.27	34.47	0.72	34.41	63.36	2.01	2.38
100	5600.00	100yrARI	24.32	256.94	257.68		257.79	0.003997	1.58	21.29	60.72	0.62	25.43	40.15	2.04	2.28
100	5500.00	100yrARI	24.32	256.45	257.25		257.37	0.003677	1.59	19.41	54.27	0.60	25.09	39.83	1.86	2.13
100	5400.00	100yrARI	24.32	255.95	256.74		256.90	0.004752	1.78	13.64	19.70	0.68	31.85	56.78	1.63	1.84
100	5300.00	100yrARI	24.32	255.46	256.34		256.46	0.003246	1.57	15.48	20.28	0.57	23.96	37.64	1.30	1.45
100	5200.00	100yrARI	24.32	255.02	256.16		256.22	0.001321	1.16	20.89	21.81	0.38	12.20	14.20	1.20	1.35
100	5100.00	100yrARI	24.32	254.82	256.05		256.10	0.001009	1.06	22.89	22.37	0.34	9.95	10.57	1.59	1.72
100	5000.00	100yrARI	35.85	254.62	255.88		255.99	0.002000	1.52	23.61	22.56	0.47	20.17	30.62	1.71	1.92
100	4900.00	100yrARI	35.85	254.42	255.68		255.79	0.002003	1.52	23.60	22.55	0.47	20.18	30.66	2.17	2.46
100	4800.00	100yrARI	35.85	254.22	255.48		255.59	0.002006	1.52	23.59	22.55	0.47	20.21	30.72	3.07	3.37
100	4700.00	100yrARI	35.85	254.02	255.27		255.39	0.002012	1.52	23.57	22.56	0.48	20.24	30.79	4.19	4.41
100	4600.00	100yrARI	35.85	253.82	255.07		255.19	0.002025	1.52	23.51	22.54	0.48	20.35	31.03	5.14	5.45
100	4500.00	100yrARI	35.85	253.61	254.87		254.99	0.001970	1.51	23.72	22.57	0.47	19.94	30.14	6.38	6.41
100	4400.00	100yrARI	35.85	253.41	254.68		254.79	0.001946	1.51	23.82	22.59	0.47	19.76	29.74	7.62	7.81
100	4300.00	100yrARI	35.85	253.21	254.49		254.60	0.001900	1.49	24.02	22.66	0.46	19.40	28.95	8.53	8.99
100	4200.00	100yrARI	35.85	253.01	254.30		254.41	0.001831	1.47	24.32	22.72	0.45	18.87	27.81	8.72	10.17
100	4100.00	100yrARI	35.85	252.81	254.12		254.23	0.001722	1.44	24.83	22.86	0.44	18.00	25.99	9.25	11.49
100	4000.00	100yrARI	39.32	252.61	253.93		254.05	0.002039	1.57	24.97	22.90	0.48	21.40	33.70	10.40	12.74
100	3900.00	100yrARI	39.32	252.41	253.72		253.85	0.002082	1.59	24.79	22.85	0.49	21.74	34.49	11.26	13.57
100	3800.00	100yrARI	39.32	252.21	253.50		253.64	0.002173	1.61	24.44	22.76	0.50	22.46	36.15	13.84	13.09
100	3700.00	100yrARI	39.32	252.01	253.27		253.41	0.002362	1.65	23.78	22.64	0.52	23.89	39.52	14.74	16.63
100	3600.00	100yrARI	39.32	251.81	252.98		253.15	0.003106	1.82	21.65	22.02	0.58	29.44	53.46	14.78	16.89
100	3500.00	100yrARI	39.32	251.61	252.77		252.88	0.001860	1.44	27.37	27.02	0.46	18.22	26.18	13.65	16.46

HEC-RAS Plan: Plan 01 River: S1D3 Reach: 100 Profile: 100yrARI (Continued)

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	3400.00	100yrARI	39.32	251.41	252.59		252.69	0.001763	1.41	27.85	27.10	0.44	17.52	24.74	14.00	16.63
100	3300.00	100yrARI	39.32	251.21	252.43		252.52	0.001606	1.37	28.72	27.28	0.43	16.34	22.37	14.94	17.10
100	3200.00	100yrARI	39.32	251.01	252.28		252.37	0.001378	1.30	30.22	27.62	0.40	14.57	18.96	15.97	17.70
100	3100.00	100yrARI	39.32	250.81	252.16		252.24	0.001106	1.21	32.52	28.11	0.36	12.36	14.94	16.34	18.26
100	3000.00	100yrARI	54.09	250.61	251.98		252.12	0.001994	1.64	33.05	28.23	0.48	22.54	36.89	16.83	18.85
100	2900.00	100yrARI	54.09	250.41	251.78		251.92	0.001990	1.64	33.07	28.23	0.48	22.51	36.81	16.82	18.70
100	2800.00	100yrARI	54.09	250.21	251.58		251.72	0.001982	1.63	33.12	28.24	0.48	22.44	36.64	16.41	18.43
100	2700.00	100yrARI	54.09	250.01	251.39		251.52	0.001967	1.63	33.21	28.27	0.48	22.31	36.34	16.06	18.13
100	2600.00	100yrARI	54.09	249.81	251.19		251.32	0.001945	1.62	33.33	28.29	0.48	22.12	35.89	15.97	17.87
100	2500.00	100yrARI	54.09	249.61	251.00		251.13	0.001908	1.61	33.55	28.34	0.47	21.80	35.16	15.60	17.29
100	2400.00	100yrARI	54.09	249.41	250.81		250.94	0.001845	1.59	33.94	28.45	0.47	21.25	33.86	14.83	16.53
100	2300.00	100yrARI	54.09	249.21	250.63		250.76	0.001757	1.57	34.49	28.54	0.46	20.49	32.12	14.08	15.70
100	2200.00	100yrARI	54.09	249.01	250.46		250.58	0.001624	1.53	35.41	28.74	0.44	19.31	29.49	13.10	14.49
100	2100.00	100yrARI	54.09	248.80	250.23		250.35	0.001730	1.56	34.66	28.57	0.45	20.26	31.61	12.14	13.26
100	2000.00	100yrARI	54.28	248.60	249.97		250.11	0.002002	1.64	33.08	28.22	0.48	22.65	37.16	11.16	12.12
100	1900.00	100yrARI	54.28	248.40	249.77		249.91	0.002003	1.64	33.08	28.23	0.48	22.66	37.18	10.10	10.93
100	1800.00	100yrARI	54.28	248.20	249.57		249.71	0.002004	1.64	33.07	28.23	0.48	22.67	37.20	9.30	9.59
100	1700.00	100yrARI	54.28	248.00	249.37		249.51	0.002009	1.64	33.04	28.21	0.48	22.72	37.32	8.43	8.71
100	1600.00	100yrARI	54.28	247.80	249.17		249.31	0.002017	1.64	33.00	28.21	0.49	22.78	37.47	7.32	7.41
100	1500.00	100yrARI	54.28	247.60	248.97		249.10	0.002035	1.65	32.91	28.20	0.49	22.92	37.81	5.99	6.01
100	1400.00	100yrARI	54.28	247.40	248.76		248.90	0.002071	1.66	32.70	28.14	0.49	23.24	38.57	4.75	4.81
100	1300.00	100yrARI	54.28	247.20	248.55		248.69	0.002145	1.68	32.33	28.07	0.50	23.86	40.05	3.81	4.13
100	1200.00	100yrARI	54.28	247.00	248.32		248.47	0.002318	1.72	31.50	27.88	0.52	25.29	43.59	3.08	3.43
100	1100.00	100yrARI	54.28	246.80	248.04		248.21	0.002834	1.84	29.46	27.43	0.57	29.41	54.18	2.92	3.29
100	1000.00	100yrARI	54.99	246.56	247.56		247.85	0.006156	2.39	23.00	25.98	0.81	52.78	126.20	2.95	3.23
100	900.00	100yrARI	54.99	245.88	247.27		247.41	0.001974	1.64	33.53	28.32	0.48	22.56	37.00	2.97	3.14
100	800.00	100yrARI	54.99	245.20	247.22		247.27	0.000524	1.05	52.60	32.12	0.26	8.24	8.62	2.80	2.89
100	700.00	100yrARI	54.99	244.52	247.21		247.23	0.000185	0.73	75.42	36.13	0.16	3.70	2.70	2.38	1.13
100	600.00	100yrARI	54.99	243.84	247.20		247.22	0.000080	0.54	101.24	40.20	0.11	1.93	1.05	2.44	2.74
100	500.00	100yrARI	54.99	243.15	247.20		247.21	0.000040	0.42	130.24	44.30	0.08	1.11	0.47	4.75	5.89
100	400.00	100yrARI	54.99	242.47	247.20		247.21	0.000022	0.34	161.76	48.39	0.06	0.69	0.23	6.28	7.03
100	300.00	100yrARI	54.99	241.79	247.20		247.20	0.000013	0.28	195.98	52.46	0.05	0.45	0.13	6.68	7.65
100	200.00	100yrARI	54.99	241.11	247.20		247.20	0.000008	0.24	233.19	56.57	0.04	0.31	0.07	6.95	8.42
100	100.00	100yrARI	54.99	240.42	247.20	241.30	247.20	0.000005	0.20	276.99	70.78	0.03	0.22	0.04	7.40	9.35

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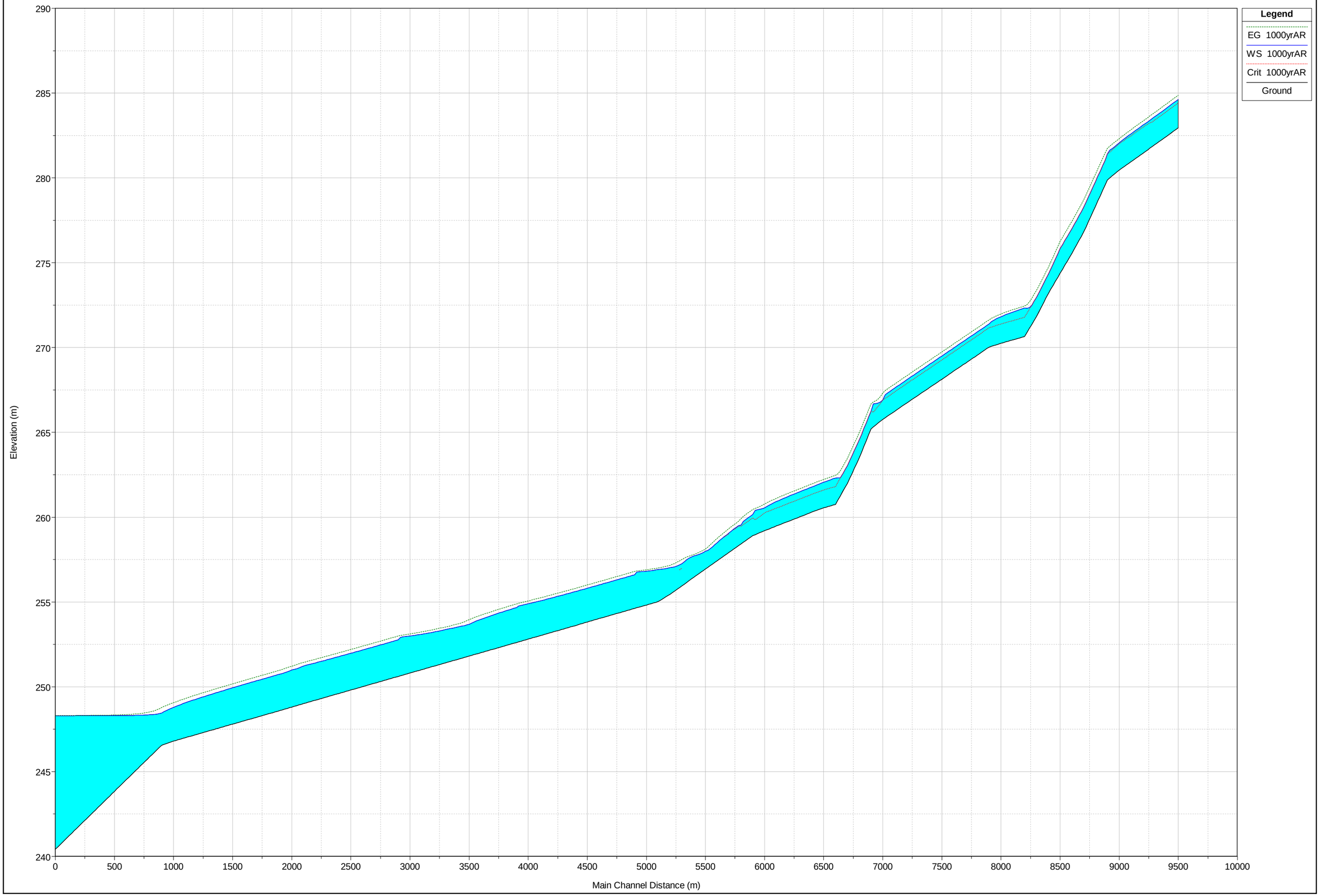

HEC-RAS Plan: Plan 01 River: S1D3 Reach: 100 Profile: 1000yrAR

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	9600.00	1000yrAR	27.00	282.95	284.63	284.42	284.87	0.004918	2.23	13.91	33.64	0.72	45.05	100.61	0.32	0.49
100	9500.00	1000yrAR	27.00	282.45	284.11	283.91	284.37	0.005109	2.27	13.79	36.95	0.73	46.50	105.43	0.34	0.27
100	9400.00	1000yrAR	27.00	281.95	283.61	283.41	283.85	0.004938	2.22	14.89	38.55	0.72	44.82	99.72	0.34	0.40
100	9300.00	1000yrAR	27.00	281.45	283.11	282.99	283.34	0.004843	2.20	14.90	31.31	0.71	43.93	96.74	0.34	0.41
100	9200.00	1000yrAR	27.00	280.96	282.60	282.48	282.85	0.005215	2.27	14.31	32.72	0.74	46.83	106.29	0.36	0.43
100	9100.00	1000yrAR	27.00	280.46	282.07	282.02	282.31	0.005286	2.27	15.15	36.66	0.74	46.87	106.21	0.38	0.36
100	9000.00	1000yrAR	27.00	279.88	281.41	281.41	281.74	0.007407	2.60	11.70	24.11	0.87	62.71	163.13	0.47	0.34
100	8900.00	1000yrAR	27.00	278.35	279.81	279.81	280.24	0.009722	2.90	9.31	10.76	1.00	79.01	229.09	1.04	1.18
100	8800.00	1000yrAR	27.00	276.82	278.28	278.28	278.71	0.009696	2.90	9.32	10.77	0.99	78.85	228.43	1.45	1.53
100	8700.00	1000yrAR	27.00	275.56	277.01	277.01	277.45	0.009898	2.92	9.25	10.72	1.00	80.20	234.21	1.42	1.78
100	8600.00	1000yrAR	27.00	274.38	275.84	275.84	276.27	0.009794	2.91	9.29	10.75	1.00	79.46	231.03	1.54	1.72
100	8500.00	1000yrAR	27.00	273.19	274.33	274.33	274.73	0.009950	2.83	9.55	11.81	1.00	76.50	216.27	1.58	1.74
100	8400.00	1000yrAR	27.00	271.82	272.96	272.96	273.36	0.009811	2.81	9.60	11.83	1.00	75.68	212.92	0.86	0.95
100	8300.00	1000yrAR	27.00	270.65	272.34	271.79	272.45	0.001849	1.51	21.61	44.54	0.46	19.66	29.75	0.28	0.36
100	8200.00	1000yrAR	27.00	270.45	272.09	271.59	272.23	0.002314	1.66	16.23	14.83	0.51	23.98	39.89	1.04	1.39
100	8100.00	1000yrAR	27.00	270.25	271.82	271.38	271.98	0.002769	1.78	15.20	14.40	0.55	27.68	49.17	2.28	2.73
100	8000.00	1000yrAR	27.00	270.03	271.40	271.17	271.64	0.004772	2.17	12.47	13.23	0.71	42.68	92.44	2.81	3.26
100	7900.00	1000yrAR	27.00	269.55	270.92	270.69	271.16	0.004695	2.15	12.54	13.25	0.71	42.16	90.80	3.06	3.51
100	7800.00	1000yrAR	27.00	269.08	270.45	270.21	270.69	0.004713	2.16	12.52	13.24	0.71	42.29	91.20	3.09	3.52
100	7700.00	1000yrAR	27.00	268.61	269.98	269.75	270.22	0.004769	2.16	12.47	13.23	0.71	42.65	92.34	2.87	3.20
100	7600.00	1000yrAR	27.00	268.13	269.50	269.26	269.74	0.004704	2.16	12.53	13.24	0.71	42.22	91.00	1.55	1.83
100	7500.00	1000yrAR	27.00	267.66	269.03	268.80	269.27	0.004701	2.15	12.53	13.25	0.71	42.19	90.89	1.17	1.13
100	7400.00	1000yrAR	27.00	267.19	268.56	268.33	268.80	0.004695	2.15	12.54	13.25	0.71	42.16	90.79	0.96	0.84
100	7300.00	1000yrAR	27.00	266.72	268.09	267.86	268.33	0.004787	2.17	12.45	13.22	0.71	42.80	92.79	1.37	1.05
100	7200.00	1000yrAR	27.00	266.24	267.61	267.38	267.85	0.004710	2.16	12.52	13.24	0.71	42.26	91.11	1.40	1.27
100	7100.00	1000yrAR	27.00	265.77	266.91	266.91	267.31	0.009850	2.82	9.58	11.82	1.00	75.94	213.98	1.40	1.57
100	7000.00	1000yrAR	40.06	265.20	266.26	266.26	266.68	0.009488	2.88	13.92	16.34	1.00	77.63	223.37	1.09	1.25
100	6900.00	1000yrAR	40.06	263.49	264.54	264.54	264.97	0.009636	2.89	13.84	16.30	1.00	78.59	227.44	1.65	1.82
100	6800.00	1000yrAR	40.06	261.99	263.05	263.05	263.47	0.009533	2.88	13.90	16.33	1.00	77.91	224.55	1.73	1.84
100	6700.00	1000yrAR	40.06	260.75	262.31	261.80	262.47	0.002271	1.75	22.92	19.36	0.51	25.69	44.89	0.97	0.98
100	6600.00	1000yrAR	40.06	260.55	262.05	261.60	262.23	0.002614	1.84	21.82	19.02	0.55	28.67	52.64	0.63	0.84
100	6500.00	1000yrAR	40.06	260.30	261.78	261.35	261.96	0.002763	1.87	21.40	18.90	0.56	29.92	56.00	0.89	1.08
100	6400.00	1000yrAR	40.06	260.02	261.50	261.07	261.68	0.002747	1.87	21.44	18.89	0.56	29.80	55.69	1.60	1.77
100	6300.00	1000yrAR	40.06	259.75	261.22	260.81	261.40	0.002828	1.89	21.22	18.82	0.57	30.48	57.54	1.41	1.56
100	6200.00	1000yrAR	40.06	259.48	260.92	260.54	261.11	0.003063	1.94	20.64	18.65	0.59	32.42	62.93	1.14	1.03
100	6100.00	1000yrAR	40.06	259.20	260.55	260.26	260.78	0.003885	2.11	18.98	18.10	0.66	39.01	82.33	0.90	1.13
100	6000.00	1000yrAR	55.66	258.91	260.16	259.95	260.45	0.004902	2.37	23.47	22.50	0.74	49.25	116.81	1.35	1.50
100	5900.00	1000yrAR	55.66	258.42	259.54	259.46	259.91	0.007235	2.71	20.57	21.71	0.89	66.12	178.88	1.58	1.81
100	5800.00	1000yrAR	55.66	257.93	259.08	259.03	259.35	0.005574	2.40	30.37	72.94	0.78	51.86	124.63	1.65	1.90
100	5700.00	1000yrAR	55.66	257.43	258.50		258.77	0.006225	2.45	31.25	70.92	0.82	54.84	134.28	1.69	2.06
100	5600.00	1000yrAR	55.66	256.94	258.00		258.13	0.003778	1.89	45.63	88.52	0.64	32.91	62.30	1.72	1.96
100	5500.00	1000yrAR	55.66	256.45	257.71		257.80	0.002121	1.57	57.77	109.57	0.49	21.42	33.54	1.40	1.67
100	5400.00	1000yrAR	55.66	255.95	257.26	256.99	257.50	0.004092	2.22	27.75	60.73	0.68	42.65	94.70	1.11	1.32
100	5300.00	1000yrAR	55.66	255.46	257.02		257.16	0.001991	1.71	41.92	106.12	0.49	24.14	41.37	0.62	0.77
100	5200.00	1000yrAR	55.66	255.02	256.91		257.00	0.001045	1.38	48.22	97.12	0.36	14.84	20.48	0.45	0.60
100	5100.00	1000yrAR	55.66	254.82	256.82		256.90	0.000838	1.28	51.82	79.71	0.33	12.49	15.93	0.81	0.95
100	5000.00	1000yrAR	81.38	254.62	256.61		256.80	0.001946	1.94	44.91	69.88	0.50	28.85	55.86	0.98	1.19
100	4900.00	1000yrAR	81.38	254.42	256.40		256.60	0.001990	1.96	41.59	26.91	0.50	29.46	57.65	1.45	1.74
100	4800.00	1000yrAR	81.38	254.22	256.21		256.40	0.001986	1.95	41.63	26.93	0.50	29.40	57.48	2.34	2.64
100	4700.00	1000yrAR	81.38	254.02	256.01		256.20	0.001977	1.95	41.69	26.94	0.50	29.30	57.19	3.45	3.68
100	4600.00	1000yrAR	81.38	253.82	255.81		256.00	0.001968	1.95	41.78	26.98	0.50	29.18	56.84	4.40	4.71
100	4500.00	1000yrAR	81.38	253.61	255.62		255.81	0.001916	1.93	42.14	27.03	0.49	28.61	55.24	5.63	5.66
100	4400.00	1000yrAR	81.38	253.41	255.43		255.61	0.001880	1.92	42.43	27.09	0.49	28.19	54.07	6.87	7.06
100	4300.00	1000yrAR	81.38	253.21	255.24		255.43	0.001825	1.90	42.87	27.19	0.48	27.55	52.30	7.78	8.24
100	4200.00	1000yrAR	81.38	253.01	255.06		255.24	0.001760	1.87	43.42	27.31	0.47	26.79	50.21	7.96	9.41
100	4100.00	1000yrAR	81.38	252.81	254.89		255.06	0.001673	1.84	44.20	27.49	0.46	25.74	47.40	8.48	10.72
100	4000.00	1000yrAR	89.60	252.61	254.67		254.89	0.002092	2.05	43.72	27.38	0.52	31.98	65.53	9.66	12.00
100	3900.00	1000yrAR	89.60	252.41	254.46		254.68	0.002156	2.07	43.26	27.28	0.53	32.73	67.80	10.52	12.83
100	3800.00	1000yrAR	89.60	252.21	254.23		254.46	0.002266	2.11	42.51	27.11	0.54	34.02	71.69	13.11	12.36
100	3700.00	1000yrAR	89.60	252.01	253.98		254.22	0.002448	2.16	41.41	26.92	0.56	36.07	78.04	14.03	15.92
100	3600.00	1000yrAR	89.60	251.81	253.69		253.96	0.002955	2.31	38.74	26.26	0.61	41.78	96.63	14.07	16.18
100	3500.00	1000yrAR	89.60	251.61	253.53		253.70	0.001663	1.81	49.48	31.56	0.46	25.07	45.40	12.89	15.70

HEC-RAS Plan: Plan 01 River: S1D3 Reach: 100 Profile: 1000yrAR (Continued)

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	3400.00	1000yrAR	89.60	251.41	253.37		253.53	0.001550	1.77	50.67	31.75	0.45	23.77	42.04	13.22	15.85
100	3300.00	1000yrAR	89.60	251.21	253.23		253.37	0.001399	1.71	52.47	32.09	0.43	21.99	37.55	14.14	16.30
100	3200.00	1000yrAR	89.60	251.01	253.10		253.24	0.001226	1.63	54.91	32.54	0.40	19.87	32.42	15.15	16.88
100	3100.00	1000yrAR	89.60	250.81	252.99		253.12	0.001046	1.54	58.00	33.10	0.37	17.60	27.18	15.51	17.43
100	3000.00	1000yrAR	120.49	250.61	252.77		252.99	0.001985	2.11	57.04	32.93	0.51	33.02	69.74	16.04	18.06
100	2900.00	1000yrAR	120.49	250.41	252.57		252.79	0.001979	2.11	57.10	32.95	0.51	32.94	69.51	16.03	17.91
100	2800.00	1000yrAR	120.49	250.21	252.37		252.60	0.001970	2.11	57.20	32.96	0.51	32.82	69.14	15.62	17.64
100	2700.00	1000yrAR	120.49	250.01	252.17		252.40	0.001956	2.10	57.33	32.98	0.51	32.65	68.61	15.28	17.35
100	2600.00	1000yrAR	120.49	249.81	251.98		252.20	0.001938	2.09	57.52	33.02	0.51	32.42	67.92	15.18	17.08
100	2500.00	1000yrAR	120.49	249.61	251.79		252.01	0.001915	2.09	57.76	33.06	0.50	32.12	67.00	14.81	16.50
100	2400.00	1000yrAR	120.49	249.41	251.60		251.82	0.001877	2.07	58.17	33.16	0.50	31.61	65.48	14.04	15.74
100	2300.00	1000yrAR	120.49	249.21	251.41		251.63	0.001836	2.06	58.60	33.21	0.49	31.10	63.94	13.30	14.92
100	2200.00	1000yrAR	120.49	249.01	251.23		251.44	0.001777	2.03	59.27	33.33	0.49	30.32	61.64	12.33	13.72
100	2100.00	1000yrAR	120.49	248.80	251.00		251.22	0.001858	2.07	58.35	33.15	0.50	31.39	64.83	11.37	12.49
100	2000.00	1000yrAR	120.97	248.60	250.75		250.98	0.002009	2.12	56.96	32.92	0.52	33.38	70.89	10.38	11.34
100	1900.00	1000yrAR	120.97	248.40	250.55		250.78	0.002013	2.13	56.92	32.90	0.52	33.44	71.08	9.32	10.15
100	1800.00	1000yrAR	120.97	248.20	250.35		250.58	0.002019	2.13	56.86	32.89	0.52	33.52	71.32	8.52	8.81
100	1700.00	1000yrAR	120.97	248.00	250.15		250.38	0.002032	2.13	56.73	32.86	0.52	33.69	71.84	7.65	7.93
100	1600.00	1000yrAR	120.97	247.80	249.94		250.17	0.002049	2.14	56.57	32.85	0.52	33.90	72.48	6.55	6.64
100	1500.00	1000yrAR	120.97	247.60	249.73		249.97	0.002078	2.15	56.31	32.80	0.52	34.26	73.60	5.23	5.25
100	1400.00	1000yrAR	120.97	247.40	249.52		249.76	0.002129	2.17	55.82	32.69	0.53	34.92	75.67	3.99	4.05
100	1300.00	1000yrAR	120.97	247.20	249.30		249.54	0.002212	2.20	55.11	32.58	0.54	35.94	78.88	3.06	3.38
100	1200.00	1000yrAR	120.97	247.00	249.06		249.31	0.002368	2.25	53.83	32.34	0.56	37.87	85.09	2.34	2.69
100	1100.00	1000yrAR	120.97	246.80	248.78		249.07	0.002694	2.35	51.50	31.91	0.59	41.79	98.16	2.18	2.54
100	1000.00	1000yrAR	122.86	246.56	248.45		248.78	0.003305	2.53	48.51	31.31	0.65	49.25	124.74	2.06	2.34
100	900.00	1000yrAR	122.86	245.88	248.35		248.52	0.001258	1.81	67.72	34.82	0.42	23.45	42.56	1.89	2.06
100	800.00	1000yrAR	122.86	245.20	248.32		248.41	0.000531	1.34	91.64	38.74	0.28	12.01	16.10	1.70	1.79
100	700.00	1000yrAR	122.86	244.52	248.31		248.36	0.000253	1.03	123.27	63.16	0.20	6.70	6.89	1.28	0.03
100	600.00	1000yrAR	122.86	243.84	248.30		248.34	0.000136	0.82	149.17	46.82	0.15	4.11	3.39	1.34	1.64
100	500.00	1000yrAR	122.86	243.15	248.30		248.33	0.000077	0.67	182.64	50.90	0.11	2.64	1.77	3.65	4.79
100	400.00	1000yrAR	122.86	242.47	248.30		248.32	0.000047	0.56	218.64	54.99	0.09	1.78	1.00	5.18	5.93
100	300.00	1000yrAR	122.86	241.79	248.30		248.31	0.000030	0.48	257.33	59.07	0.07	1.25	0.60	5.58	6.55
100	200.00	1000yrAR	122.86	241.11	248.30		248.31	0.000020	0.41	299.06	63.18	0.06	0.90	0.37	5.85	7.32
100	100.00	1000yrAR	122.86	240.42	248.30	241.87	248.31	0.000013	0.35	365.04	89.34	0.05	0.65	0.23	6.30	8.25

HEC-RAS MODELLING RESULTS FOR DIVERSION DRAIN 4

- 100 Year ARI longsection
- 100 Year ARI Table of Results
- 1000 Year longsection
- 1000 Year ARI Table of Results

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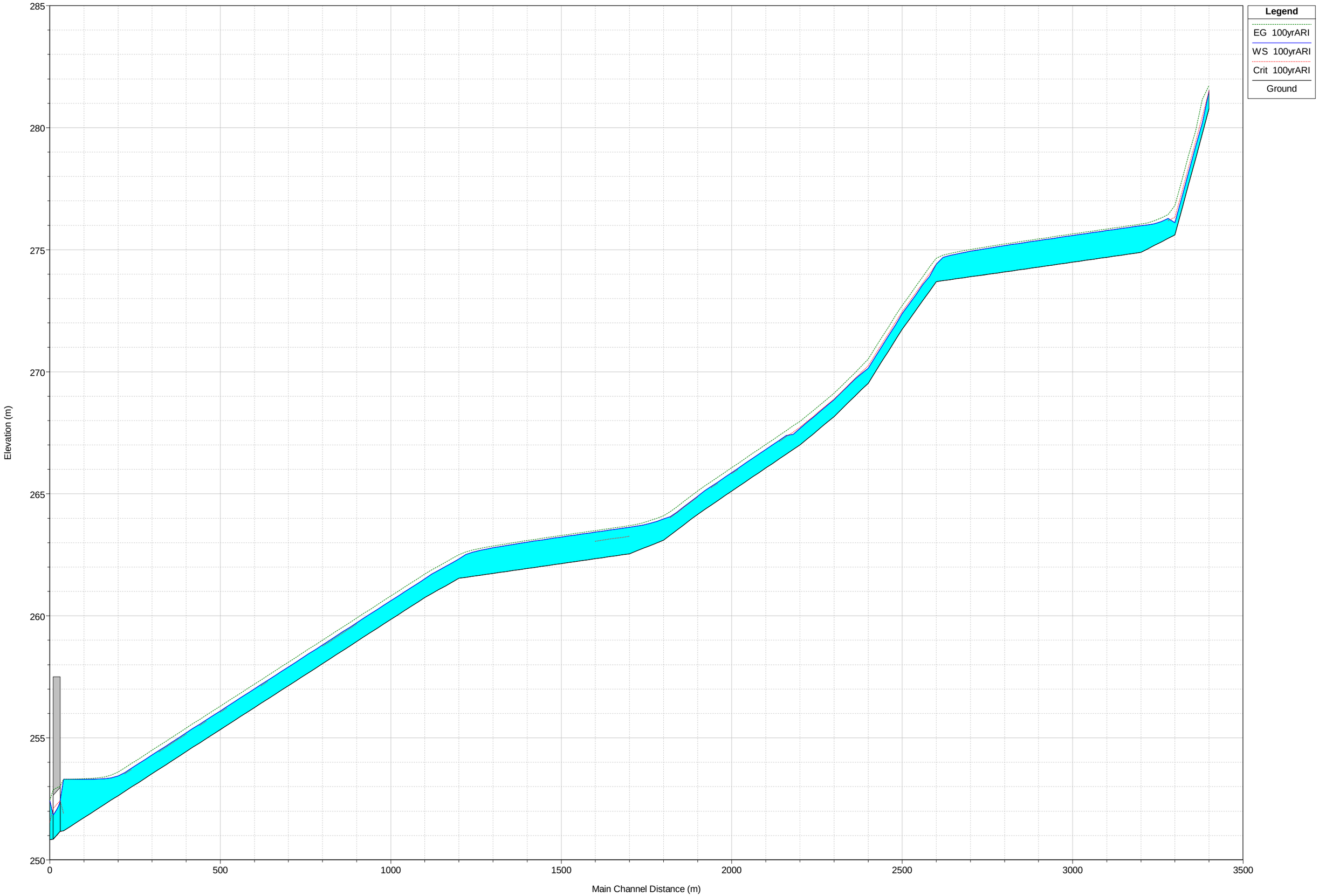

HEC-RAS Plan: Plan 03 River: S1D4 Reach: 100 Profile: 100yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	3500.00	100yrARI	6.45	280.78	281.50	281.50	281.74	0.012104	2.17	2.97	6.30	1.01	54.01	0.00	1.28	1.07
100	3400.00	100yrARI	6.45	275.61	276.11	276.33	276.80	0.051588	3.69	1.75	4.98	1.99	171.98	0.00	1.57	1.20
100	3300.00	100yrARI	6.45	274.89	275.98	275.61	276.05	0.001995	1.12	5.79	8.57	0.43	12.68	0.00	1.31	0.79
100	3200.00	100yrARI	6.45	274.69	275.78		275.85	0.002004	1.12	5.78	8.56	0.43	12.73	0.00	2.93	2.36
100	3100.00	100yrARI	6.45	274.49	275.58		275.65	0.002018	1.12	5.76	8.55	0.44	12.80	0.00	12.23	10.35
100	3000.00	100yrARI	6.45	274.29	275.38		275.44	0.002045	1.13	5.73	8.53	0.44	12.94	0.00	3.68	1.96
100	2900.00	100yrARI	6.45	274.09	275.17		275.24	0.002129	1.14	5.65	8.47	0.45	13.37	0.00	6.01	3.00
100	2800.00	100yrARI	6.45	273.89	274.94		275.01	0.002400	1.19	5.40	8.30	0.47	14.72	0.00	5.78	4.31
100	2700.00	100yrARI	6.45	273.69	274.41	274.41	274.65	0.012095	2.17	2.97	6.29	1.01	54.04	0.00	2.81	2.19
100	2600.00	100yrARI	6.45	271.74	272.38	272.46	272.72	0.019052	2.56	2.52	5.84	1.25	77.74	0.00	1.42	1.20
100	2500.00	100yrARI	6.45	269.53	270.15	270.24	270.52	0.022384	2.72	2.37	5.71	1.34	88.27	0.00	2.28	1.67
100	2400.00	100yrARI	6.45	268.16	268.85	268.88	269.12	0.013732	2.27	2.84	6.17	1.07	59.77	0.00	2.07	1.77
100	2300.00	100yrARI	6.45	267.00	267.68	267.72	267.96	0.015329	2.37	2.72	6.04	1.13	65.36	0.00	4.22	3.55
100	2200.00	100yrARI	6.45	266.06	266.82		267.02	0.009478	1.98	3.25	6.57	0.90	44.39	0.00	7.74	6.19
100	2100.00	100yrARI	6.45	265.11	265.87	265.83	266.07	0.009509	1.99	3.25	6.56	0.90	44.54	0.00	12.54	13.56
100	2000.00	100yrARI	6.45	264.16	264.90	264.88	265.12	0.010611	2.07	3.12	6.44	0.95	48.61	0.00	5.41	5.62
100	1900.00	100yrARI	6.45	263.10	263.97		264.10	0.005302	1.60	4.03	7.24	0.68	27.86	0.00	3.23	3.42
100	1800.00	100yrARI	6.45	262.54	263.63	263.26	263.70	0.002005	1.12	5.77	8.56	0.43	12.73	0.00	4.74	3.90
100	1700.00	100yrARI	6.45	262.34	263.43	263.05	263.50	0.002014	1.12	5.76	8.55	0.44	12.78	0.00	5.72	4.80
100	1600.00	100yrARI	6.45	262.14	263.23		263.29	0.002041	1.12	5.74	8.55	0.44	12.91	0.00	5.85	4.78
100	1500.00	100yrARI	6.45	261.94	263.02		263.08	0.002126	1.14	5.65	8.48	0.45	13.34	0.00	6.09	4.98
100	1400.00	100yrARI	6.45	261.74	262.79		262.86	0.002434	1.20	5.37	8.28	0.48	14.89	0.00	7.37	6.55
100	1300.00	100yrARI	6.45	261.54	262.33		262.51	0.007899	1.85	3.48	6.76	0.83	38.38	0.00	11.84	11.00
100	1200.00	100yrARI	6.45	260.75	261.52	261.47	261.71	0.009009	1.95	3.31	6.61	0.88	42.67	0.00	11.21	11.47
100	1100.00	100yrARI	6.45	259.85	260.62		260.81	0.008988	1.95	3.32	6.62	0.88	42.56	0.00	6.83	9.14
100	1000.00	100yrARI	6.45	258.95	259.72	259.67	259.91	0.009047	1.95	3.31	6.62	0.88	42.77	0.00	5.84	6.92
100	900.00	100yrARI	6.45	258.04	258.81	258.76	259.01	0.009040	1.95	3.31	6.59	0.88	42.82	0.00	4.95	6.41
100	800.00	100yrARI	6.45	257.14	257.91		258.10	0.009011	1.95	3.31	6.61	0.88	42.66	0.00	4.90	5.98
100	700.00	100yrARI	6.45	256.24	257.01		257.20	0.009015	1.95	3.31	6.62	0.88	42.66	0.00	5.14	5.63
100	600.00	100yrARI	6.45	255.34	256.11	256.05	256.30	0.008974	1.94	3.32	6.64	0.88	42.45	0.00	4.75	5.32
100	500.00	100yrARI	6.45	254.44	255.21	255.16	255.40	0.009062	1.95	3.31	6.62	0.88	42.81	0.00	4.38	5.35
100	400.00	100yrARI	6.45	253.53	254.30		254.49	0.008996	1.95	3.31	6.61	0.88	42.63	0.00	4.18	5.07
100	300.00	100yrARI	6.45	252.63	253.44		253.60	0.007448	1.81	3.56	6.83	0.80	36.60	0.00	4.55	5.17
100	200.00	100yrARI	6.45	251.73	253.30		253.32	0.000392	0.61	10.60	11.46	0.20	3.40	0.00	4.64	4.31
100	130		Culvert													
100	100.00	100yrARI	6.45	250.83	252.43	251.55	252.45	0.000363	0.59	10.91	11.61	0.19	3.20	-941.76	4.30	4.72

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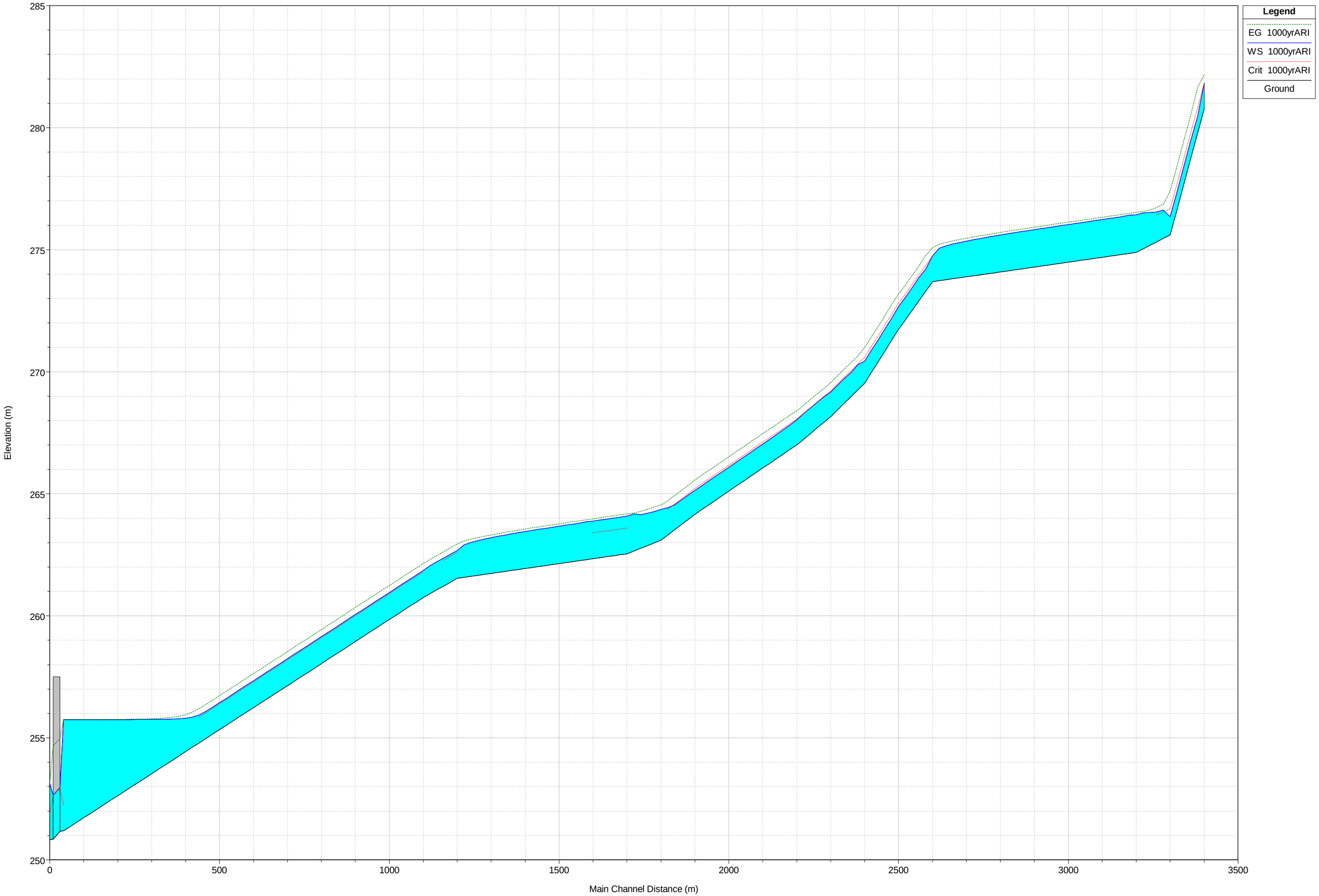

HEC-RAS Plan: Plan 03 River: S1D4 Reach: 100 Profile: 1000yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	3500.00	1000yrARI	14.04	280.78	281.84	281.84	282.17	0.010982	2.57	5.47	8.35	1.01	67.80	0.00	0.94	0.73
100	3400.00	1000yrARI	14.04	275.61	276.35	276.67	277.40	0.051696	4.55	3.08	6.39	2.09	235.89	0.00	1.33	0.96
100	3300.00	1000yrARI	14.04	274.89	276.43	275.95	276.53	0.002037	1.37	10.24	11.27	0.46	17.38	0.00	0.86	0.34
100	3200.00	1000yrARI	14.04	274.69	276.24		276.33	0.002019	1.37	10.27	11.28	0.46	17.26	0.00	2.47	1.90
100	3100.00	1000yrARI	14.04	274.49	276.03		276.13	0.002048	1.37	10.22	11.25	0.46	17.46	0.00	11.78	9.90
100	3000.00	1000yrARI	14.04	274.29	275.83		275.92	0.002061	1.38	10.67	18.89	0.46	17.51	0.00	3.23	1.51
100	2900.00	1000yrARI	14.04	274.09	275.60		275.71	0.002225	1.42	9.90	11.08	0.48	18.68	0.00	5.58	2.57
100	2800.00	1000yrARI	14.04	273.89	275.36		275.47	0.002571	1.50	9.38	10.80	0.51	20.99	0.00	5.36	3.89
100	2700.00	1000yrARI	14.04	273.69	274.75	274.75	275.08	0.010897	2.56	5.48	8.35	1.01	67.43	0.00	2.47	1.85
100	2600.00	1000yrARI	14.04	271.74	272.67	272.81	273.18	0.019249	3.16	4.44	7.56	1.32	106.67	0.00	1.13	0.91
100	2500.00	1000yrARI	14.04	269.53	270.43	270.60	270.99	0.022344	3.34	4.21	7.39	1.41	120.09	0.00	2.00	1.39
100	2400.00	1000yrARI	14.04	268.16	269.17	269.22	269.56	0.013346	2.76	5.09	8.07	1.11	79.34	0.00	1.75	1.45
100	2300.00	1000yrARI	14.04	267.00	268.03	268.07	268.40	0.012485	2.69	5.21	8.15	1.07	75.25	0.00	3.87	3.20
100	2200.00	1000yrARI	14.04	266.06	267.04	267.12	267.47	0.015340	2.90	4.84	7.88	1.18	88.73	0.00	7.52	5.97
100	2100.00	1000yrARI	14.04	265.11	266.09	266.17	266.52	0.015419	2.91	4.82	7.87	1.19	89.13	0.00	12.32	13.34
100	2000.00	1000yrARI	14.04	264.16	265.14	265.22	265.57	0.015317	2.90	4.84	7.88	1.18	88.64	0.00	5.17	5.38
100	1900.00	1000yrARI	14.04	263.10	264.36		264.55	0.004996	1.92	7.33	9.59	0.70	35.91	0.00	2.84	3.03
100	1800.00	1000yrARI	14.04	262.54	264.09	263.60	264.18	0.002022	1.37	10.26	11.28	0.46	17.28	0.00	4.28	3.44
100	1700.00	1000yrARI	14.04	262.34	263.88	263.40	263.98	0.002046	1.37	10.22	11.25	0.46	17.45	0.00	5.27	4.35
100	1600.00	1000yrARI	14.04	262.14	263.67		263.77	0.002093	1.39	10.14	11.22	0.47	17.77	0.00	5.41	4.34
100	1500.00	1000yrARI	14.04	261.94	263.45		263.56	0.002223	1.42	9.91	11.09	0.48	18.65	0.00	5.66	4.55
100	1400.00	1000yrARI	14.04	261.74	263.20		263.32	0.002602	1.50	9.35	10.78	0.51	21.19	0.00	6.96	6.14
100	1300.00	1000yrARI	14.04	261.54	262.68	262.60	262.94	0.007879	2.27	6.19	8.85	0.87	51.88	0.00	11.49	10.65
100	1200.00	1000yrARI	14.04	260.75	261.86	261.81	262.15	0.009010	2.39	5.89	8.63	0.92	57.84	0.00	10.87	11.13
100	1100.00	1000yrARI	14.04	259.85	260.96	260.91	261.25	0.008990	2.38	5.89	8.64	0.92	57.70	0.00	6.49	8.80
100	1000.00	1000yrARI	14.04	258.95	260.06	260.01	260.35	0.009022	2.38	5.89	8.65	0.92	57.84	0.00	5.50	6.58
100	900.00	1000yrARI	14.04	258.04	259.15	259.10	259.44	0.009045	2.39	5.88	8.62	0.92	58.02	0.00	4.61	6.07
100	800.00	1000yrARI	14.04	257.14	258.25	258.20	258.54	0.009013	2.38	5.89	8.64	0.92	57.83	0.00	4.56	5.64
100	700.00	1000yrARI	14.04	256.24	257.35	257.30	257.64	0.009022	2.39	5.88	8.64	0.92	57.86	0.00	4.80	5.29
100	600.00	1000yrARI	14.04	255.34	256.45	256.40	256.73	0.008947	2.38	5.91	8.66	0.92	57.44	0.00	4.41	4.98
100	500.00	1000yrARI	14.04	254.44	255.81		255.95	0.003522	1.68	8.35	10.22	0.59	27.05	0.00	3.78	4.75
100	400.00	1000yrARI	14.04	253.53	255.76		255.78	0.000373	0.73	19.30	15.35	0.21	4.40	0.00	2.72	3.61
100	300.00	1000yrARI	14.04	252.63	255.75		255.76	0.000073	0.40	35.48	20.73	0.10	1.17	0.00	2.24	2.86
100	200.00	1000yrARI	14.04	251.73	255.75		255.75	0.000021	0.25	56.61	26.13	0.05	0.43	0.00	2.19	1.86
100	130		Culvert													
100	100.00	1000yrARI	14.04	250.83	253.13	251.89	253.15	0.000317	0.68	20.51	15.81	0.19	3.85	-941.76	3.60	4.02

HEC-RAS MODELLING RESULTS FOR DIVERSION DRAIN 5

- 100 Year ARI longsection
- 100 Year ARI Table of Results
- 1000 Year longsection
- 1000 Year ARI Table of Results

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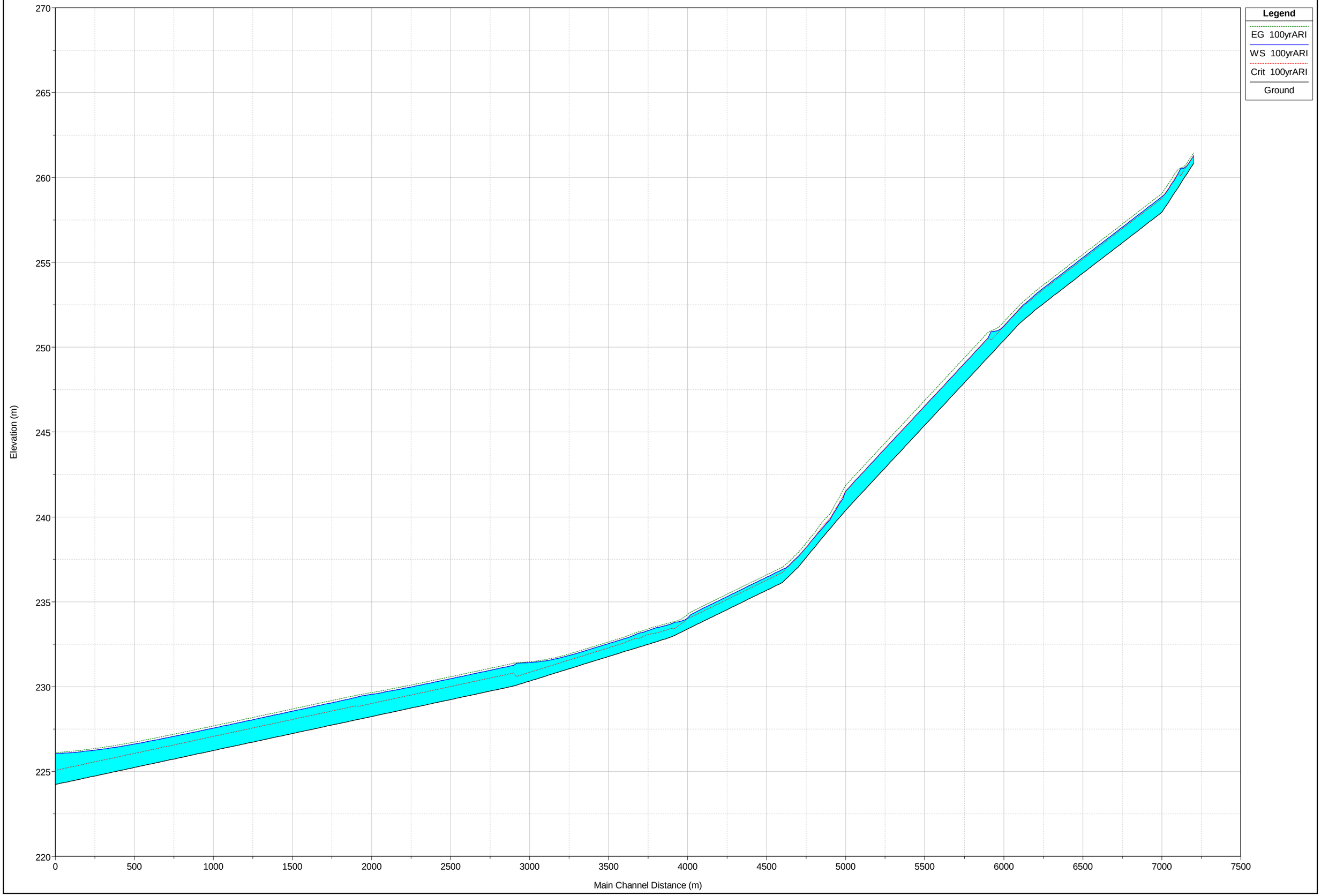

HEC-RAS Plan: Plan 03 River: S1D5 Reach: Branch Profile: 100yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
Branch	7300.00	100yrARI	2.79	260.82	261.28	261.28	261.45	0.013252	1.79	1.56	4.76	1.00	41.32	-408.40	1.55	0.72
Branch	7200.00	100yrARI	8.38	259.37	260.19	260.19	260.46	0.011372	2.27	3.69	6.95	1.00	57.01	-427.55	1.18	1.21
Branch	7100.00	100yrARI	8.38	257.95	258.87	258.78	259.06	0.007196	1.92	4.37	7.52	0.80	39.43	-486.92	2.08	1.48
Branch	7000.00	100yrARI	8.38	257.23	258.15	258.05	258.34	0.007162	1.92	4.37	7.52	0.80	39.30	-479.74	1.38	1.82
Branch	6900.00	100yrARI	8.38	256.51	257.43	257.34	257.62	0.007212	1.92	4.36	7.50	0.80	39.55	-460.11	1.94	2.33
Branch	6800.00	100yrARI	8.38	255.79	256.71	256.62	256.90	0.007126	1.91	4.38	7.52	0.80	39.17	-517.08	2.31	2.05
Branch	6700.00	100yrARI	8.38	255.08	256.00	255.90	256.18	0.007174	1.92	4.37	7.52	0.80	39.35	-510.86	2.41	2.31
Branch	6600.00	100yrARI	8.38	254.36	255.28	255.18	255.47	0.007173	1.92	4.37	7.52	0.80	39.35	-541.49	2.15	2.48
Branch	6500.00	100yrARI	8.38	253.64	254.56	254.46	254.75	0.007214	1.92	4.36	7.51	0.80	39.54	-569.75	2.62	2.86
Branch	6400.00	100yrARI	8.38	252.92	253.84	253.75	254.03	0.007175	1.92	4.37	7.52	0.80	39.36	-667.90	3.13	3.72
Branch	6300.00	100yrARI	8.38	252.20	253.10	253.02	253.30	0.008007	2.00	4.20	7.37	0.84	43.03	-1404.74	8.41	8.89
Branch	6200.00	100yrARI	8.38	251.40	252.25	252.22	252.49	0.009976	2.16	3.87	7.11	0.94	51.30	-1489.96	8.87	9.80
Branch	6100.00	100yrARI	8.38	250.40	251.25	251.22	251.49	0.010025	2.17	3.86	7.09	0.94	51.54	-1452.14	8.75	9.50
Branch	6000.00	100yrARI	15.79	249.40	250.54	250.52	250.87	0.009996	2.55	6.18	8.84	0.98	65.76	-1419.58	8.43	8.98
Branch	5900.00	100yrARI	15.79	248.40	249.54	249.53	249.87	0.010032	2.56	6.17	8.84	0.98	65.94	-1340.59	7.80	8.24
Branch	5800.00	100yrARI	15.79	247.40	248.54	248.53	248.87	0.010028	2.56	6.17	8.83	0.98	65.96	-1203.65	6.93	7.17
Branch	5700.00	100yrARI	15.79	246.40	247.54	247.51	247.87	0.009978	2.55	6.19	8.85	0.97	65.66	-1078.22	6.05	6.04
Branch	5600.00	100yrARI	15.79	245.40	246.54	246.52	246.87	0.010011	2.56	6.18	8.84	0.98	65.86	-971.92	5.19	4.98
Branch	5500.00	100yrARI	15.79	244.40	245.54	245.52	245.87	0.009977	2.55	6.18	8.85	0.97	65.67	-876.16	4.03	3.98
Branch	5400.00	100yrARI	15.79	243.40	244.54	244.52	244.87	0.010008	2.55	6.18	8.85	0.98	65.80	-729.18	3.05	2.92
Branch	5300.00	100yrARI	15.79	242.40	243.54	243.52	243.87	0.010025	2.56	6.17	8.84	0.98	65.92	-594.64	2.28	2.33
Branch	5200.00	100yrARI	15.79	241.40	242.54	242.53	242.87	0.010024	2.56	6.17	8.84	0.98	65.94	-591.29	1.56	1.58
Branch	5100.00	100yrARI	15.79	240.39	241.52	241.52	241.86	0.010345	2.59	6.10	8.78	0.99	67.65	-575.01	1.55	1.31
Branch	5000.00	100yrARI	15.79	239.31	239.85	239.91	240.18	0.016386	2.55	6.18	13.18	1.19	74.40	-685.14	2.64	2.26
Branch	4900.00	100yrARI	15.79	238.18	238.78	238.77	239.03	0.010568	2.21	7.15	13.63	0.97	53.59	-873.77	3.14	2.53
Branch	4800.00	100yrARI	15.79	237.05	237.68	237.65	237.91	0.009085	2.10	7.52	13.79	0.91	47.86	-814.88	3.21	2.49
Branch	4700.00	100yrARI	15.79	236.14	236.91	236.74	237.05	0.004596	1.67	9.45	14.60	0.66	28.67	-743.07	2.16	2.01
Branch	4600.00	100yrARI	15.79	235.68	236.45	236.27	236.59	0.004516	1.66	9.50	14.61	0.66	28.30	-540.55	1.24	1.20
Branch	4500.00	100yrARI	15.79	235.23	236.00	235.82	236.14	0.004588	1.67	9.46	14.63	0.66	28.60	-633.43	1.30	1.00
Branch	4400.00	100yrARI	15.79	234.77	235.54	235.37	235.68	0.004594	1.67	9.45	14.60	0.66	28.66	-551.55	1.25	1.61
Branch	4300.00	100yrARI	15.79	234.31	235.08	234.90	235.22	0.004506	1.66	9.51	14.62	0.66	28.25	-580.76	1.53	1.29
Branch	4200.00	100yrARI	15.79	233.86	234.63	234.46	234.77	0.004609	1.67	9.44	14.60	0.66	28.73	-601.82	1.68	2.03
Branch	4100.00	100yrARI	15.79	233.40	234.05	233.99	234.26	0.008129	2.02	7.80	13.92	0.86	44.01	-650.67	1.68	1.96
Branch	4000.00	100yrARI	23.56	232.94	233.71	233.45	233.81	0.002775	1.37	17.17	24.61	0.52	18.80	-884.78	1.65	1.79
Branch	3900.00	100yrARI	23.56	232.64	233.46	233.15	233.55	0.002206	1.27	18.49	24.92	0.47	15.88	-772.75	1.18	1.14
Branch	3800.00	100yrARI	23.56	232.35	233.17	232.86	233.25	0.002260	1.28	18.35	24.88	0.48	16.17	-731.09	1.20	1.42
Branch	3700.00	100yrARI	23.56	232.07	232.83	232.58	232.93	0.002901	1.39	16.93	24.58	0.54	19.41	-710.03	1.24	1.36
Branch	3600.00	100yrARI	23.56	231.78	232.54	232.29	232.64	0.002898	1.39	16.94	24.57	0.53	19.40	-752.64	1.24	0.87
Branch	3500.00	100yrARI	23.56	231.49	232.25	232.00	232.35	0.002858	1.38	17.03	24.63	0.53	19.18	-742.11	1.14	1.16
Branch	3400.00	100yrARI	23.56	231.20	231.97	231.71	232.07	0.002759	1.37	17.21	24.64	0.52	18.71	-701.89	1.23	1.12
Branch	3300.00	100yrARI	23.56	230.91	231.71	231.42	231.80	0.002383	1.31	18.04	24.83	0.49	16.80	-756.47	1.20	0.77
Branch	3200.00	100yrARI	23.56	230.62	231.53	231.13	231.59	0.001584	1.14	20.60	25.45	0.41	12.43	-802.43	1.09	1.09
Branch	3100.00	100yrARI	23.56	230.33	231.43	230.84	231.47	0.000827	0.92	25.49	26.56	0.30	7.68	-848.39	0.91	0.83
Branch	3000.00	100yrARI	44.41	230.04	231.26	230.81	231.38	0.001997	1.53	28.96	27.34	0.48	20.46	-894.36	0.78	0.72
Branch	2900.00	100yrARI	44.41	229.84	231.06	230.61	231.18	0.001995	1.53	28.97	27.33	0.48	20.44	-887.66	0.78	0.78
Branch	2800.00	100yrARI	44.41	229.64	230.86	230.41	230.98	0.001991	1.53	28.99	27.34	0.47	20.41	-866.59	0.78	0.78
Branch	2700.00	100yrARI	44.41	229.44	230.67	230.21	230.79	0.001985	1.53	29.02	27.35	0.47	20.36	-845.53	0.77	0.77
Branch	2600.00	100yrARI	44.41	229.24	230.47	230.01	230.59	0.001972	1.53	29.09	27.36	0.47	20.26	-824.46	0.77	0.77
Branch	2500.00	100yrARI	44.41	229.04	230.27	229.81	230.39	0.001952	1.52	29.18	27.38	0.47	20.11	-803.87	0.77	0.77
Branch	2400.00	100yrARI	44.41	228.84	230.08	229.61	230.20	0.001914	1.51	29.37	27.42	0.47	19.82	-778.49	0.76	0.76
Branch	2300.00	100yrARI	44.41	228.64	229.89	229.41	230.01	0.001849	1.49	29.72	27.50	0.46	19.31	-747.86	0.75	0.75
Branch	2200.00	100yrARI	44.41	228.44	229.71	229.21	229.82	0.001746	1.47	30.28	27.62	0.45	18.50	-717.69	0.73	0.73
Branch	2100.00	100yrARI	44.41	228.24	229.55	229.01	229.65	0.001592	1.42	31.24	27.83	0.43	17.25	-733.02	0.69	0.69
Branch	2000.00	100yrARI	50.50	228.04	229.36	228.87	229.49	0.002000	1.60	31.54	27.91	0.48	21.83	-764.13	0.68	0.68
Branch	1900.00	100yrARI	50.50	227.84	229.16	228.67	229.29	0.002000	1.60	31.54	27.91	0.48	21.83	-787.11	0.68	0.68
Branch	1800.00	100yrARI	50.50	227.64	228.96	228.47	229.09	0.001998	1.60	31.54	27.90	0.48	21.82	-787.59	0.68	0.68
Branch	1700.00	100yrARI	50.50	227.44	228.76	228.27	228.89	0.001998	1.60	31.55	27.91	0.48	21.82	-788.08	0.68	0.68
Branch	1600.00	100yrARI	50.50	227.24	228.56	228.07	228.69	0.001996	1.60	31.56	27.91	0.48	21.80	-814.40	0.68	0.68
Branch	1500.00	100yrARI	50.50	227.04	228.36	227.87	228.49	0.001996	1.60	31.56	27.91	0.48	21.80	-853.19	0.68	0.68
Branch	1400.00	100yrARI	50.50	226.84	228.16	227.67	228.29	0.001997	1.60	31.55	27.91	0.48	21.81	-843.60	0.68	0.68
Branch	1300.00	100yrARI	50.50	226.64	227.96	227.47	228.09	0.001994	1.60	31.57	27.92	0.48	21.78	-819.67	0.68	0.68
Branch	1200.00	100yrARI	50.50	226.44	227.76	227.27	227.89	0.001986	1.60	31.61	27.92	0.48	21.72	-795.74	0.68	0.68

HEC-RAS Plan: Plan 03 River: S1D5 Reach: Branch Profile: 100yrARI (Continued)

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
Branch	1100.00	100yrARI	50.50	226.24	227.56	227.07	227.69	0.001976	1.59	31.67	27.93	0.48	21.64	-771.79	0.68	0.68
Branch	1000.00	100yrARI	50.50	226.04	227.36	226.87	227.49	0.001960	1.59	31.75	27.94	0.48	21.51	-757.43	0.68	0.68
Branch	900.00	100yrARI	50.50	225.84	227.17	226.67	227.30	0.001932	1.58	31.90	27.98	0.47	21.28	-790.47	0.67	0.67
Branch	800.00	100yrARI	50.50	225.64	226.98	226.47	227.11	0.001881	1.57	32.18	28.03	0.47	20.86	-834.99	0.65	0.69
Branch	700.00	100yrARI	50.50	225.44	226.80	226.27	226.92	0.001805	1.55	32.64	28.14	0.46	20.21	-871.37	0.78	0.84
Branch	600.00	100yrARI	50.50	225.24	226.62	226.07	226.74	0.001689	1.51	33.38	28.30	0.44	19.22	-840.26	1.20	1.14
Branch	500.00	100yrARI	50.50	225.04	226.46	225.87	226.57	0.001526	1.46	34.52	28.54	0.42	17.82	-857.98	1.41	1.42
Branch	400.00	100yrARI	50.50	224.84	226.32	225.67	226.42	0.001312	1.39	36.35	28.98	0.40	15.88	-1040.39	1.80	1.65
Branch	300.00	100yrARI	50.50	224.64	226.21	225.47	226.30	0.001085	1.30	38.72	29.40	0.36	13.78	-1092.10	1.93	1.92
Branch	200.00	100yrARI	50.50	224.44	226.12	225.27	226.19	0.000852	1.20	42.01	30.06	0.32	11.47	-1038.00	2.10	2.06
Branch	100.00	100yrARI	50.50	224.24	226.05	225.07	226.11	0.000652	1.10	46.01	30.84	0.29	9.37	-1080.13	2.05	2.02

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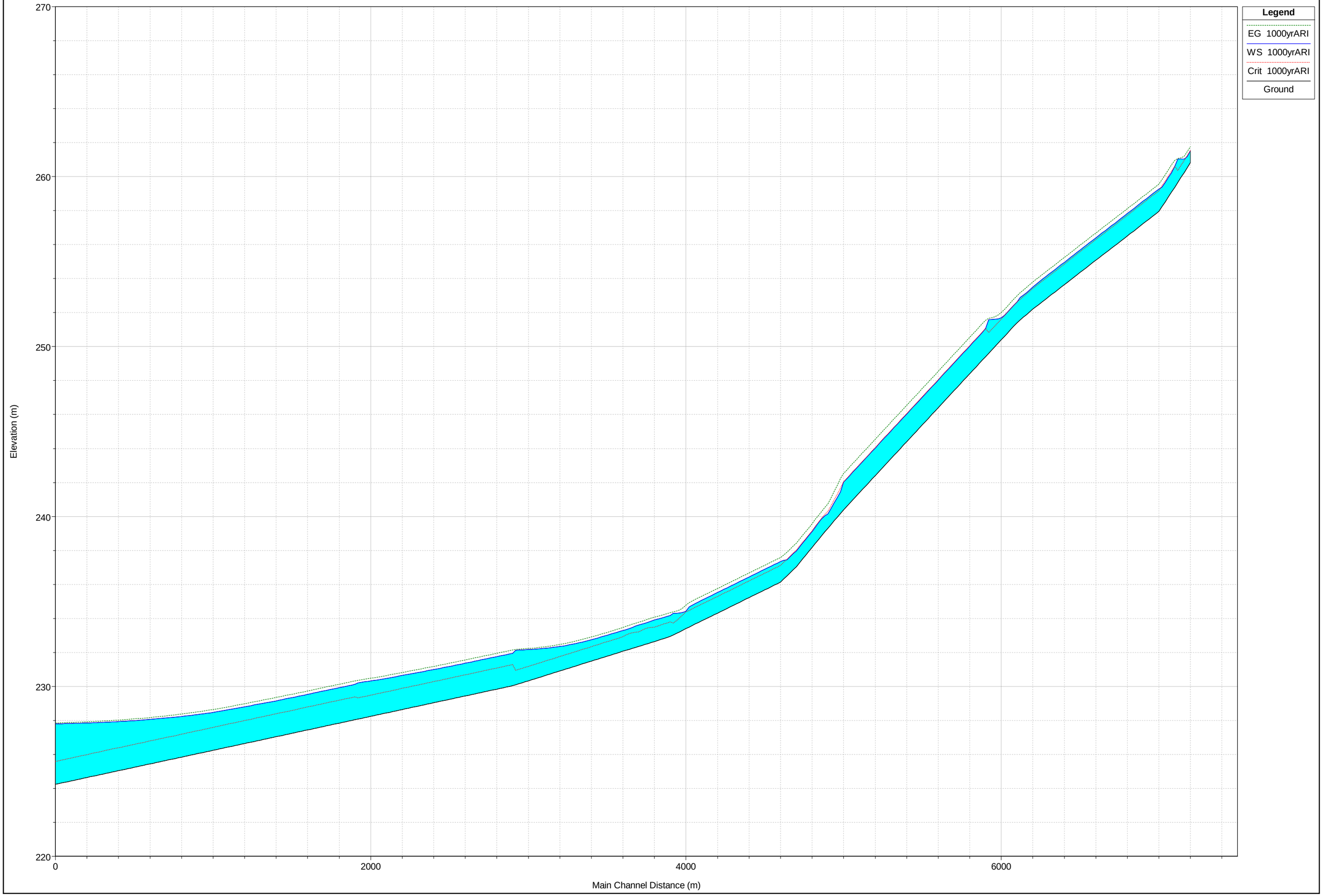

HEC-RAS Plan: Plan 03 River: S1D5 Reach: Branch Profile: 1000yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
Branch	7300.00	1000yrARI	6.20	260.82	261.52	261.52	261.76	0.012143	2.15	2.88	6.20	1.01	53.34	-408.40	1.31	0.48
Branch	7200.00	1000yrARI	18.59	259.37	260.60	260.60	260.96	0.010668	2.64	7.05	10.03	1.01	70.20	-427.55	0.77	0.80
Branch	7100.00	1000yrARI	18.59	257.95	259.27	259.17	259.55	0.007188	2.36	7.89	9.94	0.84	53.64	-486.92	1.68	1.08
Branch	7000.00	1000yrARI	18.59	257.23	258.55	258.45	258.83	0.007154	2.35	7.91	9.95	0.84	53.44	-479.74	0.98	1.42
Branch	6900.00	1000yrARI	18.59	256.51	257.83	257.73	258.12	0.007214	2.36	7.88	9.92	0.85	53.83	-460.11	1.54	1.93
Branch	6800.00	1000yrARI	18.59	255.79	257.12	257.01	257.40	0.007132	2.35	7.91	9.94	0.84	53.35	-517.08	1.90	1.64
Branch	6700.00	1000yrARI	18.59	255.08	256.40	256.30	256.68	0.007171	2.35	7.90	9.94	0.84	53.55	-510.86	2.01	1.91
Branch	6600.00	1000yrARI	18.59	254.36	255.68	255.58	255.96	0.007171	2.35	7.90	9.95	0.84	53.54	-541.49	1.75	2.08
Branch	6500.00	1000yrARI	18.59	253.64	254.96	254.86	255.25	0.007215	2.36	7.88	9.93	0.85	53.82	-569.75	2.22	2.46
Branch	6400.00	1000yrARI	18.59	252.92	254.24	254.14	254.53	0.007162	2.35	7.90	9.95	0.84	53.49	-667.90	2.73	3.32
Branch	6300.00	1000yrARI	18.59	252.20	253.49	253.42	253.80	0.007993	2.45	7.58	9.74	0.89	58.51	-1404.74	8.02	8.50
Branch	6200.00	1000yrARI	18.59	251.40	252.63	252.62	252.99	0.009970	2.66	6.99	9.38	0.98	69.88	-1489.96	8.49	9.42
Branch	6100.00	1000yrARI	18.59	250.40	251.70	251.62	252.00	0.007770	2.43	7.66	9.79	0.88	57.16	-1452.14	8.30	9.05
Branch	6000.00	1000yrARI	35.72	249.40	251.06	251.06	251.54	0.009374	3.07	11.63	11.99	1.00	85.35	-1419.58	7.91	8.46
Branch	5900.00	1000yrARI	35.72	248.40	250.03	250.06	250.55	0.010288	3.18	11.23	11.79	1.04	92.03	-1340.59	7.31	7.75
Branch	5800.00	1000yrARI	35.72	247.40	249.03	249.06	249.54	0.010235	3.18	11.25	11.78	1.04	91.71	-1203.65	6.44	6.68
Branch	5700.00	1000yrARI	35.72	246.40	248.03	248.05	248.54	0.010176	3.17	11.28	11.80	1.03	91.27	-1078.22	5.56	5.55
Branch	5600.00	1000yrARI	35.72	245.40	247.03	247.06	247.54	0.010235	3.18	11.25	11.79	1.04	91.69	-971.92	4.70	4.49
Branch	5500.00	1000yrARI	35.72	244.40	246.03	246.06	246.54	0.010205	3.17	11.26	11.79	1.04	91.48	-876.16	3.54	3.49
Branch	5400.00	1000yrARI	35.72	243.40	245.03	245.06	245.54	0.010243	3.17	11.25	11.80	1.04	91.69	-729.18	2.56	2.43
Branch	5300.00	1000yrARI	35.72	242.40	244.03	244.05	244.54	0.010226	3.17	11.26	11.79	1.04	91.61	-594.64	1.79	1.84
Branch	5200.00	1000yrARI	35.72	241.40	243.03	243.06	243.54	0.010175	3.17	11.27	11.79	1.03	91.29	-591.29	1.07	1.09
Branch	5100.00	1000yrARI	35.72	240.39	242.02	242.05	242.54	0.010313	3.18	11.22	11.77	1.04	92.28	-575.01	1.05	0.81
Branch	5000.00	1000yrARI	35.72	239.31	240.15	240.30	240.74	0.017082	3.39	10.52	15.03	1.29	115.21	-685.14	2.34	1.96
Branch	4900.00	1000yrARI	35.72	238.18	239.11	239.16	239.57	0.011754	2.99	11.96	15.60	1.09	86.65	-873.77	2.81	2.20
Branch	4800.00	1000yrARI	35.72	237.05	237.98	238.03	238.44	0.011770	2.99	11.95	15.60	1.09	86.73	-814.88	2.91	2.19
Branch	4700.00	1000yrARI	35.72	236.14	237.35	237.12	237.59	0.004584	2.16	16.54	17.28	0.70	42.08	-743.07	1.72	1.57
Branch	4600.00	1000yrARI	35.72	235.68	236.90	236.66	237.13	0.004527	2.15	16.61	17.29	0.70	41.70	-540.55	0.79	0.75
Branch	4500.00	1000yrARI	35.72	235.23	236.44	236.21	236.68	0.004578	2.16	16.56	17.31	0.70	41.99	-633.43	0.86	0.56
Branch	4400.00	1000yrARI	35.72	234.77	235.98	235.75	236.22	0.004581	2.16	16.54	17.26	0.70	42.08	-551.55	0.81	1.17
Branch	4300.00	1000yrARI	35.72	234.31	235.53	235.29	235.76	0.004515	2.15	16.62	17.28	0.70	41.62	-580.76	1.08	0.84
Branch	4200.00	1000yrARI	35.72	233.86	235.07	234.84	235.31	0.004621	2.17	16.49	17.25	0.71	42.35	-601.82	1.24	1.59
Branch	4100.00	1000yrARI	35.72	233.40	234.42	234.39	234.79	0.008593	2.68	13.31	16.12	0.94	68.20	-650.67	1.31	1.59
Branch	4000.00	1000yrARI	52.88	232.94	234.18	233.80	234.34	0.002739	1.81	29.28	27.41	0.56	28.29	-884.78	1.18	1.32
Branch	3900.00	1000yrARI	52.88	232.64	233.92	233.49	234.07	0.002432	1.74	30.46	27.65	0.53	25.88	-772.75	0.72	0.68
Branch	3800.00	1000yrARI	52.88	232.35	233.62	233.21	233.78	0.002508	1.75	30.14	27.58	0.54	26.49	-731.09	0.75	0.97
Branch	3700.00	1000yrARI	52.88	232.07	233.29	232.92	233.46	0.002832	1.83	28.97	27.36	0.57	28.99	-710.03	0.78	0.90
Branch	3600.00	1000yrARI	52.88	231.78	233.02	232.63	233.18	0.002738	1.80	29.29	27.43	0.56	28.26	-752.64	0.77	0.40
Branch	3500.00	1000yrARI	52.88	231.49	232.75	232.34	232.91	0.002521	1.75	30.13	27.65	0.54	26.54	-742.11	0.64	0.66
Branch	3400.00	1000yrARI	52.88	231.20	232.53	232.05	232.67	0.002142	1.66	31.80	27.98	0.50	23.51	-701.89	0.67	0.56
Branch	3300.00	1000yrARI	52.88	230.91	232.35	231.76	232.47	0.001599	1.51	35.05	28.64	0.44	18.88	-756.47	0.56	0.13
Branch	3200.00	1000yrARI	52.88	230.62	232.24	231.47	232.33	0.001062	1.31	40.23	29.71	0.36	13.86	-802.43	0.38	0.38
Branch	3100.00	1000yrARI	52.88	230.33	232.17	231.18	232.23	0.000676	1.13	46.91	31.02	0.29	9.83	-848.39	0.16	0.09
Branch	3000.00	1000yrARI	96.30	230.04	231.95	231.29	232.15	0.001957	1.96	49.14	31.46	0.50	29.40	-894.36	0.09	0.03
Branch	2900.00	1000yrARI	96.30	229.84	231.76	231.09	231.95	0.001939	1.95	49.29	31.49	0.50	29.20	-887.66	0.08	0.08
Branch	2800.00	1000yrARI	96.30	229.64	231.56	230.89	231.76	0.001911	1.94	49.54	31.53	0.49	28.87	-866.59	0.08	0.08
Branch	2700.00	1000yrARI	96.30	229.44	231.37	230.69	231.56	0.001891	1.94	49.73	31.58	0.49	28.63	-845.53	0.07	0.07
Branch	2600.00	1000yrARI	96.30	229.24	231.18	230.49	231.37	0.001860	1.93	50.00	31.63	0.49	28.28	-824.46	0.06	0.06
Branch	2500.00	1000yrARI	96.30	229.04	231.00	230.29	231.18	0.001802	1.91	50.55	31.73	0.48	27.61	-803.87	0.04	0.04
Branch	2400.00	1000yrARI	96.30	228.84	230.82	230.09	231.00	0.001726	1.88	51.30	31.87	0.47	26.71	-778.49	0.02	0.02
Branch	2300.00	1000yrARI	96.30	228.64	230.65	229.89	230.82	0.001734	1.84	52.22	33.43	0.47	26.04	-747.86	-0.01	-0.01
Branch	2200.00	1000yrARI	96.30	228.44	230.48	229.69	230.64	0.001675	1.81	53.25	34.17	0.46	25.07	-717.69	-0.04	-0.04
Branch	2100.00	1000yrARI	96.30	228.24	230.32	229.49	230.48	0.001435	1.76	54.69	32.37	0.43	23.17	-733.02	-0.08	-0.08
Branch	2000.00	1000yrARI	109.31	228.04	230.12	229.39	230.32	0.002010	1.99	54.90	34.88	0.51	30.31	-764.13	-0.08	-0.08
Branch	1900.00	1000yrARI	109.31	227.84	229.93	229.19	230.13	0.001909	1.99	54.91	33.55	0.50	29.91	-787.11	-0.09	-0.09
Branch	1800.00	1000yrARI	109.31	227.64	229.73	228.99	229.93	0.002007	1.97	55.35	35.56	0.51	29.93	-787.59	-0.09	-0.09
Branch	1700.00	1000yrARI	109.31	227.44	229.53	228.79	229.73	0.001992	1.98	55.31	35.30	0.50	29.91	-788.08	-0.09	-0.09
Branch	1600.00	1000yrARI	109.31	227.24	229.34	228.59	229.54	0.001830	1.97	55.52	34.48	0.49	29.20	-814.40	-0.10	-0.10
Branch	1500.00	1000yrARI	109.31	227.04	229.15	228.39	229.35	0.001831	1.99	54.89	31.82	0.48	29.62	-853.19	-0.11	-0.11
Branch	1400.00	1000yrARI	109.31	226.84	228.98	228.19	229.17	0.001806	1.92	56.89	35.09	0.48	27.98	-843.60	-0.14	-0.14
Branch	1300.00	1000yrARI	109.31	226.64	228.80	227.99	228.98	0.001768	1.89	57.83	35.96	0.48	27.15	-819.67	-0.16	-0.16
Branch	1200.00	1000yrARI	109.31	226.44	228.63	227.79	228.81	0.001677	1.86	58.91	36.14	0.46	26.07	-795.74	-0.19	-0.19

HEC-RAS Plan: Plan 03 River: S1D5 Reach: Branch Profile: 1000yrARI (Continued)

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
Branch	1100.00	1000yrARI	109.31	226.24	228.47	227.59	228.64	0.001435	1.84	59.48	32.57	0.43	24.70	-771.79	-0.23	-0.23
Branch	1000.00	1000yrARI	109.31	226.04	228.34	227.39	228.50	0.001268	1.76	62.00	32.97	0.41	22.51	-757.43	-0.30	-0.30
Branch	900.00	1000yrARI	109.31	225.84	228.23	227.19	228.38	0.001112	1.67	65.34	33.95	0.38	20.13	-790.47	-0.39	-0.39
Branch	800.00	1000yrARI	109.31	225.64	228.14	226.99	228.26	0.000953	1.57	69.51	35.17	0.36	17.66	-834.99	-0.51	-0.47
Branch	700.00	1000yrARI	109.31	225.44	228.06	226.79	228.17	0.000813	1.48	73.83	36.36	0.33	15.50	-871.37	-0.48	-0.42
Branch	600.00	1000yrARI	109.31	225.24	227.99	226.59	228.09	0.000679	1.41	77.76	36.53	0.31	13.71	-840.26	-0.17	-0.23
Branch	500.00	1000yrARI	109.31	225.04	227.93	226.39	228.02	0.000573	1.32	83.00	38.10	0.28	11.92	-857.98	-0.06	-0.05
Branch	400.00	1000yrARI	109.31	224.84	227.89	226.19	227.96	0.000458	1.23	88.99	38.37	0.26	10.15	-1040.39	0.23	0.08
Branch	300.00	1000yrARI	109.31	224.64	227.85	225.99	227.92	0.000378	1.15	95.10	39.24	0.24	8.76	-1092.10	0.29	0.28
Branch	200.00	1000yrARI	109.31	224.44	227.82	225.79	227.88	0.000311	1.07	101.97	40.28	0.22	7.51	-1038.00	0.40	0.36
Branch	100.00	1000yrARI	109.31	224.24	227.80	225.60	227.85	0.000257	1.00	109.14	41.34	0.20	6.46	-1080.13	0.30	0.27

HEC-RAS MODELLING RESULTS FOR DIVERSION DRAIN 6

- 100 Year ARI longsection
- 100 Year ARI Table of Results
- 1000 Year longsection
- 1000 Year ARI Table of Results

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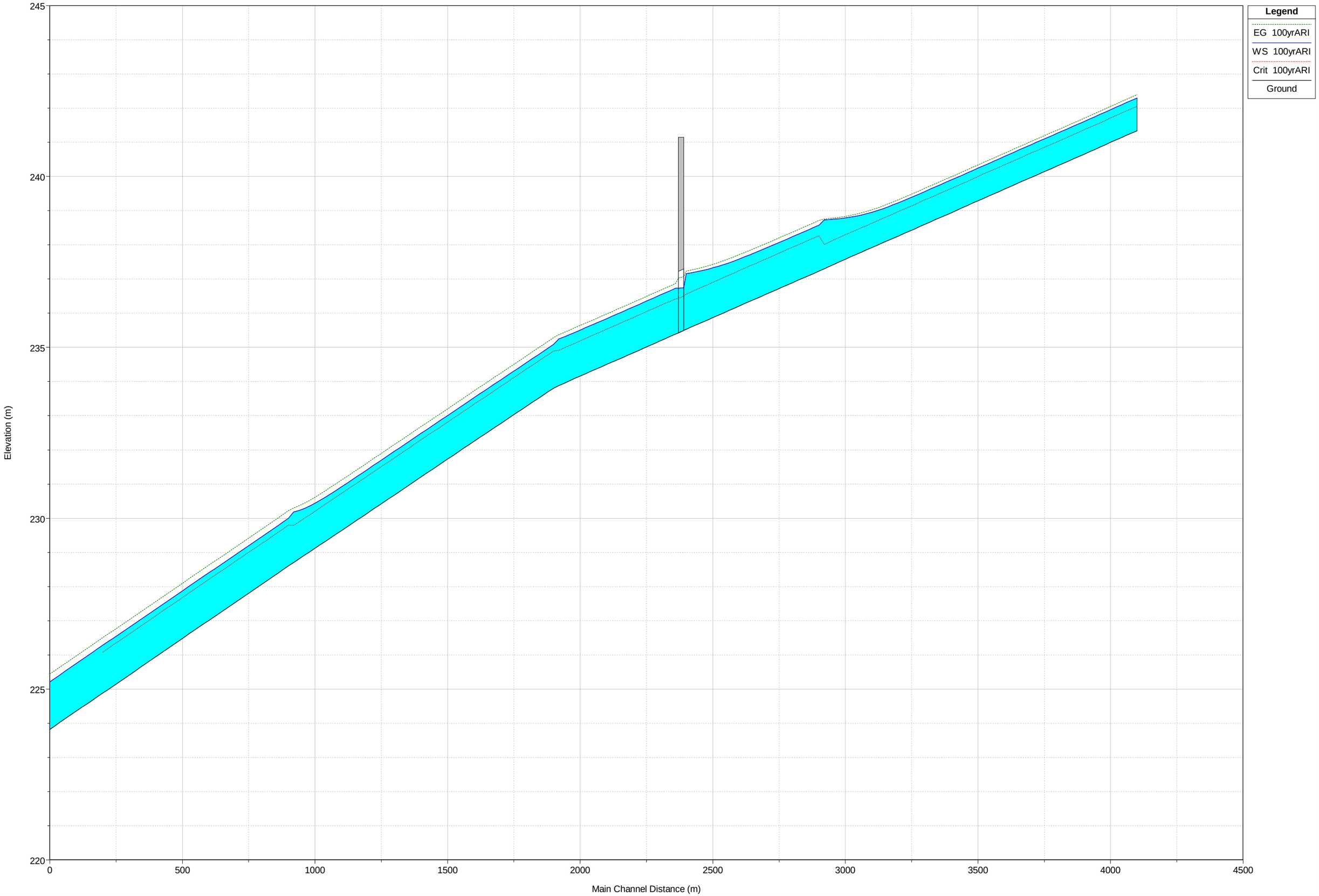

HEC-RAS Plan: Plan 06 River: S1D6 Reach: 100 Profile: 100yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	4200.00	100yrARI	6.34	241.34	242.30	242.05	242.39	0.003415	1.36	4.68	7.75	0.56	19.43	0.00	1.29	1.10
100	4100.00	100yrARI	6.34	241.00	241.96	241.71	242.05	0.003461	1.36	4.66	7.75	0.56	19.62	0.00	1.39	1.37
100	4000.00	100yrARI	6.34	240.65	241.61	241.37	241.70	0.003425	1.36	4.68	7.76	0.56	19.47	0.00	1.42	1.37
100	3900.00	100yrARI	6.34	240.31	241.27	241.02	241.36	0.003388	1.35	4.69	7.76	0.55	19.32	0.00	1.58	1.02
100	3800.00	100yrARI	6.34	239.97	240.93	240.69	241.02	0.003417	1.36	4.68	7.75	0.56	19.44	0.00	1.58	1.34
100	3700.00	100yrARI	6.34	239.63	240.59	240.35	240.68	0.003417	1.36	4.68	7.75	0.56	19.44	0.00	1.59	1.49
100	3600.00	100yrARI	6.34	239.29	240.24	240.00	240.34	0.003452	1.36	4.66	7.74	0.56	19.60	0.00	1.49	1.14
100	3500.00	100yrARI	6.34	238.94	239.90	239.65	239.99	0.003385	1.35	4.69	7.76	0.55	19.30	0.00	1.38	1.28
100	3400.00	100yrARI	6.34	238.60	239.56	239.32	239.66	0.003373	1.35	4.70	7.77	0.55	19.25	0.00	1.32	1.24
100	3300.00	100yrARI	6.34	238.26	239.23	238.97	239.32	0.003217	1.33	4.78	7.83	0.54	18.52	0.00	1.53	1.20
100	3200.00	100yrARI	6.34	237.92	238.95	238.64	239.03	0.002495	1.21	5.26	8.19	0.48	15.09	0.00	1.44	1.33
100	3100.00	100yrARI	6.34	237.58	238.79	238.30	238.83	0.001253	0.93	6.79	9.26	0.35	8.65	0.00	1.44	1.30
100	3000.00	100yrARI	13.24	237.23	238.58	238.27	238.71	0.003393	1.63	8.10	10.06	0.58	25.68	0.00	1.35	1.13
100	2900.00	100yrARI	13.24	236.89	238.24	237.93	238.37	0.003385	1.63	8.11	10.06	0.58	25.63	0.00	1.45	1.13
100	2800.00	100yrARI	13.24	236.55	237.90	237.59	238.04	0.003288	1.61	8.20	10.11	0.57	25.04	0.00	1.53	1.37
100	2700.00	100yrARI	13.24	236.21	237.59	237.25	237.71	0.003032	1.57	8.45	10.26	0.55	23.45	0.00	1.45	1.35
100	2600.00	100yrARI	13.24	235.87	237.33	236.90	237.43	0.002353	1.43	9.28	10.74	0.49	19.11	0.00	1.52	1.00
100	2500.00	100yrARI	13.24	235.53	237.16	236.56	237.23	0.001400	1.17	11.27	11.80	0.38	12.55	0.00	1.30	1.07
100	2490		Culvert													
100	2400.00	100yrARI	13.24	235.18	236.53	236.22	236.66	0.003411	1.64	8.09	10.05	0.58	25.79	0.00	1.39	1.38
100	2300.00	100yrARI	13.24	234.84	236.18	235.87	236.32	0.003428	1.64	8.07	10.05	0.58	25.88	0.00	1.56	1.36
100	2200.00	100yrARI	13.24	234.50	235.84	235.53	235.98	0.003392	1.63	8.10	10.06	0.58	25.67	0.00	1.39	1.29
100	2100.00	100yrARI	13.24	234.16	235.51	235.19	235.64	0.003320	1.62	8.17	10.10	0.58	25.24	0.00	1.28	1.19
100	2000.00	100yrARI	14.64	233.81	235.09	234.90	235.29	0.005214	1.97	7.44	9.65	0.72	37.80	0.00	1.08	0.94
100	1900.00	100yrARI	14.64	233.29	234.57	234.38	234.77	0.005234	1.97	7.43	9.65	0.72	37.90	0.00	1.04	0.94
100	1800.00	100yrARI	14.64	232.77	234.05	233.85	234.24	0.005199	1.97	7.45	9.66	0.71	37.70	0.00	1.09	1.04
100	1700.00	100yrARI	14.64	232.25	233.53	233.34	233.72	0.005175	1.96	7.47	9.68	0.71	37.54	0.00	1.11	0.98
100	1600.00	100yrARI	14.64	231.73	233.01	232.81	233.20	0.005207	1.97	7.45	9.66	0.71	37.75	0.00	1.12	0.95
100	1500.00	100yrARI	14.64	231.21	232.48	232.30	232.68	0.005246	1.97	7.43	9.65	0.72	37.96	0.00	1.11	0.89
100	1400.00	100yrARI	14.64	230.68	231.96	231.77	232.16	0.005203	1.97	7.45	9.66	0.71	37.71	0.00	1.24	1.03
100	1300.00	100yrARI	14.64	230.16	231.44	231.25	231.64	0.005204	1.97	7.45	9.65	0.71	37.75	0.00	1.11	0.92
100	1200.00	100yrARI	14.64	229.64	230.92	230.72	231.12	0.005141	1.96	7.48	9.68	0.71	37.37	0.00	0.85	0.72
100	1100.00	100yrARI	14.64	229.12	230.44	230.20	230.61	0.004508	1.86	7.86	9.92	0.67	33.58	0.00	0.59	0.68
100	1000.00	100yrARI	17.99	228.60	229.99	229.80	230.22	0.005323	2.09	8.61	10.36	0.73	41.56	0.00	1.31	1.25
100	900.00	100yrARI	17.99	228.07	229.46	229.26	229.68	0.005282	2.08	8.64	10.38	0.73	41.30	0.00	2.04	1.93
100	800.00	100yrARI	17.99	227.54	228.93	228.74	229.16	0.005293	2.08	8.63	10.37	0.73	41.38	0.00	2.47	2.34
100	700.00	100yrARI	17.99	227.01	228.40	228.21	228.63	0.005305	2.09	8.62	10.36	0.73	41.47	0.00	2.67	2.54
100	600.00	100yrARI	17.99	226.48	227.87	227.68	228.09	0.005305	2.09	8.62	10.36	0.73	41.47	0.00	2.44	2.31
100	500.00	100yrARI	17.99	225.95	227.34	227.15	227.56	0.005303	2.09	8.62	10.37	0.73	41.45	0.00	1.98	1.89
100	400.00	100yrARI	17.99	225.41	226.81	226.61	227.03	0.005278	2.08	8.64	10.38	0.73	41.28	0.00	1.37	1.11
100	300.00	100yrARI	17.99	224.88	226.28	226.08	226.50	0.005256	2.08	8.65	10.38	0.73	41.15	0.00	0.78	0.68
100	200.00	100yrARI	17.99	224.36	225.75		225.97	0.005376	2.10	8.58	10.34	0.73	41.90	0.00	0.65	0.87
100	100.00	100yrARI	17.99	223.82	225.22	225.02	225.44	0.005302	2.09	8.62	10.36	0.73	41.46	0.00	1.24	1.15

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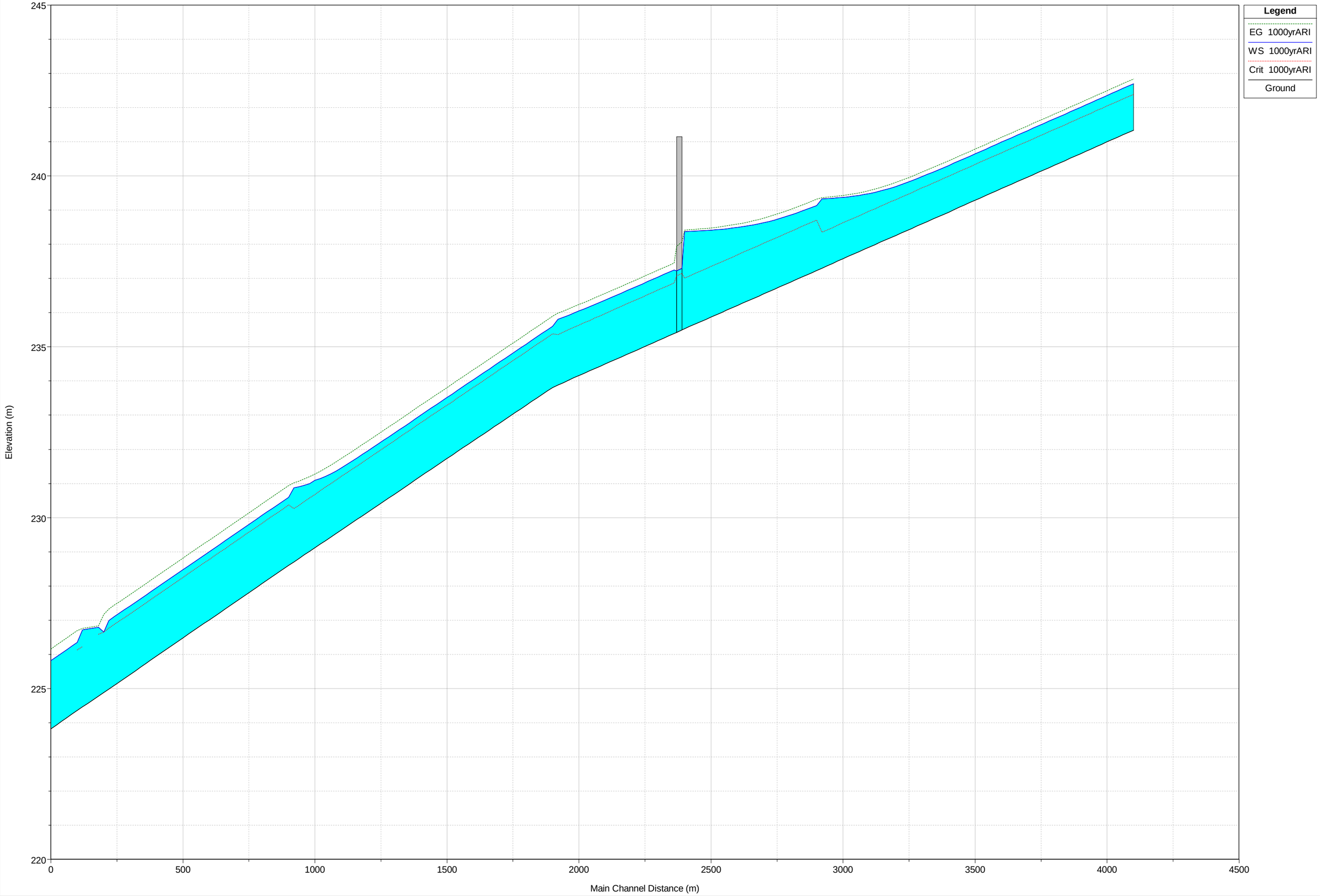

HEC-RAS Plan: Plan 06 River: S1D6 Reach: 100 Profile: 1000yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	4200.00	1000yrARI	13.67	241.34	242.70	242.39	242.84	0.003423	1.65	8.27	10.16	0.58	26.20	0.00	0.89	0.70
100	4100.00	1000yrARI	13.67	241.00	242.36	242.05	242.50	0.003450	1.66	8.25	10.17	0.59	26.33	0.00	0.99	0.97
100	4000.00	1000yrARI	13.67	240.65	242.01	241.71	242.15	0.003419	1.65	8.28	10.17	0.58	26.15	0.00	1.02	0.97
100	3900.00	1000yrARI	13.67	240.31	241.67	241.36	241.81	0.003393	1.65	8.29	10.16	0.58	26.04	0.00	1.18	0.62
100	3800.00	1000yrARI	13.67	239.97	241.33	241.02	241.47	0.003418	1.65	8.28	10.16	0.58	26.16	0.00	1.18	0.94
100	3700.00	1000yrARI	13.67	239.63	240.99	240.68	241.13	0.003417	1.65	8.28	10.16	0.58	26.16	0.00	1.19	1.09
100	3600.00	1000yrARI	13.67	239.29	240.65	240.34	240.79	0.003431	1.65	8.26	10.15	0.59	26.25	0.00	1.08	0.73
100	3500.00	1000yrARI	13.67	238.94	240.31	239.99	240.45	0.003337	1.64	8.35	10.20	0.58	25.66	0.00	0.97	0.87
100	3400.00	1000yrARI	13.67	238.60	239.98	239.65	240.12	0.003173	1.61	8.51	10.29	0.56	24.65	0.00	0.90	0.82
100	3300.00	1000yrARI	13.67	238.26	239.69	239.31	239.81	0.002708	1.51	9.03	10.59	0.52	21.67	0.00	1.07	0.74
100	3200.00	1000yrARI	13.67	237.92	239.49	238.97	239.57	0.001805	1.30	10.50	11.40	0.43	15.61	0.00	0.90	0.79
100	3100.00	1000yrARI	13.67	237.58	239.37	238.63	239.43	0.000966	1.03	13.27	12.80	0.32	9.40	0.00	0.86	0.72
100	3000.00	1000yrARI	27.93	237.23	239.13	238.71	239.32	0.003080	1.90	14.66	13.42	0.58	31.55	0.00	0.80	0.58
100	2900.00	1000yrARI	27.93	236.89	238.85	238.37	239.02	0.002687	1.81	15.43	13.75	0.55	28.25	0.00	0.84	0.52
100	2800.00	1000yrARI	27.93	236.55	238.63	238.03	238.77	0.002020	1.63	17.17	14.50	0.48	22.41	0.00	0.80	0.64
100	2700.00	1000yrARI	27.93	236.21	238.49	237.69	238.59	0.001306	1.38	20.21	15.70	0.39	15.74	0.00	0.55	0.45
100	2600.00	1000yrARI	27.93	235.87	238.41	237.35	238.48	0.000766	1.14	24.51	17.28	0.30	10.32	0.00	0.44	-0.08
100	2500.00	1000yrARI	27.93	235.53	238.37	237.01	238.41	0.000441	0.93	31.24	30.94	0.23	6.61	0.00	0.09	-0.14
100	2490		Culvert													
100	2400.00	1000yrARI	27.93	235.18	237.05	236.67	237.24	0.003404	1.98	14.13	13.17	0.61	34.22	0.00	0.87	0.86
100	2300.00	1000yrARI	27.93	234.84	236.71	236.32	236.90	0.003392	1.97	14.15	13.19	0.61	34.10	0.00	1.03	0.83
100	2200.00	1000yrARI	27.93	234.50	236.37	235.98	236.57	0.003314	1.96	14.27	13.24	0.60	33.49	0.00	0.86	0.76
100	2100.00	1000yrARI	27.93	234.16	236.05	235.63	236.24	0.003167	1.93	14.50	13.33	0.59	32.29	0.00	0.74	0.65
100	2000.00	1000yrARI	31.46	233.81	235.60	235.38	235.89	0.005217	2.39	13.16	12.72	0.75	50.62	0.00	0.57	0.43
100	1900.00	1000yrARI	31.46	233.29	235.08	234.85	235.37	0.005232	2.39	13.15	12.72	0.75	50.73	0.00	0.53	0.43
100	1800.00	1000yrARI	31.46	232.77	234.56	234.34	234.85	0.005195	2.39	13.18	12.73	0.75	50.44	0.00	0.58	0.53
100	1700.00	1000yrARI	31.46	232.25	234.04	233.82	234.33	0.005165	2.38	13.21	12.76	0.75	50.18	0.00	0.60	0.47
100	1600.00	1000yrARI	31.46	231.73	233.52	233.29	233.81	0.005210	2.39	13.16	12.72	0.75	50.57	0.00	0.61	0.44
100	1500.00	1000yrARI	31.46	231.21	233.00	232.77	233.29	0.005232	2.39	13.15	12.72	0.75	50.72	0.00	0.59	0.37
100	1400.00	1000yrARI	31.46	230.68	232.47	232.24	232.76	0.005187	2.38	13.19	12.74	0.75	50.36	0.00	0.73	0.52
100	1300.00	1000yrARI	31.46	230.16	231.96	231.73	232.24	0.005138	2.38	13.23	12.75	0.74	50.01	0.00	0.59	0.40
100	1200.00	1000yrARI	31.46	229.64	231.46	231.21	231.73	0.004802	2.32	14.05	23.58	0.72	47.28	0.00	0.31	0.18
100	1100.00	1000yrARI	31.46	229.12	231.09	230.68	231.27	0.003601	1.92	18.56	36.86	0.62	33.27	0.00	-0.06	0.03
100	1000.00	1000yrARI	41.13	228.60	230.60	230.37	230.94	0.005320	2.58	15.97	13.99	0.77	56.90	0.00	0.70	0.64
100	900.00	1000yrARI	41.13	228.07	230.07	229.84	230.40	0.005281	2.57	16.01	14.01	0.77	56.57	0.00	1.43	1.32
100	800.00	1000yrARI	41.13	227.54	229.54	229.31	229.88	0.005292	2.57	16.00	14.00	0.77	56.67	0.00	1.86	1.73
100	700.00	1000yrARI	41.13	227.01	229.01	228.78	229.35	0.005304	2.57	15.98	13.99	0.77	56.79	0.00	2.06	1.93
100	600.00	1000yrARI	41.13	226.48	228.48	228.25	228.81	0.005303	2.57	15.98	13.98	0.77	56.79	0.00	1.83	1.70
100	500.00	1000yrARI	41.13	225.95	227.95	227.72	228.28	0.005285	2.57	16.00	14.00	0.77	56.62	0.00	1.37	1.28
100	400.00	1000yrARI	41.13	225.41	227.42	227.19	227.75	0.005241	2.56	16.05	14.02	0.76	56.22	0.00	0.76	0.50
100	300.00	1000yrARI	41.13	224.88	226.66	226.66	227.17	0.009336	3.18	12.94	12.62	1.00	89.75	0.00	0.40	0.30
100	200.00	1000yrARI	41.13	224.36	226.35	226.13	226.69	0.005360	2.58	16.01	30.98	0.77	57.26	0.00	0.05	0.27
100	100.00	1000yrARI	41.13	223.82	225.82	225.58	226.16	0.005305	2.57	15.97	13.98	0.77	56.82	0.00	0.64	0.55

HEC-RAS MODELLING RESULTS FOR DIVERSION DRAIN 7

- 100 Year ARI longsection
- 100 Year ARI Table of Results
- 1000 Year longsection
- 1000 Year ARI Table of Results

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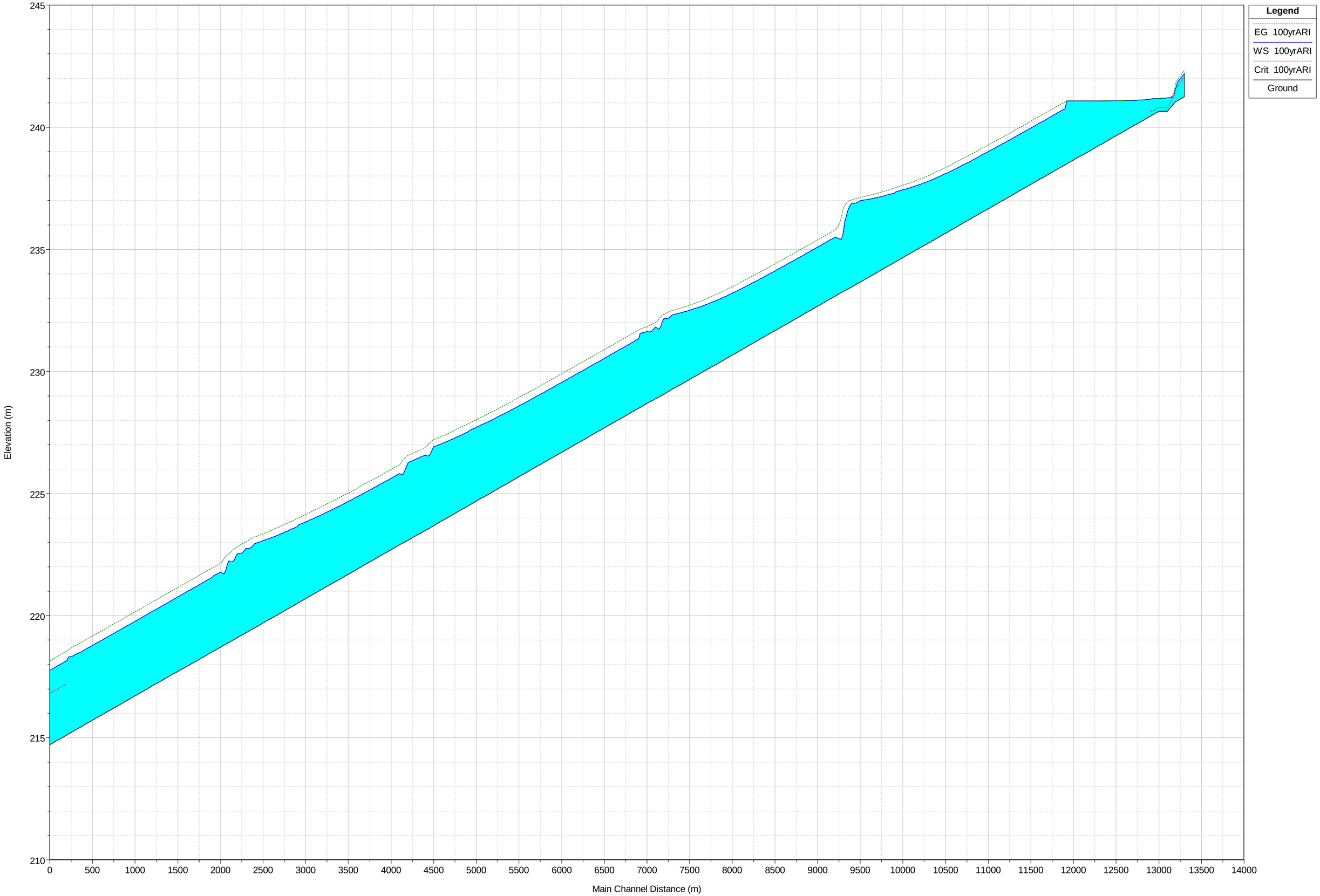

HEC-RAS Plan: Plan 01 River: S1D7 Reach: 100 Profile: 100yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	13400.00	100yrARI	7.61	241.25	242.20	242.03	242.34	0.005069	1.64	4.63	7.71	0.68	28.66	47.12	1.05	1.15
100	13300.00	100yrARI	7.61	241.05	241.60	241.60	241.82	0.011905	2.08	3.66	8.33	1.00	50.31	104.41	1.45	1.08
100	13200.00	100yrARI	7.61	240.65	241.20	240.81	241.20	0.000219	0.27	28.61	72.12	0.13	0.85	0.23	1.45	0.50
100	13100.00	100yrARI	7.61	240.65	241.18	240.80	241.18	0.000263	0.28	26.86	70.73	0.15	0.98	0.28	1.47	0.52
100	13000.00	100yrARI	16.29	240.45	241.15	240.70	241.16	0.000604	0.44	37.14	94.56	0.22	2.32	1.02	1.30	0.33
100	12900.00	100yrARI	16.29	240.25	241.11		241.12	0.000235	0.44	36.74	45.19	0.16	1.86	0.83	1.31	0.88
100	12800.00	100yrARI	16.29	240.05	241.10		241.10	0.000122	0.36	45.25	46.34	0.12	1.16	0.42	2.29	1.93
100	12700.00	100yrARI	16.29	239.85	241.09		241.09	0.000069	0.30	54.30	47.51	0.09	0.76	0.23	2.74	2.62
100	12600.00	100yrARI	16.29	239.65	241.09		241.09	0.000042	0.26	63.59	48.66	0.07	0.53	0.14	3.06	3.11
100	12500.00	100yrARI	16.29	239.45	241.08		241.08	0.000027	0.22	73.27	49.82	0.06	0.38	0.09	3.17	3.45
100	12400.00	100yrARI	16.29	239.25	241.08		241.08	0.000018	0.20	83.16	51.02	0.05	0.29	0.06	2.60	2.96
100	12300.00	100yrARI	16.29	239.05	241.08		241.08	0.000013	0.17	93.49	52.16	0.04	0.22	0.04	1.86	1.83
100	12200.00	100yrARI	16.29	238.85	241.08		241.08	0.000009	0.16	103.86	53.23	0.04	0.17	0.03	1.74	2.20
100	12100.00	100yrARI	16.29	238.66	241.08		241.08	0.000007	0.14	114.27	54.53	0.03	0.14	0.02	1.83	2.15
100	12000.00	100yrARI	253.04	238.46	240.76		241.04	0.001990	2.34	107.98	53.84	0.53	38.61	90.48	2.58	2.94
100	11900.00	100yrARI	253.04	238.26	240.56		240.84	0.001988	2.34	108.01	53.82	0.53	38.58	90.39	3.53	3.91
100	11800.00	100yrARI	253.04	238.06	240.36		240.64	0.001984	2.34	108.07	53.82	0.53	38.53	90.20	3.94	4.63
100	11700.00	100yrARI	253.04	237.86	240.17		240.44	0.001978	2.34	108.18	53.84	0.53	38.44	89.92	4.50	5.16
100	11600.00	100yrARI	253.04	237.66	239.97		240.25	0.001970	2.34	108.33	53.86	0.53	38.32	89.51	4.77	5.68
100	11500.00	100yrARI	253.04	237.46	239.77		240.05	0.001959	2.33	108.53	53.89	0.52	38.16	88.98	4.24	5.81
100	11400.00	100yrARI	253.04	237.26	239.58		239.85	0.001945	2.33	108.79	53.91	0.52	37.96	88.28	4.51	4.95
100	11300.00	100yrARI	253.04	237.06	239.38		239.66	0.001926	2.32	109.13	53.94	0.52	37.69	87.40	4.79	5.41
100	11200.00	100yrARI	253.04	236.86	239.19		239.46	0.001901	2.31	109.61	54.00	0.52	37.32	86.17	5.64	5.81
100	11100.00	100yrARI	253.04	236.66	239.00		239.27	0.001868	2.30	110.24	54.07	0.51	36.84	84.56	5.95	6.22
100	11000.00	100yrARI	255.56	236.46	238.81		239.08	0.001881	2.31	110.71	54.11	0.52	37.22	85.91	6.94	6.16
100	10900.00	100yrARI	255.56	236.26	238.63		238.89	0.001842	2.29	111.48	54.20	0.51	36.64	84.01	5.93	7.05
100	10800.00	100yrARI	255.56	236.06	238.45		238.71	0.001793	2.27	112.50	54.32	0.50	35.90	81.55	5.43	7.61
100	10700.00	100yrARI	255.56	235.86	238.27		238.53	0.001732	2.25	113.80	54.46	0.50	34.98	78.56	5.59	7.45
100	10600.00	100yrARI	255.56	235.66	238.10		238.35	0.001655	2.21	115.51	54.65	0.49	33.82	74.83	5.73	7.50
100	10500.00	100yrARI	255.56	235.46	237.94		238.18	0.001565	2.17	117.70	54.89	0.47	32.42	70.40	5.91	7.55
100	10400.00	100yrARI	255.56	235.26	237.79		238.02	0.001456	2.12	120.55	55.19	0.46	30.72	65.13	6.22	7.72
100	10300.00	100yrARI	255.56	235.06	237.66		237.88	0.001329	2.06	124.24	55.59	0.44	28.70	59.04	6.69	8.10
100	10200.00	100yrARI	255.56	234.86	237.54		237.74	0.001194	1.98	128.79	56.08	0.42	26.48	52.54	7.34	8.49
100	10100.00	100yrARI	255.56	234.66	237.44		237.62	0.001057	1.91	134.14	56.65	0.40	24.16	46.03	7.92	9.27
100	10000.00	100yrARI	275.85	234.46	237.31		237.51	0.001126	2.00	138.26	57.09	0.41	26.30	52.48	8.39	9.48
100	9900.00	100yrARI	275.85	234.26	237.21		237.40	0.000995	1.91	144.09	57.70	0.39	23.97	45.90	8.61	9.67
100	9800.00	100yrARI	275.85	234.06	237.12		237.30	0.000871	1.83	150.69	58.37	0.36	21.68	39.69	8.32	9.85
100	9700.00	100yrARI	275.85	233.86	237.05		237.21	0.000755	1.74	158.15	59.14	0.34	19.46	33.94	8.21	9.93
100	9600.00	100yrARI	275.85	233.66	236.99		237.13	0.000651	1.66	166.28	59.96	0.32	17.39	28.85	8.09	9.97
100	9500.00	100yrARI	275.85	233.46	236.90		237.03	0.000585	1.60	172.48	60.60	0.30	16.03	25.63	8.15	10.04
100	9400.00	100yrARI	275.85	233.27	235.67	235.67	236.66	0.007438	4.40	62.71	32.19	1.01	138.06	607.33	9.40	11.11
100	9300.00	100yrARI	275.85	233.07	235.49		235.79	0.001988	2.41	114.37	54.53	0.53	40.30	97.21	10.46	11.01
100	9200.00	100yrARI	275.85	232.87	235.29		235.59	0.001984	2.41	114.45	54.54	0.53	40.24	96.98	9.84	10.90
100	9100.00	100yrARI	275.85	232.67	235.09		235.39	0.001978	2.41	114.55	54.55	0.53	40.16	96.71	9.74	10.84
100	9000.00	100yrARI	275.85	232.47	234.90		235.19	0.001973	2.41	114.65	54.56	0.53	40.08	96.44	9.87	11.09
100	8900.00	100yrARI	275.85	232.27	234.70		234.99	0.001964	2.40	114.82	54.58	0.53	39.95	95.98	9.78	11.48
100	8800.00	100yrARI	275.85	232.07	234.50		234.80	0.001952	2.40	115.05	54.60	0.53	39.77	95.36	10.26	11.88
100	8700.00	100yrARI	275.85	231.87	234.31		234.60	0.001936	2.39	115.36	54.63	0.53	39.52	94.51	10.73	12.30
100	8600.00	100yrARI	275.85	231.67	234.12		234.40	0.001916	2.38	115.75	54.67	0.52	39.22	93.48	11.33	12.79
100	8500.00	100yrARI	275.85	231.47	233.93		234.21	0.001889	2.37	116.31	54.74	0.52	38.80	92.02	11.98	13.31
100	8400.00	100yrARI	275.85	231.27	233.74		234.02	0.001855	2.36	117.00	54.81	0.52	38.28	90.26	12.60	13.93
100	8300.00	100yrARI	275.85	231.07	233.56		233.83	0.001811	2.34	117.96	54.92	0.51	37.59	87.91	13.16	14.39
100	8200.00	100yrARI	275.85	230.87	233.38		233.65	0.001756	2.31	119.18	55.05	0.50	36.73	85.02	13.52	14.52
100	8100.00	100yrARI	275.85	230.67	233.21		233.47	0.001688	2.28	120.74	55.21	0.49	35.67	81.49	13.83	14.63
100	8000.00	100yrARI	275.85	230.47	233.04		233.30	0.001607	2.25	122.72	55.43	0.48	34.38	77.29	14.14	14.84
100	7900.00	100yrARI	275.85	230.27	232.89		233.13	0.001514	2.20	125.19	55.69	0.47	32.88	72.45	14.68	15.28
100	7800.00	100yrARI	275.85	230.07	232.75		232.98	0.001398	2.15	128.59	56.07	0.45	30.95	66.40	15.28	15.82
100	7700.00	100yrARI	275.85	229.87	232.62		232.84	0.001272	2.08	132.72	56.50	0.43	28.83	59.93	15.84	16.51
100	7600.00	100yrARI	275.85	229.67	232.51		232.71	0.001140	2.00	137.67	57.03	0.41	26.56	53.21	16.14	17.08
100	7500.00	100yrARI	275.85	229.47	232.41		232.60	0.001004	1.92	143.78	57.76	0.39	24.10	46.24	16.39	17.27
100	7400.00	100yrARI	275.85	229.28	232.32		232.49	0.000894	1.85	149.39	58.25	0.37	22.11	40.82	16.37	17.52
100	7300.00	100yrARI	275.85	229.07	232.18		232.34	0.000811	1.78	155.03	59.41	0.35	20.41	36.31	16.08	17.39

HEC-RAS Plan: Plan 01 River: S1D7 Reach: 100 Profile: 100yrARI (Continued)

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	7200.00	100yrARI	275.85	228.88	231.82		232.01	0.000977	1.89	145.68	58.53	0.38	23.48	44.46	16.20	16.25
100	7100.00	100yrARI	275.85	228.69	231.63		231.82	0.001001	1.92	143.81	57.67	0.39	24.08	46.19	16.06	15.74
100	7000.00	100yrARI	366.44	228.49	231.33		231.69	0.001994	2.65	138.08	57.08	0.54	46.55	123.53	15.85	15.30
100	6900.00	100yrARI	366.44	228.29	231.13		231.49	0.001993	2.65	138.11	57.08	0.54	46.53	123.46	15.47	14.76
100	6800.00	100yrARI	366.44	228.09	230.94		231.29	0.001992	2.65	138.13	57.08	0.54	46.52	123.40	15.06	14.23
100	6700.00	100yrARI	366.44	227.89	230.74		231.09	0.001989	2.65	138.21	57.09	0.54	46.46	123.18	14.62	14.00
100	6600.00	100yrARI	366.44	227.69	230.54		230.90	0.001985	2.65	138.29	57.10	0.54	46.39	122.92	14.07	13.74
100	6500.00	100yrARI	366.44	227.49	230.34		230.70	0.001981	2.65	138.39	57.11	0.54	46.32	122.64	13.53	13.22
100	6400.00	100yrARI	366.44	227.29	230.14		230.50	0.001975	2.65	138.52	57.12	0.54	46.22	122.29	12.86	12.87
100	6300.00	100yrARI	366.44	227.09	229.94		230.30	0.001969	2.64	138.65	57.12	0.54	46.12	121.90	12.01	12.56
100	6200.00	100yrARI	366.44	226.89	229.75		230.10	0.001963	2.64	138.81	57.15	0.54	46.01	121.45	11.83	11.57
100	6100.00	100yrARI	366.44	226.69	229.55		229.91	0.001953	2.64	139.03	57.17	0.54	45.84	120.81	11.36	10.85
100	6000.00	100yrARI	367.02	226.49	229.36		229.71	0.001949	2.64	139.28	57.20	0.54	45.80	120.67	10.63	11.10
100	5900.00	100yrARI	367.02	226.29	229.16		229.51	0.001935	2.63	139.62	57.23	0.54	45.55	119.74	10.29	10.58
100	5800.00	100yrARI	367.02	226.09	228.97		229.32	0.001915	2.62	140.11	57.29	0.53	45.19	118.38	9.82	10.23
100	5700.00	100yrARI	367.02	225.89	228.78		229.13	0.001893	2.61	140.67	57.35	0.53	44.79	116.87	9.36	9.81
100	5600.00	100yrARI	367.02	225.69	228.59		228.94	0.001868	2.60	141.28	57.40	0.53	44.35	115.22	8.94	9.35
100	5500.00	100yrARI	367.02	225.49	228.41		228.75	0.001833	2.58	142.19	57.51	0.52	43.72	112.86	8.51	8.66
100	5400.00	100yrARI	367.02	225.29	228.23		228.56	0.001792	2.56	143.26	57.60	0.52	42.99	110.14	8.10	8.23
100	5300.00	100yrARI	367.02	225.09	228.05		228.38	0.001742	2.54	144.65	57.75	0.51	42.07	106.75	7.72	7.53
100	5200.00	100yrARI	367.02	224.89	227.88		228.20	0.001683	2.51	146.30	57.91	0.50	41.01	102.87	7.37	6.89
100	5100.00	100yrARI	367.02	224.69	227.71		228.03	0.001613	2.47	148.42	58.15	0.49	39.71	98.20	7.06	6.34
100	5000.00	100yrARI	380.02	224.49	227.53		227.86	0.001702	2.55	149.21	58.23	0.51	42.07	107.15	6.27	5.92
100	4900.00	100yrARI	380.02	224.29	227.36		227.68	0.001638	2.51	151.16	58.42	0.50	40.86	102.73	5.64	5.40
100	4800.00	100yrARI	380.02	224.09	227.20		227.51	0.001564	2.47	153.55	58.67	0.49	39.45	97.63	5.20	4.84
100	4700.00	100yrARI	380.02	223.89	227.05		227.35	0.001477	2.43	156.50	58.96	0.48	37.80	91.79	4.96	4.92
100	4600.00	100yrARI	380.02	223.69	226.92		227.20	0.001372	2.37	160.55	59.42	0.46	35.71	84.53	4.69	4.83
100	4500.00	100yrARI	380.02	223.48	226.58		226.89	0.001561	2.46	154.37	59.43	0.49	39.13	96.32	4.38	4.53
100	4400.00	100yrARI	380.02	223.29	226.42		226.72	0.001499	2.43	156.40	59.53	0.48	37.97	92.27	3.54	4.69
100	4300.00	100yrARI	380.02	223.09	226.27		226.57	0.001444	2.41	158.01	59.37	0.47	37.05	89.10	3.84	4.63
100	4200.00	100yrARI	380.02	222.90	225.82		226.18	0.001955	2.67	142.42	57.52	0.54	46.70	124.62	4.58	4.80
100	4100.00	100yrARI	380.02	222.70	225.63		225.99	0.001943	2.66	142.73	57.56	0.54	46.48	123.75	4.95	5.10
100	4000.00	100yrARI	380.02	222.50	225.43		225.79	0.001928	2.66	143.11	57.60	0.54	46.20	122.69	5.28	6.07
100	3900.00	100yrARI	380.02	222.30	225.24		225.60	0.001909	2.65	143.57	57.64	0.54	45.87	121.41	5.50	6.37
100	3800.00	100yrARI	380.02	222.10	225.05		225.41	0.001884	2.63	144.23	57.73	0.53	45.41	119.64	6.06	6.79
100	3700.00	100yrARI	380.02	221.90	224.86		225.21	0.001854	2.62	145.00	57.80	0.53	44.86	117.57	6.17	6.69
100	3600.00	100yrARI	380.02	221.70	224.68		225.03	0.001821	2.60	145.89	57.89	0.52	44.25	115.27	6.38	6.92
100	3500.00	100yrARI	380.02	221.50	224.50		224.84	0.001778	2.58	147.06	58.01	0.52	43.47	112.32	6.59	7.14
100	3400.00	100yrARI	380.02	221.30	224.33		224.66	0.001724	2.56	148.57	58.17	0.51	42.48	108.65	6.97	7.36
100	3300.00	100yrARI	380.02	221.10	224.16		224.48	0.001665	2.53	150.35	58.34	0.50	41.36	104.55	7.62	8.09
100	3200.00	100yrARI	380.02	220.90	224.00		224.31	0.001594	2.49	152.57	58.57	0.49	40.02	99.69	8.26	8.45
100	3100.00	100yrARI	380.02	220.70	223.84		224.15	0.001514	2.45	155.23	58.84	0.48	38.50	94.26	8.27	8.52
100	3000.00	100yrARI	399.18	220.50	223.65		223.99	0.001648	2.56	155.95	58.92	0.50	42.04	107.62	8.32	8.57
100	2900.00	100yrARI	399.18	220.30	223.49		223.82	0.001577	2.52	158.27	59.15	0.49	40.68	102.59	8.27	8.51
100	2800.00	100yrARI	399.18	220.10	223.34		223.65	0.001498	2.48	161.07	59.44	0.48	39.11	96.92	8.03	8.43
100	2700.00	100yrARI	399.18	219.90	223.20		223.50	0.001403	2.42	164.69	59.80	0.47	37.21	90.20	8.30	8.41
100	2600.00	100yrARI	399.18	219.70	223.07		223.36	0.001299	2.36	169.03	60.24	0.45	35.11	82.91	8.60	8.60
100	2500.00	100yrARI	399.18	219.50	222.96		223.22	0.001192	2.29	174.05	60.74	0.43	32.88	75.42	8.89	8.76
100	2400.00	100yrARI	399.18	219.30	222.76		223.02	0.001170	2.27	175.64	61.28	0.43	32.29	73.38	9.18	9.75
100	2300.00	100yrARI	399.18	219.11	222.55		222.82	0.001207	2.30	173.32	60.68	0.43	33.20	76.45	9.35	10.16
100	2200.00	100yrARI	399.18	218.90	222.25		222.53	0.001311	2.36	169.12	60.77	0.45	35.16	82.99	9.55	10.53
100	2100.00	100yrARI	399.18	218.71	221.78		222.14	0.001803	2.64	151.28	58.44	0.52	45.01	118.77	9.69	10.49
100	2000.00	100yrARI	413.71	218.51	221.56		221.95	0.001985	2.76	150.01	58.30	0.55	49.26	135.86	9.92	10.27
100	1900.00	100yrARI	413.71	218.31	221.36		221.75	0.001983	2.76	150.07	58.31	0.55	49.22	135.68	10.12	10.30
100	1800.00	100yrARI	413.71	218.11	221.17		221.55	0.001979	2.75	150.19	58.32	0.55	49.14	135.35	9.16	9.24
100	1700.00	100yrARI	413.71	217.91	220.97		221.35	0.001972	2.75	150.36	58.33	0.55	49.01	134.84	8.42	8.62
100	1600.00	100yrARI	413.71	217.72	220.77		221.16	0.001994	2.76	149.83	58.32	0.55	49.41	136.43	7.54	7.66
100	1500.00	100yrARI	413.71	217.52	220.57		220.96	0.001994	2.76	149.82	58.31	0.55	49.41	136.43	6.98	6.83
100	1400.00	100yrARI	413.71	217.32	220.37		220.76	0.001993	2.76	149.86	58.31	0.55	49.38	136.33	6.29	6.32
100	1300.00	100yrARI	413.71	217.12	220.17		220.56	0.001990	2.76	149.94	58.33	0.55	49.32	136.08	5.55	5.70
100	1200.00	100yrARI	413.71	216.92	219.97		220.36	0.001988	2.76	149.98	58.32	0.55	49.29	135.97	3.79	4.15
100	1100.00	100yrARI	413.71	216.72	219.77		220.16	0.001987	2.76	150.01	58.32	0.55	49.27	135.89	3.38	3.10

HEC-RAS Plan: Plan 01 River: S1D7 Reach: 100 Profile: 100yrARI (Continued)

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	1000.00	100yrARI	413.71	216.52	219.57		219.96	0.001981	2.76	150.15	58.34	0.55	49.17	135.47	3.41	2.78
100	900.00	100yrARI	413.71	216.32	219.38		219.76	0.001977	2.75	150.25	58.35	0.55	49.09	135.18	2.48	2.22
100	800.00	100yrARI	413.71	216.12	219.18		219.56	0.001970	2.75	150.41	58.35	0.55	48.97	134.71	2.27	2.31
100	700.00	100yrARI	413.71	215.92	218.98		219.37	0.001964	2.75	150.58	58.37	0.55	48.85	134.22	1.55	1.68
100	600.00	100yrARI	413.71	215.72	218.79		219.17	0.001955	2.74	150.81	58.39	0.54	48.68	133.54	0.96	1.12
100	500.00	100yrARI	413.71	215.52	218.59		218.97	0.001944	2.74	151.09	58.42	0.54	48.48	132.74	0.57	0.68
100	400.00	100yrARI	413.71	215.32	218.40		218.77	0.001879	2.70	163.59	123.07	0.53	47.04	126.97	0.42	0.42
100	300.00	100yrARI	413.71	215.12	218.17	217.22	218.55	0.002000	2.76	149.65	58.27	0.55	49.54	136.95	0.45	0.45
100	200.00	100yrARI	413.71	214.92	217.97	217.02	218.35	0.002000	2.76	149.65	58.27	0.55	49.53	136.93	0.45	0.45
100	100.00	100yrARI	413.71	214.72	217.76	216.82	218.15	0.002002	2.77	149.61	58.28	0.55	49.57	137.07	0.46	0.46

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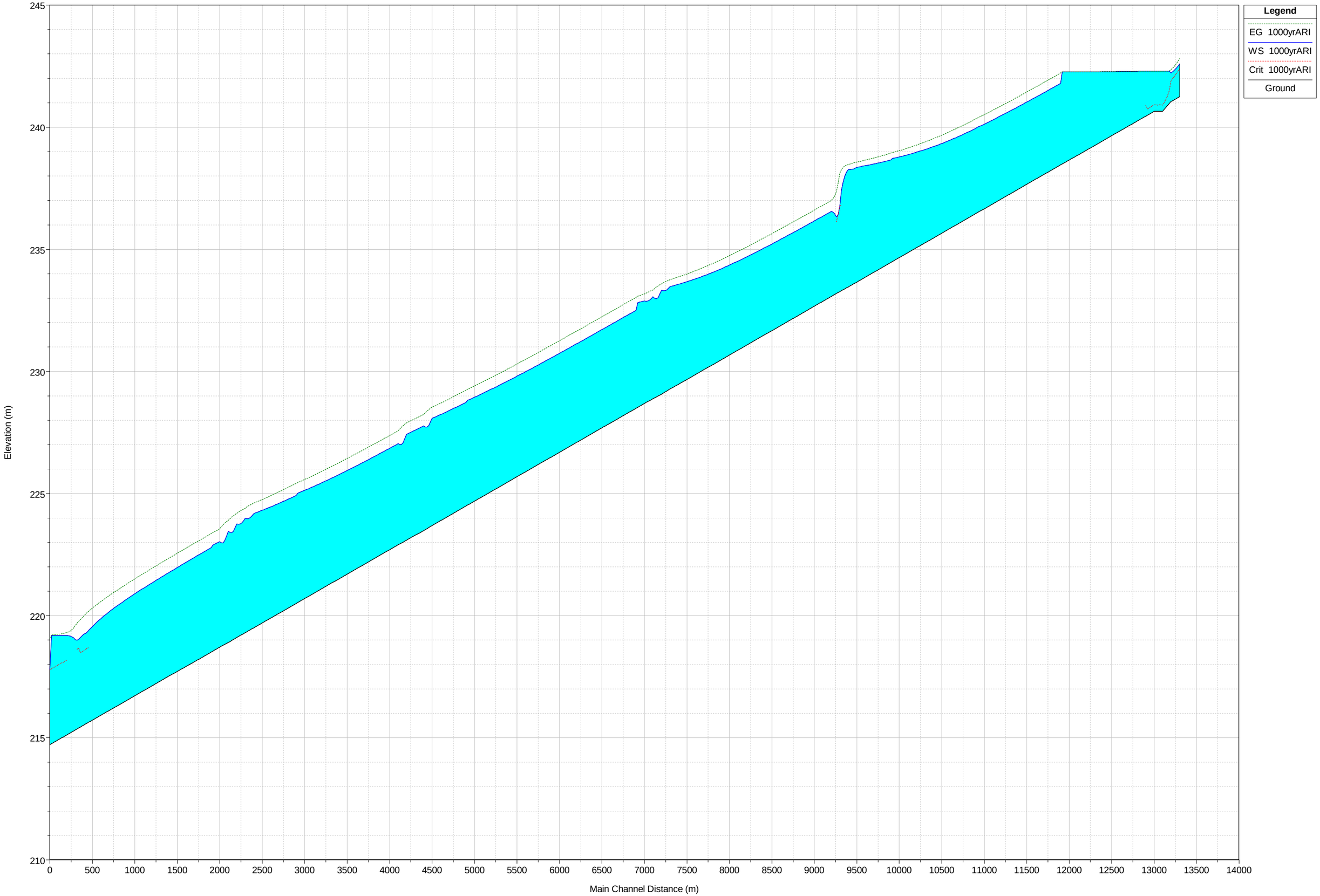


HEC-RAS Plan: Plan 01 River: S1D7 Reach: 100 Profile: 1000yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	13400.00	1000yrARI	16.56	241.25	242.59	242.40	242.81	0.005282	2.04	8.11	10.06	0.73	40.04	81.70	0.66	0.76
100	13300.00	1000yrARI	16.56	241.05	242.22	241.91	242.36	0.003321	1.66	9.98	12.05	0.58	26.15	43.39	0.83	0.46
100	13200.00	1000yrARI	16.56	240.65	242.29	240.91	242.29	0.000009	0.12	151.38	156.66	0.03	0.12	0.01	0.36	-0.59
100	13100.00	1000yrARI	16.56	240.65	242.29	240.91	242.29	0.000009	0.12	151.23	156.57	0.03	0.12	0.01	0.36	-0.59
100	13000.00	1000yrARI	34.90	240.45	242.29	240.89	242.29	0.000021	0.19	209.67	204.38	0.05	0.28	0.05	0.16	-0.81
100	12900.00	1000yrARI	34.90	240.25	242.29		242.29	0.000037	0.30	174.10	209.26	0.07	0.65	0.19	0.13	-0.30
100	12800.00	1000yrARI	34.90	240.05	242.28		242.29	0.000039	0.32	127.33	154.21	0.07	0.74	0.24	1.11	0.75
100	12700.00	1000yrARI	34.90	239.85	242.28		242.28	0.000031	0.30	114.90	54.62	0.07	0.64	0.19	1.55	1.43
100	12600.00	1000yrARI	34.90	239.65	242.27		242.28	0.000024	0.28	125.71	55.81	0.06	0.52	0.14	1.88	1.93
100	12500.00	1000yrARI	34.90	239.45	242.27		242.28	0.000019	0.26	136.85	56.99	0.05	0.43	0.11	1.98	2.26
100	12400.00	1000yrARI	34.90	239.25	242.27		242.27	0.000015	0.23	154.87	105.75	0.05	0.36	0.08	1.41	1.77
100	12300.00	1000yrARI	34.90	239.05	242.27		242.27	0.000011	0.21	195.33	167.91	0.04	0.28	0.06	0.67	0.64
100	12200.00	1000yrARI	34.90	238.85	242.27		242.27	0.000009	0.19	221.83	193.72	0.04	0.23	0.05	0.55	1.01
100	12100.00	1000yrARI	34.90	238.66	242.27		242.27	0.000008	0.19	207.00	161.95	0.03	0.22	0.04	0.64	0.96
100	12000.00	1000yrARI	480.27	238.46	241.80		242.22	0.001949	2.88	167.02	60.05	0.55	52.21	150.12	1.54	1.90
100	11900.00	1000yrARI	480.27	238.26	241.60		242.02	0.001938	2.87	167.31	60.07	0.55	52.00	149.26	2.49	2.87
100	11800.00	1000yrARI	480.27	238.06	241.41		241.83	0.001924	2.86	167.71	60.10	0.55	51.72	148.12	2.89	3.58
100	11700.00	1000yrARI	480.27	237.86	241.22		241.63	0.001907	2.85	168.24	60.16	0.54	51.36	146.61	3.45	4.11
100	11600.00	1000yrARI	480.27	237.66	241.03		241.44	0.001885	2.84	168.89	60.23	0.54	50.92	144.80	3.71	4.62
100	11500.00	1000yrARI	480.27	237.46	240.84		241.25	0.001860	2.83	169.68	60.31	0.54	50.39	142.63	3.17	4.74
100	11400.00	1000yrARI	480.27	237.26	240.66		241.06	0.001829	2.81	170.63	60.41	0.53	49.76	140.07	3.43	3.87
100	11300.00	1000yrARI	480.27	237.06	240.48		240.88	0.001794	2.80	171.75	60.51	0.53	49.04	137.13	3.69	4.31
100	11200.00	1000yrARI	480.27	236.86	240.30		240.69	0.001752	2.77	173.15	60.64	0.52	48.16	133.58	4.53	4.70
100	11100.00	1000yrARI	480.27	236.66	240.13		240.51	0.001703	2.75	174.83	60.81	0.52	47.13	129.46	4.82	5.09
100	11000.00	1000yrARI	485.03	236.46	239.95		240.34	0.001693	2.75	176.24	60.87	0.52	47.19	129.87	5.80	5.02
100	10900.00	1000yrARI	485.03	236.26	239.79		240.16	0.001637	2.72	178.35	61.15	0.51	45.97	125.01	4.77	5.89
100	10800.00	1000yrARI	485.03	236.06	239.63		239.99	0.001573	2.68	180.84	61.41	0.50	44.57	119.55	4.25	6.43
100	10700.00	1000yrARI	485.03	235.86	239.47		239.83	0.001502	2.64	183.70	61.69	0.49	43.03	113.62	4.39	6.25
100	10600.00	1000yrARI	485.03	235.66	239.33		239.68	0.001415	2.59	187.46	62.04	0.48	41.13	106.43	4.50	6.27
100	10500.00	1000yrARI	485.03	235.46	239.20		239.53	0.001322	2.53	191.85	62.47	0.46	39.06	98.76	4.65	6.29
100	10400.00	1000yrARI	485.03	235.26	239.08		239.39	0.001226	2.46	196.86	62.93	0.44	36.87	90.85	4.93	6.43
100	10300.00	1000yrARI	485.03	235.06	238.98		239.27	0.001128	2.39	202.54	63.47	0.43	34.61	82.87	5.37	6.78
100	10200.00	1000yrARI	485.03	234.86	238.88		239.15	0.001030	2.32	208.98	64.09	0.41	32.28	74.91	6.00	7.15
100	10100.00	1000yrARI	485.03	234.66	238.79		239.04	0.000935	2.24	216.06	64.73	0.39	29.97	67.27	6.57	7.92
100	10000.00	1000yrARI	519.33	234.46	238.66		238.94	0.001004	2.35	220.94	65.20	0.41	32.69	76.84	7.04	8.13
100	9900.00	1000yrARI	519.33	234.26	238.57		238.84	0.000913	2.27	228.32	65.88	0.39	30.39	69.12	7.25	8.31
100	9800.00	1000yrARI	519.33	234.06	238.49		238.74	0.000827	2.20	236.28	66.59	0.37	28.15	61.88	6.95	8.48
100	9700.00	1000yrARI	519.33	233.86	238.42		238.65	0.000744	2.12	245.02	67.38	0.35	25.97	55.05	6.84	8.56
100	9600.00	1000yrARI	519.33	233.66	238.36		238.57	0.000669	2.04	254.28	68.19	0.34	23.92	48.85	6.72	8.60
100	9500.00	1000yrARI	519.33	233.46	238.28		238.48	0.000615	1.98	261.83	68.87	0.32	22.41	44.46	6.77	8.66
100	9400.00	1000yrARI	519.33	233.27	236.76	236.76	238.11	0.006746	5.15	100.85	37.72	1.01	170.66	878.83	8.31	10.02
100	9300.00	1000yrARI	519.33	233.07	236.55		237.00	0.001957	2.95	175.85	60.92	0.55	54.39	160.63	9.40	9.95
100	9200.00	1000yrARI	519.33	232.87	236.36		236.80	0.001947	2.95	176.16	60.95	0.55	54.18	159.74	8.77	9.83
100	9100.00	1000yrARI	519.33	232.67	236.17		236.61	0.001936	2.94	176.51	60.98	0.55	53.94	158.72	8.66	9.76
100	9000.00	1000yrARI	519.33	232.47	235.97		236.41	0.001923	2.94	176.90	61.02	0.55	53.68	157.58	8.80	10.01
100	8900.00	1000yrARI	519.33	232.27	235.78		236.22	0.001907	2.93	177.43	61.08	0.55	53.32	156.08	8.70	10.40
100	8800.00	1000yrARI	519.33	232.07	235.59		236.02	0.001887	2.92	178.05	61.13	0.55	52.90	154.30	9.17	10.79
100	8700.00	1000yrARI	519.33	231.87	235.40		235.83	0.001863	2.90	178.83	61.20	0.54	52.39	152.14	9.64	11.21
100	8600.00	1000yrARI	519.33	231.67	235.22		235.64	0.001835	2.89	179.75	61.30	0.54	51.79	149.65	10.23	11.69
100	8500.00	1000yrARI	519.33	231.47	235.04		235.46	0.001801	2.87	180.91	61.41	0.53	51.05	146.56	10.87	12.20
100	8400.00	1000yrARI	519.33	231.27	234.86		235.27	0.001762	2.85	182.24	61.54	0.53	50.23	143.13	11.48	12.81
100	8300.00	1000yrARI	519.33	231.07	234.69		235.09	0.001716	2.82	183.90	61.70	0.52	49.22	138.99	12.03	13.26
100	8200.00	1000yrARI	519.33	230.87	234.52		234.92	0.001664	2.79	185.85	61.90	0.51	48.07	134.33	12.38	13.38
100	8100.00	1000yrARI	519.33	230.67	234.35		234.74	0.001605	2.76	188.13	62.11	0.51	46.78	129.13	12.69	13.48
100	8000.00	1000yrARI	519.33	230.47	234.20		234.58	0.001540	2.72	190.83	62.36	0.50	45.32	123.33	12.98	13.68
100	7900.00	1000yrARI	519.33	230.27	234.05		234.42	0.001463	2.67	194.17	62.69	0.49	43.60	116.60	13.52	14.12
100	7800.00	1000yrARI	519.33	230.07	233.92		234.27	0.001376	2.62	198.29	63.09	0.47	41.60	108.96	14.11	14.65
100	7700.00	1000yrARI	519.33	229.87	233.79		234.12	0.001285	2.56	202.98	63.53	0.46	39.49	101.03	14.67	15.34
100	7600.00	1000yrARI	519.33	229.67	233.68		233.99	0.001191	2.49	208.36	64.03	0.44	37.25	92.84	14.97	15.91
100	7500.00	1000yrARI	519.33	229.47	233.57		233.87	0.001090	2.42	214.95	64.75	0.42	34.77	84.01	15.23	16.11
100	7400.00	1000yrARI	519.33	229.28	233.47		233.76	0.001011	2.36	220.45	65.16	0.41	32.85	77.39	15.22	16.37
100	7300.00	1000yrARI	519.33	229.07	233.33		233.59	0.000937	2.29	227.23	66.41	0.39	30.80	70.40	14.93	16.24

HEC-RAS Plan: Plan 01 River: S1D7 Reach: 100 Profile: 1000yrARI (Continued)

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	7200.00	1000yrARI	519.33	228.88	233.06		233.33	0.000998	2.33	222.48	66.05	0.41	32.30	75.39	14.96	15.01
100	7100.00	1000yrARI	519.33	228.69	232.89		233.17	0.001004	2.35	220.97	65.21	0.41	32.68	76.81	14.80	14.48
100	7000.00	1000yrARI	672.73	228.49	232.50		233.03	0.001981	3.22	209.00	64.11	0.57	62.08	199.83	14.68	14.13
100	6900.00	1000yrARI	672.73	228.29	232.31		232.83	0.001978	3.22	209.11	64.11	0.57	62.01	199.49	14.29	13.58
100	6800.00	1000yrARI	672.73	228.09	232.11		232.64	0.001975	3.22	209.23	64.12	0.57	61.93	199.11	13.89	13.06
100	6700.00	1000yrARI	672.73	227.89	231.91		232.44	0.001969	3.21	209.44	64.14	0.57	61.79	198.48	13.45	12.83
100	6600.00	1000yrARI	672.73	227.69	231.72		232.24	0.001963	3.21	209.67	64.16	0.57	61.64	197.77	12.89	12.56
100	6500.00	1000yrARI	672.73	227.49	231.52		232.04	0.001955	3.20	209.93	64.19	0.57	61.47	196.97	12.35	12.04
100	6400.00	1000yrARI	672.73	227.29	231.32		231.85	0.001947	3.20	210.25	64.22	0.56	61.26	196.02	11.68	11.69
100	6300.00	1000yrARI	672.73	227.09	231.13		231.65	0.001938	3.19	210.57	64.23	0.56	61.05	195.04	10.82	11.37
100	6200.00	1000yrARI	672.73	226.89	230.94		231.45	0.001927	3.19	210.99	64.29	0.56	60.78	193.81	10.64	10.38
100	6100.00	1000yrARI	672.73	226.69	230.74		231.26	0.001914	3.18	211.48	64.33	0.56	60.47	192.37	10.17	9.66
100	6000.00	1000yrARI	673.69	226.49	230.55		231.07	0.001906	3.18	211.99	64.38	0.56	60.32	191.68	9.44	9.91
100	5900.00	1000yrARI	673.69	226.29	230.36		230.87	0.001889	3.17	212.66	64.44	0.56	59.90	189.75	9.09	9.38
100	5800.00	1000yrARI	673.69	226.09	230.18		230.68	0.001866	3.15	213.53	64.52	0.55	59.35	187.26	8.61	9.02
100	5700.00	1000yrARI	673.69	225.89	229.99		230.49	0.001843	3.14	214.48	64.61	0.55	58.77	184.60	8.15	8.60
100	5600.00	1000yrARI	673.69	225.69	229.81		230.30	0.001817	3.13	215.49	64.70	0.55	58.16	181.82	7.72	8.13
100	5500.00	1000yrARI	673.69	225.49	229.63		230.12	0.001785	3.11	216.83	64.83	0.54	57.36	178.21	7.29	7.44
100	5400.00	1000yrARI	673.69	225.29	229.45		229.94	0.001750	3.09	218.31	64.95	0.54	56.50	174.35	6.88	7.01
100	5300.00	1000yrARI	673.69	225.09	229.28		229.76	0.001708	3.06	220.12	65.12	0.53	55.47	169.75	6.49	6.30
100	5200.00	1000yrARI	673.69	224.89	229.11		229.58	0.001663	3.03	222.14	65.30	0.52	54.35	164.83	6.14	5.66
100	5100.00	1000yrARI	673.69	224.69	228.95		229.41	0.001611	3.00	224.61	65.54	0.52	53.03	159.07	5.82	5.10
100	5000.00	1000yrARI	697.76	224.49	228.74		229.23	0.001742	3.11	224.00	65.47	0.54	57.23	178.26	5.06	4.71
100	4900.00	1000yrARI	697.76	224.29	228.57		229.05	0.001701	3.09	225.84	65.64	0.53	56.20	173.62	4.43	4.19
100	4800.00	1000yrARI	697.76	224.09	228.40		228.88	0.001654	3.06	228.02	65.84	0.52	55.01	168.34	4.00	3.64
100	4700.00	1000yrARI	697.76	223.89	228.24		228.70	0.001604	3.03	230.43	66.05	0.52	53.73	162.71	3.77	3.73
100	4600.00	1000yrARI	697.76	223.69	228.08		228.53	0.001543	2.99	233.65	66.40	0.51	52.11	155.63	3.53	3.67
100	4500.00	1000yrARI	697.76	223.48	227.76		228.24	0.001652	3.04	229.21	66.68	0.52	54.56	166.09	3.20	3.35
100	4400.00	1000yrARI	697.76	223.29	227.60		228.07	0.001619	3.03	230.61	66.69	0.52	53.80	162.78	2.36	3.51
100	4300.00	1000yrARI	697.76	223.09	227.43		227.90	0.001607	3.02	230.71	66.35	0.52	53.66	162.28	2.68	3.47
100	4200.00	1000yrARI	697.76	222.90	227.04		227.57	0.001903	3.21	217.28	64.86	0.56	61.25	196.69	3.36	3.58
100	4100.00	1000yrARI	697.76	222.70	226.85		227.38	0.001885	3.20	218.00	64.93	0.56	60.80	194.60	3.73	3.88
100	4000.00	1000yrARI	697.76	222.50	226.67		227.19	0.001865	3.19	218.82	65.01	0.55	60.29	192.25	4.04	4.83
100	3900.00	1000yrARI	697.76	222.30	226.48		227.00	0.001841	3.18	219.76	65.09	0.55	59.72	189.61	4.26	5.13
100	3800.00	1000yrARI	697.76	222.10	226.30		226.81	0.001812	3.16	221.00	65.23	0.55	58.98	186.23	4.81	5.54
100	3700.00	1000yrARI	697.76	221.90	226.12		226.62	0.001781	3.14	222.32	65.33	0.54	58.20	182.66	4.91	5.43
100	3600.00	1000yrARI	697.76	221.70	225.94		226.44	0.001747	3.12	223.82	65.48	0.54	57.34	178.76	5.12	5.66
100	3500.00	1000yrARI	697.76	221.50	225.77		226.26	0.001707	3.09	225.60	65.63	0.53	56.34	174.24	5.32	5.87
100	3400.00	1000yrARI	697.76	221.30	225.60		226.08	0.001660	3.06	227.76	65.83	0.53	55.15	168.96	5.70	6.09
100	3300.00	1000yrARI	697.76	221.10	225.44		225.91	0.001611	3.03	230.14	66.04	0.52	53.89	163.39	6.34	6.81
100	3200.00	1000yrARI	697.76	220.90	225.28		225.74	0.001555	3.00	232.95	66.29	0.51	52.45	157.12	6.98	7.17
100	3100.00	1000yrARI	697.76	220.70	225.13		225.58	0.001493	2.95	236.21	66.58	0.50	50.85	150.22	6.98	7.23
100	3000.00	1000yrARI	732.34	220.50	224.92		225.42	0.001655	3.11	235.71	66.54	0.53	56.29	174.88	7.05	7.30
100	2900.00	1000yrARI	732.34	220.30	224.76		225.24	0.001606	3.07	238.20	66.76	0.52	54.99	169.06	7.00	7.24
100	2800.00	1000yrARI	732.34	220.10	224.60		225.07	0.001551	3.04	241.07	67.01	0.51	53.54	162.66	6.77	7.17
100	2700.00	1000yrARI	732.34	219.90	224.45		224.91	0.001492	3.00	244.36	67.33	0.50	51.96	155.72	7.05	7.16
100	2600.00	1000yrARI	732.34	219.70	224.32		224.76	0.001421	2.95	248.51	67.69	0.49	50.05	147.49	7.35	7.35
100	2500.00	1000yrARI	732.34	219.50	224.18		224.61	0.001346	2.89	253.19	68.11	0.48	48.02	138.89	7.67	7.54
100	2400.00	1000yrARI	732.34	219.30	223.98		224.40	0.001330	2.87	254.92	68.66	0.48	47.38	136.12	7.96	8.53
100	2300.00	1000yrARI	732.34	219.11	223.75		224.19	0.001388	2.92	250.58	67.91	0.49	49.14	143.63	8.15	8.96
100	2200.00	1000yrARI	732.34	218.90	223.45		223.90	0.001467	2.97	246.62	68.08	0.50	51.04	151.55	8.35	9.33
100	2100.00	1000yrARI	732.34	218.71	223.03		223.55	0.001799	3.20	229.07	65.95	0.55	59.99	191.78	8.44	9.24
100	2000.00	1000yrARI	759.44	218.51	222.79		223.36	0.002011	3.36	225.96	65.64	0.58	66.49	223.48	8.69	9.04
100	1900.00	1000yrARI	759.44	218.31	222.59		223.16	0.002015	3.36	225.82	65.64	0.58	66.58	223.92	8.89	9.07
100	1800.00	1000yrARI	759.44	218.11	222.38		222.96	0.002019	3.37	225.66	65.61	0.58	66.69	224.44	7.95	8.03
100	1700.00	1000yrARI	759.44	217.91	222.18		222.76	0.002024	3.37	225.52	65.62	0.58	66.79	224.92	7.21	7.41
100	1600.00	1000yrARI	759.44	217.72	221.97		222.56	0.002052	3.38	224.46	65.55	0.58	67.50	228.38	6.34	6.46
100	1500.00	1000yrARI	759.44	217.52	221.76		222.35	0.002069	3.39	223.85	65.49	0.59	67.91	230.40	5.79	5.64
100	1400.00	1000yrARI	759.44	217.32	221.55		222.14	0.002088	3.40	223.12	65.42	0.59	68.40	232.82	5.11	5.14
100	1300.00	1000yrARI	759.44	217.12	221.34		221.93	0.002112	3.42	222.25	65.34	0.59	69.00	235.79	4.38	4.53
100	1200.00	1000yrARI	759.44	216.92	221.12		221.72	0.002146	3.44	221.01	65.22	0.60	69.86	240.06	2.64	3.00
100	1100.00	1000yrARI	759.44	216.72	220.90		221.51	0.002193	3.46	219.39	65.07	0.60	71.02	245.84	2.25	1.97

HEC-RAS Plan: Plan 01 River: S1D7 Reach: 100 Profile: 1000yrARI (Continued)

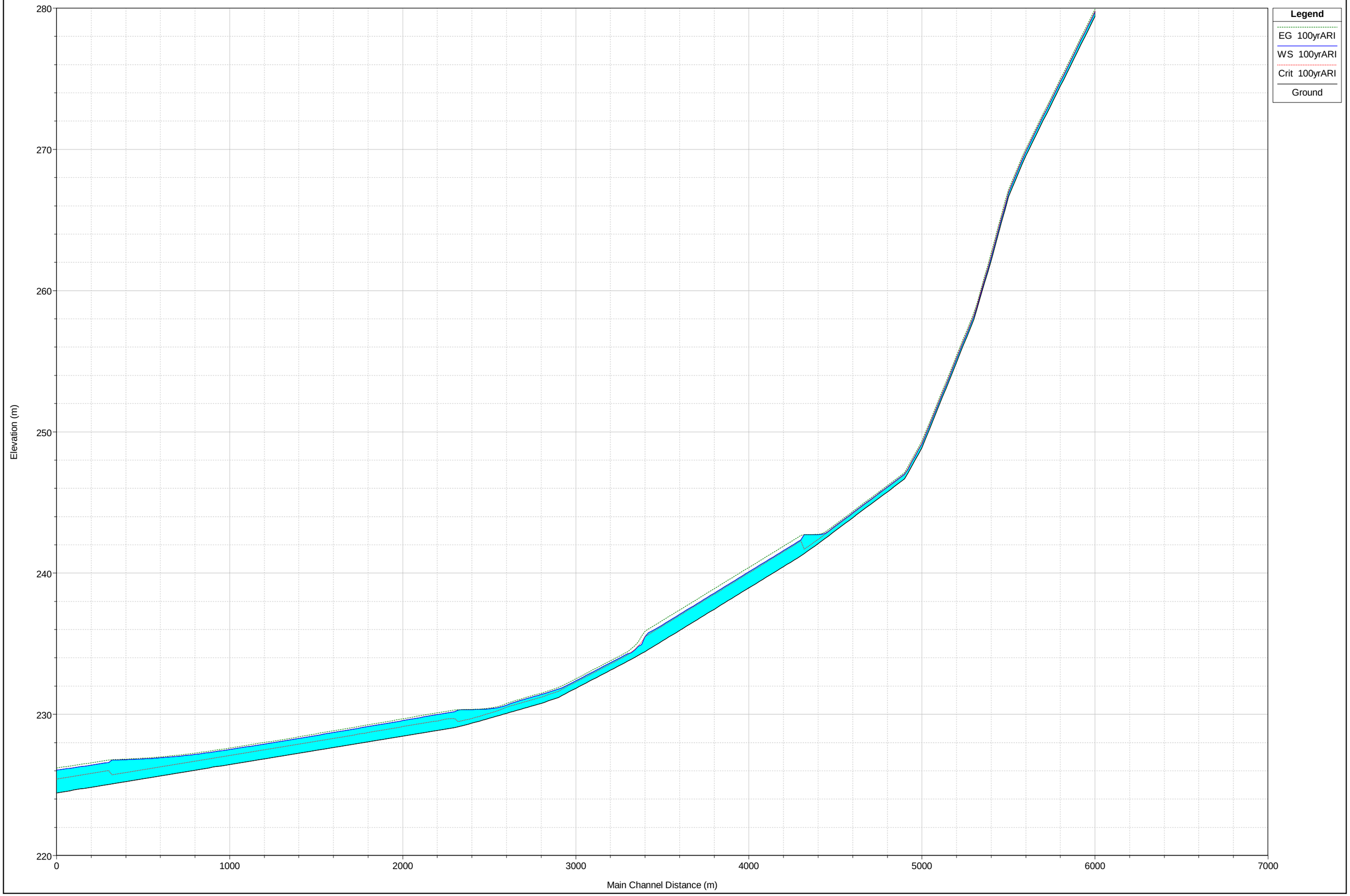
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	1000.00	1000yrARI	759.44	216.52	220.66		221.29	0.002251	3.49	217.40	64.89	0.61	72.47	253.15	2.32	1.69
100	900.00	1000yrARI	759.44	216.32	220.42		221.06	0.002337	3.54	214.63	64.63	0.62	74.57	263.86	1.44	1.18
100	800.00	1000yrARI	759.44	216.12	220.16		220.83	0.002459	3.60	210.88	64.27	0.63	77.55	279.29	1.29	1.33
100	700.00	1000yrARI	759.44	215.92	219.88		220.58	0.002649	3.69	205.59	63.79	0.66	82.08	303.19	0.65	0.78
100	600.00	1000yrARI	759.44	215.72	219.56		220.31	0.002967	3.84	197.75	63.04	0.69	89.50	343.73	0.19	0.35
100	500.00	1000yrARI	759.44	215.52	219.24	218.56	219.98	0.003157	3.86	239.73	289.03	0.71	91.66	353.95	-0.08	0.03
100	400.00	1000yrARI	759.44	215.32	219.02		219.60	0.002734	3.56	324.53	412.20	0.66	78.13	277.82	-0.20	-0.20
100	300.00	1000yrARI	759.44	215.12	219.19	218.18	219.31	0.000719	1.97	726.22	500.00	0.34	23.02	45.29	-0.57	-0.57
100	200.00	1000yrARI	759.44	214.92	219.19	217.98	219.24	0.000340	1.41	978.81	500.00	0.24	11.54	16.23	-0.77	-0.77
100	100.00	1000yrARI	759.44	214.72	217.79	217.79	219.08	0.006547	5.03	151.13	58.43	1.00	163.27	820.46	0.43	0.43

HEC-RAS MODELLING RESULTS FOR DIVERSION DRAIN 8

- 100 Year ARI longsection (upstream confluence with Diversion Drain 5)
- 100 Year ARI longsection (downstream confluence with Diversion Drain 5)
- 100 Year ARI Table of Results (upstream confluence with Diversion Drain 5)
- 100 Year ARI Table of Results (downstream confluence with Diversion Drain 5)
- 1000 Year ARI longsection (upstream confluence with Diversion Drain 5)
- 1000 Year ARI longsection (downstream confluence with Diversion Drain 5)
- 1000 Year ARI Table of Results (upstream confluence with Diversion Drain 5)
- 1000 Year ARI Table of Results (downstream confluence with Diversion Drain 5)

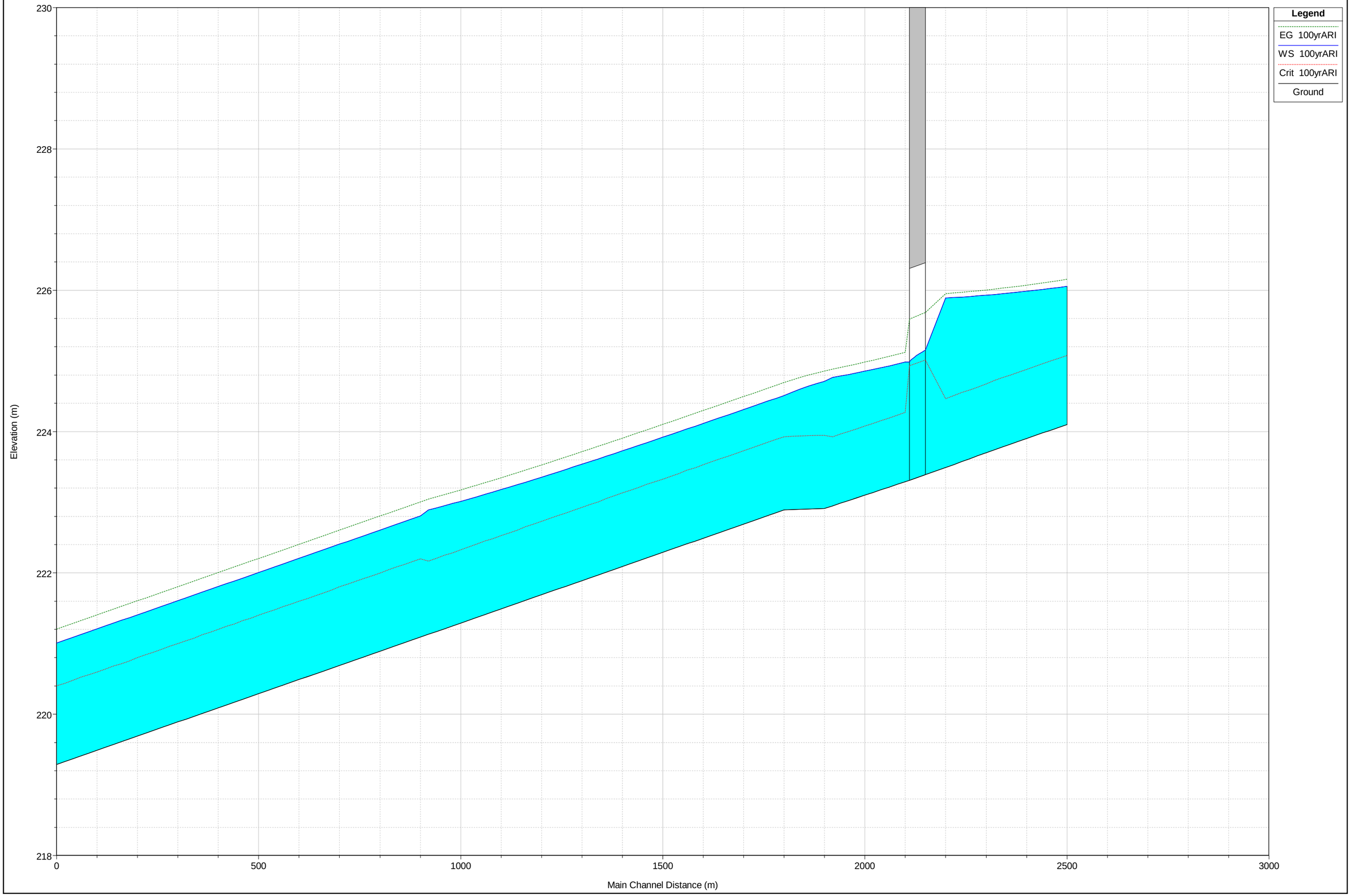
G:\41\26630\CADD\12d\ADANI_MINE_DRAINAGE_DRAI_REV01\RAW_HECRAS\\S1D58 Plan: Plan 03 2/07/2013

Diversion Drain 8 upstream of confluence with Diversion Drain 5



G:\41\26630\CADD\12d\ADANI_MINE_DRAINAGE_DRAI_REV01\RAW_HECRAS\\S1D58 Plan: Plan 03 2/07/2013

Diversion Drain 8 downstream of confluence with Diversion Drain 5



HEC-RAS Plan: Plan 03 River: S1D8 Reach: Upstream Profile: 100yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
Upstream	8668.07	100yrARI	1.74	279.42	279.74	279.78	279.91	0.020031	1.81	0.96	3.95	1.17	46.64	-386.37	1.93	2.24
Upstream	8568.07	100yrARI	1.74	276.95	277.25	277.31	277.45	0.025798	1.98	0.88	3.82	1.32	56.86	-489.31	2.43	2.84
Upstream	8468.07	100yrARI	1.74	274.48	274.78	274.83	274.98	0.025089	1.96	0.89	3.83	1.30	55.66	-551.55	2.79	3.19
Upstream	8368.07	100yrARI	1.74	272.02	272.32	272.37	272.52	0.025044	1.96	0.89	3.84	1.30	55.53	-553.48	2.98	3.39
Upstream	8268.07	100yrARI	1.74	269.55	269.85	269.90	270.05	0.025089	1.96	0.89	3.83	1.30	55.66	-546.76	2.84	2.95
Upstream	8168.07	100yrARI	1.74	266.65	266.94	267.00	267.16	0.029089	2.07	0.84	3.75	1.39	62.48	-504.63	2.24	2.53
Upstream	8068.07	100yrARI	1.74	262.13	262.39	262.49	262.69	0.046776	2.44	0.71	3.55	1.73	90.27	-642.04	3.22	3.30
Upstream	7968.07	100yrARI	2.93	257.96	258.20	258.27	258.43	0.033888	2.16	1.36	6.42	1.50	69.30	-653.06	3.22	3.67
Upstream	7868.07	100yrARI	2.93	254.93	255.17	255.24	255.40	0.030870	2.09	1.40	6.46	1.44	64.67	-530.49	2.18	2.41
Upstream	7768.07	100yrARI	2.93	251.90	252.15	252.21	252.37	0.029996	2.07	1.41	6.48	1.42	63.31	-469.68	1.98	2.12
Upstream	7668.07	100yrARI	2.93	248.87	249.12	249.18	249.34	0.030294	2.08	1.40	6.46	1.42	63.86	-479.25	2.07	2.32
Upstream	7568.07	100yrARI	2.93	246.67	247.02	246.98	247.12	0.009261	1.40	2.08	7.07	0.83	26.33	-583.62	2.21	1.87
Upstream	7468.07	100yrARI	2.93	245.75	246.10	246.06	246.20	0.009057	1.39	2.10	7.08	0.82	25.89	-485.49	1.84	1.72
Upstream	7368.07	100yrARI	2.93	244.84	245.19	245.15	245.29	0.009235	1.40	2.09	7.10	0.83	26.22	-475.43	1.88	1.86
Upstream	7268.07	100yrARI	2.93	243.92	244.27	244.23	244.37	0.009108	1.40	2.09	7.08	0.82	26.00	-499.36	1.67	1.72
Upstream	7168.07	100yrARI	2.93	243.00	243.34	243.31	243.45	0.009387	1.41	2.07	7.06	0.83	26.60	-457.23	1.76	1.77
Upstream	7068.07	100yrARI	2.93	242.08	242.73	242.39	242.75	0.000966	0.65	4.51	8.89	0.29	4.70	-438.09	1.52	1.51
Upstream	6968.07	100yrARI	23.64	241.21	242.35	242.27	242.66	0.007583	2.47	9.57	11.83	0.88	58.37	-462.98	0.95	0.98
Upstream	6868.07	100yrARI	23.64	240.45	241.59	241.51	241.90	0.007500	2.46	9.61	11.83	0.87	57.90	-468.72	0.86	0.85
Upstream	6768.07	100yrARI	23.64	239.70	240.84	240.76	241.15	0.007501	2.46	9.61	11.84	0.87	57.89	-461.06	0.86	0.59
Upstream	6668.07	100yrARI	23.64	238.95	240.09	240.01	240.40	0.007524	2.46	9.60	11.85	0.87	57.99	-471.59	0.86	0.09
Upstream	6568.07	100yrARI	23.64	238.20	239.34	239.26	239.65	0.007543	2.46	9.60	11.86	0.87	58.07	-490.27	0.85	0.27
Upstream	6468.07	100yrARI	23.64	237.44	238.58	238.50	238.89	0.007510	2.46	9.61	11.84	0.87	57.93	-502.24	0.86	0.33
Upstream	6368.07	100yrARI	23.64	236.69	237.83	237.75	238.14	0.007495	2.46	9.61	11.84	0.87	57.85	-499.36	0.86	0.38
Upstream	6268.07	100yrARI	23.64	235.94	237.08	237.00	237.39	0.007511	2.46	9.61	11.84	0.87	57.93	-481.65	0.86	0.44
Upstream	6168.07	100yrARI	23.64	235.19	236.33	236.25	236.64	0.007479	2.46	9.62	11.86	0.87	57.72	-473.52	0.86	0.47
Upstream	6068.07	100yrARI	23.64	234.44	235.49	235.49	235.88	0.010122	2.74	8.64	11.36	1.00	73.23	-462.98	0.94	0.59
Upstream	5968.07	100yrARI	23.64	233.76	234.29	234.21	234.43	0.006400	1.68	14.12	28.18	0.76	31.24	-871.37	1.40	1.67
Upstream	5868.07	100yrARI	23.64	233.12	233.65	233.56	233.79	0.006397	1.67	14.12	28.18	0.76	31.24	-937.93	1.47	1.48
Upstream	5768.07	100yrARI	23.64	232.48	233.01	232.92	233.15	0.006400	1.68	14.12	28.18	0.76	31.24	-943.20	1.47	1.63
Upstream	5668.07	100yrARI	23.64	231.84	232.37	232.28	232.51	0.006400	1.68	14.11	28.17	0.76	31.25	-930.75	1.76	1.62
Upstream	5568.07	100yrARI	23.64	231.20	231.80	231.64	231.91	0.004257	1.47	16.05	28.60	0.63	23.27	-948.94	1.51	1.42
Upstream	5468.07	100yrARI	23.64	230.77	231.40	231.21	231.50	0.003499	1.38	17.07	28.80	0.57	20.20	-923.09	1.37	1.34
Upstream	5368.07	100yrARI	23.64	230.42	231.05	230.86	231.15	0.003530	1.39	17.03	28.79	0.58	20.33	-931.22	1.37	0.91
Upstream	5268.07	100yrARI	23.64	230.07	230.64	230.51	230.76	0.005099	1.56	15.16	28.39	0.68	26.53	-909.68	1.43	1.06
Upstream	5168.07	100yrARI	23.64	229.72	230.39	230.06	230.44	0.001382	0.93	25.40	37.72	0.36	8.82	-918.77	2.33	0.75
Upstream	5068.07	100yrARI	23.64	229.37	230.33	229.71	230.35	0.000409	0.64	37.12	38.77	0.21	3.68	-939.84	2.04	0.30
Upstream	4968.07	100yrARI	65.24	229.05	230.19	229.71	230.30	0.001706	1.45	44.97	39.54	0.43	18.10	-961.38	1.86	0.15
Upstream	4868.07	100yrARI	65.24	228.85	229.99	229.52	230.10	0.001811	1.49	43.83	38.51	0.45	19.09	-835.47	1.86	0.08
Upstream	4768.07	100yrARI	65.24	228.65	229.77	229.34	229.90	0.002182	1.61	40.52	36.30	0.49	22.50	-710.98	1.88	0.09
Upstream	4668.07	100yrARI	65.24	228.45	229.55	229.13	229.68	0.002156	1.59	41.05	37.28	0.48	22.00	-654.01	1.90	0.13
Upstream	4568.07	100yrARI	65.24	228.25	229.34	228.91	229.46	0.002125	1.57	41.59	38.19	0.48	21.49	-677.47	1.91	0.13
Upstream	4468.07	100yrARI	65.24	228.05	229.13	228.71	229.25	0.002088	1.55	42.12	39.00	0.48	20.99	-704.76	1.92	0.42
Upstream	4368.07	100yrARI	65.24	227.85	228.92	228.50	229.04	0.002078	1.54	42.41	39.51	0.47	20.76	-715.30	1.93	0.38
Upstream	4268.07	100yrARI	65.24	227.65	228.71	228.30	228.84	0.002099	1.54	42.38	39.83	0.48	20.83	-746.41	1.94	0.57
Upstream	4168.07	100yrARI	65.24	227.45	228.50	228.10	228.62	0.002159	1.55	42.11	40.14	0.48	21.18	-777.54	1.95	0.69
Upstream	4068.07	100yrARI	65.24	227.25	228.28	227.89	228.41	0.002179	1.54	42.26	40.97	0.49	21.12	-808.65	1.97	0.92
Upstream	3968.07	100yrARI	65.24	227.05	228.09	227.69	228.20	0.001984	1.45	44.98	46.26	0.47	18.79	-1276.90	1.96	1.15
Upstream	3868.07	100yrARI	65.24	226.85	227.90	227.49	228.00	0.001970	1.45	45.07	46.25	0.47	18.69	-1317.60	1.95	1.22
Upstream	3768.07	100yrARI	65.24	226.65	227.70	227.29	227.81	0.001938	1.44	45.32	46.31	0.46	18.46	-1341.06	1.95	1.47
Upstream	3668.07	100yrARI	65.24	226.45	227.51	227.09	227.61	0.001881	1.43	45.76	46.37	0.46	18.07	-1364.52	1.94	1.62
Upstream	3568.07	100yrARI	65.24	226.25	227.33	226.89	227.43	0.001780	1.40	46.56	46.47	0.45	17.36	-1387.99	1.91	1.70
Upstream	3468.07	100yrARI	65.24	226.04	227.16	226.68	227.25	0.001547	1.34	48.67	46.70	0.42	15.68	-1411.44	1.88	1.69
Upstream	3368.07	100yrARI	65.24	225.84	227.03	226.48	227.11	0.001280	1.26	51.70	47.12	0.38	13.66	-1500.50	1.81	1.66
Upstream	3268.07	100yrARI	65.24	225.64	226.92	226.28	226.99	0.000991	1.16	56.10	47.66	0.34	11.34	-1558.42	1.74	1.70
Upstream	3168.07	100yrARI	65.24	225.44	226.84	226.07	226.90	0.000729	1.05	61.91	48.39	0.30	9.06	-1529.70	1.90	1.93
Upstream	3068.07	100yrARI	65.24	225.24	226.78	225.88	226.83	0.000521	0.95	68.97	49.27	0.26	7.08	-1510.54	1.69	1.78
Upstream	2968.07	100yrARI	125.75	225.04	226.59	226.02	226.76	0.001911	1.82	69.27	49.31	0.49	26.06	-1540.24	1.66	1.75
Upstream	2868.07	100yrARI	125.75	224.84	226.40	225.82	226.57	0.001863	1.80	69.84	49.38	0.48	25.58	-1501.93	1.63	1.69
Upstream	2768.07	100yrARI	125.75	224.64	226.22	225.62	226.38	0.001793	1.78	70.71	49.49	0.47	24.87	-1512.47	1.81	1.41
Upstream	2668.07	100yrARI	125.75	224.43	226.05	225.41	226.20	0.001649	1.73	72.63	49.68	0.46	23.39	-1516.29	1.78	1.63

HEC-RAS Plan: Plan 03 River: S1D8 Reach: Downstream Profile: 100yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
Downstream	2500.00	100yrARI	125.75	224.10	226.06	225.08	226.16	0.000863	1.40	89.71	51.75	0.34	14.50	-1538.79	1.21	1.12
Downstream	2400.00	100yrARI	125.75	223.90	225.98	224.88	226.07	0.000691	1.30	96.47	52.51	0.31	12.30	-1546.45	1.08	0.87
Downstream	2300.00	100yrARI	125.75	223.70	225.93	224.67	226.00	0.000549	1.21	104.11	53.38	0.28	10.35	-1441.60	0.90	0.93
Downstream	2200.00	100yrARI	125.75	223.49	225.89	224.47	225.95	0.000426	1.11	113.16	54.38	0.25	8.58	-1453.57	0.86	0.69
Downstream	2150		Culvert													
Downstream	2100.00	100yrARI	125.75	223.29	224.98	224.27	225.12	0.001419	1.65	76.26	50.13	0.43	20.94	-1475.59	1.44	1.57
Downstream	2000	100yrARI	138.06	222.91	224.71	223.95	224.86	0.001381	1.69	81.77	50.80	0.42	21.55	-1524.91	1.77	1.71
Downstream	1900.00	100yrARI	138.06	222.89	224.51	223.93	224.69	0.001984	1.90	72.69	49.71	0.50	28.15	-1524.91	1.95	1.89
Downstream	1800.00	100yrARI	138.06	222.69	224.31	223.73	224.50	0.001975	1.90	72.79	49.72	0.50	28.06	-1540.70	2.44	2.06
Downstream	1700.00	100yrARI	138.06	222.49	224.12	223.53	224.30	0.001963	1.89	72.94	49.75	0.50	27.93	-1580.46	2.71	1.80
Downstream	1600.00	100yrARI	138.06	222.29	223.92	223.33	224.10	0.001943	1.89	73.19	49.78	0.50	27.72	-1665.20	2.58	2.27
Downstream	1500.00	100yrARI	138.06	222.09	223.73	223.13	223.91	0.001915	1.88	73.53	49.82	0.49	27.42	-1748.98	2.50	2.30
Downstream	1400.00	100yrARI	138.06	221.89	223.54	222.93	223.72	0.001871	1.86	74.08	49.89	0.49	26.96	-1715.46	2.65	2.60
Downstream	1300.00	100yrARI	138.06	221.69	223.35	222.73	223.53	0.001812	1.84	74.85	49.96	0.48	26.34	-1651.31	2.87	2.31
Downstream	1200.00	100yrARI	138.06	221.49	223.18	222.53	223.35	0.001717	1.81	76.22	50.20	0.47	25.28	-1574.71	2.30	2.29
Downstream	1100.00	100yrARI	138.06	221.29	223.01	222.33	223.17	0.001607	1.77	77.85	50.35	0.46	24.09	-1619.23	2.34	2.43
Downstream	1000.00	100yrARI	152.90	221.09	222.81	222.20	223.00	0.001999	1.97	77.48	50.30	0.51	29.87	-1644.13	2.70	2.52
Downstream	900.00	100yrARI	152.90	220.89	222.61	222.00	222.80	0.001997	1.97	77.51	50.31	0.51	29.85	-1643.64	3.06	2.05
Downstream	800.00	100yrARI	152.90	220.69	222.41	221.80	222.60	0.002000	1.97	77.46	50.28	0.51	29.88	-1577.58	2.21	2.04
Downstream	700.00	100yrARI	152.90	220.49	222.21	221.60	222.40	0.001998	1.97	77.50	50.30	0.51	29.85	-1458.35	1.70	1.50
Downstream	600.00	100yrARI	152.90	220.29	222.01	221.40	222.20	0.001998	1.97	77.50	50.30	0.51	29.85	-1461.23	1.41	1.28
Downstream	500.00	100yrARI	152.90	220.09	221.81	221.20	222.00	0.001997	1.97	77.51	50.30	0.51	29.85	-1464.10	1.28	1.38
Downstream	400.00	100yrARI	152.90	219.89	221.61	221.00	221.80	0.001998	1.97	77.49	50.29	0.51	29.86	-1485.18	1.28	1.86
Downstream	300.00	100yrARI	152.90	219.69	221.41	220.80	221.61	0.001995	1.97	77.53	50.31	0.51	29.83	-1522.52	1.47	2.19
Downstream	200.00	100yrARI	152.90	219.49	221.21	220.60	221.41	0.001994	1.97	77.55	50.30	0.51	29.81	-1784.41	4.04	1.28
Downstream	100.00	100yrARI	152.90	219.29	221.01	220.40	221.20	0.002002	1.97	77.44	50.29	0.51	29.91	-1850.47	4.49	3.30

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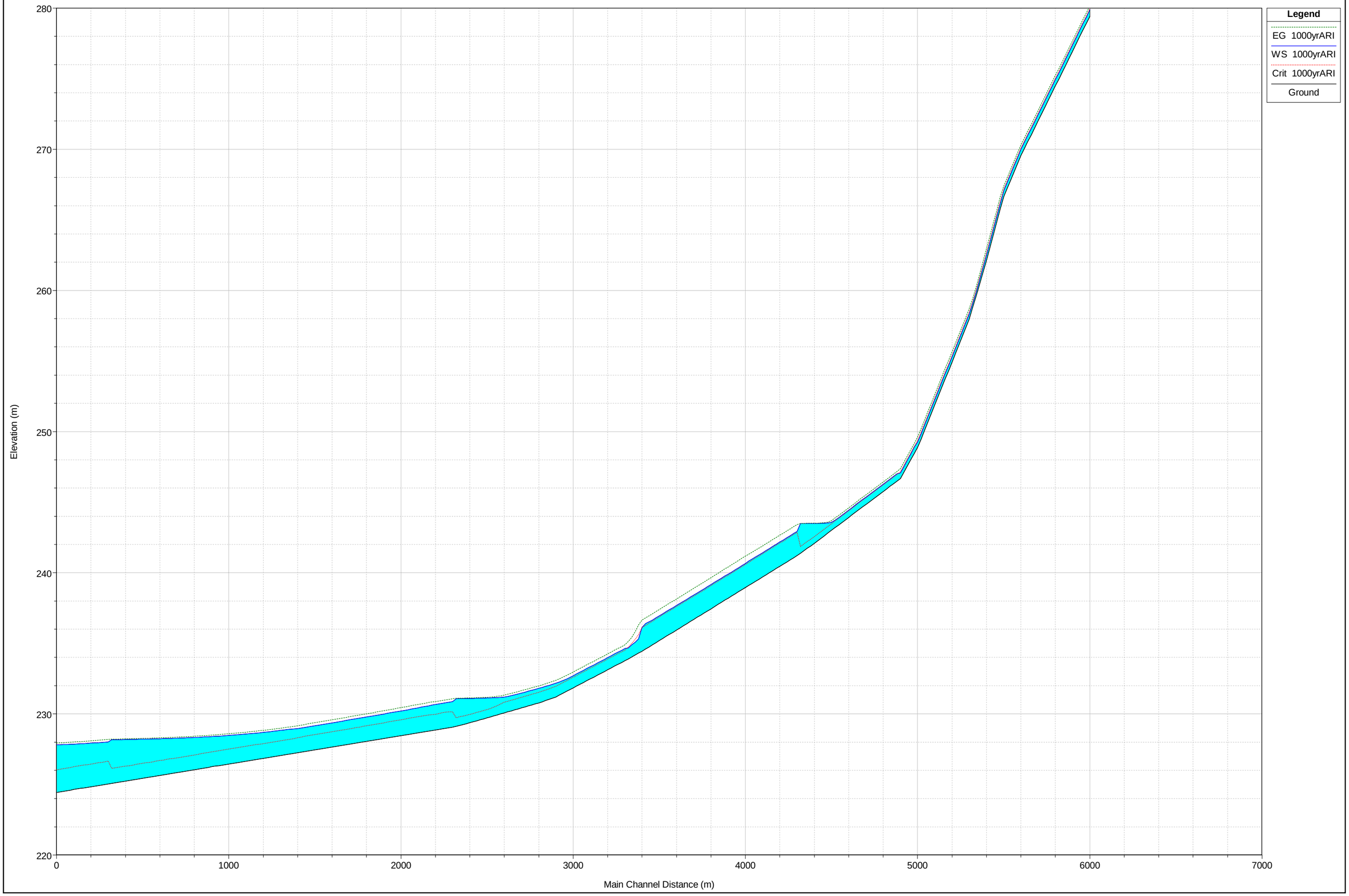
Diversion Drain 8 upstream of confluence with Diversion Drain 5



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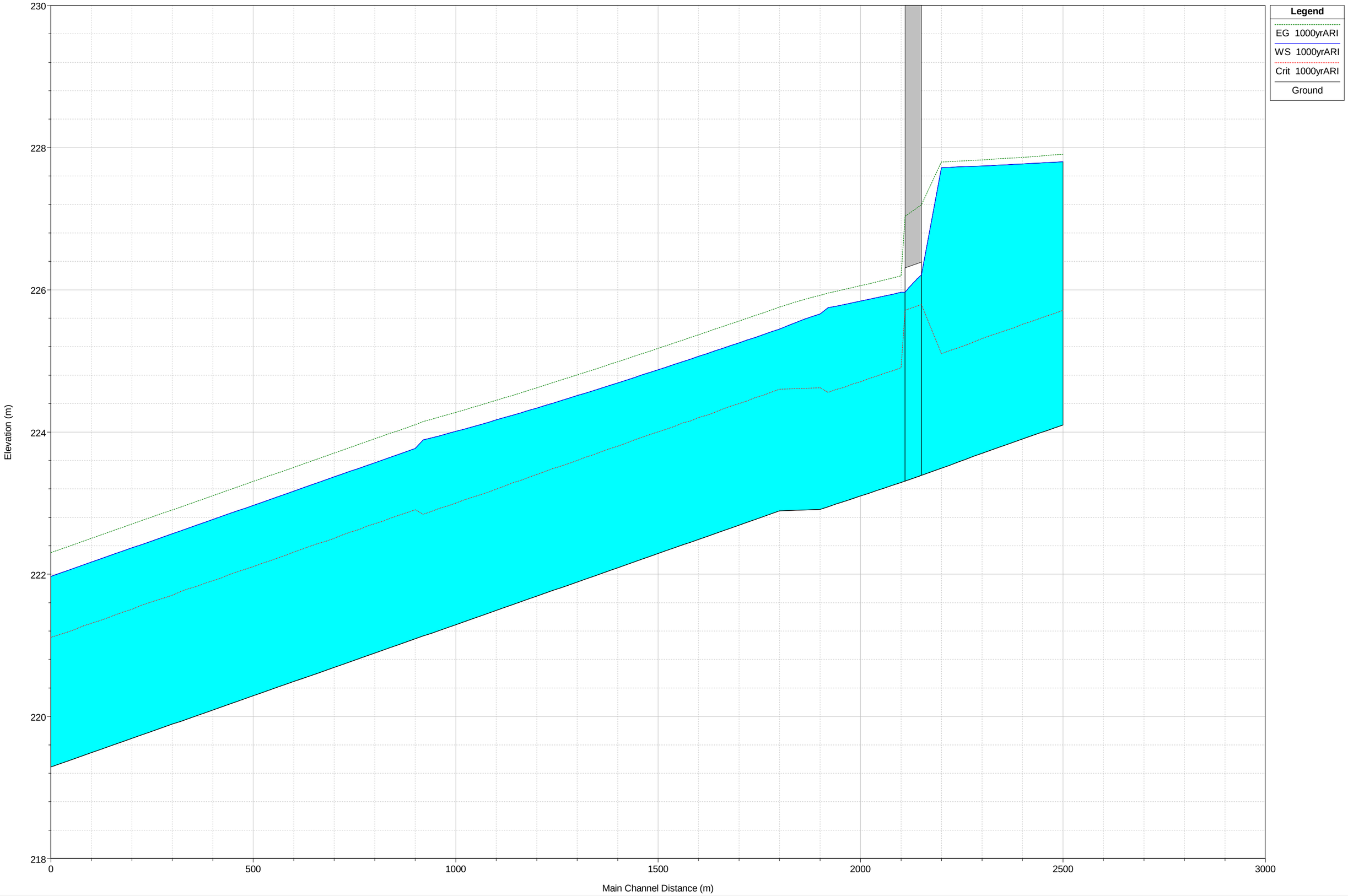
Diversion Drain 8 downstream of confluence with Diversion Drain 5



HEC-RAS Plan: Plan 03 River: S1D8 Reach: Upstream Profile: 1000yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
Upstream	8668.07	1000yrARI	3.59	279.42	279.89	279.95	280.14	0.020003	2.22	1.62	4.85	1.23	63.41	-386.37	1.78	2.09
Upstream	8568.07	1000yrARI	3.59	276.95	277.40	277.48	277.69	0.024868	2.40	1.49	4.68	1.36	75.39	-489.31	2.28	2.69
Upstream	8468.07	1000yrARI	3.59	274.48	274.93	275.01	275.22	0.024896	2.40	1.49	4.68	1.36	75.48	-551.55	2.65	3.04
Upstream	8368.07	1000yrARI	3.59	272.02	272.47	272.54	272.76	0.024837	2.40	1.49	4.69	1.36	75.27	-553.48	2.83	3.24
Upstream	8268.07	1000yrARI	3.59	269.55	270.00	270.08	270.29	0.024898	2.41	1.49	4.68	1.36	75.50	-546.76	2.69	2.80
Upstream	8168.07	1000yrARI	3.59	266.65	267.08	267.18	267.41	0.029134	2.55	1.41	4.57	1.46	85.51	-504.63	2.10	2.39
Upstream	8068.07	1000yrARI	3.59	262.13	262.51	262.66	262.97	0.045820	2.99	1.20	4.29	1.81	122.09	-642.04	3.10	3.18
Upstream	7968.07	1000yrARI	6.04	257.96	258.33	258.43	258.70	0.031523	2.69	2.24	7.21	1.54	94.73	-653.06	3.09	3.54
Upstream	7868.07	1000yrARI	6.04	254.93	255.30	255.41	255.66	0.030634	2.66	2.27	7.22	1.52	92.71	-530.49	2.05	2.28
Upstream	7768.07	1000yrARI	6.04	251.90	252.27	252.38	252.63	0.030637	2.66	2.27	7.22	1.52	92.71	-469.68	1.86	2.00
Upstream	7668.07	1000yrARI	6.04	248.87	249.24	249.35	249.60	0.030234	2.65	2.28	7.22	1.51	91.89	-479.25	1.95	2.20
Upstream	7568.07	1000yrARI	6.04	246.67	247.07	247.15	247.37	0.022643	2.41	2.51	7.42	1.32	73.76	-583.62	2.15	1.82
Upstream	7468.07	1000yrARI	6.04	245.75	246.27	246.23	246.43	0.009109	1.76	3.42	8.13	0.87	36.87	-485.49	1.67	1.55
Upstream	7368.07	1000yrARI	6.04	244.84	245.36	245.32	245.52	0.009191	1.77	3.42	8.16	0.87	37.02	-475.43	1.71	1.68
Upstream	7268.07	1000yrARI	6.04	243.92	244.44	244.40	244.60	0.009182	1.77	3.42	8.12	0.87	37.09	-499.36	1.50	1.55
Upstream	7168.07	1000yrARI	6.04	243.00	243.57	243.47	243.70	0.006478	1.57	3.85	8.44	0.74	28.38	-457.23	1.53	1.54
Upstream	7068.07	1000yrARI	6.04	242.08	243.50	242.56	243.51	0.000209	0.46	13.08	13.48	0.15	1.92	-438.09	0.75	0.74
Upstream	6968.07	1000yrARI	54.10	241.21	242.93	242.86	243.42	0.007569	3.09	17.50	15.34	0.92	81.71	-462.98	0.37	0.40
Upstream	6868.07	1000yrARI	54.10	240.45	242.18	242.10	242.66	0.007504	3.08	17.55	15.35	0.92	81.17	-468.72	0.27	0.26
Upstream	6768.07	1000yrARI	54.10	239.70	241.42	241.35	241.91	0.007576	3.09	17.51	16.45	0.92	81.72	-461.06	0.28	0.01
Upstream	6668.07	1000yrARI	54.10	238.95	240.66	240.58	241.18	0.007672	3.21	16.88	13.67	0.92	86.56	-471.59	0.29	-0.48
Upstream	6568.07	1000yrARI	54.10	238.20	239.91	239.84	240.41	0.007532	3.14	17.21	14.38	0.92	83.69	-490.27	0.28	-0.30
Upstream	6468.07	1000yrARI	54.10	237.44	239.16	239.09	239.65	0.007523	3.09	17.51	15.01	0.91	81.50	-502.24	0.28	-0.25
Upstream	6368.07	1000yrARI	54.10	236.69	238.41	238.34	238.90	0.007439	3.10	17.47	14.91	0.91	81.53	-499.36	0.28	-0.20
Upstream	6268.07	1000yrARI	54.10	235.94	237.69	237.61	238.14	0.007460	3.00	18.02	16.20	0.91	77.92	-481.65	0.25	-0.17
Upstream	6168.07	1000yrARI	54.10	235.19	236.95	236.87	237.39	0.007391	2.97	18.24	16.61	0.90	76.34	-473.52	0.24	-0.15
Upstream	6068.07	1000yrARI	54.10	234.44	236.12	236.12	236.64	0.009310	3.19	16.94	16.51	1.01	90.30	-462.98	0.31	-0.04
Upstream	5968.07	1000yrARI	54.10	233.76	234.63	234.52	234.89	0.006400	2.27	23.87	30.18	0.81	49.18	-871.37	1.06	1.33
Upstream	5868.07	1000yrARI	54.10	233.12	233.99	233.88	234.25	0.006396	2.27	23.87	30.18	0.81	49.16	-937.93	1.13	1.14
Upstream	5768.07	1000yrARI	54.10	232.48	233.35	233.24	233.61	0.006396	2.27	23.87	30.18	0.81	49.15	-943.20	1.13	1.29
Upstream	5668.07	1000yrARI	54.10	231.84	232.71	232.60	232.97	0.006318	2.26	23.97	30.19	0.81	48.72	-930.75	1.42	1.28
Upstream	5568.07	1000yrARI	54.10	231.20	232.18	231.96	232.38	0.004119	1.97	27.51	30.90	0.67	35.60	-948.94	1.13	1.04
Upstream	5468.07	1000yrARI	54.10	230.77	231.81	231.53	231.98	0.003420	1.85	29.22	31.22	0.61	31.05	-923.09	0.96	0.93
Upstream	5368.07	1000yrARI	54.10	230.42	231.48	231.18	231.65	0.003229	1.82	29.77	31.33	0.60	29.76	-931.22	0.94	0.48
Upstream	5268.07	1000yrARI	54.10	230.07	231.19	230.83	231.34	0.002678	1.71	31.64	31.68	0.55	25.92	-909.68	0.88	0.51
Upstream	5168.07	1000yrARI	54.10	229.72	231.13	230.31	231.18	0.000653	1.02	53.05	37.72	0.27	8.39	-918.77	1.59	0.01
Upstream	5068.07	1000yrARI	54.10	229.37	231.09	229.96	231.13	0.000319	0.81	66.70	38.77	0.20	4.97	-939.84	1.28	-0.46
Upstream	4968.07	1000yrARI	141.26	229.05	230.88	230.15	231.07	0.001747	1.96	71.91	39.54	0.46	28.68	-961.38	1.17	-0.54
Upstream	4868.07	1000yrARI	141.26	228.85	230.67	229.96	230.88	0.001859	2.02	70.05	38.51	0.48	30.30	-835.47	1.18	-0.60
Upstream	4768.07	1000yrARI	141.26	228.65	230.43	229.81	230.67	0.002269	2.19	64.53	36.30	0.52	36.02	-710.98	1.22	-0.57
Upstream	4668.07	1000yrARI	141.26	228.45	230.21	229.58	230.44	0.002223	2.16	65.52	37.28	0.52	35.03	-654.01	1.24	-0.53
Upstream	4568.07	1000yrARI	141.26	228.25	229.99	229.36	230.22	0.002173	2.12	66.52	38.19	0.51	34.05	-677.47	1.26	-0.52
Upstream	4468.07	1000yrARI	141.26	228.05	229.78	229.15	230.00	0.002118	2.09	67.51	39.00	0.51	33.09	-704.76	1.27	-0.23
Upstream	4368.07	1000yrARI	141.26	227.85	229.57	228.94	229.79	0.002095	2.07	68.08	39.51	0.50	32.58	-715.30	1.28	-0.27
Upstream	4268.07	1000yrARI	141.26	227.65	229.36	228.74	229.58	0.002091	2.07	68.28	39.83	0.50	32.42	-746.41	1.29	-0.08
Upstream	4168.07	1000yrARI	141.26	227.45	229.16	228.53	229.37	0.002089	2.06	68.44	40.14	0.50	32.30	-777.54	1.29	0.03
Upstream	4068.07	1000yrARI	141.26	227.25	228.96	228.31	229.17	0.001996	2.02	69.83	40.97	0.49	30.99	-808.65	1.29	0.24
Upstream	3968.07	1000yrARI	141.26	227.05	228.83	228.10	228.98	0.001515	1.75	80.54	50.66	0.44	23.35	-1276.90	1.22	0.41
Upstream	3868.07	1000yrARI	141.26	226.85	228.69	227.90	228.83	0.001346	1.69	83.70	51.02	0.42	21.40	-1317.60	1.16	0.43
Upstream	3768.07	1000yrARI	141.26	226.65	228.57	227.70	228.70	0.001157	1.61	87.95	51.55	0.39	19.13	-1341.06	1.08	0.60
Upstream	3668.07	1000yrARI	141.26	226.45	228.47	227.50	228.59	0.000970	1.52	93.19	52.16	0.36	16.78	-1364.52	0.98	0.66
Upstream	3568.07	1000yrARI	141.26	226.25	228.39	227.30	228.49	0.000796	1.42	99.42	52.86	0.33	14.50	-1387.99	0.85	0.64
Upstream	3468.07	1000yrARI	141.26	226.04	228.33	227.09	228.42	0.000635	1.32	107.12	53.69	0.30	12.25	-1411.44	0.71	0.52
Upstream	3368.07	1000yrARI	141.26	225.84	228.28	226.89	228.35	0.000509	1.23	115.25	54.61	0.27	10.39	-1500.50	0.56	0.41
Upstream	3268.07	1000yrARI	141.26	225.64	228.24	226.69	228.30	0.000407	1.14	124.12	55.58	0.24	8.79	-1558.42	0.42	0.38
Upstream	3168.07	1000yrARI	141.26	225.44	228.21	226.49	228.26	0.000327	1.06	133.66	56.62	0.22	7.44	-1529.70	0.53	0.56
Upstream	3068.07	1000yrARI	141.26	225.24	228.18	226.30	228.23	0.000263	0.98	143.75	57.66	0.20	6.32	-1510.54	0.29	0.38
Upstream	2968.07	1000yrARI	272.82	225.04	228.01	226.65	228.19	0.000953	1.88	145.15	57.81	0.38	23.07	-1540.24	0.24	0.33
Upstream	2868.07	1000yrARI	272.82	224.84	227.93	226.45	228.09	0.000830	1.79	152.06	58.52	0.36	20.78	-1501.93	0.10	0.16
Upstream	2768.07	1000yrARI	272.82	224.64	227.86	226.25	228.01	0.000711	1.71	159.66	58.64	0.33	18.58	-1512.47	0.17	-0.23
Upstream	2668.07	1000yrARI	272.82	224.43	227.80	226.04	227.93	0.000608	1.62	168.77	59.95	0.31	16.45	-1516.29	0.03	-0.12

HEC-RAS Plan: Plan 03 River: S1D8 Reach: Downstream Profile: 1000yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
Downstream	2500.00	1000yrARI	272.82	224.10	227.80	225.71	227.91	0.000437	1.43	190.23	62.31	0.26	12.66	-1538.79	-0.53	-0.62
Downstream	2400.00	1000yrARI	272.82	223.90	227.77	225.51	227.86	0.000369	1.36	200.95	62.47	0.24	11.17	-1546.45	-0.70	-0.92
Downstream	2300.00	1000yrARI	272.82	223.70	227.74	225.31	227.83	0.000308	1.30	209.48	60.20	0.22	10.03	-1441.60	-0.91	-0.88
Downstream	2200.00	1000yrARI	272.82	223.49	227.72	225.10	227.80	0.000261	1.24	220.45	60.06	0.21	8.91	-1453.57	-0.97	-1.14
Downstream	2150		Culvert													
Downstream	2100.00	1000yrARI	272.82	223.29	225.97	224.90	226.20	0.001373	2.12	128.40	56.03	0.45	30.38	-1475.59	0.45	0.58
Downstream	2000	1000yrARI	300.16	222.91	225.66	224.62	225.92	0.001503	2.26	132.77	56.49	0.47	34.10	-1524.91	0.82	0.76
Downstream	1900.00	1000yrARI	300.16	222.89	225.45	224.60	225.76	0.001940	2.46	121.93	55.33	0.53	41.31	-1524.91	1.01	0.95
Downstream	1800.00	1000yrARI	300.16	222.69	225.26	224.40	225.56	0.001921	2.45	122.33	55.37	0.53	41.01	-1540.70	1.49	1.12
Downstream	1700.00	1000yrARI	300.16	222.49	225.06	224.20	225.37	0.001898	2.44	122.83	55.44	0.52	40.63	-1580.46	1.77	0.86
Downstream	1600.00	1000yrARI	300.16	222.29	224.88	224.00	225.18	0.001867	2.43	123.52	55.51	0.52	40.12	-1665.20	1.62	1.31
Downstream	1500.00	1000yrARI	300.16	222.09	224.69	223.80	224.99	0.001829	2.41	124.36	55.60	0.52	39.52	-1748.98	1.54	1.34
Downstream	1400.00	1000yrARI	300.16	221.89	224.51	223.60	224.80	0.001781	2.39	125.48	55.72	0.51	38.73	-1715.46	1.68	1.63
Downstream	1300.00	1000yrARI	300.16	221.69	224.34	223.40	224.62	0.001725	2.37	126.80	55.85	0.50	37.82	-1651.31	1.88	1.32
Downstream	1200.00	1000yrARI	300.16	221.49	224.17	223.20	224.45	0.001646	2.33	128.88	56.16	0.49	36.48	-1574.71	1.31	1.30
Downstream	1100.00	1000yrARI	300.16	221.29	224.01	223.00	224.28	0.001568	2.29	130.91	56.31	0.48	35.21	-1619.23	1.34	1.43
Downstream	1000.00	1000yrARI	330.20	221.09	223.77	222.91	224.10	0.001999	2.57	128.66	56.05	0.54	44.30	-1644.13	1.74	1.56
Downstream	900.00	1000yrARI	330.20	220.89	223.57	222.71	223.90	0.001997	2.57	128.71	56.08	0.54	44.26	-1643.64	2.10	1.09
Downstream	800.00	1000yrARI	330.20	220.69	223.37	222.50	223.70	0.002000	2.57	128.63	56.05	0.54	44.32	-1577.58	1.25	1.08
Downstream	700.00	1000yrARI	330.20	220.49	223.17	222.31	223.50	0.001997	2.57	128.70	56.07	0.54	44.27	-1458.35	0.74	0.54
Downstream	600.00	1000yrARI	330.20	220.29	222.97	222.11	223.30	0.001997	2.57	128.70	56.07	0.54	44.27	-1461.23	0.45	0.32
Downstream	500.00	1000yrARI	330.20	220.09	222.77	221.91	223.10	0.001997	2.57	128.71	56.07	0.54	44.26	-1464.10	0.32	0.42
Downstream	400.00	1000yrARI	330.20	219.89	222.57	221.71	222.90	0.001997	2.57	128.69	56.06	0.54	44.28	-1485.18	0.32	0.90
Downstream	300.00	1000yrARI	330.20	219.69	222.37	221.51	222.71	0.001995	2.56	128.75	56.08	0.54	44.23	-1522.52	0.51	1.23
Downstream	200.00	1000yrARI	330.20	219.49	222.17	221.31	222.51	0.001994	2.56	128.76	56.07	0.54	44.22	-1784.41	3.08	0.32
Downstream	100.00	1000yrARI	330.20	219.29	221.97	221.11	222.30	0.002001	2.57	128.62	56.06	0.54	44.33	-1850.47	3.53	2.34

HEC-RAS MODELLING RESULTS FOR DIVERSION DRAIN 9

- 100 Year ARI longsection
- 100 Year ARI Table of Results
- 1000 Year longsection
- 1000 Year ARI Table of Results

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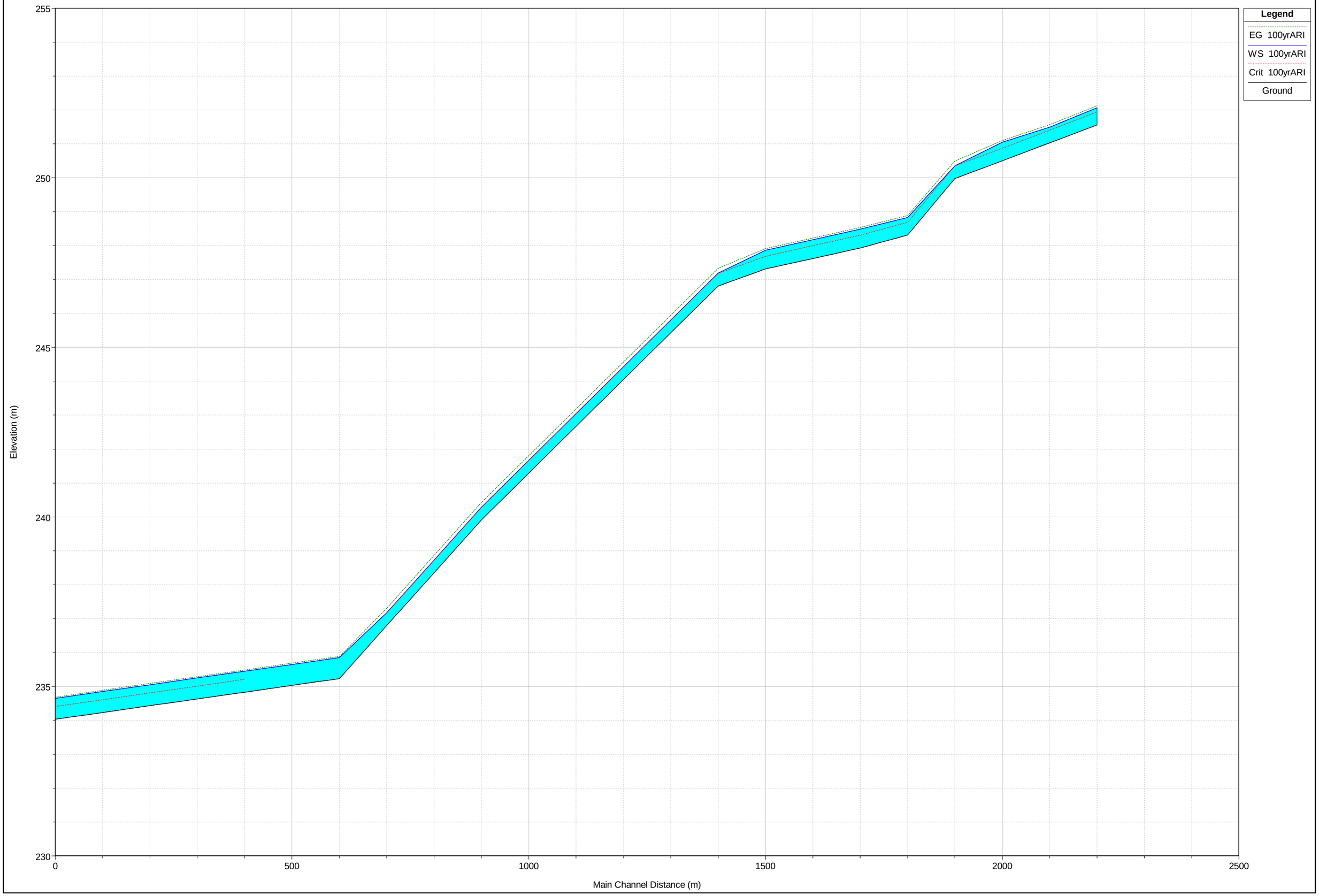

HEC-RAS Plan: Plan 01 River: S4D9 Reach: 100 Profile: 100yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	2300.00	100yrARI	1.95	251.56	252.07	251.94	252.13	0.004501	1.09	1.78	5.04	0.59	15.09	16.50	0.85	1.10
100	2200.00	100yrARI	1.95	251.03	251.49	251.40	251.57	0.007199	1.24	1.57	5.28	0.72	20.41	25.25	0.37	1.54
100	2100.00	100yrARI	1.95	250.50	251.05	250.87	251.10	0.003267	0.97	2.00	5.29	0.51	11.71	11.40	4.12	2.75
100	2000.00	100yrARI	1.95	249.98	250.36	250.36	250.50	0.014281	1.66	1.17	4.26	1.01	37.57	62.25	4.64	2.49
100	1900.00	100yrARI	1.95	248.31	248.83	248.69	248.88	0.004115	1.06	1.84	5.11	0.56	14.06	14.89	2.25	1.47
100	1800.00	100yrARI	1.95	247.93	248.49	248.31	248.53	0.003134	0.96	2.03	5.31	0.50	11.35	10.90	1.52	1.44
100	1700.00	100yrARI	1.95	247.62	248.17	248.00	248.22	0.003188	0.97	2.01	5.30	0.50	11.50	11.11	1.95	1.45
100	1600.00	100yrARI	1.95	247.31	247.86	247.68	247.91	0.003169	0.96	2.02	5.31	0.50	11.44	11.02	1.66	1.45
100	1500.00	100yrARI	1.95	246.81	247.19	247.19	247.33	0.013752	1.64	1.19	4.26	0.99	36.57	59.90	1.70	1.62
100	1400.00	100yrARI	1.95	245.43	245.81	245.81	245.95	0.013916	1.64	1.18	4.25	0.99	36.89	60.65	3.67	3.36
100	1300.00	100yrARI	1.95	244.05	244.43	244.43	244.57	0.013811	1.64	1.19	4.25	0.99	36.72	60.25	5.13	5.04
100	1200.00	100yrARI	1.95	242.67	243.05	243.05	243.19	0.013983	1.64	1.18	4.27	1.00	36.96	60.80	4.24	4.51
100	1100.00	100yrARI	1.95	241.29	241.67	241.67	241.81	0.013362	1.62	1.20	4.29	0.98	35.69	57.79	2.88	3.07
100	1000.00	100yrARI	1.95	239.91	240.29	240.29	240.43	0.014225	1.66	1.17	4.25	1.01	37.51	62.13	1.89	1.74
100	900.00	100yrARI	1.95	238.35	238.73	238.73	238.87	0.014338	1.66	1.17	4.25	1.01	37.69	62.55	1.38	1.63
100	800.00	100yrARI	1.95	236.79	237.17	237.17	237.30	0.014021	1.65	1.18	4.27	1.00	37.00	60.88	1.17	1.62
100	700.00	100yrARI	1.95	235.23	235.85		235.88	0.002005	0.82	2.39	5.71	0.40	7.94	6.47	1.58	1.52
100	600.00	100yrARI	1.95	235.03	235.65		235.68	0.002000	0.81	2.39	5.71	0.40	7.92	6.45	1.07	1.38
100	500.00	100yrARI	1.95	234.83	235.45	235.21	235.48	0.002017	0.82	2.38	5.71	0.40	7.98	6.52	1.23	1.38
100	400.00	100yrARI	1.95	234.63	235.25	235.01	235.28	0.001998	0.81	2.39	5.72	0.40	7.91	6.44	0.94	1.38
100	300.00	100yrARI	1.95	234.43	235.05	234.81	235.09	0.001971	0.81	2.40	5.73	0.40	7.83	6.34	0.93	1.38
100	200.00	100yrARI	1.95	234.23	234.85	234.60	234.88	0.001988	0.81	2.40	5.73	0.40	7.88	6.40	0.68	1.38
100	100.00	100yrARI	1.95	234.03	234.65	234.41	234.68	0.002002	0.81	2.39	5.73	0.40	7.92	6.45	0.64	1.38

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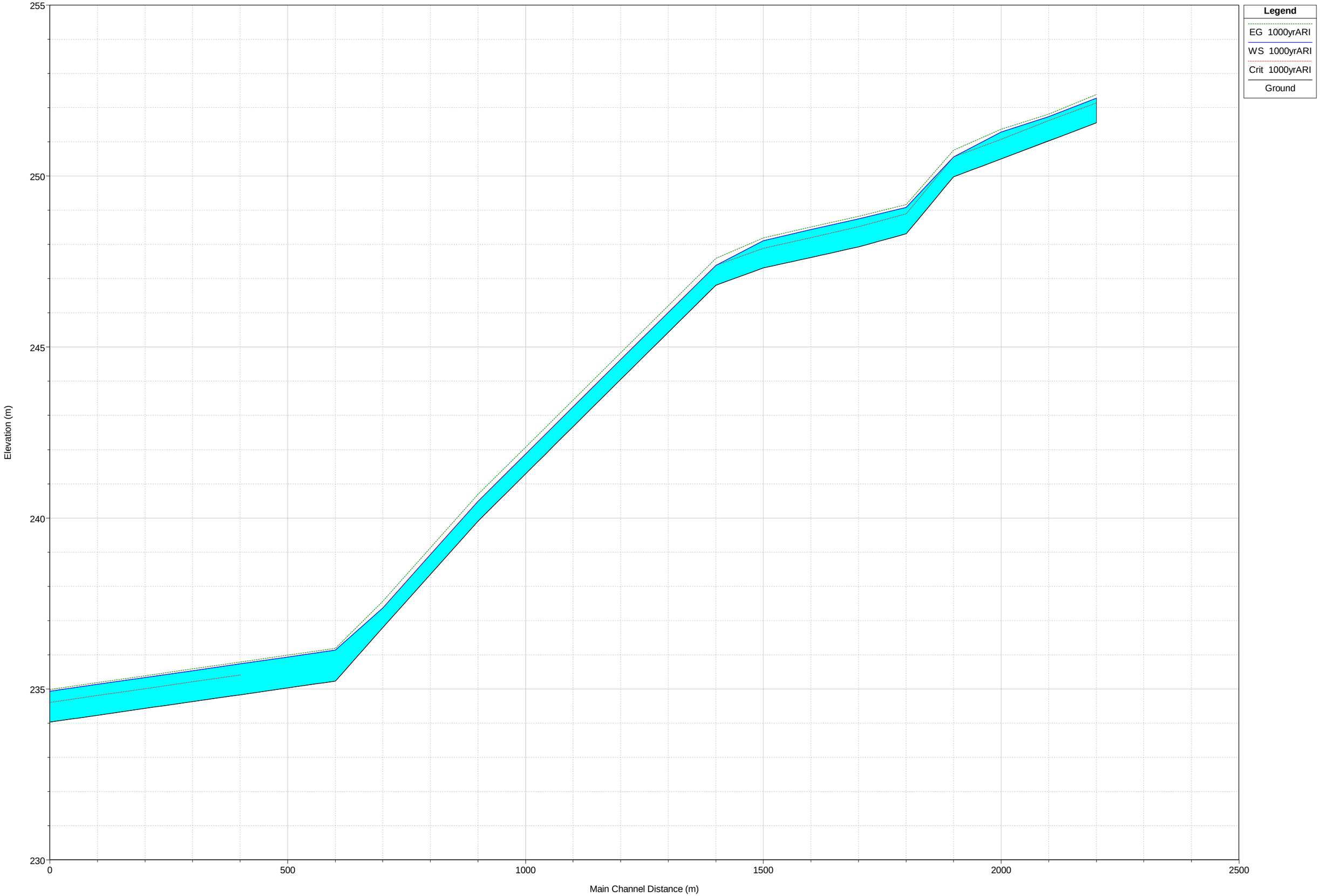

HEC-RAS Plan: Plan 01 River: S4D9 Reach: 100 Profile: 1000yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	2300.00	1000yrARI	4.28	251.56	252.28	252.14	252.38	0.005300	1.44	2.98	6.31	0.67	23.68	34.01	0.64	0.89
100	2200.00	1000yrARI	4.28	251.03	251.74	251.63	251.82	0.005885	1.24	3.47	10.12	0.67	19.38	23.94	0.12	1.29
100	2100.00	1000yrARI	4.28	250.50	251.29	251.08	251.37	0.003522	1.24	3.46	6.75	0.55	17.07	21.12	3.88	2.51
100	2000.00	1000yrARI	4.28	249.98	250.56	250.56	250.76	0.012419	1.96	2.18	5.50	0.99	46.75	91.72	4.44	2.29
100	1900.00	1000yrARI	4.28	248.31	249.08	248.89	249.17	0.003870	1.28	3.35	6.65	0.58	18.41	23.56	2.00	1.22
100	1800.00	1000yrARI	4.28	247.93	248.75	248.51	248.82	0.003126	1.18	3.62	6.87	0.52	15.54	18.40	1.26	1.18
100	1700.00	1000yrARI	4.28	247.62	248.44	248.20	248.51	0.003080	1.18	3.64	6.89	0.52	15.35	18.08	1.68	1.18
100	1600.00	1000yrARI	4.28	247.31	248.11	247.89	248.19	0.003345	1.21	3.53	6.80	0.54	16.39	19.89	1.41	1.20
100	1500.00	1000yrARI	4.28	246.81	247.39	247.39	247.59	0.012941	1.99	2.15	5.44	1.01	48.40	96.52	1.50	1.42
100	1400.00	1000yrARI	4.28	245.43	246.01	246.01	246.21	0.012802	1.99	2.16	5.46	1.01	47.97	95.25	3.47	3.16
100	1300.00	1000yrARI	4.28	244.05	244.63	244.63	244.83	0.012795	1.99	2.16	5.45	1.01	47.98	95.32	4.93	4.84
100	1200.00	1000yrARI	4.28	242.67	243.25	243.25	243.45	0.012787	1.98	2.16	5.47	1.01	47.87	94.94	4.04	4.31
100	1100.00	1000yrARI	4.28	241.29	241.87	241.87	242.07	0.012739	1.98	2.16	5.47	1.01	47.76	94.66	2.68	2.87
100	1000.00	1000yrARI	4.28	239.91	240.49	240.49	240.69	0.012780	1.98	2.16	5.46	1.01	47.90	95.06	1.69	1.54
100	900.00	1000yrARI	4.28	238.35	238.93	238.93	239.13	0.012757	1.98	2.16	5.47	1.01	47.77	94.65	1.18	1.42
100	800.00	1000yrARI	4.28	236.79	237.37	237.37	237.57	0.012811	1.98	2.16	5.47	1.01	47.92	95.08	0.97	1.42
100	700.00	1000yrARI	4.28	235.23	236.14		236.19	0.002000	1.00	4.27	7.42	0.42	10.84	10.89	1.29	1.23
100	600.00	1000yrARI	4.28	235.03	235.94		235.99	0.001999	1.00	4.27	7.42	0.42	10.84	10.88	0.78	1.09
100	500.00	1000yrARI	4.28	234.83	235.74	235.41	235.79	0.001981	1.00	4.28	7.44	0.42	10.76	10.76	0.94	1.09
100	400.00	1000yrARI	4.28	234.63	235.53	235.21	235.59	0.002005	1.00	4.26	7.43	0.42	10.86	10.91	0.66	1.10
100	300.00	1000yrARI	4.28	234.43	235.33	235.01	235.39	0.002002	1.00	4.27	7.43	0.42	10.85	10.89	0.65	1.10
100	200.00	1000yrARI	4.28	234.23	235.14	234.81	235.19	0.001982	1.00	4.28	7.44	0.42	10.76	10.77	0.39	1.10
100	100.00	1000yrARI	4.28	234.03	234.93	234.61	234.99	0.002001	1.00	4.27	7.45	0.42	10.83	10.86	0.36	1.10

HEC-RAS MODELLING RESULTS FOR DIVERSION DRAIN 10

- 100 Year ARI longsection
- 100 Year ARI Table of Results
- 1000 Year longsection
- 1000 Year ARI Table of Results

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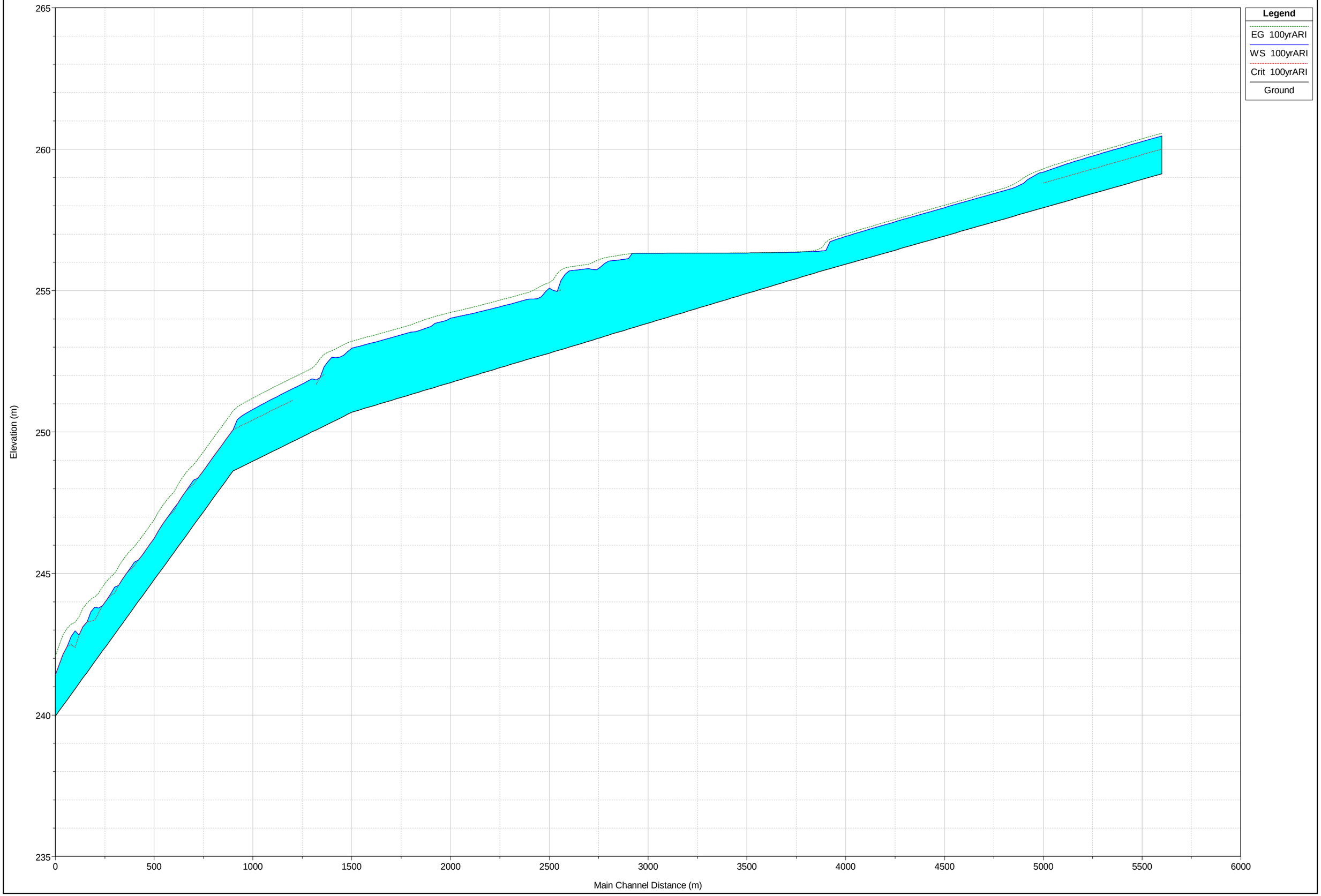

HEC-RAS Plan: Plan 01 River: S4D10 Reach: 100 Profile: 100yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	5700.00	100yrARI	16.78	259.13	260.47	260.01	260.57	0.001999	1.39	12.10	13.06	0.46	17.58	24.37	0.76	0.97
100	5600.00	100yrARI	16.78	258.93	260.27	259.81	260.37	0.002009	1.39	12.07	13.03	0.46	17.66	24.54	0.85	1.41
100	5500.00	100yrARI	16.78	258.73	260.07	259.60	260.17	0.002023	1.39	12.04	13.01	0.46	17.77	24.75	1.13	1.59
100	5400.00	100yrARI	16.78	258.53	259.86	259.40	259.96	0.002046	1.40	12.00	13.00	0.46	17.92	25.06	1.53	1.95
100	5300.00	100yrARI	16.78	258.33	259.66	259.20	259.76	0.002091	1.41	11.90	12.95	0.47	18.24	25.71	1.49	2.11
100	5200.00	100yrARI	16.78	258.13	259.44	259.01	259.54	0.002225	1.44	11.63	12.82	0.48	19.16	27.64	1.42	1.94
100	5100.00	100yrARI	16.78	257.93	259.19	258.80	259.30	0.002601	1.53	10.99	12.52	0.52	21.69	33.09	1.43	1.98
100	5000.00	100yrARI	16.78	257.73	258.80		258.98	0.004896	1.92	8.75	11.41	0.70	35.76	68.53	2.13	2.33
100	4900.00	100yrARI	16.78	257.53	258.53		258.62	0.002000	1.28	13.06	16.01	0.45	15.68	20.13	3.18	3.30
100	4800.00	100yrARI	16.78	257.33	258.33		258.42	0.002003	1.28	13.05	16.00	0.45	15.70	20.18	3.85	4.30
100	4700.00	100yrARI	16.78	257.13	258.13		258.22	0.001997	1.28	13.07	16.02	0.45	15.66	20.10	4.29	4.77
100	4600.00	100yrARI	16.78	256.93	257.93		258.02	0.001996	1.28	13.08	16.02	0.45	15.65	20.08	4.53	4.95
100	4500.00	100yrARI	16.78	256.73	257.73		257.82	0.002003	1.28	13.06	16.01	0.45	15.70	20.17	4.47	4.99
100	4400.00	100yrARI	16.78	256.53	257.53		257.62	0.002008	1.29	13.04	16.00	0.45	15.73	20.23	4.57	4.95
100	4300.00	100yrARI	16.78	256.33	257.33		257.42	0.002027	1.29	13.00	15.98	0.46	15.85	20.46	4.79	5.19
100	4200.00	100yrARI	16.78	256.13	257.13		257.21	0.002049	1.29	12.96	15.98	0.46	15.97	20.68	5.15	5.65
100	4100.00	100yrARI	16.78	255.93	256.92		257.00	0.002132	1.31	12.78	15.91	0.47	16.46	21.61	5.57	5.96
100	4000.00	100yrARI	19.44	255.74	256.41	256.41	256.71	0.010957	2.39	8.12	14.05	1.01	61.11	146.35	6.21	6.82
100	3900.00	100yrARI	19.44	255.53	256.37		256.39	0.000362	0.54	35.84	45.07	0.19	2.81	1.52	6.51	7.15
100	3800.00	100yrARI	19.44	255.32	256.35		256.36	0.000184	0.44	44.41	46.20	0.14	1.72	0.75	6.78	7.40
100	3700.00	100yrARI	19.44	255.11	256.34		256.35	0.000101	0.36	53.68	47.38	0.11	1.11	0.40	7.03	7.60
100	3600.00	100yrARI	19.44	254.90	256.33		256.34	0.000060	0.31	63.45	48.61	0.09	0.76	0.23	7.25	7.85
100	3500.00	100yrARI	19.44	254.69	256.33		256.33	0.000038	0.26	73.60	49.84	0.07	0.54	0.14	7.54	8.06
100	3400.00	100yrARI	19.44	254.48	256.33		256.33	0.000025	0.23	84.09	51.10	0.06	0.40	0.09	7.71	8.28
100	3300.00	100yrARI	19.44	254.27	256.32		256.33	0.000017	0.20	94.87	52.35	0.05	0.31	0.06	7.98	8.60
100	3200.00	100yrARI	19.44	254.06	256.32		256.32	0.000012	0.18	105.91	53.59	0.04	0.24	0.04	8.13	8.80
100	3100.00	100yrARI	19.44	253.85	256.32		256.32	0.000009	0.17	117.29	54.86	0.04	0.19	0.03	8.12	8.87
100	3000.00	100yrARI	214.38	253.64	256.13		256.30	0.001081	1.81	118.42	54.97	0.39	22.50	40.74	8.13	8.69
100	2900.00	100yrARI	214.38	253.43	256.04		256.19	0.000921	1.72	124.93	55.68	0.37	19.95	34.24	7.65	7.64
100	2800.00	100yrARI	214.38	253.21	255.78		255.94	0.000979	1.75	122.46	55.46	0.38	20.88	36.55	5.68	5.89
100	2700.00	100yrARI	214.38	253.00	255.70		255.84	0.000826	1.65	129.59	56.23	0.35	18.38	30.41	3.83	4.47
100	2600.00	100yrARI	214.38	252.79	255.09		255.28	0.001407	1.96	109.11	54.66	0.44	27.18	53.41	3.54	4.55
100	2500.00	100yrARI	214.38	252.59	254.71		254.95	0.001879	2.17	98.84	53.05	0.51	33.89	73.51	5.45	8.12
100	2400.00	100yrARI	214.38	252.38	254.52		254.76	0.001836	2.16	99.37	52.85	0.50	33.42	72.10	5.47	7.54
100	2300.00	100yrARI	214.38	252.17	254.34		254.57	0.001745	2.12	101.06	53.05	0.49	32.18	68.25	4.61	6.50
100	2200.00	100yrARI	214.38	251.96	254.17		254.39	0.001633	2.08	103.31	53.30	0.48	30.62	63.54	4.07	5.63
100	2100.00	100yrARI	214.38	251.75	254.02		254.23	0.001491	2.01	106.44	53.64	0.46	28.62	57.64	3.77	5.24
100	2000.00	100yrARI	233.40	251.54	253.73		254.04	0.002269	2.46	94.83	46.59	0.55	42.94	105.69	4.14	5.12
100	1900.00	100yrARI	233.40	251.33	253.53		253.80	0.001973	2.27	102.65	53.22	0.52	36.82	83.72	4.20	4.31
100	1800.00	100yrARI	233.40	251.12	253.34		253.60	0.001927	2.26	103.44	53.31	0.52	36.19	81.65	2.64	2.23
100	1700.00	100yrARI	233.40	250.91	253.15		253.40	0.001865	2.23	104.57	53.44	0.51	35.31	78.82	1.32	1.29
100	1600.00	100yrARI	233.40	250.70	252.97		253.21	0.001785	2.20	106.11	53.63	0.50	34.17	75.16	0.89	0.85
100	1500.00	100yrARI	233.40	250.35	252.64		252.88	0.001752	2.19	106.75	53.69	0.49	33.71	73.69	1.02	0.63
100	1400.00	100yrARI	233.40	250.01	251.88		252.26	0.003478	2.74	85.22	51.21	0.68	56.09	153.63	2.27	0.80
100	1300.00	100yrARI	233.40	249.66	251.53	251.12	251.91	0.003458	2.73	85.36	51.21	0.68	55.87	152.76	2.55	1.02
100	1200.00	100yrARI	233.40	249.32	251.18	250.78	251.56	0.003562	2.76	84.55	51.13	0.69	57.09	157.61	2.12	0.63
100	1100.00	100yrARI	233.40	248.97	250.81	250.43	251.20	0.003698	2.79	83.54	51.03	0.70	58.68	163.95	1.73	0.56
100	1000.00	100yrARI	233.40	248.63	250.09	250.09	250.75	0.008136	3.61	64.70	48.76	1.00	104.85	378.20	1.99	0.96
100	900.00	100yrARI	233.40	247.67	249.13	249.13	249.79	0.008106	3.60	64.78	48.76	1.00	104.58	376.83	2.07	0.87
100	800.00	100yrARI	233.40	246.71	248.30	248.17	248.85	0.006043	3.28	71.22	49.55	0.87	84.29	276.26	1.54	0.84
100	700.00	100yrARI	233.40	245.74	247.30	247.20	247.87	0.006475	3.35	69.63	49.34	0.90	88.70	297.31	1.29	0.90
100	600.00	100yrARI	233.40	244.78	246.24	246.24	246.90	0.008106	3.60	64.77	48.76	1.00	104.58	376.85	1.20	1.41
100	500.00	100yrARI	233.40	243.82	245.40	245.27	245.96	0.006140	3.29	70.86	49.52	0.88	85.28	280.91	2.14	2.22
100	400.00	100yrARI	233.40	242.85	244.52	244.31	245.01	0.005190	3.12	74.81	49.97	0.81	75.37	235.17	2.42	2.80
100	300.00	100yrARI	233.40	241.89	243.81	243.35	244.17	0.003147	2.65	88.05	51.55	0.65	52.09	138.06	2.65	3.04
100	200.00	100yrARI	233.40	240.92	242.97	242.38	243.28	0.002559	2.48	94.22	52.26	0.59	44.68	110.68	3.23	3.43
100	100.00	100yrARI	233.40	239.96	241.42	241.42	242.08	0.008063	3.60	64.88	48.77	1.00	104.18	374.76	4.04	4.28

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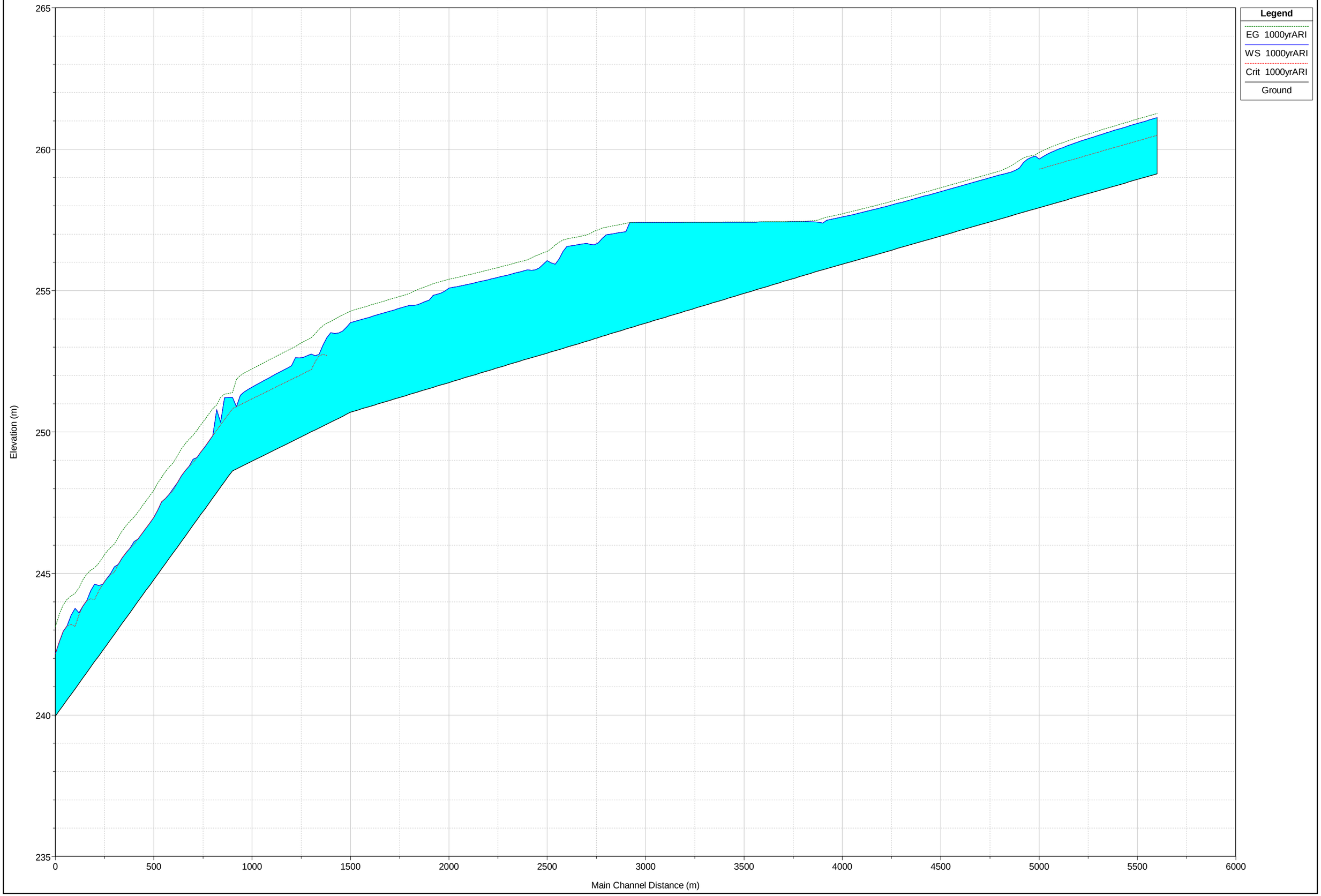

HEC-RAS Plan: Plan 01 River: S4D10 Reach: 100 Profile: 1000yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	5700.00	1000yrARI	37.61	259.13	261.12	260.49	261.27	0.002016	1.73	21.77	16.92	0.49	24.51	42.33	0.12	0.33
100	5600.00	1000yrARI	37.61	258.93	260.91	260.29	261.06	0.002046	1.74	21.66	16.88	0.49	24.80	43.05	0.21	0.77
100	5500.00	1000yrARI	37.61	258.73	260.70	260.09	260.86	0.002087	1.75	21.50	16.82	0.49	25.20	44.09	0.50	0.96
100	5400.00	1000yrARI	37.61	258.53	260.49	259.89	260.65	0.002152	1.77	21.26	16.74	0.50	25.82	45.68	0.90	1.32
100	5300.00	1000yrARI	37.61	258.33	260.26	259.69	260.43	0.002279	1.81	20.81	16.57	0.51	27.04	48.86	0.88	1.51
100	5200.00	1000yrARI	37.61	258.13	260.00	259.49	260.18	0.002585	1.89	19.86	16.22	0.55	29.93	56.66	0.86	1.38
100	5100.00	1000yrARI	37.61	257.93	259.65	259.30	259.89	0.003685	2.16	17.45	15.31	0.64	39.73	85.65	0.97	1.52
100	5000.00	1000yrARI	37.61	257.73	259.33	259.08	259.61	0.004702	2.34	17.66	29.42	0.72	47.89	112.27	1.60	1.80
100	4900.00	1000yrARI	37.61	257.53	259.10		259.23	0.001988	1.64	22.98	19.37	0.48	22.53	36.88	2.62	2.73
100	4800.00	1000yrARI	37.61	257.33	258.90		259.03	0.001984	1.64	22.99	19.37	0.48	22.50	36.80	3.28	3.73
100	4700.00	1000yrARI	37.61	257.13	258.70		258.83	0.001965	1.63	23.07	19.41	0.48	22.33	36.39	3.72	4.20
100	4600.00	1000yrARI	37.61	256.93	258.50		258.64	0.001944	1.62	23.16	19.43	0.47	22.14	35.95	3.96	4.38
100	4500.00	1000yrARI	37.61	256.73	258.31		258.44	0.001919	1.62	23.27	19.46	0.47	21.92	35.43	3.89	4.41
100	4400.00	1000yrARI	37.61	256.53	258.12		258.25	0.001870	1.60	23.48	19.53	0.47	21.48	34.40	3.98	4.36
100	4300.00	1000yrARI	37.61	256.33	257.94		258.07	0.001801	1.58	23.79	19.61	0.46	20.87	32.98	4.18	4.58
100	4200.00	1000yrARI	37.61	256.13	257.76		257.89	0.001686	1.54	24.36	19.80	0.44	19.81	30.58	4.52	5.02
100	4100.00	1000yrARI	37.61	255.93	257.60		257.72	0.001542	1.50	25.14	20.03	0.43	18.48	27.64	4.89	5.28
100	4000.00	1000yrARI	44.53	255.74	257.39		257.55	0.002307	1.81	24.58	19.88	0.52	27.24	49.35	5.23	5.85
100	3900.00	1000yrARI	44.53	255.53	257.44		257.45	0.000117	0.51	87.34	51.47	0.12	1.93	0.98	5.44	6.08
100	3800.00	1000yrARI	44.53	255.32	257.43		257.44	0.000083	0.46	97.87	52.68	0.11	1.49	0.68	5.70	6.32
100	3700.00	1000yrARI	44.53	255.11	257.43		257.43	0.000060	0.41	108.73	53.90	0.09	1.18	0.48	5.94	6.51
100	3600.00	1000yrARI	44.53	254.90	257.42		257.43	0.000045	0.37	119.97	55.14	0.08	0.94	0.35	6.16	6.76
100	3500.00	1000yrARI	44.53	254.69	257.42		257.42	0.000034	0.34	131.51	56.38	0.07	0.77	0.26	6.45	6.97
100	3400.00	1000yrARI	44.53	254.48	257.42		257.42	0.000026	0.31	143.38	57.63	0.06	0.63	0.20	6.62	7.19
100	3300.00	1000yrARI	44.53	254.27	257.41		257.42	0.000021	0.29	155.52	58.89	0.06	0.53	0.15	6.89	7.51
100	3200.00	1000yrARI	44.53	254.06	257.41		257.42	0.000016	0.27	167.89	60.13	0.05	0.44	0.12	7.04	7.71
100	3100.00	1000yrARI	44.53	253.85	257.41		257.41	0.000013	0.25	180.64	61.40	0.05	0.38	0.09	7.03	7.78
100	3000.00	1000yrARI	414.39	253.64	257.09		257.38	0.001294	2.39	173.63	60.71	0.45	35.63	85.04	7.17	7.73
100	2900.00	1000yrARI	414.39	253.43	256.97		257.24	0.001175	2.31	179.40	61.27	0.43	33.12	76.50	6.72	6.71
100	2800.00	1000yrARI	414.39	253.21	256.68		256.96	0.001278	2.38	174.42	60.83	0.45	35.28	83.82	4.78	4.99
100	2700.00	1000yrARI	414.39	253.00	256.56		256.83	0.001159	2.30	180.31	61.41	0.43	32.76	75.29	2.97	3.61
100	2600.00	1000yrARI	414.39	252.79	256.06		256.38	0.001516	2.51	165.39	60.62	0.48	39.88	99.92	2.57	3.58
100	2500.00	1000yrARI	414.39	252.59	255.73		256.09	0.001771	2.65	156.42	59.24	0.52	45.07	119.41	4.43	7.10
100	2400.00	1000yrARI	414.39	252.38	255.56		255.91	0.001732	2.63	157.27	59.06	0.52	44.46	117.16	4.43	6.50
100	2300.00	1000yrARI	414.39	252.17	255.39		255.73	0.001655	2.59	159.74	59.32	0.50	42.94	111.39	3.56	5.45
100	2200.00	1000yrARI	414.39	251.96	255.23		255.56	0.001561	2.54	162.92	59.63	0.49	41.09	104.50	3.01	4.57
100	2100.00	1000yrARI	414.39	251.75	255.09		255.40	0.001454	2.48	166.86	60.02	0.48	38.94	96.71	2.70	4.17
100	2000.00	1000yrARI	446.33	251.54	254.67		255.19	0.002517	3.19	139.83	49.40	0.61	65.09	207.77	3.20	4.18
100	1900.00	1000yrARI	446.33	251.33	254.48		254.90	0.002064	2.86	155.86	58.92	0.56	52.64	150.74	3.25	3.36
100	1800.00	1000yrARI	446.33	251.12	254.27		254.69	0.002056	2.86	156.06	58.94	0.56	52.48	150.10	1.70	1.30
100	1700.00	1000yrARI	446.33	250.91	254.07		254.49	0.002044	2.85	156.45	67.35	0.56	52.24	149.09	0.40	0.37
100	1600.00	1000yrARI	446.33	250.70	253.87		254.27	0.002187	2.83	162.94	98.70	0.57	52.41	148.23	-0.01	-0.05
100	1500.00	1000yrARI	446.33	250.35	253.52		253.91	0.002026	2.80	174.18	133.04	0.56	50.76	142.32	0.14	-0.25
100	1400.00	1000yrARI	446.33	250.01	252.76	252.21	253.33	0.003416	3.36	134.60	93.75	0.71	75.77	254.36	1.39	-0.08
100	1300.00	1000yrARI	446.33	249.66	252.35	251.87	252.96	0.003622	3.46	129.01	56.09	0.73	80.44	278.29	1.73	0.20
100	1200.00	1000yrARI	446.33	249.32	251.97	251.52	252.60	0.003735	3.51	127.34	56.44	0.74	82.85	290.82	1.33	-0.16
100	1100.00	1000yrARI	446.33	248.97	251.59	251.17	252.24	0.003892	3.56	125.34	55.33	0.75	85.58	304.88	0.95	-0.22
100	1000.00	1000yrARI	446.33	248.63	251.23	250.83	251.40	0.001561	2.24	323.76	267.28	0.48	34.01	76.27	0.85	-0.18
100	900.00	1000yrARI	446.33	247.67	249.88	249.88	250.84	0.007169	4.34	102.87	53.25	1.00	134.01	581.45	1.32	0.12
100	800.00	1000yrARI	446.33	246.71	249.05	248.91	249.89	0.005890	4.07	109.77	54.02	0.91	115.75	470.65	0.80	0.09
100	700.00	1000yrARI	446.33	245.74	248.01	247.94	248.91	0.006553	4.21	105.94	53.57	0.96	125.37	528.17	0.58	0.19
100	600.00	1000yrARI	446.33	244.78	246.98	246.98	247.95	0.007194	4.34	102.74	53.23	1.00	134.37	583.69	0.46	0.67
100	500.00	1000yrARI	446.33	243.82	246.13	246.02	246.99	0.006138	4.12	108.29	53.87	0.93	119.34	491.88	1.41	1.49
100	400.00	1000yrARI	446.33	242.85	245.24	245.05	246.04	0.005470	3.97	112.48	54.30	0.88	109.54	434.67	1.70	2.08
100	300.00	1000yrARI	446.33	241.89	244.63	244.09	245.21	0.003382	3.38	132.02	56.43	0.71	76.39	258.26	1.83	2.22
100	200.00	1000yrARI	446.33	240.92	243.77	243.13	244.30	0.002964	3.23	137.98	57.06	0.66	69.17	223.74	2.43	2.63
100	100.00	1000yrARI	446.33	239.96	242.17	242.17	243.13	0.007175	4.34	102.83	53.23	1.00	134.11	582.13	3.29	3.53

HEC-RAS MODELLING RESULTS FOR DIVERSION DRAIN 11

- 100 Year ARI longsection
- 100 Year ARI Table of Results
- 1000 Year longsection
- 1000 Year ARI Table of Results

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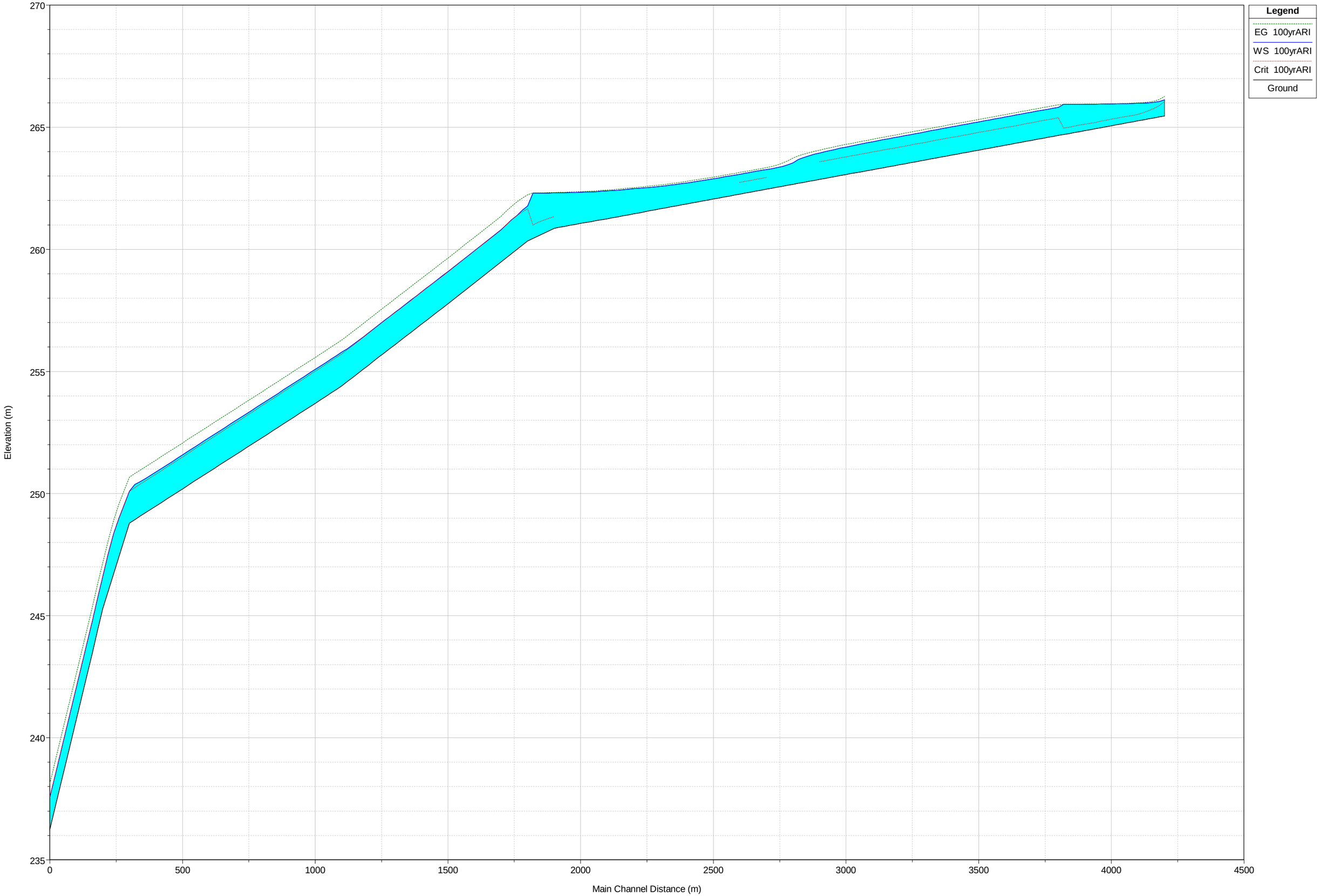

HEC-RAS Plan: Plan 01 River: S4D11 Reach: 100 Profile: 100yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	4400.00	100yrARI	4.41	265.46	266.12	266.05	266.26	0.007974	1.68	2.62	5.96	0.81	33.21	55.87	0.76	1.34
100	4300.00	100yrARI	4.41	265.26	265.98	265.52	265.99	0.000447	0.50	8.78	14.34	0.20	2.64	1.33	0.90	1.28
100	4200.00	100yrARI	4.41	265.06	265.95	265.33	265.96	0.000209	0.39	11.34	15.37	0.14	1.49	0.58	1.05	1.11
100	4100.00	100yrARI	4.41	264.86	265.94	265.12	265.95	0.000106	0.31	14.31	16.49	0.11	0.88	0.27	1.04	0.92
100	4000.00	100yrARI	21.68	264.66	265.82	265.39	265.92	0.001997	1.39	15.61	16.96	0.46	17.63	24.49	1.10	0.90
100	3900.00	100yrARI	21.68	264.46	265.62	265.18	265.72	0.001996	1.39	15.62	16.97	0.46	17.62	24.47	1.15	1.01
100	3800.00	100yrARI	21.68	264.26	265.42	264.99	265.52	0.001994	1.39	15.62	16.96	0.46	17.62	24.46	1.04	0.88
100	3700.00	100yrARI	21.68	264.06	265.22	264.79	265.32	0.001987	1.39	15.64	16.98	0.46	17.56	24.34	1.02	0.84
100	3600.00	100yrARI	21.68	263.86	265.02	264.58	265.12	0.001973	1.38	15.68	16.98	0.46	17.47	24.16	0.81	0.84
100	3500.00	100yrARI	21.68	263.66	264.81	264.38	264.91	0.002012	1.39	15.57	16.95	0.46	17.73	24.69	0.75	0.85
100	3400.00	100yrARI	21.68	263.46	264.61	264.18	264.71	0.002030	1.40	15.52	16.93	0.47	17.86	24.95	1.19	0.84
100	3300.00	100yrARI	21.68	263.26	264.41	263.99	264.51	0.002079	1.41	15.40	16.89	0.47	18.19	25.61	1.56	1.30
100	3200.00	100yrARI	21.68	263.06	264.19	263.78	264.29	0.002182	1.43	15.14	16.81	0.48	18.86	27.01	2.38	2.05
100	3100.00	100yrARI	21.68	262.86	263.95	263.59	264.06	0.002505	1.50	14.44	16.55	0.51	20.98	31.51	2.78	2.67
100	3000.00	100yrARI	21.68	262.66	263.54		263.73	0.005430	1.96	11.07	15.27	0.73	37.90	74.22	3.11	2.83
100	2900.00	100yrARI	21.68	262.46	263.27	262.95	263.34	0.001967	1.19	18.19	24.88	0.44	13.96	16.64	3.21	2.77
100	2800.00	100yrARI	21.68	262.26	263.08	262.74	263.15	0.001920	1.18	18.34	24.92	0.44	13.71	16.21	3.34	2.82
100	2700.00	100yrARI	21.68	262.06	262.89		262.96	0.001814	1.16	18.68	24.99	0.43	13.15	15.27	3.31	2.89
100	2600.00	100yrARI	21.68	261.86	262.72		262.78	0.001604	1.12	19.45	25.19	0.41	12.01	13.39	3.48	3.09
100	2500.00	100yrARI	21.68	261.66	262.58		262.64	0.001271	1.03	20.97	25.55	0.36	10.11	10.45	3.61	3.07
100	2400.00	100yrARI	21.68	261.45	262.48		262.52	0.000860	0.91	23.82	26.18	0.30	7.57	6.89	4.00	3.37
100	2300.00	100yrARI	21.68	261.25	262.39		262.43	0.000608	0.81	26.72	26.88	0.26	5.85	4.74	3.84	3.37
100	2200.00	100yrARI	21.68	261.06	262.34		262.36	0.000410	0.71	30.43	27.67	0.22	4.36	3.11	2.99	2.65
100	2100.00	100yrARI	21.68	260.86	262.31	261.34	262.33	0.000264	0.61	35.28	28.70	0.18	3.13	1.92	2.01	1.82
100	2000.00	100yrARI	104.43	260.34	261.78	261.66	262.24	0.006325	2.99	34.88	28.60	0.87	74.44	222.87	1.63	1.34
100	1900.00	100yrARI	104.43	259.48	260.80	260.79	261.36	0.008588	3.32	31.50	27.90	1.00	93.66	310.53	1.50	1.39
100	1800.00	100yrARI	104.43	258.62	259.94	259.94	260.50	0.008495	3.30	31.61	27.91	0.99	92.91	307.00	1.34	1.10
100	1700.00	100yrARI	104.43	257.77	259.09	259.08	259.65	0.008397	3.29	31.73	27.94	0.99	92.11	303.15	0.99	1.00
100	1600.00	100yrARI	104.43	256.93	258.25	258.24	258.81	0.008398	3.29	31.72	27.93	0.99	92.13	303.27	0.93	0.83
100	1500.00	100yrARI	104.43	256.09	257.41	257.40	257.97	0.008397	3.29	31.73	27.94	0.99	92.10	303.14	0.94	0.79
100	1400.00	100yrARI	104.43	255.25	256.58	256.56	257.13	0.008356	3.29	31.78	27.95	0.98	91.76	301.48	1.01	0.89
100	1300.00	100yrARI	104.43	254.41	255.80	255.72	256.29	0.007163	3.12	33.46	28.30	0.92	81.74	255.11	1.02	0.90
100	1200.00	100yrARI	104.43	253.69	255.08	255.00	255.57	0.007005	3.10	33.70	28.34	0.91	80.40	249.11	1.08	1.15
100	1100.00	100yrARI	104.43	252.99	254.39	254.31	254.87	0.006996	3.10	33.73	28.37	0.91	80.29	248.61	1.16	1.47
100	1000.00	100yrARI	104.43	252.29	253.69	253.60	254.17	0.006999	3.10	33.72	28.36	0.91	80.32	248.73	1.35	1.55
100	900.00	100yrARI	104.43	251.59	252.98	252.90	253.47	0.007003	3.10	33.71	28.35	0.91	80.37	248.97	1.33	1.43
100	800.00	100yrARI	104.43	250.89	252.29	252.20	252.77	0.006993	3.10	33.73	28.37	0.91	80.27	248.50	1.40	1.42
100	700.00	100yrARI	104.43	250.19	251.59	251.50	252.07	0.006992	3.10	33.72	28.33	0.91	80.31	248.71	1.74	1.66
100	600.00	100yrARI	104.43	249.49	250.89	250.80	251.37	0.006909	3.08	33.86	28.39	0.90	79.56	245.33	2.10	1.93
100	500.00	100yrARI	104.43	248.79	250.10	250.10	250.67	0.008781	3.34	31.26	27.83	1.01	95.25	318.20	2.41	1.98
100	400.00	100yrARI	104.43	245.29	246.61	246.61	247.17	0.008768	3.34	31.27	27.83	1.01	95.14	317.71	5.38	5.18
100	300.00	100yrARI	104.43	240.77	242.08	242.08	242.65	0.008782	3.34	31.26	27.85	1.01	95.23	318.09	9.18	9.05
100	200.00	100yrARI	104.43	236.25	237.57	237.57	238.13	0.008779	3.34	31.26	27.83	1.01	95.24	318.15	12.77	12.66

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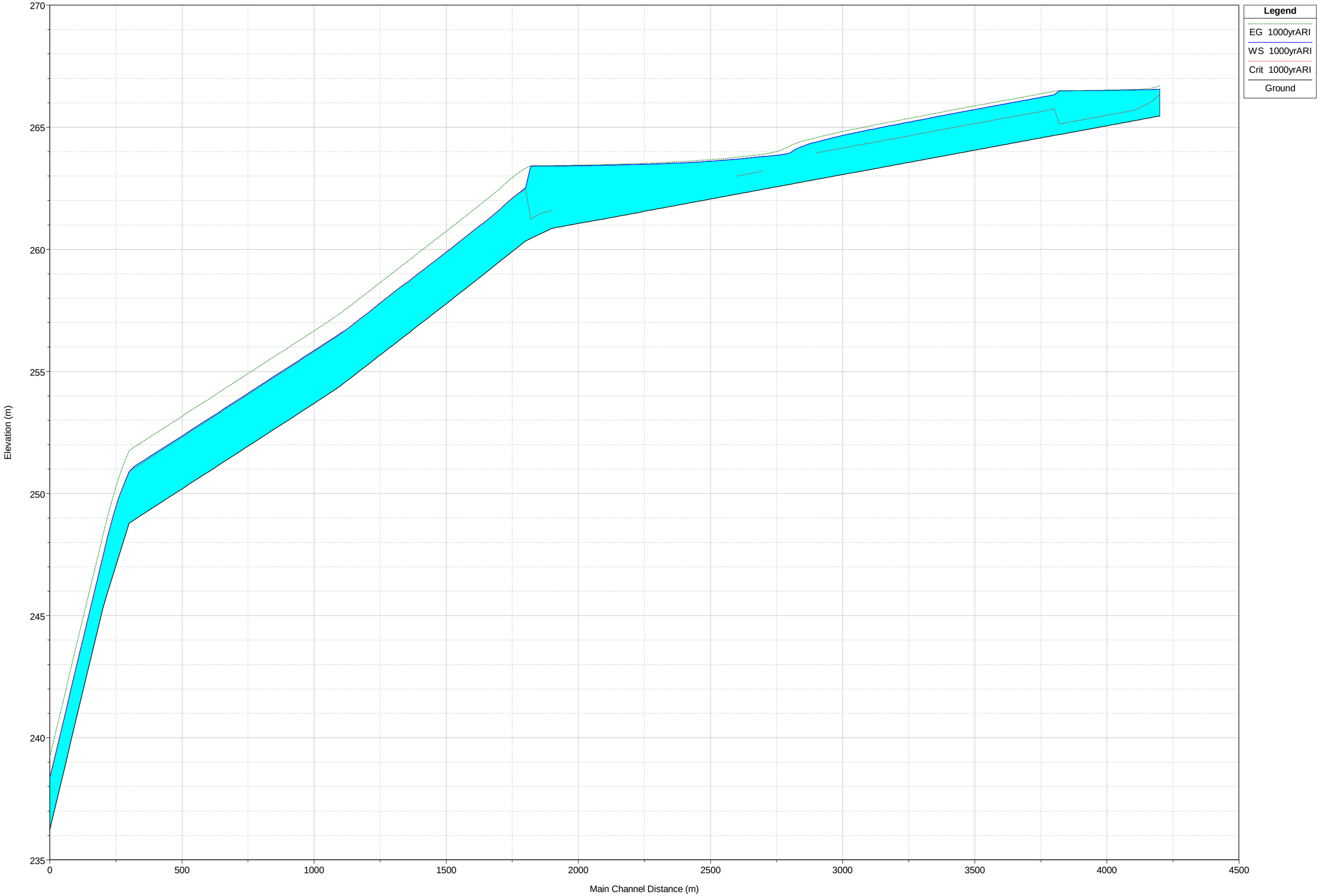

HEC-RAS Plan: Plan 01 River: S4D11 Reach: 100 Profile: 1000yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	4400.00	1000yrARI	9.55	265.46	266.56	266.34	266.70	0.004205	1.63	5.87	8.63	0.63	26.92	43.80	0.32	0.90
100	4300.00	1000yrARI	9.55	265.26	266.53	265.69	266.54	0.000278	0.55	17.52	17.62	0.17	2.65	1.44	0.35	0.73
100	4200.00	1000yrARI	9.55	265.06	266.51	265.50	266.52	0.000170	0.46	20.80	18.70	0.14	1.81	0.83	0.49	0.55
100	4100.00	1000yrARI	9.55	264.86	266.50	265.29	266.51	0.000108	0.39	24.43	19.84	0.11	1.27	0.50	0.48	0.36
100	4000.00	1000yrARI	42.36	264.66	266.32	265.75	266.47	0.001998	1.70	24.96	19.99	0.48	23.82	40.42	0.60	0.40
100	3900.00	1000yrARI	42.36	264.46	266.12	265.55	266.27	0.001996	1.70	24.98	20.01	0.48	23.79	40.35	0.65	0.51
100	3800.00	1000yrARI	42.36	264.26	265.92	265.35	266.07	0.001997	1.70	24.96	20.00	0.48	23.81	40.41	0.54	0.38
100	3700.00	1000yrARI	42.36	264.06	265.73	265.15	265.87	0.001993	1.70	24.99	20.02	0.48	23.76	40.28	0.51	0.33
100	3600.00	1000yrARI	42.36	263.86	265.53	264.95	265.67	0.001989	1.69	25.00	20.01	0.48	23.74	40.22	0.30	0.33
100	3500.00	1000yrARI	42.36	263.66	265.31	264.75	265.46	0.002041	1.71	24.82	21.27	0.49	24.22	41.41	0.25	0.35
100	3400.00	1000yrARI	42.36	263.46	265.11	264.54	265.26	0.002081	1.72	24.60	19.88	0.49	24.59	42.35	0.69	0.34
100	3300.00	1000yrARI	42.36	263.26	264.89	264.35	265.04	0.002160	1.74	24.29	19.80	0.50	25.30	44.12	1.08	0.82
100	3200.00	1000yrARI	42.36	263.06	264.66	264.15	264.82	0.002309	1.79	23.72	19.64	0.52	26.65	47.60	1.91	1.58
100	3100.00	1000yrARI	42.36	262.86	264.39	263.95	264.58	0.002704	1.89	22.44	19.24	0.56	30.15	56.92	2.34	2.23
100	3000.00	1000yrARI	42.36	262.66	263.95		264.23	0.005198	2.38	17.84	17.73	0.76	50.08	118.96	2.70	2.42
100	2900.00	1000yrARI	42.36	262.46	263.80	263.21	263.89	0.001307	1.31	32.33	28.09	0.39	14.53	19.04	2.68	2.24
100	2800.00	1000yrARI	42.36	262.26	263.69	263.00	263.77	0.001044	1.22	34.86	28.63	0.35	12.27	14.91	2.73	2.21
100	2700.00	1000yrARI	42.36	262.06	263.61		263.67	0.000797	1.11	38.18	29.31	0.31	10.01	11.10	2.59	2.17
100	2600.00	1000yrARI	42.36	261.86	263.55		263.60	0.000589	1.00	42.29	30.15	0.27	7.96	7.98	2.65	2.26
100	2500.00	1000yrARI	42.36	261.66	263.50		263.54	0.000431	0.90	47.02	31.08	0.23	6.28	5.66	2.69	2.15
100	2400.00	1000yrARI	42.36	261.45	263.47		263.50	0.000310	0.81	52.62	32.11	0.20	4.89	3.93	3.01	2.38
100	2300.00	1000yrARI	42.36	261.25	263.44		263.47	0.000231	0.73	58.30	33.17	0.17	3.89	2.83	2.79	2.32
100	2200.00	1000yrARI	42.36	261.06	263.43		263.45	0.000175	0.66	64.14	34.22	0.15	3.15	2.08	1.90	1.56
100	2100.00	1000yrARI	42.36	260.86	263.41	261.60	263.43	0.000132	0.60	70.68	35.35	0.14	2.54	1.52	0.91	0.72
100	2000.00	1000yrARI	228.29	260.34	262.53	262.47	263.32	0.006748	3.93	58.12	33.12	0.95	113.69	446.53	0.88	0.59
100	1900.00	1000yrARI	228.29	259.48	261.60	261.60	262.45	0.007590	4.09	55.81	32.70	1.00	124.42	508.94	0.70	0.59
100	1800.00	1000yrARI	228.29	258.62	260.74	260.74	261.59	0.007546	4.08	55.92	32.72	1.00	123.88	505.70	0.54	0.30
100	1700.00	1000yrARI	228.29	257.77	259.89	259.89	260.74	0.007524	4.08	55.98	32.72	1.00	123.61	504.14	0.19	0.20
100	1600.00	1000yrARI	228.29	256.93	259.05	259.05	259.90	0.007568	4.09	55.88	32.73	1.00	124.11	507.03	0.13	0.03
100	1500.00	1000yrARI	228.29	256.09	258.23	258.23	259.06	0.007498	4.03	56.81	37.64	0.99	121.25	488.47	0.12	-0.03
100	1400.00	1000yrARI	228.29	255.25	257.37	257.37	258.22	0.007504	4.07	56.04	33.56	0.99	123.33	502.43	0.22	0.10
100	1300.00	1000yrARI	228.29	254.41	256.57	256.52	257.38	0.007132	4.00	57.03	32.93	0.97	118.61	474.84	0.25	0.14
100	1200.00	1000yrARI	228.29	253.69	255.86	255.81	256.66	0.007008	3.98	57.36	32.97	0.96	117.07	465.93	0.30	0.37
100	1100.00	1000yrARI	228.29	252.99	255.16	255.11	255.96	0.006991	3.98	57.41	32.98	0.96	116.85	464.67	0.38	0.69
100	1000.00	1000yrARI	228.29	252.29	254.46	254.41	255.26	0.006993	3.98	57.42	33.00	0.96	116.83	464.54	0.58	0.77
100	900.00	1000yrARI	228.29	251.59	253.76	253.70	254.56	0.007003	3.98	57.38	32.98	0.96	116.99	465.46	0.55	0.65
100	800.00	1000yrARI	228.29	250.89	253.06	253.00	253.86	0.006980	3.97	57.44	32.99	0.96	116.70	463.81	0.63	0.65
100	700.00	1000yrARI	228.29	250.19	252.36	252.30	253.16	0.006981	3.97	57.43	32.98	0.96	116.72	463.97	0.97	0.88
100	600.00	1000yrARI	228.29	249.49	251.66	251.60	252.46	0.006904	3.96	57.66	33.04	0.96	115.70	458.06	1.33	1.16
100	500.00	1000yrARI	228.29	248.79	250.90	250.90	251.76	0.007707	4.11	55.52	32.65	1.01	125.89	517.64	1.61	1.18
100	400.00	1000yrARI	228.29	245.29	247.41	247.41	248.27	0.007695	4.11	55.55	32.65	1.01	125.74	516.74	4.58	4.38
100	300.00	1000yrARI	228.29	240.77	242.89	242.89	243.75	0.007690	4.11	55.56	32.65	1.01	125.69	516.49	8.37	8.24
100	200.00	1000yrARI	228.29	236.25	238.37	238.37	239.23	0.007703	4.11	55.53	32.65	1.01	125.84	517.38	11.96	11.85

HEC-RAS MODELLING RESULTS FOR DIVERSION DRAIN 12

- 100 Year ARI longsection
- 100 Year ARI Table of Results
- 1000 Year longsection
- 1000 Year ARI Table of Results

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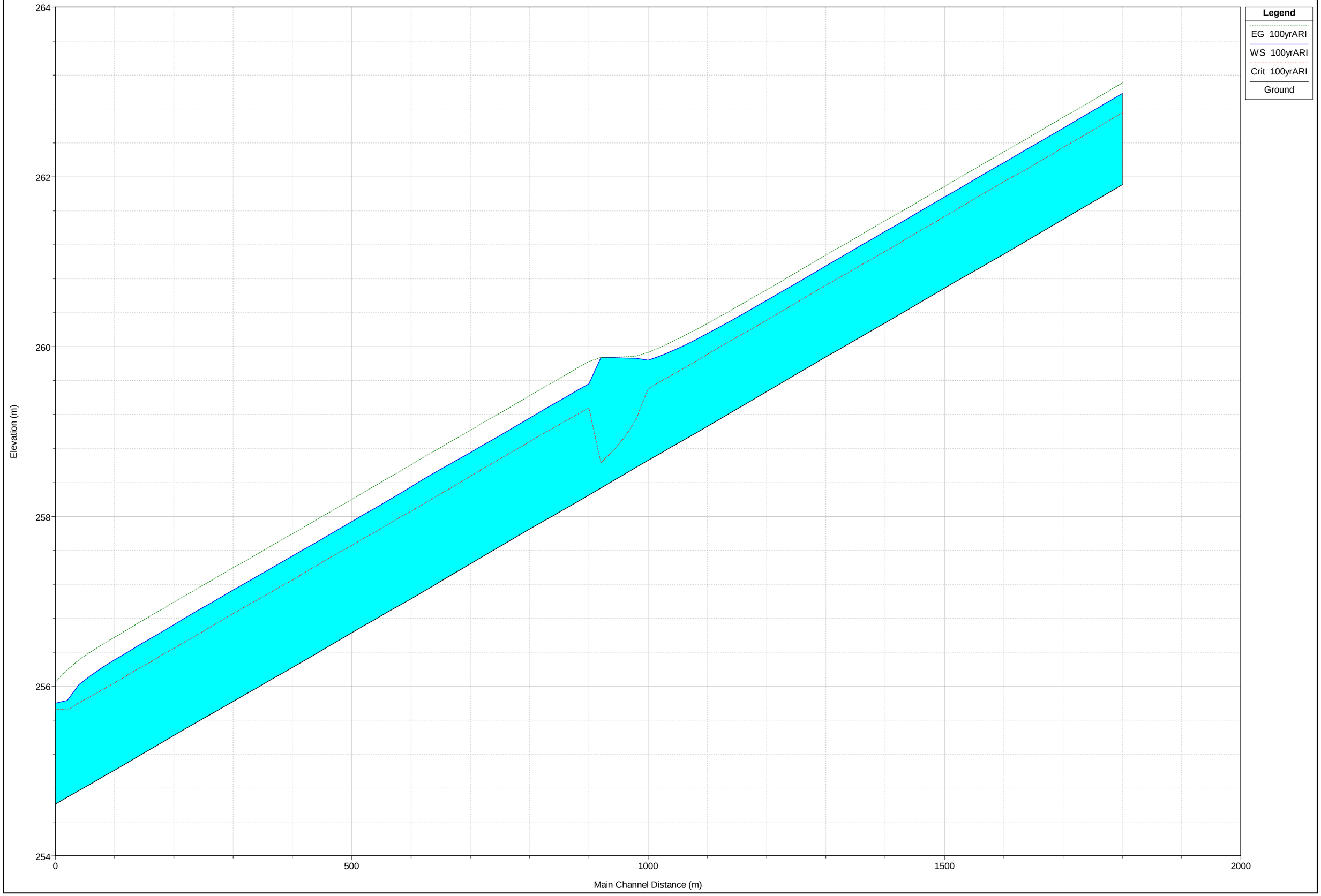

HEC-RAS Plan: Plan 01 River: S5D12 Reach: 100 Profile: 100yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	1900.00	100yrARI	8.83	261.91	262.98	262.76	263.11	0.004061	1.57	5.61	8.46	0.62	25.39	39.94	0.74	0.65
100	1800.00	100yrARI	8.83	261.50	262.57	262.35	262.70	0.004063	1.57	5.61	8.44	0.62	25.43	40.05	0.90	0.66
100	1700.00	100yrARI	8.83	261.09	262.17	261.94	262.29	0.004041	1.57	5.62	8.45	0.62	25.31	39.77	1.04	1.33
100	1600.00	100yrARI	8.83	260.69	261.76	261.54	261.89	0.004066	1.57	5.61	8.45	0.62	25.42	40.02	1.07	1.23
100	1500.00	100yrARI	8.83	260.28	261.36	261.12	261.48	0.004016	1.57	5.63	8.46	0.61	25.18	39.47	0.92	0.91
100	1400.00	100yrARI	8.83	259.88	260.95	260.72	261.08	0.004090	1.58	5.59	8.43	0.62	25.56	40.35	0.93	0.90
100	1300.00	100yrARI	8.83	259.47	260.55	260.31	260.67	0.004035	1.57	5.62	8.46	0.61	25.26	39.66	0.92	0.84
100	1200.00	100yrARI	8.83	259.06	260.15	259.91	260.27	0.003800	1.54	5.75	8.54	0.60	24.08	36.99	0.91	1.02
100	1100.00	100yrARI	8.83	258.66	259.84	259.50	259.93	0.002696	1.35	6.53	9.08	0.51	18.25	24.68	1.01	1.32
100	1000.00	100yrARI	71.23	258.25	259.56	259.28	259.83	0.004017	2.27	31.44	27.88	0.68	43.75	99.14	1.02	1.71
100	900.00	100yrARI	71.23	257.85	259.16	258.88	259.42	0.004073	2.28	31.29	27.85	0.69	44.21	100.63	0.99	1.31
100	800.00	100yrARI	71.23	257.44	258.75	258.48	259.01	0.004008	2.26	31.46	27.88	0.68	43.68	98.91	0.69	0.77
100	700.00	100yrARI	71.23	257.03	258.35	258.06	258.61	0.004618	2.25	31.66	33.07	0.72	44.91	101.15	0.68	-0.03
100	600.00	100yrARI	71.23	256.63	257.94	257.66	258.20	0.004068	2.28	31.31	27.86	0.69	44.16	100.48	0.77	1.05
100	500.00	100yrARI	71.23	256.22	257.53	257.25	257.80	0.004016	2.27	31.43	27.86	0.68	43.76	99.16	0.99	1.30
100	400.00	100yrARI	71.23	255.82	257.13	256.85	257.39	0.004021	2.27	31.43	27.89	0.68	43.78	99.21	1.32	1.64
100	300.00	100yrARI	71.23	255.42	256.73	256.44	256.99	0.004093	2.28	31.26	27.87	0.69	44.34	101.05	1.39	1.55
100	200.00	100yrARI	71.23	255.01	256.31	256.04	256.58	0.004174	2.30	31.02	27.76	0.69	45.06	103.45	1.40	1.38
100	100.00	100yrARI	71.23	254.61	255.80	255.73	256.05	0.004673	2.31	38.02	62.51	0.72	46.68	107.70	1.33	1.56

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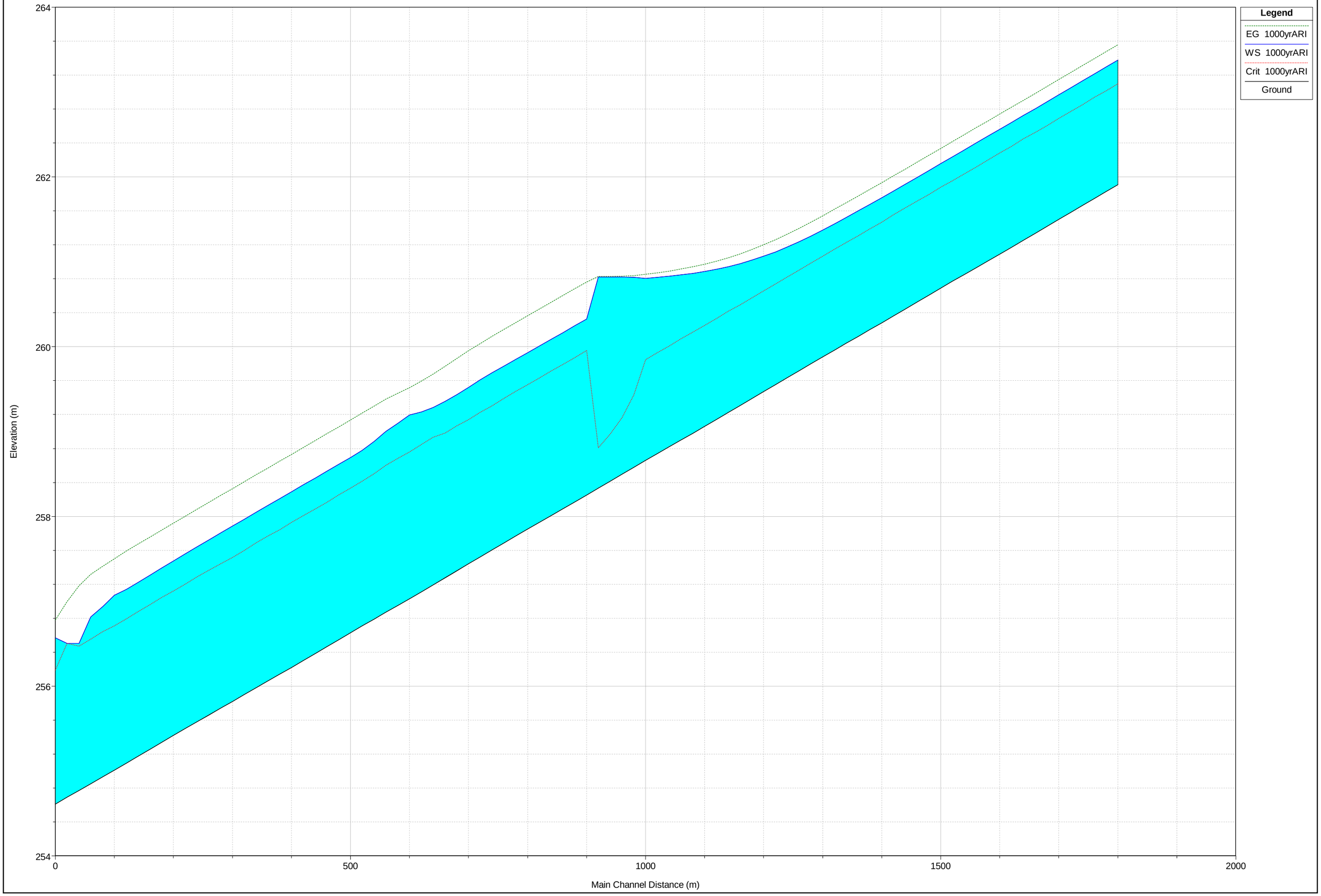


HEC-RAS Plan: Plan 01 River: S5D12 Reach: 100 Profile: 1000yrARI

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	Shear Chan	Power Chan	L. Freeboard	R. Freeboard
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(N/m2)	(N/m s)	(m)	(m)
100	1900.00	1000yrARI	17.65	261.91	263.38	263.10	263.56	0.004042	1.88	9.41	10.82	0.64	33.01	61.92	0.34	0.25
100	1800.00	1000yrARI	17.65	261.50	262.97	262.69	263.15	0.004063	1.88	9.38	10.79	0.64	33.19	62.43	0.50	0.26
100	1700.00	1000yrARI	17.65	261.09	262.56	262.28	262.74	0.004045	1.88	9.41	10.82	0.64	33.03	61.98	0.65	0.94
100	1600.00	1000yrARI	17.65	260.69	262.16	261.88	262.34	0.004049	1.88	9.40	10.82	0.64	33.06	62.07	0.67	0.83
100	1500.00	1000yrARI	17.65	260.28	261.76	261.47	261.93	0.003963	1.86	9.48	10.85	0.64	32.50	60.53	0.52	0.51
100	1400.00	1000yrARI	17.65	259.88	261.37	261.07	261.54	0.003738	1.82	9.68	10.96	0.62	31.02	56.55	0.51	0.48
100	1300.00	1000yrARI	17.65	259.47	261.07	260.66	261.20	0.002765	1.63	10.84	11.58	0.54	24.28	39.55	0.40	0.32
100	1200.00	1000yrARI	17.65	259.06	260.89	260.25	260.97	0.001502	1.30	13.61	12.95	0.40	14.81	19.20	0.17	0.28
100	1100.00	1000yrARI	17.65	258.66	260.81	259.85	260.85	0.000700	0.98	18.10	14.86	0.28	7.98	7.79	0.04	0.35
100	1000.00	1000yrARI	159.39	258.25	260.33	259.96	260.76	0.003978	2.93	54.45	32.46	0.72	64.10	187.64	0.25	0.94
100	900.00	1000yrARI	159.39	257.85	259.93	259.55	260.36	0.003955	2.92	54.55	32.47	0.72	63.83	186.50	0.22	0.54
100	800.00	1000yrARI	159.39	257.44	259.52	259.14	259.95	0.004543	2.91	54.79	36.44	0.76	65.64	190.96	-0.08	0.00
100	700.00	1000yrARI	159.39	257.03	259.20	258.76	259.52	0.003037	2.56	71.33	80.07	0.63	48.94	125.21	-0.17	-0.88
100	600.00	1000yrARI	159.39	256.63	258.69	258.33	259.14	0.004055	2.95	54.08	32.39	0.73	65.05	191.71	0.02	0.30
100	500.00	1000yrARI	159.39	256.22	258.29	257.93	258.73	0.004026	2.94	54.21	32.40	0.73	64.71	190.26	0.23	0.54
100	400.00	1000yrARI	159.39	255.82	257.89	257.52	258.33	0.004042	2.94	54.15	32.42	0.73	64.88	190.96	0.56	0.88
100	300.00	1000yrARI	159.39	255.42	257.48	257.12	257.92	0.004112	2.96	53.85	32.38	0.73	65.71	194.47	0.64	0.80
100	200.00	1000yrARI	159.39	255.01	257.07	256.71	257.50	0.003999	2.92	57.20	45.51	0.72	64.04	187.19	0.64	0.62
100	100.00	1000yrARI	159.39	254.61	256.57	256.19	256.78	0.002594	2.29	90.83	74.65	0.58	39.82	91.15	0.56	0.79

Appendix F Preliminary Design Drawings

Overview

Preliminary Carmichael River levees longitudinal section

Preliminary diversion drain longitudinal sections

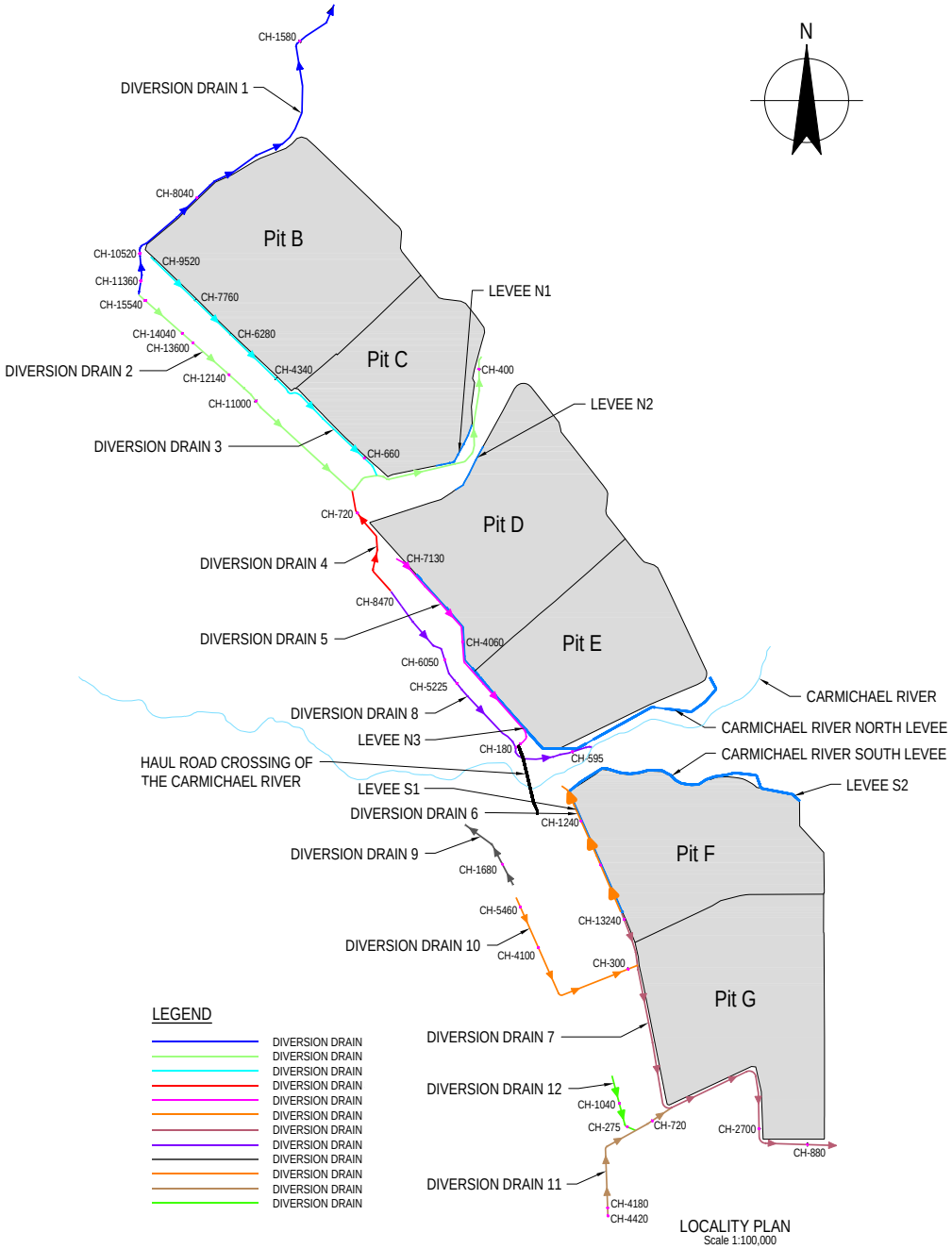
Preliminary diversion drain cross sections

Preliminary diversion drain longitudinal sections with subsidence

Preliminary mine levee longitudinal sections

NOT FOR CONSTRUCTION

ADANI MINING PTY LTD FLOOD MITIGATION AND CREEK DIVERSION



LOCALITY PLAN
Scale 1:100,000

DRAWING LIST

41-24415-G001	LOCALITY PLAN AND DRAWING LIST
41-24415-W001	CARMICHAEL RIVER NORTH AND SOUTH LEVEE - LONGITUDINAL SECTION
41-24415-W002	HAUL ROAD CROSSING OF THE CARMICHAEL RIVER - LONGITUDINAL SECTION
41-24415-W003	DIVERSION DRAIN 1 - LONGITUDINAL SECTION
41-24415-W004	DIVERSION DRAIN 1 - ANNOTATED CROSS SECTIONS
41-24415-W005	DIVERSION DRAIN 2 - LONGITUDINAL SECTION
41-24415-W006	DIVERSION DRAIN 2 - ANNOTATED CROSS SECTIONS - SHEET 1 OF 2
41-24415-W007	DIVERSION DRAIN 2 - ANNOTATED CROSS SECTIONS - SHEET 2 OF 2
41-24415-W008	DIVERSION DRAIN 3 - LONGITUDINAL SECTION
41-24415-W009	DIVERSION DRAIN 3 - ANNOTATED CROSS SECTIONS - SHEET 1 OF 2
41-24415-W010	DIVERSION DRAIN 3 - ANNOTATED CROSS SECTIONS - SHEET 2 OF 2
41-24415-W011	DIVERSION DRAIN 4 - LONGITUDINAL SECTION
41-24415-W012	DIVERSION DRAIN 4 - ANNOTATED CROSS SECTIONS
41-24415-W013	DIVERSION DRAIN 5 - LONGITUDINAL SECTION
41-24415-W014	DIVERSION DRAIN 5 - ANNOTATED CROSS SECTIONS
41-24415-W015	DIVERSION DRAIN 6 - LONGITUDINAL SECTION
41-24415-W016	DIVERSION DRAIN 6 - ANNOTATED CROSS SECTIONS
41-24415-W017	DIVERSION DRAIN 7 - LONGITUDINAL SECTION
41-24415-W018	DIVERSION DRAIN 7 - ANNOTATED CROSS SECTIONS
41-24415-W019	DIVERSION DRAIN 8 - LONGITUDINAL SECTION
41-24415-W020	DIVERSION DRAIN 8 - ANNOTATED CROSS SECTIONS
41-24415-W021	DIVERSION DRAIN 9 - LONGITUDINAL SECTION
41-24415-W022	DIVERSION DRAIN 9 - ANNOTATED CROSS SECTIONS
41-24415-W023	DIVERSION DRAIN 10 - LONGITUDINAL SECTION
41-24415-W024	DIVERSION DRAIN 10 - ANNOTATED CROSS SECTIONS
41-24415-W025	DIVERSION DRAIN 11 - LONGITUDINAL SECTION
41-24415-W026	DIVERSION DRAIN 11 - ANNOTATED CROSS SECTIONS
41-24415-W027	DIVERSION DRAIN 12 - LONGITUDINAL SECTION
41-24415-W028	DIVERSION DRAIN 12 - ANNOTATED CROSS SECTIONS
41-24415-W029	DIVERSION DRAIN 1 (SUBSIDENCE 2024) - LONGITUDINAL SECTION
41-24415-W030	DIVERSION DRAIN 1 (SUBSIDENCE 2029) - LONGITUDINAL SECTION
41-24415-W031	DIVERSION DRAIN 1 (SUBSIDENCE 2034) - LONGITUDINAL SECTION
41-24415-W032	DIVERSION DRAIN 1 (SUBSIDENCE 2061) - LONGITUDINAL SECTION
41-24415-W033	DIVERSION DRAIN 1 (SUBSIDENCE 2071) - LONGITUDINAL SECTION
41-24415-W034	DIVERSION DRAIN 4 (SUBSIDENCE 2044) - LONGITUDINAL SECTION
41-24415-W035	DIVERSION DRAIN 4 (SUBSIDENCE 2051) - LONGITUDINAL SECTION
41-24415-W036	DIVERSION DRAIN 4 (SUBSIDENCE 2061) - LONGITUDINAL SECTION
41-24415-W037	DIVERSION DRAIN 4 (SUBSIDENCE 2071) - LONGITUDINAL SECTION
41-24415-W038	DIVERSION DRAIN 8 (SUBSIDENCE 2039) - LONGITUDINAL SECTION
41-24415-W039	DIVERSION DRAIN 8 (SUBSIDENCE 2044) - LONGITUDINAL SECTION
41-24415-W040	DIVERSION DRAIN 8 (SUBSIDENCE 2051) - LONGITUDINAL SECTION
41-24415-W041	DIVERSION DRAIN 8 (SUBSIDENCE 2061) - LONGITUDINAL SECTION
41-24415-W042	DIVERSION DRAIN 8 (SUBSIDENCE 2071) - LONGITUDINAL SECTION
41-24415-W043	LEVEE N1 AND N2 - LONGITUDINAL SECTION
41-24415-W044	LEVEE N3 - LONGITUDINAL SECTION
41-24415-W045	LEVEE S1 AND S2 - LONGITUDINAL SECTION

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

0 1000 2000 3000 4000 5000m
SCALE 1:100,000 AT ORIGINAL SIZE

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Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title LOCALITY PLAN AND DRAWING LIST

Original Size A1
Drawing No: 41-24415-G001
Rev: A

Plot Date: 29 July 2013 - 9:11 AM Plotted by: Shaun Kelly Cad File No: G:\41\24415\CADD\Drawings\41-24415-G001.dwg

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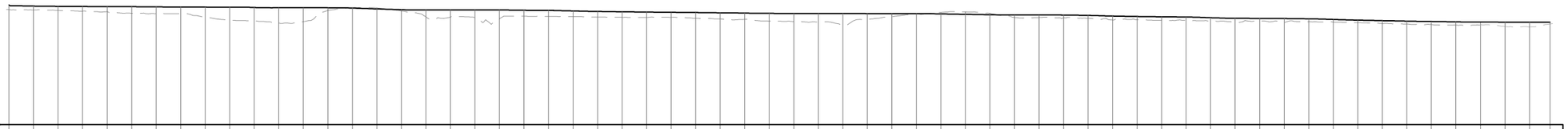

DATUM 181.0

CHAINAGE	DESIGN LEVEE CREST LEVEL	EXISTING LEVEL	HEIGHT TO DESIGN LEVEL
0.00	229.69	227.80	1.88
100.00	229.23	227.67	1.56
200.00	229.13	227.51	1.62
300.00	229.07	227.19	1.89
400.00	229.02	226.94	2.08
500.00	228.98	226.29	2.69
600.00	228.91	226.15	2.76
700.00	228.83	226.14	2.69
800.00	228.80	224.79	4.01
900.00	228.77	223.52	5.25
1000.00	228.65	223.20	5.45
1100.00	228.57	222.38	6.18
1200.00	228.58	222.87	5.71
1300.00	228.54	227.40	1.14
1400.00	228.42	228.50	0.08
1500.00	228.08	228.47	0.39
1600.00	227.75	227.26	0.49
1700.00	227.67	224.89	2.78
1800.00	227.67	224.79	2.88
1900.00	227.68	224.36	3.33
2000.00	227.68	224.02	3.66
2100.00	227.53	225.12	2.41
2200.00	227.48	225.03	2.45
2300.00	227.25	224.92	2.33
2400.00	227.04	224.77	2.27
2500.00	226.90	224.65	2.25
2600.00	226.79	224.62	2.16
2700.00	226.69	224.65	2.04
2800.00	226.61	224.26	2.35
2900.00	226.50	224.00	2.50
3000.00	226.38	223.83	2.55
3100.00	226.28	223.12	3.16
3200.00	226.22	222.90	3.32
3300.00	226.20	222.73	3.47
3400.00	226.20	221.49	4.71
3500.00	226.17	223.89	2.28
3600.00	226.16	224.88	1.28
3700.00	226.16	226.02	0.13
3800.00	226.05	226.63	0.58
3900.00	225.88	226.86	0.98
4000.00	225.70	226.30	0.59
4100.00	225.60	224.57	1.03
4200.00	225.60	224.56	1.03
4300.00	225.58	224.45	1.13
4400.00	225.43	224.25	1.17
4500.00	225.17	223.54	1.63
4600.00	225.00	223.71	1.29
4700.00	224.87	223.38	1.49
4800.00	224.77	223.36	1.41
4900.00	224.50	223.14	1.36
5000.00	224.25	222.63	1.62
5100.00	224.20	222.95	1.25
5200.00	224.15	222.56	1.59
5300.00	224.04	222.86	1.18
5400.00	223.79	222.73	1.06
5500.00	223.51	222.50	1.01
5600.00	223.30	222.10	1.20
5700.00	223.10	221.92	1.19
5800.00	222.96	221.69	1.27
5900.00	222.80	221.45	1.34
6000.00	222.76	221.53	1.23
6100.00	222.68	220.94	1.73
6200.00	222.66	220.75	1.91
6284.23	222.66	221.96	0.69

LONGITUDINAL SECTION
CARMICHAEL RIVER
NORTH LEVEE
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

DATUM 179.0

CHAINAGE	DESIGN LEVEE CREST LEVEL	EXISTING LEVEL	HEIGHT TO DESIGN LEVEL
0.00	229.15	226.77	2.37
100.00	229.11	226.37	2.73
200.00	229.05	226.12	2.92
300.00	228.98	226.01	2.96
400.00	228.89	226.14	2.75
500.00	228.79	226.15	2.64
600.00	228.72	226.16	2.55
700.00	228.64	226.07	2.57
800.00	228.58	225.91	2.67
900.00	228.49	225.85	2.64
1000.00	228.35	225.73	2.62
1100.00	228.16	225.46	2.70
1200.00	227.86	225.23	2.63
1300.00	227.72	224.83	2.89
1400.00	227.53	224.58	2.95
1500.00	227.36	224.13	3.24
1600.00	227.23	223.76	3.48
1700.00	227.12	223.61	3.51
1800.00	227.04	223.85	3.19
1900.00	226.93	224.11	2.82
2000.00	226.87	223.99	2.87
2100.00	226.80	223.90	2.90
2200.00	226.69	223.80	2.89
2300.00	226.54	223.75	2.78
2400.00	226.44	223.57	2.87
2500.00	226.30	223.23	3.07
2600.00	226.17	222.92	3.25
2700.00	226.02	222.90	3.12
2800.00	225.92	222.67	3.26
2900.00	225.79	222.72	3.07
3000.00	225.62	222.82	2.80
3100.00	225.36	222.44	2.92
3200.00	225.22	222.54	2.68
3300.00	225.10	222.67	2.43
3400.00	224.98	222.63	2.36
3500.00	224.90	222.44	2.46
3600.00	224.85	222.22	2.63
3700.00	224.80	222.16	2.64
3800.00	224.76	222.87	1.89
3900.00	224.68	223.32	1.36
4000.00	224.64	223.04	1.61
4100.00	224.62	222.98	1.64
4200.00	224.60	222.79	1.81
4300.00	224.57	223.02	1.55
4400.00	224.51	223.28	1.23
4500.00	224.45	222.93	1.52
4600.00	224.33	222.81	1.51
4700.00	224.15	222.79	1.36
4800.00	224.00	222.61	1.39
4900.00	223.82	222.54	1.29
5000.00	223.68	222.38	1.30
5100.00	223.59	222.16	1.43
5200.00	223.43	222.09	1.34
5300.00	223.28	221.92	1.36
5400.00	223.13	221.44	1.68
5500.00	222.92	221.04	1.89
5600.00	222.78	220.55	2.23
5700.00	222.66	220.27	2.39
5800.00	222.53	220.06	2.46
5900.00	222.40	219.67	2.73
6000.00	222.30	219.67	2.63
6100.00	222.06	219.93	2.14
6200.00	221.80	219.78	2.02
6300.00	221.77	219.86	1.91
6400.00	221.75	219.74	2.01
6500.00	221.74	219.99	1.75
651.06	221.74	220.33	1.41

LONGITUDINAL SECTION
CARMICHAEL RIVER
SOUTH LEVEE
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **ADANI MINING PTY LTD**
Project **FLOOD MITIGATION AND CREEK DIVERSION**
Title **CARMICHAEL RIVER NORTH AND SOUTH LEVEE LONGITUDINAL SECTION**

Original Size **A1**
Drawing No: **41-24415-W001**
Rev: **A**

Plot Date: 22 July 2013 - 2:38 PM
Plotted by: Adam Gaffel
Cad File No: G:\41\24415\CADD\Drawings\41-24415-W001.dwg

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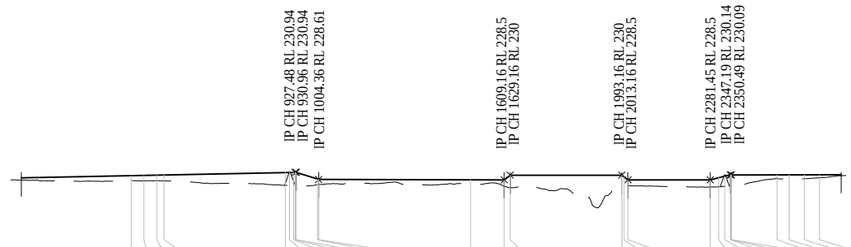

DATUM RL. 204.00

VERTICAL ALIGNMENT

L=893.62m G=0.21% | L=73.4m G=-3.10% | L=604.8m G=-0.02% | L=20m G=-7.5% | L=364m G=0% | L=20m G=-7.5% | L=268.29m G=0% | L=65.71m G=2.45% | L=358.81m G=0.03%

HORIZONTAL ALIGNMENT

L=392.08m | L=84.38m R=200.00m | L=419.02m | L=27.23m R=200.00m | L=1386.39m | L=39.96m R=-200.00m | L=189.87m | L=99.06m R=200.00m | L=85.96m

SOUTH LEVEE

230.00

NORTH LEVEE

227.34
230.94
227.93
226.74

CHAINAGE	SURFACE LEVEL	DESIGN SURFACE LEVEL	CUT - / FILL +	LEVEL DIFFERENCE
0.00	228.51			
392.08	228.18	229.839	1.66	
434.27	228.15	229.926	1.77	
476.46	228.20	230.013	1.81	
500.00	228.16	230.062	1.90	
895.48	226.66	230.878	4.22	
909.09	226.58	230.906	4.33	
922.71	226.58	230.935	4.36	
927.48	226.57	230.944	4.38	
930.96	226.53	230.945	4.41	
1000.00	226.91	228.745	1.83	
1004.36	226.97	228.606	1.64	
1500.00	227.13	228.519	1.38	
1609.16	226.33	228.500	2.17	
1629.16	225.93	230.000	4.07	
1993.16	226.75	230.000	3.25	
2000.00	226.72	229.487	2.77	
2013.16	226.63	228.500	1.87	
2281.45	226.17	228.500	2.33	
2309.10	226.24	229.190	2.95	
2329.08	226.39	229.688	3.30	
2347.19	226.50	230.140	3.64	
2349.06	226.52	230.113	3.59	
2350.49	226.54	230.091	3.56	
2500.00	228.87	230.137	1.27	
2538.92	228.80	230.148	1.34	
2588.45	228.85	230.163	1.31	
2657.98	229.17	230.178	1.01	

LONGITUDINAL SECTION
HAUL ROAD CROSSING OF CARMICHAEL RIVER
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drafting Check | Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title HAUL ROAD CROSSING OF THE CARMICHAEL RIVER LONGITUDINAL SECTION

Original Size A1 | Drawing No: 41-24415-W002 | Rev: A

Plot Date: 22 July 2013 - 3:21 PM | Plotted by: Adam Gaffel | Cad File No: G:\41\24415\CADD\Drawings\41-24415-W002.dwg

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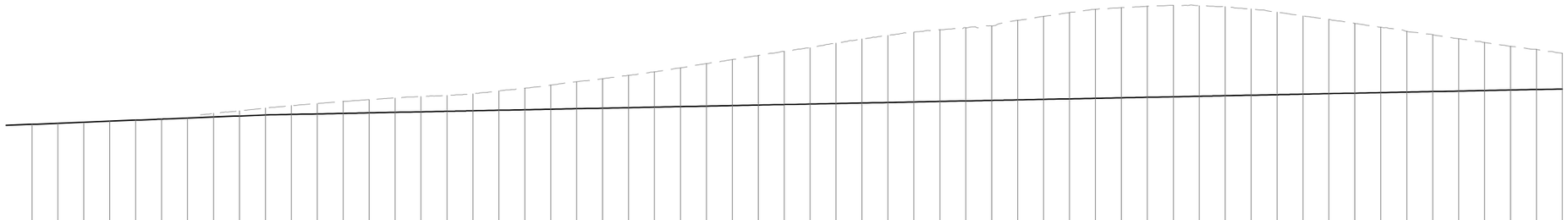
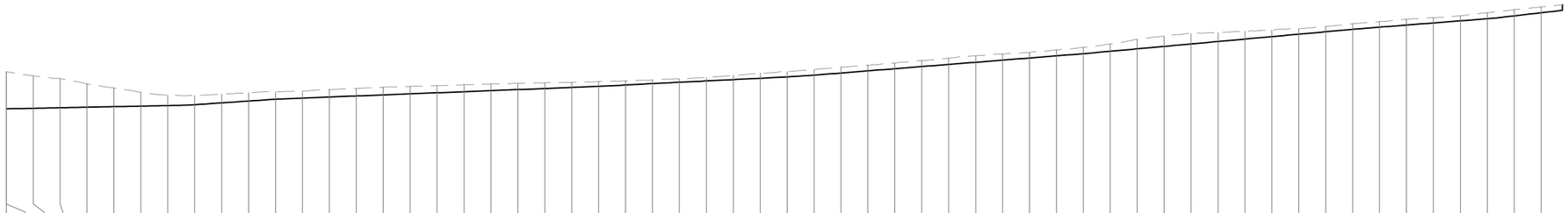


DATUM 205.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
0.00			
100.00	245.74	0.00	245.74
200.00	246.14	0.00	246.14
300.00	246.55	0.00	246.55
400.00	246.95	0.00	246.95
500.00	247.35	0.00	247.35
600.00	247.75	0.00	247.75
700.00	248.15	0.00	248.15
800.00	249.98	1.42	248.56
900.00	250.95	1.99	248.96
1000.00	252.05	2.69	249.36
1100.00	252.94	3.38	249.56
1200.00	253.76	4.00	249.76
1300.00	254.59	4.63	249.96
1400.00	255.27	5.11	250.16
1500.00	255.89	5.53	250.36
1600.00	256.46	5.90	250.56
1700.00	256.84	6.08	250.76
1800.00	257.48	6.52	250.96
1900.00	258.62	7.46	251.16
2000.00	259.69	8.33	251.36
2100.00	260.83	9.27	251.56
2200.00	262.14	10.38	251.76
2300.00	263.30	11.34	251.96
2400.00	264.60	12.44	252.16
2500.00	265.96	13.60	252.36
2600.00	267.50	14.94	252.56
2700.00	269.15	16.39	252.76
2800.00	270.72	17.76	252.96
2900.00	272.30	19.14	253.16
3000.00	273.81	20.45	253.36
3100.00	275.28	21.72	253.56
3200.00	276.99	23.23	253.76
3300.00	278.60	24.65	253.96
3400.00	280.00	25.84	254.16
3500.00	281.30	26.94	254.36
3600.00	282.21	27.65	254.56
3700.00	282.97	28.21	254.76
3800.00	283.63	28.67	254.96
3900.00	285.82	30.66	255.16
4000.00	287.35	31.99	255.36
4100.00	288.79	33.23	255.56
4200.00	290.05	34.29	255.76
4300.00	290.70	34.74	255.96
4400.00	291.23	35.07	256.16
4500.00	291.57	35.21	256.36
4600.00	291.45	34.89	256.56
4700.00	291.09	34.33	256.76
4800.00	290.20	33.24	256.96
4900.00	288.96	31.80	257.16
5000.00	287.50	30.14	257.36
5100.00	286.18	28.62	257.56
5200.00	284.62	26.86	257.76
5300.00	283.18	25.22	257.96
5400.00	281.58	23.42	258.16
5500.00	280.27	21.91	258.36
5600.00	278.74	20.18	258.56
5700.00	277.26	18.50	258.76
5800.00	275.80	16.84	258.96
5900.00	274.65	15.49	259.16
5999.96	273.12	13.76	259.36

LONGITUDINAL SECTION
DIVERSION DRAIN 1
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 219.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
5999.96	273.12	13.76	259.36
6000.00	273.12	13.76	259.36
6100.00	271.65	12.09	259.56
6200.00	270.62	10.86	259.76
6300.00	268.65	8.69	259.96
6400.00	267.12	6.96	260.16
6500.00	265.54	5.19	260.36
6600.00	264.43	3.87	260.56
6700.00	264.32	3.42	260.90
6800.00	264.77	3.19	261.58
6900.00	265.28	3.03	262.25
7000.00	265.72	2.80	262.93
7100.00	265.97	2.62	263.35
7200.00	266.53	2.78	263.74
7300.00	266.93	2.79	264.14
7400.00	267.38	2.85	264.54
7500.00	267.71	2.78	264.93
7600.00	267.96	2.64	265.33
7700.00	268.33	2.61	265.72
7800.00	268.61	2.49	266.12
7900.00	268.86	2.35	266.51
8000.00	269.04	2.13	266.91
8100.00	269.21	1.90	267.31
8200.00	269.48	1.76	267.72
8300.00	269.80	1.59	268.21
8400.00	270.11	1.38	268.73
8500.00	270.52	1.28	269.24
8600.00	271.06	1.33	269.73
8700.00	271.80	1.58	270.22
8800.00	272.65	1.93	270.72
8900.00	273.26	2.01	271.25
9000.00	273.98	2.10	271.88
9100.00	274.84	2.16	272.68
9200.00	275.60	2.12	273.48
9300.00	276.39	2.11	274.27
9400.00	277.31	2.24	275.07
9500.00	278.19	2.32	275.87
9600.00	279.08	2.42	276.67
9700.00	279.75	2.29	277.47
9800.00	280.32	2.05	278.27
9900.00	281.27	2.20	279.06
10000.00	282.24	2.37	279.86
10100.00	283.46	2.69	280.77
10200.00	285.14	3.46	281.67
10300.00	286.43	3.85	282.58
10400.00	287.31	3.82	283.49
10500.00	287.70	3.31	284.40
10600.00	288.20	2.90	285.30
10700.00	288.62	2.41	286.21
10800.00	289.17	2.05	287.12
10900.00	289.94	1.91	288.03
11000.00	291.03	2.09	288.93
11100.00	291.80	2.08	289.72
11200.00	292.65	2.13	290.51
11300.00	293.29	1.98	291.30
11400.00	293.97	1.88	292.09
11500.00	295.07	2.19	292.88
11600.00	296.26	2.32	293.94
11700.00	297.26	2.17	295.09

LONGITUDINAL SECTION
DIVERSION DRAIN 1
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **ADANI MINING PTY LTD**
Project **FLOOD MITIGATION AND CREEK DIVERSION**
Title **DIVERSION DRAIN 1 LONGITUDINAL SECTION**

Original Size **A1**
Drawing No: **41-24415-W003**
Rev: **A**

Plot Date: 22 July 2013 - 1:21 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W003.dwg

NOT FOR CONSTRUCTION

DATUM R.L. 291.00

DESIGN SURFACE LEVEL		293.474	293.772	293.775	291.775	291.775	291.775	293.765	
DEPTH CUT - / FILL +		0	0.28	0.21	-1.89	-1.9	-1.92	0	
EXISTING SURFACE LEVEL		293.47	293.49	293.56	293.66	293.68	293.69	293.77	
OFFSET FROM CENTRELINE		-10.89	-10	-7	-1	0	1	6.97	

CH 11360

DATUM R.L. 283.00

DESIGN SURFACE LEVEL	287.656	286.578	284.578	284.578	284.578	288.007	
DEPTH CUT - / FILL +	-0	-1.12	-3.17	-3.24	-3.31	0	
EXISTING SURFACE LEVEL	287.66	287.7	287.75	287.81	287.88	288.01	
OFFSET FROM CENTRELINE	-14.24	-11	-5	0	5	15.29	

CH 10520

DATUM R.L. 266.00

DESIGN SURFACE LEVEL	269.183	269.072	267.072	267.072	267.072	269.171	
DEPTH CUT - / FILL +	-0	-0.1	-2.02	-2.04	-2.06	0	
EXISTING SURFACE LEVEL	269.18	269.18	269.09	269.11	269.13	269.17	
OFFSET FROM CENTRELINE	-21.33	-21	-15	0	15	21.3	

CH 8040

DATUM R.L. 249.00

DESIGN SURFACE LEVEL	256.41	252.52	250.52	250.52	250.52	256.311		
DEPTH CUT - / FILL +	0	-3.93	-5.86	-5.84	-5.85	0		
EXISTING SURFACE LEVEL	256.41	256.45	256.38	256.36	256.37	256.31		
OFFSET FROM CENTRELINE	-37.66	-26	-20	0	20	37.37		

CH 1580

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale 1:100
This Drawing must not be used for Construction unless signed as Approved

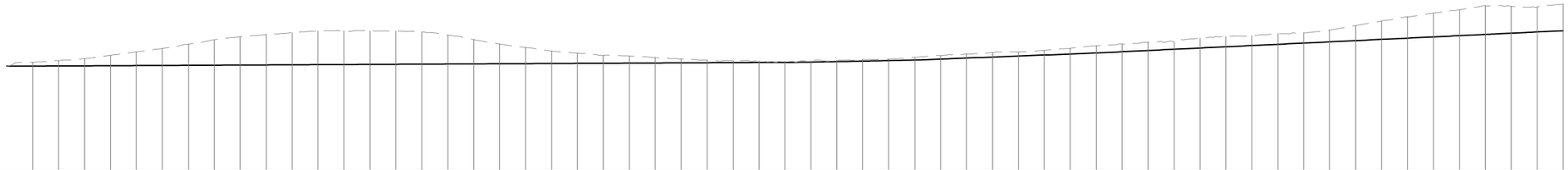
Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 1
ANNOTATED CROSS SECTIONS

Original Size A1
Drawing No: 41-24415-W004
Rev: A

Plot Date: 22 July 2013 - 1:21 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W004.dwg

G:\41\26630\CADD\Drawings\dwg plan view\Copy of Copy of GIS_Maps_and_DWGs_Required_for_Report1_version 2.xlsx

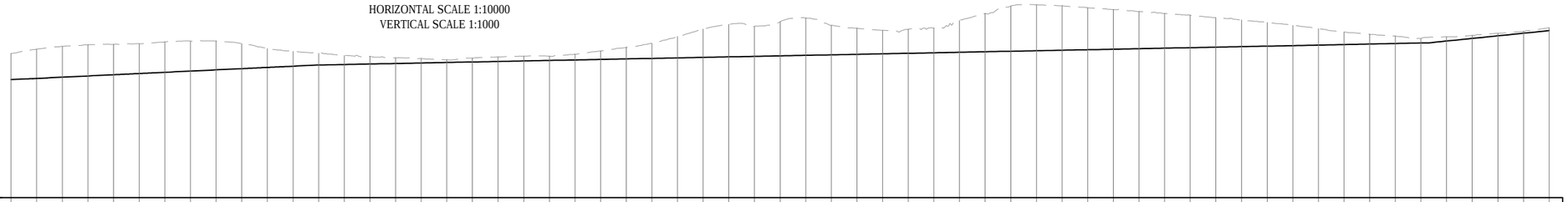
NOT FOR CONSTRUCTION



DATUM 191.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
100.00	232.88	1.45	231.44
200.00	233.56	2.07	231.49
300.00	234.32	2.79	231.54
400.00	235.60	4.01	231.59
500.00	236.95	5.32	231.64
600.00	238.27	6.58	231.69
700.00	239.88	8.14	231.74
800.00	241.53	9.75	231.78
900.00	242.75	10.92	231.83
1000.00	243.60	11.72	231.88
1100.00	244.32	12.39	231.93
1200.00	245.00	13.01	231.98
1300.00	245.09	13.05	232.03
1400.00	244.94	12.86	232.08
1500.00	244.97	12.84	232.13
1600.00	244.63	12.45	232.18
1700.00	243.40	11.17	232.23
1800.00	241.67	9.39	232.28
1900.00	239.95	7.62	232.33
2000.00	238.62	6.24	232.38
2100.00	237.24	4.81	232.43
2200.00	236.43	3.95	232.48
2300.00	235.53	3.00	232.53
2400.00	235.30	2.72	232.58
2500.00	234.68	2.05	232.63
2600.00	234.14	1.46	232.68
2700.00	233.72	0.99	232.73
2800.00	233.53	0.76	232.78
2900.00	233.37	0.55	232.83
3000.00	233.24	0.36	232.88
3100.00	233.43	0.47	232.96
3200.00	233.65	0.49	233.16
3300.00	233.97	0.62	233.36
3400.00	234.18	0.62	233.56
3500.00	234.79	1.04	233.76
3600.00	235.51	1.37	234.14
3700.00	236.10	1.57	234.53
3800.00	236.68	1.76	234.92
3900.00	236.91	1.60	235.31
4000.00	237.47	1.77	235.70
4100.00	238.31	2.22	236.09
4200.00	239.27	2.78	236.49
4300.00	239.99	3.03	236.97
4400.00	240.66	3.21	237.44
4500.00	240.88	2.96	237.92
4600.00	242.25	3.85	238.40
4700.00	242.86	3.98	238.87
4800.00	243.22	3.87	239.35
4900.00	243.94	4.11	239.83
5000.00	244.25	3.95	240.30
5100.00	245.30	4.52	240.78
5200.00	247.05	5.79	241.26
5300.00	248.80	7.06	241.74
5400.00	250.44	8.22	242.21
5500.00	251.86	9.17	242.69
5600.00	253.14	9.98	243.17
5700.00	254.68	11.04	243.64
5800.00	254.47	10.35	244.12
5900.00	254.22	9.63	244.60
6000.00	255.31	10.24	245.07

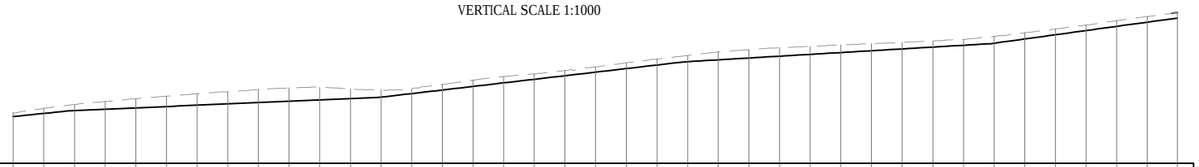
LONGITUDINAL SECTION
DIVERSION DRAIN 2
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 199.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
6000.00	255.31	10.24	245.07
6100.00	256.94	11.39	244.65
6200.00	258.07	12.04	246.03
6300.00	258.67	12.17	246.50
6400.00	258.85	11.87	246.98
6500.00	259.11	11.65	247.46
6600.00	259.81	11.87	247.93
6700.00	260.13	11.72	248.41
6800.00	260.15	11.26	248.89
6900.00	259.20	9.83	249.36
7000.00	257.24	7.40	251.10
7100.00	256.11	5.79	250.32
7200.00	255.38	4.60	250.78
7300.00	254.55	3.58	250.98
7400.00	254.18	3.00	251.18
7500.00	253.59	2.22	251.38
7600.00	253.30	1.73	251.57
7700.00	252.81	1.03	251.77
7800.00	253.52	1.55	251.97
7900.00	253.96	1.79	252.17
8000.00	254.27	1.90	252.37
8100.00	254.24	1.67	252.57
8200.00	255.00	2.23	252.77
8300.00	256.28	3.31	252.97
8400.00	257.69	4.52	253.17
8500.00	259.24	5.88	253.37
8600.00	261.98	8.41	253.57
8700.00	264.85	11.08	253.77
8800.00	266.71	12.74	253.97
8900.00	265.88	11.72	254.17
9000.00	267.66	13.30	254.36
9100.00	269.16	14.60	254.56
9200.00	266.27	11.51	254.76
9300.00	265.20	10.24	254.96
9400.00	264.30	9.14	255.16
9500.00	264.75	9.39	255.36
9600.00	265.22	9.66	255.56
9700.00	268.19	12.43	255.76
9800.00	270.91	14.95	255.96
9900.00	273.82	17.66	256.16
10000.00	274.34	17.98	256.36
10100.00	273.93	17.38	256.56
10200.00	273.18	16.42	256.76
10300.00	272.45	15.50	256.96
10400.00	271.68	14.52	257.16
10500.00	270.94	13.58	257.36
10600.00	270.23	12.67	257.56
10700.00	269.31	11.56	257.76
10800.00	268.37	10.41	257.96
10900.00	267.35	9.20	258.16
11000.00	266.31	7.95	258.36
11100.00	264.99	6.44	258.55
11200.00	263.70	4.94	258.76
11300.00	262.79	3.83	258.97
11400.00	262.09	2.92	259.17
11500.00	261.15	1.77	259.38
11600.00	261.77	1.62	260.15
11700.00	262.34	1.17	261.17
11800.00	263.13	0.95	262.19
11900.00	263.94	0.73	263.21
12000.00	265.37	1.15	264.23

LONGITUDINAL SECTION
DIVERSION DRAIN 2
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 199.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
12000.00	265.37	1.15	264.23
12100.00	266.86	1.62	265.24
12200.00	268.15	1.96	266.18
12300.00	269.14	2.53	266.62
12400.00	270.01	2.96	267.05
12500.00	270.85	3.38	267.48
12600.00	271.67	3.76	267.91
12700.00	272.29	3.94	268.34
12800.00	273.08	4.31	268.77
12900.00	273.59	4.39	269.20
13000.00	273.68	4.05	269.63
13100.00	273.24	3.18	270.07
13200.00	272.93	2.38	270.54
13300.00	273.28	1.58	271.70
13400.00	274.68	1.81	272.87
13500.00	276.05	2.02	274.03
13600.00	277.27	2.07	275.20
13700.00	278.12	1.76	276.36
13800.00	279.21	1.68	277.53
13900.00	280.42	1.73	278.69
14000.00	281.75	1.89	279.86
14100.00	282.91	1.89	281.02
14200.00	284.12	2.00	282.11
14300.00	285.30	2.59	282.71
14400.00	286.00	2.70	283.30
14500.00	286.67	2.78	283.89
14600.00	287.11	2.62	284.48
14700.00	287.58	2.50	285.08
14800.00	287.98	2.31	285.67
14900.00	288.40	2.14	286.26
15000.00	288.85	2.00	286.86
15100.00	289.34	1.89	287.45
15200.00	290.30	2.17	288.14
15300.00	291.56	2.05	289.51
15400.00	292.79	1.91	290.88
15500.00	294.06	1.80	292.25
15600.00	295.47	1.85	293.63
15700.00	296.80	1.80	295.00
15797.71	298.08	1.74	296.34

LONGITUDINAL SECTION
DIVERSION DRAIN 2
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **ADANI MINING PTY LTD**
Project **FLOOD MITIGATION AND CREEK DIVERSION**
Title **DIVERSION DRAIN 2 LONGITUDINAL SECTION**

Original Size **A1**
Drawing No: **41-24415-W005**
Rev: **A**

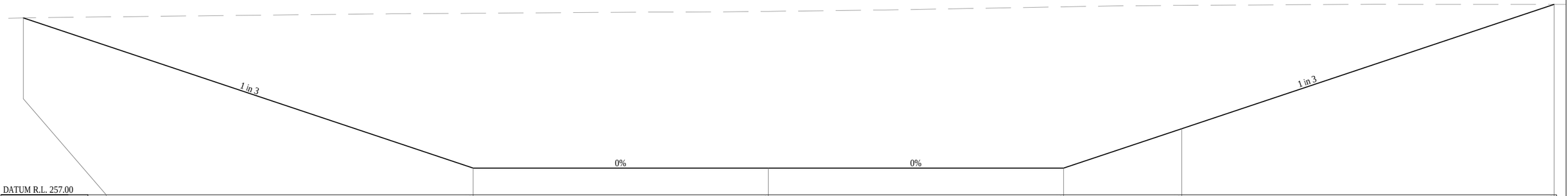
Plot Date: 22 July 2013 - 1:21 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W005.dwg

NOT FOR CONSTRUCTION

DATUM R.L. 264.00

DESIGN SURFACE LEVEL	267.649	265.651	265.651	265.651	267.651	267.648	267.169
DEPTH CUT - / FILL +	-0	-1.89	-1.77	-1.66	0.43	0.46	0
EXISTING SURFACE LEVEL	267.65	267.55	267.43	267.31	267.22	267.19	267.17
OFFSET FROM CENTRELINE	-15.99	-10	0	10	16	19	20.44

CH 12140



DATUM R.L. 257.00

DESIGN SURFACE LEVEL	265.971	258.355	258.355	258.355	260.355	266.658
DEPTH CUT - / FILL +	-0	-7.86	-7.95	-8.18	-6.25	-0
EXISTING SURFACE LEVEL	265.97	266.21	266.31	266.53	266.61	266.66
OFFSET FROM CENTRELINE	-37.85	-15	0	15	21	39.91

CH 11000

DATUM R.L. 230.00

DESIGN SURFACE LEVEL	235.708	235.586	231.586	231.586	231.586	235.586	235.583	235.528
DEPTH CUT - / FILL +	0	-0.12	-4.08	-4.01	-3.9	0.06	0.06	-0
EXISTING SURFACE LEVEL	235.71	235.71	235.67	235.6	235.48	235.52	235.53	235.53
OFFSET FROM CENTRELINE	-32.36	-32	-20	0	20	32	35	35.17

CH 400

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale 1:100
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 2
ANNOTATED CROSS SECTIONS - SHEET 1 OF 2

Original Size A1
Drawing No: 41-24415-W006
Rev: A

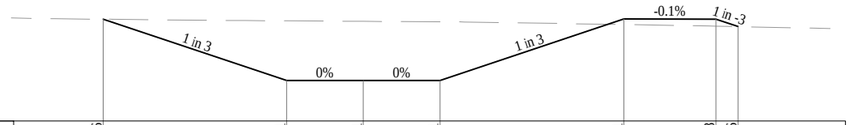
Plot Date: 22 July 2013 - 1:21 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W006.dwg

NOT FOR CONSTRUCTION

DATUM R.L. 292.00

DESIGN SURFACE LEVEL	294.728	292.803	292.803	292.803	294.803	294.8	294.435	
DEPTH CUT - / FILL +	-0	-1.8	-1.78	-1.77	0.32	0.35	-0	
EXISTING SURFACE LEVEL	294.73	294.61	294.59	294.57	294.49	294.45	294.44	
OFFSET FROM CENTRELINE	-6.77	-1	0	1	7	10	11.1	

CH 15540



DATUM R.L. 279.00

DESIGN SURFACE LEVEL	282.316	280.321	280.321	280.321	282.321	282.318	282.076	
DEPTH CUT - / FILL +	-0	-1.94	-1.93	-1.91	0.18	0.23	0	
EXISTING SURFACE LEVEL	282.32	282.26	282.25	282.23	282.14	282.09	282.08	
OFFSET FROM CENTRELINE	-8.48	-2.5	0	2.5	8.5	11.5	12.23	

CH 14040

DATUM R.L. 274.00

DESIGN SURFACE LEVEL	277.498	275.198	275.198	275.198	277.198	277.195	277.014
DEPTH CUT - / FILL +	0	-2.18	-2.07	-1.97	0.13	0.17	0
EXISTING SURFACE LEVEL	277.5	277.38	277.27	277.17	277.07	277.02	277.01
OFFSET FROM CENTRELINE	-11.9	-5	0	5	11	14	14.54

CH 13600

PRELIMINARY

No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale 1:100
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 2
ANNOTATED CROSS SECTIONS - SHEET 2 OF 2

Original Size A1
Drawing No: 41-24415-W007
Rev: A

Plot Date: 22 July 2013 - 1:21 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W007.dwg

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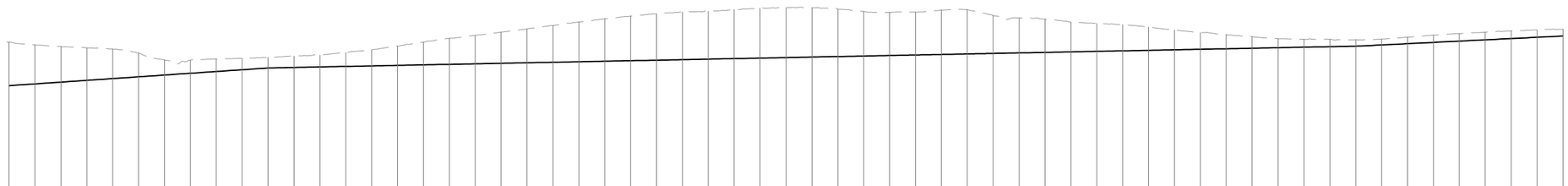
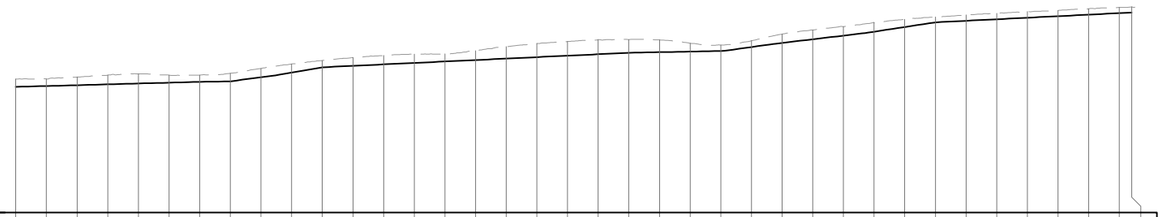


DATUM 199.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
0.00	256.58	16.78	245.43
100.00	255.51	15.03	240.48
200.00	254.92	13.76	241.16
300.00	254.37	12.53	241.84
400.00	253.92	11.40	242.52
500.00	252.41	9.21	243.20
600.00	249.73	5.84	243.89
700.00	249.58	5.01	244.57
800.00	250.07	4.82	245.25
900.00	250.33	4.40	245.93
1000.00	250.65	4.03	246.62
1100.00	251.17	4.35	246.82
1200.00	251.56	4.55	247.02
1300.00	252.65	5.43	247.22
1400.00	253.64	6.23	247.42
1500.00	255.10	7.48	247.62
1600.00	256.58	8.76	247.82
1700.00	258.03	10.02	248.02
1800.00	259.17	10.95	248.22
1900.00	260.45	12.03	248.42
2000.00	261.68	13.06	248.62
2100.00	262.98	14.16	248.82
2200.00	264.35	15.33	249.02
2300.00	265.60	16.38	249.22
2400.00	266.61	17.19	249.42
2500.00	267.46	17.84	249.62
2600.00	268.21	18.39	249.82
2700.00	268.47	18.45	250.02
2800.00	269.13	18.91	250.22
2900.00	269.64	19.22	250.42
3000.00	269.89	19.26	250.62
3100.00	269.86	19.03	250.82
3200.00	269.34	18.32	251.02
3300.00	268.42	17.19	251.22
3400.00	268.06	16.64	251.43
3500.00	268.11	16.48	251.63
3600.00	268.95	17.12	251.83
3700.00	269.11	17.09	252.03
3800.00	266.83	14.61	252.23
3900.00	265.93	13.50	252.43
4000.00	265.43	12.80	252.63
4100.00	264.35	11.52	252.83
4200.00	263.78	10.75	253.03
4300.00	263.28	10.05	253.23
4400.00	262.39	8.96	253.43
4500.00	261.24	7.61	253.63
4600.00	260.28	6.45	253.83
4700.00	259.50	5.47	254.03
4800.00	258.68	4.45	254.23
4900.00	257.92	3.49	254.43
5000.00	257.68	3.05	254.63
5100.00	257.69	2.86	254.83
5200.00	257.55	2.52	255.03
5300.00	257.77	2.27	255.50
5400.00	258.45	2.46	255.99
5500.00	259.30	2.82	256.48
5600.00	259.89	2.91	256.98
5700.00	260.43	2.96	257.47
5800.00	260.91	2.95	257.96
5900.00	261.30	2.85	258.46
6000.00	261.50	2.55	258.95

LONGITUDINAL SECTION
DIVERSION DRAIN 3
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 218.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
6000.00	261.50	2.55	258.95
6100.00	261.53	2.31	259.22
6200.00	262.15	2.65	259.50
6300.00	262.80	3.03	259.77
6400.00	263.21	3.17	260.05
6500.00	262.80	2.48	260.32
6600.00	262.79	2.23	260.57
6700.00	263.36	2.59	260.77
6800.00	264.97	2.88	262.09
6900.00	266.39	2.77	263.62
7000.00	267.53	2.20	265.33
7100.00	268.51	2.71	265.81
7200.00	269.17	2.90	266.28
7300.00	269.63	2.88	266.75
7400.00	269.67	2.45	267.22
7500.00	270.76	3.06	267.70
7600.00	272.05	3.88	268.17
7700.00	273.05	4.41	268.64
7800.00	273.75	4.63	269.12
7900.00	274.36	4.77	269.59
8000.00	274.40	4.34	270.06
8100.00	274.28	4.01	270.26
8200.00	273.18	2.72	270.46
8300.00	272.61	1.95	270.66
8400.00	274.00	2.07	271.93
8500.00	276.16	2.88	273.28
8600.00	277.52	3.06	274.47
8700.00	278.61	2.96	275.65
8800.00	279.91	2.97	276.94
8900.00	280.95	2.48	278.47
9000.00	281.71	1.72	279.99
9100.00	282.37	1.88	280.49
9200.00	282.95	1.95	280.99
9300.00	283.50	2.00	281.49
9400.00	283.87	1.88	281.99
9500.00	284.42	1.93	282.49
9600.00	284.86	1.87	282.99
9640.47	284.99	1.80	283.19

LONGITUDINAL SECTION
DIVERSION DRAIN 3
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
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Client **ADANI MINING PTY LTD**
Project **FLOOD MITIGATION AND CREEK DIVERSION**
Title **DIVERSION DRAIN 3 LONGITUDINAL SECTION**

Original Size **A1**
Drawing No: **41-24415-W008**
Rev: **A**

Plot Date: 22 July 2013 - 1:21 PM Plotted by: Adam Gaffel Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W008.dwg

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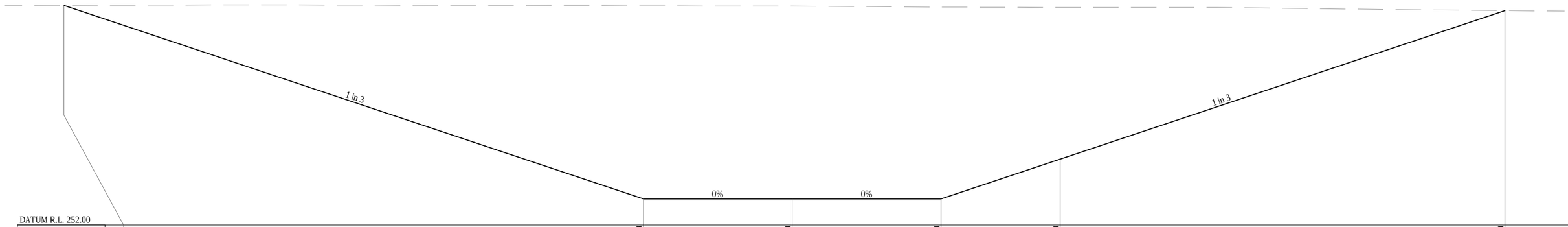
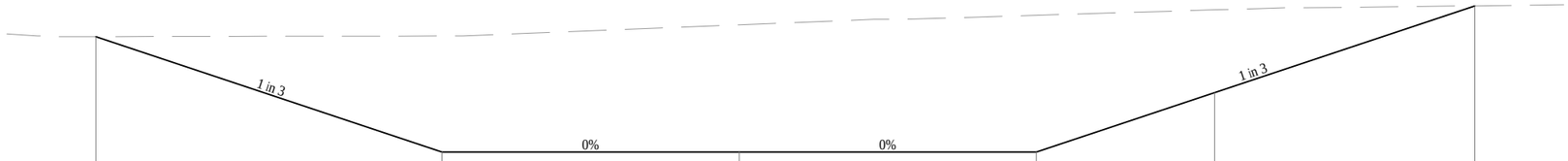


DATUM R.L. 252.00

DESIGN SURFACE LEVEL	263.04	253.309	253.309	253.309	255.309	262.779	
DEPTH CUT - / FILL +	-0	-9.71	-9.7	-9.65	-7.63	-0	
EXISTING SURFACE LEVEL	263.04	263.01	263	262.96	262.94	262.78	
OFFSET FROM CENTRELINE	-36.69	-7.5	0	7.5	13.5	35.91	

CH 4340



DATUM R.L. 243.00

DESIGN SURFACE LEVEL	248.18	244.296	244.296	244.296	246.296	249.214	
DEPTH CUT - / FILL +	-0	-3.9	-4.28	-4.6	-2.78	-0	
EXISTING SURFACE LEVEL	248.18	248.2	248.58	248.9	249.08	249.21	
OFFSET FROM CENTRELINE	-21.65	-10	0	10	16	24.76	

CH 660

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale 1:100
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 3
ANNOTATED CROSS SECTIONS - SHEET 1 OF 2

Original Size A1
Drawing No: 41-24415-W009
Rev: A

Plot Date: 22 July 2013 - 1:21 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W009.dwg

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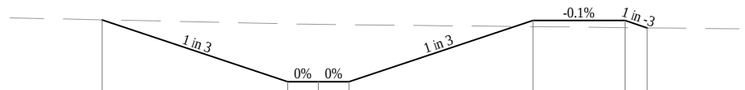
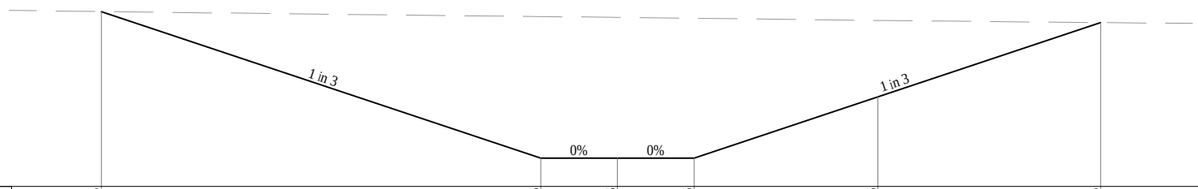


DATUM R.L. 281.00

DESIGN SURFACE LEVEL	284.61	282.591	282.591	282.591	284.591	284.588	284.347
DEPTH CUT - / FILL +	-0	-1.89	-1.87	-1.86	0.2	0.23	-0
EXISTING SURFACE LEVEL	284.61	284.48	284.46	284.45	284.39	284.35	284.35
OFFSET FROM CENTRELINE	-7.06	-1	0	1	7	10	10.72

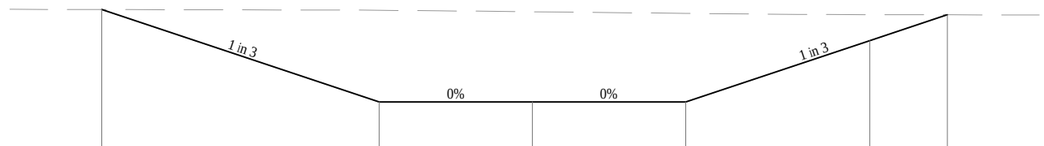
CH 9520



DATUM R.L. 268.00

DESIGN SURFACE LEVEL	273.705	268.926	268.926	268.926	270.926	273.345	
DEPTH CUT - / FILL +	0	-4.62	-4.59	-4.56	-2.49	0	
EXISTING SURFACE LEVEL	273.71	273.54	273.51	273.49	273.42	273.35	
OFFSET FROM CENTRELINE	-16.84	-2.5	0	2.5	8.5	15.76	

CH 7760



DATUM R.L. 258.00

DESIGN SURFACE LEVEL	262.732	259.717	259.717	259.717	261.717	262.562	
DEPTH CUT - / FILL +	-0	-2.99	-2.94	-2.89	-0.85	-0	
EXISTING SURFACE LEVEL	262.73	262.71	262.66	262.61	262.57	262.56	
OFFSET FROM CENTRELINE	-14.05	-5	0	5	11	13.54	

CH 6280

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
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Design Check
Approved (Project Director)
Date
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 3
ANNOTATED CROSS SECTIONS - SHEET 2 OF 2

Original Size A1
Drawing No: 41-24415-W010
Rev: A

Plot Date: 22 July 2013 - 1:21 PM
Plotted by: Adam Gaffel
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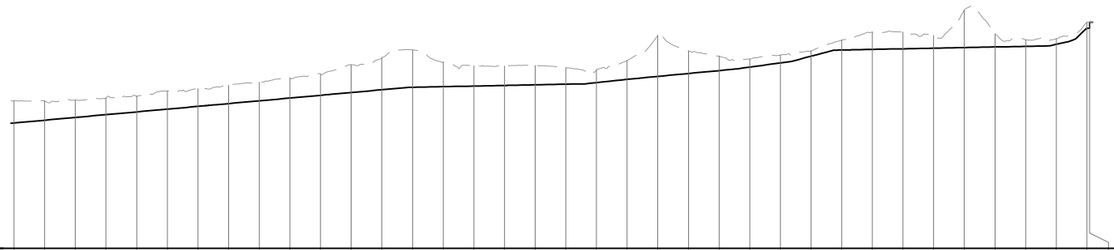

DATUM 209.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
0.00	257.11	7.21	249.86
100.00	257.11	6.31	250.80
200.00	257.35	5.65	251.70
300.00	258.04	5.43	252.61
400.00	258.60	5.09	253.51
500.00	260.34	5.93	254.41
600.00	261.10	5.79	255.31
700.00	262.22	6.01	256.21
800.00	263.17	6.05	257.12
900.00	264.61	6.59	258.02
1000.00	265.87	6.95	258.92
1100.00	268.90	9.08	259.82
1200.00	271.16	10.44	260.73
1300.00	273.75	12.22	261.53
1400.00	269.76	8.02	261.73
1500.00	268.52	6.58	261.93
1600.00	268.45	6.32	262.13
1700.00	268.65	6.32	262.33
1800.00	267.94	5.40	262.53
1900.00	267.20	4.13	263.06
2000.00	270.26	6.13	264.13
2100.00	278.49	13.41	265.08
2200.00	273.38	7.35	266.03
2300.00	271.67	4.70	266.97
2400.00	270.70	2.59	268.11
2500.00	272.01	2.52	269.49
2600.00	273.36	1.69	271.66
2700.00	276.90	3.21	273.69
2800.00	279.51	5.62	273.89
2900.00	279.51	5.43	274.09
3000.00	278.42	4.13	274.29
3100.00	286.67	12.18	274.49
3200.00	278.98	4.30	274.68
3300.00	277.05	2.16	274.88
3400.00	277.34	1.79	275.55
3500.00	282.68	1.92	280.77
3508.83	282.79	1.99	282.79

LONGITUDINAL SECTION
DIVERSION DRAIN 4

HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Designer P.WOODMAN
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Design Check
Approved (Project Director)
Date
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 4 LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W011
Rev: A

Plot Date: 22 July 2013 - 1:21 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W011.dwg

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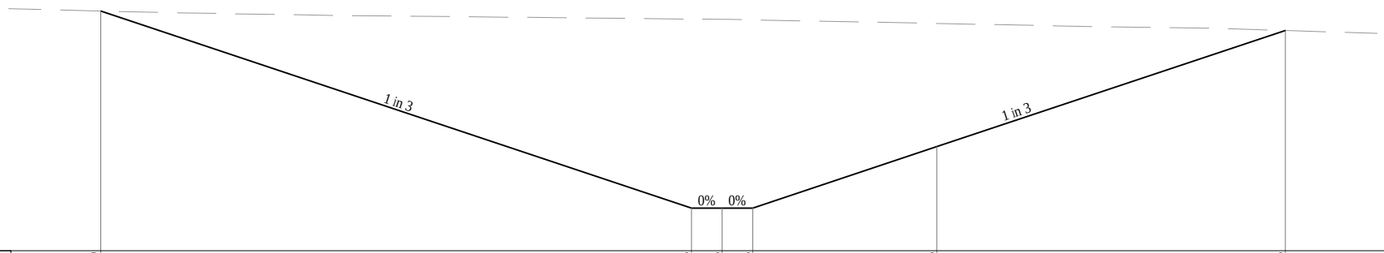

DATUM R.L. 255.00

DESIGN SURFACE LEVEL	262.819	256.395	256.395	256.395	258.395	262.185	
DEPTH CUT - / FILL +	-0	-6.16	-6.15	-6.13	-4.02	-0	
EXISTING SURFACE LEVEL	262.82	262.56	262.55	262.53	262.41	262.19	
OFFSET FROM CENTRELINE	-20.27	-1	0	1	7	18.37	

CH 720

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 4
ANNOTATED CROSS SECTIONS

Original Size A1
Drawing No: 41-24415-W012
Rev: A

Plot Date: 22 July 2013 - 1:21 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W012.dwg

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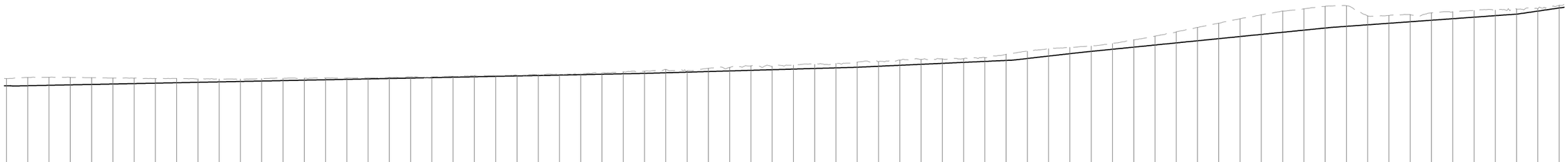

DATUM 184.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
0.00	227.61		224.23
100.00	228.10	3.86	224.24
200.00	228.21	3.77	224.44
300.00	228.16	3.52	224.64
400.00	228.04	3.19	224.84
500.00	227.82	2.77	225.04
600.00	227.82	2.57	225.24
700.00	227.63	2.19	225.44
800.00	227.66	2.01	225.64
900.00	227.47	1.62	225.84
1000.00	227.38	1.34	226.04
1100.00	227.44	1.20	226.24
1200.00	227.59	1.15	226.44
1300.00	227.79	1.14	226.64
1400.00	227.76	0.92	226.84
1500.00	227.85	0.81	227.04
1600.00	227.86	0.61	227.24
1700.00	227.91	0.47	227.45
1800.00	228.16	0.51	227.65
1900.00	228.32	0.47	227.85
2000.00	228.39	0.34	228.05
2100.00	228.67	0.42	228.25
2200.00	229.00	0.55	228.45
2300.00	228.97	0.33	228.65
2400.00	229.16	0.31	228.85
2500.00	229.51	0.46	229.05
2600.00	229.66	0.41	229.25
2700.00	229.80	0.35	229.45
2800.00	230.30	0.65	229.65
2900.00	230.73	0.88	229.85
3000.00	231.08	1.04	230.05
3100.00	231.90	1.57	230.34
3200.00	231.21	0.59	230.63
3300.00	232.45	1.54	230.91
3400.00	232.84	1.63	231.20
3500.00	233.58	2.08	231.49
3600.00	233.41	1.63	231.78
3700.00	233.94	1.87	232.07
3800.00	234.30	1.94	232.36
3900.00	234.82	2.17	232.65
4000.00	235.32	2.37	232.95
4100.00	235.57	2.17	233.40
4200.00	236.33	2.47	233.86
4300.00	236.58	2.26	234.32
4400.00	236.91	2.13	234.78
4500.00	236.96	1.73	235.23
4600.00	237.48	1.79	235.69
4700.00	239.04	2.89	236.15
4800.00	240.49	3.42	237.06
4900.00	241.62	3.42	238.20
5000.00	242.35	3.02	239.33
5100.00	242.89	2.48	240.41
5200.00	244.08	2.67	241.41
5300.00	245.85	3.45	242.41
5400.00	247.60	4.19	243.41
5500.00	249.61	5.20	244.41
5600.00	251.68	6.27	245.41
5700.00	253.67	7.26	246.41
5800.00	255.77	8.36	247.41
5900.00	257.65	9.24	248.41
6000.00	259.42	10.01	249.41
6100.00	260.48	10.07	250.41
6200.00	261.62	10.20	251.41
6300.00	261.92	9.71	252.21
6400.00	257.14	4.21	252.93
6500.00	257.34	3.69	253.65
6600.00	257.70	3.33	254.37
6700.00	258.57	3.48	255.08
6800.00	259.05	3.25	255.80
6900.00	259.72	3.20	256.52
7000.00	259.83	2.59	257.24
7100.00	260.40	2.45	257.96
7200.00	260.54	1.16	259.39
7300.00	262.06	1.22	260.84

LONGITUDINAL SECTION
DIVERSION DRAIN 5
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
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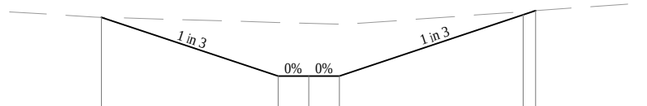
Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 5
LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W013
Rev: A

Plot Date: 22 July 2013 - 1:22 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W013.dwg

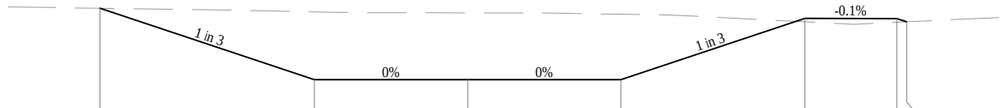
NOT FOR CONSTRUCTION



DATUM R.L. 257.00

DESIGN SURFACE LEVEL	260.29	258.369	258.369	258.369	260.369	260.505	
DEPTH CUT - / FILL +		-1.75	-1.72	-1.69	-0.11	-0	
EXISTING SURFACE LEVEL	260.29 0	260.12	260.09	260.06	260.48	260.5	
OFFSET FROM CENTRELINE	-6.76	-1	0	1	7	7.41	

CH 7130



DATUM R.L. 232.00

DESIGN SURFACE LEVEL	235.553	233.221	233.221	233.221	235.221	235.218	235.111
DEPTH CUT - / FILL +	0	-2.21	-2.18	-2.14	0.11	0.12	-0
EXISTING SURFACE LEVEL	235.55	235.43	235.4	235.36	235.11	235.1	235.11
OFFSET FROM CENTRELINE	-11.99	-5	0	5	11	14	14.32

CH 4060

DATUM R.L. 223.00

DESIGN SURFACE LEVEL	228.159	226.403	224.403	224.403	224.403	226.403	228.228
DEPTH CUT - / FILL +	-0	-1.82	-3.83	-3.77	-3.83	-1.82	-0
EXISTING SURFACE LEVEL	228.16	228.23	228.24	228.18	228.24	228.22	228.23
OFFSET FROM CENTRELINE	-21.27	-16	-10	0	10	16	21.47

CH 180

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale 1:100
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 5
ANNOTATED CROSS SECTIONS

Original Size A1
Drawing No: 41-24415-W014
Rev: A

Plot Date: 22 July 2013 - 1:22 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W014.dwg

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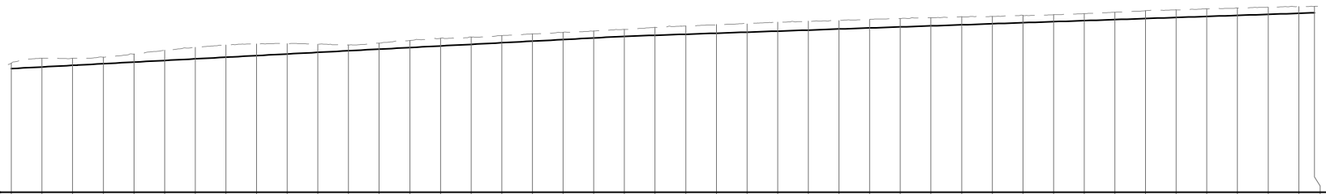

DATUM 183.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
0.00	225.09	1.79	225.09
100.00	226.70	2.87	223.83
200.00	226.67	2.31	224.36
300.00	227.00	2.11	224.89
400.00	228.06	2.64	225.42
500.00	229.27	3.32	225.95
600.00	230.24	3.76	226.48
700.00	231.02	4.00	227.01
800.00	231.34	3.80	227.54
900.00	231.45	3.38	228.07
1000.00	231.26	2.66	228.60
1100.00	230.98	1.86	229.12
1200.00	231.60	1.95	229.65
1300.00	232.45	2.29	230.17
1400.00	233.20	2.51	230.69
1500.00	233.61	2.40	231.21
1600.00	234.08	2.35	231.73
1700.00	234.60	2.35	232.25
1800.00	235.12	2.35	232.78
1900.00	235.54	2.24	233.30
2000.00	236.09	2.27	233.82
2100.00	236.74	2.58	234.16
2200.00	237.20	2.69	234.50
2300.00	237.67	2.83	234.85
2400.00	237.90	2.71	235.19
2500.00	238.44	2.91	235.53
2600.00	238.76	2.89	235.87
2700.00	239.00	2.78	236.21
2800.00	239.34	2.79	236.56
2900.00	239.63	2.73	236.90
3000.00	239.89	2.65	237.24
3100.00	240.23	2.64	237.58
3200.00	240.34	2.42	237.92
3300.00	240.65	2.39	238.26
3400.00	240.89	2.29	238.61
3500.00	241.23	2.28	238.95
3600.00	241.67	2.38	239.29
3700.00	242.16	2.53	239.63
3800.00	242.47	2.50	239.97
3900.00	242.81	2.50	240.32
4000.00	243.04	2.38	240.66
4100.00	243.34	2.34	241.00
4200.00	243.52	2.18	241.34
4251.36	243.58	2.07	241.51

LONGITUDINAL SECTION
DIVERSION DRAIN 6
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 6 LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W015
Rev: A

Plot Date: 22 July 2013 - 1:22 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W015.dwg

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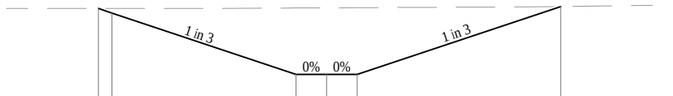

DATUM R.L. 229.00

DESIGN SURFACE LEVEL	232.001	231.855	229.855	229.855	229.855	232.066
DEPTH CUT - / FILL +	0	-0.15	-2.16	-2.17	-2.17	-0
EXISTING SURFACE LEVEL	232	232	232.02	232.02	232.03	232.07
OFFSET FROM CENTRELINE	-7.44	-7	-1	0	1	7.64

CH 1240

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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SCALE 1:100 AT ORIGINAL SIZE

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale 1:100
This Drawing must not be used for Construction unless signed as Approved

Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 6
ANNOTATED CROSS SECTIONS

Original Size A1
Drawing No: 41-24415-W016
Rev: A

Plot Date: 22 July 2013 - 1:22 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W016.dwg

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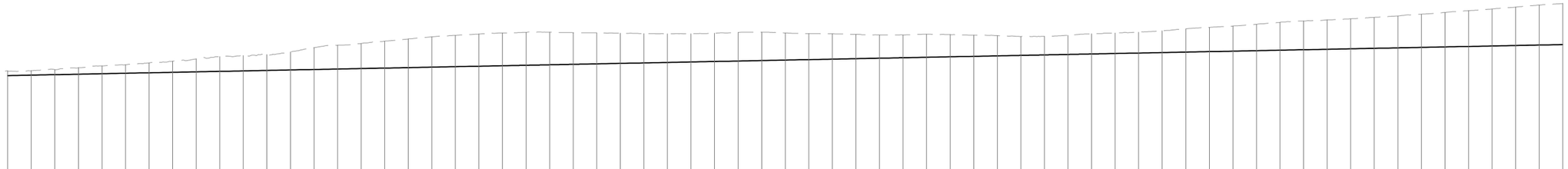
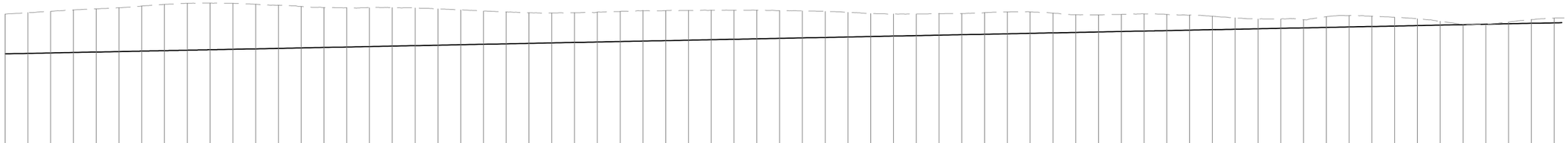


DATUM 174.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
0.00	216.50	1.98	216.50
100.00	216.57	1.85	214.72
200.00	217.07	2.15	214.92
300.00	217.85	2.73	215.12
400.00	218.68	3.36	215.32
500.00	219.12	3.60	215.52
600.00	219.92	4.20	215.72
700.00	220.63	4.71	215.92
800.00	221.57	5.46	216.12
900.00	222.66	6.35	216.32
1000.00	223.02	6.50	216.52
1100.00	223.46	6.75	216.72
1200.00	224.60	7.68	216.92
1300.00	226.38	9.27	217.12
1400.00	227.42	10.11	217.32
1500.00	228.15	10.63	217.52
1600.00	229.15	11.44	217.72
1700.00	230.07	12.15	217.91
1800.00	230.98	12.86	218.11
1900.00	231.59	13.28	218.31
2000.00	232.16	13.64	218.51
2100.00	232.63	13.92	218.71
2200.00	232.89	13.98	218.91
2300.00	232.93	13.82	219.11
2400.00	232.74	13.43	219.31
2500.00	232.70	13.18	219.51
2600.00	232.49	12.78	219.71
2700.00	232.38	12.47	219.91
2800.00	232.29	12.18	220.11
2900.00	232.30	11.99	220.31
3000.00	232.56	12.05	220.51
3100.00	232.89	12.18	220.71
3200.00	232.98	12.07	220.91
3300.00	232.60	11.49	221.11
3400.00	232.38	11.07	221.31
3500.00	232.27	10.76	221.51
3600.00	232.04	10.34	221.71
3700.00	231.79	9.88	221.91
3800.00	231.79	9.68	222.11
3900.00	232.08	9.78	222.31
4000.00	231.92	9.41	222.51
4100.00	231.68	8.97	222.71
4200.00	231.48	8.58	222.91
4300.00	231.12	8.01	223.11
4400.00	231.17	7.87	223.31
4500.00	231.60	8.10	223.50
4600.00	232.25	8.54	223.70
4700.00	232.59	8.68	223.90
4800.00	232.99	8.89	224.10
4900.00	233.53	9.22	224.30
5000.00	234.42	9.92	224.50
5100.00	235.01	10.31	224.70
5200.00	235.57	10.67	224.90
5300.00	236.29	11.19	225.10
5400.00	237.13	11.82	225.30
5500.00	237.70	12.20	225.50
5600.00	238.18	12.48	225.70
5700.00	238.64	12.74	225.90
5800.00	239.23	13.13	226.10
5900.00	239.84	13.54	226.30
6000.00	240.60	14.10	226.50
6100.00	241.34	14.64	226.70
6200.00	242.08	15.18	226.90
6300.00	242.79	15.69	227.10
6400.00	243.62	16.32	227.30
6500.00	244.44	16.94	227.50
6600.00	245.11	17.42	227.70

LONGITUDINAL SECTION
DIVERSION DRAIN 7

HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 186.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
6600.00	245.11	17.42	227.70
6700.00	245.73	17.83	227.90
6800.00	246.30	18.20	228.10
6900.00	246.93	18.63	228.30
7000.00	247.38	18.88	228.50
7100.00	247.88	19.19	228.70
7200.00	248.63	19.74	228.90
7300.00	249.34	20.25	229.09
7400.00	249.81	20.51	229.29
7500.00	249.91	20.41	229.49
7600.00	249.85	20.16	229.69
7700.00	249.38	19.49	229.89
7800.00	249.01	18.91	230.09
7900.00	248.41	18.12	230.29
8000.00	247.98	17.49	230.49
8100.00	247.86	17.17	230.69
8200.00	247.92	17.03	230.89
8300.00	247.93	16.84	231.09
8400.00	247.83	16.54	231.29
8500.00	247.39	15.90	231.49
8600.00	246.92	15.23	231.69
8700.00	246.46	14.57	231.89
8800.00	246.04	13.95	232.09
8900.00	245.67	13.38	232.29
9000.00	245.57	13.08	232.49
9100.00	245.68	13.00	232.69
9200.00	245.96	13.07	232.89
9300.00	246.26	13.18	233.09
9400.00	246.63	13.34	233.29
9500.00	246.66	13.17	233.49
9600.00	246.73	13.04	233.69
9700.00	246.80	12.91	233.89
9800.00	246.79	12.71	234.09
9900.00	246.77	12.48	234.29
10000.00	246.65	12.16	234.49
10100.00	246.56	11.87	234.68
10200.00	246.28	11.40	234.88
10300.00	245.87	10.79	235.08
10400.00	245.37	10.09	235.28
10500.00	245.21	9.72	235.48
10600.00	245.16	9.48	235.68
10700.00	245.32	9.44	235.88
10800.00	245.36	9.27	236.08
10900.00	245.71	9.43	236.28
11000.00	246.06	9.58	236.48
11100.00	246.01	9.33	236.68
11200.00	245.50	8.61	236.88
11300.00	244.84	7.76	237.08
11400.00	244.72	7.44	237.28
11500.00	244.96	7.48	237.48
11600.00	245.18	7.50	237.68
11700.00	244.94	7.06	237.88
11800.00	244.66	6.58	238.08
11900.00	244.15	5.88	238.28
12000.00	243.51	5.03	238.48
12100.00	242.94	4.26	238.68
12200.00	243.01	4.13	238.88
12300.00	242.65	3.57	239.08
12400.00	243.95	4.67	239.28
12500.00	244.45	4.98	239.48
12600.00	244.17	4.49	239.68
12700.00	243.72	3.84	239.88
12800.00	243.07	2.99	240.08
12900.00	241.94	1.66	240.27
13000.00	240.67	0.20	240.47
13100.00	240.66	-0.01	240.67
13200.00	241.70	0.82	240.87
13300.00	242.69	1.61	241.08
13400.00	243.35	2.07	241.28

LONGITUDINAL SECTION
DIVERSION DRAIN 7

HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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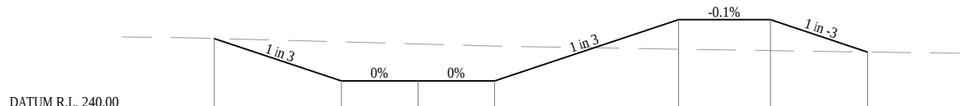
Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 7 LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W017
Rev: A

Plot Date: 22 July 2013 - 1:22 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W017.dwg

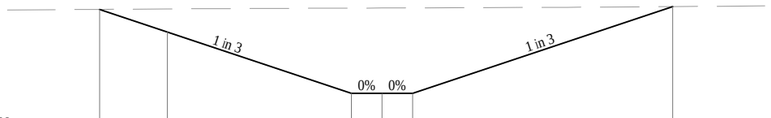
NOT FOR CONSTRUCTION



DATUM R.L. 240.00

DESIGN SURFACE LEVEL	242.335	240.955	240.955	240.955	242.955	242.952	241.897	
DEPTH CUT - / FILL +	0	-1.27	-1.2	-1.14	0.97	1.01	-0	
EXISTING SURFACE LEVEL	242.34	242.22	242.16	242.09	241.99	241.94	241.9	
OFFSET FROM CENTRELINE	-6.64	-2.5	0	2.5	8.5	11.5	14.67	

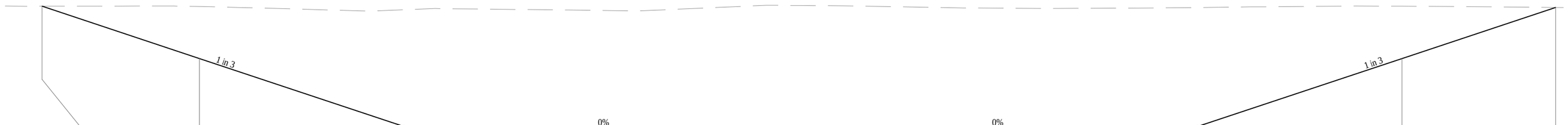
CH 13240



DATUM R.L. 235.00

DESIGN SURFACE LEVEL	238.951	238.213	236.213	236.213	236.213	239.042	
DEPTH CUT - / FILL +	-0	-0.75	-2.78	-2.78	-2.79	-0	
EXISTING SURFACE LEVEL	238.95	238.96	238.99	239	239	239.04	
OFFSET FROM CENTRELINE	-9.21	-7	-1	0	1	9.49	

CH 2700



DATUM R.L. 215.00

DESIGN SURFACE LEVEL	222.439	219.778	216.278	216.278	216.278	219.778	222.375	
DEPTH CUT - / FILL +	0	-2.64	-5.98	-6.2	-6.09	-2.66	-0	
EXISTING SURFACE LEVEL	222.44	222.42	222.26	222.47	222.37	222.44	222.37	
OFFSET FROM CENTRELINE	-38.48	-30.5	-20	0	20	30.5	38.29	

CH 880

PRELIMINARY

No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale 1:100
This Drawing must not be used for Construction unless signed as Approved

Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 7
ANNOTATED CROSS SECTIONS

Original Size A1
Drawing No: 41-24415-W018
Rev: A

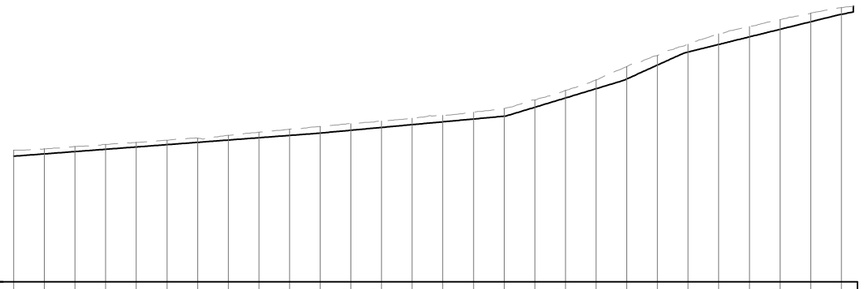
Plot Date: 22 July 2013 - 1:22 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W018.dwg

NOT FOR CONSTRUCTION

DATUM 179.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
0.00	220.77		220.77
100.00	220.16	0.87	219.29
200.00	222.61	3.11	219.49
300.00	223.25	3.56	219.69
400.00	223.06	3.16	219.89
500.00	222.92	2.83	220.09
600.00	223.46	3.16	220.29
700.00	223.81	3.32	220.49
800.00	224.57	3.88	220.69
900.00	224.47	3.58	220.89
1000.00	225.01	3.92	221.09
1100.00	225.08	3.79	221.29
1200.00	225.15	3.66	221.49
1300.00	225.42	3.72	221.69
1400.00	225.55	3.66	221.89
1500.00	225.46	3.37	222.09
1600.00	225.63	3.34	222.29
1700.00	226.37	3.88	222.49
1800.00	226.16	3.47	222.69
1900.00	226.38	3.49	222.89
2000.00	226.31	3.22	223.09
2100.00	226.42	3.13	223.29
2200.00	226.68	3.18	223.49
2300.00	226.68	2.98	223.70
2400.00	227.02	3.13	223.90
2500.00	227.27	3.17	224.10
2600.00	227.63	3.33	224.30
2700.00	227.72	3.22	224.50
2800.00	227.95	3.25	224.70
2900.00	228.09	3.19	224.90
3000.00	228.42	3.32	225.11
3100.00	228.58	3.27	225.31
3200.00	228.76	3.25	225.51
3300.00	228.77	3.07	225.71
3400.00	228.75	2.84	225.91
3500.00	228.91	2.80	226.11
3600.00	229.13	2.82	226.31
3700.00	229.18	2.66	226.51
3800.00	229.29	2.57	226.72
3900.00	228.99	2.08	226.92
4000.00	229.19	2.07	227.12
4100.00	229.11	1.79	227.32
4200.00	229.17	1.65	227.52
4300.00	229.17	1.45	227.72
4400.00	229.31	1.39	227.92
4500.00	229.43	1.31	228.12
4600.00	229.52	1.20	228.32
4700.00	229.76	1.24	228.52
4800.00	230.03	1.31	228.72
4900.00	230.30	1.38	228.92
5000.00	230.30	1.16	229.14
5100.00	230.78	1.29	229.49
5200.00	231.20	1.36	229.84
5300.00	231.72	1.53	230.19
5400.00	232.11	1.57	230.54
5500.00	232.73	1.84	230.89
5600.00	233.49	2.07	231.41
5700.00	234.33	2.28	232.05
5800.00	234.63	1.93	232.69
5900.00	235.41	2.07	233.34
6000.00	235.91	1.98	233.93

LONGITUDINAL SECTION
DIVERSION DRAIN 8
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 193.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
6000.00	235.91	1.98	233.93
6100.00	236.31	1.62	234.68
6200.00	237.08	1.64	235.44
6300.00	237.76	1.57	236.19
6400.00	238.44	1.49	236.94
6500.00	239.16	1.46	237.69
6600.00	239.81	1.36	238.45
6700.00	240.73	1.53	239.20
6800.00	241.75	1.80	239.95
6900.00	242.76	2.05	240.70
7000.00	243.63	2.16	241.47
7100.00	244.56	2.17	242.39
7200.00	245.39	2.08	243.31
7300.00	246.33	2.11	244.22
7400.00	247.27	2.13	245.14
7500.00	248.31	2.25	246.06
7600.00	249.48	2.50	246.98
7700.00	252.25	2.37	249.89
7800.00	255.39	2.47	252.92
7900.00	258.82	2.87	255.94
8000.00	263.18	4.06	259.12
8100.00	266.76	3.12	263.64
8200.00	270.42	2.51	267.91
8300.00	273.84	3.46	270.37
8400.00	276.21	3.37	272.84
8500.00	278.46	3.15	275.31
8600.00	280.57	2.80	277.77
8700.00	282.37	2.17	280.20

LONGITUDINAL SECTION
DIVERSION DRAIN 8
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 8 LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W019
Rev: A

Plot Date: 22 July 2013 - 1:22 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W019.dwg

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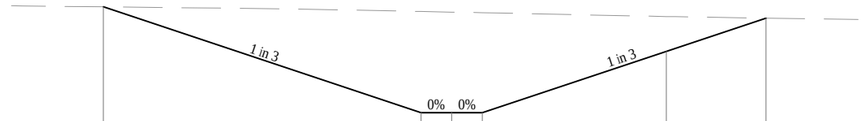
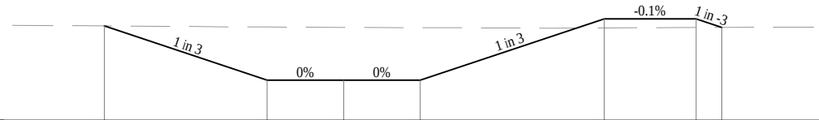


DATUM R.L. 273.00

DESIGN SURFACE LEVEL	278.019	274.567	274.567	274.567	276.567	277.652		
DEPTH CUT - / FILL +	0	-3.3	-3.28	-3.26	-1.14	0		
EXISTING SURFACE LEVEL	278.02	277.87	277.85	277.83	277.71	277.65		
OFFSET FROM CENTRELINE	-11.36	-1	0	1	7	10.26		

CH 8470



DATUM R.L. 233.00

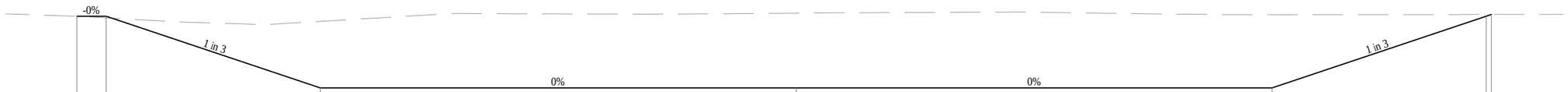
DESIGN SURFACE LEVEL	236.076	234.309	234.309	234.309	236.309	236.306	236.028	
DEPTH CUT - / FILL +	0	-1.73	-1.72	-1.71	0.3	0.28	0	
EXISTING SURFACE LEVEL	236.08	236.04	236.03	236.02	236.01	236.02	236.03	
OFFSET FROM CENTRELINE	-7.8	-2.5	0	2.5	8.5	11.5	12.33	

CH 6050

DATUM R.L. 229.00

DESIGN SURFACE LEVEL	231.392	229.926	229.926	229.926	231.926	231.923	231.185	
DEPTH CUT - / FILL +	-0	-1.46	-1.41	-1.31	0.74	0.74	-0	
EXISTING SURFACE LEVEL	231.39	231.39	231.34	231.24	231.19	231.18	231.18	
OFFSET FROM CENTRELINE	-16.9	-12.5	0	12.5	18.5	21.5	23.72	

CH 5225



DATUM R.L. 219.00

DESIGN SURFACE LEVEL	223.281	223.281	220.281	220.281	220.281	223.281	223.355	
DEPTH CUT - / FILL +	0	0.07	-2.78	-3.13	-3.06	-0.07	0	
EXISTING SURFACE LEVEL	223.28	223.21	223.07	223.41	223.34	223.35	223.35	
OFFSET FROM CENTRELINE	-30.22	-29	-20	0	20	29	29.22	

CH 595

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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SCALE 1:100 AT ORIGINAL SIZE

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Designer P.WOODMAN
Drafting Check
Design Check
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Date
Scale 1:100
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 8
ANNOTATED CROSS SECTIONS

Original Size A1
Drawing No: 41-24415-W020
Rev: A

Plot Date: 22 July 2013 - 1:22 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W020.dwg

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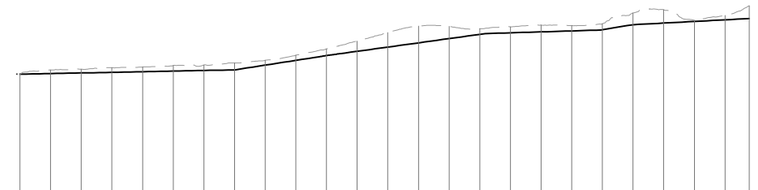

DATUM 193.0

EXISTING LEVEL	233.82	235.21	235.46	235.95	236.17	236.63	236.82	237.47	238.35	240.00	242.08	244.59	247.37	249.51	249.41	248.63	249.29	249.81	249.68	250.30	253.77	254.81	251.35	252.97	256.14				
DEPTH TO DESIGN LEVEL		1.18	1.24	1.52	1.55	1.80	1.79	2.24	1.57	1.66	2.18	3.31	4.70	5.47	3.98	1.83	1.98	2.19	1.75	2.00	3.80	4.31	0.33	1.41	4.17				
DESIGN LEVEL	233.82	234.03	234.23	234.43	234.63	234.83	235.03	235.23	236.78	238.34	239.90	241.28	242.66	244.04	245.42	246.80	247.31	247.62	247.93	248.29	249.97	250.50	251.02	251.55	251.97				
CHAINAGE	0.00	100.00	200.00	300.00	400.00	500.00	600.00	700.00	800.00	900.00	1000.00	1100.00	1200.00	1300.00	1400.00	1500.00	1600.00	1700.00	1800.00	1900.00	2000.00	2100.00	2200.00	2300.00	2379.22				

LONGITUDINAL SECTION
DIVERSION DRAIN 9
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 9 LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W021
Rev: A

Plot Date: 22 July 2013 - 1:22 PM Plotted by: Adam Gaffel Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W021.dwg

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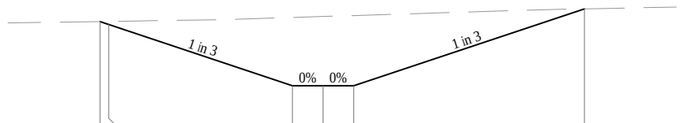

DATUM R.L. 246.00

DESIGN SURFACE LEVEL	249.651	249.558	247.558	247.558	247.558	250.065
DEPTH CUT - / FILL +	0	-0.1	-2.22	-2.26	-2.29	0
EXISTING SURFACE LEVEL	249.65	249.66	249.78	249.81	249.85	250.07
OFFSET FROM CENTRELINE	-7.28	-7	-1	0	1	8.52

CH 1680

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale 1:100
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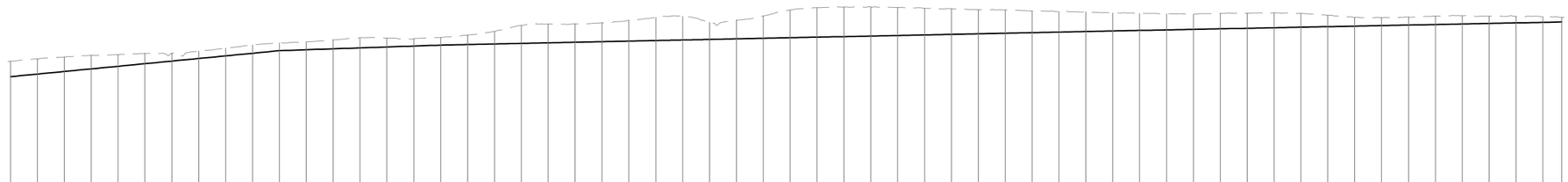
Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 9
ANNOTATED CROSS SECTIONS

Original Size A1
Drawing No: 41-24415-W022
Rev: A

Plot Date: 22 July 2013 - 1:22 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W022.dwg

NOT FOR CONSTRUCTION



DATUM 198.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
0.00	244.73	5.75	238.98
100.00	245.62	5.67	239.95
200.00	246.25	5.34	240.91
300.00	246.91	5.04	241.87
400.00	247.16	4.33	242.84
500.00	247.60	3.79	243.80
600.00	247.72	2.95	244.77
700.00	248.47	2.74	245.73
800.00	249.56	2.87	246.69
900.00	250.71	3.06	247.66
1000.00	251.49	2.87	248.62
1100.00	251.91	2.94	248.97
1200.00	252.59	3.28	249.31
1300.00	253.39	3.74	249.66
1400.00	253.30	3.30	250.00
1500.00	253.07	2.72	250.35
1600.00	253.52	2.82	250.70
1700.00	254.43	3.53	250.91
1800.00	255.77	4.65	251.12
1900.00	257.99	6.67	251.33
2000.00	258.50	6.97	251.54
2100.00	258.57	6.82	251.75
2200.00	258.95	6.99	251.96
2300.00	259.86	7.70	252.17
2400.00	260.95	8.57	252.38
2500.00	261.37	8.78	252.59
2600.00	259.17	6.37	252.80
2700.00	259.97	6.97	253.01
2800.00	261.50	8.29	253.22
2900.00	263.73	10.31	253.43
3000.00	264.58	10.95	253.64
3100.00	264.78	10.94	253.85
3200.00	264.80	10.75	254.05
3300.00	264.67	10.40	254.26
3400.00	264.29	9.82	254.47
3500.00	264.21	9.52	254.68
3600.00	263.81	8.92	254.89
3700.00	263.76	8.65	255.10
3800.00	263.38	8.07	255.31
3900.00	263.13	7.61	255.52
4000.00	262.99	7.26	255.73
4100.00	262.64	6.71	255.93
4200.00	262.48	6.34	256.13
4300.00	262.29	5.96	256.33
4400.00	262.20	5.67	256.53
4500.00	262.47	5.74	256.73
4600.00	262.54	5.61	256.93
4700.00	262.66	5.53	257.13
4800.00	262.48	5.15	257.33
4900.00	261.75	4.22	257.53
5000.00	261.02	3.29	257.73
5100.00	260.88	2.95	257.93
5200.00	261.05	2.93	258.13
5300.00	261.41	3.08	258.33
5400.00	261.56	3.03	258.53
5500.00	261.41	2.68	258.73
5600.00	261.36	2.44	258.93
5700.00	261.31	2.18	259.13
5769.95	260.97	1.71	259.26

LONGITUDINAL SECTION
DIVERSION DRAIN 10
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
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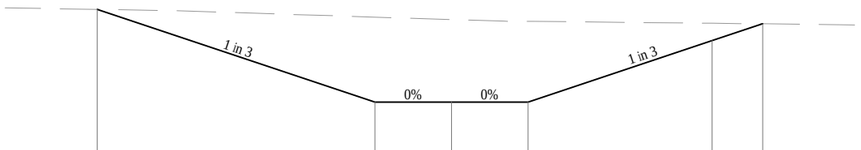
Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 10 LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W023
Rev: A

Plot Date: 22 July 2013 - 1:23 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W023.dwg

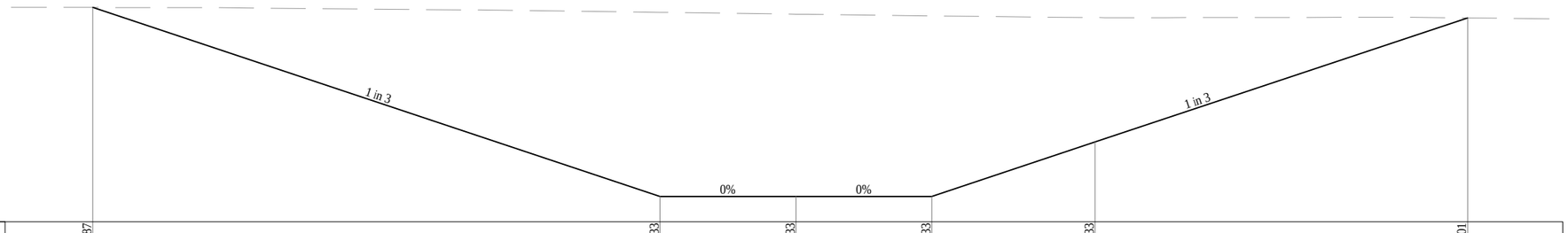
NOT FOR CONSTRUCTION



DATUM R.L. 257.00

DESIGN SURFACE LEVEL	261.667	258.647	258.647	258.647	260.647	261.197	
DEPTH CUT - / FILL +	0	-2.77	-2.69	-2.63	-0.57	0	
EXISTING SURFACE LEVEL	261.67	261.42	261.34	261.28	261.21	261.2	
OFFSET FROM CENTRELINE	-11.56	-2.5	0	2.5	8.5	10.15	

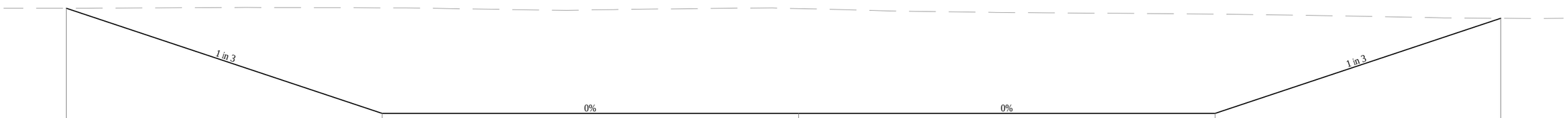
CH 5460



DATUM R.L. 255.00

DESIGN SURFACE LEVEL	262.887	255.933	255.933	255.933	257.933	262.501	
DEPTH CUT - / FILL +	0	-6.77	-6.71	-6.64	-4.58	-0	
EXISTING SURFACE LEVEL	262.89	262.71	262.64	262.58	262.52	262.5	
OFFSET FROM CENTRELINE	-25.86	-5	0	5	11	24.7	

CH 4100



DATUM R.L. 241.00

DESIGN SURFACE LEVEL	246.929	241.874	241.874	241.874	246.447		
DEPTH CUT - / FILL +	0	-5.08	-5.04	-4.78	0		
EXISTING SURFACE LEVEL	246.93	246.95	246.91	246.65	246.45		
OFFSET FROM CENTRELINE	-35.17	-20	0	20	33.72		

CH 300

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

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Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale 1:100
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 10
ANNOTATED CROSS SECTION

Original Size A1
Drawing No: 41-24415-W024
Rev: A

Plot Date: 22 July 2013 - 1:23 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W024.dwg

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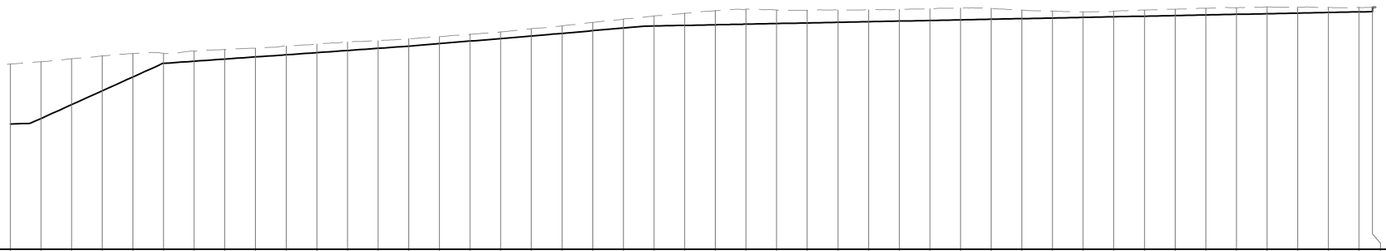

DATUM 188.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
0.00	248.38	19.54	228.84
100.00	249.17	18.53	230.64
200.00	250.13	14.97	235.16
300.00	251.07	11.39	239.68
400.00	251.82	7.63	244.20
500.00	251.90	3.28	248.62
600.00	252.63	3.30	249.32
700.00	253.17	3.15	250.02
800.00	253.58	2.86	250.72
900.00	254.26	2.84	251.42
1000.00	254.92	2.80	252.12
1100.00	255.56	2.74	252.82
1200.00	256.04	2.52	253.52
1300.00	256.69	2.46	254.22
1400.00	257.32	2.27	255.05
1500.00	258.11	2.22	255.89
1600.00	258.89	2.17	256.73
1700.00	259.95	2.38	257.57
1800.00	260.85	2.44	258.41
1900.00	261.95	2.67	259.28
2000.00	263.08	2.94	260.14
2100.00	264.08	3.27	260.81
2200.00	264.95	3.94	261.01
2300.00	265.80	4.59	261.21
2400.00	266.28	4.87	261.41
2500.00	265.99	4.38	261.61
2600.00	265.93	4.13	261.81
2700.00	265.98	3.97	262.01
2800.00	266.06	3.85	262.21
2900.00	266.28	3.87	262.41
3000.00	266.47	3.86	262.61
3100.00	266.67	3.86	262.81
3200.00	266.58	3.57	263.01
3300.00	265.98	2.77	263.21
3400.00	265.69	2.28	263.41
3500.00	265.38	1.77	263.61
3600.00	265.63	1.82	263.81
3700.00	266.00	1.99	264.01
3800.00	266.25	2.04	264.21
3900.00	266.60	2.19	264.41
4000.00	266.75	2.14	264.61
4100.00	266.99	2.18	264.81
4200.00	266.95	1.94	265.01
4300.00	266.82	1.61	265.21
4400.00	266.81	1.40	265.41
4444.09	266.91	1.41	266.91

LONGITUDINAL SECTION
DIVERSION DRAIN 11
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 11 LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W025
Rev: A

Plot Date: 22 July 2013 - 1:23 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W025.dwg

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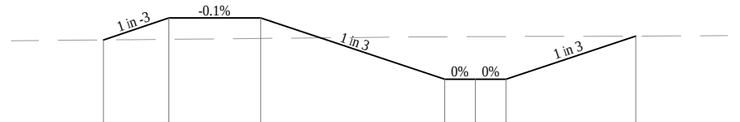
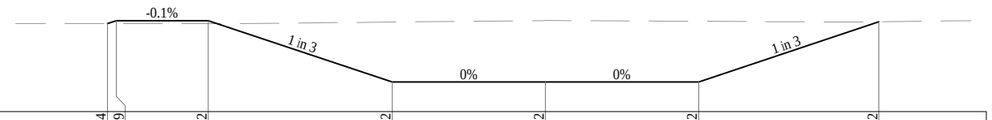


DATUM R.L. 264.00

DESIGN SURFACE LEVEL	266.737	267.449	267.452	265.452	265.452	265.452	266.862
DEPTH CUT - / FILL +	-0	0.69	0.67	-1.39	-1.39	-1.39	0
EXISTING SURFACE LEVEL	266.74	266.76	266.78	266.84	266.84	266.85	266.86
OFFSET FROM CENTRELINE	-12.14	-10	-7	-1	0	1	5.23

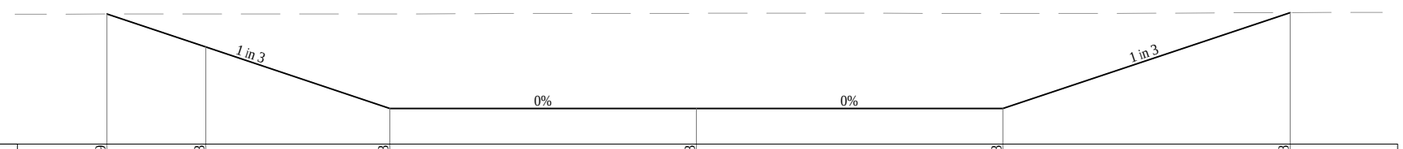
CH 4420



DATUM R.L. 264.00

DESIGN SURFACE LEVEL	266.874	266.969	266.972	264.972	264.972	264.972	266.932
DEPTH CUT - / FILL +	0	0.09	0.1	-1.95	-2	-1.98	0
EXISTING SURFACE LEVEL	266.87	266.87	266.88	266.92	266.97	266.95	266.93
OFFSET FROM CENTRELINE	-14.29	-14	-11	-5	0	5	10.88

CH 4180



DATUM R.L. 249.00

DESIGN SURFACE LEVEL	253.239	252.163	250.163	250.163	250.163	253.288
DEPTH CUT - / FILL +	-0	-1.08	-3.08	-3.1	-3.09	-0
EXISTING SURFACE LEVEL	253.24	253.24	253.24	253.26	253.26	253.29
OFFSET FROM CENTRELINE	-19.23	-16	-10	0	10	19.37

CH 720

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale 1:100
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 11
ANNOTATED CROSS SECTIONS

Original Size A1
Drawing No: 41-24415-W026
Rev: A

Plot Date: 22 July 2013 - 1:23 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W026.dwg

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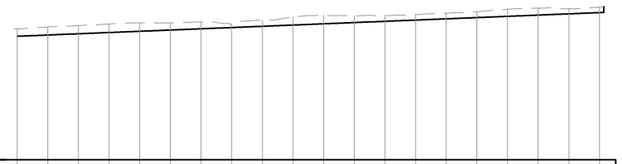

DATUM 214.0

CHAINAGE	EXISTING LEVEL	DEPTH TO DESIGN LEVEL	DESIGN LEVEL
0.00	256.68	2.45	254.22
100.00	257.25	2.62	254.64
200.00	257.74	2.70	255.04
300.00	258.22	2.77	255.45
400.00	258.55	2.70	255.85
500.00	258.62	2.36	256.26
600.00	258.85	2.19	256.67
700.00	258.17	1.10	257.07
800.00	259.45	1.98	257.48
900.00	260.44	2.56	257.88
1000.00	261.06	2.77	258.29
1100.00	260.93	2.24	258.70
1200.00	261.05	1.95	259.10
1300.00	261.33	1.83	259.51
1400.00	261.76	1.85	259.91
1500.00	262.24	1.92	260.32
1600.00	263.05	2.32	260.73
1700.00	263.37	2.23	261.13
1800.00	263.17	1.64	261.54
1900.00	263.76	1.82	261.94

LONGITUDINAL SECTION
DIVERSION DRAIN 12

HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 12 LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W027
Rev: A

Plot Date: 22 July 2013 - 1:23 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W027.dwg

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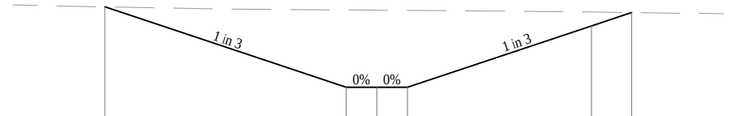

DATUM R.L. 257.00

DESIGN SURFACE LEVEL	261.076	258.452	258.452	258.452	260.452	260.889	
DEPTH CUT - / FILL +	0	-2.52	-2.51	-2.51	-0.45	0	
EXISTING SURFACE LEVEL	261.08	260.97	260.97	260.96	260.91	260.89	
OFFSET FROM CENTRELINE	-8.87	-1	0	1	7	8.31	

CH 1040

DATUM R.L. 254.00

DESIGN SURFACE LEVEL	258.118	255.347	255.347	255.347	257.347	257.977		
DEPTH CUT - / FILL +	0	-2.75	-2.77	-2.72	-0.65	-0		
EXISTING SURFACE LEVEL	258.12	258.1	258.12	258.07	258	257.98		
OFFSET FROM CENTRELINE	-18.31	-10	0	10	16	17.89		

CH 275

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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Design Check
Approved (Project Director)
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Scale 1:100
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 12
ANNOTATED CROSS SECTIONS

Original Size A1
Drawing No: 41-24415-W028
Rev: A

Plot Date: 22 July 2013 - 1:23 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W028.dwg

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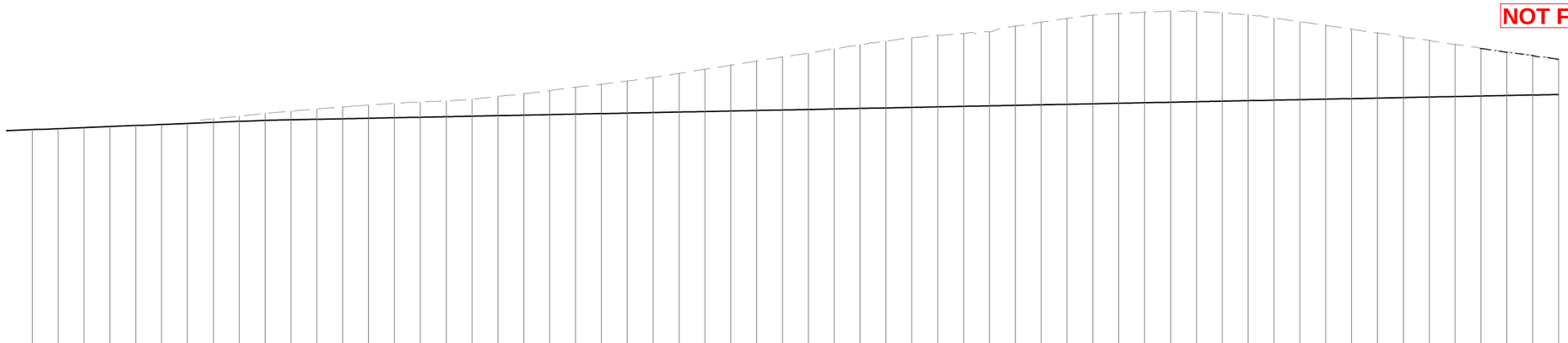
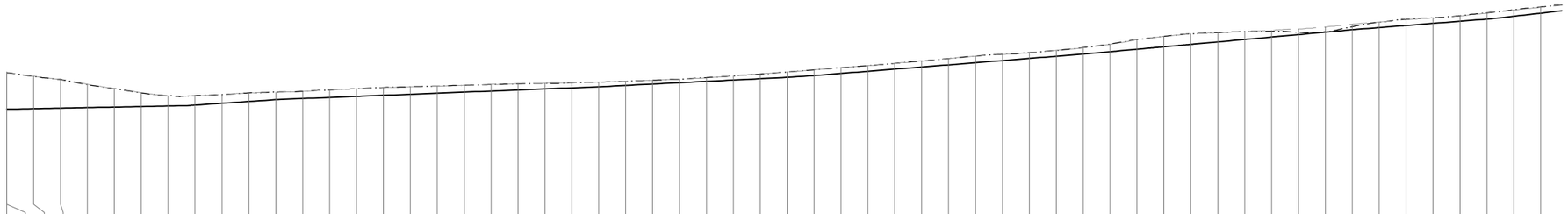


DATUM 160.0

CHAINAGE	EXISTING LEVEL	10YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
0.00				
100.00	245.74			245.74
200.00	246.14			246.14
300.00	246.55			246.55
400.00	246.95			246.95
500.00	247.35			247.35
600.00	247.75			247.75
700.00	248.15			248.15
800.00	249.98			248.56
900.00	250.95			248.96
1000.00	252.05			249.36
1100.00	252.94			249.56
1200.00	253.76			249.76
1300.00	254.59			249.96
1400.00	255.27			250.16
1500.00	255.89			250.36
1600.00	256.46			250.56
1700.00	256.84			250.76
1800.00	257.48			250.96
1900.00	258.62			251.16
2000.00	259.69			251.36
2100.00	260.83			251.56
2200.00	262.14			251.76
2300.00	263.30			251.96
2400.00	264.60			252.16
2500.00	265.96			252.36
2600.00	267.50			252.56
2700.00	269.15			252.76
2800.00	270.72			252.96
2900.00	272.30			253.16
3000.00	273.81			253.36
3100.00	275.28			253.56
3200.00	276.99			253.76
3300.00	278.60			253.96
3400.00	280.00			254.16
3500.00	281.30			254.36
3600.00	282.21			254.56
3700.00	282.97			254.76
3800.00	283.63			254.96
3900.00	285.82			255.16
4000.00	287.35			255.36
4100.00	288.79			255.56
4200.00	290.05			255.76
4300.00	290.70			255.96
4400.00	291.23			256.16
4500.00	291.57			256.36
4600.00	291.45			256.56
4700.00	291.09			256.76
4800.00	290.20			256.96
4900.00	288.96			257.16
5000.00	287.50			257.36
5100.00	286.18			257.56
5200.00	284.62			257.76
5300.00	283.18			257.96
5400.00	281.58			258.16
5500.00	280.27			258.36
5600.00	278.74			258.56
5700.00	277.26	277.17	18.41	258.76
5800.00	275.80	275.71	16.75	258.96
5900.00	274.65	274.35	15.19	259.16
5999.96	273.12	272.95	13.59	259.36

LONGITUDINAL SECTION
DIVERSION DRAIN 1
(SUBSIDENCE 2024)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 219.0

CHAINAGE	EXISTING LEVEL	10YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
5999.96	273.12	272.95	13.59	259.36
6000.00	273.12	272.95	13.59	259.36
6100.00	271.65	271.58	12.02	259.56
6200.00	270.62	270.43	10.67	259.76
6300.00	268.65	268.52	8.56	259.96
6400.00	267.12	267.01	6.85	260.16
6500.00	265.54	265.42	5.06	260.36
6600.00	264.43	264.43	3.87	260.56
6700.00	264.32	264.40	3.50	260.90
6800.00	264.77	264.83	3.25	261.58
6900.00	265.28	265.42	3.17	262.25
7000.00	265.72	265.75	2.82	262.93
7100.00	265.97	266.04	2.69	263.35
7200.00	266.53	266.54	2.80	263.74
7300.00	266.93	267.02	2.88	264.14
7400.00	267.38	267.45	2.92	264.54
7500.00	267.71	267.70	2.77	264.93
7600.00	267.96	267.97	2.65	265.33
7700.00	268.33	268.26	2.53	265.72
7800.00	268.61	268.58	2.46	266.12
7900.00	268.86	268.81	2.29	266.51
8000.00	269.04	269.00	2.09	266.91
8100.00	269.21	269.24	1.92	267.31
8200.00	269.48	269.47	1.75	267.72
8300.00	269.80	269.74	1.53	268.21
8400.00	270.11	270.15	1.42	268.73
8500.00	270.52	270.53	1.29	269.24
8600.00	271.06	271.12	1.39	269.73
8700.00	271.80	271.76	1.54	270.22
8800.00	272.65	272.45	1.73	270.72
8900.00	273.26	273.21	1.96	271.25
9000.00	273.98	274.04	2.15	271.88
9100.00	274.84	274.82	2.14	272.68
9200.00	275.60	275.56	2.09	273.48
9300.00	276.39	276.41	2.13	274.27
9400.00	277.31	277.30	2.22	275.07
9500.00	278.19	278.20	2.33	275.87
9600.00	279.08	279.13	2.46	276.67
9700.00	279.75	279.79	2.33	277.47
9800.00	280.32	280.45	2.18	278.27
9900.00	281.27	281.26	2.19	279.06
10000.00	282.24	282.31	2.45	279.86
10100.00	283.46	283.62	2.85	280.77
10200.00	285.14	285.26	3.59	281.67
10300.00	286.43	286.47	3.89	282.58
10400.00	287.31	287.43	3.94	283.49
10500.00	287.70	287.86	3.46	284.40
10600.00	288.20	288.23	2.93	285.30
10700.00	288.62	288.33	2.12	286.21
10800.00	289.17	287.98	0.86	287.12
10900.00	289.94	288.15	0.13	288.03
11000.00	291.03	290.08	1.14	288.93
11100.00	291.80	291.73	2.00	289.72
11200.00	292.65	292.80	2.28	290.51
11300.00	293.29	293.41	2.11	291.30
11400.00	293.97	294.14	2.05	292.09
11500.00	295.07	295.25	2.37	292.88
11600.00	296.26	296.37	2.43	293.94
11700.00	297.26	297.42	2.34	295.09

LONGITUDINAL SECTION
DIVERSION DRAIN 1
(SUBSIDENCE 2024)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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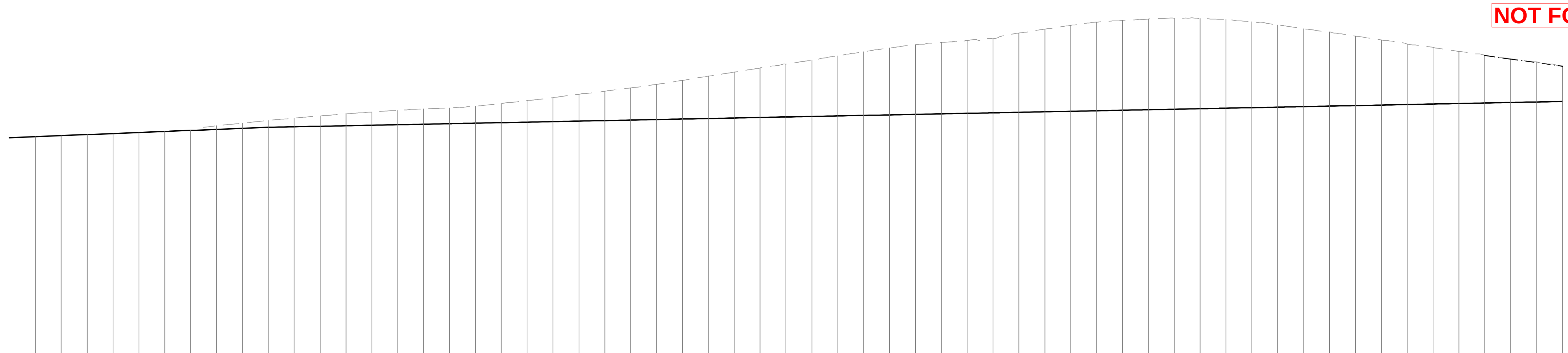
Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **ADANI MINING PTY LTD**
Project **FLOOD MITIGATION AND CREEK DIVERSION**
Title **DIVERSION DRAIN 1 (SUBSIDENCE 2024) LONGITUDINAL SECTION**

Original Size **A1**
Drawing No: **41-24415-W029**
Rev: **A**

Plot Date: 22 July 2013 - 1:23 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W029.dwg

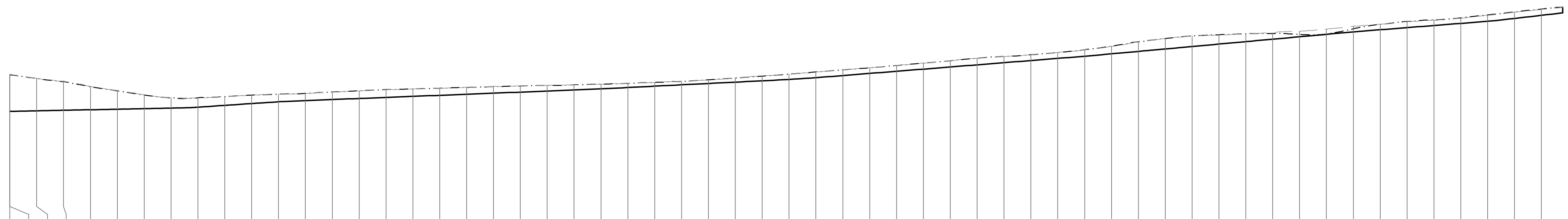
NOT FOR CONSTRUCTION



DATUM 160.0

CHAINAGE	EXISTING LEVEL	15YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
0.00				
100.00	245.74			245.74
200.00	246.14			246.14
300.00	246.55			246.55
400.00	246.95			246.95
500.00	247.35			247.35
600.00	247.75			247.75
700.00	248.15			248.15
800.00	249.98			248.56
900.00	250.95			248.96
1000.00	252.05			249.36
1100.00	252.94			249.56
1200.00	253.76			249.76
1300.00	254.59			249.96
1400.00	255.27			250.16
1500.00	255.89			250.36
1600.00	256.46			250.56
1700.00	256.84			250.76
1800.00	257.48			250.96
1900.00	258.62			251.16
2000.00	259.69			251.36
2100.00	260.83			251.56
2200.00	262.14			251.76
2300.00	263.30			251.96
2400.00	264.60			252.16
2500.00	265.96			252.36
2600.00	267.50			252.56
2700.00	269.15			252.76
2800.00	270.72			252.96
2900.00	272.30			253.16
3000.00	273.81			253.36
3100.00	275.28			253.56
3200.00	276.99			253.76
3300.00	278.60			253.96
3400.00	280.00			254.16
3500.00	281.30			254.36
3600.00	282.21			254.56
3700.00	282.97			254.76
3800.00	283.63			254.96
3900.00	285.82			255.16
4000.00	287.35			255.36
4100.00	288.79			255.56
4200.00	290.05			255.76
4300.00	290.70			255.96
4400.00	291.23			256.16
4500.00	291.57			256.36
4600.00	291.45			256.56
4700.00	291.09			256.76
4800.00	290.20			256.96
4900.00	288.96			257.16
5000.00	287.50			257.36
5100.00	286.18			257.56
5200.00	284.62			257.76
5300.00	283.18			257.96
5400.00	281.58			258.16
5500.00	280.27			258.36
5600.00	278.74			258.56
5700.00	277.26	277.17	18.41	258.76
5800.00	275.80	275.71	16.75	258.96
5900.00	274.65	274.35	15.19	259.16
5999.96	273.12	272.95	13.59	259.36

LONGITUDINAL SECTION
DIVERSION DRAIN 1
(SUBSIDENCE 2029)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 219.0

CHAINAGE	EXISTING LEVEL	15YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
5999.96	273.12	272.95	13.59	259.36
6000.00	273.12	272.95	13.59	259.36
6100.00	271.65	271.58	12.02	259.56
6200.00	270.62	270.43	10.67	259.76
6300.00	268.65	268.52	8.56	259.96
6400.00	267.12	267.01	6.85	260.16
6500.00	265.54	265.42	5.06	260.36
6600.00	264.43	264.43	3.87	260.56
6700.00	264.32	264.40	3.50	260.90
6800.00	264.77	264.83	3.25	261.58
6900.00	265.28	265.42	3.17	262.25
7000.00	265.72	265.75	2.82	262.93
7100.00	265.97	266.04	2.69	263.35
7200.00	266.53	266.54	2.80	263.74
7300.00	266.93	267.02	2.88	264.14
7400.00	267.38	267.45	2.92	264.54
7500.00	267.71	267.70	2.77	264.93
7600.00	267.96	267.97	2.65	265.33
7700.00	268.33	268.26	2.53	265.72
7800.00	268.61	268.58	2.46	266.12
7900.00	268.86	268.81	2.29	266.51
8000.00	269.04	269.00	2.09	266.91
8100.00	269.21	269.24	1.92	267.31
8200.00	269.48	269.47	1.75	267.72
8300.00	269.80	269.74	1.53	268.21
8400.00	270.11	270.15	1.42	268.73
8500.00	270.52	270.53	1.29	269.24
8600.00	271.06	271.12	1.39	269.73
8700.00	271.80	271.76	1.54	270.22
8800.00	272.65	272.45	1.73	270.72
8900.00	273.26	273.21	1.96	271.25
9000.00	273.98	274.04	2.15	271.88
9100.00	274.84	274.82	2.14	272.68
9200.00	275.60	275.56	2.09	273.48
9300.00	276.39	276.41	2.13	274.27
9400.00	277.31	277.30	2.22	275.07
9500.00	278.19	278.20	2.33	275.87
9600.00	279.08	279.13	2.46	276.67
9700.00	279.75	279.79	2.33	277.47
9800.00	280.32	280.45	2.18	278.27
9900.00	281.27	281.26	2.19	279.06
10000.00	282.24	282.31	2.45	279.86
10100.00	283.46	283.62	2.85	280.77
10200.00	285.14	285.26	3.59	281.67
10300.00	286.43	286.47	3.89	282.58
10400.00	287.31	287.43	3.94	283.49
10500.00	287.70	287.86	3.46	284.40
10600.00	288.20	288.23	2.93	285.30
10700.00	288.62	288.33	2.12	286.21
10800.00	289.17	287.98	0.86	287.12
10900.00	289.94	288.15	0.13	288.03
11000.00	291.03	290.08	1.14	288.93
11100.00	291.80	291.73	2.00	289.72
11200.00	292.65	292.80	2.28	290.51
11300.00	293.29	293.41	2.11	291.30
11400.00	293.97	294.14	2.05	292.09
11500.00	295.07	295.25	2.37	292.88
11600.00	296.26	296.37	2.43	293.94
11700.00	297.26	297.42	2.34	295.09

LONGITUDINAL SECTION
DIVERSION DRAIN 1
(SUBSIDENCE 2029)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL | Designer P.WOODMAN
Drafting Check | Design Check
Approved (Project Director) | Date
Scale AS SHOWN | This Drawing must not be used for Construction unless signed as Approved

Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 1 (SUBSIDENCE 2029) LONGITUDINAL SECTION
Original Size A1 | Drawing No: 41-24415-W030 | Rev: A

Plot Date: 22 July 2013 - 1:23 PM Plotted by: Adam Gaffel Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W030.dwg

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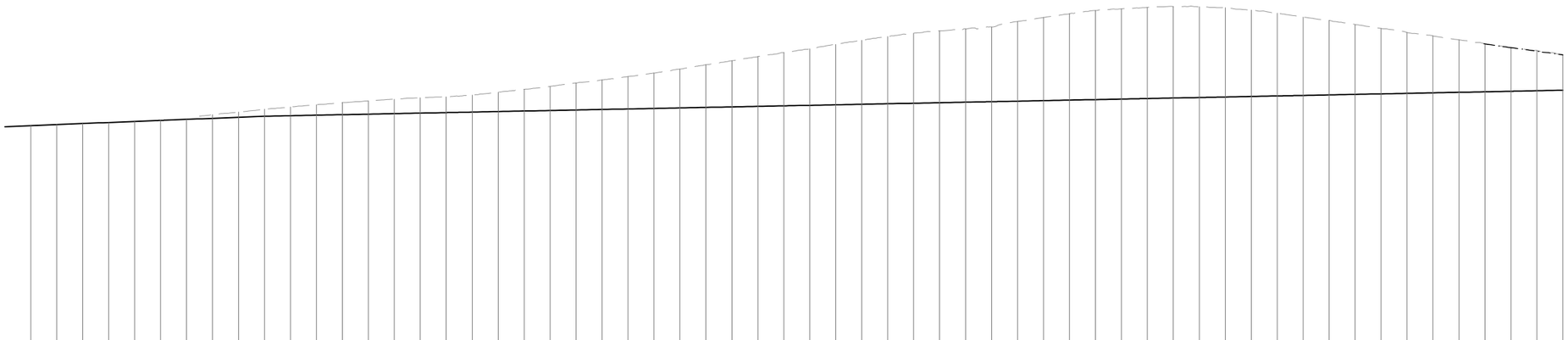
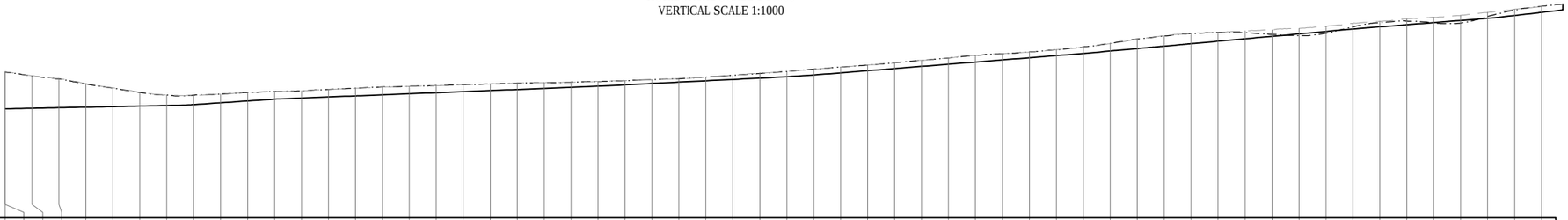


DATUM 160.0

CHAINAGE	EXISTING LEVEL	20YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
0.00				
100.00	245.74			245.74
200.00	246.14			246.14
300.00	246.55			246.55
400.00	246.95			246.95
500.00	247.35			247.35
600.00	247.75			247.75
700.00	248.15			248.15
800.00	248.56			248.56
900.00	248.96			248.96
1000.00	249.36			249.36
1100.00	249.56			249.56
1200.00	249.76			249.76
1300.00	249.96			249.96
1400.00	250.16			250.16
1500.00	250.36			250.36
1600.00	250.56			250.56
1700.00	250.76			250.76
1800.00	250.96			250.96
1900.00	251.16			251.16
2000.00	251.36			251.36
2100.00	251.56			251.56
2200.00	251.76			251.76
2300.00	251.96			251.96
2400.00	252.16			252.16
2500.00	252.36			252.36
2600.00	252.56			252.56
2700.00	252.76			252.76
2800.00	252.96			252.96
2900.00	253.16			253.16
3000.00	253.36			253.36
3100.00	253.56			253.56
3200.00	253.76			253.76
3300.00	253.96			253.96
3400.00	254.16			254.16
3500.00	254.36			254.36
3600.00	254.56			254.56
3700.00	254.76			254.76
3800.00	254.96			254.96
3900.00	255.16			255.16
4000.00	255.36			255.36
4100.00	255.56			255.56
4200.00	255.76			255.76
4300.00	255.96			255.96
4400.00	256.16			256.16
4500.00	256.36			256.36
4600.00	256.56			256.56
4700.00	256.76			256.76
4800.00	256.96			256.96
4900.00	257.16			257.16
5000.00	257.36			257.36
5100.00	257.56			257.56
5200.00	257.76			257.76
5300.00	257.96			257.96
5400.00	258.16			258.16
5500.00	258.36			258.36
5600.00	258.56			258.56
5700.00	258.76	277.17	18.41	258.76
5800.00	258.96	275.71	16.75	258.96
5900.00	259.16	274.35	15.19	259.16
5999.96	259.36	272.95	13.59	259.36

LONGITUDINAL SECTION
DIVERSION DRAIN 1
(SUBSIDENCE 2034)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 219.0

CHAINAGE	EXISTING LEVEL	20YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
5999.96	273.12	272.95	13.59	259.36
6000.00	273.12	272.95	13.59	259.36
6100.00	271.65	271.58	12.02	259.56
6200.00	270.62	270.43	10.67	259.76
6300.00	268.65	268.52	8.56	259.96
6400.00	267.12	267.01	6.85	260.16
6500.00	265.54	265.42	5.06	260.36
6600.00	264.43	264.43	3.87	260.56
6700.00	264.32	264.40	3.50	260.90
6800.00	264.77	264.83	3.25	261.58
6900.00	265.28	265.42	3.17	262.25
7000.00	265.72	265.75	2.82	262.93
7100.00	265.97	266.04	2.69	263.35
7200.00	266.53	266.54	2.80	263.74
7300.00	266.93	267.02	2.88	264.14
7400.00	267.38	267.45	2.92	264.54
7500.00	267.71	267.70	2.77	264.93
7600.00	267.96	267.97	2.65	265.33
7700.00	268.33	268.26	2.53	265.72
7800.00	268.61	268.58	2.46	266.12
7900.00	268.86	268.81	2.29	266.51
8000.00	269.04	269.00	2.09	266.91
8100.00	269.21	269.24	1.92	267.31
8200.00	269.48	269.47	1.75	267.72
8300.00	269.80	269.74	1.53	268.21
8400.00	270.11	270.18	1.45	268.73
8500.00	270.52	270.53	1.29	269.24
8600.00	271.06	270.18	1.45	269.73
8700.00	271.80	271.76	1.54	270.22
8800.00	272.65	272.45	1.73	270.72
8900.00	273.26	273.21	1.96	271.25
9000.00	273.98	274.04	2.15	271.88
9100.00	274.84	274.82	2.14	272.68
9200.00	275.60	275.56	2.09	273.48
9300.00	276.39	276.41	2.13	274.27
9400.00	277.31	277.30	2.22	275.07
9500.00	278.19	278.20	2.33	275.87
9600.00	279.08	279.13	2.46	276.67
9700.00	279.75	279.79	2.33	277.47
9800.00	280.32	280.45	2.18	278.27
9900.00	281.27	281.26	2.19	279.06
10000.00	282.24	282.31	2.44	279.86
10100.00	283.46	283.60	2.83	280.77
10200.00	285.14	285.19	3.51	281.67
10300.00	286.43	286.33	3.75	282.58
10400.00	287.31	287.28	3.79	283.49
10500.00	287.70	287.62	3.23	284.40
10600.00	288.20	287.57	2.26	285.30
10700.00	288.62	286.93	0.72	286.21
10800.00	289.17	286.48	-0.64	287.12
10900.00	289.94	287.39	-0.63	288.03
11000.00	291.03	289.72	0.78	288.93
11100.00	291.80	291.30	1.58	289.72
11200.00	292.65	291.88	1.36	290.51
11300.00	293.29	291.18	-0.13	291.30
11400.00	293.97	291.13	-0.96	292.09
11500.00	295.07	293.58	0.70	292.88
11600.00	296.26	296.00	2.06	293.94
11700.00	297.26	297.40	2.31	295.09

LONGITUDINAL SECTION
DIVERSION DRAIN 1
(SUBSIDENCE 2034)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **ADANI MINING PTY LTD**
Project **FLOOD MITIGATION AND CREEK DIVERSION**
Title **DIVERSION DRAIN 1 (SUBSIDENCE 2034) LONGITUDINAL SECTION**

Original Size **A1**
Drawing No: **41-24415-W031**
Rev: **A**

Plot Date: 22 July 2013 - 1:23 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W031.dwg

NOT FOR CONSTRUCTION

DATUM 170.0

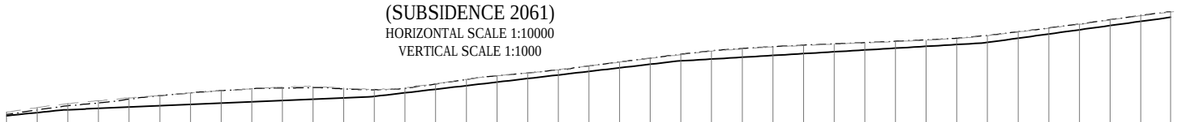
CHAINAGE	EXISTING LEVEL	47YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
100.00	232.88			231.44
200.00	233.56			231.49
300.00	234.32			231.54
400.00	235.60			231.59
500.00	236.95			231.64
600.00	238.27			231.69
700.00	239.88			231.74
800.00	241.53			231.78
900.00	242.75			231.83
1000.00	243.60			231.88
1100.00	244.32			231.93
1200.00	245.00			231.98
1300.00	245.09			232.03
1400.00	244.94			232.08
1500.00	244.97			232.13
1600.00	244.63			232.18
1700.00	243.40			232.23
1800.00	241.67			232.28
1900.00	239.95			232.33
2000.00	238.62			232.38
2100.00	237.24			232.43
2200.00	236.43			232.48
2300.00	235.53			232.53
2400.00	235.30			232.58
2500.00	234.68			232.63
2600.00	234.14			232.68
2700.00	233.72			232.73
2800.00	233.53			232.78
2900.00	233.37			232.83
3000.00	233.24			232.88
3100.00	233.43			232.96
3200.00	233.65			233.16
3300.00	233.97			233.36
3400.00	234.18			233.56
3500.00	234.79			233.76
3600.00	235.51			234.14
3700.00	236.10			234.53
3800.00	236.68			234.92
3900.00	236.91			235.31
4000.00	237.47			235.70
4100.00	238.31			236.09
4200.00	239.27			236.49
4300.00	239.99			236.97
4400.00	240.66			237.44
4500.00	240.88			237.92
4600.00	242.25			238.40
4700.00	242.86			238.87
4800.00	243.22			239.35
4900.00	243.94			239.83
5000.00	244.25			240.30
5100.00	245.30			240.78
5200.00	247.05			241.26
5300.00	248.80			241.74
5400.00	250.44			242.21
5500.00	251.86			242.69
5600.00	253.14			243.17
5700.00	254.68			243.64
5800.00	254.47	254.75	10.63	244.12
5900.00	254.22	254.54	9.94	244.60
6000.00	255.31	255.61	10.54	245.07

LONGITUDINAL SECTION
DIVERSION DRAIN 1
(SUBSIDENCE 2061)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

DATUM 185.0

CHAINAGE	EXISTING LEVEL	47YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
6000.00	255.31	255.61	10.54	245.07
6100.00	256.94	257.08	11.53	244.65
6200.00	258.07	258.18	12.16	246.03
6300.00	258.67	258.76	12.25	246.50
6400.00	258.85	259.00	12.02	246.98
6500.00	259.11	259.17	11.71	247.46
6600.00	259.81	259.87	11.94	247.93
6700.00	260.13	260.17	11.76	248.41
6800.00	260.15	260.09	11.20	248.89
6900.00	259.20	259.10	9.74	249.36
7000.00	257.24	257.06	7.22	251.10
7100.00	256.11	256.11	5.79	250.32
7200.00	255.38	255.36	4.58	250.78
7300.00	254.55	254.63	3.66	250.98
7400.00	254.18	253.92	2.75	251.18
7500.00	253.59	253.17	1.79	251.38
7600.00	253.30	250.77	-0.81	251.57
7700.00	252.81	250.42	-1.36	251.77
7800.00	253.52	251.00	-0.97	251.97
7900.00	253.96	251.47	-0.71	252.17
8000.00	254.27	251.85	-0.52	252.37
8100.00	254.24	251.98	-0.59	252.57
8200.00	255.00	252.55	-0.22	252.77
8300.00	256.28	253.79	0.82	252.97
8400.00	257.69	255.08	1.91	253.17
8500.00	259.24	256.85	3.48	253.37
8600.00	261.98	259.46	5.89	253.57
8700.00	264.85	262.49	8.72	253.77
8800.00	266.71	264.51	10.54	253.97
8900.00	265.88	264.29	10.13	254.17
9000.00	267.66	265.71	11.34	254.36
9100.00	269.16	267.16	12.60	254.56
9200.00	266.27	264.59	9.82	254.76
9300.00	265.20	263.28	8.31	254.96
9400.00	264.30	262.49	7.33	255.16
9500.00	264.75	262.65	7.29	255.36
9600.00	265.22	263.04	7.48	255.56
9700.00	268.19	266.06	10.30	255.76
9800.00	270.91	268.88	12.93	255.96
9900.00	273.82	271.65	15.49	256.16
10000.00	274.34	272.24	15.89	256.36
10100.00	273.93	271.72	15.16	256.56
10200.00	273.18	271.03	14.27	256.76
10300.00	272.45	270.39	13.44	256.96
10400.00	271.68	269.54	12.38	257.16
10500.00	270.94	268.79	11.43	257.36
10600.00	270.23	268.02	10.47	257.56
10700.00	269.31	267.20	9.45	257.76
10800.00	268.37	266.41	8.45	257.96
10900.00	267.35	265.92	7.76	258.16
11000.00	266.31	265.17	6.82	258.36
11100.00	264.99	264.02	5.47	258.55
11200.00	263.70	262.85	4.09	258.76
11300.00	262.79	261.95	2.99	258.97
11400.00	262.09	261.11	1.94	259.17
11500.00	261.15	260.65	1.27	259.38
11600.00	261.77	261.04	0.88	260.15
11700.00	262.34	261.57	0.40	261.17
11800.00	263.13	262.37	0.19	262.19
11900.00	263.94	263.23	0.02	263.21
12000.00	265.37	264.63	0.40	264.23

LONGITUDINAL SECTION
DIVERSION DRAIN 1
(SUBSIDENCE 2061)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 190.0

CHAINAGE	EXISTING LEVEL	47YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
12000.00	265.37	264.63	0.40	264.23
12100.00	266.86	266.11	0.87	265.24
12200.00	268.15	267.47	1.29	266.18
12300.00	269.14	268.41	1.79	266.62
12400.00	270.01	269.65	2.60	267.05
12500.00	270.85	270.78	3.30	267.48
12600.00	271.67	271.72	3.81	267.91
12700.00	272.29	272.41	4.07	268.34
12800.00	273.08	273.05	4.28	268.77
12900.00	273.59	273.25	4.05	269.20
13000.00	273.68	273.39	3.76	269.63
13100.00	273.24	273.03	2.96	270.07
13200.00	272.93	272.70	2.16	270.54
13300.00	273.28	273.18	1.48	271.70
13400.00	274.68	274.56	1.69	272.87
13500.00	276.05	276.04	2.01	274.03
13600.00	277.27	277.26	2.06	275.20
13700.00	278.12	278.16	1.80	276.36
13800.00	279.21	279.24	1.71	277.53
13900.00	280.42	280.45	1.76	278.69
14000.00	281.75	281.76	1.91	279.86
14100.00	282.91	283.00	1.98	281.02
14200.00	284.12	284.25	2.14	282.11
14300.00	285.30	285.42	2.72	282.71
14400.00	286.00	286.16	2.86	283.30
14500.00	286.67	286.77	2.88	283.89
14600.00	287.11	287.23	2.74	284.48
14700.00	287.58	287.68	2.61	285.08
14800.00	287.98	288.08	2.41	285.67
14900.00	288.40	288.54	2.27	286.26
15000.00	288.85	288.95	2.09	286.86
15100.00	289.34	289.51	2.07	287.45
15200.00	290.30	290.42	2.29	288.14
15300.00	291.56	291.62	2.12	289.51
15400.00	292.79	292.87	1.99	290.88
15500.00	294.06	294.15	1.90	292.25
15600.00	295.47	295.56	1.94	293.63
15700.00	296.80	296.95	1.95	295.00
15797.71	298.08	298.19	1.85	296.34

LONGITUDINAL SECTION
DIVERSION DRAIN 1
(SUBSIDENCE 2024)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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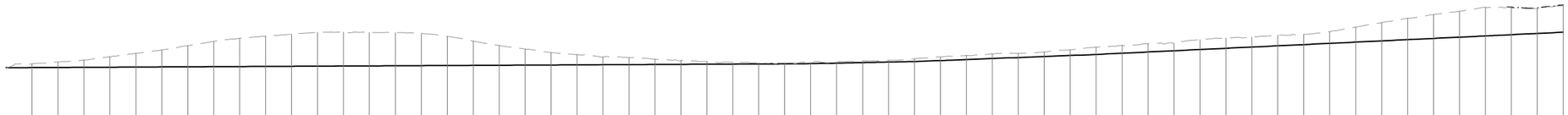
Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **ADANI MINING PTY LTD**
Project **FLOOD MITIGATION AND CREEK DIVERSION**
Title **DIVERSION DRAIN 1 (SUBSIDENCE 2061) LONGITUDINAL SECTION**

Original Size **A1**
Drawing No: **41-24415-W032**
Rev: **A**

Plot Date: 22 July 2013 - 1:23 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W032.dwg

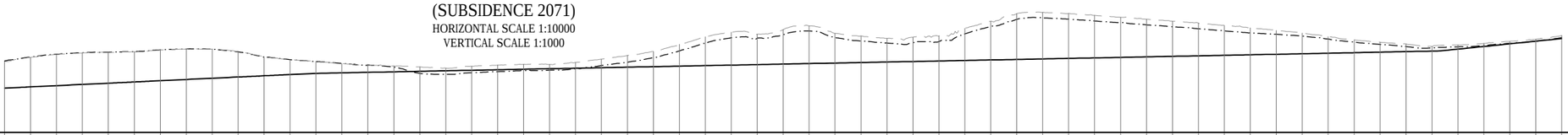
NOT FOR CONSTRUCTION



DATUM 170.0

CHAINAGE	EXISTING LEVEL	57YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
100.00	232.88			231.44
200.00	233.56			231.49
300.00	234.32			231.54
400.00	235.60			231.59
500.00	236.95			231.64
600.00	238.27			231.69
700.00	239.88			231.74
800.00	241.53			231.78
900.00	242.75			231.83
1000.00	243.60			231.88
1100.00	244.32			231.93
1200.00	245.00			231.98
1300.00	245.09			232.03
1400.00	244.94			232.08
1500.00	244.97			232.13
1600.00	244.63			232.18
1700.00	243.40			232.23
1800.00	241.67			232.28
1900.00	239.95			232.33
2000.00	238.62			232.38
2100.00	237.24			232.43
2200.00	236.43			232.48
2300.00	235.53			232.53
2400.00	235.30			232.58
2500.00	234.68			232.63
2600.00	234.14			232.68
2700.00	233.72			232.73
2800.00	233.53			232.78
2900.00	233.37			232.83
3000.00	233.24			232.88
3100.00	233.43			232.96
3200.00	233.65			233.16
3300.00	233.97			233.36
3400.00	234.18			233.56
3500.00	234.79			233.76
3600.00	235.51			234.14
3700.00	236.10			234.53
3800.00	236.68			234.92
3900.00	236.91			235.31
4000.00	237.47			235.70
4100.00	238.31			236.09
4200.00	239.27			236.49
4300.00	239.99			236.97
4400.00	240.66			237.44
4500.00	240.88			237.92
4600.00	242.25			238.40
4700.00	242.86			238.87
4800.00	243.22			239.35
4900.00	243.94			239.83
5000.00	244.25			240.30
5100.00	245.30			240.78
5200.00	247.05			241.26
5300.00	248.80			241.74
5400.00	250.44			242.21
5500.00	251.86			242.69
5600.00	253.14			243.17
5700.00	254.68			243.64
5800.00	254.47	254.75	10.63	244.12
5900.00	254.22	254.54	9.94	244.60
6000.00	255.31	255.61	10.54	245.07

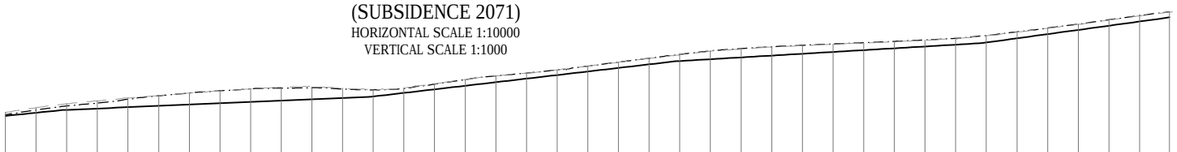
LONGITUDINAL SECTION
DIVERSION DRAIN 1
(SUBSIDENCE 2071)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 170.0

CHAINAGE	EXISTING LEVEL	57YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
6000.00	255.31	255.61	10.54	245.07
6100.00	256.94	257.08	11.53	244.65
6200.00	258.07	258.18	12.16	246.03
6300.00	258.67	258.76	12.25	246.50
6400.00	258.85	259.00	12.02	246.98
6500.00	259.11	259.17	11.71	247.46
6600.00	259.81	259.87	11.94	247.93
6700.00	260.13	260.17	11.76	248.41
6800.00	260.15	260.09	11.20	248.89
6900.00	259.20	259.10	9.74	249.36
7000.00	257.24	257.06	7.22	251.10
7100.00	256.11	256.11	5.79	250.32
7200.00	255.38	255.36	4.58	250.78
7300.00	254.55	254.63	3.66	250.98
7400.00	254.18	253.92	2.75	251.18
7500.00	253.59	253.17	1.79	251.38
7600.00	253.30	250.77	-0.81	251.57
7700.00	252.81	250.42	-1.36	251.77
7800.00	253.52	251.00	-0.97	251.97
7900.00	253.96	251.47	-0.71	252.17
8000.00	254.27	251.85	-0.52	252.37
8100.00	254.24	251.98	-0.59	252.57
8200.00	255.00	252.55	-0.22	252.77
8300.00	256.28	253.79	0.82	252.97
8400.00	257.69	255.08	1.91	253.17
8500.00	259.24	256.85	3.48	253.37
8600.00	261.98	259.46	5.89	253.57
8700.00	264.85	262.49	8.72	253.77
8800.00	266.71	264.51	10.54	253.97
8900.00	265.88	264.29	10.13	254.17
9000.00	267.66	265.71	11.34	254.36
9100.00	269.16	267.16	12.60	254.56
9200.00	266.27	264.59	9.82	254.76
9300.00	265.20	263.28	8.31	254.96
9400.00	264.30	262.49	7.33	255.16
9500.00	264.75	262.65	7.29	255.36
9600.00	265.22	263.04	7.48	255.56
9700.00	268.19	266.06	10.30	255.76
9800.00	270.91	268.88	12.93	255.96
9900.00	273.82	271.65	15.49	256.16
10000.00	274.34	272.24	15.89	256.36
10100.00	273.93	271.72	15.16	256.56
10200.00	273.18	271.03	14.27	256.76
10300.00	272.45	270.39	13.44	256.96
10400.00	271.68	269.54	12.38	257.16
10500.00	270.94	268.79	11.43	257.36
10600.00	270.23	268.02	10.47	257.56
10700.00	269.31	267.20	9.45	257.76
10800.00	268.37	266.41	8.45	257.96
10900.00	267.35	265.92	7.76	258.16
11000.00	266.31	265.17	6.82	258.36
11100.00	264.99	264.02	5.47	258.55
11200.00	263.70	262.85	4.09	258.76
11300.00	262.79	261.95	2.99	258.97
11400.00	262.09	261.11	1.94	259.17
11500.00	261.15	260.65	1.27	259.38
11600.00	261.77	261.04	0.88	260.15
11700.00	262.34	261.57	0.40	261.17
11800.00	263.13	262.37	0.19	262.19
11900.00	263.94	263.23	0.02	263.21
12000.00	265.37	264.63	0.40	264.23

LONGITUDINAL SECTION
DIVERSION DRAIN 1
(SUBSIDENCE 2071)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 224.0

CHAINAGE	EXISTING LEVEL	57YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
12000.00	265.37	264.63	0.40	264.23
12100.00	266.86	266.11	0.87	265.24
12200.00	268.15	267.47	1.29	266.18
12300.00	269.14	268.41	1.79	266.62
12400.00	270.01	269.65	2.60	267.05
12500.00	270.85	270.78	3.30	267.48
12600.00	271.67	271.72	3.81	267.91
12700.00	272.29	272.41	4.07	268.34
12800.00	273.08	273.05	4.28	268.77
12900.00	273.59	273.25	4.05	269.20
13000.00	273.68	273.39	3.76	269.63
13100.00	273.24	273.03	2.96	270.07
13200.00	272.93	272.70	2.16	270.54
13300.00	273.28	273.18	1.48	271.70
13400.00	274.68	274.56	1.69	272.87
13500.00	276.05	276.04	2.01	274.03
13600.00	277.27	277.26	2.06	275.20
13700.00	278.12	278.16	1.80	276.36
13800.00	279.21	279.24	1.71	277.53
13900.00	280.42	280.45	1.76	278.69
14000.00	281.75	281.76	1.91	279.86
14100.00	282.91	283.00	1.98	281.02
14200.00	284.12	284.25	2.14	282.11
14300.00	285.30	285.42	2.72	282.71
14400.00	286.00	286.16	2.86	283.30
14500.00	286.67	286.77	2.88	283.89
14600.00	287.11	287.23	2.74	284.48
14700.00	287.58	287.68	2.61	285.08
14800.00	287.98	288.08	2.41	285.67
14900.00	288.40	288.54	2.27	286.26
15000.00	288.85	288.95	2.09	286.86
15100.00	289.34	289.51	2.07	287.45
15200.00	290.30	290.42	2.29	288.14
15300.00	291.56	291.62	2.12	289.51
15400.00	292.79	292.87	1.99	290.88
15500.00	294.06	294.15	1.90	292.25
15600.00	295.47	295.56	1.94	293.63
15700.00	296.80	296.95	1.95	295.00
15797.71	298.08	298.19	1.85	296.35

LONGITUDINAL SECTION
DIVERSION DRAIN 1
(SUBSIDENCE 2024)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **ADANI MINING PTY LTD**
Project **FLOOD MITIGATION AND CREEK DIVERSION**
Title **DIVERSION DRAIN 1 (SUBSIDENCE 2071) LONGITUDINAL SECTION**

Original Size **A1**
Drawing No: **41-24415-W033**
Rev: **A**

Plot Date: 22 July 2013 - 1:24 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W033.dwg

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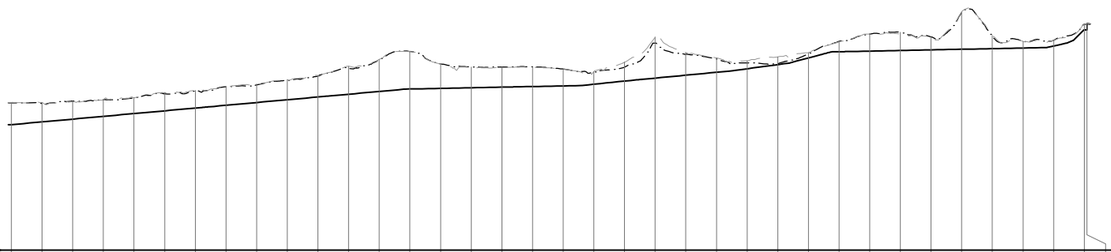

DATUM 209.0

CHAINAGE	EXISTING LEVEL	30YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
0.00	257.11	257.00	7.10	249.86
100.00	257.11	256.57	5.77	250.80
200.00	257.35	257.58	5.88	251.70
300.00	258.04	258.05	5.44	252.61
400.00	258.60	258.72	5.21	253.51
500.00	260.34	259.93	5.52	254.41
600.00	261.10	260.96	5.65	255.31
700.00	262.22	262.25	6.04	256.21
800.00	263.17	262.85	5.73	257.12
900.00	264.61	264.23	6.21	258.02
1000.00	265.87	265.74	6.82	258.92
1100.00	268.90	268.30	8.48	259.82
1200.00	271.16	271.01	10.29	260.73
1300.00	273.75	273.76	12.23	261.53
1400.00	269.76	269.76	8.03	261.73
1500.00	268.52	268.72	6.78	261.93
1600.00	268.45	268.70	6.56	262.13
1700.00	268.65	268.75	6.42	262.33
1800.00	267.94	268.03	5.50	262.53
1900.00	267.20	267.00	3.94	263.06
2000.00	270.26	268.62	4.49	264.13
2100.00	278.49	276.50	11.42	265.08
2200.00	273.38	272.83	6.81	266.03
2300.00	271.67	271.26	4.28	266.97
2400.00	270.70	270.00	1.89	268.11
2500.00	272.01	269.82	0.33	269.49
2600.00	273.36	272.96	1.30	271.66
2700.00	276.90	277.08	3.39	273.69
2800.00	279.51	279.44	5.55	273.89
2900.00	279.51	280.05	5.96	274.09
3000.00	278.42	278.53	4.25	274.29
3100.00	286.67	286.50	12.02	274.49
3200.00	278.98	278.65	3.97	274.68
3300.00	277.05	277.09	2.21	274.88
3400.00	277.34	277.42	1.87	275.55
3500.00	282.68	282.62	1.86	280.77
3508.83	282.79	282.72	1.92	282.79

LONGITUDINAL SECTION
DIVERSION DRAIN 4
(SUBSIDENCE 2044)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 4 (SUBSIDENCE 2044) LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W034
Rev: A

Plot Date: 22 July 2013 - 1:24 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W034.dwg

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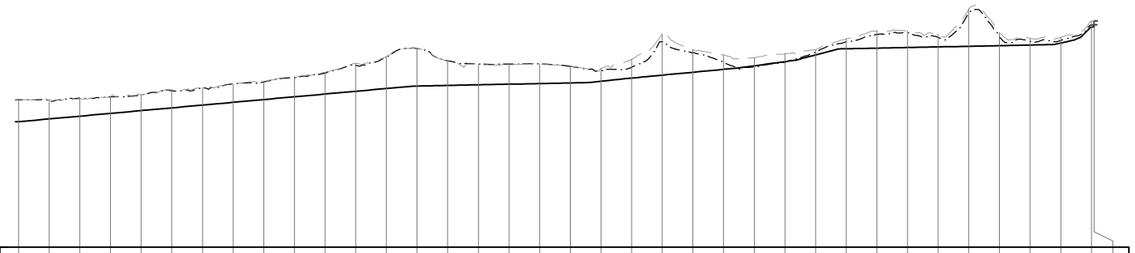

DATUM 209.0

CHAINAGE	EXISTING LEVEL	37YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
0.00	257.11	257.00	7.10	249.86
100.00	257.11	256.57	5.77	250.80
200.00	257.35	257.58	5.88	251.70
300.00	258.04	258.05	5.44	252.61
400.00	258.60	258.72	5.21	253.51
500.00	260.34	259.93	5.52	254.41
600.00	261.10	260.96	5.65	255.31
700.00	262.22	262.25	6.04	256.21
800.00	263.17	262.85	5.73	257.12
900.00	264.61	264.23	6.21	258.02
1000.00	265.87	265.74	6.82	258.92
1100.00	268.90	268.30	8.48	259.82
1200.00	271.16	271.01	10.29	260.73
1300.00	273.75	273.76	12.23	261.53
1400.00	269.76	269.76	8.03	261.73
1500.00	268.52	268.72	6.78	261.93
1600.00	268.45	268.70	6.56	262.13
1700.00	268.65	268.74	6.41	262.33
1800.00	267.94	267.92	5.39	262.53
1900.00	267.20	266.50	3.44	263.06
2000.00	270.26	267.63	3.50	264.13
2100.00	278.49	276.00	10.92	265.08
2200.00	273.38	272.34	6.32	266.03
2300.00	271.67	269.24	2.27	266.97
2400.00	270.70	267.77	-0.35	268.11
2500.00	272.01	269.28	-0.20	269.49
2600.00	273.36	272.60	0.94	271.66
2700.00	276.90	275.95	2.27	273.69
2800.00	279.51	278.35	4.47	273.89
2900.00	279.51	278.87	4.79	274.09
3000.00	278.42	277.39	3.10	274.29
3100.00	286.67	285.37	10.89	274.49
3200.00	278.98	277.54	2.85	274.68
3300.00	277.05	276.01	1.12	274.88
3400.00	277.34	276.36	0.81	275.55
3500.00	282.68	281.50	0.73	280.77
3508.83	282.79	281.50	0.70	282.79

LONGITUDINAL SECTION
DIVERSION DRAIN 4
(SUBSIDENCE 2051)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 4 (SUBSIDENCE 2051) LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W035
Rev: A

Plot Date: 22 July 2013 - 1:24 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W035.dwg

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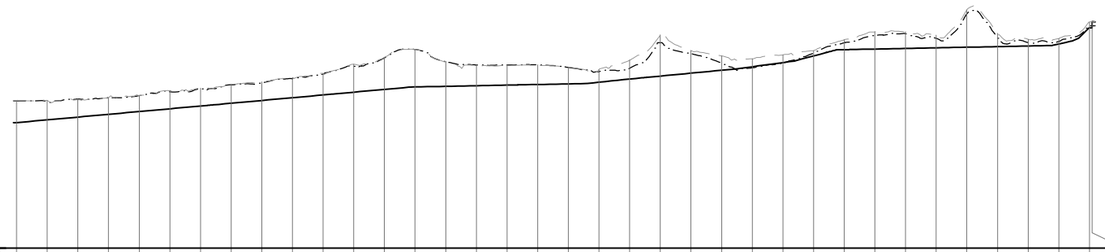

DATUM 209.0

CHAINAGE	EXISTING LEVEL	47YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
0.00	257.11	257.00	7.10	249.86
100.00	257.11	256.57	5.77	250.80
200.00	257.35	257.58	5.88	251.70
300.00	258.04	258.05	5.44	252.61
400.00	258.60	258.72	5.21	253.51
500.00	260.34	259.93	5.52	254.41
600.00	261.10	260.96	5.65	255.31
700.00	262.22	262.25	6.04	256.21
800.00	263.17	262.85	5.73	257.12
900.00	264.61	264.23	6.21	258.02
1000.00	265.87	265.74	6.82	258.92
1100.00	268.90	268.30	8.48	259.82
1200.00	271.16	271.01	10.29	260.73
1300.00	273.75	273.76	12.23	261.53
1400.00	269.76	269.76	8.03	261.73
1500.00	268.52	268.72	6.78	261.93
1600.00	268.45	268.70	6.56	262.13
1700.00	268.65	268.74	6.41	262.33
1800.00	267.94	267.91	5.38	262.53
1900.00	267.20	266.50	3.44	263.06
2000.00	270.26	267.63	3.50	264.13
2100.00	278.49	276.00	10.92	265.08
2200.00	273.38	272.34	6.32	266.03
2300.00	271.67	269.24	2.27	266.97
2400.00	270.70	267.77	-0.35	268.11
2500.00	272.01	269.28	-0.20	269.49
2600.00	273.36	272.60	0.94	271.66
2700.00	276.90	275.95	2.27	273.69
2800.00	279.51	278.35	4.47	273.89
2900.00	279.51	278.87	4.79	274.09
3000.00	278.42	277.39	3.10	274.29
3100.00	286.67	285.37	10.89	274.49
3200.00	278.98	277.54	2.85	274.68
3300.00	277.05	276.01	1.12	274.88
3400.00	277.34	276.36	0.81	275.55
3500.00	282.68	281.50	0.73	280.77
3508.83	282.79	281.50	0.70	282.79

LONGITUDINAL SECTION
DIVERSION DRAIN 4
(SUBSIDENCE 2061)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 4 (SUBSIDENCE 2061) LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W036
Rev: A

Plot Date: 22 July 2013 - 1:24 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W036.dwg

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DATUM 209.0

CHAINAGE	EXISTING LEVEL	57YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
0.00	257.11	257.00	7.10	249.86
100.00	257.11	256.57	5.77	250.80
200.00	257.35	257.58	5.88	251.70
300.00	258.04	258.05	5.44	252.61
400.00	258.60	258.72	5.21	253.51
500.00	260.34	259.93	5.52	254.41
600.00	261.10	260.96	5.65	255.31
700.00	262.22	262.25	6.04	256.21
800.00	263.17	262.85	5.73	257.12
900.00	264.61	264.23	6.21	258.02
1000.00	265.87	265.74	6.82	258.92
1100.00	268.90	268.30	8.48	259.82
1200.00	271.16	271.01	10.29	260.73
1300.00	273.75	273.76	12.23	261.53
1400.00	269.76	269.76	8.03	261.73
1500.00	268.52	268.72	6.78	261.93
1600.00	268.45	268.70	6.56	262.13
1700.00	268.65	268.74	6.41	262.33
1800.00	267.94	268.74	6.41	262.53
1900.00	267.20	266.50	3.44	263.06
2000.00	270.26	267.63	3.50	264.13
2100.00	278.49	276.00	10.92	265.08
2200.00	273.38	272.34	6.32	266.03
2300.00	271.67	269.24	2.27	266.97
2400.00	270.70	267.77	-0.35	268.11
2500.00	272.01	269.28	-0.20	269.49
2600.00	273.36	272.60	0.94	271.66
2700.00	276.90	275.95	2.27	273.69
2800.00	279.51	278.35	4.47	273.89
2900.00	279.51	278.87	4.79	274.09
3000.00	278.42	277.39	3.10	274.29
3100.00	286.67	285.37	10.89	274.49
3200.00	278.98	277.54	2.85	274.68
3300.00	277.05	276.01	1.12	274.88
3400.00	277.34	276.36	0.81	275.55
3500.00	282.68	281.50	0.73	280.77
3508.83	282.79	281.50	0.70	282.79

LONGITUDINAL SECTION
DIVERSION DRAIN 4
(SUBSIDENCE 2071)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL | Designer P.WOODMAN
Drafting Check | Design Check
Approved (Project Director)
Date
Scale AS SHOWN
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Client **ADANI MINING PTY LTD**
Project **FLOOD MITIGATION AND CREEK DIVERSION**
Title **DIVERSION DRAIN 4 (SUBSIDENCE 2071) LONGITUDINAL SECTION**

Original Size **A1** **Drawing No: 41-24415-W037** **Rev: A**

Plot Date: 22 July 2013 - 1:24 PM Plotted by: Adam Gaffel Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W037.dwg

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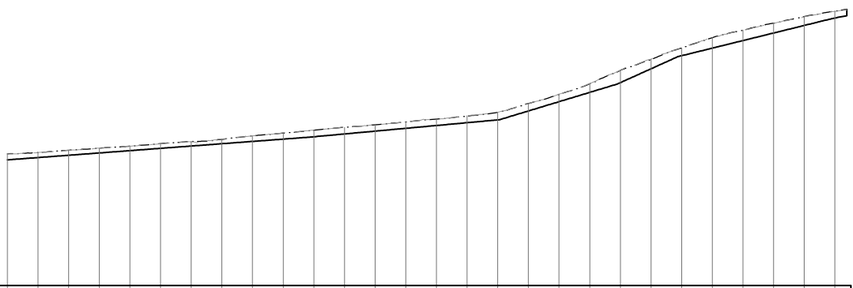
DATUM 179.0

CHAINAGE	EXISTING LEVEL	25YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
0.00	220.77			220.77
100.00	220.16			219.29
200.00	222.61			219.49
300.00	223.25			219.69
400.00	223.06			219.89
500.00	222.92			220.09
600.00	223.46			220.29
700.00	223.81			220.49
800.00	224.57			220.69
900.00	224.47			220.89
1000.00	225.01			221.09
1100.00	225.08			221.29
1200.00	225.15			221.49
1300.00	225.42			221.69
1400.00	225.55	225.50	3.61	221.89
1500.00	225.46	225.82	3.73	222.09
1600.00	225.63	226.00	3.71	222.29
1700.00	226.37	226.28	3.78	222.49
1800.00	226.16	226.46	3.77	222.69
1900.00	226.38	226.50	3.61	222.89
2000.00	226.31	226.50	3.41	223.09
2100.00	226.42	226.50	3.21	223.29
2200.00	226.68	226.51	3.02	223.49
2300.00	226.68	226.79	3.09	223.70
2400.00	227.02	227.00	3.10	223.90
2500.00	227.27	227.29	3.19	224.10
2600.00	227.63	227.50	3.20	224.30
2700.00	227.72	227.53	3.03	224.50
2800.00	227.95	227.72	3.02	224.70
2900.00	228.09	228.03	3.13	224.90
3000.00	228.42	228.27	3.17	225.11
3100.00	228.58	228.37	3.07	225.31
3200.00	228.76	228.23	2.73	225.51
3300.00	228.77	228.00	2.29	225.71
3400.00	228.75	228.11	2.20	225.91
3500.00	228.91	228.35	2.24	226.11
3600.00	229.13	228.30	1.99	226.31
3700.00	229.18	228.21	1.70	226.51
3800.00	229.29	228.14	1.42	226.72
3900.00	228.99	228.03	1.11	226.92
4000.00	229.19	227.98	0.86	227.12
4100.00	229.11	227.88	0.56	227.32
4200.00	229.17	227.86	0.34	227.52
4300.00	229.17	227.71	-0.01	227.72
4400.00	229.31	227.52	-0.40	227.92
4500.00	229.43	227.88	-0.24	228.12
4600.00	229.52	227.80	-0.52	228.32
4700.00	229.76	227.80	-0.72	228.52
4800.00	230.03	228.17	-0.55	228.72
4900.00	230.30	228.15	-0.77	228.92
5000.00	230.30	228.29	-0.84	229.14
5100.00	230.78	229.05	-0.44	229.49
5200.00	231.20	229.56	-0.28	229.84
5300.00	231.72	229.56	-0.28	230.19
5400.00	232.11	230.66	0.12	230.54
5500.00	232.73	231.51	0.62	230.89
5600.00	233.49	232.96	1.55	231.41
5700.00	234.33	234.18	2.13	232.05
5800.00	234.63	234.66	1.96	232.69
5900.00	235.41	235.35	2.01	233.34
6000.00	235.91	235.93	2.00	233.93

LONGITUDINAL SECTION
DIVERSION DRAIN 8
(SUBSIDENCE 2039)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 193.0

CHAINAGE	EXISTING LEVEL	25YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
6000.00	235.91	235.93	2.00	233.93
6100.00	236.31	236.32	1.64	234.68
6200.00	237.08	237.09	1.65	235.44
6300.00	237.76	237.74	1.55	236.19
6400.00	238.44	238.42	1.47	236.94
6500.00	239.16	239.23	1.54	237.69
6600.00	239.81	239.93	1.49	238.45
6700.00	240.73	240.61	1.41	239.20
6800.00	241.75	241.76	1.81	239.95
6900.00	242.76	242.67	1.96	240.70
7000.00	243.63	243.59	2.12	241.47
7100.00	244.56	244.56	2.17	242.39
7200.00	245.39	245.38	2.07	243.31
7300.00	246.33	246.32	2.10	244.22
7400.00	247.27	247.24	2.10	245.14
7500.00	248.31	248.23	2.17	246.06
7600.00	249.48	249.45	2.47	246.98
7700.00	252.25	252.32	2.43	249.89
7800.00	255.39	255.28	2.37	252.92
7900.00	258.82	258.77	2.83	255.94
8000.00	263.18	263.13	4.00	259.12
8100.00	266.76	266.70	3.06	263.64
8200.00	270.42	270.43	2.52	267.91
8300.00	273.84	273.80	3.43	270.37
8400.00	276.21	276.27	3.42	272.84
8500.00	278.46	278.55	3.24	275.31
8600.00	280.57	280.67	2.89	277.77
8700.00	282.37	282.47	2.27	280.20

LONGITUDINAL SECTION
DIVERSION DRAIN 8
(SUBSIDENCE 2039)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE — 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE — 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **ADANI MINING PTY LTD**
Project **FLOOD MITIGATION AND CREEK DIVERSION**
Title **DIVERSION DRAIN 8 (SUBSIDENCE 2039) LONGITUDINAL SECTION**

Original Size **A1** Drawing No: **41-24415-W038** Rev: **A**

Plot Date: 22 July 2013 - 1:24 PM Plotted by: Adam Gaffel Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W038.dwg

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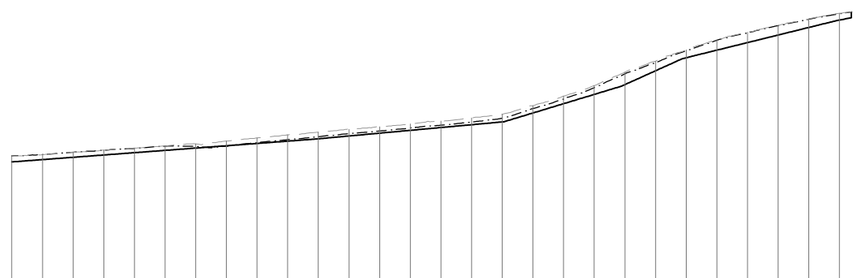
DATUM 179.0

CHAINAGE	EXISTING LEVEL	30YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
0.00	220.77			220.77
100.00	220.16			219.29
200.00	222.61			219.49
300.00	223.25			219.69
400.00	223.06			219.89
500.00	222.92			220.09
600.00	223.46			220.29
700.00	223.81			220.49
800.00	224.57			220.69
900.00	224.47			220.89
1000.00	225.01			221.09
1100.00	225.08			221.29
1200.00	225.15			221.49
1300.00	225.42			221.69
1400.00	225.55	225.50	3.61	221.89
1500.00	225.46	225.82	3.73	222.09
1600.00	225.63	226.00	3.71	222.29
1700.00	226.37	226.28	3.78	222.49
1800.00	226.16	226.46	3.77	222.69
1900.00	226.38	226.50	3.61	222.89
2000.00	226.31	226.50	3.41	223.09
2100.00	226.42	226.50	3.21	223.29
2200.00	226.68	226.51	3.02	223.49
2300.00	226.68	226.79	3.09	223.70
2400.00	227.02	227.00	3.10	223.90
2500.00	227.27	227.29	3.19	224.10
2600.00	227.63	227.61	3.31	224.30
2700.00	227.72	227.63	3.13	224.50
2800.00	227.95	227.72	3.02	224.70
2900.00	228.09	228.03	3.13	224.90
3000.00	228.42	228.16	3.05	225.11
3100.00	228.58	228.26	2.95	225.31
3200.00	228.76	227.10	1.59	225.51
3300.00	228.77	225.40	-0.31	225.71
3400.00	228.75	225.40	-0.51	225.91
3500.00	228.91	225.68	-0.43	226.11
3600.00	229.13	225.67	-0.65	226.31
3700.00	229.18	225.59	-0.92	226.51
3800.00	229.29	225.54	-1.18	226.72
3900.00	228.99	225.46	-1.45	226.92
4000.00	229.19	225.44	-1.67	227.12
4100.00	229.11	225.50	-1.82	227.32
4200.00	229.17	225.50	-2.02	227.52
4300.00	229.17	225.50	-2.22	227.72
4400.00	229.31	225.50	-2.42	227.92
4500.00	229.43	225.62	-2.50	228.12
4600.00	229.52	225.78	-2.54	228.32
4700.00	229.76	225.95	-2.57	228.52
4800.00	230.03	226.16	-2.56	228.72
4900.00	230.30	226.38	-2.54	228.92
5000.00	230.30	226.50	-2.64	229.14
5100.00	230.78	227.02	-2.47	229.49
5200.00	231.20	227.54	-2.30	229.84
5300.00	231.72	228.11	-2.08	230.19
5400.00	232.11	228.50	-2.04	230.54
5500.00	232.73	229.80	-1.09	230.89
5600.00	233.49	232.65	1.23	231.41
5700.00	234.33	234.08	2.03	232.05
5800.00	234.63	234.62	1.93	232.69
5900.00	235.41	235.35	2.01	233.34
6000.00	235.91	235.93	2.00	233.93

LONGITUDINAL SECTION
DIVERSION DRAIN 8
(SUBSIDENCE 2044)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 193.0

CHAINAGE	EXISTING LEVEL	30YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
6000.00	235.91	235.93	2.00	233.93
6100.00	236.31	236.32	1.64	234.68
6200.00	237.08	237.09	1.65	235.44
6300.00	237.76	237.73	1.54	236.19
6400.00	238.44	238.35	1.40	236.94
6500.00	239.16	239.06	1.37	237.69
6600.00	239.81	239.00	0.55	238.45
6700.00	240.73	239.06	-0.14	239.20
6800.00	241.75	240.22	0.27	239.95
6900.00	242.76	241.19	0.48	240.70
7000.00	243.63	242.14	0.66	241.47
7100.00	244.56	243.14	0.75	242.39
7200.00	245.39	244.01	0.71	243.31
7300.00	246.33	245.03	0.81	244.22
7400.00	247.27	245.91	0.77	245.14
7500.00	248.31	246.97	0.91	246.06
7600.00	249.48	248.22	1.24	246.98
7700.00	252.25	251.32	1.43	249.89
7800.00	255.39	254.49	1.58	252.92
7900.00	258.82	258.15	2.21	255.94
8000.00	263.18	262.66	3.53	259.12
8100.00	266.76	266.34	2.70	263.64
8200.00	270.42	270.15	2.24	267.91
8300.00	273.84	273.58	3.21	270.37
8400.00	276.21	276.04	3.20	272.84
8500.00	278.46	278.35	3.04	275.31
8600.00	280.57	280.45	2.68	277.77
8700.00	282.37	282.25	2.05	280.20

LONGITUDINAL SECTION
DIVERSION DRAIN 8
(SUBSIDENCE 2044)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 8 (SUBSIDENCE 2044) LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W039
Rev: A

Plot Date: 22 July 2013 - 1:24 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W039.dwg

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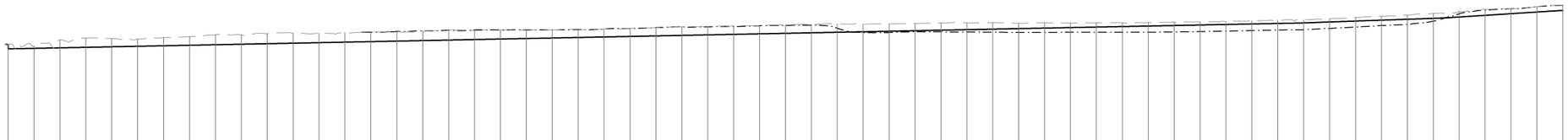
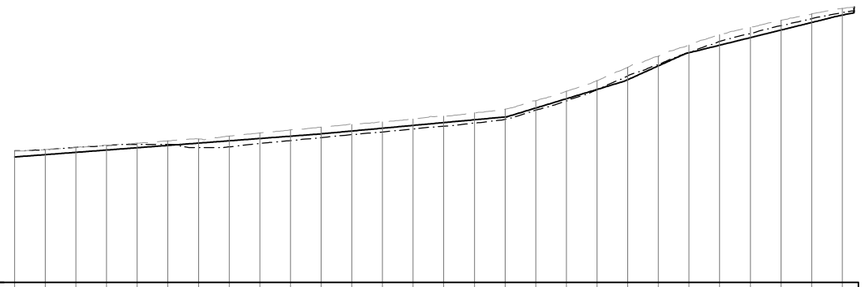


DATUM 179.0

CHAINAGE	EXISTING LEVEL	37YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
0.00	220.77			220.77
100.00	220.16			219.29
200.00	222.61			219.49
300.00	223.25			219.69
400.00	223.06			219.89
500.00	222.92			220.09
600.00	223.46			220.29
700.00	223.81			220.49
800.00	224.57			220.69
900.00	224.47			220.89
1000.00	225.01			221.09
1100.00	225.08			221.29
1200.00	225.15			221.49
1300.00	225.42			221.69
1400.00	225.55	225.50	3.61	221.89
1500.00	225.46	225.82	3.73	222.09
1600.00	225.63	226.00	3.71	222.29
1700.00	226.37	226.28	3.78	222.49
1800.00	226.16	226.46	3.77	222.69
1900.00	226.38	226.50	3.61	222.89
2000.00	226.31	226.50	3.41	223.09
2100.00	226.42	226.50	3.21	223.29
2200.00	226.68	226.51	3.02	223.49
2300.00	226.68	226.79	3.09	223.70
2400.00	227.02	227.00	3.10	223.90
2500.00	227.27	227.29	3.19	224.10
2600.00	227.63	227.61	3.31	224.30
2700.00	227.72	227.63	3.13	224.50
2800.00	227.95	227.72	3.02	224.70
2900.00	228.09	228.03	3.13	224.90
3000.00	228.42	228.16	3.05	225.11
3100.00	228.58	228.26	2.95	225.31
3200.00	228.76	227.10	1.59	225.51
3300.00	228.77	225.40	-0.31	225.71
3400.00	228.75	225.40	-0.51	225.91
3500.00	228.91	225.68	-0.43	226.11
3600.00	229.13	225.67	-0.65	226.31
3700.00	229.18	225.59	-0.92	226.51
3800.00	229.29	225.54	-1.18	226.72
3900.00	228.99	225.46	-1.45	226.92
4000.00	229.19	225.44	-1.67	227.12
4100.00	229.11	225.50	-1.82	227.32
4200.00	229.17	225.50	-2.02	227.52
4300.00	229.17	225.50	-2.22	227.72
4400.00	229.31	225.50	-2.42	227.92
4500.00	229.43	225.62	-2.50	228.12
4600.00	229.52	225.78	-2.54	228.32
4700.00	229.76	225.95	-2.57	228.52
4800.00	230.03	226.16	-2.56	228.72
4900.00	230.30	226.38	-2.54	228.92
5000.00	230.30	226.50	-2.64	229.14
5100.00	230.78	227.02	-2.47	229.49
5200.00	231.20	227.54	-2.30	229.84
5300.00	231.72	228.11	-2.08	230.19
5400.00	232.11	228.50	-2.04	230.54
5500.00	232.73	229.80	-1.09	230.89
5600.00	233.49	232.65	1.23	231.41
5700.00	234.33	234.08	2.03	232.05
5800.00	234.63	234.62	1.93	232.69
5900.00	235.41	235.35	2.01	233.34
6000.00	235.91	235.93	2.00	233.93

LONGITUDINAL SECTION
DIVERSION DRAIN 8
(SUBSIDENCE 2051)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 193.0

CHAINAGE	EXISTING LEVEL	37YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
6000.00	235.91	235.93	2.00	233.93
6100.00	236.31	236.32	1.64	234.68
6200.00	237.08	237.08	1.64	235.44
6300.00	237.76	237.67	1.48	236.19
6400.00	238.44	238.00	1.06	236.94
6500.00	239.16	238.00	0.31	237.69
6600.00	239.81	237.00	-1.45	238.45
6700.00	240.73	237.23	-1.97	239.20
6800.00	241.75	238.33	-1.63	239.95
6900.00	242.76	239.29	-1.42	240.70
7000.00	243.63	240.24	-1.23	241.47
7100.00	244.56	240.24	-1.23	242.39
7200.00	245.39	242.05	-1.26	243.31
7300.00	246.33	243.04	-1.18	244.22
7400.00	247.27	243.94	-1.20	245.14
7500.00	248.31	244.98	-1.08	246.06
7600.00	249.48	246.20	-0.77	246.98
7700.00	252.25	249.18	-0.71	249.89
7800.00	255.39	252.24	-0.67	252.92
7900.00	258.82	255.86	-0.08	255.94
8000.00	263.18	260.38	1.25	259.12
8100.00	266.76	264.10	0.46	263.64
8200.00	270.42	268.02	0.11	267.91
8300.00	273.84	271.60	1.23	270.37
8400.00	276.21	274.21	1.37	272.84
8500.00	278.46	276.75	1.44	275.31
8600.00	280.57	279.03	1.26	277.77
8700.00	282.37	280.99	0.80	280.20

LONGITUDINAL SECTION
DIVERSION DRAIN 8
(SUBSIDENCE 2044)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 8 (SUBSIDENCE 2051) LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W040
Rev: A

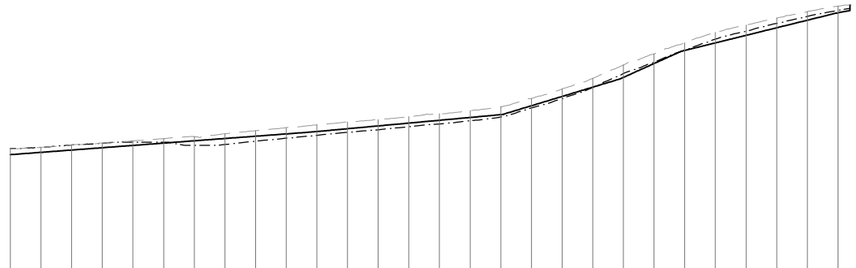
Plot Date: 22 July 2013 - 1:24 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W040.dwg

NOT FOR CONSTRUCTION

DATUM 179.0

CHAINAGE	EXISTING LEVEL	47YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
0.00	220.77			220.77
100.00	220.16			219.29
200.00	222.61			219.49
300.00	223.25			219.69
400.00	223.06			219.89
500.00	222.92			220.09
600.00	223.46			220.29
700.00	223.81			220.49
800.00	224.57			220.69
900.00	224.47			220.89
1000.00	225.01			221.09
1100.00	225.08			221.29
1200.00	225.15			221.49
1300.00	225.42			221.69
1400.00	225.55	225.50	3.61	221.89
1500.00	225.46	225.82	3.73	222.09
1600.00	225.63	226.00	3.71	222.29
1700.00	226.37	226.28	3.78	222.49
1800.00	226.16	226.46	3.77	222.69
1900.00	226.38	226.50	3.61	222.89
2000.00	226.31	226.50	3.41	223.09
2100.00	226.42	226.50	3.21	223.29
2200.00	226.68	226.51	3.02	223.49
2300.00	226.68	226.79	3.09	223.70
2400.00	227.02	227.00	3.10	223.90
2500.00	227.27	227.29	3.19	224.10
2600.00	227.63	227.61	3.31	224.30
2700.00	227.72	227.63	3.13	224.50
2800.00	227.95	227.72	3.02	224.70
2900.00	228.09	228.03	3.13	224.90
3000.00	228.42	228.16	3.05	225.11
3100.00	228.58	228.26	2.95	225.31
3200.00	228.76	227.10	1.59	225.51
3300.00	228.77	225.40	-0.31	225.71
3400.00	228.75	225.40	-0.51	225.91
3500.00	228.91	225.68	-0.43	226.11
3600.00	229.13	225.67	-0.65	226.31
3700.00	229.18	225.59	-0.92	226.51
3800.00	229.29	225.54	-1.18	226.72
3900.00	228.99	225.46	-1.45	226.92
4000.00	229.19	225.44	-1.67	227.12
4100.00	229.11	225.50	-1.82	227.32
4200.00	229.17	225.50	-2.02	227.52
4300.00	229.17	225.50	-2.22	227.72
4400.00	229.31	225.50	-2.42	227.92
4500.00	229.43	225.62	-2.50	228.12
4600.00	229.52	225.78	-2.54	228.32
4700.00	229.76	225.95	-2.57	228.52
4800.00	230.03	226.16	-2.56	228.72
4900.00	230.30	226.38	-2.54	228.92
5000.00	230.30	226.50	-2.64	229.14
5100.00	230.78	227.02	-2.47	229.49
5200.00	231.20	227.54	-2.30	229.84
5300.00	231.72	228.11	-2.08	230.19
5400.00	232.11	228.50	-2.04	230.54
5500.00	232.73	229.80	-1.09	230.89
5600.00	233.49	232.65	1.23	231.41
5700.00	234.33	234.08	2.03	232.05
5800.00	234.63	234.62	1.93	232.69
5900.00	235.41	235.35	2.01	233.34
6000.00	235.91	235.91	2.00	233.93

LONGITUDINAL SECTION
DIVERSION DRAIN 8
(SUBSIDENCE 2061)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 193.0

CHAINAGE	EXISTING LEVEL	47YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
6000.00	235.91	235.93	2.00	233.93
6100.00	236.31	236.32	1.64	234.68
6200.00	237.08	237.08	1.64	235.44
6300.00	237.76	237.67	1.48	236.19
6400.00	238.44	238.00	1.06	236.94
6500.00	239.16	238.00	0.31	237.69
6600.00	239.81	237.00	-1.45	238.45
6700.00	240.73	237.23	-1.97	239.20
6800.00	241.75	238.33	-1.63	239.95
6900.00	242.76	239.29	-1.42	240.70
7000.00	243.63	240.24	-1.23	241.47
7100.00	244.56	240.24	-1.23	242.39
7200.00	245.39	242.05	-1.26	243.31
7300.00	246.33	243.04	-1.18	244.22
7400.00	247.27	243.94	-1.20	245.14
7500.00	248.31	244.98	-1.08	246.06
7600.00	249.48	246.20	-0.77	246.98
7700.00	252.25	249.18	-0.71	249.89
7800.00	255.39	252.24	-0.67	252.92
7900.00	258.82	255.86	-0.08	255.94
8000.00	263.18	260.38	1.25	259.12
8100.00	266.76	264.10	0.46	263.64
8200.00	270.42	268.02	0.11	267.91
8300.00	273.84	271.60	1.23	270.37
8400.00	276.21	274.21	1.37	272.84
8500.00	278.46	276.75	1.44	275.31
8600.00	280.57	279.03	1.26	277.77
8700.00	282.37	280.99	0.80	280.20

LONGITUDINAL SECTION
DIVERSION DRAIN 8
(SUBSIDENCE 2061)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

Note: * indicates signatures on original issue of drawing or last revision of drawing

VERTICAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m
HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Drawn A.GAFFEL
Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title DIVERSION DRAIN 8 (SUBSIDENCE 2061) LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W041
Rev: A

Plot Date: 22 July 2013 - 1:24 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W041.dwg

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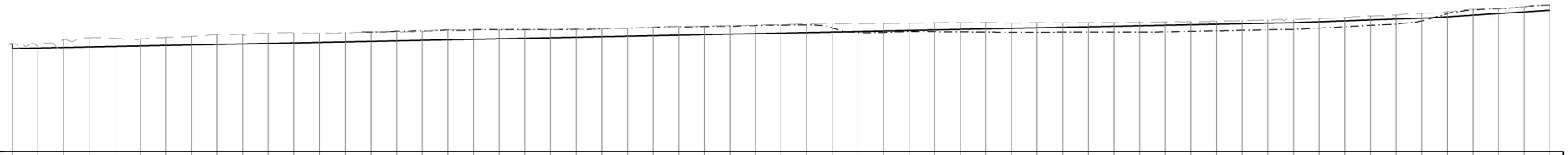
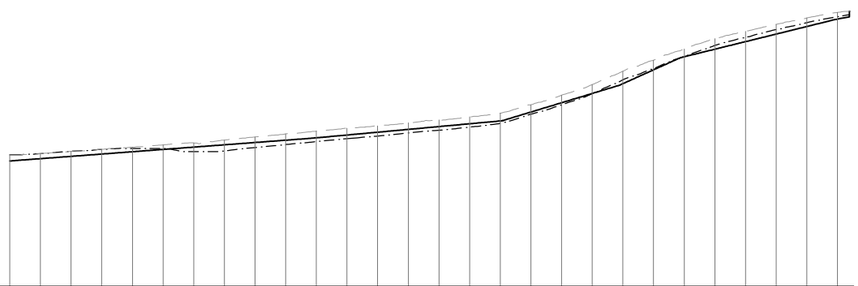


DATUM 179.0

CHAINAGE	EXISTING LEVEL	57YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
0.00	220.77			220.77
100.00	220.16			219.29
200.00	222.61			219.49
300.00	223.25			219.69
400.00	223.06			219.89
500.00	222.92			220.09
600.00	223.46			220.29
700.00	223.81			220.49
800.00	224.57			220.69
900.00	224.47			220.89
1000.00	225.01			221.09
1100.00	225.08			221.29
1200.00	225.15			221.49
1300.00	225.42			221.69
1400.00	225.55	225.50	3.61	221.89
1500.00	225.46	225.82	3.73	222.09
1600.00	225.63	226.00	3.71	222.29
1700.00	226.37	226.28	3.78	222.49
1800.00	226.16	226.46	3.77	222.69
1900.00	226.38	226.50	3.61	222.89
2000.00	226.31	226.50	3.41	223.09
2100.00	226.42	226.50	3.21	223.29
2200.00	226.68	226.51	3.02	223.49
2300.00	226.68	226.79	3.09	223.70
2400.00	227.02	227.00	3.10	223.90
2500.00	227.27	227.29	3.19	224.10
2600.00	227.63	227.61	3.31	224.30
2700.00	227.72	227.63	3.13	224.50
2800.00	227.95	227.72	3.02	224.70
2900.00	228.09	228.03	3.13	224.90
3000.00	228.42	228.16	3.05	225.11
3100.00	228.58	228.26	2.95	225.31
3200.00	228.76	227.10	1.59	225.51
3300.00	228.77	225.40	-0.31	225.71
3400.00	228.75	225.40	-0.51	225.91
3500.00	228.91	225.68	-0.43	226.11
3600.00	229.13	225.67	-0.65	226.31
3700.00	229.18	225.59	-0.92	226.51
3800.00	229.29	225.54	-1.18	226.72
3900.00	228.99	225.46	-1.45	226.92
4000.00	229.19	225.44	-1.67	227.12
4100.00	229.11	225.50	-1.82	227.32
4200.00	229.17	225.50	-2.02	227.52
4300.00	229.17	225.50	-2.22	227.72
4400.00	229.31	225.50	-2.42	227.92
4500.00	229.43	225.62	-2.50	228.12
4600.00	229.52	225.78	-2.54	228.32
4700.00	229.76	225.95	-2.57	228.52
4800.00	230.03	226.16	-2.56	228.72
4900.00	230.30	226.38	-2.54	228.92
5000.00	230.30	226.50	-2.64	229.14
5100.00	230.78	227.02	-2.47	229.49
5200.00	231.20	227.54	-2.30	229.84
5300.00	231.72	228.11	-2.08	230.19
5400.00	232.11	228.50	-2.04	230.54
5500.00	232.73	229.80	-1.09	230.89
5600.00	233.49	232.65	1.23	231.41
5700.00	234.33	234.08	2.03	232.05
5800.00	234.63	234.62	1.93	232.69
5900.00	235.41	235.35	2.01	233.34
6000.00	235.91	235.93	2.00	233.93

LONGITUDINAL SECTION
DIVERSION DRAIN 8
(SUBSIDENCE 2071)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 193.0

CHAINAGE	EXISTING LEVEL	57YR SUBSIDENCE	DEPTH FROM SUBSIDENCE TO DESIGN LEVEL	DESIGN LEVEL
6000.00	235.91	235.93	2.00	233.93
6100.00	236.31	236.32	1.64	234.68
6200.00	237.08	237.08	1.64	235.44
6300.00	237.76	237.67	1.48	236.19
6400.00	238.44	238.00	1.06	236.94
6500.00	239.16	238.00	0.31	237.69
6600.00	239.81	237.00	-1.45	238.45
6700.00	240.73	237.23	-1.97	239.20
6800.00	241.75	238.33	-1.63	239.95
6900.00	242.76	239.29	-1.42	240.70
7000.00	243.63	240.24	-1.23	241.47
7100.00	244.56	240.24	-1.23	242.39
7200.00	245.39	242.05	-1.26	243.31
7300.00	246.33	243.04	-1.18	244.22
7400.00	247.27	243.94	-1.20	245.14
7500.00	248.31	244.98	-1.08	246.06
7600.00	249.48	246.20	-0.77	246.98
7700.00	252.25	249.18	-0.71	249.89
7800.00	255.39	252.24	-0.67	252.92
7900.00	258.82	255.86	-0.08	255.94
8000.00	263.18	260.38	1.25	259.12
8100.00	266.76	264.10	0.46	263.64
8200.00	270.42	268.02	0.11	267.91
8300.00	273.84	271.60	1.23	270.37
8400.00	276.21	274.21	1.37	272.84
8500.00	278.46	276.75	1.44	275.31
8600.00	280.57	279.03	1.26	277.77
8700.00	282.37	280.99	0.80	280.20

LONGITUDINAL SECTION
DIVERSION DRAIN 8
(SUBSIDENCE 2071)
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
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Client **ADANI MINING PTY LTD**
Project **FLOOD MITIGATION AND CREEK DIVERSION**
Title **DIVERSION DRAIN 8 (SUBSIDENCE 2071) LONGITUDINAL SECTION**

Original Size **A1**
Drawing No: **41-24415-W042**
Rev: **A**

Plot Date: 22 July 2013 - 1:24 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W042.dwg

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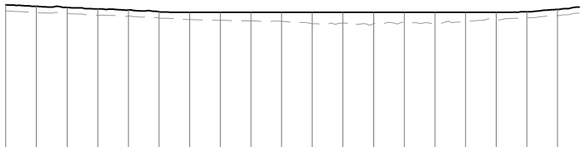
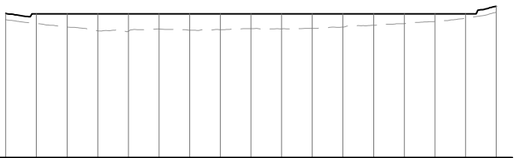


DATUM 193.0

DESIGN LEVEE CREST LEVEL	240.30	239.83	239.48	238.97	238.61	238.05	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	238.06	238.81
EXISTING LEVEL	238.29	237.83	237.46	236.95	236.62	236.01	235.50	235.25	235.02	234.91	234.19	234.32	234.15	234.71	234.38	234.94	235.30	236.06	236.82
HEIGHT TO DESIGN LEVEL	2.01	2.00	2.01	2.01	1.99	2.04	2.38	2.63	2.86	2.97	3.69	3.56	3.73	3.17	3.50	2.94	2.58	2.00	1.99
CHAINAGE	29000.00	29100.00	29200.00	29300.00	29400.00	29500.00	29600.00	29700.00	29800.00	29900.00	30000.00	30100.00	30200.00	30300.00	30400.00	30500.00	30600.00	30700.00	30800.00

LONGITUDINAL SECTION
LEVEE N1
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000



DATUM 191.0

DESIGN LEVEE CREST LEVEL	238.02	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	237.88	240.33
EXISTING LEVEL	236.02	234.73	233.57	232.31	232.19	232.89	232.52	232.69	233.05	232.92	233.11	233.53	234.13	234.66	235.37	236.50	238.33
HEIGHT TO DESIGN LEVEL	2.00	3.15	4.31	5.57	5.69	4.99	5.36	5.19	4.83	4.96	4.77	4.35	3.75	3.22	2.51	1.38	2.00
CHAINAGE	13900.00	14000.00	14100.00	14200.00	14300.00	14400.00	14500.00	14600.00	14700.00	14800.00	14900.00	15000.00	15100.00	15200.00	15300.00	15400.00	15500.00

LONGITUDINAL SECTION
LEVEE N2
HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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HORIZONTAL 1:10000 AT ORIGINAL SIZE 0 100 200 300 400 500m

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Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title LEVEE N1 AND N2 LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W043
Rev: A

Plot Date: 22 July 2013 - 1:25 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W043.dwg

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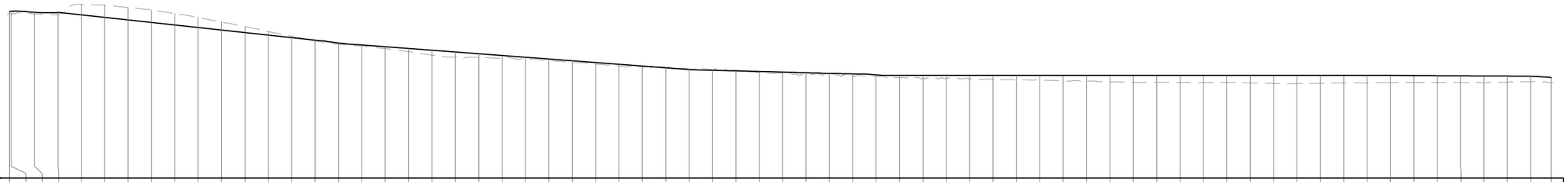

DATUM 187.0

CHAINAGE	DESIGN LEVEE CREST LEVEL	EXISTING LEVEL	HEIGHT TO DESIGN LEVEL
19692.68	258.10	257.08	1.02
19700.00	258.18	256.94	1.23
19800.00	257.63	256.91	0.72
19900.00	257.63	256.60	1.02
20000.00	256.64	261.10	4.46
20100.00	255.56	260.77	5.21
20200.00	254.48	259.68	5.20
20300.00	253.40	258.66	5.26
20400.00	252.32	257.20	4.88
20500.00	251.24	255.49	4.25
20600.00	250.16	253.56	3.40
20700.00	249.08	251.56	2.48
20800.00	248.00	249.50	1.50
20900.00	246.91	247.47	0.56
21000.00	245.83	245.51	0.33
21100.00	244.63	244.09	0.54
21200.00	243.74	243.36	0.39
21300.00	243.00	242.28	0.72
21400.00	242.25	240.94	1.31
21500.00	241.50	239.45	2.05
21600.00	240.75	238.59	2.16
21700.00	240.00	238.42	1.58
21800.00	239.25	238.08	1.17
21900.00	238.51	237.71	0.80
22000.00	237.76	237.14	0.61
22100.00	237.01	236.09	0.92
22200.00	236.26	235.59	0.67
22300.00	235.51	234.96	0.55
22400.00	234.76	234.35	0.42
22500.00	234.01	234.10	0.08
22600.00	233.27	233.50	0.23
22700.00	232.94	233.29	0.35
22800.00	232.70	233.11	0.41
22900.00	232.46	231.99	0.47
23000.00	232.21	231.88	0.33
23100.00	231.96	231.63	0.33
23200.00	231.62	231.38	0.24
23300.00	231.40	230.62	0.78
23400.00	231.02	230.34	0.68
23500.00	230.83	229.85	0.98
23600.00	230.83	229.55	1.28
23700.00	230.83	229.38	1.46
23800.00	230.83	229.33	1.50
23900.00	230.83	229.13	1.70
24000.00	230.83	228.77	2.07
24100.00	230.83	228.99	1.85
24200.00	230.83	228.43	2.41
24300.00	230.83	228.17	2.66
24400.00	230.83	228.10	2.73
24500.00	230.83	227.76	3.07
24600.00	230.83	227.85	2.99
24700.00	230.83	227.80	3.03
24800.00	230.83	227.67	3.16
24900.00	230.83	227.83	3.00
25000.00	230.83	227.58	3.25
25100.00	230.83	227.29	3.54
25200.00	230.83	227.31	3.52
25300.00	230.83	227.43	3.39
25400.00	230.81	227.61	3.21
25500.00	230.80	227.58	3.22
25600.00	230.78	227.74	3.04
25700.00	230.74	227.77	2.97
25800.00	230.67	227.79	2.89
25900.00	230.61	227.68	2.93
26000.00	230.56	227.66	2.89
26100.00	230.51	227.82	2.69
26200.00	230.43	228.05	2.37
26287.87	229.75	227.78	1.98

LONGITUDINAL SECTION
LEVEE N3

HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
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Client **ADANI MINING PTY LTD**
Project **FLOOD MITIGATION AND CREEK DIVERSION**
Title **LEVEE N3 LONGITUDINAL SECTION**

Original Size **A1**
Drawing No: **41-24415-W044**
Rev: **A**

Plot Date: 22 July 2013 - 1:25 PM
Plotted by: Adam Gaffel
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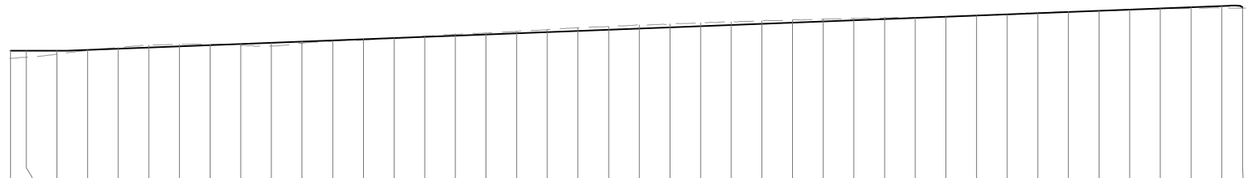

DATUM 186.0

CHAINAGE	DESIGN LEVEE CREST LEVEL	EXISTING LEVEL	HEIGHT TO DESIGN LEVEL
14949.10	229.21	226.77	2.44
15000.00	229.22	227.11	2.12
15100.00	229.22	228.17	1.05
15200.00	229.49	229.34	0.14
15300.00	229.87	230.25	0.38
15400.00	230.26	231.03	0.77
15500.00	230.65	231.29	0.65
15600.00	231.04	231.34	0.31
15700.00	231.42	230.96	0.46
15800.00	231.81	230.74	1.07
15900.00	232.20	231.65	0.55
16000.00	232.59	232.34	0.24
16100.00	232.97	232.72	0.25
16200.00	233.36	233.34	0.02
16300.00	233.75	234.04	0.29
16400.00	234.14	234.62	0.48
16500.00	234.52	235.02	0.49
16600.00	234.91	235.52	0.61
16700.00	235.30	236.11	0.81
16800.00	235.69	236.69	1.00
16900.00	236.07	237.14	1.06
17000.00	236.46	237.65	1.19
17100.00	236.85	237.98	1.13
17200.00	237.24	238.27	1.03
17300.00	237.63	238.60	0.97
17400.00	238.01	238.96	0.94
17500.00	238.40	239.24	0.84
17600.00	238.79	239.52	0.73
17700.00	239.18	239.73	0.55
17800.00	239.56	239.95	0.39
17900.00	239.95	240.06	0.10
18000.00	240.34	240.30	0.04
18100.00	240.73	240.60	0.12
18200.00	241.11	241.10	0.02
18300.00	241.50	241.55	0.05
18400.00	241.89	241.93	0.04
18500.00	242.28	242.21	0.07
18600.00	242.66	242.49	0.17
18700.00	243.05	242.83	0.22
18800.00	243.44	243.00	0.44
18900.00	243.83	243.22	0.61
18968.27	243.40	243.07	0.33

LONGITUDINAL SECTION
LEVEE S1

HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

DATUM 179.0

CHAINAGE	DESIGN LEVEE CREST LEVEL	EXISTING LEVEL	HEIGHT TO DESIGN LEVEL
7463.15	220.46	219.81	0.65
7500.00	220.47	219.77	0.70
7600.00	220.48	219.68	0.81
7700.00	220.62	219.95	0.67
7800.00	221.09	220.60	0.50
7900.00	221.29	220.33	0.96
8000.00	221.36	220.16	1.20
8100.00	221.45	220.61	0.84
8200.00	221.51	220.67	0.84
8300.00	221.57	220.75	0.82
8400.00	221.66	220.75	0.91
8500.00	221.70	220.42	1.29
8600.00	221.73	220.47	1.26
8700.00	221.74	220.52	1.23
8732.49	221.74	220.34	1.41

LONGITUDINAL SECTION
LEVEE S2

HORIZONTAL SCALE 1:10000
VERTICAL SCALE 1:1000

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No	Revision	Drawn	Job Manager	Project Director	Date
A	INITIAL ISSUE	AG			22/07/13

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Designer P.WOODMAN
Drafting Check
Design Check
Approved (Project Director)
Date
Scale AS SHOWN
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Client ADANI MINING PTY LTD
Project FLOOD MITIGATION AND CREEK DIVERSION
Title LEVEE S1 AND S2 LONGITUDINAL SECTION

Original Size A1
Drawing No: 41-24415-W045
Rev: A

Plot Date: 22 July 2013 - 1:25 PM
Plotted by: Adam Gaffel
Cad File No: P:\AU\Brisbane\Projects\41\24415\CADD\Drawings\41-24415-W045.dwg

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	P. Woodman	S. Hein	DRAFT	J Keane	DRAFT	08/07/2013
B	P. Woodman	S. Hein	DRAFT	J Keane	DRAFT	30/07/2013
0	P. Woodman	S. Hein	On file	J Keane	On file	31/07/2013
1	M Goodall	J Keane		J Keane		21/10/2013

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