Wallarah 2
COAL PROJECT

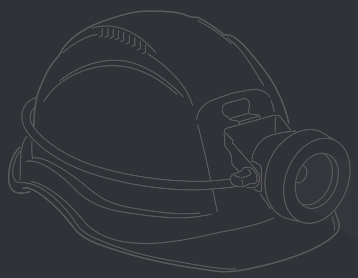
Wallarah 2 Coal Project

Environmental Impact Statement

April 2013

Appendix K

Flood Impact Assessment



Hansen Bailey
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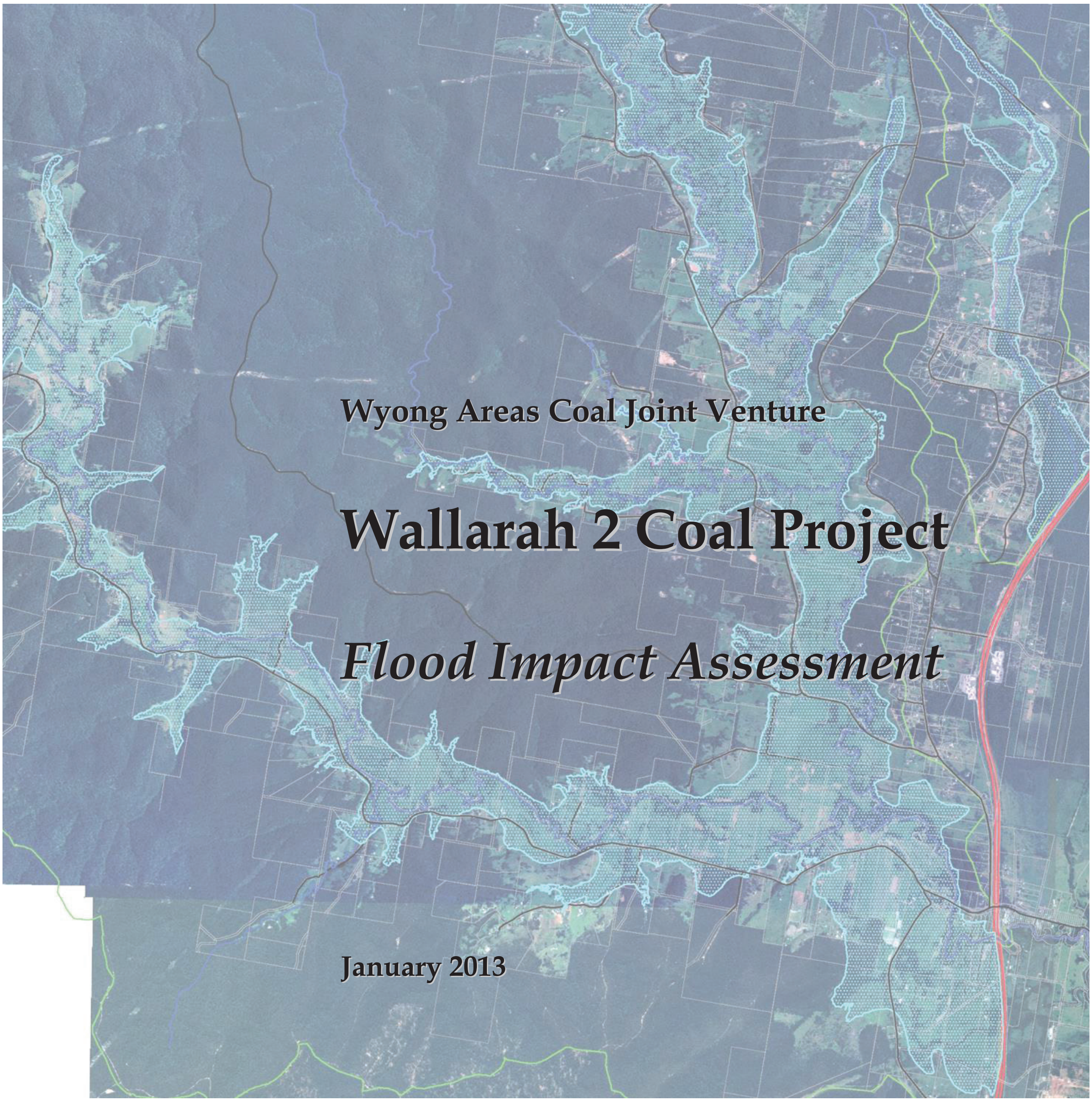

Wyong Areas Coal Joint Venture

Wallarah 2 Coal Project

Flood Impact Assessment

January 2013

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EXECUTIVE SUMMARY

This Flood Impact Assessment report presents the results of the assessments of potential impacts on flooding caused by predicted subsidence due to the proposed Wallarah 2 Coal Project (W2CP). It represents a more advanced approach to flood studies undertaken by Environmental Resources Management Australia Pty Limited (ERM) between 1999 and 2009. The modelling by ERM used the RAFTS software package for hydrological modelling and MIKE 11 for hydraulic modelling as well as HEC-RAS for the Hue Hue catchment. Previous flood assessments were fundamental in the development of the current final mine plan assessed in this report. This report is based on more detailed hydrological and hydraulic modelling using the TUFLOW software package and utilises highly accurate topographic data for existing and post-subsidence conditions.

The main advantages of TUFLOW over MIKE 11 and HEC-RAS are that it can incorporate rainfall input directly; it generally provides more accurate estimates of flood flows and levels and it considers two-dimensional flow effects. It can also predict flood levels at specific points of interest (e.g. houses) across the flood plain without the need to interpolate between cross-sections.

The current mine plan was developed over a number of iterations to eliminate flood impacts from almost all of the Yarramalong Valley, which is drained by the Wyong River. Longwall layouts were also improved to minimise the overall impacts in the Dooralong Valley, drained by Jilliby Jilliby Creek, and along Hue Hue Creek. The latest, 2012, subsidence data has been used in this report. No further refinements have been made to the mine plan and the 2009 subsidence predictions for floodplain areas have not changed.

The Project's original hydrological base data continued to be valid as no significant changes had occurred to rainfall and recorded flood data since the previous assessments. However, because TUFLOW allows for direct input of design rainfall, there was no longer a requirement to use a separate hydrological model. Only one additional flood event (in March 2007) had occurred since the previous report and this has been added to the list of recorded floods for which calibration of the model was made.

In accordance with the NSW Floodplain Development Manual, the 1% Annual Exceedance Probability (AEP) – or 100 year Average Recurrence Interval (ARI) – flood is considered to be the appropriate Flood Planning Level (FPL) and consequently formed the basis for assessing impacts to houses, properties and infrastructure. Lesser floods including the 2%, 5%, 10%, 20%, 50% and 100% AEP events were also assessed to determine potential changes in frequency of nuisance floods. The Probable Maximum Flood (PMF) was assessed to determine upper bound flood levels and the full extent of the floodplain in the most extreme event possible. In all cases, a range of storm durations was studied to determine the critical event at every location.

Subsidence will occur along a 5.2 km length of the Dooralong Valley floodplain (including part of Jilliby Jilliby Creek, Little Jilliby Jilliby Creek and minor tributaries). Subsidence generally of between 0 and 1.3 m will occur within the

affected sections of the Jilliby Jilliby Creek channel. Isolated areas of the adjacent floodplain may experience greater subsidence of up to approximately 1.6 m.

Subsidence in the lower Jilliby Jilliby Creek channel (below the confluence with Little Jilliby Jilliby Creek) is expected to be mostly less than 0.75 m. This change in the topography will cause changes in flood depths of up to 1.35 m even though absolute flood levels (in mAHD) will generally drop.

For Hue Hue Creek, mining will result in subsidence of up to 0.95 m under the floodplain and will cause increases in flood depths of up to 0.64 m, mostly restricted to a short section of the right bank.

Greater subsidence is expected in the forested and unpopulated mountainous areas, but this will have no impact on general runoff characteristics or on flooding in the valleys. Subsidence effects across the project area will relate to the progress of underground mining over the full 42 year project life and therefore it will be many years before some impacts noted in this study would occur. This report uses the upper bound (maximum) subsidence predictions for flood impact assessment purposes although it is acknowledged that the actual subsidence is likely to be less.

The key findings of this assessment are as follows:

- *Both Dooralong (Jilliby Jilliby Creek) and Yarramalong (Wyong River) Valleys are currently significantly flood prone with the 1% AEP (100 year ARI) flood extending across most of the width of both valleys for much of the lower reaches, inundating many dwellings (i.e. flood levels above floor levels) and cutting several roads. Hue Hue Creek is moderately flood prone with only one dwelling inundated and two roads partly cut in the 1% AEP event.*

- *Subsidence can cause both positive and negative effects on flood extents and flood depths due to changes in the hydraulic behaviour of flood flows.*

- *Virtually no changes will occur to flood extents and depths in the Yarramalong Valley as a result of mine subsidence. Negligible subsidence (less than 0.15 m) is predicted under short stretches of the main channel of the Wyong River and minor subsidence is predicted in three small backwater areas.*

- *Approximately 40.3 ha of additional land will become flood affected (5.2 ha in the Yarramalong, 33.2 ha in the Dooralong and 1.9 ha in the Hue Hue Valleys), while approximately 6.4 ha of existing flood affected land will become flood free.*

- *There will be six dwellings that will experience major adverse impacts caused by an increase in flood depths (five of which would not be inundated in the 1% AEP flood prior to subsidence).*

- *A further 11 dwellings will experience moderate adverse impacts with the majority of these dwellings (seven) already subject to flooding in the 1% AEP flood.*

- *There will be 10 dwellings that will experience minor adverse impacts, including four that are currently flood affected that will experience a slight increase in flood level and 6 that will experience minor decreases in freeboard but will remain uninundated by floods.*

- *There will be ten properties that will experience an increase in flood affectation to more than 5% of their land.*

- *The majority (63) of the 103 dwellings in the Yarramalong/Dooralong and Hue Hue study areas that are within or near to the 1%AEP flood extent will not be adversely affected, and a large proportion (48) will, in fact, be beneficially impacted. Most of these positive impacts are small, generally in the order of 5 to 20 mm reduction in flood depths, and are typically the result of detention of flood peaks in the subsided areas reducing peak flows further downstream.*

- *There will be no significant change to flood hazard or risk categories as a result of subsidence.*

- *There will be no change in hydrology or catchment yield as a result of subsidence.*

- *Access roads in six locations will become untrafficable for longer durations after subsidence.*

Options available to mitigate against flood impacts on dwellings include construction of individual flood levees, raising houses in-situ and relocating or reconstructing houses on higher ground within the property. It is expected that most, if not all, dwellings and properties that may be adversely affected will be adequately modified by one of these methods to mitigate against all impacts. For potentially impacted houses that are unable to be protected, raised or moved, properties may need to be purchased or owners otherwise appropriately compensated. Options are also available to reduce post-subsidence flooding by undertaking minor channel improvements.

This study presents mitigation options that the Project could undertake to address these impacts so that post mining conditions are better or at least no worse than existing conditions.

Subsidence will cause several low points in key access roads and some bridges within the Dooralong Valley and Hue Hue Valley to become untrafficable for longer periods than the existing situation during flood events. No significant impacts to major roads or other infrastructure will occur in the Yarramalong Valley but property access will be adversely affected to three dwellings. Options are available to mitigate against these impacts, including raising bridges, raising low sections of roads, and improving the hydraulic capacity of channels in some sections. It may also be possible to make flood proof some sections of road that are currently flood prone.

The preferred mitigation option for each dwelling, property and road will need to be determined individually, prior to mining commencing near each particular location. This will require appropriate consultation with land owners and with Council and other stakeholders. Determination of appropriate mitigation works and strategies for public infrastructure will be developed as part of the Subsidence Management Plans while the scope of specific mitigation works on private property will be developed as part of the individual Property Subsidence Management Plans.

1 INTRODUCTION

1.1 Project Overview

The Wyong Areas Coal Joint Venture (WACJV) seeks a Development Consent under Division 4.1 in Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) for the Wallarah 2 Coal Project (the Project). This Flood Impact Assessment supports 'The Wallarah 2 Coal Project Environmental Impact Statement' (Wallarah 2 EIS) prepared by Hansen Bailey Environmental Consultants to support the application.

This Flood Impact Assessment has been prepared in accordance with the Director-General's Environmental Assessment Requirements (DGRs) for the Project issued by the Department of Planning and Infrastructure (DP&I) on 12 January 2012.

Development Consent is sought to mine coal within the Extraction Area for a period of 28 years. The majority of this resource lies beneath the Wyong State Forest and surrounding ranges (including the Jilliby State Conservation Area (SCA)) while a proportion, to be extracted first, lies beneath a section of the Dooralong Valley and the Hue Hue area.

Key features of the Project include:

- The construction and operation of an underground mining operation extracting up to 5.0 Mtpa of export quality thermal coal by longwall methods at a depth of between 350 m and 690 m below the surface within the underground Extraction Area;
- Mining and related activities will occur 24 hours a day 7 days a week for a Project period of 28 years;
- Tooheys Road Site surface facilities on company owned and third party land (potentially leasehold land) between the Motorway Link Road and the F3 Freeway which will include (at least) a rail loop and spur, stockpiles, water and gas management facilities, workshop and offices;
- Buttonderry Site Surface Facilities on company owned land at Hue Hue Road between Sparks Road and the Wyong Shire Council's (WSC) Buttonderry Waste Management Facility. This facility will include (at least) the main personnel access to the mine, main ventilation facilities, offices and employee amenities;
- An inclined tunnel (or "drift") constructed from the coal seam beneath the Buttonderry Site to the surface at the Tooheys Road Site;

- Construction and use of various mining related infrastructure including water management structures, water treatment plant (reverse osmosis or similar), generator, second air intake ventilation shaft, boreholes, communications, water discharge point, powerlines, and connection to the WSC (after July 2013, the Central Coast Water Corporation) town water and sewerage systems;
- Capture of methane for treatment initially involving flaring as practicable for greenhouse emission management and ultimately for beneficial use of methane such as electricity generation at the Tooheys Road Site;
- Transport of coal by rail to either the Newcastle port for export or to domestic power stations;
- A workforce of approximately 300 full-time company employees (plus additional 30 full time contractors); and
- Rehabilitation and closure of the site at cessation of mining operations.

The land which is the subject of this development application comprises the area within the Project Boundary on ***Figure 1.1*** and excludes the surface (defined as lands to a depth of 50 m from the surface) of the Jilliby SCA.

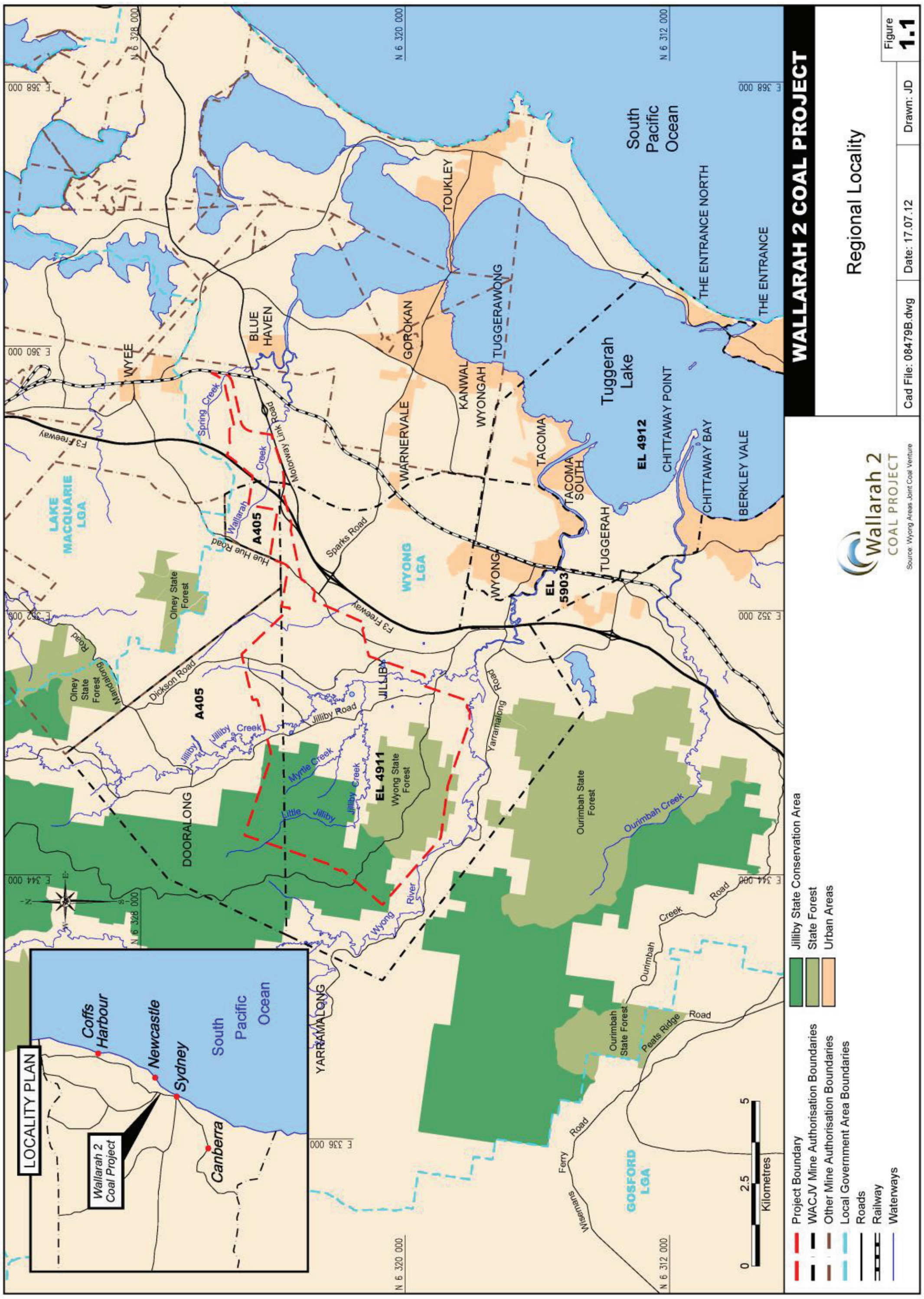


Figure 1.1 Regional Locality

1.2 *Study Overview*

This Flood Impact Assessment forms part of the Wallarah 2 EIS and looks primarily at the potential changes to flood impacts associated with predicted subsidence resulting from the proposed underground mining. This assessment also examines mitigation measures that may be required.

Similar assessments were undertaken by Environmental Resources Management (ERM) between 1999 and 2007 and the mine plan was developed interactively with these studies to minimise impacts on existing river channels. Additional modifications were made to the flood assessment in 2009 in response to findings of the independent expert panel for the Strategic Review into coal mining potential in the Wyong LGA in 2008. A suggestion of the expert panel was that consideration be made for using 2D flood modelling software such as TUFLOW in future studies. The veracity of the previous 1D (MIKE 11) modelling was not in question, however, it was suggested that a 2D model might provide greater accuracy where second order flow effects occur. **This suggestion has been adopted for this study and the TUFLOW software package has been used.**

The major catchments surrounding the mine subsidence area are the Yarramalong and Dooralong Valleys and the unnamed catchment between Buttonderry Creek and Jilliby Jilliby Creek, designated herein as Hue Hue Creek. The main waterways within these catchments – Wyong River, Jilliby Jilliby Creek and Hue Hue Creek – are significantly flood prone. The floodplain within the Yarramalong and Dooralong Valleys is subject to regular inundation and the river banks are breached by floods having an Average Recurrence Interval (ARI) between 2 years and 5 years. Sections of the public road networks in both valleys are flood prone and many of the secondary access roads are also within the floodplain. The flood depths in the Hue Hue Creek floodplain are significantly less than in the other two valleys. All of the flood prone land is located in rural/agricultural or public open space areas of the catchments rather than in urban residential areas, although a number of dwellings are located within the existing floodplains and a greater concentration of residential properties exists near Hue Hue Creek.

The current study introduces a new approach to modelling using TUFLOW to model both the hydrologic and hydraulic responses to direct rainfall storm events. While the mine plan and subsidence information in the floodplain area have not altered since the 2009 study by ERM, this assessment has included improved aerial laser survey topographic information. Also, because rainfall is input directly into the model rather than through a hydrological model, this has been done as a different step in the process using similar design rainfall intensities and temporal patterns used in previous assessments.

A similar process has also been undertaken to calibrate the TUFLOW model to the same known floods used to calibrate earlier models.

Note that throughout this report the terms Annual Exceedance Probability (AEP) and Average Recurrence Interval (ARI) will be used interchangeably. Both terms refer to the likelihood of a particular storm or flood event occurring or being exceeded in any year. The ARI is equivalent to the reciprocal of the AEP i.e. 1% AEP = 100 year ARI, 2% AEP = 50 year ARI etc. The terms "right bank" and "left bank" used throughout this report refer to the right side and left side of a river, stream or channel when facing downstream.

1.3 *STUDY OBJECTIVES*

The primary purpose of this study is to address the Director General's Requirements in relation to flood impacts. These requirements and the relevant outcomes are summarised in ***Section 8.7***. This study concentrates on flood behaviour in two catchments, the Wyong River catchment – including both the Yarramalong and Dooralong Valleys – and the Hue Hue Creek catchment. Portions of these catchments are predicted to be impacted by subsidence as a result of underground longwall mining.

The objectives of this study are to:

- review the previous studies that have been completed to confirm existing flood behaviour in the catchments;
- determine the extent of flood impacts resulting from predicted subsidence in the area; and
- present options to mitigate the flood impacts on agricultural land, transport, services, habitability and public safety as well as any additional damage that may occur as a result of changes to flood regimes.

1.4 *THE FLOODPLAIN RISK MANAGEMENT PROCESS*

In New South Wales, the process to assess the impacts of flooding on a community is set out in the New South Wales Government's Floodplain Development Manual (2005) which supersedes the Floodplain Development Manual (2001). The process is based on the New South Wales Government's Flood Prone Land Policy.

The floodplain risk management study forms part of the floodplain risk management process. A process diagram showing the floodplain management process is shown in ***Figure 1.2***.

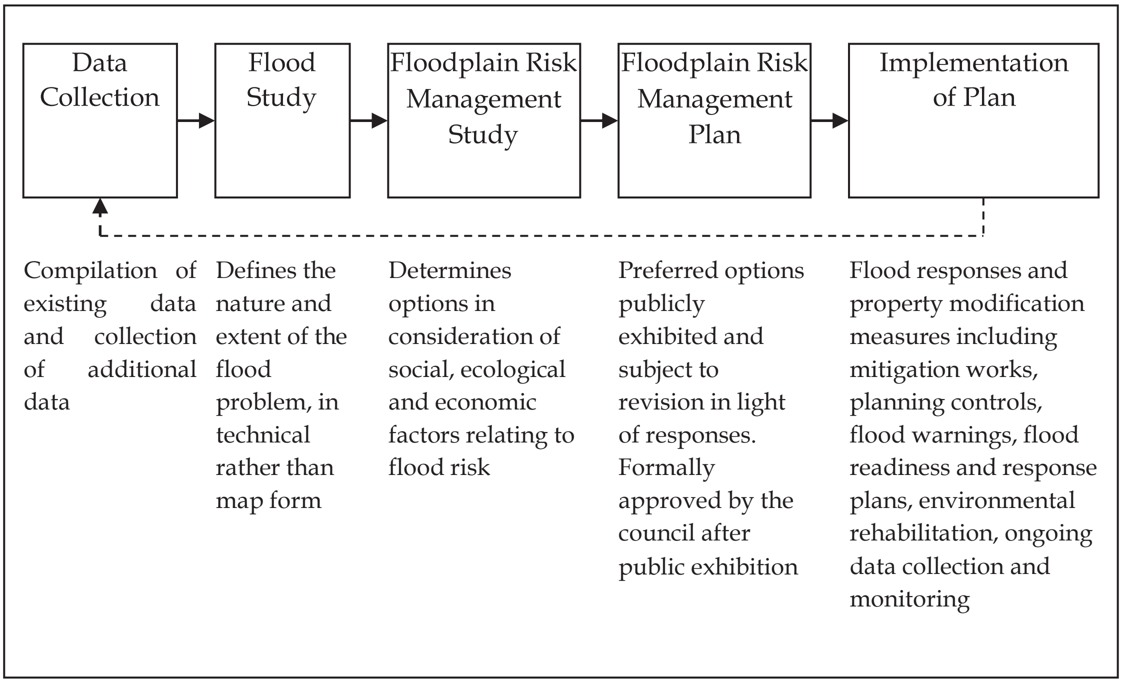


Figure 1.2 The Floodplain Risk Management Process (NSW Govt, 2005)

This study does not include a floodplain risk management study for existing flood impacts. This study does however investigate the risks resulting from the change in flood impacts due to subsidence. The study has been undertaken to assess the changes in flood behaviour as a result of underground mining and associated subsidence and the extent of impacts as a result of these changes. The study also presents mitigation options to address these impacts so that post mining conditions, including risk issues, will be better or at least no worse than existing conditions.

1.5 *REPORT STRUCTURE*

The report is structured in the following format:

- ***Section 1*** provides an introduction to the study and defines the study objectives;
- ***Sections 2*** and ***3*** provide a description of the study area, summarise available data, give an overview of existing flooding and summarise the predicted subsidence;
- ***Sections 4*** and ***5*** detail the modelling that has been undertaken;
- ***Section 6*** details the predicted flood impacts resulting from predicted subsidence;
- ***Section 7*** presents mitigation options; and
- ***Section 8*** provides a conclusion to this report.

Subsidence related impacts on environmental hydrology that are beyond the scope of this report include:

- fluvial geomorphology;
- low flow hydrology and river hydraulics;
- sediment transport and deposition; and
- riparian ponding, riffle systems and associated ecological habitat.

These studies have been undertaken by others and are reported elsewhere in the Wallarah 2 EIS.

2 *STUDY AREA*

2.1 *OVERVIEW*

The study area catchments and subsidence affected areas of the Project are located near Wyong on the Central Coast of New South Wales (see ***Figure 2.1***). The proposed mine plan is shown in ***Figure 2.2***.

The study area for this assessment incorporates the Wyong River catchment including the Jilliby Jilliby Creek sub-catchment, which has been modelled as a combined Dooralong and Yarramalong Valley catchment, and the Hue Hue Creek catchment. Both catchments are upstream and to the west of the Sydney-Newcastle F3 Freeway. Subsidence will alter the topography within the floodplains of parts of these catchments and hence, potentially, the flood behaviour. Subsidence within the main river channel and the floodplain of the Yarramalong Valley (Wyong River) will be negligible, being generally less than 0.15 m, and limited to a small backwater area. Thus, negligible changes would be expected to occur to flood extents and depths in the Yarramalong Valley as a result of predicted mine subsidence. This has been confirmed by the modelling, which found most locations in the Yarramalong Valley will be marginally beneficially affected.

Subsidence will extend along approximately 5.2 km of the Dooralong Valley (Jilliby Jilliby Creek) floodplain. Estimates of subsidence vary from zero up to 1.3 m near the channel of Jilliby Jilliby Creek, with isolated subsidence areas in the Little Jilliby Creek floodplain of the order of approximately 1.6 m. Subsidence of up to 0.95 m will occur along a 1.3 km length of the Hue Hue floodplain. It should be noted that these are the upper bound estimates of subsidence. Flood modelling has been done for 50%, 75% and 100% of these estimates to cover the anticipated range of what the eventual subsidence is expected to be. Impacts of subsidence on flooding are discussed in ***Section 6***.

All major streams and tributaries within the two catchments were modelled in fine detail from the F3 Freeway, which is well downstream of potential subsidence impacts, to locations well upstream of the subsidence areas.

Figure 2.1 Catchment Locality Plan

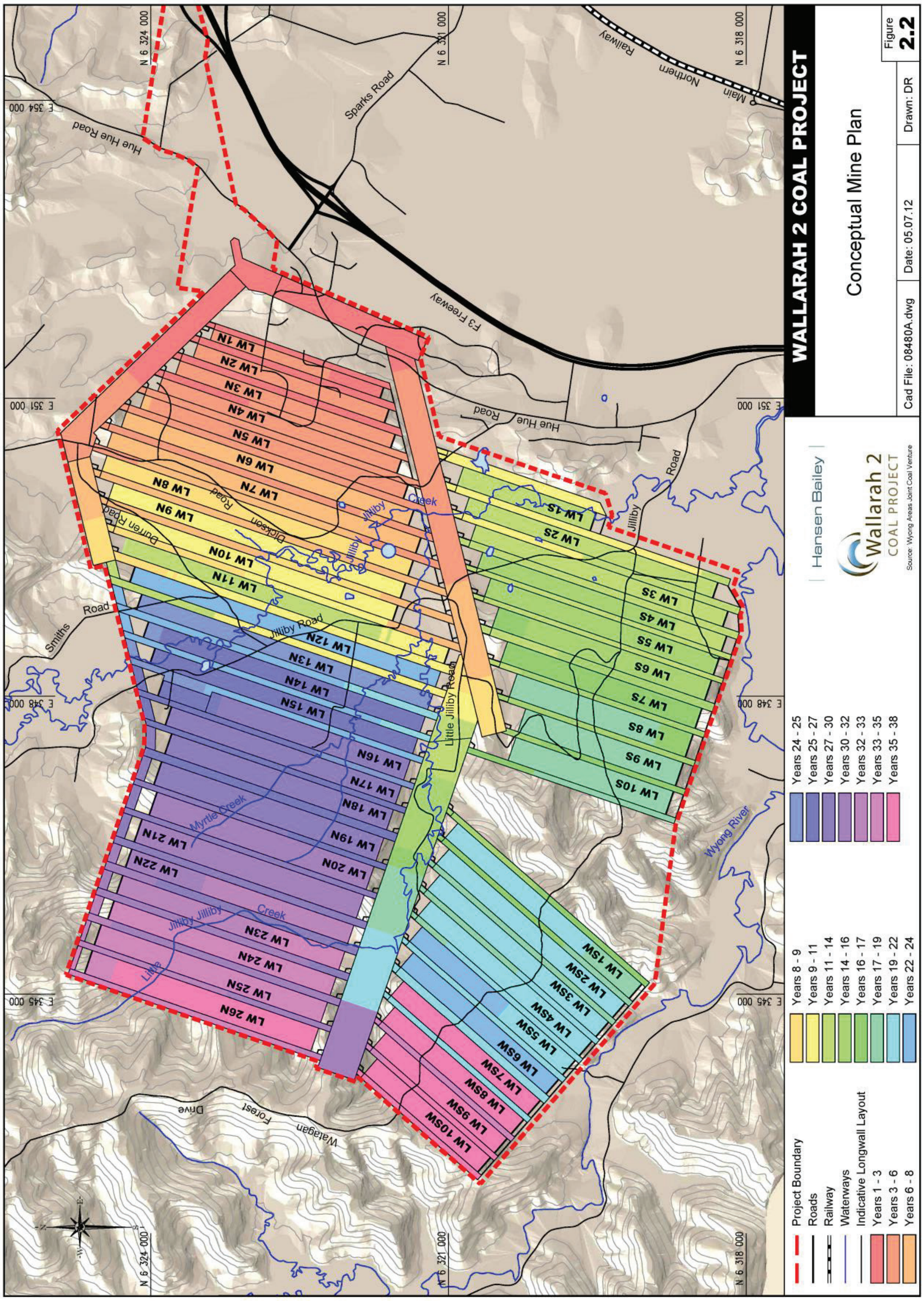


Figure 2.2 Mine Plan

The **Study Area** for the flood impact assessment has consequently been defined as the floodplains of:

- Wyong River upstream of the F3 Freeway for a stream distance of 25,900 m.
- Jilliby Jilliby Creek upstream of its confluence with Wyong River for a stream distance of 20,050 m.
- Little Jilliby Jilliby Creek upstream of its confluence with Jilliby Jilliby Creek for a stream distance of 5,000 m.
- Hue Hue Creek upstream of the F3 Freeway for a stream distance of 5,480 m.

The Study Area is shown in ***Figure 2.3***.

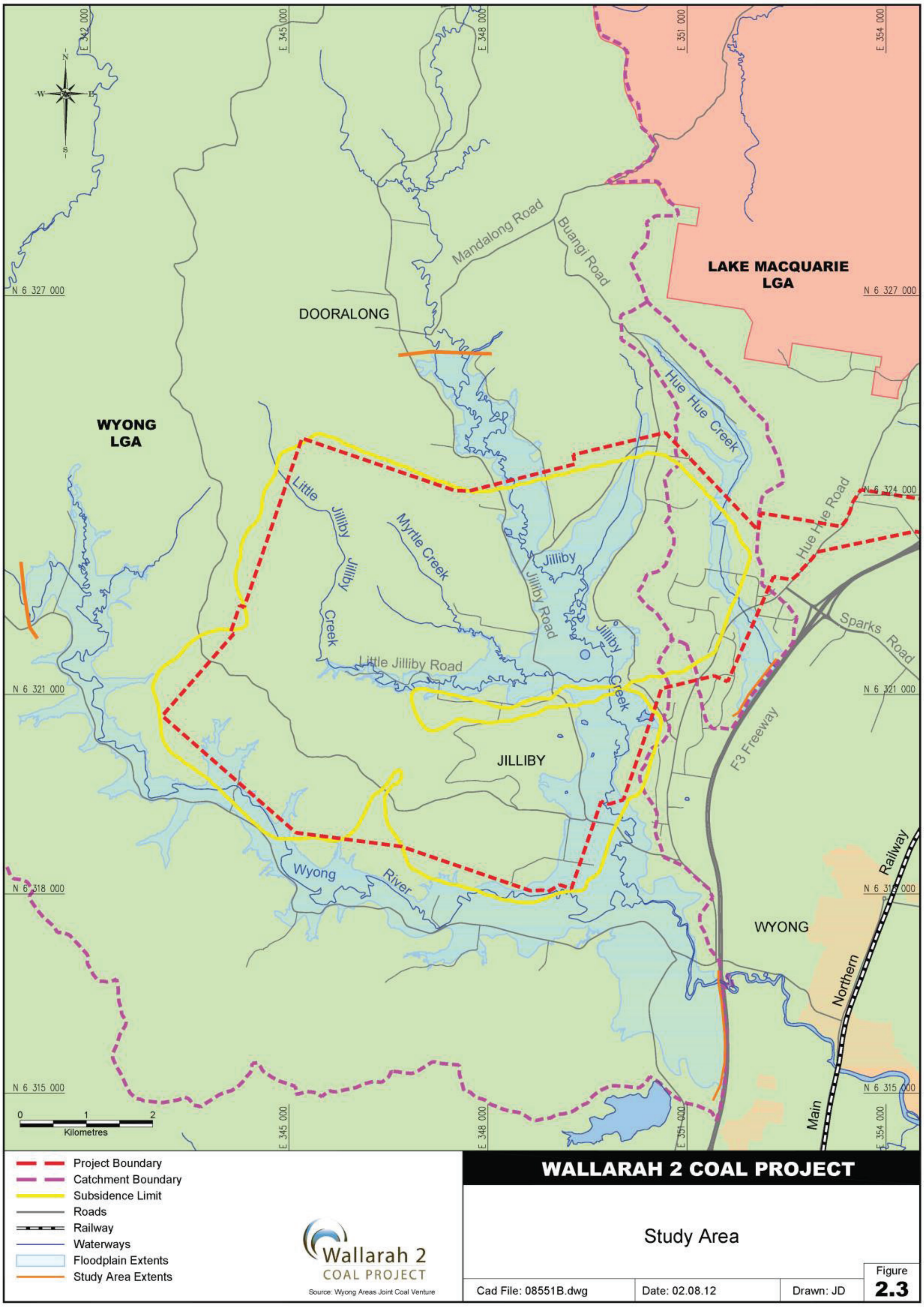


Figure 2.3 Study Area

2.2 *YARRAMALONG AND DOORALONG VALLEYS*

The Wyong River, upstream of the F3 Freeway, has a total catchment area of 357 km^2. The catchment is divided into two major sub-catchments referred to in this report as the Yarramalong and Dooralong Valleys.

The major waterways within the Yarramalong and Dooralong Valleys include the Wyong River, Jilliby Jilliby Creek and Little Jilliby Jilliby Creek. Tributaries within the study area include Chandlers Creek, Smiths Creek, Myrtle Creek and Durrens Creek as well as a number of unnamed minor streams. The Wyong River flows through the Yarramalong Valley, while Jilliby Jilliby Creek drains the Dooralong Valley before joining the Wyong River approximately 2.8 km upstream of the F3 Freeway. Little Jilliby Jilliby Creek joins Jilliby Jilliby Creek approximately 5.7 km upstream of its confluence with the Wyong River. The Wyong River passes over the Wyong Weir immediately downstream of the F3 Freeway then continues through the Wyong Industrial Estate, and under the Old Pacific Highway and Main Northern Railway at Wyong before finally discharging into Tuggerah Lake at Tacoma.

The Wyong River rises in the Watagan Mountains in the Olney State Forest. The river valley has been cleared for agricultural land uses - primarily grazing. The steep hillsides and ridges are heavily vegetated and generally located within State Forests and Jilliby State Conservation Area.

The Wyong River, upstream of the Jilliby Jilliby Creek confluence, has a total catchment area of 250 km^2 . Within the study area there are 21 bridges over the Wyong River, which alter the natural flooding patterns in smaller floods but which are fully submerged and have little impact during large floods (i.e. greater than 2% AEP (50 year ARI) events). The majority of the bridges provide access to private properties; however, there are significant main road crossings along Yarramalong Road and Bunning Creek Road.

Jilliby Jilliby Creek also rises in the foothills of the Watagan Mountains. The upper sections of the Dooralong Valley are contained within the Olney State Forest and are covered in dense vegetation. Further downstream, the floodplain has been partially cleared for mixed rural land uses, including grazing, orchards and turf farms.

Jilliby Jilliby Creek has a total catchment area of 98 km^2 above its confluence with the Wyong River. There are 11 bridges that cross the creek within the study area and upper catchment. The major road into the valley is Jilliby Road, which crosses the creek and its tributaries at a number of locations. There are also important bridge and culvert crossings over Jilliby Jilliby Creek and tributaries along Durren and Mandalong Roads.

Between the confluence of Jilliby Jilliby Creek with the Wyong River and Woodburys Bridge, the topography of the valley changes. The floodplain narrows as the river flows through this area and the left bank becomes steeper and more vegetated. This creates a significant restriction to the passage of flood flows.

2.3 *HUE HUE CREEK*

Hue Hue Creek has been so named for convenience due to its proximity to Hue Hue Road. The Hue Hue Valley catchment is located mostly to the west of Hue Hue Road between Wyong and Wyee. It drains into Porters Swamp just downstream of the F3 Freeway. Porters Creek flows from Porters Swamp, under the bridge at Alison Street, Wyong, immediately prior to joining the Wyong River.

The study area includes the entire Hue Hue Creek catchment upstream of the F3 Freeway. The total area of this catchment is 8.2 km^2 . The Hue Hue Creek portion of the study area is also shown in ***Figure 2.3***.

The majority of the upper reaches of the Hue Hue catchment and the steeper hillsides are heavily vegetated. The valley in the middle reaches of the catchment has been predominantly cleared and mainly consists of small rural and rural-residential land holdings. Residential development is concentrated in the area around Sandra Street and Hue Hue Road. There is a smaller residential subdivision at Cottesloe Road higher in the catchment.

The drainage system within the Hue Hue Valley consists of a series of small, poorly defined, ephemeral watercourses draining towards the south east. There are three locations where roads cross the Hue Hue Creek, these are:

- two separate culverts under the F3 Freeway;
- a culvert under Sandra Street; and
- a culvert at Hue Hue Road.

Two private access roads from the end of Cottesloe Road also cross Hue Hue Creek upstream of Sandra Street.

3 DATA REVIEW

3.1 PREVIOUS STUDIES

A number of previous studies have investigated flooding within and adjacent to the study area and contain information that is relevant to the current assessment. These studies are described below.

Upper Wyong River Flood Study, Public Works Department (PWD), 1988

The Upper Wyong River Flood Study is particularly relevant to the current investigation, as it:

- defined flooding in the Wyong River downstream of the study area, which was used to confirm the downstream boundary conditions for the current model; and
- compiled available flood calibration data within the Yarramalong and Dooralong Valleys prior to 1988, including summaries of rainfall and corresponding streamflow information.

The study developed a Watershed Boundary Network Model (WBNM) hydrologic model and a CELLS hydraulic model of the Wyong River catchment to Tuggerah Lake. The hydraulic model was limited from the perspective of the current assessment because it did not focus on the hydraulic characteristics of the Yarramalong and Dooralong Valleys. It also did not produce dynamically routed flood hydrographs. Dynamically routed hydrographs more accurately account for the attenuation of a flood wave as it moves through the river system due to the effects of floodplain storage and downstream hydraulic constraints.

The hydrologic model was also not relevant for the current study as the TUFLOW model uses a direct rainfall input approach.

Trunk Drainage Investigation Warnervale East 7b Stage 1 - Flood Study, Willing and Partners, May 1990

The study of Warnervale East provides flood levels for the section of Porters Creek downstream of the F3 Freeway. These levels have been used in setting boundary conditions for the TUFLOW model of Hue Hue Creek in the current study. The study involved development of an XP-RAFTS model for the entire Porters Creek catchment, inclusive of Hue Hue Creek, and a CELLS hydraulic model of the downstream section of Porters Creek to estimate flood levels for the 1%, 2% and 5% AEP storm events.

Yarramalong and Dooralong Valleys Baseline Flood Study, ERM, May 2000

The Yarramalong and Dooralong Valley Baseline Flood Study was undertaken by ERM in 2000 for Coal Operations Pty Ltd. An XP-RAFTS model was developed for both valleys and calibrated using three Department of Land and Water Conservation (currently NSW Office of Water (NOW)) streamflow gauges for 11 recorded storm events. A MIKE 11 hydraulic model was developed to estimate flood levels for a range of design floods including the Probable Maximum Flood (PMF), 1%, 2%, 5%, 10% and 20% AEP storm events.

The baseline flood study found that the topography of the valleys is well defined with steep valley walls and a relatively flat floodplain. As water depth increases with the magnitude of each flood, the submerged area increases only marginally. Therefore, there is little difference between the area inundated in a 1% AEP flood and a 20% AEP flood.

The following conclusions about existing flood behaviour were drawn from the baseline flood study:

- the rivers and creeks have little capacity and most of the flood flows break out of the main channel and inundate the floodplain for storms in excess of the 20% AEP event;
- the 1% AEP flood is approximately 1.1 m higher than a 20% AEP flood in the centre of the study area;
- flood widths range from 500 m to in excess of 1 km in the lower sections of the valley;
- average velocities are low due to the width of the floodplain;
- higher localised flow velocities occur near bridges in the upper reaches of the valleys;
- the local community has a good understanding of flood behaviour in the valleys due to the frequency and extent of flooding;
- this intuitive knowledge of flood behaviour is demonstrated by the fact that most residences are located either outside the floodplain or on the flood fringe;
- some bridges for private access roads are overtopped by floodwaters in small floods, and during major events they are overtopped early in the flood; and

- bridges on public roads generally have a greater capacity than those serving private properties, but several public bridges are also overtopped in frequent flood events.

Dwelling Status Report – Flood Prone Areas (Preliminary Report), Grahame Lindsay & Claire Byrne, June 2001

This report identified and summarised dwellings that were within the predicted subsidence areas with particular focus on those that were within the 1 in 100 year (1%AEP) flood areas calculated in the previous studies.

Yarramalong and Dooralong Valleys - Flood Impact Assessment, ERM, March 2003

This flood impact assessment was commissioned by Hunter Valley Energy Coal (HVEC) on behalf of the WACJV to assess potential impacts associated with subsidence from underground mining and to develop any mitigation measures that may be required. The study area included the Wyong River, Jilliby Jilliby and Little Jilliby Jilliby Creeks but did not include Hue Hue Creek.

The study for the mine plan at the time found that overall, changes to flood behaviour would be fairly minimal, existing flow patterns would be retained and inundation areas would not significantly change. Changes to flood behaviour in the Dooralong Valley were found to be more significant than in the Yarramalong Valley.

(NOTE: Mine plans and subsidence assessments have changed since this 2003 study; hence comparison between the 2003 study and the current study in terms of predicted impacts on flooding due to subsidence may no longer be valid. The study was updated in 2007 for the revised mine plan)

Hue Hue Creek, Baseline Flood Study, ERM, March 2003

This study investigated flood behaviour in the Hue Hue Valley. Using XP-RAFTS and HEC-RAS, the study:

- determined peak flood levels, flow rates and velocities for the PMF, 1%, 2%, 5%, 10% and 20% AEP design storms; and
- identified flood hazards for roads, bridges, and structures located within the 1% AEP floodplain.

The purpose of the study was to establish existing flood behaviour in the catchment and a baseline from which the impacts of the proposed coal mining on flood behaviour could be assessed.

(NOTE: No modelling was undertaken in the 2000 ERM study to assess impacts of mine subsidence on flooding in Hue Hue Creek. This work was subsequently undertaken as part of the 2003 study and the 2007 study revision.)

Wallarah No.2 Coal Project - Flood Impact Assessment, ERM, March 2009

This flood impact assessment was an extension to the earlier ERM studies to address issues raised during public consultation and arising from the review into mining in the Wyong LGA. These issues included additional sensitivity analyses and further refinement of the model to better represent anabranches and pseudo-2D flow effects. The outcome of the refined modelling showed no significant differences from the predicted flood levels and subsidence impacts from previous models.

Porters Creek Floodplain Risk Management Study, Cardno, October 2011

This study provided an updated assessment of flood risk in the Porters Creek catchment, which encompasses Hue Hue Creek, based on the Flood Studies by Cardno in 2009 and 2010. The supporting documents to this report included a flood extent map which was used for comparison with the flood extents determined in this study. While Cardno's Flood Studies included revisions to estimated flood levels in Porters Swamp, it was found that changes to tailwater conditions downstream of the F3 had no impacts on flood levels in Hue Hue Creek upstream of the F3.

Lower Wyong River Floodplain Risk Management Study, Paterson Consultants Pty Limited, July 2010

This study focused on flood risk assessment for the Lower Wyong River downstream of Woodbury's Bridge to Tuggerah Lake. Consequently, it provided additional overlap assessment of tailwater levels immediately upstream of the F3 Freeway.

3.2 *Topographic Data*

3.2.1 *Digital Terrain Models*

WACJV supplied two Digital Terrain Models (DTM) of the floodplain between the F3 Freeway to upstream of Cottesloe Road, within the Hue Hue Creek catchment, and for most of the Yarramalong and Dooralong Valleys. The first was derived from 1996 Aerial Surveys and Photography, which was normalised against 150 surveyed ground stations. The second was derived from a 2006 Aerial Laser Survey (ALS), which produced topographic information with an accuracy of +/- 0.1 m laterally and +/- 0.2 m vertically. This was more accurate than the previous DTM and it also indicated changes to ground features that had occurred since 1996. The DTM data was used to assign z-values to the 2D model grid points and to extract cross section information for the 1D low flow channel integrated into the wider 2D TUFLOW model.

Additional ALS data has recently been obtained by Wyong Council for developing flood models throughout the wider LGA. This information was not available at the time of development of the TUFLOW model. In any case, the topographic data used for estimating runoff hydrographs from the upper sub-catchments is completely adequate and the ALS data used for modelling flood levels in the study area, and the subsidence area within, is no less accurate than the Wyong City Council data.

3.2.2 *Maps and Plans*

Contours generated from the 2006 ALS and the 1996 Aerial Survey with a contour interval of 0.5 m were used to define catchment boundaries. For a small extent of the upper sub-catchments outside of the area covered by these surveys, orthophoto maps were also used to define catchment boundaries. Almost the entire study area was covered by the ALS. Most importantly, 100% of the subsidence area and areas shown by the flood model to have any consequent changes in flood levels were entirely within the ALS survey area. Contour plans were used to confirm accurate locations of the flood boundaries based on TUFLOW model output.

High resolution colour aerial photographs of the catchments were supplied in August 1999 by AAM Surveys Pty Ltd. More recent aerial photographs associated with the aerial laser surveys were provided in October 2006 by WACJV. The photographs were used to determine extents of different vegetation types and land uses for development of surface roughness values and permeability for input to the TUFLOW model.

3.2.3 *Detailed Survey*

As part of previous Baseline Flood Studies, a detailed survey was undertaken to accurately define the creek sections and structure details at culverts and bridges in the Yarramalong and Dooralong Valleys and Hue Hue Creek (ERM, 2000). Bridges were found to vary significantly in size and level and many can act as hydraulic controls during smaller floods. Twenty-one bridges in the Yarramalong Valley and eleven bridges in the Dooralong Valley were surveyed, as well as cross-sections immediately upstream and downstream of the bridges. Within the Hue Hue Creek catchment, a detailed survey of the one bridge and five culvert crossings upstream of the F3 Freeway was undertaken. Details of survey information are provided in ***Annex* A**.

3.2.4 *Post-Subsidence Topography*

Subsidence modelling was undertaken by Mine Subsidence Engineering Consultants, based on the mine plan developed by WACJV, to quantify subsidence predictions. The predicted subsidence values were subtracted from the existing surface levels to produce subsided surface elevations. From this information, a new set of surface topography data was generated for the 2D cell grid points and the 1D channel sections for direct input into the TUFLOW model. This enabled accurate prediction of changes to flood levels as a result of subsidence. Since the subsidence modelling provided upper bound predictions, the TUFLOW model was also run for 75% and 50% subsidence cases, which represent the median and lower bound estimates of subsidence respectively.

A predicted subsidence contour plan is shown in ***Figure 6.1*** and a representation of subsidence profiles along main channel beds is shown in ***Figure 3.2***.

3.3 *Significant Floods of Record*

The Baseline Flood Studies (ERM, 2000) reviewed historical flood and rainfall information. Significant historical floods were identified from a range of sources including Council's records, previous studies and streamflow records. Significant floods occurred in the following years:

- 1964 (June);
- 1967 (June);
- 1967 (August);
- 1974 (June);
- 1977 (March);
- 1978 (March);
- 1984 (November);
- 1985 (October);
- 1989 (June);
- 1990 (February); and
- 1992 (February).

A more recent event in June 2007 has also subsequently been reviewed.

The 1964 event was the largest of these floods. It was described at the time as the worst flood in 40 years at Wyong. This and other floods are described in the Upper Wyong River Study (PWD, 1988).

No significant flood events were recorded since the 2009 Flood Impact Assessment was completed so no additional calibration was possible for the current study. The most recent flood in June 2007 was estimated to have an AEP of between 30% and 20% (3 to 5 year ARI) in the vicinity of the subsidence area in Jilliby Jilliby Creek based on comparison with other floods of record and flood levels estimated for design storms. Other areas in the wider Wyong River catchment were reported to have experienced rainfall and flood flows with AEPs estimated to have been up to 5% (20 year ARI) during the 2007 storm.

3.4 RAINFALL DATA

All flood studies require rainfall data for two distinct purposes. The first is to provide information on actual rainfall in the catchment during moderate recorded floods to be entered into a hydrologic model for calibration purposes. This data is referred to as "event" data. The second is to provide information on rare or extreme storms, (usually annual maxima) to compare against design floods. Design storm data requires stations with many years of continuous records. Since no extreme storms have been recorded in the relatively short period of records available, it is not possible to determine estimates of flood probability using statistical methods. Consequently, the only practical method available for developing flood frequency estimates is to use the procedures outlined in *Australian Rainfall and Runoff* (1987, Revised 2007) (AR&R) and discussed later in this Section.

Rainfall data is most useful if it coincides with direct streamflow measurements. In such instances the parameters in elements of the TUFLOW model affecting runoff from direct rainfall (i.e. initial losses, continuing losses and roughnesses) are adjusted until computed discharges match measured values. A direct, though sometimes more difficult, calibration can also be achieved using only recorded flood levels in conjunction with the hydraulic output from the model. In this instance the parameters of the overall model were adjusted until agreement was reached between both computed hydrographs and levels and recorded hydrographs and levels.

The most useful rainfall data is obtained from pluviographs, which record rainfall continuously over time. Pluviographs give rainfall intensities over the duration of the storm, providing details of the temporal distribution of rainfall. Daily read rain gauge stations yield less information about the storm, but can still be useful indicators of the spatial distribution of rainfall.

3.4.1 *Event Data*

There are a number of rainfall gauges within or adjacent to the catchments which are useful for event data. These gauges are summarised in ***Table 3.1*** and their locations are shown in ***Figure 3.3.***

Based on available data, temporal and spatial patterns of rainfall were defined for each storm used in the calibration and verification process. The final selection was based on the availability of data including rainfall, streamflow, flood heights and approximate AEP of the storm. The selected storms have the most complete data set and are discussed further in ***Section 3.4.3.***

Table 3.1 Summary of Rain Gauges

Gauge Type	Location	Data Source	Recording Frequency
Pluviograph	Mardi Dam	MHL	2 minutes
Pluviograph	Toukley	MHL	5 minutes
Pluviograph	Wyong	MHL	10 minutes
Pluviograph	Yarramalong	MHL	2 minutes
Rainfall	Wyee Post Office	BOM	Daily
Rainfall	Gosford (Narara Research Station) AWS	BOM	Daily
Rainfall	Ourimbah (Dog Trap Road)	BOM	Daily
Rainfall	Laguna (Kolongba)	BOM	Daily
Rainfall	Kulnura North (Jeavons)	BOM	Daily
Rainfall	Watagan Central	BOM	Daily
Rainfall	Yarramalong (Lewinsbrook)	BOM	Daily
Rainfall	Norah Head Lighthouse	BOM	Daily

Notes:

1. BOM abbreviates Bureau of Meteorology.
2. MHL abbreviates Manly Hydraulics Laboratory.
3. AWS abbreviates Automated Weather Station.

Figure 3.1 Rainfall and Streamflow Gauging Stations

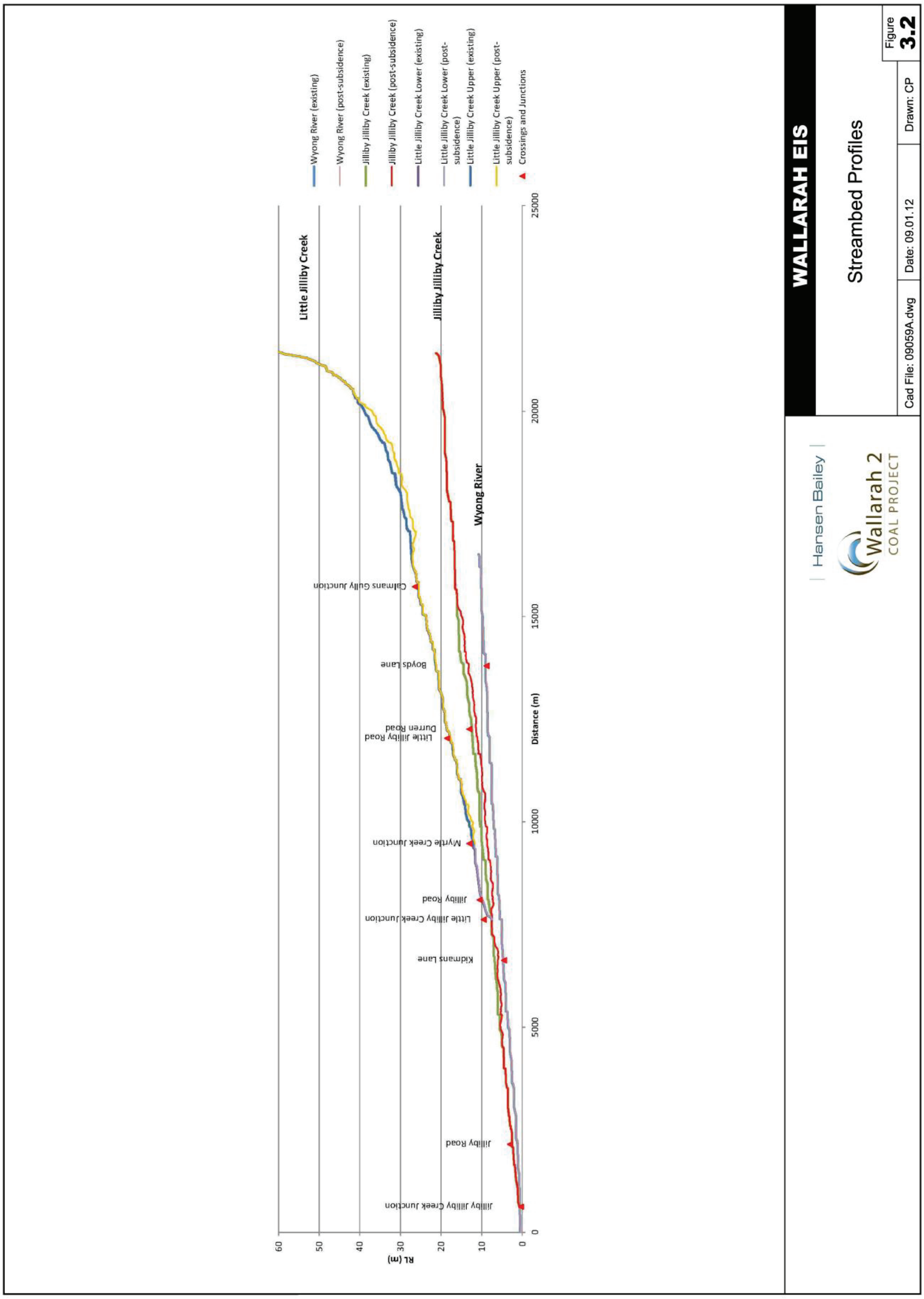


Figure 3.2 Streambed Profiles

3.4.2 *Design Rainfall*

Design storm data published in AR&R was used in this study. The conventional approach to design rainfall estimation is to allow for spatial variations of rainfall intensity parameters by using sub-catchments to model a range of intensities for design storms of particular probabilities. A conservative approach was taken in this study by adopting, for the whole of the catchments, the maximum value for each of the rainfall parameters from the relevant AR&R Maps from any point within the catchment. Details of the rainfall maps and design intensities calculated are provided in ***Annex B***.

3.4.3 *Rainfall Data for Calibration Events*

Complete data sets were available for only three storms (1989, 1990 and 1992) that could be used to calibrate and verify the Yarramalong/Dooralong model and no data was available for calibration of the Hue Hue model. Pluviograph data was collected by Manly Hydraulics Laboratory for the Department of Public Works and Services.

Daily rainfall data at various locations within and adjacent to the catchment were obtained from the Bureau of Meteorology. These were supplemented by daily rainfall records provided by the community during the 1999/2000 public consultation process.

An isohyetal rainfall distribution map was developed for each calibration storm and used to develop direct rainfall input to the TUFLOW model to reasonably represent spatial variation in rainfall across the catchment for each storm event.

A temporal distribution was obtained by inspecting pluviograph records. The pluviograph station selected as best representing each calibration storm was determined based on its location, its operational state and its consistency with other rainfall records. For the 1989 storm, pluviograph data was obtained from stations at Toukley, Mardi Dam and Yarramalong. Pluviograph data was examined for stations at Wyong and Yarramalong for the 1990 storm and for Yarramalong during the 1992 storm.

Based on a review of the data and initial modelling results, the following pluviographs were adopted for the calibration:

- 1989 storm temporal data from Toukley;
- 1990 storm temporal data from Wyong (Yarramalong produced similar results); and
- 1992 storm temporal data from Yarramalong.

3.5 Streamflow Data

Operational streamflow gauges in the valley are shown in ***Figure 3.1***. ***Table 3.2*** gives the operational condition of each streamflow gauge during floods since 1988.

Streamflow gauges, which measure flow within Wyong River, are located near the Yarramalong and Wyong Creek localities. For reporting purposes, these gauges are named Yarramalong and Gracemere respectively. In addition, the Wyong Weir flow gauge is located approximately 1.6 km downstream of Woodburys Bridge and immediately downstream of the F3 Freeway. Within the Dooralong Valley, flow gauges are found near the Dooralong and Jilliby townships. These gauges are named Dooralong and Jilliby, respectively.

Yarramalong Flow Gauge

The NOW (formerly Department of Water and Energy) operates three streamflow gauging stations in the region, including a gauge on the Wyong River at Yarramalong. The catchment area to this gauge is approximately 181 km^2 . The available period of record is 1976 – present.

Jilliby Flow Gauge

The Jilliby flow gauge is located on Jilliby Jilliby Creek upstream of the confluence with the Wyong River. Its available period of record is 1972 – present. The catchment area to the station is approximately 92 km^2 . It was noted in the PWD 1988 study that there are doubts about the accuracy of the rating curve for this station for high flow conditions. Comparisons of gauged flows with observed flood marks at the station by the NOW for the June 1975 flood also demonstrated that the rating curve was under-predicting high flows.

Gracemere Flow Gauge

The Gracemere flow gauge is located on the Wyong River approximately 4.3 km to the west of the F3 Freeway. It has been operating since 1972 and its maximum gauged level was 6.47 m in November 1981 (gauge zero being 4.495 m AHD). The catchment area above the gauge is approximately 236 km^2 .

Table 3.2 Operational Streamflow Gauges

Station	NOW Identification No.	Operation in Flood		
		1989	**1990**	**1992**
Yarramalong	211014	No	Yes	Yes
Gracemere	211009	Yes	Yes	No
Jilliby	211010	Yes	No	Yes

Details of streamflow records prior to 1988 are included in the PWD 1988 study. This combined data set was used to calibrate the model as part of the study. The Dooralong flow gauge was not used, as it is only read at irregular intervals, and the quality of the available data was rated poor by the NOW.

3.6 FLOOD HEIGHT DATA

3.6.1 Wyong Council Records

Only limited official recorded flood height data is available in the catchment. Council records of historic flood heights were provided as input to previous studies. Flood marks used in the calibration of the model are tabulated in ***Annex C***.

3.6.2 Records Provided by Community

Another important source of information on past floods was the local community. Historic records including photographs, videos, flood marks and rainfall charts were sought as part of the previous studies from residents in Yarramalong and Dooralong Valleys through a community consultation process. Information was assessed for suitability and then used in the calibration of the flood model.

Levels and location co-ordinates of each flood mark were accurately surveyed during previous studies so they could be used in the calibration process. Recorded flood marks based on information supplied by the community are also included in ***Annex C***.

3.6.3 *Downstream Conditions*

Hydraulic models require the definition of the boundary conditions at the downstream end of the model. The boundary conditions can be entered as:

- a constant water surface level;
- a time varying relationship of water surface levels; or
- a rating curve providing water surface levels for various flow rates.

The Upper Wyong River Flood Study (PWD, 1988) and the Lower Wyong River Risk Management Study (Paterson Consultants, 2010) defined design flood levels for the area immediately downstream of Woodburys Bridge. These water surface levels were used to develop a stage-discharge relationship of tailwater surface levels for all storm events at the downstream boundary of the model. The stage-discharge relationship used in the model was conservatively based on a restricted conveyance properties that produced design tailwater levels higher than those estimated in the abovementioned studies.

4 *HYDROLOGIC DATA*

4.1 *OVERVIEW*

In previous studies, a separate hydrological model was developed using XP-RAFTS and hydrographs output from this model were then input into the MIKE 11 hydraulic model for the Yarramalong/Dooralong catchment and the HEC-RAS hydraulic model for the Hue Hue Catchment. TUFLOW provides an option for direct input of rainfall to all cells in the model so that separate hydrological modelling to produce inflow hydrographs at specific points in the model is not required. This has the advantage of providing more accurate estimates of flows at all points in the model but has a drawback in potentially creating model instabilities and "noise" in water level estimates due to all cells being wet. The later problem was overcome in this study by reducing the time step of calculations to 2 seconds and by post-processing water surface contour output to rationalise predicted flood levels at floodplain boundaries.

The calibration storms discussed in ***Section 3.4.3*** were used to calibrate the TUFLOW model for both flows and water levels concurrently. Since the earlier investigations, no additional significant storm events (greater than 10% AEP) have occurred to enable further calibration, nor have there been significant changes in catchment use and characteristics such as urban development or land clearing.

The revised PMF has also been input into the TUFLOW model as direct rainfall without the need for a separate hydrological model.

4.2 *DESCRIPTION OF TUFLOW HYDROLOGIC FUNCTIONS*

The direct input of rainfall into the TUFLOW model has the advantage of producing a more accurate estimate of design flows throughout the catchment than does a separate hydrological model such as XP-RAFTS, which estimates hydrographs at a limited number of defined points. The direct rainfall approach has the added advantage of producing flow estimates along the many minor streams and tributaries that would be impractical to model separately using XP-RAFTS or similar software. There are also fewer problems with potential errors due to link lagging estimates between outlet points for each sub-catchment.

A more detailed description of all the functions of TUFLOW is given in ***Section 5***. With regard to its hydrological functions, the main parameters to be input include rainfall hyetograph information (determined using the methods of AR&R and entered in the boundary condition input files); and initial and continuing losses (entered either globally or as part of the cell properties entered in the materials input files). Other relevant factors such as slopes, areas, surface roughness, flow lengths, travel times etc. are either entered as part of the topographic or material properties for each cell or are calculated as part of the model runs.

Rainfall intensities can be varied spatially by applying different hyetographs to different regions of the model. For this study, however, a more conservative approach was used by applying the maximum values of design intensities for any point to the entire catchments.

4.3 *Rainfall Parameters*

Design storm rainfall was determined for AEPs between 1% and 100% and for durations between 6 hours and 72 hours in accordance with the standard procedures described in Chapter 2 of AR&R. Parameters for each rainfall zone were calculated using the maps provided in Volume 2 of AR&R. Hyetographs for each design storm were also developed in accordance with the procedures outlined in AR&R. Parameters used in development of the hydrologic input to the TUFLOW model are detailed in ***Annex D***.

4.4 *Probable Maximum Precipitation (PMP) Calculations*

Probable Maximum Precipitation (PMP) at various locations was calculated in studies prior to 2007 using the Generalised Short Duration Method (GSDM) as described in the Bureau of Meteorology's Bulletin 53 (1994). This method is now considered suitable only for catchments up to 1000 km^2 in area and for storms up to 6 hours in duration. Bulletin 53 was revised in June 2003, with the moisture adjustment factor (MAF) being changed to reflect updated moisture data that has been used by the Hydrometeorology Section of the Bureau of Meteorology since 2001. There has been no change to the design temporal patterns or to the method for determining the spatial distribution of rainfall.

Other methods of PMP estimation applicable to the catchment are the Generalised Southeast Australia Method (GSAM), which provides estimates for storm durations ranging from 1 to 4 days, and the revised Generalised Tropical Storm Method (GTSMR), which provides estimates for storm durations ranging from 1 to 5 days. The study area is in the transition zone between the GSAM and GTSMR methods of PMP estimation for longer duration storms, however, the GSAM became publicly available in October 2006, while the GTSMR was finalised in 2003. Under the revisions to Bulletin 53, the moisture adjustment factor for the catchment increased by approximately 4% from 0.68 to 0.71.

The PMP was applied directly into the TUFLOW model with spatial distribution as prescribed in Bulletin 53 and as shown in ***Annex E***.

5 TUFLOW MODELLING

5.1 METHODOLOGY

Estimating flood levels, flows and velocities before and after subsidence is essential to ensure public safety is maintained. It is also necessary so that mitigation measures can be put in place for every structure and property as well as public infrastructure adversely affected as a result of changes to flood behaviour resulting from subsidence. These estimates can only be made using either a physical model or a computer model to emulate the floods. A physical model is both impractical and relatively inaccurate when compared to modern software modelling packages, hence the latter has been chosen for this study.

For previous studies, an unsteady hydrodynamic model (MIKE 11) was found to be the most appropriate for the Dooralong and Yarramalong valleys and a steady state model (HEC-RAS) was found to be appropriate for the Hue Hue valley. Given the topography of the valleys, a one-dimensional model with capacity for pseudo two-dimensional flow where alternate flow paths occur was adequate to represent flood behaviour. In this type of model each major stream is represented by a series of cross-sections, with hydraulic controls such as bridges, culverts and weirs included at specific locations.

Even though previous models gave good estimates of predicted flood levels and accurate estimates of the changes in flood levels as a result of predicted subsidence, it was suggested during review by the expert panel in 2009 that a 2D model may give more accurate estimates of flood levels, especially near stream confluences and areas where secondary flow effects may occur. While it is arguable that greater accuracy can be achieved without a much larger data set of calibration information than is currently available; the adoption of a 2D model that can be recalibrated over the lifetime of the mine to continually review and update impacts assessment is clearly a preferred approach. Consequently, this flood assessment has been based on the TUFLOW computer model using data consistent with that used in previous models and updated where appropriate.

Due to the size of the Dooralong/Yarramalong catchment and the limitations of the software it was not practical (nor necessary) to model the entire catchment using a fine grid. The upper Jilliby Jilliby Creek catchment and the upper Wyong River catchment were modelled using a 200 m x 200 m grid and the calculated hydrographs were then input into a much finer 25 m x 25 m grid to model the study area. All subsidence impacts were fully within the fine grid boundary. Hue Hue Creek, being much smaller, was modelled using a 20 m x 20 m grid for the entire catchment.

For all locations and for each storm AEP, a range of rainfall durations were modelled to determine which would be the critical storm. In general, for the 1% AEP event, the 30 hour storm was found to be the critical duration for major floods in the Dooralong/Yarramalong model, increasing slightly in critical duration for more frequent storm events. The critical storm duration in the Hue Hue model was found to be approximately 12 hours. Each critical storm was then modelled for existing (unsubsided) conditions and for subsided conditions to determine the impacts. In addition, models were run for a range of subsidence predictions, including the upper bound estimate, as well as potential changes in design rainfall and tailwater conditions to account for climate change impacts. Details of the modelling procedures and the specific inputs and iterations are given in the following Sections.

5.2 *Model Description*

TUFLOW is a computer program for simulating depth-averaged, two and one-dimensional free-surface flows such as occur during floods and tidal flows. The 2D solution algorithm is based on work by G. S. Stelling (Reference: *On the Construction of Computational Methods for Shallow Water Flow Problems Rijkswaterstaat Communications, No. 35/1984, The Hague, The Netherlands - Stelling, 1984*) and is documented in *Dynamically Linked Two-Dimensional / One-Dimensional Hydrodynamic Modelling Program for Rivers, Estuaries & Coastal Waters - W. J. Syme, 1991*. It solves the full two-dimensional, depth averaged, momentum and continuity equations for free-surface flow.

TUFLOW solves the depth averaged 2D shallow water equations (SWE) of fluid motion used for modelling long waves such as floods, ocean tides and storm surges. These equations are derived using the hypotheses of vertically uniform horizontal velocity and negligible vertical acceleration (i.e. a hydrostatic pressure distribution). These assumptions are valid where the wave length is much greater than the depth of water.

The 2D SWE in the horizontal plane are described by the following partial differential equations of mass continuity and momentum conservation in the X and Y directions for an in-plan Cartesian coordinate frame of reference. The equations are:

$$\frac{\partial \zeta}{\partial t} + \frac{\partial (Hu)}{\partial x} + \frac{\partial (Hv)}{\partial y} = 0$$

(2D Continuity)

$$\frac{\partial u}{\partial t} + u\frac{\partial u}{\partial x} + v\frac{\partial u}{\partial y} - c_f v + g\frac{\partial \zeta}{\partial x} + g u \left(\frac{n^2}{H^{4/3}} + \frac{f_l}{2g\Delta x} \right) \sqrt{u^2 + v^2} - \mu \left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} \right) + \frac{1}{\rho}\frac{\partial p}{\partial x} = F_x$$

(X Momentum)

$$\frac{\partial v}{\partial t} + u\frac{\partial v}{\partial x} + v\frac{\partial v}{\partial y} + c_f u + g\frac{\partial \zeta}{\partial y} + g v \left(\frac{n^2}{H^{4/3}} + \frac{f_l}{2g\Delta y} \right) \sqrt{u^2 + v^2} - \mu \left(\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} \right) + \frac{1}{\rho}\frac{\partial p}{\partial y} = F_y$$

(Y Momentum)

where

ζ = *Water surface elevation*

u and v = *Depth averaged velocity components in X and Y directions*

H = *Depth of water*

t = *Time*

x and y = *Distance in X and Y directions*

Δx and Δy = *Cell Dimensions in X and Y directions*

c_f = *Coriolis force coefficient*

n = *Manning's n*

f_l = *Form (Energy) Loss coefficient*

μ = *Horizontal diffusion of momentum coefficient*

p = *Atmospheric pressure*

ρ = *Density of water*

F_x and F_y = *Sum of components of external forces (eg. wind) in X and Y directions*

The 2D elements of TUFLOW integrate with a 1D network (ESTRY) to more accurately model the main channels, culverts, bridges and anabranches in a floodplain and other locations where sudden changes in surface level and flow conditions occur that cannot accurately be represented by the 2D cell elements. The 1D solution uses an explicit finite difference, second-order, Runge-Kutta solution technique for the 1D SWE of continuity and momentum as given by the equations below. The equations contain the essential terms for modelling periodic long waves in estuaries and rivers, that is: wave propagation; advection of momentum (inertia terms) and bed friction (Manning's equation).

$$\frac{\partial (uA)}{\partial x} + B\frac{\partial \zeta}{\partial t} = 0 \quad \text{(1D Continuity)}$$

$$\frac{\partial u}{\partial t} + u\frac{\partial u}{\partial x} + g\frac{\partial \zeta}{\partial x} + k\,|\,u\,|\,u = 0 \quad \text{(1D Momentum)}$$

where

$u = \text{depth and width averaged velocity}$

$\zeta = \text{water level}$

$t = \text{time}$

$x = \text{distance}$

$A = \text{cross sectional area}$

$B = \text{width of flow}$

$$k = \text{energy loss coefficient} = \frac{gn^2}{R^{4/3}} + \frac{f_l}{2g\Delta x}$$

$n = \text{Manning's } n$

$f_l = \text{Form (Energy) Loss coefficient}$

$R = \text{Hydraulic Radius}$

$g = \text{acceleration due to gravity}$

Figure 5.1 illustrates the data input and output structure used in TUFLOW. Text files are used for controlling simulations and simulation parameters, whilst the bulk of data input is in GIS formats. For time-series data and other non-geographically located data, spreadsheet software and/or the SMS TUFLOW Interface are used.

The primary inputs to the model include:

- Cell grid definition (i.e. dividing the entire catchment and floodplain into small individual cells);
- Topography (i.e. assigning elevation values to the four points in each cell from GIS ground surface information);
- Boundaries (i.e. controls for all inflows (e.g. rainfall) and outflows to and from the model as well as between 1D and 2D components); and
- Materials (i.e. surface roughness and impediments to the flow based on actual site conditions shown on aerial photos and maps).

The primary outputs include water depth/levels, velocities and flows at all cells throughout the model. The output is used to generate flood maps and identify specific points of interest that may be inundated.

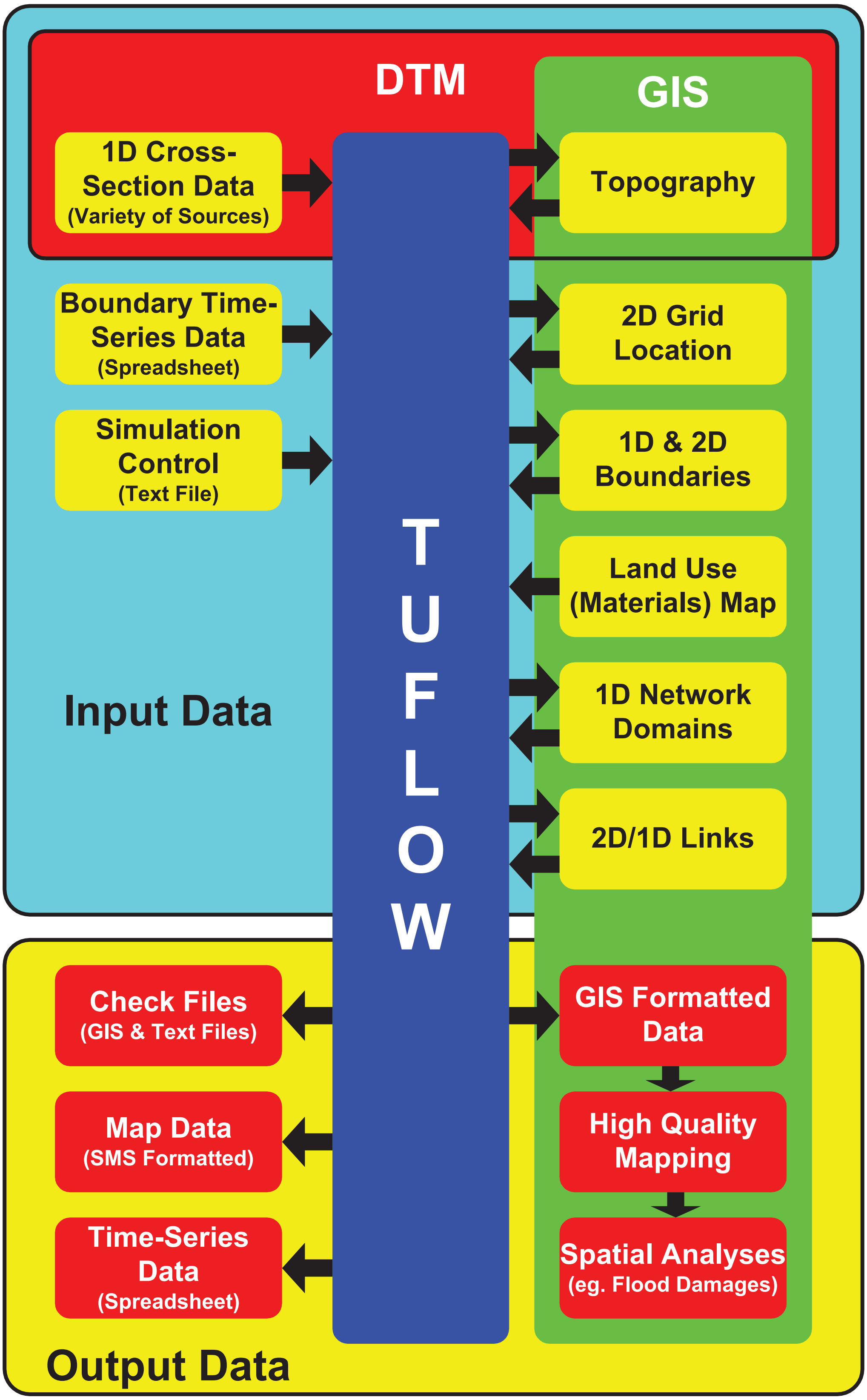


Figure 5.1 TUFLOW Data Input and Output Structure

5.3 *MODEL LAYOUT*

5.3.1 *Coarse Grid Models*

A coarse grid measuring 21 km x 29 km was developed to fully enclose the combined catchments of the Wyong River (Yarramalong valley) above the F3 Freeway, Jilliby Jilliby Creek (Dooralong valley) above the Wyong river confluence and Hue Hue Creek above the F3 Freeway. The purpose of the coarse grid model was to provide a crude order of magnitude check of results by running the 2D coarse grid without refinements for the full catchments. Coarse grid models were also created for the upper Wyong and Jilliby Jilliby sub-catchments to determine upstream hydrographs used as inputs to a more accurate fine grid model of the study area. In TUFLOW, active (wet) cells are established by identifying all grid cells within the catchment boundaries.

Catchment boundaries were defined from contour maps developed from the DTM data over much of the catchments with parts of the upper Jilliby Jilliby and upper Wyong River sub-catchments based on 1:25000 topographic maps where the aerial survey and DTM coverage was not available. For a total Wyong River catchment area above the F3 Freeway of 357 km^2, a 200 m x 200 m cell grid was found to provide satisfactory preliminary estimates of flows and water levels. Similarly, the 200 m x 200 m grid provided accurate estimates of hydrographs for the upper Wyong catchment (195 km^2) and upper Jilliby Jilliby catchment (51.4 km^2) upstream of the fine grid model catchment (110.6 km^2).

Topographic information varied across different parts of the catchments. A DTM derived from detailed and highly accurate ALS information was used for virtually all of the floodplains within the study area. Beyond the ALS boundaries, data was based on DTM information developed from 1996 aerial surveys. Finally, in parts of the upper catchments 1:25,000 topographic maps were digitised to create a third DTM to complete the topographic input for the models. Grid z-values were created by registering the grid points to each of the three DTMs.

The coarse grid layout and catchment boundaries are shown in ***Figure 5.2*** and are summarised in ***Annex F***.

5.3.2 *Fine Grid Models*

Two separate fine grid models were developed to fully encompass the study area within which all subsidence impacts were found to occur. The Dooralong/Yarramalong fine grid model measured 12 km x12 km and had a cell grid size of 25 m x 25 m. This grid size was found to produce accurate estimates of flood levels over the floodplains while allowing reasonable run times of under 7 hours for each flood modelled.

Since the Hue Hue catchment above the F3 Freeway is reasonably small, it was possible to model the entire catchment within a fine grid model measuring 2.7 km x 6.6 km with a cell grid size of 20 m x 20 m.

ALS information was used to develop the topographic data for both fine grid models, ensuring highly accurate surface level values for the 925,444 points in the Yarramalong/Dooralong model and the 180,064 points in the Hue Hue Model.

The fine grid layouts and catchment boundaries are shown in ***Figure 5.3*** and ***Figure 5.4*** and are summarised in ***Annex F***.

5.3.3 *1D Model Elements*

Because topography along the low flow channels can vary significantly within a short distance, 2D cells may not accurately represent flow and water level conditions at these locations. It is preferable to model low flow channels as 1D networks that are fully integrated into the 2D model. This was done for the Wyong River channel, Jilliby Jilliby Creek, Little Jilliby Jilliby Creek, Chandlers Creek, Smiths Creek, Durrens Creek and Myrtle Creek as well as for the Hue Hue Creek channel.

Cross section information for the channel networks was derived from the DTM data generated from the ALS as well as field surveys and extended approximately 15 m either side of the channel centrelines. For consistency with previous modelling, the cross sections were located at the same or similar locations to those in the MIKE 11 models and similar stream roughness values were used. TUFLOW automatically calculates the stream lengths between each cross section from the digitised stream lines.

5.3.4 *Structures*

There are 21 bridges crossing the Wyong River and a further eight bridges and three culverts crossing Jilliby Jilliby Creek and some of its tributaries. These typically span the river channel without significant abutments and approaches that would seriously impede flow. Some bridges have intermediate supports. The deck levels of most of these bridges are below the existing 20% AEP flood level in most cases and would therefore impede flood flows and cause increases to flood levels upstream (afflux). Because most bridges within the study area are relatively small, especially in relation to larger flood flow cross sections (i.e. less than 5% AEP), their effects are small and are generally localised. Each bridge has been surveyed, and the survey plans are included in ***Annex A***.

Bridges and culverts have been modelled by using the appropriate hydraulic structure module in TUFLOW. Surveyed bridge data was used to input appropriate deck levels, widths, and waterway opening data. The surrounding 2D grids provided accurate representation of the weir effects of raised approach roads. Roughness values were estimated from site inspections and survey information for the bridges.

There is one bridge and five culvert crossings along Hue Hue Creek upstream of the Porters Creek Swamp. These structures have a significant effect on the flood levels in the area immediately upstream of each structure. Detailed field surveys were prepared for each of the six crossings of Hue-Hue Creek and copies are included in ***Annex A***.

Bridge locations and main roads and features are also shown in ***Figure 5.3*** and ***Figure 5.4***.

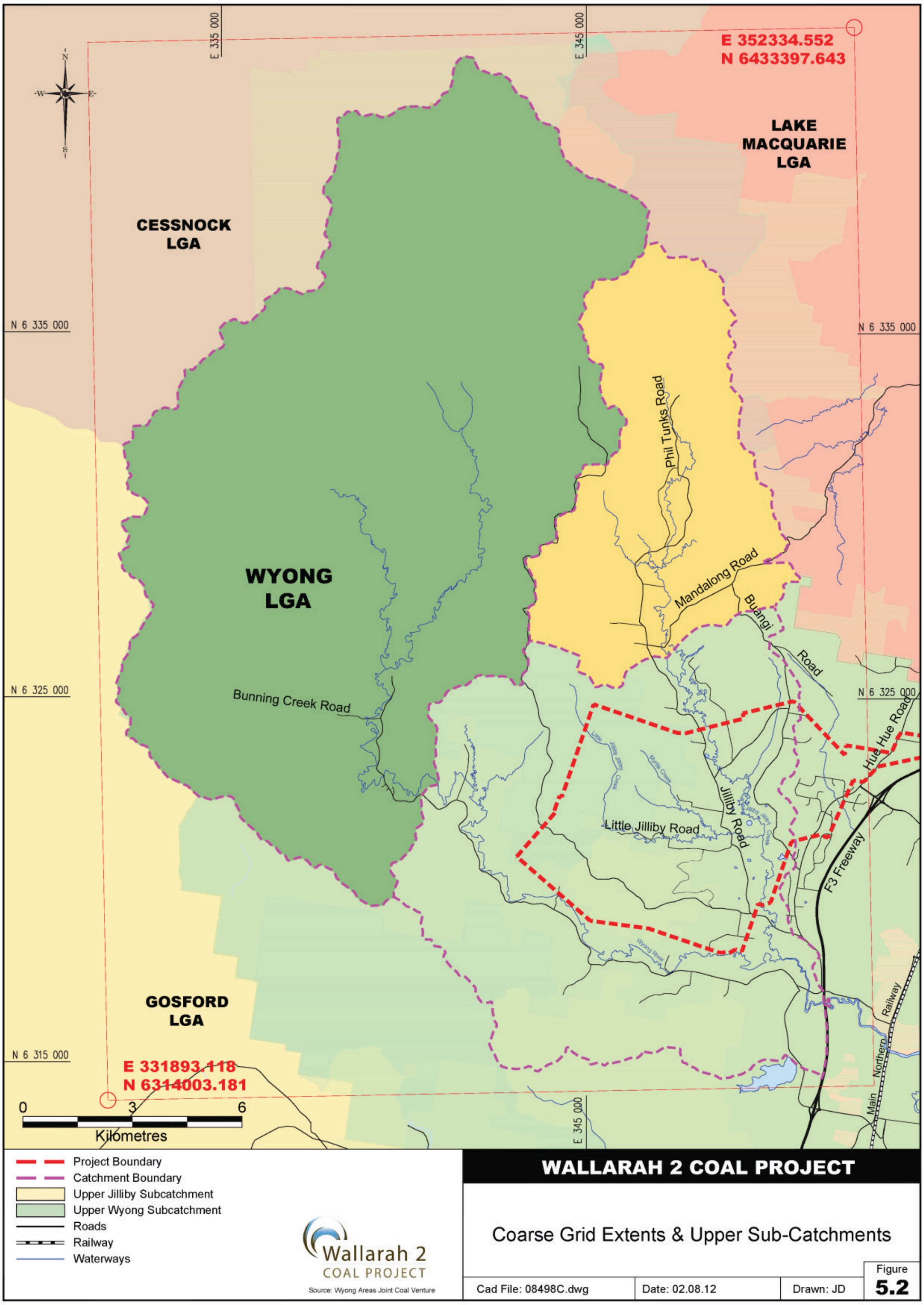


Figure 5.2 Coarse Grid Extent and Upper Sub-catchments

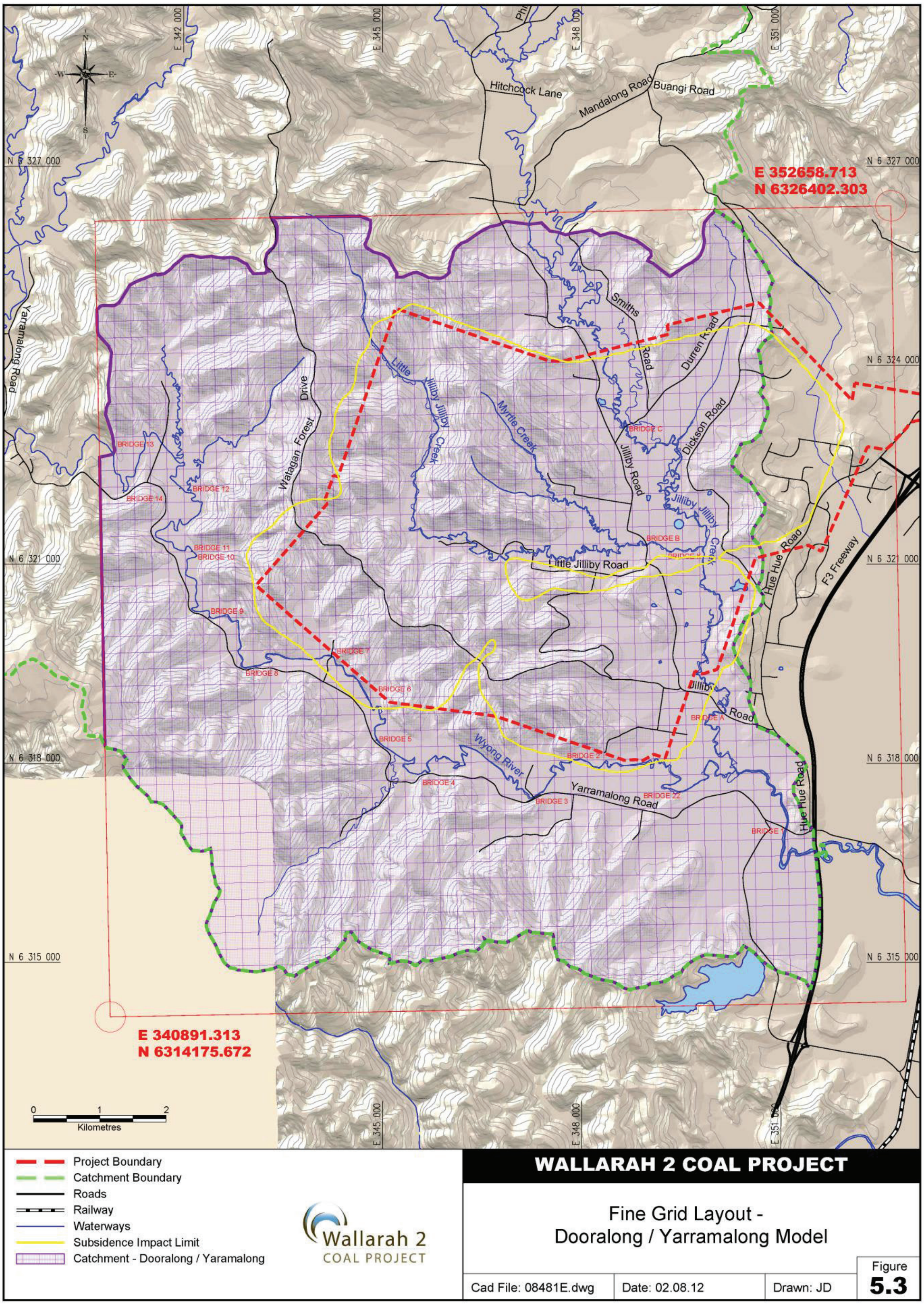


Figure 5.3 Fine Grid Layout - Dooralong/Yarramalong Model

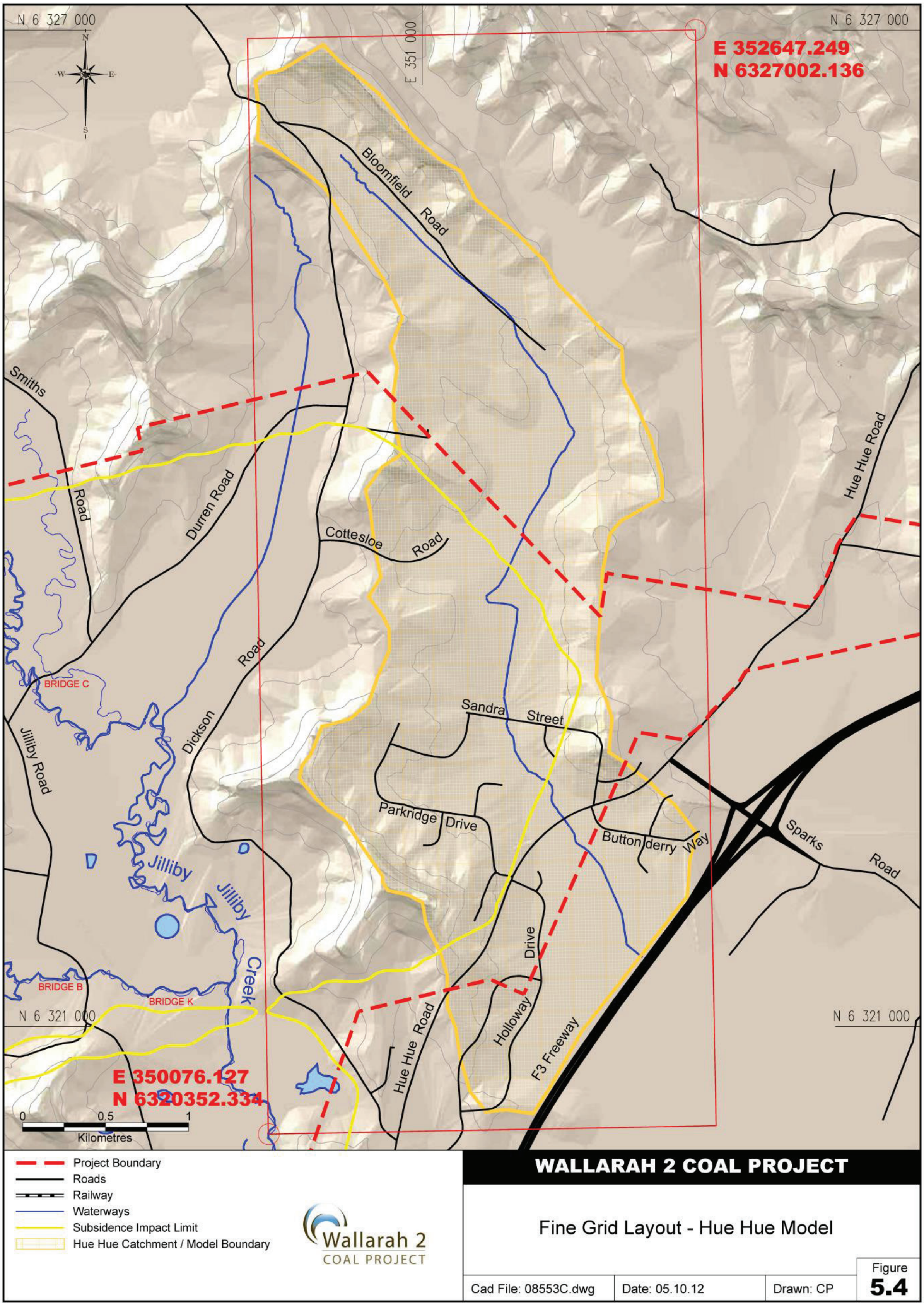


Figure 5.4 Fine Grid Layout - Hue Hue Model

5.4 Model Parameters

Roughness Values

Surface roughness is one of the main parameters affecting flood behaviour. In general, for a given flow, water depth is proportional to a function of surface roughness. In the TUFLOW model, roughness, expressed as Manning's n values, are entered as a tabulated set of material properties for a range of vegetation coverage and surface types. Each cell is then allocated a material property.

The material properties for all of the coarse and fine grid models were developed by digitising boundaries around a range of vegetation types and surface features using high resolution aerial photographs. The material properties were defined in greater detail in the fine grid model where greater accuracy is required for calculation of water depths within the flood plains. For the coarse grid upper catchment models, most of the surfaces were covered by dense forest vegetation with negligible impact of finer features on the estimation of hydrographs.

Roughness values were estimated by comparing the vegetation and topography of the creek and floodplain with published data (Chow, 1986). These values were then adjusted in the calibration process to achieve a close match between observed and modelled flood levels.

The riparian zones along the main channels are typically heavily vegetated with large trees and dense undergrowth. Some tributaries, side channels and billabongs within the floodplain are similarly densely vegetated. The majority of the floodplains have been cleared for agricultural land use and so have generally lower roughness values than the forested hills and the riparian zones.

The floodplain roughness values used in the model are slightly higher than would normally be adopted on the basis of a preliminary assessment of aerial photographs. Detailed assessment of the aerial photographs revealed that stands of trees are orientated perpendicular to the direction of flood flows at numerous locations in both the Dooralong and Yarramalong Valley. These raise the average roughness values of the floodplain as they pose a significant impediment to the passage of floodwaters.

Downstream of the Jilliby Jilliby/Wyong confluence, the flood behaviour becomes more complex and hydraulic losses increase. The width of the river valley narrows as flows are channelled between hills on both the right and left banks, the riparian zone becomes wider and the northern bank more densely vegetated. In addition some of the floodwaters in the right bank of the floodplain break across Yarramalong Road and flow towards Deep Creek.

These factors would all be expected to increase losses in this lower section of the model.

Downstream Boundary Conditions

TUFLOW requires the user to specify the boundary conditions at the downstream end of the model. The downstream end of the previous Dooralong/Yarramalong models was located 900 m downstream of Woodburys Bridge. For this study, the downstream end of the TUFLOW model was extended to the Wyong River Bridge and the embankment of the F3 Freeway. Rating curves have been developed for the various flood events in the lower part of the Wyong River based on the PWD and Paterson Consultants studies.

While the hydraulic model extends as far downstream as the F3 Freeway, the focus of this study is the river system upstream of the confluence of Jilliby Jilliby Creek and the Wyong River, particularly in the vicinity of predicted subsidence approximately 0.9 to 6.5 km upstream. Variances in flood levels resulting from changes to downstream boundary conditions were noted to have dissipated within 400 m of Woodburys Bridge, well downstream of the confluence and well outside of areas impacted by subsidence. This included the deliberate addition of 1.1 m to tailwater levels as a conservative provision for climate change effects. It should be noted that the weir immediately downstream of the F3 Freeway would significantly limit such a climate change impact from extending upstream of the F3 Freeway but the model case has been studied for completeness.

The effective downstream control for Hue Hue Creek is located approximately 500 m downstream of the F3 Freeway. This is the area known as Porters Creek swamp. Inflow to Porters Creek swamp occurs not only for local run-off but also from flooding in the Wyong River (Willing and Partners, 1990). The area acts as flood storage with flood levels controlled by the Wyong River.

Flood levels for Porters Creek Swamp for the 1% AEP event were obtained from the Warnervale East Flood Study (Willing and Partners, 1990)and from the more recent Cardno Flood Study (2009). This was used to establish a fixed tailwater level as the downstream boundary condition for the Hue Hue model at the F3 Freeway embankment. As for the Dooralong/Yarramalong model, 1.1 m was added to this level as a conservative provision for climate change effects.

Rainfall and Inflow Hydrographs

All inflow to the TUFLOW model comes from either direct rainfall applied to all active cells or from pre-calculated inflows at prescribed points on the boundary of the model. The Dooralong/Yarramalong fine grid model included both types of inflow - using outflow hydrographs from the upper sub-catchment coarse grid models. The Hue Hue model required only direct rainfall as its input. Direct rainfall hyetographs were determined using AR&R as discussed previously and were applied equally to both the coarse and fine grid models. Inflow hydrographs were derived from coarse grid models for the upper Wyong and upper Jilliby Jilliby sub-catchments and input at entry points of these streams to the boundaries of the fine grid model.

Losses

An important parameter associated with rainfall is losses. Initial losses are generally a function of how wet the catchment is before the design storm occurs and continuing losses are generally a function of the permeability of the catchment surfaces. In TUFLOW models, losses are typically allocated to each of the material types. This allows different losses to be assigned to different parts of the catchment for greater accuracy in representing true surface runoff. In this study, losses as recommended for Eastern NSW in AR&R were initially adopted (i.e. initial loss between 10 and 35 mm and continuing loss of 2.5 mm/h). These were later adjusted during the calibration process to better represent the recorded storm flows as described in ***Section*** **5.5**.

Simulation Parameters

The numerical stability of a TUFLOW model is affected by a number of parameters. Key parameters include the grid size, the simulation time step and the initial conditions. Another factor that can affect model stability is the topography - especially where direct rainfall is applied to rugged terrain.

As noted previously, the grid size was determined to accurately represent the floodplain and catchment topographies yet enable reasonable run times to be achieved for each model.

For the TUFLOW model, the Courant Number generally needs to be less than 10 and is typically around 5 for most real-world applications (Syme 1991). The computation timestep should be set in accordance with this criterion as given in the equation below.

$$C_r = \frac{\Delta t \sqrt{2gH}}{\Delta x} \qquad \text{2-D Square Grid} \quad (1)$$

where

$\Delta t = timestep,\ s$

$\Delta x = length\ of\ model\ element,\ m$

$g = acceleration\ due\ to\ gravity,\ ms^{-\frac{1}{2}}$

$H = depth\ of\ water,\ m$

As a rule, the timestep (in seconds) is typically half the cell size (in metres). For steep models with high Froude numbers and supercritical flow or for models with direct rainfall applied to rugged terrain, smaller timesteps may be required. In this study it was found that a 3 second timestep was the longest that could be used without instabilities occurring in the fine grid models. Consequently, a timestep of 2 seconds was selected for all models.

A summary of input parameters used in the models is given in ***Annex G***.

5.5 *MODEL CALIBRATION*

Calibration uses historical floods where stream gauging and reported flood levels have been recorded. Model results are compared with recorded data and model parameters adjusted until a satisfactory correlation is achieved. Calibration information was only available for the Dooralong/Yarramalong valleys. Consequently, calibration could not be done for the Hue Hue model and parameters determined in the Dooralong/Yarramalong model were adopted. In previous studies, the XP-RAFTS hydrological model was calibrated against recorded flow data separately to the MIKE 11 hydraulic model, which was calibrated against known flood levels. In this study, hydrological and hydraulic calibration has been carried out as an integrated and iterative process.

For the Dooralong/Yarramalong model, three rainfall pluviograph stations - Mardi Dam, Toukley and Yarramalong township - were used in the calibration process. Sreamflow data was available from three gauging stations at Yarramalong, Gracemere and Jilliby and at Wyong Weir. The spatial variability of rainfall across the catchment was based on an isohyetal map of rainfall depth developed for each storm. After historic storm rainfall depths and temporal patterns were entered directly into the TUFLOW model, results were compared against actual streamflow records and against recorded flood levels.

In earlier studies, reported flood marks were obtained from Council and through consultation with local communities. Residents who reported flood marks were interviewed and a surveyor was engaged to determine precise levels of the identified flood marks for the original Baseline Flood Study. This information was reused in the current study.

Hydrologic and hydraulic parameters were adjusted interactively to achieve a reasonable calibration fit to observed flood levels and stream gauging results. The calibration compared favourably with the earlier study of the Upper Wyong River (PWD, 1988).

Recorded floods with sufficient historical hydrological and streamflow data that were chosen to calibrate the Dooralong/Yarramalong model included the 1964, 1974, 1985, 1989, 1990, 1992, and 2007 floods. In addition, the 1967, 1978, and 1984 floods provided limited data to add to the hydrological calibration only. The model was initially calibrated against the recorded hydrographs and flood level information at the stream gauging stations. Unfortunately insufficient recorded rainfall, streamflow and flood level data were available for the 1964 flood event to assist with the calibration.

The 1989, 1990 and 1992 floods were the only documented floods where flood marks were recorded at sufficient locations in the valleys to enable the hydraulic model parameters to be calibrated. It was found that the initial roughness values adopted tended to under-predict flood levels at most locations for all three floods. Roughness values were increased until a suitable match between the observed and modelled peak flood levels was achieved.

Initial and continuing loss factors were varied in the first round of calibration to give close approximations to the recorded flows then, after roughness values were calibrated for recorded flood levels, a second round of calibrations was undertaken to refine these estimates of losses and roughness values. A comparison between peak flow discharges modelled and recorded values at the gauging stations is given in ***Table 5.1***.

Field inspections were carried out in previous studies to examine the reasonableness of the calibrated roughness values. It was found that while in many floodplain areas land had been cleared for agricultural purposes large stands of vegetation remained. The planting of trees along road and property boundaries also creates a significant barrier to flood flows in these areas. As a result the calibrated roughness values were considered appropriate and adopted.

Table 5.1 Comparison of Peak Recorded and Modelled Flows for Historical Storms

Flood Event	Gauging Station	Recorded Flow (m^3/s)	Modelled Flow (m^3/s)	% Difference
June 1964		Not Recorded	921	na
June 1967	Wyong Weir	377	289 [1]	-23
August 1967	Wyong Weir	425	424 [1]	0
June 1974	Gracemere	190	152	- 20
	Jilliby	61	60	- 2
March 1978	Gracemere	394	415 [1]	5
	Jilliby	75	124 [1]	65
November 1984	Yarramalong	207	211 [1]	2
	Gracemere	198	237 [1]	20
	Jilliby	53	142 [1]	168
October 1985	Yarramalong	223	243	9
	Gracemere	198	192	- 3
	Jilliby	58	44	- 32
June 1989	Yarramalong	299	326	9
	Jilliby	67	83	24
February 1990	Yarramalong	301	285	- 5
	Gracemere	312	284	- 9
February 1992	Yarramalong	183	229	25
	Jilliby	73	121	66
June 2007	Gracemere	394	383	-11
	Jilliby	52	55	3

Note: Hydrologic modelling assumed an initial wetness value of one hundred percent
1. 1967, 1978 and 1984 floods used for hydrological calibration only

The largest recorded flood in 1964 may have represented a 40 to 50 year ARI event and would be classed as a moderate flood. Because no information is available for large events (i.e. 2% AEP (50 year ARI) or larger), calibration of the flood model against these storms cannot be confirmed. However, the model was shown to be accurate for small to moderate storms, and the adoption of conservative model parameters can be expected to provide good estimates of floods resulting from larger storms. Overall, calibration is considered acceptable given the purpose of this study is to assess the impacts of subsidence on changes to flood levels and flows rather than to determine absolute flood level and flow values for large or extreme floods.

5.6 *SIMULATION OF DESIGN FLOODS*

The calibrated TUFLOW model was used to simulate flood behaviour for the 1%, 2%, 5%, 10%, 20%, 50% and 100% AEP design storms. Storm durations of 6 hours to 72 hours were modelled. The results indicated that the 24 and 30 hour storms produced the highest flood levels and discharges at most locations in the Dooralong/Yarramalong valleys. The 12 hour storms produced the highest flood levels and discharges at all locations in the Hue Hue valley.

The six hour duration PMF has been modelled to provide an indication of flood behaviour in an extreme event. Longer duration PMP rainfalls would be expected to produce higher discharges and flood levels in a catchment of this size. However, the generalised short duration method has an upper limit of six hours for the east coast of Australia. Peak flood levels in the six hour PMF event are estimated to be approximately 4 m higher than the 1% AEP event within most of the study area.

Flood heights are important when assessing property damage, especially crop and pasture damage, effects on agricultural capability and household buildings and contents damage. Flow velocities are relevant for assessing potential structural damage and erosion, whilst a combination of depths and velocities will be relevant to evacuation safety and access.

5.7 *SENSITIVITY ANALYSIS*

To assess the sensitivity of both the Dooralong/Yarramalong and Hue Hue models to climate change, a conservative 1.1 m was added to the tailwater levels at the downstream boundary of the models at the F3 Freeway. In addition, a blanket 20% increase was applied to all design rainfall inputs. These represent a simplistic and extremely conservative application of upper bound climate change estimates to 2100.

The predicted subsidence used to modify the topographic input to the model is considered to be the upper bound estimate. Although a definitive estimate of actual subsidence cannot be stated, it is expected that final subsidence values may be around 75% of the upper bound with a lower bound expected to be around 50%. The fine grid models were both analysed for 100%, 75% and 50% subsidence cases.

For the Hue Hue model, due to the lack of historical flood data, it was necessary to select parameters consistent with those adopted in the Dooralong/Yarramalong model. It was also even more important to examine the sensitivity of the design flood levels to key parameters for the Hue Hue model in addition to climate change impacts.

Manning's roughness coefficients were globally varied in both models by 10% to cover the potential for revegetation and other changes to the surface roughness. This is considered an unlikely scenario unless significant redevelopment occurs outside of planning constraints.

To examine the sensitivity of the results to initial wetness of the catchments, the value for initial losses was reduced to 5 mm and continuing loss was reduced to 1 mm/h; representing a saturated relatively impermeable catchment condition.

The sensitivity analyses and results are discussed in greater detail in ***Section 6.5***.

6 MODEL RESULTS AND FLOOD IMPACT ASSESSMENT

6.1 RESULTS SUMMARY

The results provided by the flood modelling have been summarised to provide a complete understanding of all impacts within the study area that are a result of subsidence, as follows:

- The extents and levels of flooding for pre and post subsidence conditions are given in ***Figures 6.4*** and ***6.5*** and ***Annex I***.
- The levels of flooding at or near potentially affected houses and properties in the study area are given in ***Tables 6.1***, ***6.2*** and ***6.3***.
- The durations of inundation at key road access points are given in ***Table 6.10***.

These and other model results are discussed in more detail in the following Sections.

6.2 OVERVIEW OF POTENTIAL SUBSIDENCE IMPACTS

Subsidence can cause changes in floodplain storage or changes in hydraulic gradients within the floodplain. This will alter flooding behaviour to some extent; with the significance depending on mine panel widths and orientation and their influence on subsided topography. Such effects can have adverse or beneficial impacts on flooding within the subsided area and in areas upstream and downstream, depending on the hydraulic behaviour and provisions made for flood management.

Control measures will be required to mitigate potential flood impacts. Specific issues to address include:

- risk and degree of property flooding;
- flood hazards; and
- access to properties.

Access to properties may be temporarily disrupted if floodwaters overtop bridges or culverts, or extend across roads. A flood hazard may be posed by floodwaters of certain velocities and depths flowing across roads and in the vicinity of properties.

Conversely, due to detention effects, the proposed mine is likely to provide slight flood mitigation benefits in alleviating existing flooding experienced downstream at Wyong. However, this should not be considered a benefit unless all adverse effects on properties within the valleys are adequately addressed or mitigated.

The Project will lead to differential subsidence within the floodplains. The extent of upper bound estimates of subsidence, represented as subsidence contours, is shown in ***Figure 6.1***. It can be seen that subsidence only affects a very small proportion of the floodplain of the Yarramalong Valley and is relatively small (<150 mm) in these locations. Subsidence will extend over approximately a 5.2 km length of the Dooralong Valley floodplain and a 1.3 km length of the Hue Hue Valley floodplain.

Subsidence can cause increases in local velocities and potential scour where gradients are increased as well as potential ponding at the downstream end of depressed areas. Hydraulic capacity can also be reduced where higher unsubsided ground restricts flows from subsided areas upstream, thus increasing flood depths upstream.

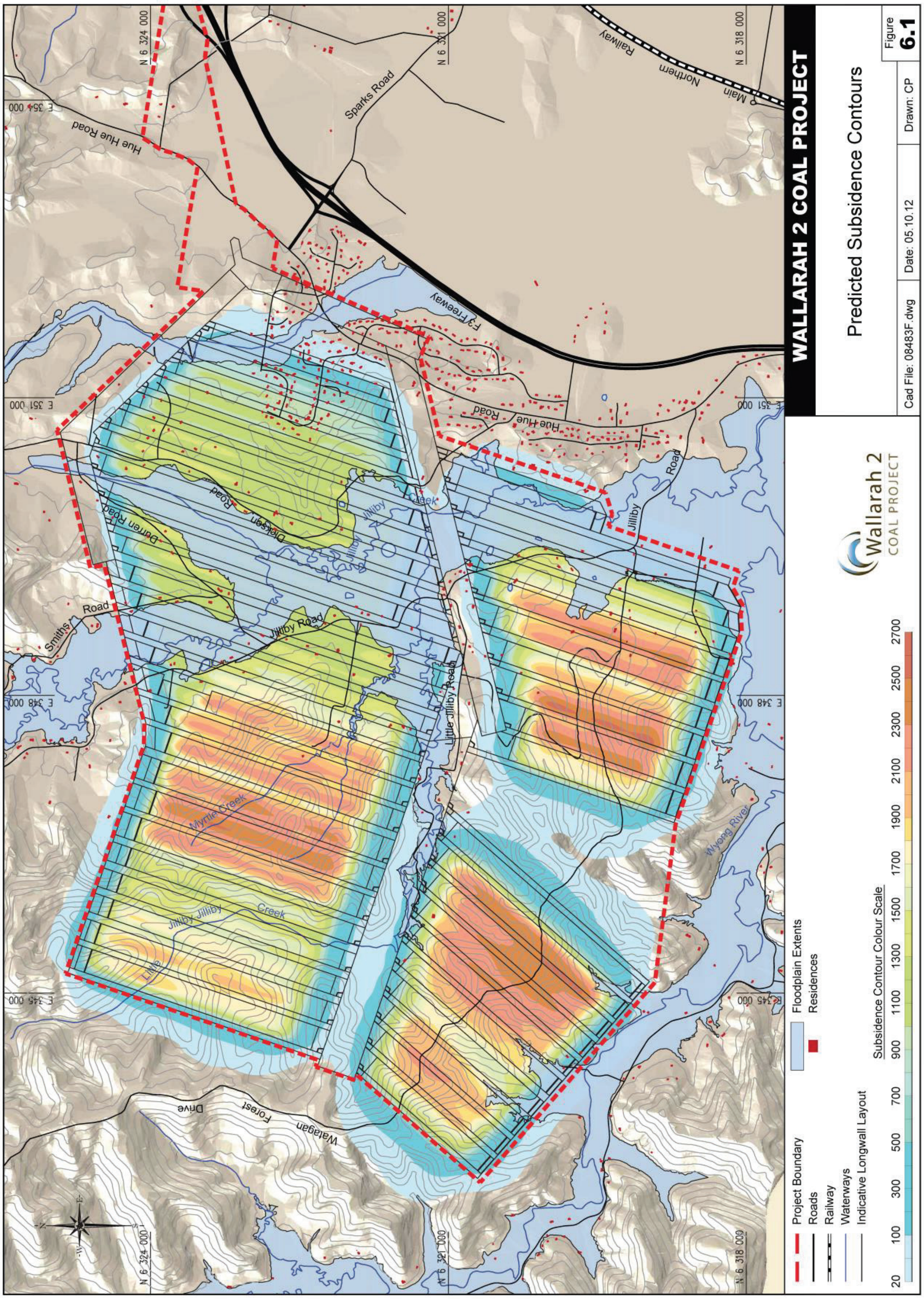


Figure 6.1 Predicted Subsidence Contours

Following completion of the TUFLOW modelling of design storms for existing conditions, the model was amended and re-run to assess post mining flood levels and flows within the study area. The areas directly affected by subsidence include the floodplains of Jilliby Jilliby Creek, Little Jilliby Jilliby Creek and nearby tributaries and Hue Hue Creek as well as flood fringe areas of the Wyong River.

Subsidence was applied to the model grid z-point values in the 2D models as well as the cross sections in the 1D stream network integral with the models. Geometry of bridges, culverts and approach roads within the subsidence area was also adjusted based on the subsidence contours.

The amended model was re-run for all floods. Calculated flood levels at key locations for the existing topography and the subsided topography are included in ***Annex H***. Changes to flood behaviour are discussed below.

6.3 FLOOD HAZARD ASSESSMENT

According to the NSW Floodplain Development Manual (2005), floodplain areas can be divided into specific categories that are used to determine appropriate land uses. Categories include:

- Hydraulic categories that represent the impact of development on flood behaviour – floodway, flood storage and flood fringe; and
- Hazard categories (low hazard and high hazard) that show the impact of flooding on structures and people.

Diagrammatic definitions of these categories are provided in ***Figure 6.2*** and ***Figure 6.3***.

The floodplain was defined using these flood categories for all river reaches where flood behaviour may be potentially impacted by the mine plan. This area is shown in the flood maps included in ***Annex I*** and is described below. Note that the hydraulic model extended beyond this study area:

- Wyong River from the F3 Freeway to 25.9 km upstream;
- Jilliby Jilliby Creek from its confluence with the Wyong River to 20.1 km upstream;
- Little Jilliby Jilliby Creek; and
- Other tributaries to Jilliby Jilliby Creek.

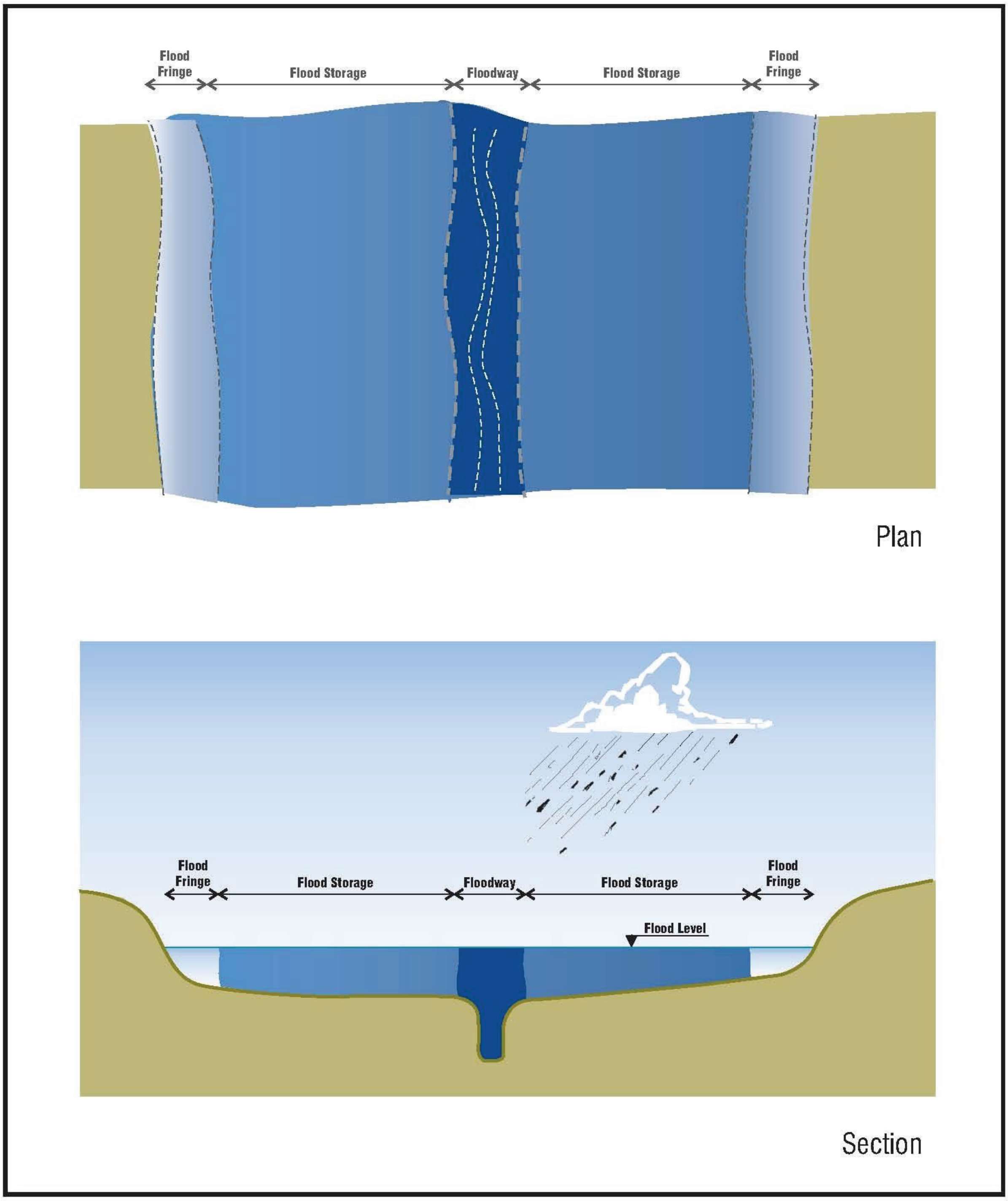


Figure 6.2 Hydraulic Categories

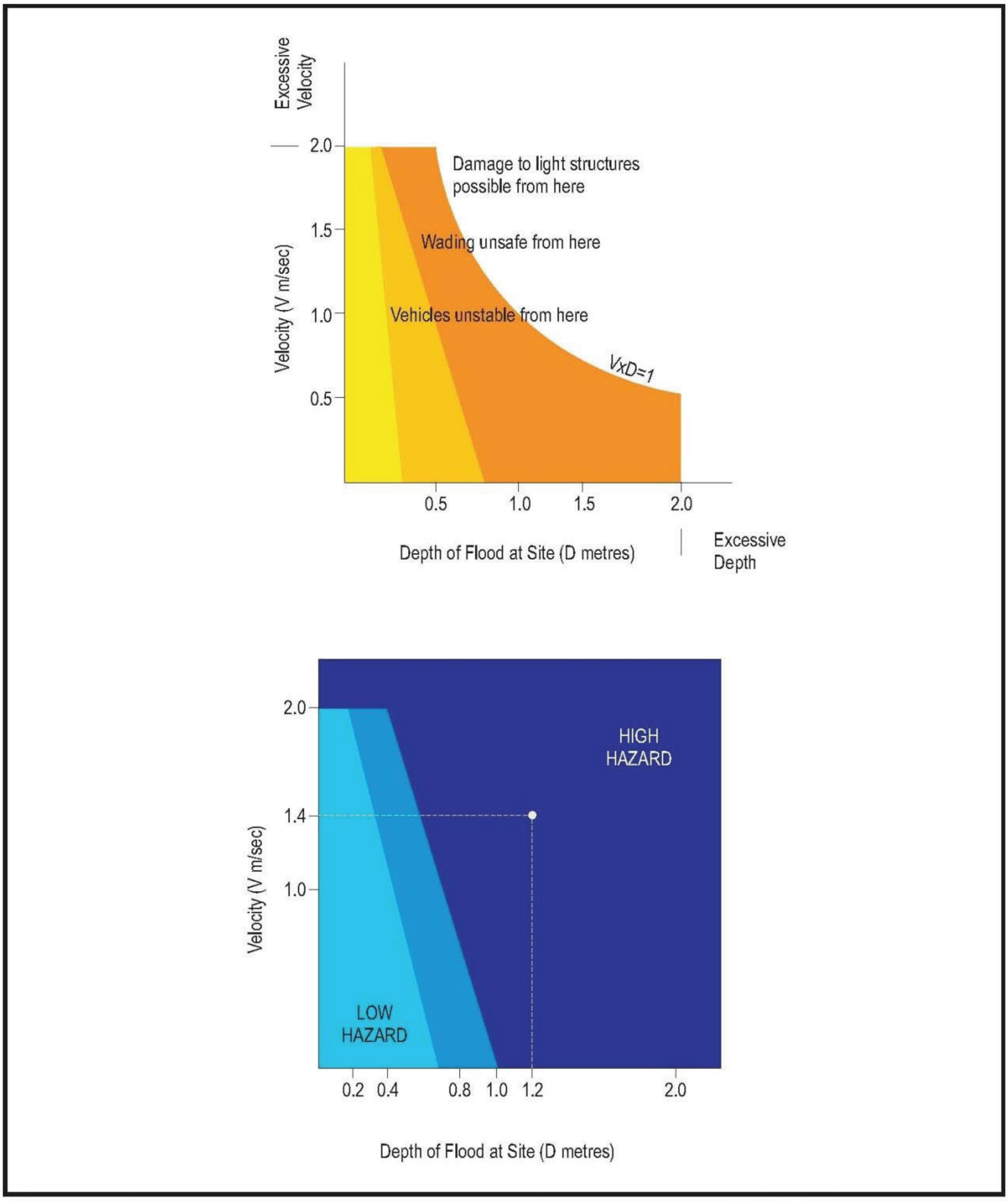


Figure 6.3 Flood Hazard Categories

6.3.1 *Floodway Extents*

The NSW Floodplain Development Manual defines floodways as the areas of the floodplain which convey a significant proportion of the flood flow and where partial blocking will adversely affect flood behaviour. Velocities and depths are usually highest in this section of the floodplain.

Although not specifically quantified in the NSW Floodplain Development Manual, the boundaries of the floodway were determined by progressively increasing blockage until an afflux of 0.3 m was produced. The floodway extents were then plotted, taking into consideration the topography and shape of the main stream channel.

Flood Storage Extents

Flood storage areas are defined by the NSW Floodplain Development Manual as those areas outside of the floodway and extending to the flood fringe that, if filled, would cause peak flood levels anywhere on the floodplain to increase by more than 0.1 m and/or the peak discharge downstream to increase by more than 10%. Flood storages are generally characterised by relatively low velocities.

Blockage was progressively increased from the flood extent lines until the flood levels were increased by more than 0.1 m or flood flows were increased by more than 10% downstream. Flood storage extents were then plotted, taking into consideration the topography and location within the overall flood prone area.

Flood Fringe Extents

Flood fringe areas are defined as those areas outside of the flood storage and extending to the edge of the floodplain that, if filled, would cause peak flood levels anywhere on the floodplain to increase by less than 0.1 m and the peak discharge downstream to increase by less than 10%. Flood fringes are generally characterised by zero or negligible velocities.

6.3.2 *Flood Hazard Categories*

Flood hazard relates to the threat to personal safety and structural damage caused by floods. The Floodplain Development Manual defines hazard categories as either:

- *High Hazard* – possible danger to personal safety, evacuation by trucks difficult, able bodied adults have difficulty wading to safety, potential for significant structural damage to buildings; or

- *Low Hazard* – trucks can evacuate people and their possessions, able-bodied adults would have little difficulty in wading to safety.

Flood hazard depends largely on the velocity and depth of floodwaters. These two parameters were used to define flood hazard areas throughout the study area.

TUFLOW incorporates a function to calculate the flood hazard category at all locations based on the velocity-depth relationship. Hazard areas were mapped and adjusted based on the velocity distribution.

6.4 MODELLED FLOOD BEHAVIOUR

6.4.1 Dooralong and Yarramalong Valleys

Flood levels and velocities determined from the TUFLOW model for existing and subsided topography are presented in ***Annex H***. This data was used to produce 1% and 20% AEP flood maps for both scenarios as presented in ***Annex I***. The maps show:

- the extent of the mine subsidence zone;
- property boundaries;
- flood extents;
- floodway, flood storage and flood fringe areas; and
- high hazard and low hazard areas.

Existing Flood Behaviour

The Dooralong and Yarramalong Valleys differ significantly in their flood behaviour.

Results for the Yarramalong Valley show that:

- the floodplain is relatively narrow (typically 300 to 600 m wide in comparison to the Dooralong Valley which is 900 to 1400 m wide);
- flood flows in the Yarramalong Valleys are twice as large as those in the Dooralong Valley;
- the floodway is approximately 100 to 200 m wide and restricted to the zone immediately adjacent to the river;
- the flood storage areas extend almost to the flood limits with the flood fringe making up less than 5% of the total floodplain area;
- flow velocities in the main channel range from 0.7 to 2.2 m/s and the overbank velocities range from 0.3 to 0.6 m/s; and

- the majority of the floodplain is classified as high hazard based on flood depths. Velocities are typically low except in the main river channel and downstream of bridges and other constrictions to flow.

The Dooralong Valley results show that:

- the flood fringe in the valley areas is more extensive than in the Yarramalong Valley. Flood fringe areas are generally between 10% and 20% of the floodplain area;
- the floodway is typically 50 to 100 m wide;
- the majority of the floodplain is classified as low hazard storage;
- main channel velocities range from 0.5 to 2.0 m/s and the overbank velocities range from 0.02 to 0.6 m/s;
- high hazard zones are mainly restricted to low lying areas adjacent to Jilliby Jilliby Creek and large farm dams; and
- flood behaviour in the lower 2.5 km of the Dooralong Valley is affected by backwater from the Wyong River and is classified as high hazard based on flood depths.

Post-Subsidence Flood Behaviour

Mine subsidence will generally lower the topography of parts of the Dooralong Valley and, to a much lesser extent, the Yarramalong Valley and will subsequently cause a change in the flood behaviour within the valleys. This has the potential to impact on existing properties and future developments in the area. Maps for existing and subsided scenarios showing both the 1% and 20% AEP flood extents are presented in ***Annex I*** with an overview map provided in ***Figure 6.4***.

Flood behaviour in the Yarramalong Valley will not significantly change as a result of subsidence. The model indicates flood levels generally reduce by 0.01 to 0.03 m in the study area. This is due to the detention effects in the subsided areas of the Dooralong Valley which reduces the peak flows in the lower reaches of Jilliby Jilliby Creek and consequently reduces peak flows and flood levels in the lower reaches of the Wyong River.

Flood depths in the Yarramalong Valley reduce by a similar amount with the exception of a section of flood fringe on the left bank of the Wyong River where depths increase in three small backwater areas due to subsidence of the topography in these locations. Only one residence (D0042) will experience an increase in flood depth greater than 0.17 m; however, this house has a floor level high enough to maintain adequate freeboard after mining subsidence has occurred. With the exception of these three backwaters where the flood fringe will increase by a total of 5.21 ha as a result of subsidence, lateral flood extents within the Yarramalong Valley will reduce by up to 5 m after subsidence resulting in a reduction in flood prone land of 0.55 ha. Flow velocities will be unaffected.

Results for the Dooralong Valley show that, for a 1% AEP event:

- post-subsidence flood levels within the study area were generally between zero and 1.31 m lower than levels for existing conditions (this is a function of water levels dropping with the subsided land surface);
- flood depths increased by up to 1.35 m but generally increased by less than 0.5 m in most of the subsidence areas and reduced slightly elsewhere in the valley;
- inundation extents increased by up to 240 m within the areas directly affected by subsidence;
- inundation increased by a net area of 28.25 ha, comprising an additional 33.23 ha of land which will be inundated and 4.98 ha of land which will no longer be inundated;
- changes to flood behaviour in Jilliby Jilliby Creek extended over a distance of approximately 8.7 km upstream from its confluence with the Wyong River;
- post-subsidence flow velocities were similar to existing velocities;
- flood behaviour in the downstream reaches of Little Jilliby Jilliby Creek is effectively governed by flood levels in Jilliby Jilliby Creek;
- Myrtle Creek, a tributary to Little Jilliby Jilliby Creek, has a critical duration storm which will be much shorter than the 30 hour duration for the Dooralong/Yarramalong system; however no dwellings are close enough to be affected by higher flood levels in Myrtle Creek.

Downstream of the confluence of Jilliby Jilliby Creek and the Wyong River flood levels reduced by up to 0.02 m with a consequent small reduction in inundation extent and area. This is also a result of detention effects.

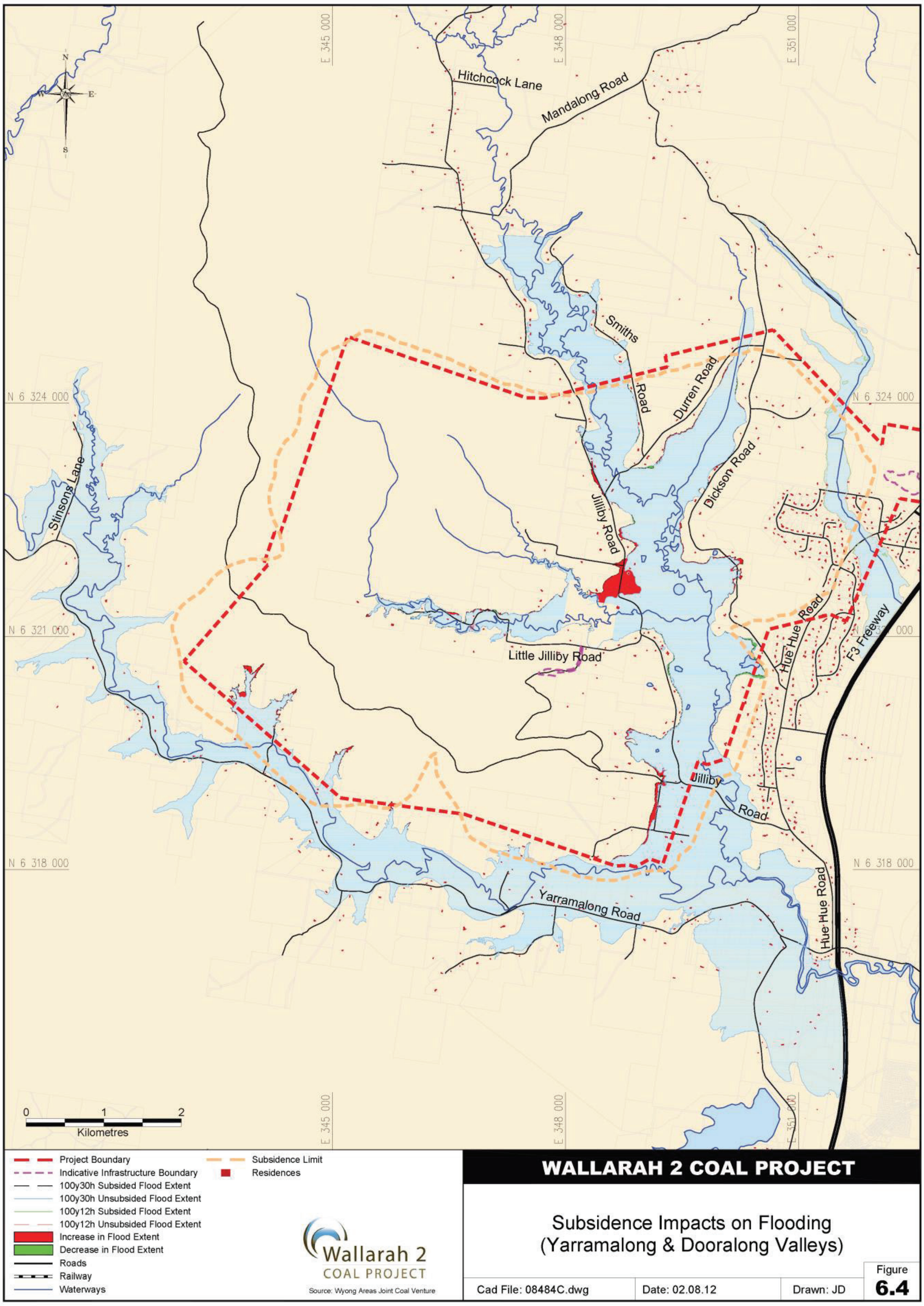


Figure 6.4 Subsidence Impacts on Flood Extent (Yarramalong and Dooralong Valleys)

Flood Hazard and Hydraulic Categories

Hydraulic categories in the 1% and 20% AEP floods will be altered in several areas within the subsidence zone. In areas which are negatively impacted, development controls may be required to ensure appropriate land uses in the future.

Current studies indicated that the major negative impacts in the Dooralong Valley were:

- 28 ha previously classified as flood fringe would become flood storage and
- 12 ha previously classified as flood storage would become floodway.

The major positive impacts in the Dooralong Valley were:

- 7 ha previously classified as flood storage would become flood fringe and
- 4 ha previously classified as floodway would become flood storage.

There were no significant changes in flood hazard and hydraulic categories in the Yarramalong Valley for the current mine plan. This is mainly a consequence of previous changes to the mine plan to curtail mining so that almost all subsidence is outside of the Wyong River floodplain. With the exception of three small backwaters on the left bank of the Wyong River, there will be no discernible overall flood impacts. Within these backwaters, the 1%AEP flood fringe will extend by up to 150 m to cover an additional 5.21 ha in total. This is due to direct subsidence impacts on topography in a backwater area rather than changes to the 1% AEP flood levels in the Wyong River (i.e. reduced ground levels with essentially unchanged flood levels).

A number of flood prone properties within the Dooralong Valley will be subjected to both positive and negative changes in flood hazard and flood hydraulic categories following mining. Areas of the floodplain which are negatively impacted may require development controls which are appropriate to the new flood category. Development controls are discussed in ***Section* 7**.

6.4.2 Hue Hue Catchment

Flood levels, flood depths and flow velocities were calculated along the entire length of Hue Hue Creek. Detailed results are tabulated in ***Annex J***.

TUFLOW modelling indicated that flood depths may increase as a result of subsidence by up to 0.64 m in some locations. ***Figure 6.5*** shows the impact that subsidence has on flood extents along Hue Hue Creek.

Modelling of existing conditions indicated that three of the four road/access road crossings of Hue Hue Creek which are upstream of the F3 Freeway are inundated during a 1%AEP event. It is only the Cottesloe Road property access crossing that does not overtop. This is also the case under subsided conditions. The model indicated that the F3 Freeway is well above the 1% AEP flood level both for existing and subsided conditions.

Results for Hue Hue Creek show that:

- the floodplain is relatively narrow - typically 200 to 300 m wide and broadening to 500 m wide near the F3 Freeway;
- flood flows are much smaller than those in the Dooralong and Yarramalong Valleys;
- the floodway is approximately 100 to 150 m wide and restricted to the zone immediately adjacent to the creek;
- the flood storage areas extend almost to the flood limits with the flood fringe making up less than 6% of the total floodplain area;
- the F3 Freeway acts as a dam resulting in low velocities immediately upstream of its embankment;
- Sandra Street and Hue Hue Road act in a similar way as hydraulic controls but, unlike the F3 Freeway, both roads are overtopped in the 1% AEP flood; and
- the majority of the floodplain is classified as high hazard based on flood depths. Velocities are typically low except in the upper reaches of the catchment, immediately downstream of Hue Hue Road and through a narrowing of the floodplain between Sandra Street and Hue Hue Road.

Post-subsidence results for Hue Hue Creek show that:

- post-subsidence flood levels within the study area were generally less than 0.1 m lower than levels for existing conditions except upstream of Sandra Street where levels dropped by up to 0.5 m (this is a function of water levels dropping with the subsided land surface and Sandra Street acting as a weir);
- flood depths increased by up to 0.64 m over a small area but generally increased by less than 0.3 m over most of the subsided areas and decreased very slightly (<0.01 m) in other areas;
- inundation extents increased by up to 30 m within the areas directly affected by subsidence - limited to a 1.6 km reach along the right

(western) bank between Cottosloe Road and just upstream of Hue Hue Road;

- inundation extent increased by a net area of 1.11 ha, comprising an additional 1.92 ha of land which will be inundated and 0.81 ha of land which will no longer be inundated;
- post-subsidence flow velocities were similar to existing velocities; and
- there was negligible change to flood hazard categories except immediately adjacent to Sandra Street where the greater subsidence along the right bank created greater depths of flow overtopping the road in this vicinity.

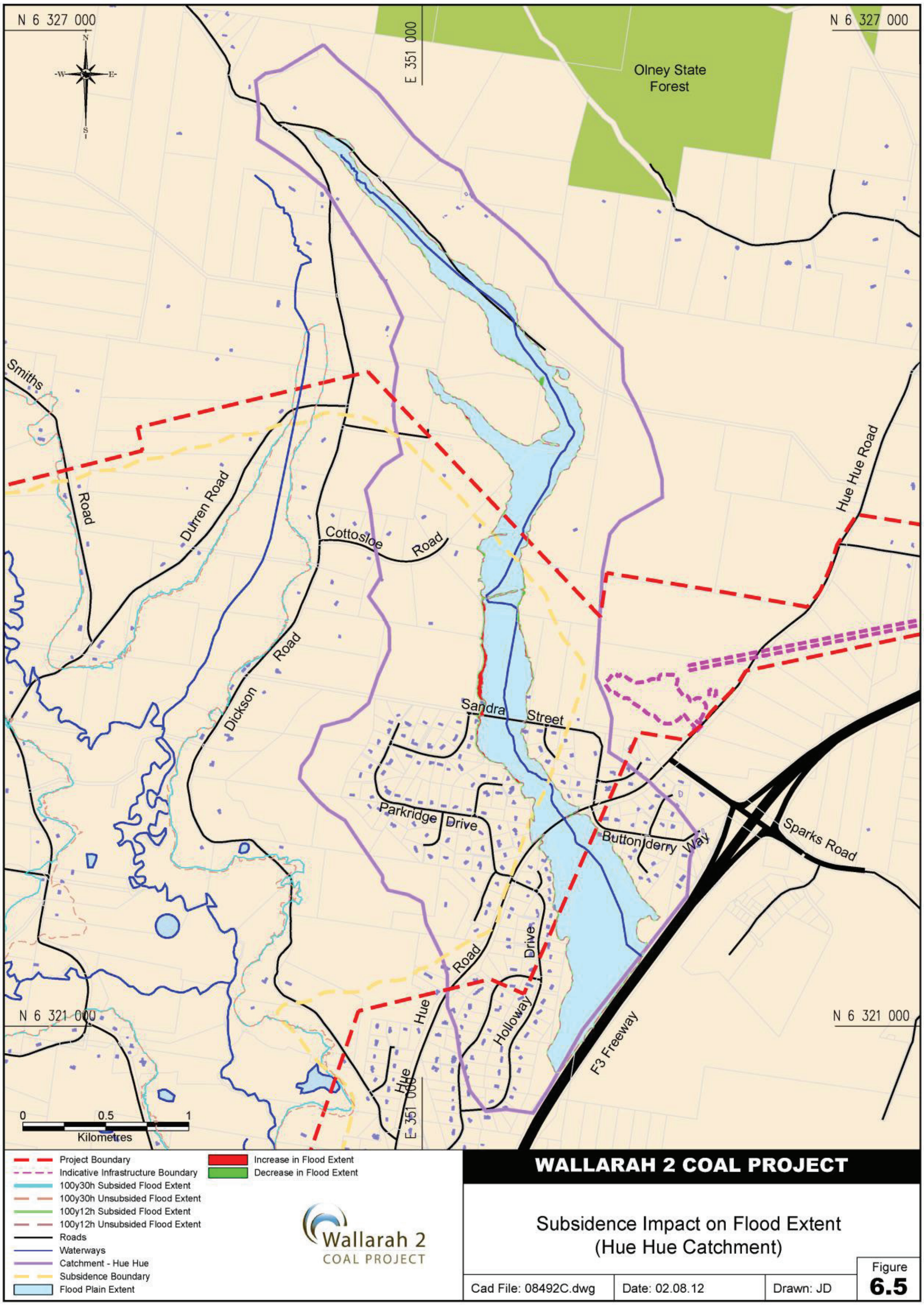


Figure 6.5 Subsidence Impact on Flood Extent (Hue Hue Catchment)

6.4.3 *Wallarah Creek*

Although not affected by subsidence, Wallarah Creek is adjacent to the proposed surface facilities. Consequently, it will be necessary to ensure that all structures, dams, embankments, plant and equipment are outside the 1% AEP flood extent. It will also be necessary to ensure any afflux that might be caused by the two rail crossings does not affect any other properties or public infrastructure. In addition, it will be necessary to ensure that runoff from paved and other disturbed areas within the surface facilities does not increase flows into Wallarah Creek or adversely impact water quality.

The extent of the 1% AEP flood in Wallarah Creek is shown in ***Figure I-11*** in ***Annex I***. The culvert under the F3-Pacific Highway Link Road acts as a hydraulic control and all potential afflux is fully contained within the surface facility site boundary.

6.5 *MODEL SENSITIVITY*

A number of scenarios were modelled to assess the sensitivity of the model to a range of potential variations to input parameters. The parameters tested included:

- initial and continuing losses;
- rainfall intensities;
- material properties (Manning's n - roughness coefficients);
- tailwater levels; and
- subsidence predictions.

It is important to note that while absolute values of flood levels and depths are important, it is the changes in differences between pre and post-mining conditions that need to be used to assess the sensitivity of the model. The critical 1% AEP flood was used for all sensitivity model runs and scenarios were compared against the base case on the basis of flood depths.

Initial and Continuing Losses

In the base case model, relatively low values of initial losses (15 to 20 mm) and continuing losses (1.5 mm/h) were used. This was partly a consequence of the requirement to calibrate the model against historical floods. It is not normal practice to artificially reduce losses in combination with design storms as this incorrectly alters the storm probability. However, to assess the potential impact of a pre-saturated catchment, the model was run for an initial loss of 5 mm and a continuing loss of 1 mm/h.

Rainfall Intensities

As a conservative allowance for potential climate change impacts, design rainfall intensities were increased by 20% for the sensitivity analysis.

Material Properties

Material properties were developed in the base model to enable calibration against historical floods. Although it is unlikely that model roughnesses will increase unless significant areas are revegetated, the values of Manning's n were increased by 10% as part of the sensitivity analysis.

Tailwater Levels

It is almost impossible for sea level increases to significantly impact on normal flood levels upstream of the Wyong Weir. However, as part of the sensitivity analysis, the upper bound estimate of 1.1 m was added to the tailwater rating curve used in the base model.

Subsidence Predictions

The subsidence predictions used in the base model were upper bound estimates. Subsidence levels will require validation during the initial years of mining and it is expected that they will be in the range of 50% to 100% of the predicted values used in the model. To assess the impacts of this uncertainty, sensitivity runs were made for 50%, 75% and 100% subsidence.

Sensitivity Results

Output from sensitivity runs was reported at key points throughout the model and is summarised in ***Table 6.6***.

As would be expected, the low losses scenario and the high rainfall scenario result in greater flows in all waterways and consequently greater flood levels and depths. However, flow velocities did not vary significantly so that hazard categories did not change significantly. No additional dwellings were inundated under these two sensitivity scenarios; however, the dwellings and properties previously identified in ***Tables 6.1 to 6.5*** would all have increased inundation or reduced freeboard under these conditions. Flood depths increased by less than 0.02 m for the low loss subsided scenario, which is inconsequential and shows there is little sensitivity of the model to antecedent wetness conditions. Flood depths increased by less than 0.45 m for the 120% factored rainfall scenario. Under these conditions:

- 3 dwellings would change from Category B3 to A1;
- 1 would change from C1 to A1;
- 3 would change from C1 to B2;

- 1 would change from C2 to C1; and
- 1 would change from C3 to C1.

It should be noted that neither scenario is representative of design (1% AEP) conditions but should be revisited should greater understanding and confirmation of climate change result in changes to the design storms determined by AR&R.

Changes to material properties (i.e. increasing Manning's n by 10%) resulted in slightly reduced peak flows but increases to peak flood levels of up to 0.15 m. This would not significantly alter the degree to which dwellings and properties are predicted to be impacted and would change one dwelling from C3 to C1 and one dwelling from C1 to B2.

Changes to tailwater by adding 1.1 m to the tailwater rating curve resulted in virtually no changes to flooding beyond about 600 m upstream of the F3 Freeway. This is similar to the findings of previous studies which showed that flood levels in the zone of the study area affected by subsidence were completely insensitive to tailwater levels at the downstream end of the model. In the case of Hue Hue Creek, there was no significant change in flood levels upstream of the F3 Freeway and none upstream of Hue Hue Road. This is due to the constriction of culverts under the freeway acting as a hydraulic control on water levels upstream over the full range of design flows. In addition, Hue Hue Road also acts as a hydraulic control with almost no influence from water levels between it and the F3 Freeway on upstream flows and levels.

As expected, reduced values of subsidence result in reduced flood impacts throughout the study area. While subsidence can be expected to be less than the values used in the base case model, it is proposed as part of this assessment to use upper bound estimates of subsidence throughout.

Of note: for all scenarios other than the reduced losses scenario, there was very little change in flood levels between pre and post-subsidence conditions. In other words; there was little sensitivity in the degree of adverse impacts resulting from changes to model parameters. The reduced initial and continuing losses actually reduced the differences between pre and post-subsidence flood depths, even though flood levels increased slightly for both. This is an outcome of changes to the shape of the hydrographs due to earlier commencement of excess rainfall and may be different for different duration storms.

Comparison with other Studies

It was found that hydraulic controls were established for Hue Hue Creek at culverts under Hue Hue Road and the F3 Freeway resulting in tailwater levels downstream of the F3 to Porters Creek having negligible impacts in the study area. As a comparison, the 1% AEP flood extent was overlayed on the (equivalent) Flood Planning Area in Figure 3 of the Draft Porters Creek Flood Plain Risk Management Plan and found to match almost exactly.

Tailwater levels calculated by the model were compared against the two reports on the Upper and Lower Wyong River Floodplain Risk Management Studies (ref PWD and Paterson Consultants) and were consistently higher than corresponding peak levels stated in these reports (e.g. 1% AEP level at F3 of 7.70 mAHD compared to 6.45 mAHD)

Hydrographs calculated at locations equivalent to input points from hydrological models used in previous ERM models were found to be similar to those using the original RAFTS model.

Flood levels calculated by the TUFLOW model were generally similar to those calculated by the earlier MIKE11 model but showed some moderate differences in some locations. These differences appear to be mainly due to the 2D variation across floodplains that can be more accurately estimated by TUFLOW.

6.6 *IMPACTS ON DWELLINGS AND PROPERTY*

Model results were output at all dwellings and major building locations identified as being within or close to the floodplains. It is important to note that the locations of buildings and the levels of surrounding grounds can be determined accurately from aerial photographs and DTM information. However, floor levels could not be accurately determined where access was not available to properties. It will be ***essential*** that all floor levels are accurately surveyed as part of the preparation of individual Property Subsidence Management Plans (PSMP) for every property identified in this report as potentially experiencing adverse impacts as a result of changes to flood behaviour due to mining induced subsidence.

6.6.1 *Dooralong and Yarramalong Valleys*

Post-subsidence flood impacts to properties and dwellings were determined via a hazard assessment which aimed to:

- determine what changes, if any, would be required to existing dwellings so that existing flood conditions are not exacerbated; and
- examine the development controls required for properties which have been negatively impacted due to a change in flood hazard or flood category.

Within the study area, there are 283 properties which have land located within the floodplains of the Wyong River and Jilliby Jilliby Creek. There are 87 dwellings located within or close to the floodplains that have been assessed in detail as part of this flood study. The majority of these dwellings are located in low hazard flood storage or low hazard flood fringe zones. An additional 13 dwellings located within the floodplain close to the F3 Freeway and south towards Deep Creek were not included in this assessment as they are considered too distant from the subsidence area to be relevant and were shown by the model to have the same level of minor beneficial impacts (i.e. reduced flooding) as most other dwellings in the Yarramalong Valley.

Flood behaviour near flood prone dwellings was determined for pre and post mining scenarios to determine which dwellings will be negatively impacted. The assessment included those dwellings that are fully or partially inside the flood extents or are close enough to the flood extent that freeboard could be a concern (generally where floor levels are less than 1.5 m above flood levels).

Dwellings impacted by subsidence related changes to the 1% and 20% AEP floods are identified in ***Table 6.1***. The extent of impacts for these floods is given in ***Table 6.2***. It is known that at least five of the "dwellings" throughout the flood study area are more accurately described as "sheds" and should probably not be considered as primary dwellings.

In the study area, of the 88 flood affected dwellings, 33 dwellings and two sheds will be adversely affected, 39 dwellings (three of which are sheds) will be beneficially impacted to a slight degree or better (i.e. reduced flooding) and 14 will be unchanged.

Of the 33 dwellings and two sheds adversely affected, four dwellings (D0060, D0061, D0063 and D0855) which would not currently be subject to inundation (flood level greater than floor level) in the 1% AEP flood will be subject to inundation after subsidence. This is considered to be the most severe adverse impact (Category A1). Ten dwellings and two shed (D0237, D0017, D0041, D0058, D0767, D0776, D0051, D0615, D0736, D0851 and S0776 and S0041) that are already prone to inundation will be subjected to increased flood inundation after subsidence - this also indicates that these dwellings will be flooded more frequently and by lesser floods after subsidence. The remaining 19 dwellings will have reduced freeboard (height of floor above flood level) but will not be inundated and six of these will have freeboard of less than 0.3 m after subsidence.

For the 39 dwellings that are potentially beneficially affected, 33 will have very minor to negligible decreases in inundation and six will have slightly increased freeboards.

In the Yarramalong Valley eight houses and one shed will be adversely affected as a direct result of subsidence rather than any change in flood levels. Only five of these buildings (D0767, D0615, D0051, D0041 and S0041) have the potential to become inundated.

Floor levels that were not able to be confirmed either by survey or by visual comparison against nearby datum points were assumed to be 0.3 m above ground level. This assumption will be confirmed during the preparation of individual Property Subsidence Management Plans (PSMP) prior to the commencement of mining in that locality.

For the 20% AEP flood after subsidence, 33 dwellings will be adversely affected, 36 will be beneficially affected and the remainder will be unchanged. Only 10 dwellings will be subjected to increased inundation and 9 will have decreased inundation during a 20%AEP flood. This is considered to be an appropriate indicator of the overall change in frequency of flood impacts on dwellings.

Impact categories were developed to summarise the severity of impacts that may occur to dwellings and to property inundation as a result of subsidence impacts on flooding. These are given in ***Table 6.3*** and ***Table 6.4*** and are cross-referenced in ***Table 6.1*** and ***Table 6.2***. It would be reasonable to expect that mitigation works will be required for dwellings in Category A (Major Impacts) and Category B (Moderate Impacts). However, dwellings in other categories are unlikely to require mitigation works.

Mitigation options for dwellings which will be moderately or highly impacted by increased flood depths as a result of mine related subsidence are discussed in ***Section 7***.

6.6.2 Hue Hue Catchment

There are a number of dwellings (including at least one shed or non-primary dwelling) located along the length of Hue Hue Creek that are close to the 1% AEP flood extent. Most of these dwellings are located between Sandra Street and the F3 Freeway and two dwellings are located just upstream of Sandra Street. Currently four of these dwellings are flood affected during a 1% AEP event:

- only one dwelling is inundated (i.e. flood water above floor levels) during the 1% AEP flood under existing conditions;
- one dwelling is flood affected as a result of having direct access to Cottesloe Road cut during a 1%AEP flood but has secondary access via the neighbouring property; and
- two dwellings have less than 0.3 m freeboard.

The TUFLOW model indicated that subsidence would cause:

- one dwelling that is currently not flood impacted will become inundated (Category A1);
- the one dwelling currently subject to inundation will experience greater and more frequent inundation;
- the access of one dwelling to Cottesloe Road will be unchanged;
- one dwelling will have freeboard reduced significantly to < 0.3 m;
- three will have reduced freeboard but will retain freeboard >0.5 m; and
- the other ten dwellings included in this assessment will experience beneficial impacts of between 0.01 and 0.05 m increase in freeboard.

Table 6.3 indicates which dwellings are affected, their estimated floor levels, predicted 1% AEP flood level and freeboards before and after subsidence.

6.6.3 Wallarah Creek

There will be no adverse impacts on properties, dwellings or public infrastructure as a result of any changes to flood behaviour in Wallarah Creek. Depending on the degree to which runoff from the surface facilities site is detained, there may be potential to slightly reduce flood flows in Wallarah Creek.

Table 6.1 Dwellings Potentially Affected by Flooding - Dooralong and Yarramalong Valleys

Dwelling ID	Existing Ground Level (mAHD)	Existing Floor Level (mAHD)	Subsidence (m)	Subsided Ground Level (mAHD)	Subsided Floor Level (mAHD)	Within Subsidence Zone	Within Existing 1% AEP Flood Extent	Within Subsided 1% AEP Flood Extent	Within Existing 20% AEP Flood Extent	Within Subsided 20% AEP Flood Extent	Comment
Adverse Impacts											
D0060 DV	11.48	12.18	-1.311	10.16	10.86	Y	Y (part)	Y	N	N	Not currently inundated
D0061 DV	10.36	11.06	-0.393	9.96	10.66	Y	N	Y	N	N	Not currently inundated
D0063 DV	10.29	10.79	-1.361	8.93	9.43	Y	Y	Y	N	Y	Not currently inundated
D0855 DV	26.42	26.72*	-0.08	26.34	26.64	Y	Y	Y	N	N	Not currently inundated
D0237 DV	13.63	13.93*	-1.12	12.51	12.81	Y	Y	Y	N	Y	Not currently inundated by 20% AEP
D0017 DV	9.5	10.08	-0.139	9.36	9.94	Y	Y	Y	Y	Y	Increased Inundation by >0.3 m
D0041	17.46	17.76*	-0.096	17.36	17.66	Y	Y	Y	N	N	Increased Inundation
D0058 DV	9.59	10.29	-0.173	9.42	10.12	Y	Y	Y	N	N	Increased Inundation
D/S0767	18.15	18.45*	-0.197	17.95	18.25	Y	Y	Y	Y	Y	Increased Inundation
D0776 DV	15.86	16.16*	-1.417	14.44	14.74	Y	Y*	Y	Y	Y	Increased Inundation
S0041	15.11	15.41*	-0.068	15.04	15.34	Y	Y	Y	Y	Y	Increased Inundation
D0240 DV	16.8	17.10*	-1.19	15.61	15.91	Y	N (but on island)	Y	N	N	Freeboard reduced to < 0.3 m
D0870 DV	11.66	11.96*	-0.928	10.73	11.03	Y	N	Y	N	N	Freeboard reduced to < 0.3 m

Dwelling ID	Existing Ground Level (mAHD)	Existing Floor Level (mAHD)	Subsidence (m)	Subsided Ground Level (mAHD)	Subsided Floor Level (mAHD)	Within Subsidence Zone	Within Existing 1% AEP Flood Extent	Within Subsided 1% AEP Flood Extent	Within Existing 20% AEP Flood Extent	Within Subsided 20% AEP Flood Extent	Comment
D0049	13.7	14.00*	-0.027	13.67	13.97	Y	Y	Y	N	N	Freeboard reduced, and < 0.3 m
D0203 DV	24.7	25.00*	-0.07	24.63	24.93	Y	Y	Y	N	N	Freeboard reduced, and < 0.3 m
D0862 DV	15	15.30*	-0.881	14.12	14.42	Y	N	Y	N	N	Freeboard reduced, and < 0.3 m
D0863 DV	14.5	14.80*	-1.182	13.32	13.62	Y	N	Y	N	Y	Freeboard reduced, and < 0.3 m
D0051	13.34	13.84	-0.005	13.33	13.83	N	Y	Y	N	N	Increased Inundation by <50 mm
D0615	13.47	13.77*	-0.018	13.45	13.75	Y	Y	Y	N	N	Increased Inundation by <50 mm
D0736 DV	9.8	10.7	-0.042	9.76	10.66	Y	Y	Y	Y	Y	Increased Inundation by <50 mm
D0851 DV	15.25	15.55*	-1.311	13.94	14.24	Y	Y	Y	Y	Y	Increased Inundation by <50 mm
D0432 DV	14.92	15.22*	-1.347	13.57	13.87	Y	N	N	N	N	Freeboard reduced, but > 0.3 m
D0737 DV	11.29	11.92	-0.796	10.49	11.12	Y	N	Y	N	N	Freeboard reduced, but > 0.3 m
D0042	18.66	21.86	-0.515	18.15	21.35	Y	Y	Y	N	N	Freeboard reduced, but > 0.5 m
D0050	13.58	14.81	-0.028	13.55	14.79	Y	Y	Y	N	N	Freeboard reduced, but > 0.5 m
D0197 DV	16.31	16.61*	-1.325	14.99	15.29	Y	N	N	N	N	Freeboard reduced, but > 0.5 m
D0207 DV	13.74	15	-1.166	12.57	13.83	Y	Y	Y	N	N	Freeboard reduced, but > 0.5 m
D0209 DV	15.33	15.6	-1.076	14.25	14.52	Y	N	N	N	N	Freeboard reduced, but > 0.5 m
D0220 DV	15.3	15.60*	-1.156	14.14	14.44	Y	N	N but on island	N	N	Freeboard reduced, but > 0.5 m

Dwelling ID	Existing Ground Level (mAHD)	Existing Floor Level (mAHD)	Subsidence (m)	Subsided Ground Level (mAHD)	Subsided Floor Level (mAHD)	Within Subsidence Zone	Within Existing 1% AEP Flood Extent	Within Subsided 1% AEP Flood Extent	Within Existing 20% AEP Flood Extent	Within Subsided 20% AEP Flood Extent	Comment
D0221 DV	15.83	16.13*	-1.01	14.82	15.12	Y	N	N but on island	N	N	Freeboard reduced, but > 0.5 m
D0236 DV	16	16.30*	-1.214	14.78	15.08	Y	N	N	N	N	Freeboard reduced, but > 0.5 m
D0614	13.76	14.06*	-0.043	13.72	14	Y	N	N	N	N	Freeboard reduced, but > 0.5 m
D0713 DV	15.31	15.61*	-1.2	14.11	14.41	Y	N	N	N	N	Freeboard reduced, but > 0.5 m
D0773 DV	16.37	17.47	-1.326	15.05	16.15	Y	Y	Y	Y	Y	Freeboard reduced, but > 0.5 m
Beneficial Impacts											
D0226 DV	22.95	23.25*	-0.12	22.81	23.11	Y	Y	N	N	N	Increased Freeboard to >0.3 m
D0852 DV	15.5	15.80*	-1.197	14.3	14.6	Y	Y	Y	Y	Y	Reduced Inundation by >50 mm
D0002	19.5	19.8	0	19.5	19.8	N	Y	Y	Y	Y	Reduced Inundation
D0003	21.84	23.8	0	21.84	23.8	N	Y (part)	Y (part)	N	N	Increased freeboard
D0004	19.66	21.86	0	19.66	21.86	N	Y	Y	N	N	Increased freeboard
D0012	18.97	20.17	0	18.97	20.17	N	Y	Y	N	N	Reduced Inundation
D0035	13.73	14.13	0	13.73	14.13	N	Y	Y	Y	Y	Reduced Inundation
D0038	16.5	16.8	0	16.5	16.8	N	Y	Y	Y	Y	Reduced Inundation
D0040	15.77	16.57	0	15.77	16.57	N	Y	Y	Y	Y	Reduced Inundation
D0052	12.42	12.92	0	12.42	12.92	N	Y	Y	Y	Y	Reduced Inundation

Dwelling ID	Existing Ground Level (mAHD)	Existing Floor Level (mAHD)	Subsidence (m)	Subsided Ground Level (mAHD)	Subsided Floor Level (mAHD)	Within Subsidence Zone	Within Existing 1% AEP Flood Extent	Within Subsided 1% AEP Flood Extent	Within Existing 20% AEP Flood Extent	Within Subsided 20% AEP Flood Extent	Comment
D0053	12.48	13.48	0	12.48	13.48	N	Y	Y	Y	Y	Reduced Inundation
D0089	10.48	11.28	0	10.48	11.28	N	Y	Y	Y	Y	Reduced Inundation
D0091	13.2	13.7	0	13.2	13.7	N	Y	Y	N	N	Reduced Inundation
D0097	12.69	13.39	0	12.69	13.39	N	Y	Y	N	N	Increased freeboard
D0099	10	10.30*	0	10	10.3	N	Y	Y	Y	Y	Reduced Inundation
D0103	12.5	13	0	12.5	13	N	Y	Y	Y	Y	Reduced Inundation
D0110	13	13.3	0	13	13.3	N	Y	Y	Y	Y	Reduced Inundation
D0113	11.39	11.99	0	11.39	11.99	N	Y	Y	Y	Y	Reduced Inundation
D0360	7.7	8.00*	0	7.7	8.00*	N	Y	Y			Reduced Inundation
D0361	7.7	8.00*	0	7.7	8.00*	N	Y	Y			Reduced Inundation
D0363	8.83	10.33	0	8.83	10.33	N	Y	Y	N	N	Increased freeboard
D0370	7.99	8.29	0	7.99	8.29	N	Y	Y	N	N	Reduced Inundation
D0372	6.71	7.01*	0	6.71	7.01*	N	Y	Y			Reduced Inundation
D0381	8.32	8.92	0	8.32	8.92	N	Y	Y	Y	Y	Reduced Inundation
D0382	6.75	8.05*	0	6.75	8.05*	N	Y	Y			Reduced Inundation
D0383	8.1	8.40*	0	8.1	8.40*	N	Y	Y			Reduced Inundation
D0385	9.5	9.8	0	9.5	9.8	N	Y	Y	N	N	Reduced Inundation

Dwelling ID	Existing Ground Level (mAHD)	Existing Floor Level (mAHD)	Subsidence (m)	Subsided Ground Level (mAHD)	Subsided Floor Level (mAHD)	Within Subsidence Zone	Within Existing 1% AEP Flood Extent	Within Subsided 1% AEP Flood Extent	Within Existing 20% AEP Flood Extent	Within Subsided 20% AEP Flood Extent	Comment
D0734	11.94	12.62	0	11.94	12.62	N	Y	Y	Y	Y	Reduced Inundation
D0739	11.5	11.80*	0	11.5	11.8	N	Y	Y	Y	Y	Reduced Inundation
D0820	20.32	20.62*	0	20.32	20.62	N	Y	Y	N	N	Reduced Inundation
D0828	19.5	19.80*	0	19.5	19.8	N	Y	Y	Y	Y	Reduced Inundation
D0875 DV	16.95	17.25*	-1.23	15.72	16.02	Y	N	N	N	N	Increased freeboard
D0876	19.11	19.41*	0	19.11	19.41	N	Y	Y	Y	Y	Reduced Inundation
D0885	11.55	11.85*	0	11.55	11.85*	N	Y	Y			Reduced Inundation
D0886	10.93	11.23*	0	10.93	11.23*	N	Y	Y			Reduced Inundation
D0889	8.6	8.90*	0	8.6	8.90*	N	Y	Y			Reduced Inundation
S0101	10.49	10.79*	0	10.49	10.79	N	Y	Y	Y	Y	Reduced Inundation
S0371	8.83	8.83	0	8.83	8.83	N	Y	Y	N	N	Reduced Inundation
S0824	16.71	17.01*	-0.017	16.69	16.99	N	Y	Y	Y	Y	Reduced Inundation
Unchanged											
D0006	21.7	22*	0	21.7	22*	N	Y	Y	N	N	No change to inundation
D0009	21.57	22.57	0	21.57	22.57	N	Y	Y	N	N	No change to inundation
D0048	15.06	15.86	0	15.06	15.86	N	Y	Y	Y	Y	No change to inundation
D0106	10.31	10.61*	0	10.31	10.61	N	N	N	N	N	No change to inundation

Dwelling ID	Existing Ground Level (mAHD)	Existing Floor Level (mAHD)	Subsidence (m)	Subsided Ground Level (mAHD)	Subsided Floor Level (mAHD)	Within Subsidence Zone	Within Existing 1% AEP Flood Extent	Within Subsided 1% AEP Flood Extent	Within Existing 20% AEP Flood Extent	Within Subsided 20% AEP Flood Extent	Comment
D0108	11	11.30*	0	11	11.3	N	Y	Y	N	N	No change to inundation
D0115	13.84	14.34	0	13.84	14.34	N	Y	Y	N	N	No change to inundation
D0170 DV	20.28	21.6	0	20.28	21.6	N	Y (part)	Y (part)	N	N	No change to inundation
D0201 DV	20.93	22.15	0	20.93	22.15	N	Y	Y	N	N	No change to inundation
D0377	7.37	7.67*	0	7.37	7.67*	N	Y	Y			No change to inundation
D0384	7.5	7.80*	0	7.5	7.80*	N	Y	Y			No change to inundation
D0712 DV	21.06	21.15	0	21.06	21.15	N	N	N	N	N	No change to inundation
D0869	14.71	15.01*	0	14.71	15.01	N	Y	Y	Y	Y	No change to inundation
S0048	15.33	15.33	0	15.33	15.33	N	Y	Y			No change to inundation
S0842	20.5	20.5	0	20.5	20.5	N	Y	Y			No change to inundation

- * Indicates that floor level was estimated assuming clearance of 0.3 m above ground level
- DV Located in Dooralong Valley (Note: all other dwellings are in Yarramalong Valley)

Table 6.2 Extent of Flood Impacts on Dwellings - Dooralong and Yarramalong Valleys

Dwelling ID	Cat.*	Existing 1% AEP Flood Level (mAHD)	Existing 1% AEP Flood Depth (m)	Existing 1% AEP Freeboard / (Inund.) (m)	Subsided 1% AEP Flood Level (mAHD)	Subsided 1% AEP Flood Depth (m)	Subsided 1% AEP Freeboard / (Inund.) (m)	Change in 1% AEP Freeboard (m)	Existing 20% AEP Flood Level (mAHD)	Existing 20% AEP Flood Depth (m)	Existing 20%AEP Freeboard / (Inund.) (m)	Subsided 20% AEP Flood Level (mAHD)	Subsided 20% AEP Flood Depth (m)	Subsided 20% AEP Freeboard / (Inund.) (m)	Change in 20% AEP Freeboard (m)
Adverse Impacts															
D0060 DV	A1	11.467	0.00	0.71	10.697	0.54	-(0.14)	-0.85	10.250	0.00	1.93	9.500	0.00	1.06	-0.87
D0061 DV	A1	10.698	0.34	0.36	10.697	0.74	-(0.04)	-0.40	9.7500	0.00	1.31	9.500	0.00	1.16	-0.15
D0063 DV	A1	10.710	0.42	0.08	10.703	1.77	-(1.27)	-1.35	9.887	0.00	0.90	9.482	0.55	-(0.05)	-0.96
D0855 DV	A1	26.450	0.03	0.27	26.750	0.41	-(0.11)	-0.38	26.000	0.00	0.72	25.750	0.00	0.89	0.17
D0237 DV	A2	13.935	0.30	-(0.01)	13.233	0.72	-(0.42)	-0.42	13.650	0.00	0.28	13.074	0.56	-(0.26)	-0.54
D0017 DV	B1	10.752	1.25	-(0.67)	10.745	1.39	-(0.81)	-0.92	9.800	0.30	0.28	9.750	0.39	0.89	-0.09
D0041	B2	18.437	0.98	-(0.68)	18.437	1.08	-(0.78)	-0.10	17.250	0.00	0.51	17.151	0.00	0.54	0.00
D0058 DV	B2	10.697	1.11	-(0.41)	10.695	1.27	-(0.57)	-0.17	9.642	0.05	0.65	9.461	0.04	0.66	0.01
D0767	B2	19.652	1.50	-(1.2)	19.619	1.67	-(1.37)	-0.17	18.059	0.09	0.39	18.018	0.07	0.23	-0.16
D0776 DV	B2	16.183	0.32	-(0.02)	14.914	0.47	-(0.17)	-0.15	16.101	0.24	0.06	14.822	0.38	-(0.08)	-0.14
S0776 DV	B2	16.183	0.32	-(0.02)	14.914	0.47	-(0.17)	-0.15	16.101	0.24	0.06	14.822	0.38	-(0.08)	-0.14
S0041	B2	18.487	3.38	-(3.08)	18.485	3.44	-(3.14)	-0.07	17.063	1.95	-(1.65)	17.059	2.019	-(1.72)	-0.07
D0240 DV	B3	16.200	0.00	0.90	15.650	0.04	0.26	-0.64	16.000	0.00	1.10	15.500	0.00	0.41	-0.69
D0870 DV	B3	10.950	0.00	1.01	10.750	0.02	0.28	-0.73	11.100	0.00	0.86	10.200	0.00	0.83	-0.03
D0049	C1	13.895	0.20	0.11	13.895	0.22	0.08	-0.03	13.465	0.00	0.54	13.442	0.00	0.53	-0.01
D0203 DV	C1	24.750	0.05	0.25	24.750	0.12	0.18	-0.07	24.310	0.00	0.69	24.310	0.00	0.62	-0.07
D0862 DV	C1	14.850	0.00	0.45	14.200	0.08	0.22	-0.23	14.750	0.00	0.55	14.100	0.00	0.32	-0.23

Dwelling ID	Cat.*	Existing 1% AEP Flood Level (mAHD)	Existing 1% AEP Flood Depth (m)	Existing 1% AEP Freeboard / (Inund.) (m)	Subsided 1% AEP Flood Level (mAHD)	Subsided 1% AEP Flood Depth (m)	Subsided 1% AEP Freeboard / (Inund.) (m)	Change in 1% AEP Freeboard (m)	Existing 20% AEP Flood Level (mAHD)	Existing 20% AEP Flood Depth (m)	Existing 20%AEP Freeboard / (Inund.) (m)	Subsided 20% AEP Flood Level (mAHD)	Subsided 20% AEP Flood Depth (m)	Subsided 20% AEP Freeboard / (Inund.) (m)	Change in 20% AEP Freeboard (m)
D0863 DV	C1	14.500	0.00	0.30	13.440	0.12	0.18	-0.12	14.000	0.00	0.80	13.25	0.00	0.37	-0.43
D0051	C2	13.873	0.53	-(0.04)	13.896	0.57	-(0.07)	-0.03	12.843	0.00	1.00	12.841	0.00	0.99	-0.01
D0615	C2	13.771	0.31	-(0.01)	13.760	0.32	-(0.02)	-0.01	12.750	0.00	1.02	12.74	0.00	1.01	-0.01
D0736 DV	C2	10.752	0.95	-(0.05)	10.754	0.99	-(0.09)	-0.04	9.750	0.00	0.95	9.740	0.00	0.92	-0.03
D0851 DV	C2	16.192	0.94	-(0.64)	14.885	0.95	-(0.65)	-0.01	15.558	0.31	-(0.01)	14.343	0.41	-(0.11)	-0.10
D0432 DV	C3	14.448	0.00	0.77	13.389	0.00	0.48	-0.29	14.360	0.00	0.86	13.235	0.00	0.63	-0.22
D0737 DV	C3	11.201	0.00	0.72	10.750	0.26	0.37	-0.35	9.750	0.00	2.17	9.450	0.00	1.67	-0.50
D0042	D	20.050	1.39	1.81	20.011	1.86	1.34	-0.47	18.287	0.00	3.57	18.243	0.00	3.11	-0.47
D0050	D	13.891	0.31	0.92	13.895	0.34	0.90	-0.02	12.845	0.00	1.97	12.841	0.00	1.95	-0.02
D0197 DV	D	14.450	0.00	2.16	13.390	0.00	1.90	-0.26	14.360	0.00	2.25	13.235	0.00	2.05	-0.20
D0207 DV	D	13.800	0.06	1.20	13.233	0.66	0.60	-0.60	13.770	0.03	1.23	13.200	0.63	0.63	-0.60
D0209 DV	D	13.750	0.00	1.85	13.400	0.00	1.12	-0.73	13.650	0.00	1.95	13.150	0.00	1.37	-0.58
D0220 DV	D	14.100	0.00	1.50	13.600	0.00	0.84	-0.66	13.950	0.00	1.65	13.250	0.00	1.19	-0.46
D0221 DV	D	14.650	0.00	1.48	13.950	1.17	1.29	-0.31	14.535	0.00	1.60	13.750	0.00	1.37	-0.23
D0236 DV	D	15.140	0.00	1.16	14.012	0.00	1.07	-0.09	15.018	0.00	1.28	13.905	0.00	1.17	-0.11
D0614	D	13.462	0.00	0.60	13.449	0.00	0.57	-0.03	12.413	0.00	1.65	12.401	0.00	1.62	-0.03
D0713 DV	D	14.610	0.00	1.00	13.510	0.00	0.90	-0.10	14.500	0.00	1.11	13.25	0.00	1.16	0.05
D0773 DV	D	16.550	0.18	0.92	15.250	0.20	0.90	-0.02	16.588	0.22	0.88	15.249	0.20	0.90	0.02

Dwelling ID	Cat.*	Existing 1% AEP Flood Level (mAHD)	Existing 1% AEP Flood Depth (m)	Existing 1% AEP Freeboard / (Inund.) (m)	Subsided 1% AEP Flood Level (mAHD)	Subsided 1% AEP Flood Depth (m)	Subsided 1% AEP Freeboard / (Inund.) (m)	Change in 1% AEP Freeboard (m)	Existing 20% AEP Flood Level (mAHD)	Existing 20% AEP Flood Depth (m)	Existing 20%AEP Freeboard / (Inund.) (m)	Subsided 20% AEP Flood Level (mAHD)	Subsided 20% AEP Flood Depth (m)	Subsided 20% AEP Freeboard / (Inund.) (m)	Change in 20% AEP Freeboard (m)
Beneficial Impacts															
D0226 DV	E1	23.000	0.05	0.25	22.800	0.00	0.31	0.06	22.750	0.00	0.50	22.600	0.00	0.51	0.01
D0852 DV	E2	16.031	0.53	-(0.23)	14.770	0.47	-(0.17)	0.06	15.958	0.46	-(0.16)	14.705	0.41	-(0.11)	0.05
D0002	E3	21.868	2.37	-(2.07)	21.858	2.36	-(2.06)	0.01	20.097	0.59	-(0.30)	20.091	0.59	-(0.29)	0.01
D0003	E3	22.106	0.27	1.69	22.101	0.27	1.70	0.01	20.250	0.00	3.55	20.250	0.00	3.55	0.00
D0004	E3	21.110	1.45	0.75	21.080	1.42	0.75	0.03	19.255	0.00	2.61	19.250	0.00	2.62	0.01
D0012	E3	20.010	2.04	-(0.84)	20.000	2.03	-(0.83)	0.01	19.249	0.28	0.92	19.244	0.27	0.93	0.01
D0035	E3	15.920	2.19	-(1.79)	15.913	2.18	-(1.78)	0.01	14.479	0.75	-(0.35)	14.482	0.75	-(0.35)	0.00
D0038	E3	17.270	0.77	-(0.47)	17.259	0.76	-(0.46)	0.01	15.750	0.00	1.05	15.750	0.00	1.05	0.00
D0040	E3	17.135	1.37	-(0.57)	17.105	1.34	-(0.54)	0.03	15.805	0.04	0.76	15.805	0.04	0.76	0.00
D0052	E3	13.915	1.49	-(0.99)	13.894	1.47	-(0.97)	0.02	12.847	0.43	0.07	12.841	0.42	0.08	0.01
D0053	E3	13.930	1.45	-(0.45)	13.920	1.44	-(0.44)	0.01	12.832	0.35	0.65	12.831	0.35	0.65	0.00
D0089	E3	12.989	2.51	-(1.71)	12.979	2.50	-(1.7)	0.01	11.737	1.26	-(0.46)	11.725	1.24	-(0.44)	0.02
D0091	E3	13.820	0.62	-(0.12)	13.813	0.61	-(0.11)	0.01	12.900	0.00	0.8	12.900	0.00	0.8	0.00
D0097	E3	13.053	0.37	0.34	13.026	0.34	0.37	0.03	12.249	0.00	1.14	12.239	0.00	1.15	0.01
D0099	E3	11.656	1.66	-(1.36)	11.625	1.63	-(1.33)	0.03	10.690	0.69	-(0.39)	10.670	0.67	-(0.37)	0.02
D0103	E3	13.360	0.86	-(0.36)	13.349	0.85	-(0.35)	0.01	12.770	0.27	0.23	12.770	0.27	0.23	0.00
D0110	E3	13.492	0.49	-(0.19)	13.481	0.48	-(0.18)	0.01	12.750	0.00	0.55	12.750	0.00	0.55	0.00
D0113	E3	12.704	1.32	-(0.72)	12.695	1.31	-(0.71)	0.01	11.718	0.33	0.27	11.710	0.32	0.28	0.01
D0360	E3	9.229	1.53	-(1.23)	9.229	1.53	-(1.22)	0.01	8.358	0.66	-(0.36)	8.361	0.66	-(0.36)	0.00

Dwelling ID	Cat.*	Existing 1% AEP Flood Level (mAHD)	Existing 1% AEP Flood Depth (m)	Existing 1% AEP Freeboard / (Inund.) (m)	Subsided 1% AEP Flood Level (mAHD)	Subsided 1% AEP Flood Depth (m)	Subsided 1% AEP Freeboard / (Inund.) (m)	Change in 1% AEP Freeboard (m)	Existing 20% AEP Flood Level (mAHD)	Existing 20% AEP Flood Depth (m)	Existing 20%AEP Freeboard / (Inund.) (m)	Subsided 20% AEP Flood Level (mAHD)	Subsided 20% AEP Flood Depth (m)	Subsided 20% AEP Freeboard / (Inund.) (m)	Change in 20% AEP Freeboard (m)
D0361	E3	9.110	1.41	-(1.11)	9.110	1.40	-(1.1)	0.01	8.311	0.61	-(0.31)	8.313	0.61	-(0.31)	0.00
D0363	E3	9.536	0.71	0.79	9.531	0.70	0.80	0.01	8.738	0.00	1.59	8.715	0.00	1.61	0.02
D0370	E3	9.248	1.26	-(0.96)	9.238	1.25	-(0.95)	0.01	8.305	0.32	-(0.02)	8.309	0.32	-(0.02)	0.00
D0372	E3	8.164	1.46	-(1.16)	8.157	1.45	-(1.15)	0.01	7.008	0.30	0.00	7.003	0.29	0.01	0.01
D0381	E3	9.694	1.38	-(0.78)	9.688	1.37	-(0.77)	0.01	8.975	0.66	-(0.06)	8.979	0.66	-(0.06)	0.00
D0382	E3	8.192	1.45	-(1.15)	8.185	1.44	-(1.14)	0.01	6.984	0.24	0.06	6.988	0.24	0.06	0.00
D0383	E3	9.053	0.95	-(0.65)	9.043	0.94	-(0.64)	0.01	8.266	0.17	0.13	8.268	0.17	0.13	0.00
D0385	E3	9.888	0.39	-(0.09)	9.874	-0.07	-(0.07)	0.02	9.245	0.00	0.56	9.243	0.00	0.56	0.00
D0734	E3	13.989	2.05	-(1.37)	13.981	2.04	-(1.36)	0.01	12.958	1.02	-(0.34)	12.959	1.02	-(0.34)	0.00
D0739	E3	13.906	2.41	-(2.11)	13.897	2.40	-(2.1)	0.01	12.845	1.35	-(1.05)	12.841	1.34	-(1.04)	0.01
D0820	E3	23.135	2.82	-(2.52)	23.132	2.81	-(2.51)	0.01	21.334	1.01	-(1.33)	21.332	1.01	-(1.33)	0.00
D0828	E3	24.395	4.90	-(4.6)	24.394	4.89	-(4.59)	0.01	22.613	3.11	-(2.81)	22.613	3.11	-(2.81)	0.00
D0875 DV	E3	16.865	0.00	0.38	15.630	0.00	0.39	0.01	16.750	0.00	0.50	15.50	0.00	0.52	0.02
D0876	E3	22.087	2.98	-(2.68)	22.079	2.97	-(2.67)	0.01	20.342	1.23	-(0.93)	20.340	1.23	-(0.93)	0.01
D0885	E3	13.104	1.56	-(1.26)	13.085	1.54	-(1.24)	0.02	11.757	0.21	0.09	11.744	0.20	0.10	0.01
D0886	E3	12.289	1.36	-(1.06)	12.273	1.34	-(1.04)	0.02	11.366	0.44	-(0.14)	11.356	0.43	-(0.13)	0.01
D0889	E3	9.125	0.52	-(0.22)	9.113	0.51	-(0.21)	0.01	8.236	0.00	0.66	8.242	0.00	0.66	0.00
S0101	E3	11.776	1.29	-(0.99)	11.748	1.26	-(0.96)	0.03	10.902	0.41	-(0.11)	10.895	0.40	-(0.10)	0.01
S0371	E3	9.695	0.87	-(0.87)	9.690	0.86	-(0.86)	0.01	9.100	0.27	-(0.27)	9.000	0.26	-(0.26)	0.01
S0824	E3	18.887	2.18	-(1.88)	18.887	2.17	-(1.87)	0.01	17.482	0.77	-(0.47)	17.460	0.75	-(0.45)	0.02

Dwelling ID	Cat.*	Existing 1% AEP Flood Level (mAHD)	Existing 1% AEP Flood Depth (m)	Existing 1% AEP Freeboard / (Inund.) (m)	Subsided 1% AEP Flood Level (mAHD)	Subsided 1% AEP Flood Depth (m)	Subsided 1% AEP Freeboard / (Inund.) (m)	Change in 1% AEP Freeboard (m)	Existing 20% AEP Flood Level (mAHD)	Existing 20% AEP Flood Depth (m)	Existing 20%AEP Freeboard / (Inund.) (m)	Subsided 20% AEP Flood Level (mAHD)	Subsided 20% AEP Flood Depth (m)	Subsided 20% AEP Freeboard / (Inund.) (m)	Change in 20% AEP Freeboard (m)
Unchanged															
D0006	U	22.000	0.30	0.00	22.000	0.30	0.00	0.00	20.25	0.00	1.75	20.25	0.00	1.75	0.00
D0009	U	22.252	0.68	0.32	22.250	0.68	0.32	0.00	20.561	0.00	2.01	20.561	0.00	2.01	0.00
D0048	U	18.189	3.13	-(2.33)	18.190	3.13	-(2.33)	0.00	16.172	1.12	-(0.32)	16.180	1.12	-(0.32)	0.00
D0106	U	10.116	0.00	0.32	10.114	0.00	0.32	0.00	9.500	0.00	0.93	9.500	0.00	0.93	0.00
D0108	U	11.334	0.33	-(0.03)	11.334	0.33	-(0.03)	0.00	10.308	0.00	0.99	10.302	0.00	1.00	0.01
D0115	U	14.050	0.21	0.29	14.050	0.21	0.29	0.00	12.500	0.00	1.84	12.500	0.00	1.84	0.00
D0170 DV	U	20.750	0.47	0.85	20.750	0.47	0.85	0.00	20.490	0.00	1.11	20.490	0.00	1.11	0.00
D0201 DV	U	20.948	0.02	1.20	20.948	0.02	1.20	0.00	20.937	0.00	1.21	20.936	0.00	1.21	0.00
D0377	U	8.433	1.06	-(0.76)	8.430	1.06	-(0.76)	0.00	7.565	0.19	0.11	7.569	0.20	0.10	-0.01
D0384	U	8.407	0.91	-(0.61)	8.404	0.91	-(0.61)	0.00	7.631	0.13	0.17	7.635	0.13	0.17	0.00
D0712 DV	U	20.669	0.00	0.48	20.669	0.00	0.48	0.00	20.660	0.00	0.49	20.660	0.00	0.49	0.00
D0869	U	18.101	3.39	-(3.09)	18.099	3.39	-(3.09)	0.00	16.702	1.99	-(1.69)	16.703	1.99	-(1.69)	0.00
S0048	U	17.847	2.52	-(2.52)	17.844	2.52	-(2.52)	0.00	16.506	1.18	-(1.18)	16.506	1.18	-(1.18)	0.00
S0842	U	24.577	4.08	-(4.08)	22.101	4.08	-(4.08)	0.00	22.953	2.45	-(2.45)	22.953	2.45	-(2.45)	0.00

* Refer to Table 6.4 for description of Impact Categories

Dwelling ID	Cat. *	Existing Ground Level (mAHD)	Existing Floor Level [1.] (mAHD)	Subsidence (m)	Subsided Ground Level (mAHD)	Subsided Floor Level (mAHD)	Existing 1% AEP Flood Level (mAHD)	Existing 1% AEP Freeboard / (Inund.) (m)	Subsided 1% AEP Flood Level (mAHD)	Subsided 1% AEP Freeboard / (Inund.) (m)	Change in 1% AEP Freeboard (m)	Comment
D0430	A1	14.42	14.42	-0.66	13.76	13.76	13.85	0.57	13.83	-(0.07)	-0.64	Not currently inundated
D0415	E2	14.20	14.50	-0.07	14.13	14.43	13.94	0.56	13.79	0.61	0.05	Increased freeboard
SANDRA STREET												
D0513	B3	14.5	14.5	-0.67	13.83	13.83	13.85	0.65	13.79	0.04	-0.61	Insufficient freeboard
D0507	D	14.5	14.6	-0.08	14.42	14.52	13.79	0.81	13.76	0.76	-0.05	Freeboard reduced, but > 0.5 m
D0587	D	13.9	14.1	-0.07	13.83	14.03	13.25	0.85	13.20	0.83	-0.02	Freeboard reduced, but > 0.5 m
D0588	D	13.66	13.8	-0.05	13.61	13.75	12.94	0.86	12.90	0.85	-0.01	Freeboard reduced, but > 0.5 m
D0589	B2	12.25	12.35	-0.04	12.21	12.31	12.51	-(0.16)	12.50	-(0.19)	-0.03	Increased Inundation
HUE HUE ROAD												
D0461	E3	10	10.8	0.00	10	10.8	9.85	0.95	9.84	0.96	0.01	Increased freeboard
D0462	E3	9.96	10.5	0.00	9.96	10.5	9.65	0.85	9.64	0.86	0.01	Increased freeboard
D0463	E3	9.23	9.5	0.00	9.23	9.5	8.95	0.55	8.94	0.56	0.01	Increased freeboard
D0464	E3	8.76	9.00	0.00	8.76	9.00	8.71	0.19	8.72	0.20	0.01	Increased freeboard but <0.3 m
D0465	E3	8.50	9.30	0.00	8.50	9.30	8.55	0.75	8.62	0.74	0.01	Increased freeboard
D0466	E3	8.69	9.30	0.00	8.69	9.30	8.38	0.62	8.37	0.63	0.01	Increased freeboard
D0467	E3	8.93	9.00	0.00	8.93	9.00	8.22	0.98	8.21	0.99	0.01	Increased freeboard
D0579A	E3	10.01	10.12	0.00	10.01	10.12	10.06	0.06	10.05	0.07	0.01	Increased freeboard but <0.3 m
D0579	E3	10.10	10.40	0.00	10.10	10.40	9.82	0.58	9.81	0.59	0.01	Increased freeboard

Notes: 1. Floor levels estimated from Dwelling Status Report Flood Prone Areas, Preliminary report, MEGS for COAL, 2001, and topographic data from WACJV DTM

*. Refer Table 6.4 for description of Impact Categories

Table 6.4 Impact Categories for Dwellings (Dooralong/Yarramalong and Hue Hue)

Category	Description	Number Affected	Houses Affected	Impacts
A	Major Impacts			
A1	House floor not flooded by 1:100 yr ARI (1% AEP) flood prior to mining but becomes flooded after mining.	5	D0060, D0061, D0063, D0855, D0430	Significant Impact – major increase in damage costs.
A2	House floor flooded by 1:100 yr (1%) flood prior to mining with >0.3 m increase in flooding after mining PLUS house floor not flooded by 1:5 yr (20%) flood prior to mining but becomes flooded after mining.	1	D0237	Major Impact – increase in frequency of damage plus some increase in maximum damage costs.
B	Moderate Impacts			
B1	House floor flooded by 1:100 yr (1%) flood prior to mining with >0.3 m increase in flooding after mining BUT will remain unaffected by 1:5 yr (20%) flood.	1	D0017 (Also a local heritage silo affected)	Moderate Impact – moderate increase in frequency and cost of damage from larger floods.
B2	House floor flooded by 1:100 yr (1%) flood prior to mining with only minor (<0.3 m) increase in flooding after mining.	7	D0041, D0058, D0767, D0776, D0589 and two sheds: S0041, S0776	Moderate Impact - minor increase in frequency and cost of damage from very large floods.
B3	House floor not flooded by 1:100 yr flood (1%) prior to mining nor flooded after mining, BUT freeboard reduced by more than 0.5 m to < 0.3 m after mining.	3	D0240, D0870, D0513	Moderate Impact - moderate change in risk and no direct cost impacts but planning constraints no longer satisfied for freeboard.

Category	Description	Number Affected	Houses Affected	Impacts
C	Minor Impacts			
C1	House floor not flooded by 1:100 yr flood (1%) prior to mining nor flooded after mining, BUT freeboard reduced by less than 0.5 m to < 0.3 m after mining.	4	D0049, D0203, D0862, D0863	Minor Impact - slight change in risk and no direct cost impacts but planning constraints no longer satisfied for freeboard.
C2	House floor flooded by 1:100 yr flood (1%) prior to mining with negligible (<0.05 m) increase in flooding after mining	4	D0051, D0615, D0736, D0851	Minor Impact - negligible change in risk or cost impacts
C3	House floor not flooded by 1:100 yr (1%) flood prior to mining nor flooded after mining, BUT freeboard reduced to 0.3 m to 0.5 m range	2	D0432, D0737	Minor Impact - less than desirable freeboard but negligible risk and no cost impacts
D	Negligible Impacts			
D	House floor not flooded by 1:100 yr (1%) flood prior to mining nor flooded after mining and change in freeboard <0.1 m and freeboard remains >0.3 m (OR freeboard remains >0.5 m after subsidence regardless of reduction)	14	D0042, D0050, D0197, D0207, D0209, D0220, D0221, D0236, D0614, D0713, D0773, D0507, D0587, D0588	No impacts and no significant change
E	Beneficial Impacts			
E1	Significant (>0.2 m) reduction in flood levels in 1:100yr (1%) flood after mining PLUS achieving a freeboard of at least 0.3 m after mining.	1	D0226 (freeboard increased from 0.25 m to 0.31 m)	Moderate Beneficial Impact
E2	Minor (0.05 m to 0.2 m) reduction in flood levels in 1:100yr flood (1%) after mining and no change to flood category after mining.	2	D0852, D0415	Minor Beneficial Impact

Category	Description	Number Affected	Houses Affected	Impacts
E3	Negligible (<0.05 m) reduction in flood levels and/or freeboard after mining for all floods	46	(see Tables 6.2 & 6.3)	No impacts and no significant change
U	Unchanged			
U	No change in flood depths after mining but minor change in ground levels	14	D0006, D0009, D0048, D0106, D0108, D0115, D0170, D0201, D0377, D0384, D0712, D0869, and sheds S0048, S0842	No impacts

Table 6.5 Impact Categories for Properties

Category	Description	Number Affected	Land / Properties Affected	Impacts
L1	Reduction in Flood Extent of 1:100 yr flood (1%) by more than 5% of individual property area after mining.	2	Generally grazing land near property boundary.	Moderate Beneficial Impact.
L2	Reduction in Flood Extent of 1:100 yr flood (1%) by less than 5% of individual property area after mining.	3	Generally grazing land near property boundary.	Minor Beneficial Impact.
L3	Increase in Flood Extent of 1:100 yr flood (1%) by more than 5% but less than 20% of individual property area after mining.	4	Mostly grazing land plus some areas of non-agricultural and uncleared land.	Minor to Moderate Adverse Impact.
L4	Increase in Flood Extent of 1:100 yr flood (1%) by more than 20% of individual property area (or other major effect) after mining.	6	Agricultural land plus one cattle property.	Moderate to Major Adverse Impact.

Table 6.6 Sensitivity Analysis Comparison of Flood Depths

Location	Base Case Existing	Base Case 100% Subsided	Base Case Change	75% Subsidence	75% Subsidence Change	50% Subsidence	50% Subsidence Change	Low Losses Existing	Low Losses Subsided	Low Losses Change	High Rainfall Existing	High Rainfall Subsided	High Rainfall Change	High Roughness Existing	High Roughness Subsided	High Roughness Change	High Tailwater Existing	High Tailwater Subsided	High Tailwater Change
D0061 DV	0.338	0.730	0.392	0.633	0.295	0.245	-0.093	0.339	0.732	0.305	0.674	1.070	0.396	0.427	0.811	0.383	0.363	0.751	0.389
D0063 DV	0.420	1.774	1.354	1.437	1.017	0.119	-0.301	0.422	1.777	1.267	0.754	2.113	1.360	0.509	1.853	1.344	0.444	1.795	1.351
D0237 DV	0.305	0.723	0.418	0.482	0.177	0.304	-0.001	0.305	0.744	0.439	0.308	0.883	0.575	0.304	0.741	0.437	0.305	0.723	0.419
D0017 DV	1.252	1.384	0.132	1.353	0.101	0.775	-0.477	1.253	1.386	0.030	1.569	1.706	0.137	1.356	1.479	0.124	1.274	1.403	0.129
D0041	0.977	1.073	0.096	1.049	0.072	0.000	-0.977	0.979	1.075	-0.033	1.407	1.503	0.096	1.108	1.206	0.098	0.977	1.073	0.096
D0058 DV	1.107	1.278	0.171	1.237	0.130	0.048	-1.059	1.108	1.281	0.084	1.443	1.619	0.176	1.197	1.359	0.163	1.131	1.300	0.169
D0767	1.502	1.666	0.164	1.623	0.121	0.000	-1.502	1.504	1.669	0.020	1.958	2.125	0.167	1.648	1.813	0.165	1.502	1.666	0.164
D0776 DV	0.323	0.471	0.148	0.369	0.046	0.254	-0.069	0.327	0.476	0.125	0.419	0.566	0.147	0.350	0.499	0.149	0.323	0.471	0.148
S0041	3.377	3.443	0.066	3.427	0.050	0.723	-2.654	3.379	3.445	-0.067	3.796	3.862	0.066	3.513	3.580	0.067	3.377	3.443	0.066
D0049	0.195	0.222	0.027	0.212	0.017	0.000	-0.195	0.193	0.206	-0.128	0.508	0.526	0.018	0.333	0.336	0.002	0.195	0.222	0.027
D0863 DV	0.000	0.122	0.122	0.118	0.118	0.112	0.112	0.005	0.123	0.118	0.106	0.126	0.020	0.006	0.124	0.119	0.005	0.122	0.118
D0051	0.533	0.561	0.028	0.555	0.022	0.000	-0.533	0.519	0.522	-0.157	0.867	0.863	-0.004	0.680	0.678	-0.002	0.538	0.561	0.023
D0615	0.301	0.308	0.007	0.211	-0.090	0.000	-0.301	0.196	0.204	-0.105	0.505	0.510	0.006	0.308	0.313	0.004	0.197	0.213	0.017
D0736 DV	0.952	0.996	0.044	0.929	-0.023	0.387	-0.565	0.904	0.938	-0.064	1.204	1.245	0.041	1.002	1.028	0.026	0.923	0.955	0.032
D0851 DV	0.942	0.946	0.004	0.945	0.003	0.942	0.000	0.942	0.946	0.004	0.943	0.947	0.005	0.942	0.947	0.005	0.942	0.946	0.005

6.7 *PROPERTY ACCESS*

Flood duration, or length of time a community or single dwelling is cut off by floodwaters can significantly impact on the costs and disruption associated with flooding. Subsidence will result in an increase in the flood duration at low points along access routes within the Dooralong Valley. There are no expected impacts of subsidence on property access in the Yarramalong Valley. Mitigation measures will be required in affected locations to maintain existing flood access.

As noted previously, both Sandra Street and Hue Hue Road will be overtopped during the 1% AEP flood for both pre and post-subsidence conditions. However, there will always be access to all properties in the Hue Hue precinct by alternate routes. Consequently, there is no need to consider flood impacts on property access for Hue Hue Creek in greater detail.

Access Routes

Primary and secondary access routes to the Dooralong and Yarramalong Valleys were documented. This included the identification of the most direct route to the F3 Freeway along with emergency evacuation routes.

Determination of Key Low Points

Key locations that will be affected directly by subsidence or by subsidence induced increases in flood depth comprise low points on roads and bridges that are inundated during the initial stages of flooding. These locations are considered critical if floodwaters will cut off access to dwellings or restrict emergency evacuation routes for long periods of time. These locations were determined using:

- long sections of each of the roads from DTM data supplied by WACJV;
- survey plans of bridges prepared by Monteath and Powys (1997);
- CAD plans showing flood extents, topographic data, dwelling locations and drainage lines; and
- 1:25,000 scale topographic maps produced by the Central Mapping Authority.

Low points have been identified using the road name and an easting and northing.

Safe Evacuation Levels

A velocity/depth relationship was used to determine vehicle stability in floodwaters. Vehicles can become unstable when flood depths over roads exceed 0.15 - 0.30 m (depending on flow velocity and vehicle characteristics) and when flood velocities exceed 2 m/s. Trafficable flow depths were determined at each low point based on the relevant velocities shown in ***Table 6.7***.

Table 6.7 Safe Depth for Vehicles at Specified Flow Velocities

Flow Velocity (m/s)	Maximum Safe Depth (m)
0 – 0.5	0.30
0.5 – 1.0	0.25
1.0 – 1.5	0.20
1.5 – 2.0	0.15
Source: NSW Floodplain Development Manual (2005) Note: No depth is considered safe for flow velocities greater than 2 m/s	

Duration of Flooding

Flood durations at each of the key low points were determined for each scenario directly from the TUFLOW model.

Affected Dwellings

The durations of blocked accesses were determined for roads and access tracks servicing properties within the study area through the following steps:

- a list was compiled detailing the evacuation route for each dwelling and the low points on the route;
- for each low point, the location, flow velocity, flood duration and maximum flood depth were tabulated; and
- each dwelling was assigned a key low point for all of its evacuation routes. This is the low point which is untrafficable for the longest duration along any route.

Post Mining Topography

The physical changes to the positions and elevations of the low points were determined from post-subsidence topography data. Any new low points were also identified.

Access Impact Assessment

Changes to flooding depths and durations at low points after subsidence were calculated for the 1% and 20% AEP flood events.

Key Low Points

Thirty low points were identified in this assessment as potentially limiting access to properties in the Yarramalong and Dooralong valleys during floods. An additional two points, identified as D41 and D81, were also identified as being of interest as they are lower than adjacent points D40 and D80 respectively. These points are summarised in ***Table 6.8*** including their location, existing and subsided levels and numbers of dwellings serviced.

A number of these low points may also block secondary access routes during floods. Only D70 is critical for both primary and secondary access. Details on the low points and the dwellings that would be impacted if primary accesses were blocked and secondary access was required are given in ***Table 6.9***.

Only 15 of the abovementioned 32 low points were found to be key low points within or near the study area or deemed to be potentially affected by subsidence impacts. These key low points on access roads are shown in ***Figure 6.6***. It should be noted that primary access routes may have several low points that may be affected by flooding.

Table 6.8 Low Points – Primary Access Routes

Low Point Identifier	Grid Coordinates[1]		Minimum Road or Bridge Deck Level (mAHD)		Dwellings Serviced as Primary Access
	Easting	Northing	Existing	Subsided	
D20	334650	1325049	19.69	19.69	3
D30	335028	1324402	18.96	18.96	11
D40	336553	1324365	18.05	18.05	0
D41 (Bridge C)	335045	1322793	15.20	14.01	0
D50	335624	1319119	9.68	8.40	172
D60 (Bridge A)	336336	1318402	7.52	7.52	192
D70	336399	1321613	12.15	10.94	29
D80 (Bridge B)	335220	1320955	14.61	13.40	150
D81	335220	1320955	14.46	13.15	150
Y10 (Bridge 13)	327941	1322614	17.89	17.89	0
Y20 (Bridge 12)	328197	1321944	17.14	17.14	2
Y30	328040	1321636	18.89	18.89	0
Y40	327767	1321358	17.19	17.19	7
Y50 (Bridge 10)	328420	1320915	14.92	14.92	1
Y60 (Bridge 11)	328369	1320983	17.21	17.21	1
Y70	328320	1320117	16.19	16.19	20
Y80	330367	1319602	12.32	12.12	1
Y90 (Bridge 7)	330441	1319375	12.86	12.76	3
Y100 (Bridge 6)	330968	1318756	13.73	13.68	1
Y110	330929	1318435	13.60	13.60	54
Y120 (Bridge 5)	331056	1318092	13.66	13.66	58
Y130	331102	1318105	12.80	12.80	1
Y140	331596	1317440	13.12	13.12	72
Y150 (Bridge 4)	331859	1317591	11.45	11.45	2
Y160	331960	1317569	12.49	12.49	75
Y170 (Bridge 3)	333439	1317201	9.59	9.59	95
Y180 (Bridge 2)	333982	1317696	8.96	8.96	2
Y190	334926	1317001	8.95	8.95	122
Y200	336345	1317195	8.90	8.90	140
Y210	336711	1317092	8.19	8.19	143
Y220 (Bridge 1)	337245	1316635	10.23	10.23	148
Y230	336941	1316780	7.55	7.55	148
1. Coordinates in NSW ISG					

Table 6.9 Low Points – Secondary Access Routes

Low Point Identifier	Primary Access Points[1]	Minimum Road or Bridge Deck Level (m AHD)		Dwellings Serviced as Secondary Access
		Existing	Subsided	
D10 (Bridge D)	D90, D20, D60	24.16	24.16	197
D20	D10, D30	19.69	19.69	3
D30	D20, D40	18.96	18.96	11
D40	D30, D70	18.05	18.05	0
D41	D30, D70	15.20	14.01	0
D50	D60	9.68	8.40	20
D70	D60	12.73	11.4	198
D80	D50, D60	14.61	13.40	10
D81	D50, D60	14.46	14.15	10
D90 (Bridge E)	D60, D50, D80	26.98	26.98	44

1. Points which, if inundated, means secondary access must be used

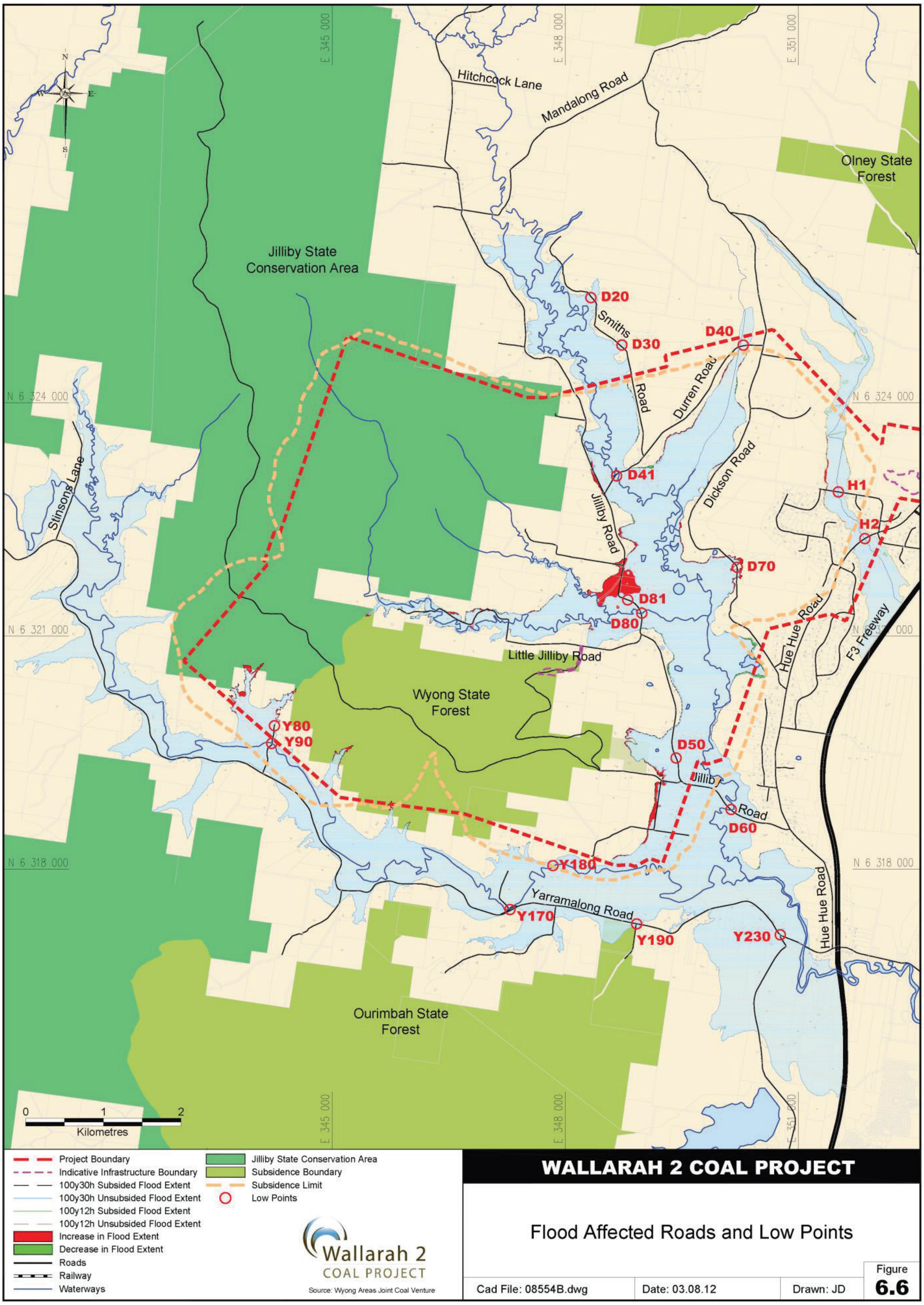


Figure 6.6 Flood Affected Access Roads and Key Low Points

Access Routes

Primary and secondary access routes for properties in the Dooralong and Yarramalong Valleys are shown in ***Figure 6.6***. Flood durations at key low points along access roads for both existing and subsided terrains are presented in the following sections.

For any residence, the primary access route is the most direct route to the F3 Freeway. This generally includes Yarramalong Road for residents in the Yarramalong Valley, and Jilliby Road for residents in the Dooralong Valley. Jilliby Road and the two secondary routes to the F3 Freeway from the Dooralong Valley (Durren Road and Mandalong Road) were investigated to identify which had the shortest duration of inundation.

The primary access route for dwellings on the right bank (western side) of the Dooralong Valley was found to be Jilliby Road which crosses Jilliby Jilliby Creek at Flack's Bridge. The primary access road for properties on the left bank of Dooralong Valley is Mandalong Road to Morisset.

The primary access route for dwellings on the right bank (southern side) of the Yarramalong Valley is Yarramalong Road. Most dwellings on the left bank have access to Yarramalong Road by short link roads which cross the Wyong River over low bridges, most of which are cut during relatively small floods.

A secondary route for dwellings on the right bank of Dooralong Valley is Mandalong Road via Durren Road. An alternative secondary route is Mandalong Road directly from Jilliby Road.

The TUFLOW model was run for the critical durations of inundation for both existing and subsided topography at the 15 key low points listed in ***Table 6.10***. The upper and lower bounds of inundation were found to be represented by:

- the critical duration (30 hour) 1% AEP; and
- the critical duration (36 hour) 20% AEP flood.

For each low point along primary access routes where potential increases in flood depth were found from the TUFLOW model results, the depth at which the road becomes untrafficable and the duration of inundation for the relevant scenarios are presented in ***Table 6.10***. All other points listed in ***Table 6.8*** and not included in ***Table 6.10*** were determined to have slightly reduced durations of inundation after subsidence due to slight reductions in flood peak levels.

Table 6.10 Primary Access Impacts at Key Low Points

Key Low Point ID	Maximum Existing Trafficable RL (m AHD)	Maximum Subsided Trafficable RL (m AHD)	Existing Inundation Duration (hours)		Post-mining Inundation Duration (hours)		Increase in Inundation Duration (hours)	
			1% AEP	20% AEP	1% AEP	20% AEP	1% AEP	20% AEP
D20	20.0	20.0	19	9	19	9	Nil	Nil
D30	19.3	19.3	5	0	5	0	Nil	Nil
D40	18.35	18.35	19	11	19	11	Nil	Nil
D41 (Bridge C)	15.40	14.21	24	24	22	21	Nil	Nil
D50	10.0	8.7	6	0	33	31	27	31
D60 (Bridge A)	7.9	7.9	24	21	24	22	Nil	1
D70	12.45	11.24	15	12	28	25	13	14
D80 (Bridge B)	14.9	13.7	10	0	15	11	5	11
D81	14.7	13.4	11	4	17	10	6	6
Y80	12.6	12.4	71	68	73	69	2	1
Y90 (Bridge 7)	13.06	12.95	62	54	63	55	1	1
Y170 (Bridge 3)	9.84	9.84	50	50	50	49	Nil	Nil
Y180 (Bridge 2)	9.20	9.20	51	50	51	50	Nil	Nil
Y190	9.25	9.25	33	32	33	32	Nil	Nil
Y230	7.85	7.85	10	0	10	0	Nil	Nil

6.8 *Access Impact Assessment*

Overall, only seven of the 15 key low points will be adversely affected by increased durations of inundation as a result of subsidence as summarised in ***Table 6.10***.

Yarramalong Valley – Primary Access Routes

The results show that for all events modelled, post-subsidence flooding durations are similar to or less than existing durations for almost all low points within the Yarramalong Valley. There will be no dwellings in this valley that will have access cut off where it is not cut off under existing conditions.

Only three dwellings (D0016, D0028 and D0042) within the Yarramalong Valley will be adversely affected in terms of duration of impacts on access along the primary access route. Following subsidence, dwelling D0016 will be cut off at low point Y80 for a maximum duration of 73 hours and all three will be cut off at low point Y90 (Bridge 7) during the critical 1% AEP flood event. This is an increase of 2 hours and 1 hour respectively over the existing situation.

Dooralong Valley – Primary Access Routes

There will be no dwellings in the Dooralong Valley that will have access cut off where it is not cut off under existing (pre-mining) conditions. Up to 218 dwellings within the Dooralong Valley may be adversely affected in terms of duration of impacts on access out of the valley along their relevant primary access route. These include:

- 172 dwellings that will be cut off at low point D50 for a maximum duration of 33 hours during the critical 1% AEP flood event and 31 hours in the 20% AEP flood. This is an increase of 27 and 25 hours respectively over the existing situation;
- 20 additional dwellings will be cut off at low point D60 (Bridge A) for a maximum duration of 24 hours during the critical 1% AEP flood event and 22 hours during the 20% AEP flood. This is an increase of 1 hour for only the 20% AEP flood over the existing situation; and
- 26 additional dwellings will be cut off at low point D70 for a maximum duration of 28 hours during the critical 1% AEP flood event and 25 hours for the 20% AEP flood. This is an increase of 13 and 14 hours respectively over the existing situation.

Points D80 (Bridge B) and D81 will impact most of the same dwellings as point D50 but the durations of inundation will be less and the increase in duration will also be less, as a result of subsidence.

Dooralong Valley –Secondary Access Routes

Up to 198 dwellings within the Dooralong Valley can be adversely affected in terms of access out of the valley if both primary and secondary access routes are inundated. This would occur if both D50 and D70 were cut off simultaneously. The shortest duration dwellings will be cut off under these circumstances will be dependent on low point D70 and will be for a maximum duration of 28 hours during the critical 1% AEP flood event after mine subsidence. This is an increase of 13 hours over the existing (pre-mining) situation.

7 MITIGATION MEASURES

7.1 PROPERTY HAZARD MITIGATION MEASURES

It will not be the responsibility of the mine to address the existing (pre-mining) impacts of flooding in the Yarramalong and Dooralong Valleys or in the Hue Hue Creek precinct. However, where properties become more flood prone or are otherwise adversely affected as a result of flood changes due to mining induced subsidence, mitigation measures will need to be implemented. All costs associated with mitigating the impacts of changes to flooding as a result of mining will be borne by the WACJV. Potential management measures are outlined in the NSW Floodplain management Manual (2005) and are listed in ***Table 7.1***. They are grouped into three categories:

- *Property modification* – modify properties and/or impose controls on property and infrastructure development;
- *Response modification* – modify the response of the population at risk to better respond to a flood event; and
- *Flood modification* – modify the behaviour of the flood.

Table 7.1 Flood Management Measures

Category	Measure
Property modification	Zoning Voluntary purchase House raising Building and development controls Flood proofing buildings Raising roads and bridges
Response modification	Community awareness Community readiness Flood predictions and warning Local flood plans Evacuation arrangements Recovery plans
Flood modification	Flood control dams Retarding dams Flood levees Bypass floodways Channel improvements Flood gates
Ref.: NSW Floodplain Management Manual	

Flood Modifications

Large scale flood modification options are not required in the Yarramalong Valley and are limited in practicality and cost effectiveness in the Dooralong Valley. Due to the current scale of flooding in these valleys, flood modification structures such as flood control dams or bypass floodways would not be practical or effective and would potentially create even greater environmental problems. Minor channel improvements can be made to a short reach of Jilliby Jilliby Creek below the confluence with Little Jilliby Jilliby Creek but this would be to address localised ponding issues and would have little impact on flood levels.

Four flood modification options were considered for Hue Hue Creek involving combinations of channel improvements, culvert amplifications and road raising at Sandra Street and Hue Hue Road. While some of these options improved flood conditions at some dwellings, other dwellings were adversely affected and no option fully mitigated all adverse impacts. The only potential option to modify the flood would be to raise the level of Sandra Street to increase the retarding storage upstream. This would have even greater adverse impacts on a single dwelling immediately upstream of Sandra Street but could limit the requirement for relocation or purchase of properties in the Hue Hue precinct to this single dwelling.

Response Modification

There are a number of options available to Council and the community to mitigate flood impacts; however, many options may not be practical for the existing circumstances or for the type of impacts that result from subsidence. Risks to public safety can be reduced by increasing public awareness and readiness, but this is a Council function that WACJV can only contribute to and cannot take control of. The only effective input WACJV can make to this category of flood mitigation measures is to provide all pre and post mitigation flood model information to Council to assist in its Flood Planning and to contribute updated flood prediction data on an ongoing basis over the life of the mine.

Property Modification

Four mitigation options are recommended for properties adversely impacted by the Project within the study area. These are:

- house raising;
- house relocation;
- flood proofing with individual flood levees; and
- voluntary purchase or other compensation measures.

Raising roads and bridges is considered in ***Section 7.3*** as part of access mitigation options. In the case of house raising and/or relocation, the design floor level would include a freeboard above the 1% AEP post-subsidence flood. This is preferably 500 mm but is typically specified by Councils and other authorities in NSW as within the range of 300 mm to 500 mm, depending on the potential for wind waves, turbulence and future climate change impacts. Specific Council planning requirements also need to be considered. In the case of individual flood levees, the impacts of the levees themselves on the local environment and other properties will need to be considered.

House Raising and House Relocation

House raising is a widely accepted method of reducing flood damage and has been implemented in many flood prone areas in New South Wales. House relocation involves the complete relocation of the dwelling to higher ground preferably nearby within the land-owner's property.

Not all houses are suitable for raising or relocation. Houses best suited to raising or relocation are timber framed and clad with non-masonry materials. There are methods available for raising houses constructed on slabs, however these are usually not cost effective and can cause unacceptable damage to the building in the process.

The following dwellings impacted by subsidence have floor joists and are timber framed. Depending on the existing floor height above the ground level, it may be possible to raise or relocate these dwellings to achieve the required design freeboard:

- Dwelling D0060 – raise 0.63 m, or relocate;
- Dwelling D0061 – raise 0.86 m, or relocate; and
- Dwelling D0237 – raise 2.02 m, or relocate.

Other timber framed dwellings may exist for which similar measures can be taken.

Where it is impossible or impractical to relocate an existing dwelling, the other form of relocation will entail the construction of a new building of equivalent or superior size, quality and amenity at a location and level on the same property that is sufficiently higher than the 1% AEP flood level. This option is available for every dwelling identified in this study as being adversely affected by flood changes due to subsidence.

Flood Levees

Ring levees are frequently the most economically viable measure to protect single dwellings in flood prone areas. Ring levees are generally a grassed earthen bund constructed around the dwelling and can be constructed from select fill material obtained from the property. The design also requires a controlled outlet at the lowest point of the protected area to drain stormwater and, in some cases, a pump to dewater during rain whenever floodwaters are high. Flood levees are typically designed to protect dwellings from floodwaters up to the 1% AEP flood with a nominal freeboard to the crest of the levee of 0.3 m.

Typically, it is undesirable to construct levees in excess of 3 m in height or in locations where the levee itself will exacerbate flood level increases.

The use of flood levees may be suitable for the following dwellings subject to discussions with the property owners:

- Dwelling D0017 – 1% AEP flood depth 1.39 m;
- Dwelling D0058 – 1% AEP flood depth 1.27 m;
- Dwelling D0737 – 1% AEP flood depth 0.26 m;
- Dwelling D0063 – 1% AEP flood depth 1.77 m.
- Dwelling D0430 – 1% AEP flood depth 0.07 m.

These measures have the added potential benefit of reducing or even eliminating existing flooding impacts on an already partly flood prone property wherever the levee can protect a significant proportion of the property as well as the dwelling. These works may therefore increase the overall property value and improve agricultural capability.

It should be re-emphasised that each levee option must be modelled on a case by case basis to determine if any adverse impacts can occur as a consequence of the levee itself.

Voluntary Purchase

In certain high hazard areas of the floodplain, it may be impractical or unacceptable to property owners to mitigate the impacts of mining induced changes to flooding by any of the above options. Under such circumstances, the property may need to be purchased at an equitable price or other negotiated compensation may need to be made.

The mechanisms for voluntary purchase of properties or for other forms of compensation are beyond the scope of this report.

7.2 *DEVELOPMENT CONTROLS*

The NSW Floodplain Development Manual outlines interim guidelines which identify the types of land use, developments and conditions that are generally appropriate to the various hydraulic and hazard categories of flood prone land. These guidelines are used to develop planning controls for land which is impacted by flooding.

The guidelines outlined in the manual recommend development controls based on land use and development categories. The land uses are defined as residential, commercial, industrial, open space, rural/non-urban, and special use.

Residential and rural/non-urban land uses have been reviewed for this study. Development categories which have been reviewed are existing development, infill development and redevelopment.

Development controls for the six flood categories are shown in ***Table 7.2***. A number of the controls listed are based on the Flood Planning Level (FPL). Typically, Councils in New South Wales adopt the 1% AEP flood for the FPL.

Table 7.2 Development Controls for New Developments

Hydraulic and Hazard Categories	Development Guideline		SPECIAL
	Residential	Rural / non-urban	
High hazard floodway	1,2,3,5 and SPECIAL	1,2,3,5 and SPECIAL where warranted	Incorporate measures to ensure the safe evacuation of people from the area should a design flood or greater occur. Ensure development does not significantly increase flood hazard or flood damage to other properties or adversely affect flood behaviour
High hazard flood storage	1,2,3,5 and SPECIAL	1,2,3,5 and SPECIAL	Incorporate measures to ensure the safe evacuation of people from the area should a design flood or greater occur. Ensure development does not significantly increase flood levels or flood hazard, either at the proposed site or elsewhere
High hazard flood fringe	1,2,3,5 and SPECIAL	1,2,3 and 5	Incorporate measures to ensure the safe evacuation of people from the area should a design flood or greater occur. Ensure that the displacement of these people will not significantly add to the overall cost and community disruption caused by the flood.
Low hazard floodway	1,2,3,5 and SPECIAL	1,2,3,5 and SPECIAL	Ensure development does not significantly increase flood levels or flood hazard at the proposed site or elsewhere.
Low hazard flood storage	1,2,3 and SPECIAL	1,2,3 and SPECIAL where warranted	Ensure development does not significantly increase flood levels or flood hazard at the proposed site or elsewhere.
Low hazard flood fringe	1,2 and 3	1,2 and 3	None

Other requirements of the NSW Floodplain Development Manual include:

- Any portion of a building or structure below the Flood Planning Level (FPL) should be built from flood compatible materials;
- The habitable floors of new residences and new commercial and industrial developments, together with normally occupied floors of special use developments, should either have a floor level at or above the FPL or be flood proofed to this level;
- Special consideration should be given to caravan parks; and
- Buildings or structures should be able to withstand the force of flowing floodwaters.

7.3 *ACCESS MITIGATION OPTIONS*

Subsidence will cause the roads at low points D50, D70 and D80/D81 to become untrafficable for longer periods than for the existing situation. In addition, low points Y80 and Y90 will be marginally impacted in the 1%AEP flood and all five points will be slightly impacted by the 20%AEP flood. Mitigation options are assessed for each low point below.

Low Point D50 - Jilliby Road

The 1%AEP flood level in the vicinity of D50 is approximately RL10.71 mAHD for existing and RL10.70 mAHD for subsided conditions. While Bridge A (point D60) is outside the subsidence zone and is also significantly flooded, the lowest point on the road, approximately 1,100 m to the northwest of the bridge, will drop to about RL8.4 mAHD due to subsidence. To reinstate the status quo of 24 hours for which the entire road would be untrafficable due to flooding at point D60 would require raising the road over a distance of 440 m to above RL8.9 m AHD after subsidence.

Low Point D70 - Dickson Road

This low point is significantly affected by subsidence for all floods. The lowest point on the road will subside from RL12.2 to RL10.9 mAHD, thereby increasing duration and frequency of inundation. It is relatively simple to raise this road to RL14.0 mAHD over a distance of 400 m after subsidence has occurred. This would ensure the road is flood free for all events up to the 1% AEP flood.

Low Point D80/D81 - Jilliby Road

Low point D80 (RL14.61 mAHD) is currently located on Jilliby Road at the Little Jilliby Jilliby Creek crossing (Bridge B) and D81 is approximately 120 m to the north of the bridge. After subsidence the lowest point on the road, D81, will shift approximately 200 m to the north where the road is currently at

RL14.6 m AHD and will drop to approximately RL13.2 mAHD. To mitigate these impacts would require raising the road by up to 1.3 m to RL14.5 mAHD over a distance of about 480 m. Because this would be in the flood fringe, there would be no significant change in final flood levels. It may be possible to flood proof this section of road by raising to RL15 mAHD. However, significant culverts would be required to maintain flow capacity.

Low Point Y80 - Boyds Lane Access

One dwelling is affected by flooding increases at low point Y80 for up to 73 hours in the 1% AEP flood, which is an increase of 2 hours on existing conditions. The road could be raised by up to approximately 0.4 m over a distance of 80 m to mitigate the increase in flooding duration at the low point.

Low Point Y90 (Bridge 7) - Boyds Lane

An additional two dwellings will be impacted by an increase in flood duration at point Y90. This access across the Wyong River (Bridge 7) will become the critical low point if Y80 is raised sufficiently to reduce inundation duration to less than 63 hours in the 1% AEP flood. This bridge is also predicted to subside by approximately 0.1 m which will result in it being untrafficable for an additional hour. It would therefore be beneficial if the bridge were also raised by at least 0.1 m to mitigate the additional impact.

7.4 Emergency Evacuation Routes

Access routes to higher ground were investigated for the case when primary and secondary access routes become untrafficable. It was found that for most dwellings, access to higher ground is available during large floods.

While many access roads in the Yarramalong and Dooralong Valleys become untrafficable during floods, there are roads which provide residents with access to higher ground if required. These include Bantman Drive and Watagan Forest Drive. Although these routes pass through catchments where flood levels are unknown, residents are able to use these routes during emergencies.

The primary access route for residents in the Yarramalong Valley is Yarramalong Road which runs along the right bank of the Wyong River and crosses the F3 Freeway to the east of the study area. Yarramalong Road joins the F3 Freeway via the Old Maitland Road to the south of the study area. Emergency evacuation routes for residents in the Yarramalong Valley are:

- Yarramalong Road to the west which provides access to the Yarramalong district; and
- Bantman Road (unsealed single lane) which provides access to the F3 Freeway. The Bantman Road emergency evacuation route is described in ***Table 7.3***.

Table 7.3 Bantman Road – Emergency Evacuation Route

	Road / River Crossing Name	Northing	Easting
Intersection	Yarramalong Rd into Bantam Rd	6317100	348800
Intersection	Bantam Rd into Red Hill Rd	6315250	347500
Intersection	Red Hill Rd into Wallaby Rd	6314700	345400
Crossing	Drainage Channel	6311400	346700
Intersection	Wallaby Rd into Palmdale Creek Rd	6311300	347150
Bridge	Drainage Channel	6311400	347200
Bridge	Canada Drop Down Creek	6311000	347800
Bridge	Ourimbah Creek	6310500	349000
Intersection	Palmdale Creek Rd into F3 Freeway	6310400	349100

The primary access route for residents on the right bank of Dooralong Valley is Jilliby Road (sealed, single/two lane) which joins Hue Hue Road (sealed, two lanes). Hue Hue Road then joins the F3 Freeway via Sparks Road to the east of the study area. The secondary access routes are:

- Durren Road (unsealed, single lane) which crosses Jilliby Jilliby Creek and joins Dickson Road (unsealed, single lane). Dickson Road joins Hue Hue Road which provides access to the F3 Freeway. Dickson Road also joins Mandalong Road (unsealed, two lane) to the north which provides access to Morisset; and
- Mandalong Road (sealed/unsealed, single/two lane) which crosses Jilliby Jilliby Creek and provides access to Morisset.

An emergency evacuation route for residents on the left bank of the Yarramalong Valley and right bank of Dooralong Valley is Watagan Forest Drive, this road provides access to Morisset. The Watagan Forest Drive evacuation route is described in ***Table 7.4***.

Table 7.4 Watagan Forest – Emergency Evacuation Route

	Road / River Crossing Name	Northing	Easting
Intersection	Jilliby Rd into Dunks La	6318900	349400
Crossing	Drainage Channel	6319000	348900
Name Change	Watagan Rd	6319300	347900
Name Change	Watagan Forest Dr	6321400	343500
Intersection	Watagan Forest Rd into Martinsville Hill Rd	6338200	346500
Crossing	Drainage Channel	6340500	350500
Intersection	Martinsville Hill Rd into Martinsville Rd	6340800	351400
Crossing	Drainage Channel	6340700	351700
Bridge	Merchants Creek	6340100	352500
Crossing	Un-named creek	6339600	353000
Bridge	Un-named creek	6339400	353900
Bridge	Burnt Bridge Creek	6338800	354200
Intersection	Martinsville Rd into Freemans Dr	6338700	355000

8 CONCLUSION

8.1 GENERAL IMPACTS

Impacts of subsidence on flooding are generally limited to subsidence areas where water levels will generally be slightly lower but water depths and flood extents will be greater in some locations. Downstream of subsidence areas flood depths will be reduced slightly due to the detention effects of extra flood storage volumes in subsided areas. Upstream of subsided areas, flood depths will be reduced slightly as a result of lower tailwater levels. The effects of these reductions will generally dissipate within 600 m of the subsidence areas; beyond which differences will be less than 10 mm.

There will be no measurable impacts on hydrology, catchment yield or overall flood volumes as a result of subsidence. There will be a very small reduction in peak flows as a result of detention effects which will be matched by a very slight increase in flood durations; however, these effects will be insignificant (2% reduction in peak flow, 6% increase in duration and 0% change in flood volume at the F3 Freeway).

It was found that negligible (<0.02m) but beneficial changes will occur to flood depths in the almost all of the Yarramalong Valley (Wyong River) as a result of predicted mine subsidence. Subsidence predictions suggest that the maximum subsidence under the main channel of the Wyong River will be in the order of 0.15 m over a very short section and that three small backwater areas will experience greater flood depths due to subsidence in the flood fringe zone.

In the Dooralong Valley (Jilliby Jilliby Creek and tributaries) subsidence generally of between zero and 1.3 m will occur within the affected sections of the main channel. Isolated areas of the adjacent floodplain will experience subsidence of the order of approximately 1.6 m. Subsidence levels in the lower Jilliby Jilliby Creek channel (below the confluence with Little Jilliby Jilliby Creek) are expected to be mostly less than 0.75 m. Reductions of flood levels within or near the subsided areas of up to 1.31 m and changes in flood depth of up to 1.35 m can be expected.

For Hue Hue Creek, mining will result in subsidence of up to 0.95 m under the floodplain and will cause reductions in flood levels within or near the subsided areas of up to 0.5 m with changes in flood depths of up to 0.64 m.

There will be no impacts on flooding in Wallarah Creek or any other catchment that is not affected by subsidence.

8.2 *IMPACTS ON DWELLINGS AND PROPERTIES*

The impacts on dwellings and properties described in this Section are based on the upper bound subsidence predictions and are prior to any mitigation and remediation measures.

Only three dwellings near Hue Hue Creek will be adversely impacted by changes to flooding as a result of mine subsidence and one dwelling will have a beneficial impact of greater freeboard (height of floor level above the 1% AEP flood).

Of the 87 dwellings in the Dooralong/Yarramalong study area located within or near to the 1% AEP (100-year ARI) floodplain, 34 will be subject to some degree of potential adverse impacts. Of these dwellings, 16 will experience increased flood depths of less than 50mm and eight will experience increased flood depths of more than 0.3m. Of the 34 adversely affected dwellings 11 are already subject to inundation by the existing 1% AEP flood but an additional four that are not currently inundated in the 1%AEP flood will become inundated after subsidence.

In terms of adverse impact categories (refer ***Table 6.4***):

- Five dwellings will experience major impacts, comprising four dwellings that were not previously flood prone but which will become subject to flooding by the 1% AEP flood after subsidence and one that is already inundated in the 1%AEP flood but will now become inundated in the 2% AEP flood after subsidence;

- Eight dwellings will experience moderate impacts, mostly comprising dwellings already affected by the 1% AEP flood, but which will experience minor increases to flood depths (generally less than 0.3m) after subsidence; and

- Twenty one dwellings, only four of which are currently inundated in the 1% AEP flood, will experience minor or negligible impacts, mainly as a result of reduced freeboards (height of floor level above flood level) during the 1% AEP flood after subsidence.

The majority (53) of the 87 dwellings in the Dooralong/Yarramalong study area will not be adversely affected, and a large proportion will, in fact, be slightly beneficially impacted.

Neutral and beneficial impacts will be represented as follows:

- One dwelling will experience a significant benefit in reduction of flood levels and will benefit from an increase of freeboard to more than 0.3m after subsidence;

- Nine dwellings will experience a minor benefit in reduction of flood levels after mining (<0.2 m);

- Twenty nine dwellings (the largest proportion of the 83 dwellings in the study area) will experience very minor beneficial impacts (typically reductions in flood levels of 10mm); and
- Fourteen dwellings will experience no change or effect as a result of subsidence impacts on flooding.

An additional thirteen dwellings within the floodplain near the F3 Freeway were not included in the study area assessment as they are too far outside the area of influence of the subsidence but all would experience zero or slightly beneficial impacts.

A number of properties will be subject to changes in floodwaters on their land but will otherwise not be impacted by changes to flood conditions near residences or other buildings as a result of subsidence. A total of 28.3Ha of additional land in the Dooralong Valley, will be inundated in the 1% AEP flood following the subsidence as a result of mining. However, 5Ha will no longer be classified as flood prone after mining. The consequences of this additional extent of flood prone land are expected to be minor as most is grazing land. However, each property will need to be assessed individually as part of the PSMP process to confirm land use and potential for damage closer to the time of mining in that location.

In the Yarramalong Valley only 5.2Ha of additional land will be inundated in three small backwater areas and only three dwellings will be adversely affected. In the Hue Hue Creek area 1.9Ha of additional land will be inundated and 0.8Ha of land will become flood free and only three dwellings will be adversely affected.

8.3 IMPACTS ON FLOOD HAZARD AND RISK

There will be no significant changes in flood hazard with the exception of the additional land inundated which will become part of the flood fringe. There will be no significant changes in flood velocities but increases in flood depths may be viewed as a form of increased hazard.

8.4 IMPACTS ON ACCESS ROUTES

Dwellings in the Dooralong Valley will have an increased risk of evacuation routes being cut off for longer periods after subsidence. Dwellings in the Yarramalong valley and Hue Hue Creek will experience no change in the frequency or duration that access routes will be affected by floods after subsidence.

Three low points (D50, D70 and D80) on two primary access routes (Jilliby Road and Dickson Road) will be adversely impacted by changes to the 1%AEP as a result of subsidence. The depth and duration of inundation will increase at these low points. Only one property access road affecting three properties in the Yarramalong Valley will be affected by subsidence (at points Y80 and Y90).

8.5 Mitigation Options

General options available to reduce flood levels include channel improvements and provision of additional waterway area at bridges and other constrictions. These types of options have limited benefit and are not expected to be cost effective. However, for the reach of Jilliby Jilliby Creek immediately downstream of the confluence with Little Jilliby Jilliby Creek, the main channel may benefit from regrading works to prevent ponding of water upstream of the unsubsided zone over the main underground mine access roadway. These regrading works would only be required if the natural process of stream bed readjustment due to erosion and accretion is unsatisfactory.

Options available to mitigate against flood impacts on dwellings include construction of individual flood levees, raising houses in-situ and relocating or reconstructing houses on higher ground within the affected properties. Where impacted dwellings are unable to be protected, raised or moved, properties may need to be purchased or the landowners compensated in accordance with the regulatory provisions including conditions of approvals and leases. Prior to mining taking place in any particular location, each dwelling will need to be assessed individually and properties where land but not dwellings may be affected will also need to be considered on a case by case basis.

Options to mitigate against impacts on access routes, include raising bridges, raising low sections of roads, and improving the hydraulic capacity of channels in some sections. All low points discussed in ***Section 8.4*** can be addressed by moderate road raising.

All surface facilities where runoff can flow into adjacent waterways (Buttonderry Creek and Wallarah Creek) will be required to provide detention basins to ensure post development runoff does not exceed existing flows and that, wherever practicable, not part of the facilities encroaches on the 1% AEP floodplain.

8.6 *BENEFITS*

There are a significant number of dwellings that will experience slight beneficial impacts as a result of subsidence related changes to flooding. While these are small (generally less than 20mm reduction in flood depths) they need to be considered in the context of an overall assessment of flood impacts.

Depending on the selection of mitigation options, there are opportunities to improve current flood impact situations in many locations. Dwellings that are currently flood prone which are raised, relocated or reconstructed will become flood free. Several roads including Jilliby Road, Dickson Road, Hue Hue Road and Sandra Street can be raised or otherwise modified to reduce flood inundation compared to existing conditions.

8.7 *RESPONSE TO DIRECTOR GENERAL'S REQUIREMENTS*

The issues raised in the DGR's that relate to flood impacts and a response to each of these issues, are provided in the ***Table 8.1***.

Table 8.1 References to DGRs

DGR No.	Issue	Location addressed in this report
5.	• detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment, which includes: ○ a description of the existing environment, using sufficient baseline data; ○ an assessment of the potential impacts of all stages of the development, including any cumulative impacts, taking into consideration relevant guidelines, policies, plans and statutes; and ○ a description of the measures that would be implemented to avoid, minimise and if necessary, offset the potential impacts of the development, including proposals for adaptive management and/or contingency plans to manage any significant risks to the environment;	Section 3 provides information on the existing flood conditions and calibration data from floods of record. Section 6 includes a comparison between existing flood conditions and conditions after subsidence. Mitigation measures are described in Section 7
7.	The EIS must address the following specific issues: • **Subsidence** - including a detailed quantitative and qualitative assessment of the potential conventional and non-conventional subsidence impacts of the development that includes: ○ the identification of the natural and built features (both surface and subsurface) within the area that could be affected by subsidence, and an assessment of the respective values of these features using any relevant statutory or policy documents; ○ accurate predictions of the potential subsidence effects and impacts of the development, including a robust sensitivity analysis of these predictions; ○ a detailed assessment of the potential environmental consequences of these effects and impacts on both the natural and built environment, paying particular attention to those features that are considered to have significant economic, social, cultural or environmental values; and	Natural and built features potentially affected by flooding and changes in flood behaviour are discussed in Section 3. Changes in flood behaviour resulting from subsidence are discussed in detail in Section 6, which includes presentation of sensitivity analysis in Section 6.5. Tables 6.2 to 6.5 provide a detailed summary of impacts on dwellings and properties and Table 6.10 details impacts on major road access routes. Section 7 describes mitigation measures that can be implemented to remediate or offset subsidence induced flood impacts but final measures adopted will depend on individual Property Subsidence Management Plans.

DGR No.	Issue	Location addressed in this report
	○ a detailed description of the measures that would be implemented to avoid, minimise, remediate and/or offset subsidence impacts and environmental consequences (including adaptive management and proposed performance measures);	
9.	• **Water Resources -** including: ○ a detailed flood impact assessment, which identifies impacts on local and regional flood regimes and resultant impacts on agricultural land use, transport, services, habitability and public safety, including any measures proposed to mitigate potential flood impacts;	The report in toto provides a detailed flood impact assessment, which identifies impacts on local and regional flood regimes and impacts on dwellings, properties, transport, habitability and public safety as well as relevant mitigation measures. Information from the flood impacts assessment has been made available to other studies to assess impacts on agricultural land, services and water resources.
19.	• **Hazards** - paying particular attention to public safety, and including bushfires;	Flood Hazard assessment is addressed in Section 6.3 with Hazard mitigation measures discussed in Section 7.1 and emergency evacuation routes described in Section 7.4.
51.	B. Relevant Policies The proposal must address the relevant NSW State Government natural resource management policies, including: • NSW State Rivers and Estuaries Policy • NSW Wetlands Management Policy • NSW Flood Prone Land Policy • NSW Groundwater Policy Framework Document – General • NSW Groundwater Quantity Management Policy • NSW Groundwater Quality Protection Policy • NSW Groundwater Dependent Ecosystem Policy	The key NSW State Government policy relevant to this study is the NSW Flood Prone Land Policy. In addressing this policy, the study found there is significant risk associated with existing flood conditions, particularly in the Dooralong and Yarramalong Valleys. Thirty-four dwellings may suffer some level of increased risk from flooding (refer Table 6.4) as a consequence of subsidence induced changes to flood behaviour. In addition 10 properties may experience increased inundation of rural land and six public road low points may suffer more frequent and longer inundation. In line with the NSW Flood Prone Land Policy the primary objective of this study has been to identify these adverse impacts so that mitigation measures can be put in place to completely eliminate these risks and potentially improve conditions to a better state than existing.

DGR No.	Issue	Location addressed in this report
73.	<u>F. Secondary Issue - Flooding</u> The primary objective of the *NSW Flood Prone Land Policy* is to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property and to reduce private and public losses resulting from floods. The policy also highlights the primary responsibility for floodplain risk management rests with councils, which are provided with financial and technical support by the State Government. Although THE NSW Office of Water has no direct statutory role with regard to flood impacts in the determination of this mining proposal, the possible effects on the flooding behaviour of the catchments of Jilliby Jilliby Creek and Wyong River are important considerations in relation to impacts on surface water features and the mine water balance. The following comments are offered in this regard. The mining proposal may, if approved, result in landform changes in the catchments of Wyong River and Jilliby Jilliby Creek through mine subsidence. These changes in the landform, especially in the floodplain, have the potential to alter the flooding characteristics of the catchment. These possible changes to the landform may take place for at least the proposed mine life of 42 years. The proponent should be required to undertake a study to assist in the determination of the effects of the mining proposal on flood prone property. Any flood study required should be in line with the provisions set down in the state government's Floodplain Development Manual. The flood study should include, but not be limited to, ecological impacts of flooding, such as: an assessment of the impact of change of flood level and flow characteristics on ecological communities, especially riparian vegetation, wetlands, groundwater dependent ecosystems, floodplains and not only focus on threatened ecological communities. It should also include an assessment of the impact of change of flood level and flow characteristics on geomorphic stability of watercourses.	In addition to the response to DGR Issue No. 51, the following additional comments relate to this issue. There will be changes to flood behaviour as a result of subsidence. These changes will develop as longwall mining proceeds under the Dooralong Valley and they will be permanent. This study is completely in line with the provisions set down in the state government's Floodplain Development Manual and frequent reference to this document is made throughout the report. While this report is focused on property and risk impacts, the flood information from this study has been incorporated into the Surface Water Impact Assessment to consider ecological and geomorphic impacts.

DGR No.	Issue	Location addressed in this report
231.	**Flooding and coastal erosion** The EIS should include an assessment of the following referring to the relevant guidelines in Attachment 2: 1. Whether the proposal is consistent with any floodplain risk management plans.	The study is consistent with the NSW Floodplain Development Manual and specific references are made to relevant sections of this Manual throughout the report. There is no known formal floodplain risk management plan established by Wyong Council or any other authority relevant to the study area.
232.	2. Whether the proposal is compatible with the flood hazard of the land.	The study confirms that flood hazard will be adversely impacted for some properties and public roads. The purpose of mitigation options will be to fully eliminate these changes to flood hazard.
233.	3. Whether the proposal will significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties.	The Executive Summary to this report and Section 8 provide comment on the degree to which flood behaviour changes will result in adverse impacts. Adverse impacts are not considered to be "significant" insofar as they can be readily and economically fully mitigated.
234.	4. Whether the proposal will significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.	This Flood Impact Assessment is primarily focused on property and risk impacts due to changes in flood behaviour. The Surface Water Impact Assessment considers impacts on river banks, riparian vegetation and watercourses due to flooding and topographic changes in detail.
235.	5. Whether the proposal incorporates appropriate measures to manage risk to life from flood.	Issues related to risk to life are treated specifically in Sections 6.3, 7.2, 7.4, 8.3 and 8.4.
236.	6. Whether the proposal is likely to result in unsustainable social and economic costs to the community as a consequence of flooding.	By implementing mitigation options discussed in Section 7 and in Section 8.4 there should be no social or economic costs to the community as a result of changes to flood behaviour as a consequence of the Project. There will continue to be costs and risks due to flooding that will be no worse than existing conditions.

DGR No.	Issue	Location addressed in this report
271.	Issues: • Local creeks flood rapidly. • There is generally poor access for residences in the area of proposed extraction. • There is the likelihood of increased flooding for some properties due to subsidence. What is needed: • Before and after subsidence flood modelling. • Compensation programs for impacts arising. • Emergency evacuation programs for flood affected properties. • Extensive baseline data.	Section 6 of this report presents the results of before and after subsidence flood modelling and identifies all properties, dwellings and roads that may be adversely affected. Section 7 outlines mitigation options and Section 7.4 discusses emergency evacuation routes. The model was run for worst case subsidence predictions and will be rerun over the life of the mine as progressive baseline subsidence information is obtained from field measurements.
293.	3. A significant number of properties/structures located in flood prone areas are proposed to be undermined. Properties / structures already affected by flooding may be subject to greater flood impacts and properties/structures not previously affected by flooding may be impacted by flooding as a result of the proposed mining. In addressing this issue, the proponent will have significant challenges with respect to community issues, identification of all affected features, selection of appropriate mine design and development of effective management strategies.	It is predicted that the worst case scenario will include 11 houses that are already affected by flooding to be subject to greater impacts and six houses that were not previously impacted to experience flood levels after subsidence that are above floor levels (refer Table 6.4). It is understood these impacts must be fully mitigated and Sections 7 and 8 discuss mitigation options that may include raising or relocating or reconstructing houses to higher ground, levees and road modifications as well as other options.

9 *REFERENCES*

Pilgrim, DH, (ed)., *Australian Rainfall & Runoff - A Guide to Flood Estimation*, Institution of Engineers, Australia, Barton, ACT, 1987 - Revised 2007

Bureau of Meteorology (1994) *Bulletin 53*

Department of Planning (December 2008) *Impacts of Potential Underground Coal Mining in the Wyong Local Government Area – Strategic Review*

ERM (March 2009) *Wallarah No.2 Coal Project - Flood Impact Assessment*

ERM (March 2003) *Yarramalong and Dooralong Valleys - Flood Impact Assessment*

ERM (March 2000) *Hue Hue Creek Baseline Flood Study DRAFT*

ERM (May 2000) *Yarramalong and Dooralong Valleys Baseline Flood Study*

Grahame Lindsay & Claire Byrne (June 2001) *Dwelling Status Report – Flood Prone Areas (Preliminary Report)*

New South Wales Government (2005) *Floodplain Development Manual*

Public Works Department (1988) *Upper Wyong River Study*

Willing and Partners (May 1990) *Trunk Drainage Investigation Warnervale East 7b Stage 1- Flood Study*

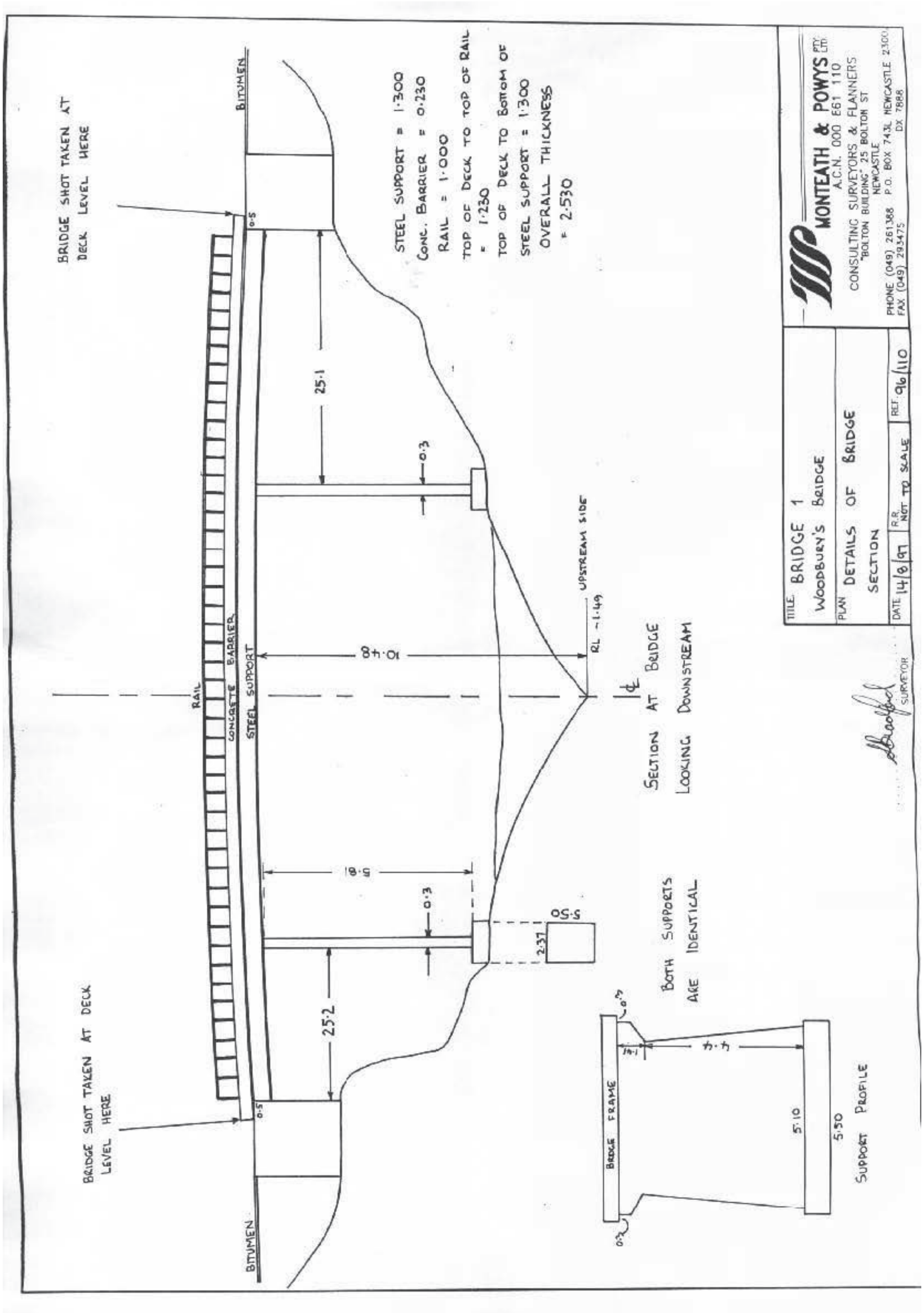
Cardno (October 2011) *Porters Creek Floodplain Risk Management Study*

Paterson Consultants Pty Limited (July 2010) *Lower Wyong River Floodplain Risk Management Study*

Engineers Australia (November 2012) *Australian Rainfall and Runoff Revision Projects - Project 15, Two Dimensional Modelling in Urban and Rural floodplains*

Annex A

Detailed Survey


BRIDGE SHOT TAKEN AT DECK LEVEL HERE
BITUMEN
0.5
25.1
0.3
STEEL SUPPORT = 1.300
CONC. BARRIER = 0.230
RAIL = 1.000
TOP OF DECK TO TOP OF RAIL = 1.230
TOP OF DECK TO BOTTOM OF STEEL SUPPORT = 1.300
OVERALL THICKNESS = 2.530
RAIL
CONCRETE BARRIER
STEEL SUPPORT
10.48
RL -1.49
UPSTREAM SIDE
SECTION AT BRIDGE
LOOKING DOWNSTREAM
5.81
0.3
5.50
2.37
25.2
BOTH SUPPORTS ARE IDENTICAL
BRIDGE SHOT TAKEN AT DECK LEVEL HERE
0.5
BITUMEN
BRIDGE FRAME
0.2
0.7
1.41
4.4
5.10
5.50
SUPPORT PROFILE
MONTEATH & POWYS PTY LTD
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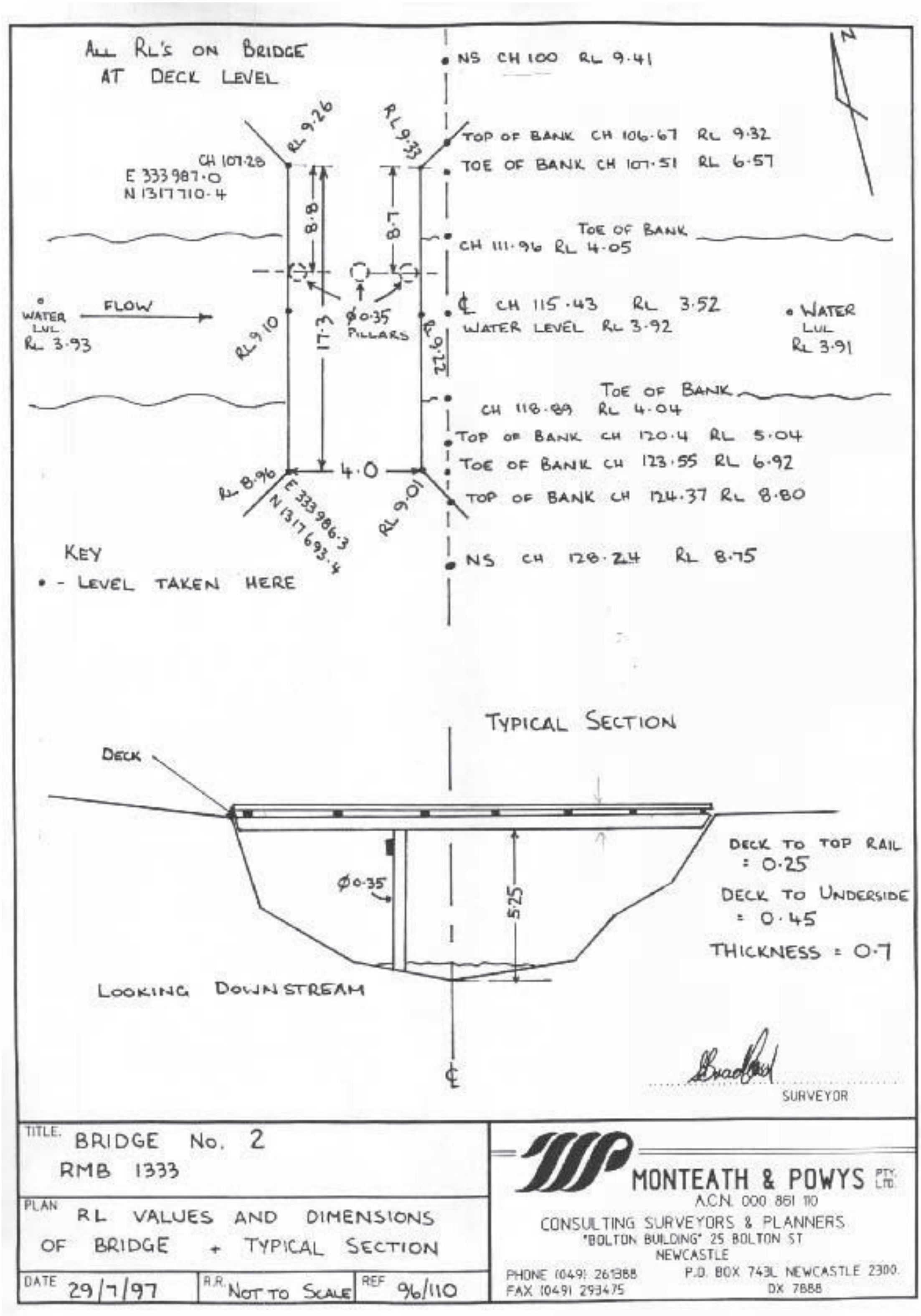
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300
DX 7888
TITLE BRIDGE 1
WOODBURY'S BRIDGE
PLAN DETAILS OF BRIDGE SECTION
DATE 14/8/97
R.R.
NOT TO SCALE
REF. 96/110
SURVEYOR


ALL RL'S ON BRIDGE AT DECK LEVEL
NS CH 100 RL 9.41
TOP OF BANK CH 106.67 RL 9.32
TOE OF BANK CH 107.51 RL 6.57
RL 9.26
RL 9.33
CH 107.28
E 333 987.0
N 1317710.4
8.8
8.7
TOE OF BANK
CH 111.96 RL 4.05
WATER LVL RL 3.93
FLOW
Ø0.35 PILLARS
17.3
22.6
RL 9.10
℄ CH 115.43 RL 3.52
WATER LEVEL RL 3.92
WATER LVL RL 3.91
TOE OF BANK
CH 118.89 RL 4.04
TOP OF BANK CH 120.4 RL 5.04
TOE OF BANK CH 123.55 RL 6.92
TOP OF BANK CH 124.37 RL 8.80
4.0
RL 8.96
E 333986.3
N 1317693.4
RL 9.01
NS CH 128.24 RL 8.75
KEY
• - LEVEL TAKEN HERE
TYPICAL SECTION
DECK
Ø0.35
5.25
DECK TO TOP RAIL = 0.25
DECK TO UNDERSIDE = 0.45
THICKNESS = 0.7
LOOKING DOWNSTREAM
℄
SURVEYOR
TITLE. BRIDGE No. 2
RMB 1333
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 29/7/97
R.R. NOT TO SCALE
REF 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
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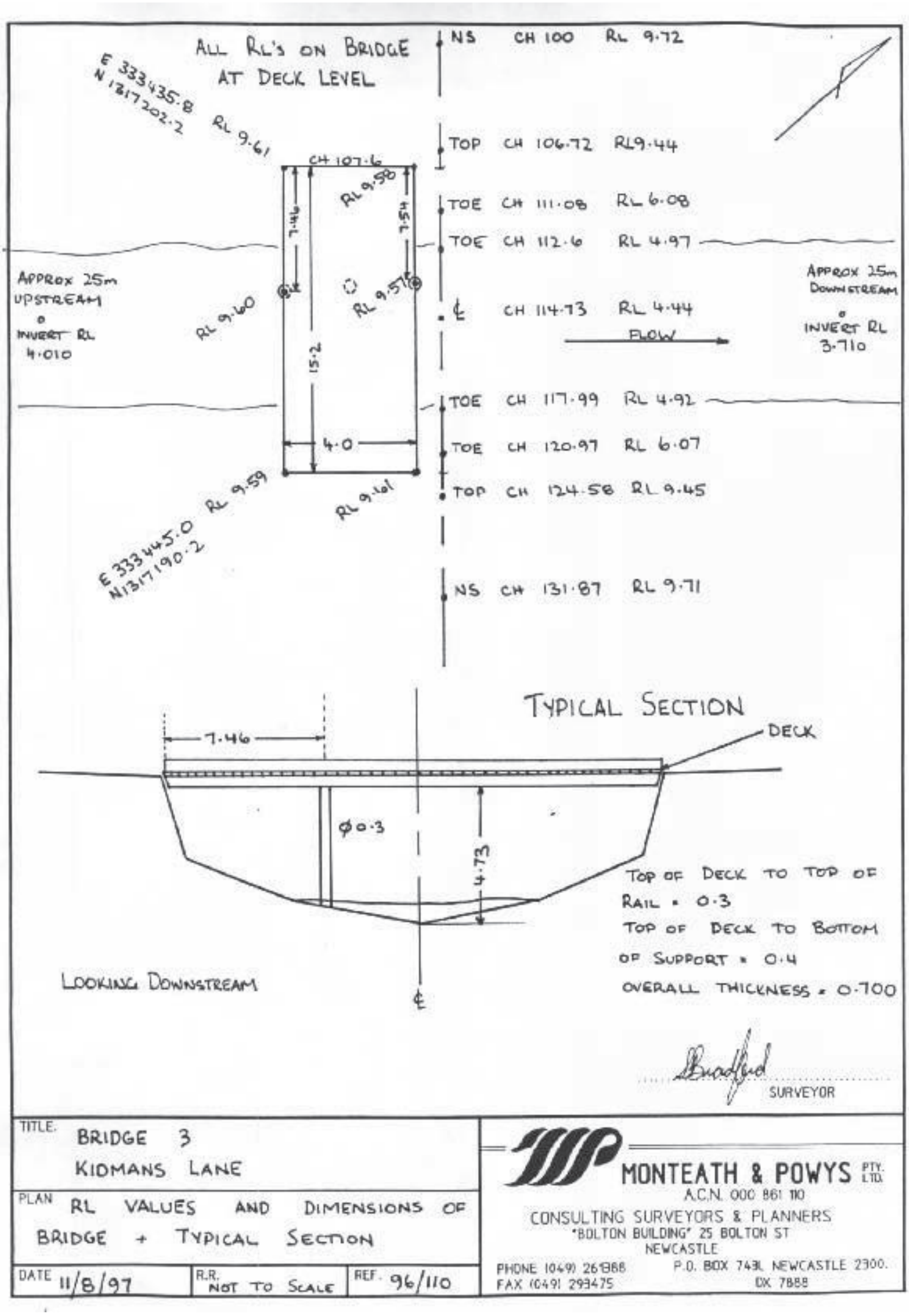
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300.
DX 7888


ALL RL's ON BRIDGE AT DECK LEVEL
NS CH 100 RL 9.72
TOP CH 106.72 RL9.44
TOE CH 111.08 RL 6.08
TOE CH 112.6 RL 4.97
℄ CH 114.73 RL 4.44
FLOW
TOE CH 117.99 RL 4.92
TOE CH 120.97 RL 6.07
TOP CH 124.58 RL 9.45
NS CH 131.87 RL 9.71
E 333435.8 N 1317202.2
RL 9.61
CH 107.6
RL 9.58
7.46
7.54
APPROX 25m UPSTREAM INVERT RL 4.010
APPROX 25m DOWNSTREAM INVERT RL 3.710
RL 9.60
RL 9.57
15.2
4.0
RL 9.59
RL 9.61
E 333445.0 N1317190.2
TYPICAL SECTION
DECK
7.46
ø0.3
4.73
TOP OF DECK TO TOP OF RAIL = 0.3
TOP OF DECK TO BOTTOM OF SUPPORT = 0.4
OVERALL THICKNESS = 0.700
LOOKING DOWNSTREAM
℄
SURVEYOR
TITLE: BRIDGE 3 KIDMANS LANE
PLAN: RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 11/8/97
R.R. NOT TO SCALE
REF. 96/110
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CONSULTING SURVEYORS & PLANNERS
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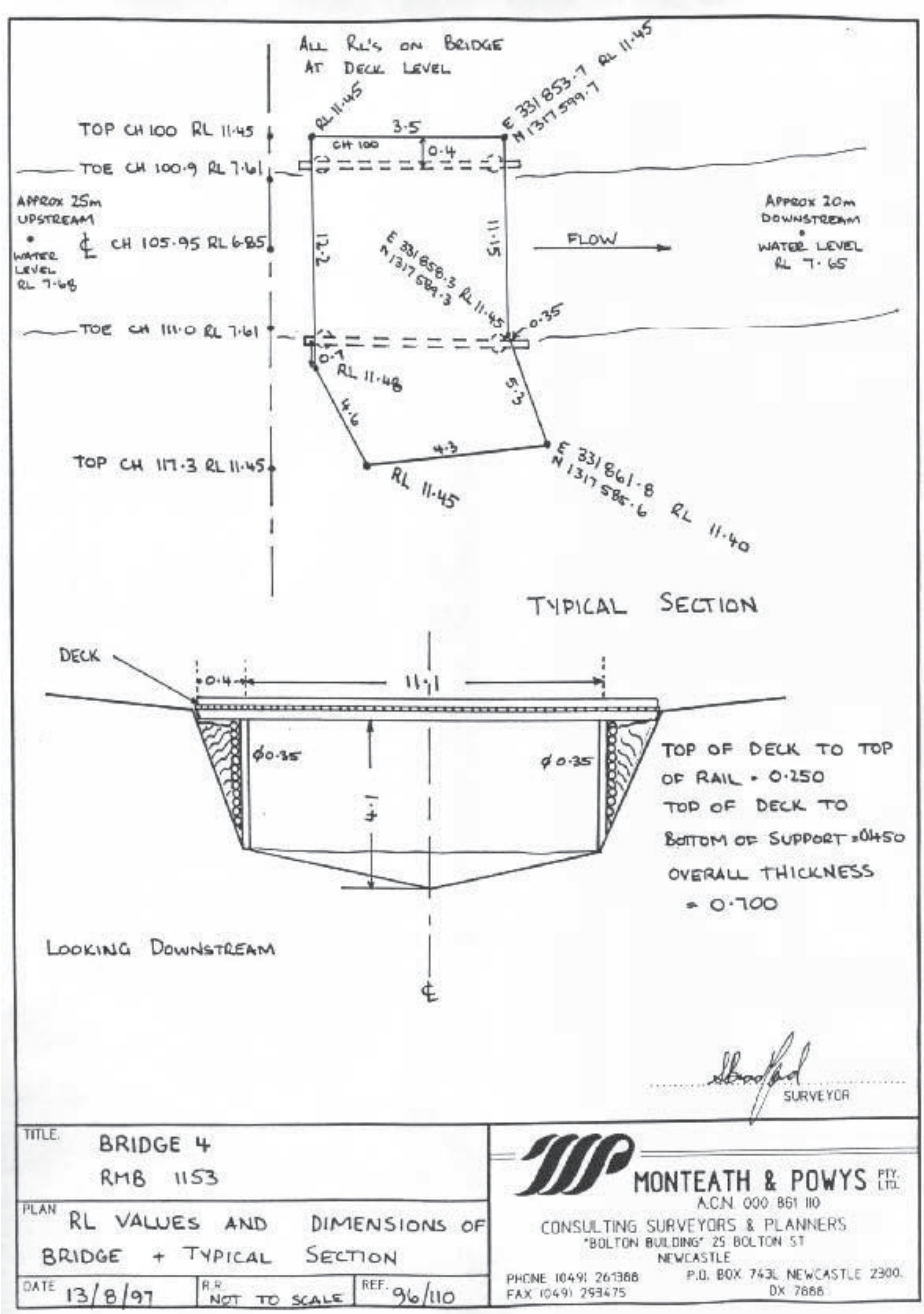
ALL RL's ON BRIDGE
AT DECK LEVEL
TOP CH 100 RL 11·45
TOE CH 100·9 RL 7·61
APPROX 25m UPSTREAM
WATER LEVEL
RL 7·68
℄ CH 105·95 RL 6·85
TOE CH 111·0 RL 7·61
TOP CH 117·3 RL 11·45
RL 11·45
3·5
CH 100
0·4
E 331 853·7
N 1317 599·7
RL 11·45
12·2
11·15
E 331 858·3
N 1317 584·3
RL 11·45
0·35
FLOW
APPROX 20m DOWNSTREAM
WATER LEVEL
RL 7·65
0·7
RL 11·48
4·6
5·3
4·3
RL 11·45
E 331 861·8
N 1317 585·6
RL 11·40
TYPICAL SECTION
DECK
0·4
11·1
ϕ0·35
ϕ0·35
4·1
TOP OF DECK TO TOP OF RAIL = 0·250
TOP OF DECK TO BOTTOM OF SUPPORT = 0·450
OVERALL THICKNESS = 0·700
LOOKING DOWNSTREAM
℄
SURVEYOR
TITLE: BRIDGE 4
RMB 1153
PLAN: RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 13/8/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
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PHONE (049) 261388
FAX (049) 293475
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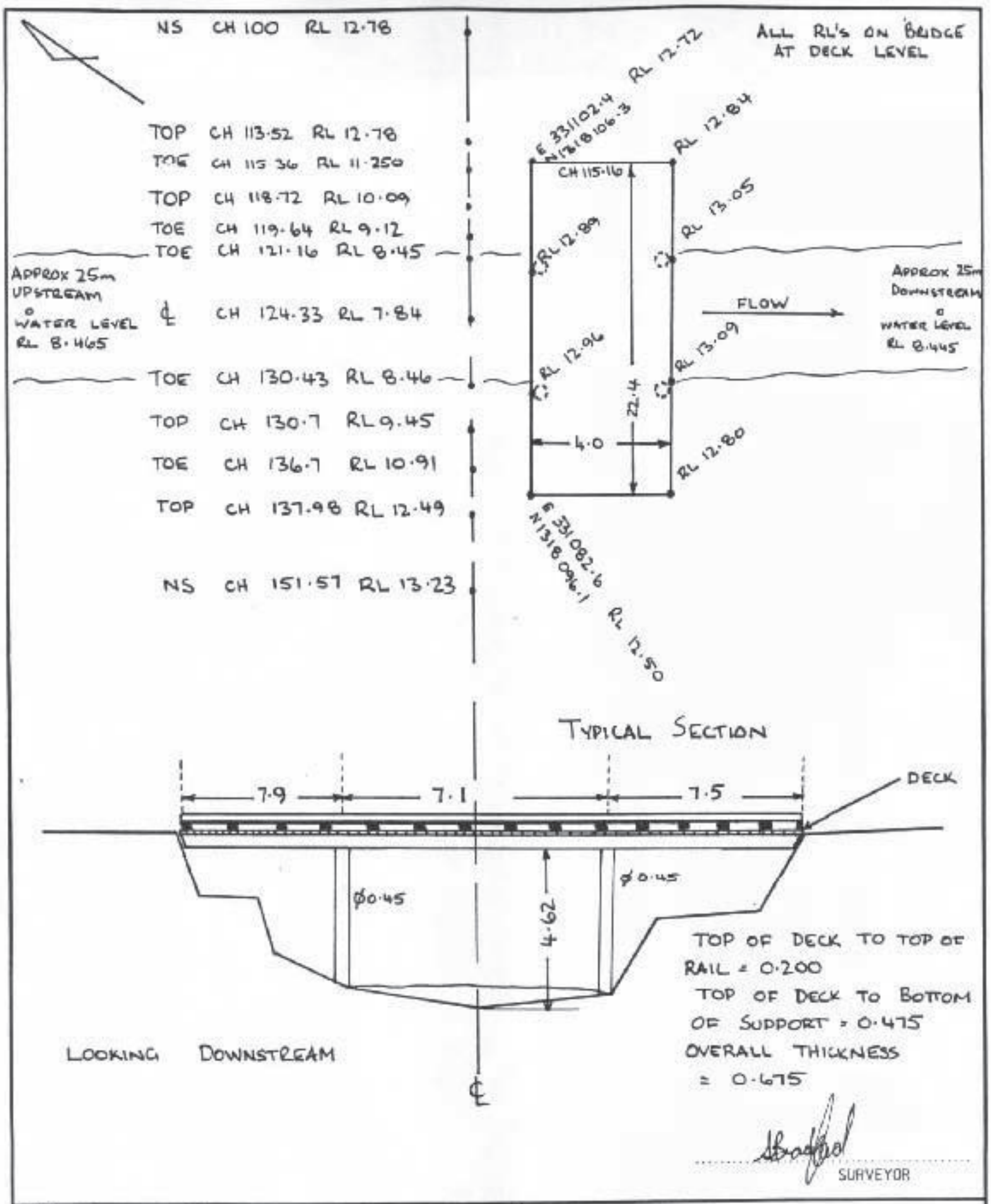
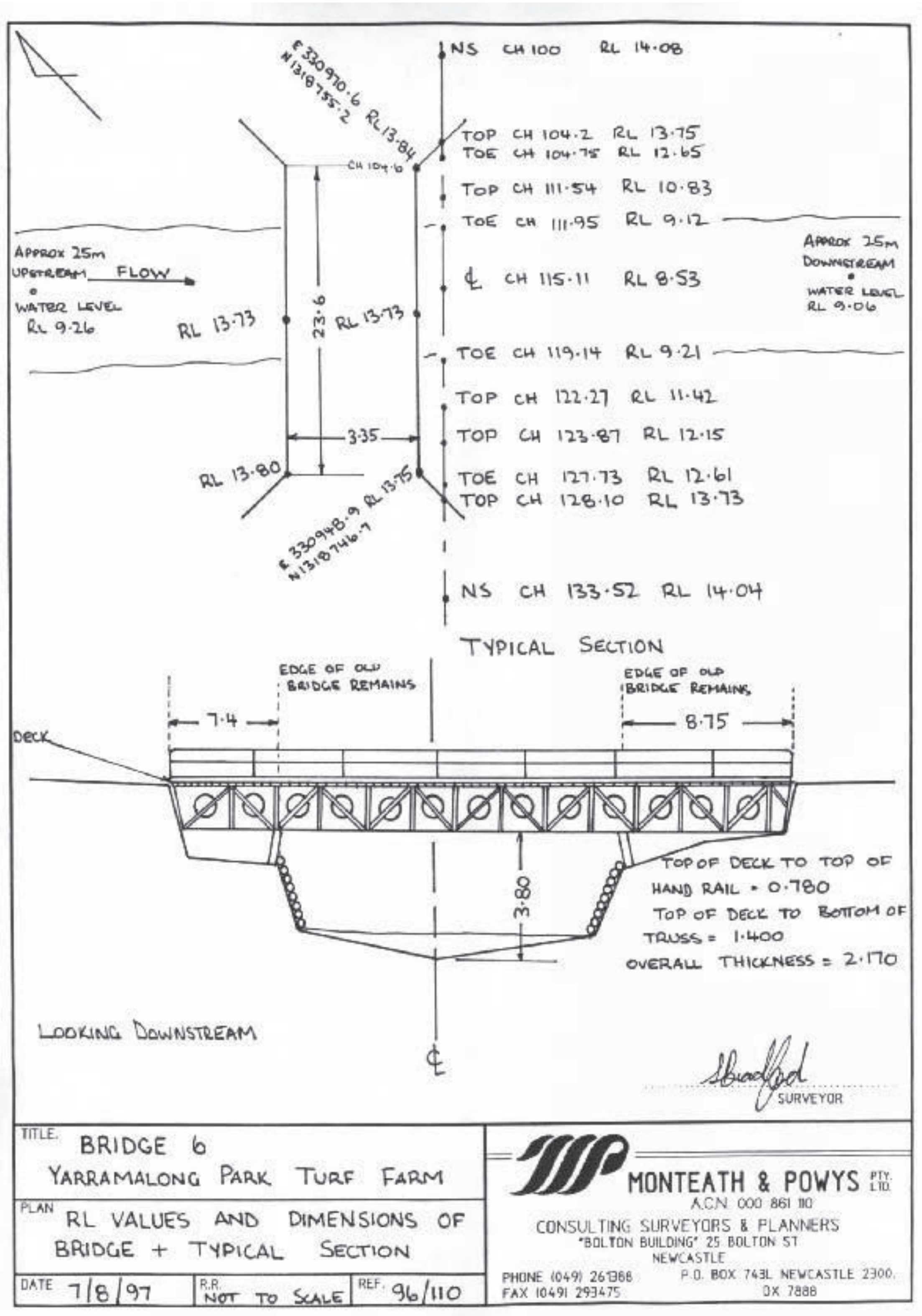
DX 7888



TITLE. BRIDGE 5 "MELON PATCH" RMB 1163	MONTEATH & POWYS PTY. LTD. A.C.N. 000 861 110 CONSULTING SURVEYORS & PLANNERS "BOLTON BUILDING" 25 BOLTON ST NEWCASTLE
PLAN RL VALUES + DIMENSIONS OF BRIDGE + TYPICAL SECTION	
DATE 11/8/97 · R.R. NOT TO SCALE · REF. 96/110	PHONE (049) 261388 FAX (049) 293475 P.O. BOX 743L NEWCASTLE 2300. DX 7888


NS CH 100 RL 14·08
E 330970·6
N 1318755·2
RL 13·84
CH 104·6
TOP CH 104·2 RL 13·75
TOE CH 104·75 RL 12·65
TOP CH 111·54 RL 10·83
TOE CH 111·95 RL 9·12
APPROX 25m UPSTREAM WATER LEVEL RL 9·26
FLOW
RL 13·73
23·6
RL 13·73
℄ CH 115·11 RL 8·53
APPROX 25m DOWNSTREAM WATER LEVEL RL 9·06
TOE CH 119·14 RL 9·21
TOP CH 122·27 RL 11·42
3·35
TOP CH 123·87 RL 12·15
RL 13·80
E 330948·9
N 1318746·7
RL 13·75
TOE CH 127·73 RL 12·61
TOP CH 128·10 RL 13·73
NS CH 133·52 RL 14·04
TYPICAL SECTION
EDGE OF OLD BRIDGE REMAINS
EDGE OF OLD BRIDGE REMAINS
7·4
8·75
DECK
3·80
TOP OF DECK TO TOP OF HAND RAIL = 0·780
TOP OF DECK TO BOTTOM OF TRUSS = 1·400
OVERALL THICKNESS = 2·170
LOOKING DOWNSTREAM
℄
SURVEYOR
TITLE. BRIDGE 6
YARRAMALONG PARK TURF FARM
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 7/8/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
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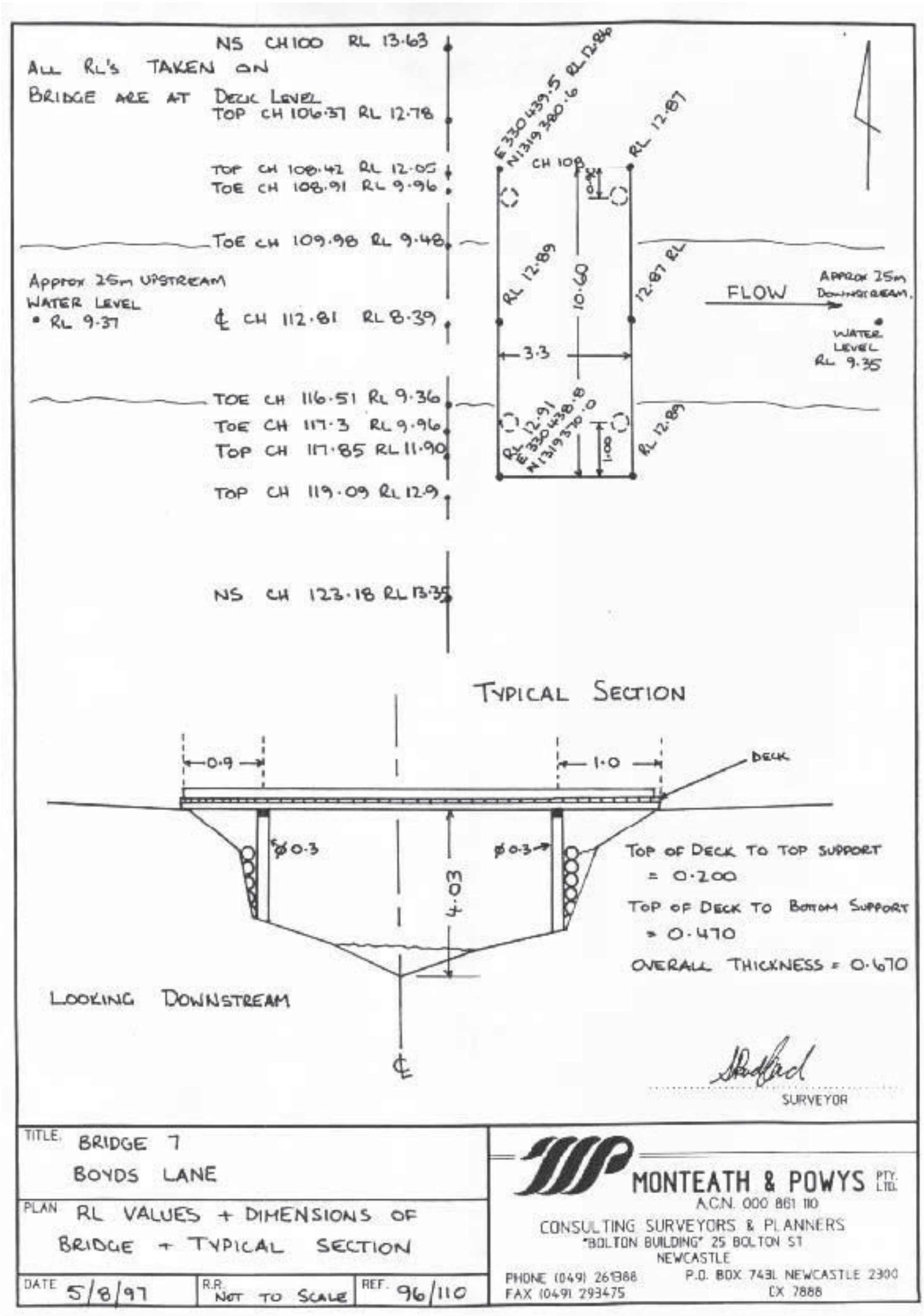
ALL RL'S TAKEN ON BRIDGE ARE AT DECK LEVEL
NS CH100 RL 13.63
TOP CH 106.37 RL 12.78
TOP CH 108.42 RL 12.05
TOE CH 108.91 RL 9.96
TOE CH 109.98 RL 9.48
Approx 25m UPSTREAM WATER LEVEL • RL 9.37
℄ CH 112.81 RL 8.39
TOE CH 116.51 RL 9.36
TOE CH 117.3 RL 9.96
TOP CH 117.85 RL 11.90
TOP CH 119.09 RL 12.9
NS CH 123.18 RL 13.35
E 330439.5 N 1319380.6 RL 12.89
CH 108
RL 12.87
RL 12.89
10.60
12.87 RL
3.3
FLOW
APPROX 25m DOWNSTREAM WATER LEVEL RL 9.35
RL 12.91 E 330438.8 N 1319370.0
1.00
RL 12.89
TYPICAL SECTION
0.9
1.0
DECK
ø0.3
ø0.3
4.03
TOP OF DECK TO TOP SUPPORT = 0.200
TOP OF DECK TO BOTTOM SUPPORT = 0.470
OVERALL THICKNESS = 0.670
LOOKING DOWNSTREAM
℄
SURVEYOR
TITLE: BRIDGE 7 BOYDS LANE
PLAN: RL VALUES + DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 5/8/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
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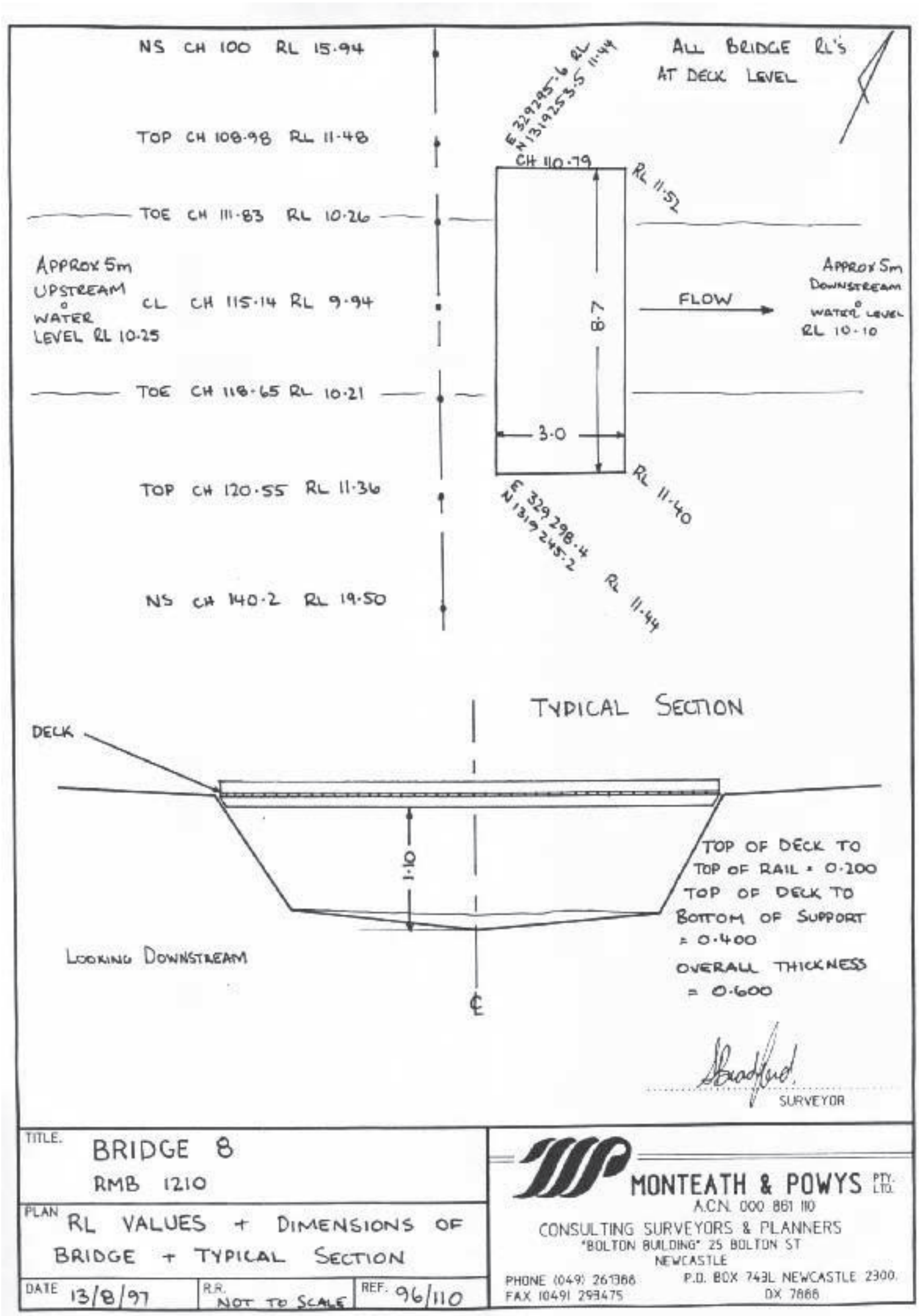
NS CH 100 RL 15·94
TOP CH 108·98 RL 11·48
TOE CH 111·83 RL 10·26
APPROX 5m UPSTREAM WATER LEVEL RL 10·25
CL CH 115·14 RL 9·94
TOE CH 118·65 RL 10·21
TOP CH 120·55 RL 11·36
NS CH 140·2 RL 19·50
E 329245·6 N 1319253·5 RL 11·44
ALL BRIDGE RL'S AT DECK LEVEL
CH 110·79
RL 11·52
8·7
FLOW
APPROX 5m DOWNSTREAM WATER LEVEL RL 10·10
3·0
RL 11·40
E 329298·4 N 1319245·2
RL 11·44
TYPICAL SECTION
DECK
1·10
LOOKING DOWNSTREAM
TOP OF DECK TO TOP OF RAIL = 0·200
TOP OF DECK TO BOTTOM OF SUPPORT = 0·400
OVERALL THICKNESS = 0·600
SURVEYOR
TITLE. BRIDGE 8
RMB 1210
PLAN RL VALUES + DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 13/8/97
R.R. NOT TO SCALE
REF. 96/110
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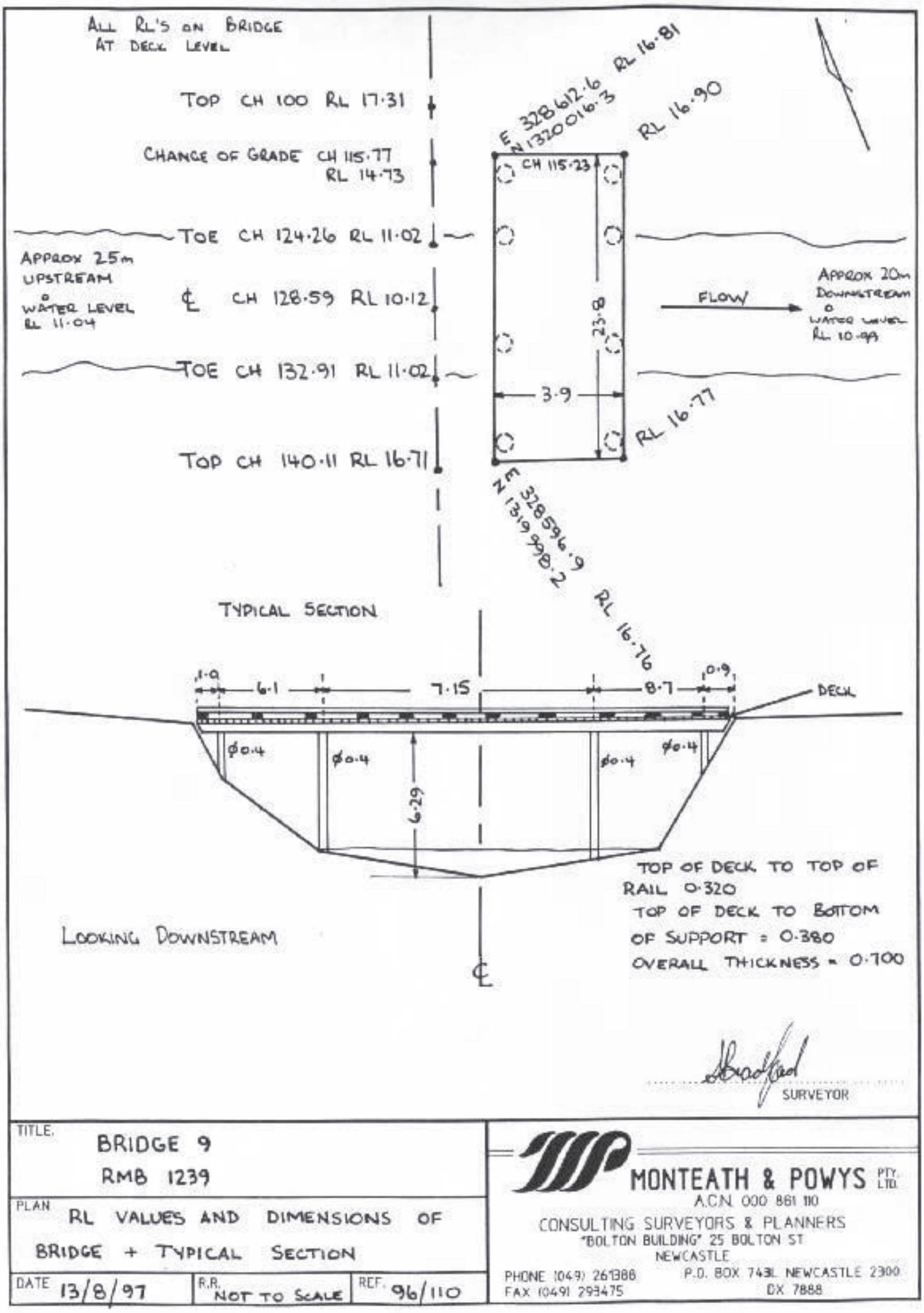
DX 7888


ALL RL'S ON BRIDGE AT DECK LEVEL
TOP CH 100 RL 17·31
CHANGE OF GRADE CH 115·77 RL 14·73
TOE CH 124·26 RL 11·02
℄ CH 128·59 RL 10·12
TOE CH 132·91 RL 11·02
TOP CH 140·11 RL 16·71
APPROX 25m UPSTREAM WATER LEVEL RL 11·04
E 328 612·6 N 1320 016·3 RL 16·81
RL 16·90
CH 115·23
23·8
3·9
FLOW
APPROX 20m DOWNSTREAM WATER LEVEL RL 10·99
RL 16·77
E 328 596·9 N 1319 998·2
RL 16·76
TYPICAL SECTION
1·0
6·1
7·15
8·7
0·9
DECK
ϕ0·4
6·29
TOP OF DECK TO TOP OF RAIL 0·320
TOP OF DECK TO BOTTOM OF SUPPORT = 0·380
OVERALL THICKNESS = 0·700
LOOKING DOWNSTREAM
℄
SURVEYOR
TITLE. BRIDGE 9 RMB 1239
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 13/8/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
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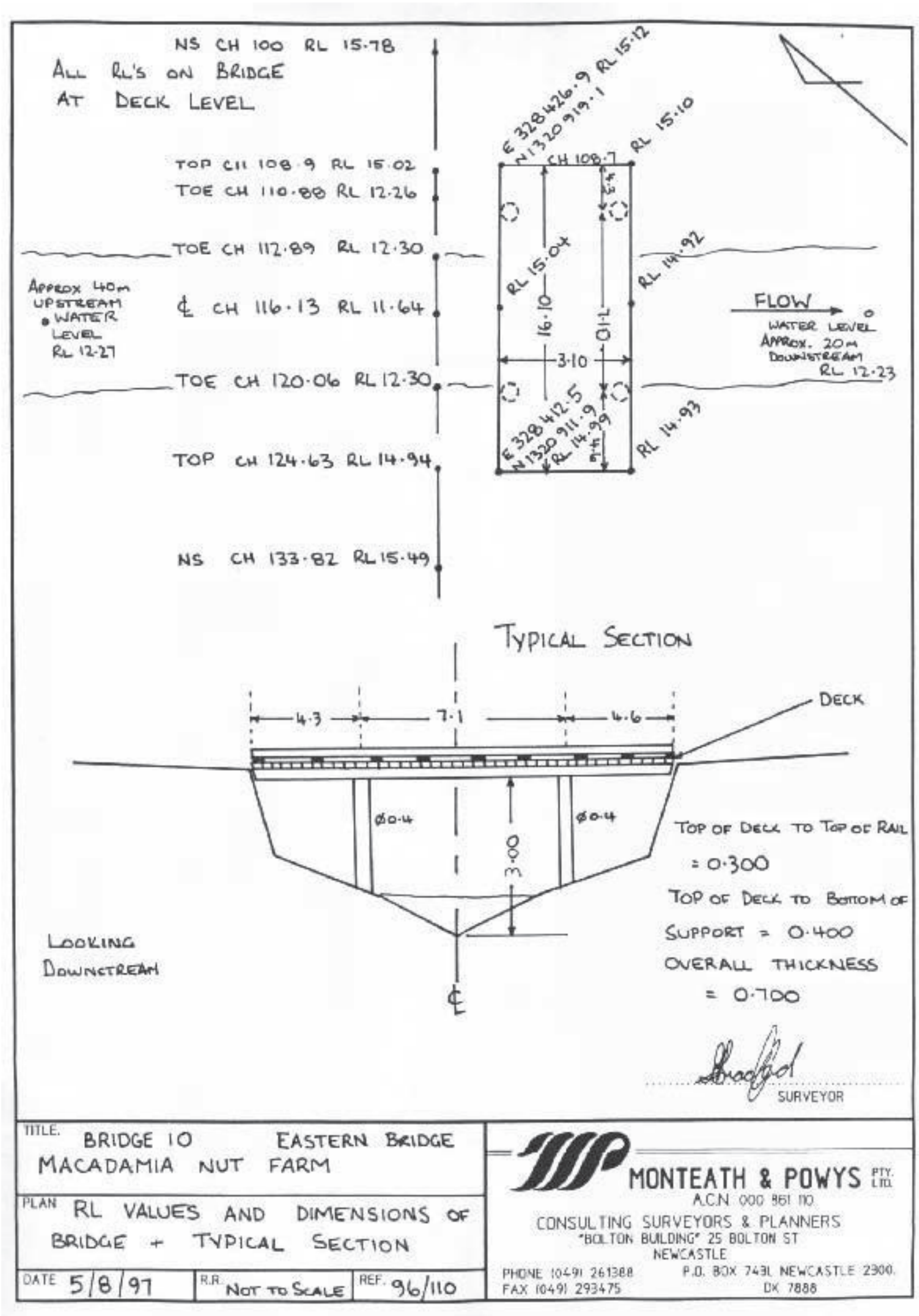
NS CH 100 RL 15·78
ALL RL'S ON BRIDGE AT DECK LEVEL
TOP CH 108·9 RL 15·02
TOE CH 110·88 RL 12·26
TOE CH 112·89 RL 12·30
℄ CH 116·13 RL 11·64
TOE CH 120·06 RL 12·30
TOP CH 124·63 RL 14·94
NS CH 133·82 RL 15·49
APPROX 40m UPSTREAM WATER LEVEL RL 12·27
E 328426·9 N 1320919·1 RL 15·12
RL 15·10
CH 108·7
RL 15·04
16·10
16·10
RL 14·92
3·10
E 328412·5 N 1320911·9 RL 14·99
RL 14·93
FLOW
WATER LEVEL APPROX. 20m DOWNSTREAM RL 12·23
TYPICAL SECTION
4·3
7·1
4·6
DECK
ø0·4
ø0·4
3·00
TOP OF DECK TO TOP OF RAIL = 0·300
TOP OF DECK TO BOTTOM OF SUPPORT = 0·400
OVERALL THICKNESS = 0·700
LOOKING DOWNSTREAM
℄
SURVEYOR
TITLE. BRIDGE 10 EASTERN BRIDGE MACADAMIA NUT FARM
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 5/8/97
R.R. NOT TO SCALE
REF. 96/110
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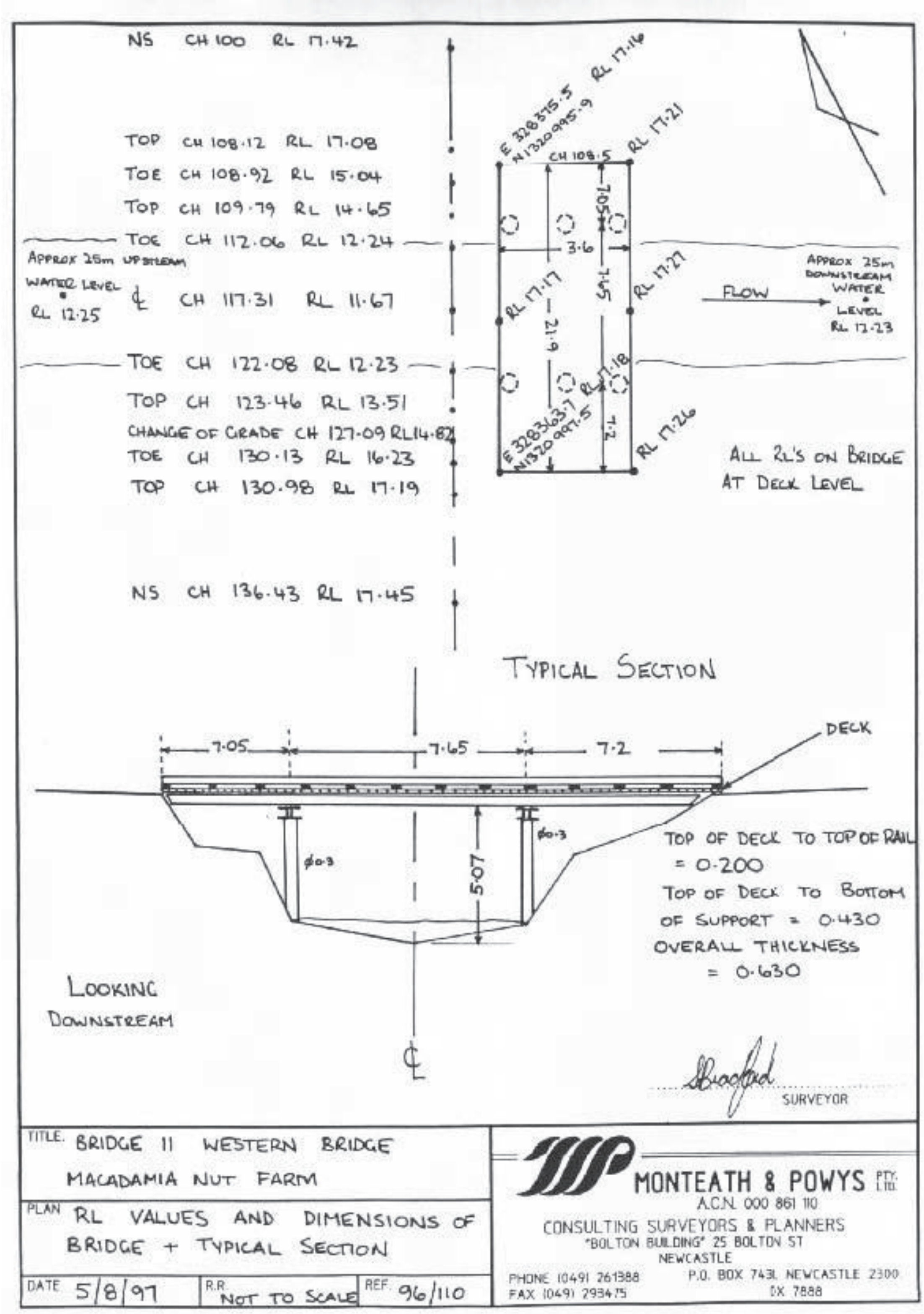
NS CH 100 RL 17.42
TOP CH 108.12 RL 17.08
TOE CH 108.92 RL 15.04
TOP CH 109.79 RL 14.65
TOE CH 112.06 RL 12.24
APPROX 25m UPSTREAM WATER LEVEL RL 12.25
℄ CH 117.31 RL 11.67
TOE CH 122.08 RL 12.23
TOP CH 123.46 RL 13.51
CHANGE OF GRADE CH 127.09 RL14.82
TOE CH 130.13 RL 16.23
TOP CH 130.98 RL 17.19
NS CH 136.43 RL 17.45
FLOW
APPROX 25m DOWNSTREAM WATER LEVEL RL 12.23
ALL RL'S ON BRIDGE AT DECK LEVEL
TYPICAL SECTION
DECK
TOP OF DECK TO TOP OF RAIL = 0.200
TOP OF DECK TO BOTTOM OF SUPPORT = 0.430
OVERALL THICKNESS = 0.630
LOOKING DOWNSTREAM
SURVEYOR
TITLE: BRIDGE 11 WESTERN BRIDGE MACADAMIA NUT FARM
PLAN: RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 5/8/97
R.R NOT TO SCALE
REF. 96/110
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A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
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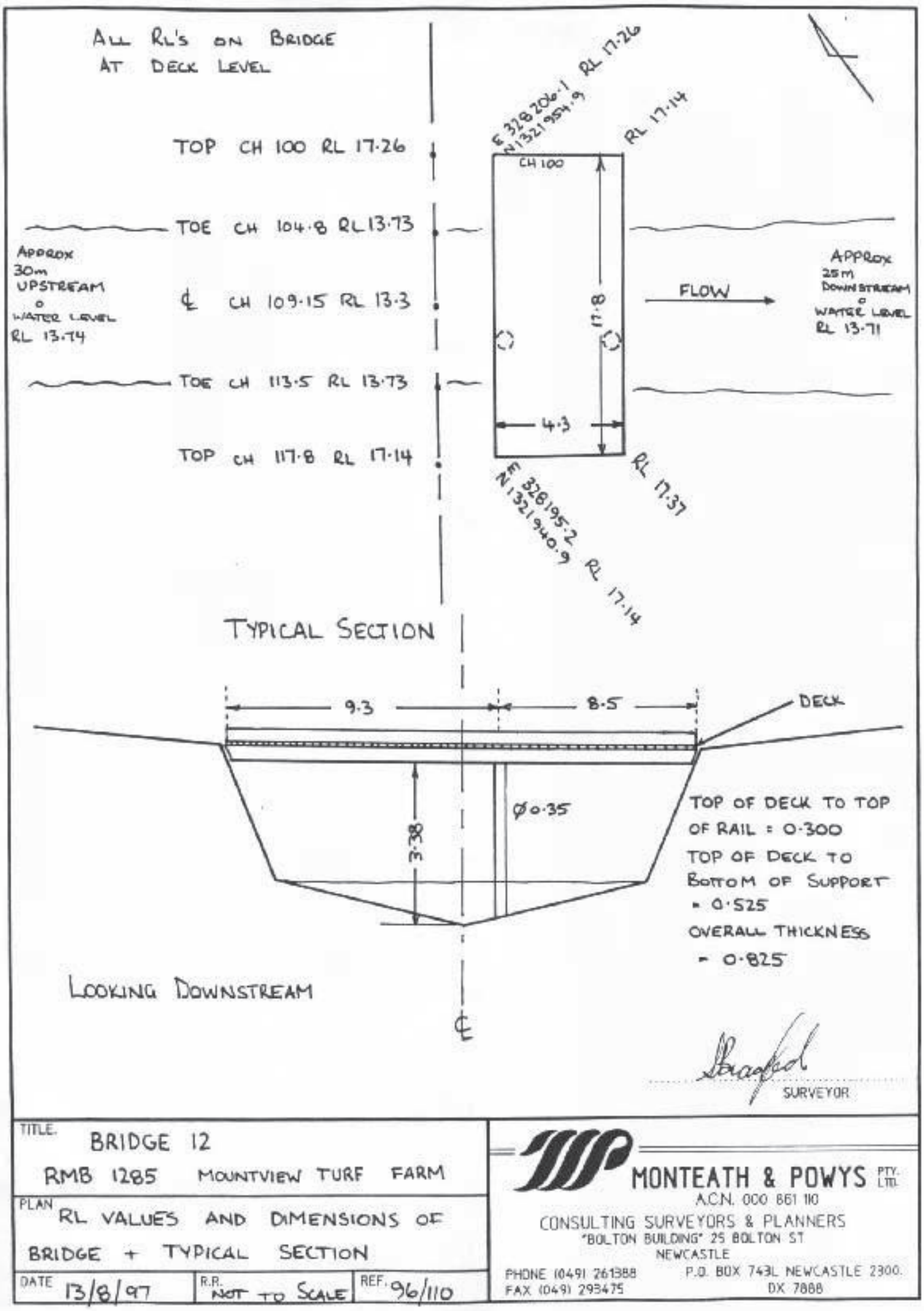
ALL RL'S ON BRIDGE
AT DECK LEVEL
TOP CH 100 RL 17·26
TOE CH 104·8 RL 13·73
℄ CH 109·15 RL 13·3
TOE CH 113·5 RL 13·73
TOP CH 117·8 RL 17·14
APPROX
30m
UPSTREAM
WATER LEVEL
RL 13·74
APPROX
25m
DOWNSTREAM
WATER LEVEL
RL 13·71
FLOW
E 328 206·1
N 1321 954·9
RL 17·26
RL 17·14
CH 100
17·8
4·3
RL 17·37
E 328 195·2
N 1321 940·9
RL 17·14
TYPICAL SECTION
9·3
8·5
DECK
Ø 0·35
3·38
TOP OF DECK TO TOP
OF RAIL = 0·300
TOP OF DECK TO
BOTTOM OF SUPPORT
= 0·525
OVERALL THICKNESS
= 0·825
LOOKING DOWNSTREAM
℄
SURVEYOR
TITLE. BRIDGE 12
RMB 1285 MOUNTVIEW TURF FARM
PLAN RL VALUES AND DIMENSIONS OF
BRIDGE + TYPICAL SECTION
DATE 13/8/97
R.R. NOT TO SCALE
REF. 96/110
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A.C.N. 000 861 110
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NEWCASTLE
PHONE (049) 261388
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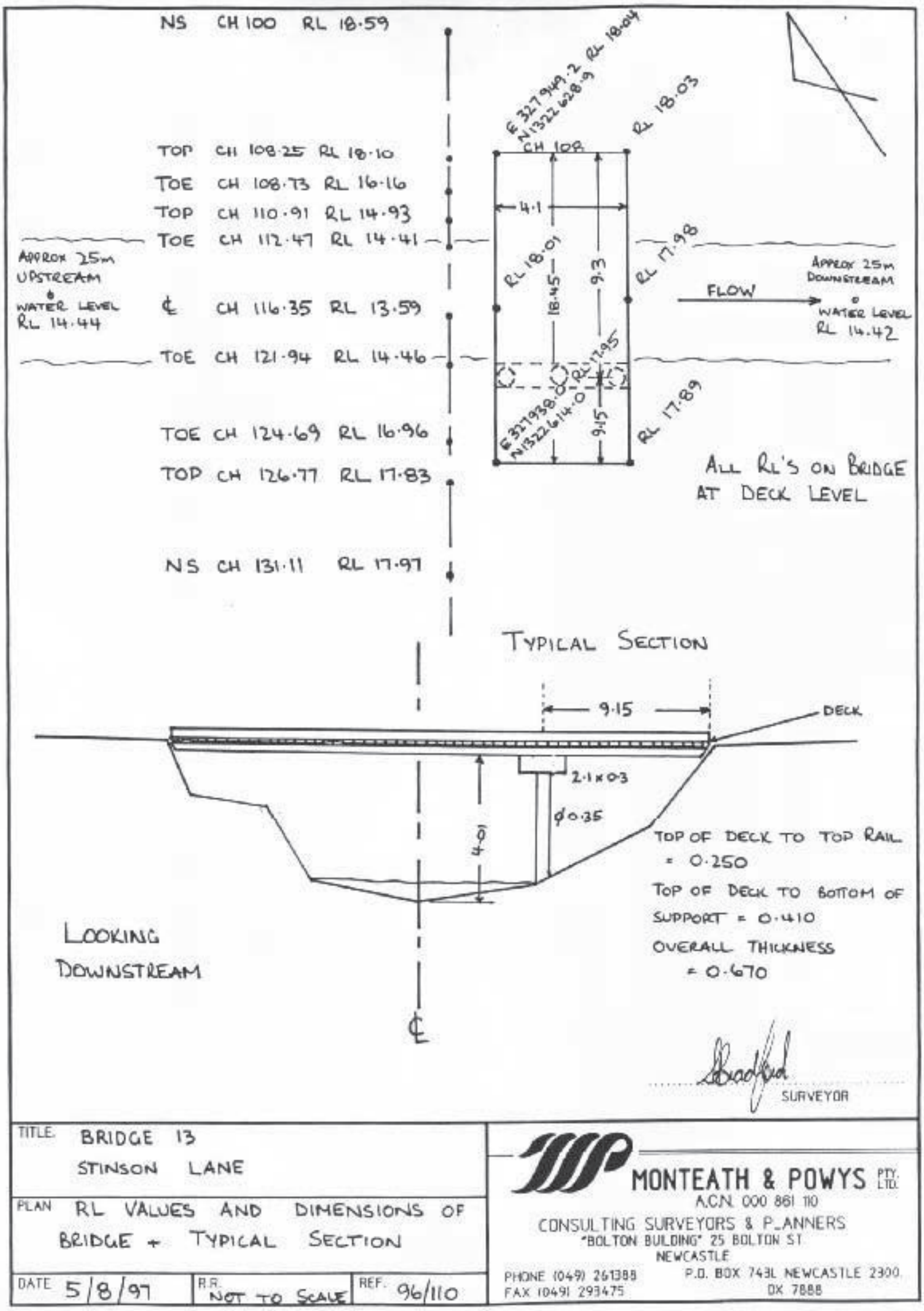
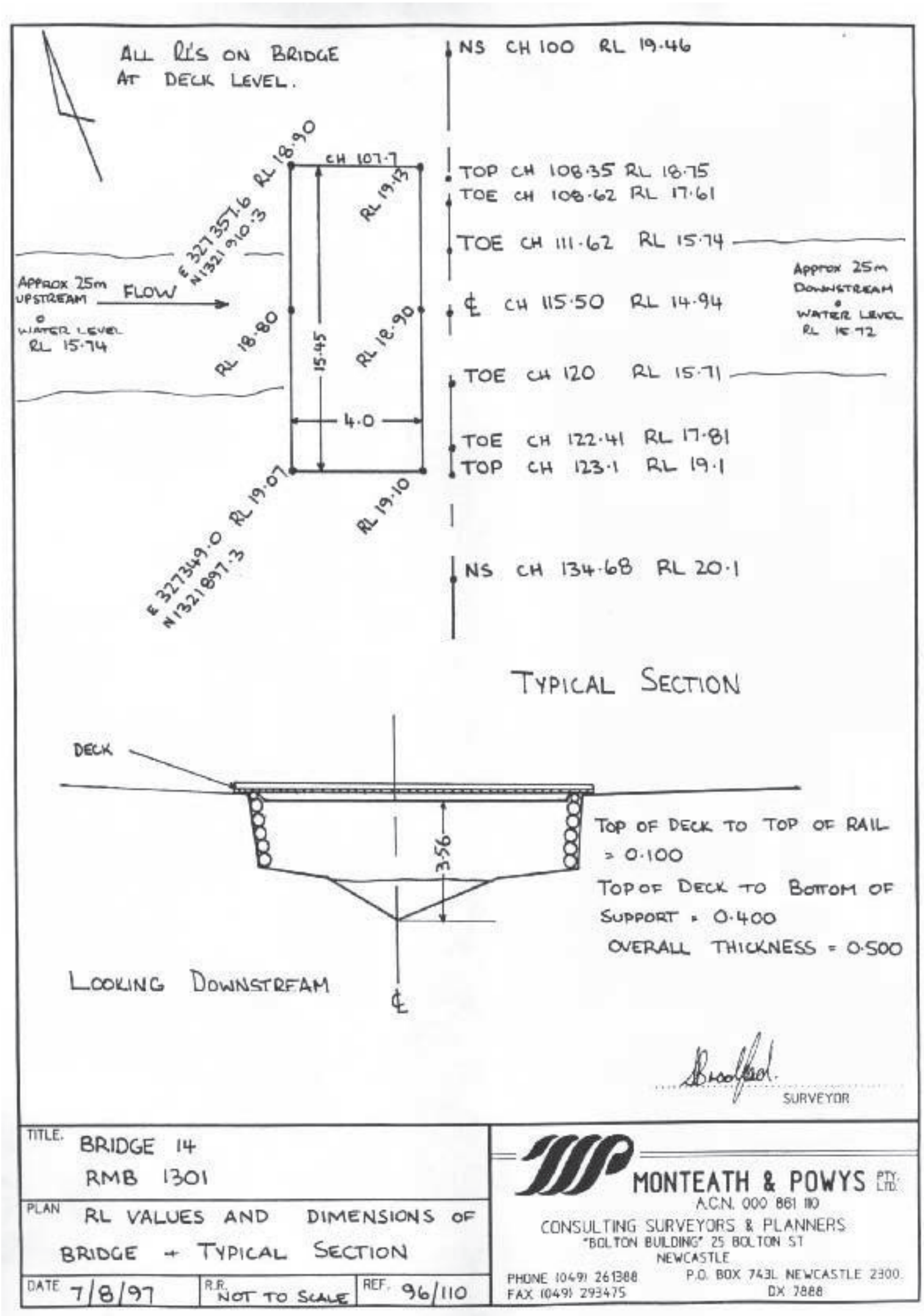
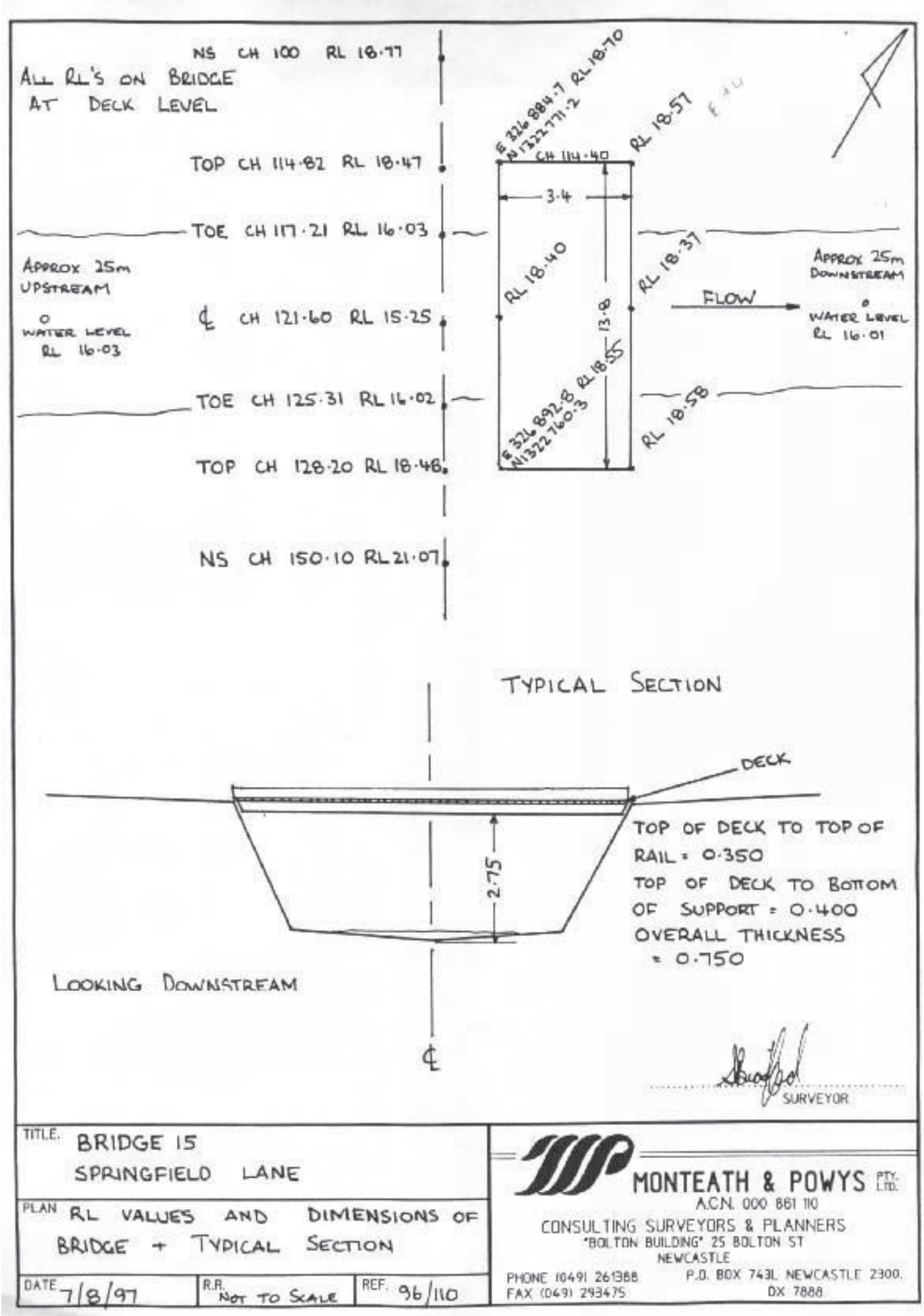
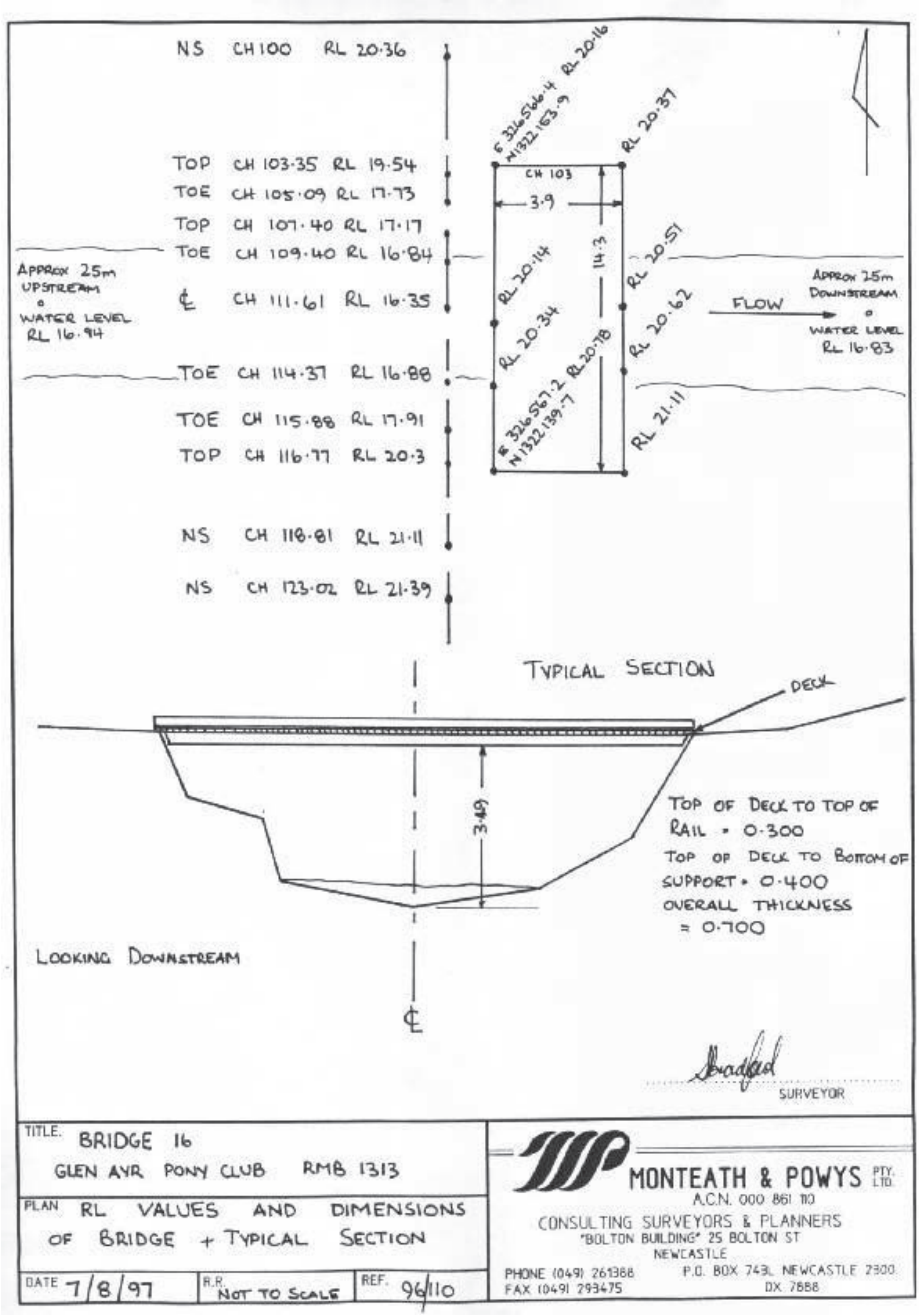
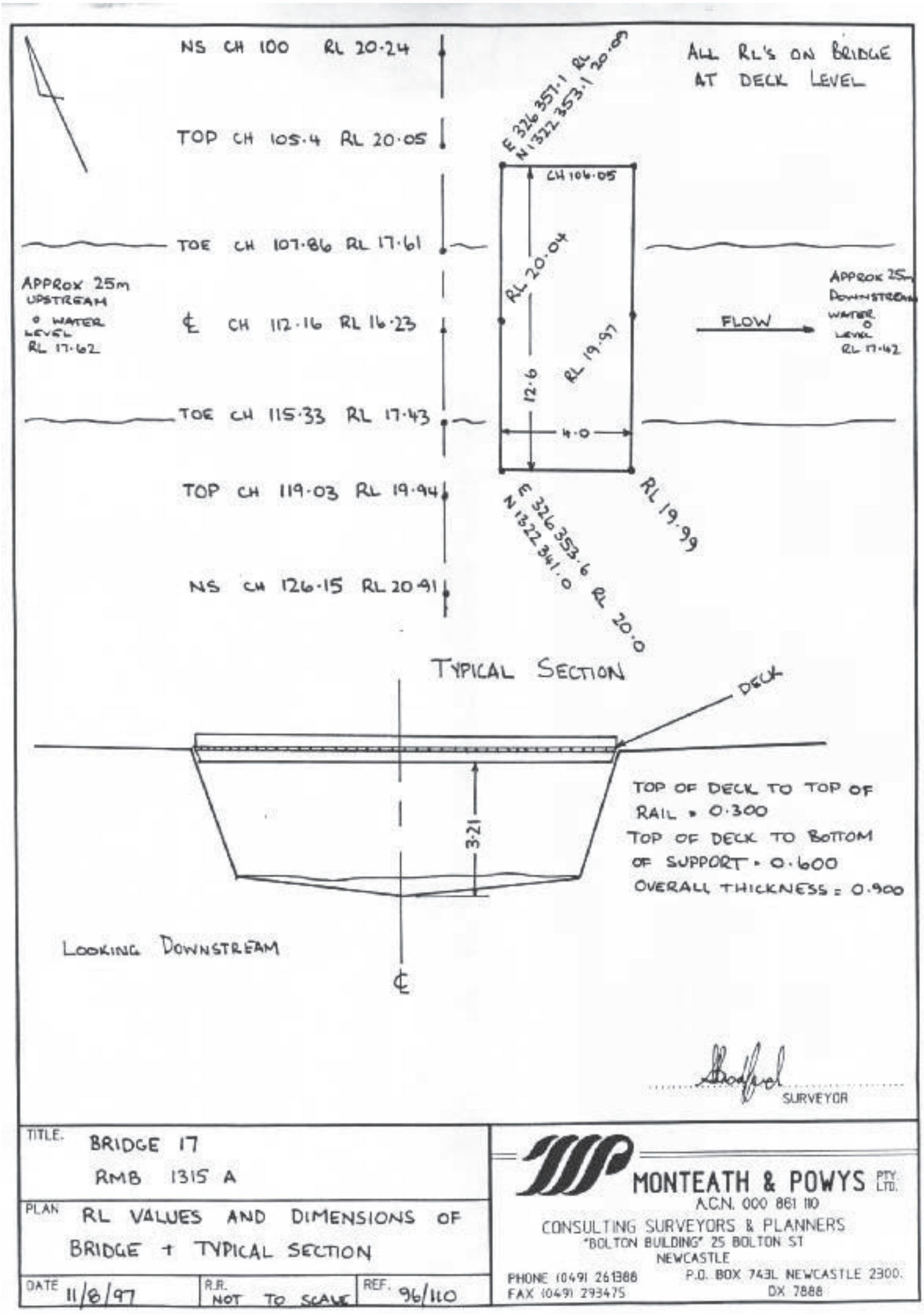
P.O. BOX 743L NEWCASTLE 2300.
DX 7888

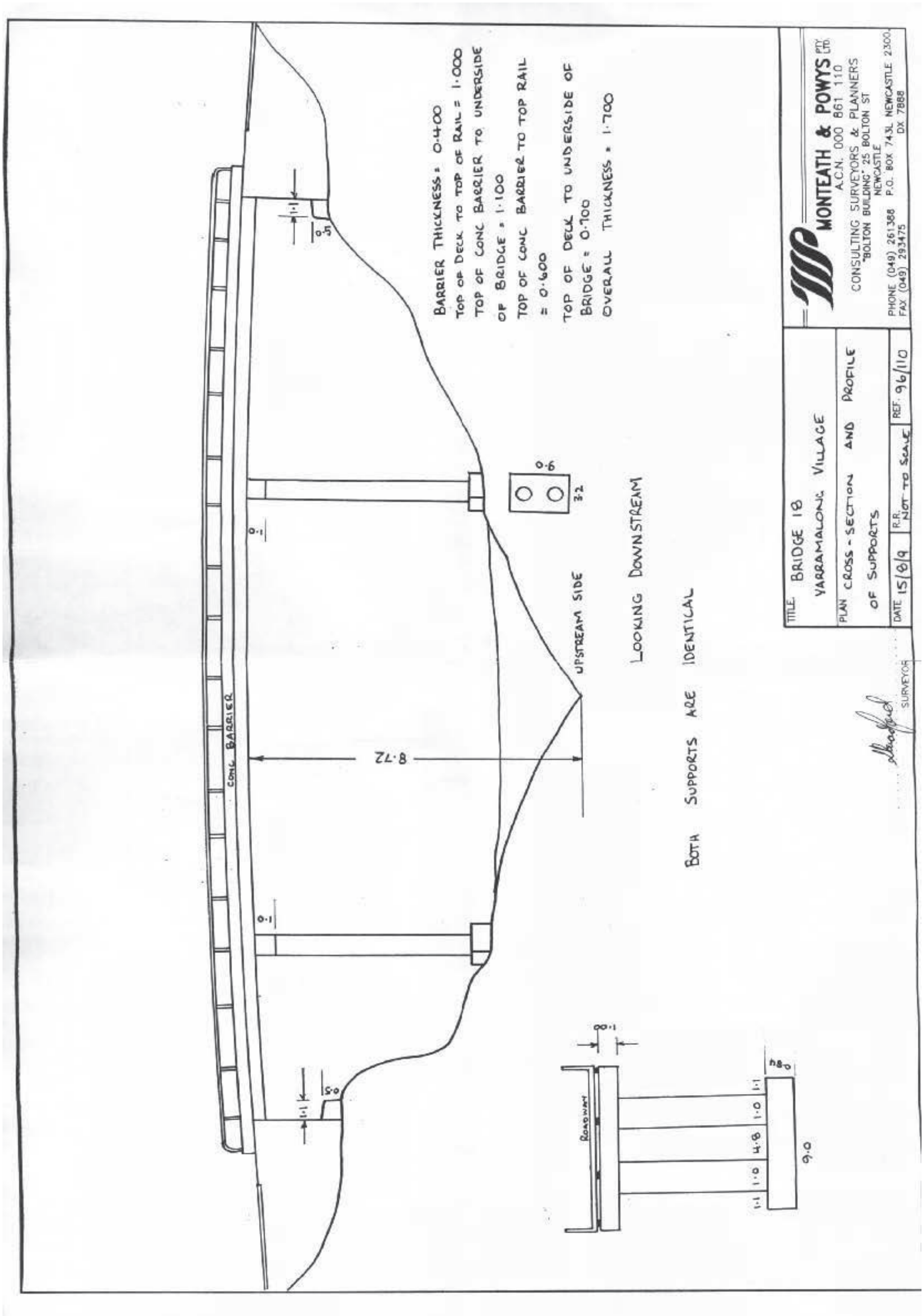

NS CH 100 RL 18·59
TOP CH 108·25 RL 18·10
TOE CH 108·73 RL 16·16
TOP CH 110·91 RL 14·93
TOE CH 112·47 RL 14·41
¢ CH 116·35 RL 13·59
TOE CH 121·94 RL 14·46
TOE CH 124·69 RL 16·96
TOP CH 126·77 RL 17·83
NS CH 131·11 RL 17·97
APPROX 25m UPSTREAM WATER LEVEL RL 14·44
APPROX 25m DOWNSTREAM WATER LEVEL RL 14·42
FLOW
E 327949·2 N 1322628·9 RL 18·04
RL 18·03
CH 108
4·1
RL 18·01
18·45
9·3
RL 17·98
RL 17·95
E 327938·0 N 1322614·0
9·15
RL 17·89
ALL RL'S ON BRIDGE AT DECK LEVEL
TYPICAL SECTION
9·15
DECK
2·1 x 0·3
ϕ 0·35
4·01
TOP OF DECK TO TOP RAIL = 0·250
TOP OF DECK TO BOTTOM OF SUPPORT = 0·410
OVERALL THICKNESS = 0·670
LOOKING DOWNSTREAM
¢
SURVEYOR
TITLE BRIDGE 13 STINSON LANE
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 5/8/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST. NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300
DX 7888

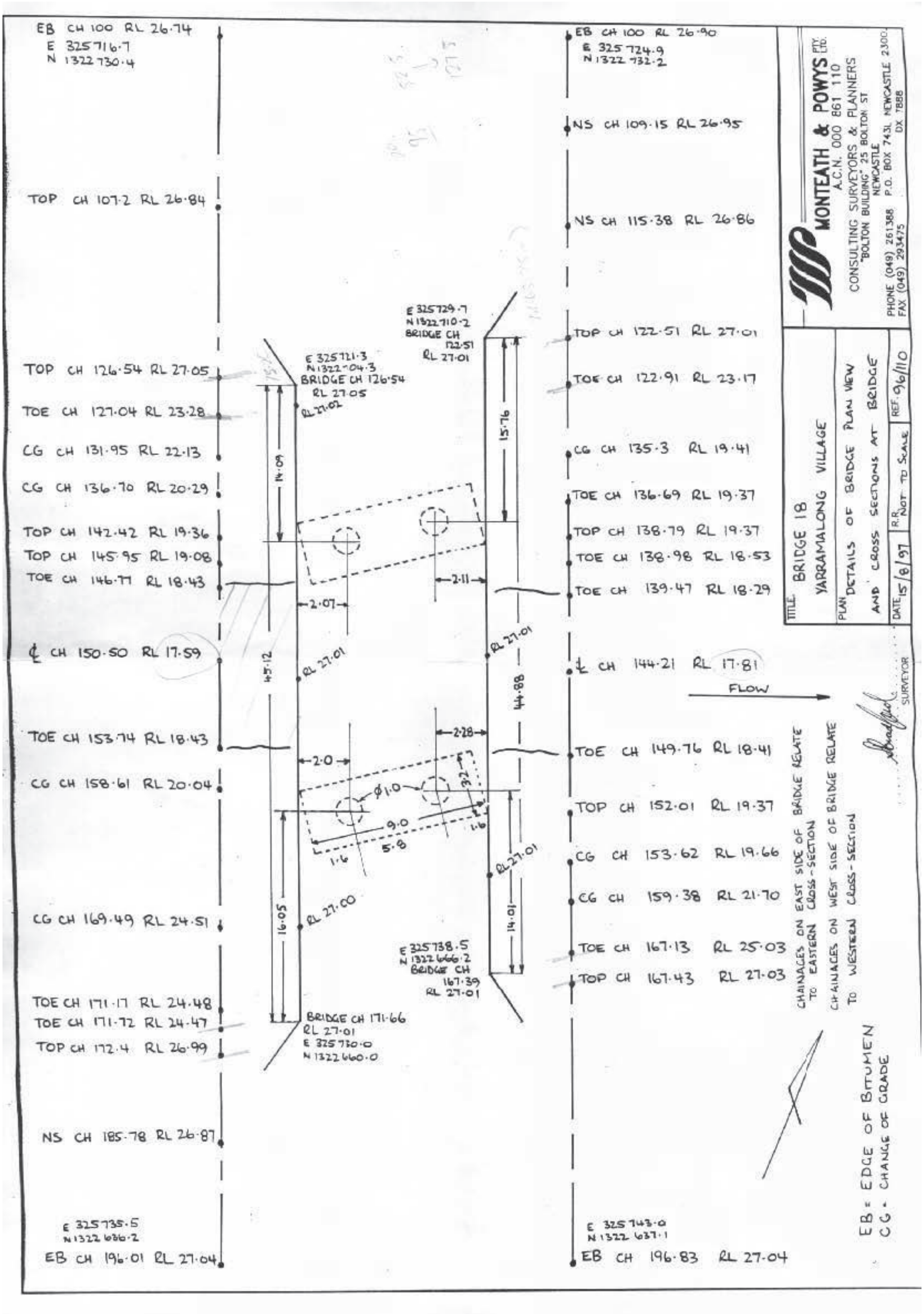

ALL RL'S ON BRIDGE
AT DECK LEVEL.
NS CH 100 RL 19.46
CH 107.7
E 327357.6 N1321910.3 RL 18.90
RL 19.13
TOP CH 108.35 RL 18.75
TOE CH 108.62 RL 17.61
TOE CH 111.62 RL 15.74
APPROX 25m UPSTREAM
WATER LEVEL
RL 15.74
FLOW
RL 18.80
15.45
RL 18.90
℄ CH 115.50 RL 14.94
Approx 25m DOWNSTREAM
WATER LEVEL
RL 15.72
TOE CH 120 RL 15.71
4.0
TOE CH 122.41 RL 17.81
TOP CH 123.1 RL 19.1
E 327349.0 N1321897.3 RL 19.07
RL 19.10
NS CH 134.68 RL 20.1
TYPICAL SECTION
DECK
3.56
TOP OF DECK TO TOP OF RAIL = 0.100
TOP OF DECK TO BOTTOM OF SUPPORT = 0.400
OVERALL THICKNESS = 0.500
LOOKING DOWNSTREAM
℄
SURVEYOR
TITLE. BRIDGE 14
RMB 1301
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 7/8/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300.
DX 7888

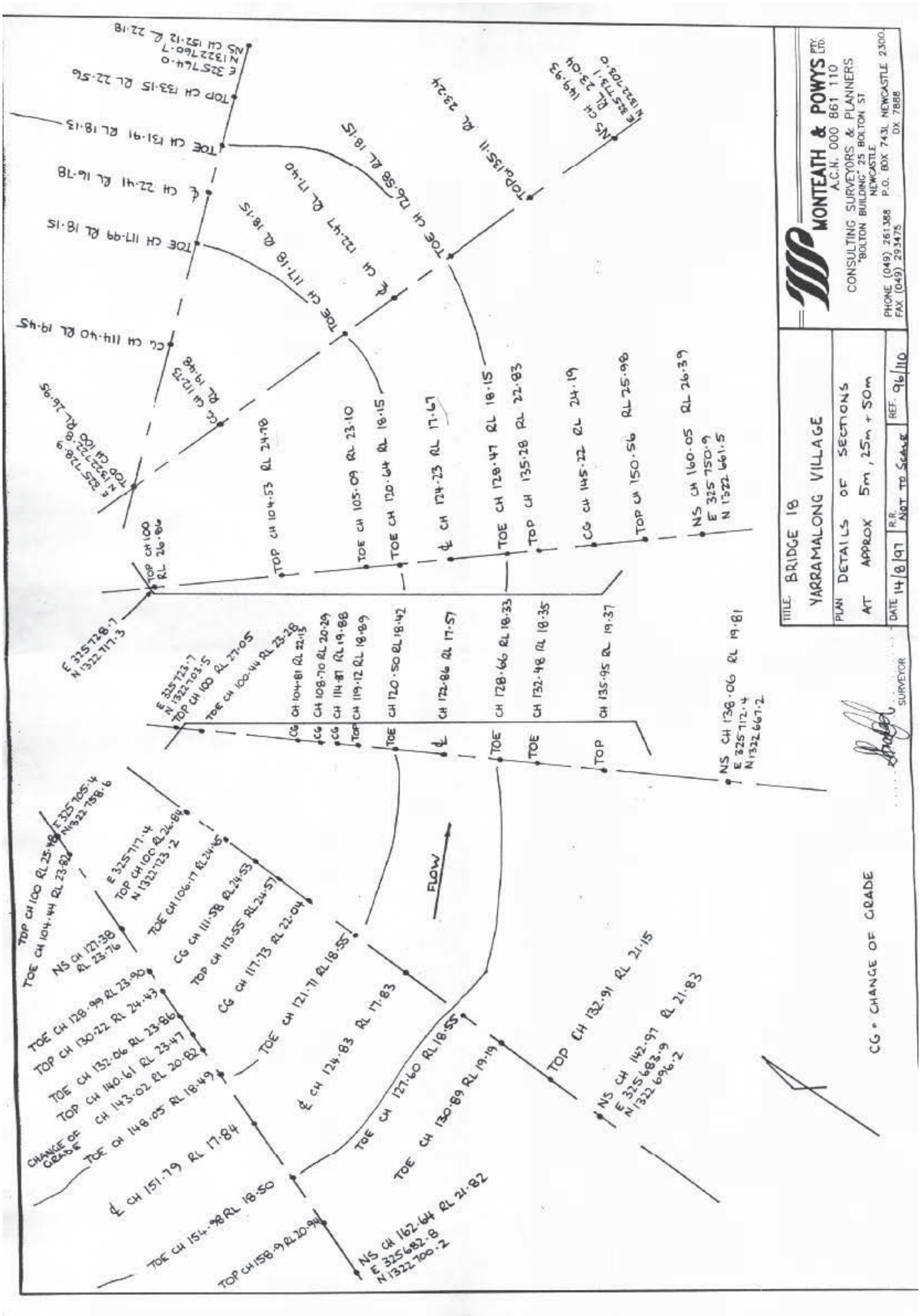

NS CH 100 RL 18·77
ALL RL'S ON BRIDGE AT DECK LEVEL
TOP CH 114·82 RL 18·47
TOE CH 117·21 RL 16·03
APPROX 25m UPSTREAM
WATER LEVEL RL 16·03
℄ CH 121·60 RL 15·25
TOE CH 125·31 RL 16·02
TOP CH 128·20 RL 18·48
NS CH 150·10 RL 21·07
RL 18·70
RL 18·57
CH 114·40
3·4
RL 18·40
RL 18·37
13·8
RL 18·55
RL 18·58
FLOW
APPROX 25m DOWNSTREAM
WATER LEVEL RL 16·01
TYPICAL SECTION
DECK
2·75
TOP OF DECK TO TOP OF RAIL = 0·350
TOP OF DECK TO BOTTOM OF SUPPORT = 0·400
OVERALL THICKNESS = 0·750
LOOKING DOWNSTREAM
℄
SURVEYOR
TITLE. BRIDGE 15 SPRINGFIELD LANE
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 7/8/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300.
DX 7888

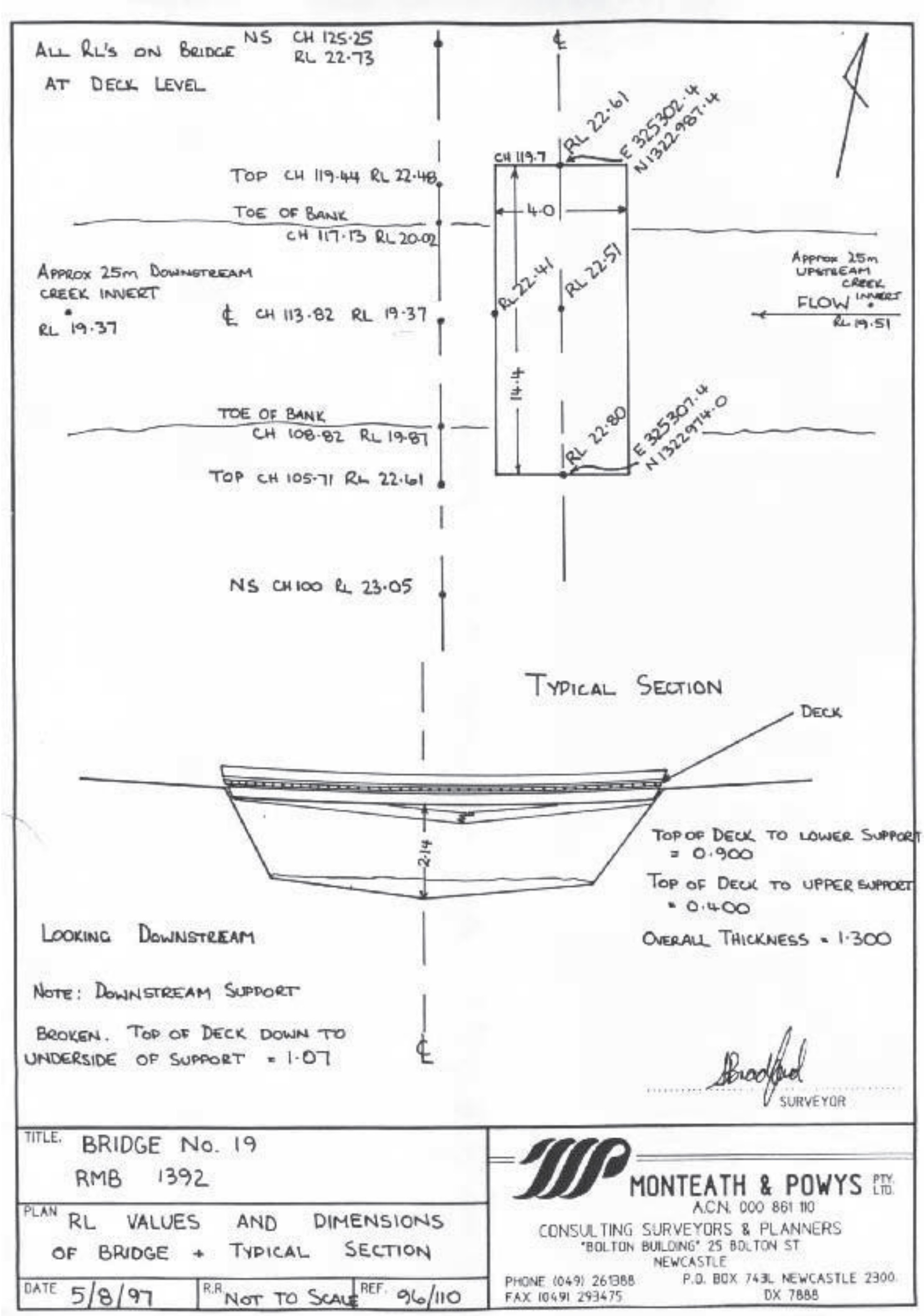

NS CH100 RL 20.36
TOP CH 103.35 RL 19.54
TOE CH 105.09 RL 17.73
TOP CH 107.40 RL 17.17
TOE CH 109.40 RL 16.84
℄ CH 111.61 RL 16.35
TOE CH 114.37 RL 16.88
TOE CH 115.88 RL 17.91
TOP CH 116.77 RL 20.3
NS CH 118.81 RL 21.11
NS CH 123.02 RL 21.39
APPROX 25m UPSTREAM WATER LEVEL RL 16.94
APPROX 25m DOWNSTREAM WATER LEVEL RL 16.83
FLOW
E 326566.4 N 1322163.9 RL 20.16
RL 20.37
CH 103
3.9
14.3
RL 20.14
RL 20.51
RL 20.34
RL 20.62
E 326567.2 N 1322139.7 RL 20.78
RL 21.11
TYPICAL SECTION
DECK
3.49
TOP OF DECK TO TOP OF RAIL = 0.300
TOP OF DECK TO BOTTOM OF SUPPORT = 0.400
OVERALL THICKNESS = 0.700
LOOKING DOWNSTREAM
℄
SURVEYOR
TITLE. BRIDGE 16
GLEN AYR PONY CLUB RMB 1313
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 7/8/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300
DX 7888

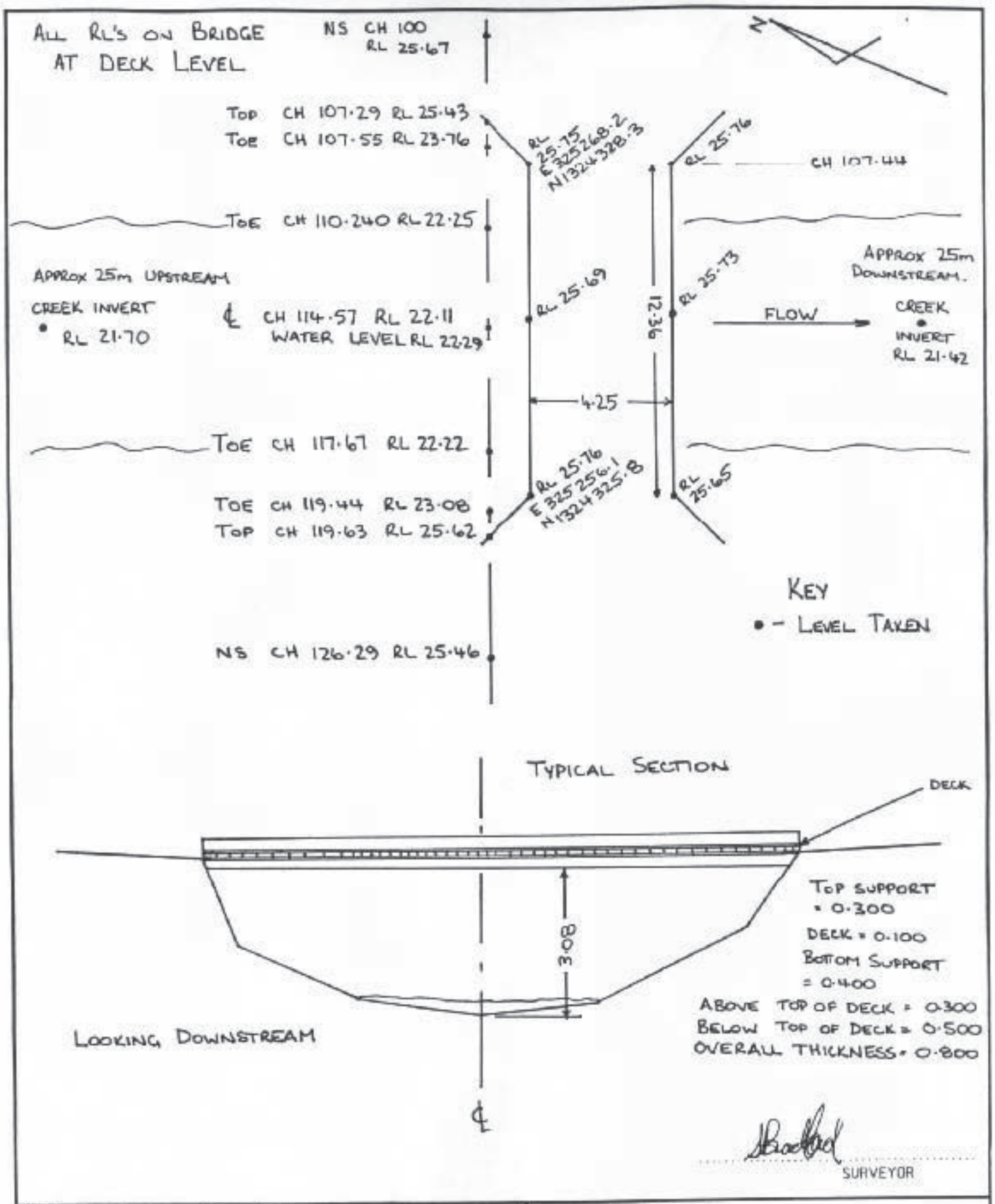

NS CH 100 RL 20·24
TOP CH 105·4 RL 20·05
TOE CH 107·86 RL 17·61
℄ CH 112·16 RL 16·23
TOE CH 115·33 RL 17·43
TOP CH 119·03 RL 19·94
NS CH 126·15 RL 20·41
ALL RL's ON BRIDGE AT DECK LEVEL
APPROX 25m UPSTREAM WATER LEVEL RL 17·62
FLOW
CH 106·05
RL 20·04
RL 19·97
12·6
4·0
RL 19·99
TYPICAL SECTION
DECK
3·21
TOP OF DECK TO TOP OF RAIL = 0·300
TOP OF DECK TO BOTTOM OF SUPPORT = 0·600
OVERALL THICKNESS = 0·900
LOOKING DOWNSTREAM
℄
SURVEYOR
TITLE. BRIDGE 17
RMB 1315 A
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 11/8/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300.
DX 7888


BARRIER THICKNESS = 0·400
TOP OF DECK TO TOP OF RAIL = 1·000
TOP OF CONC BARRIER TO UNDERSIDE OF BRIDGE = 1·100
TOP OF CONC BARRIER TO TOP RAIL = 0·600
TOP OF DECK TO UNDERSIDE OF BRIDGE = 0·700
OVERALL THICKNESS = 1·700
CONC BARRIER
8·72
UPSTREAM SIDE
LOOKING DOWNSTREAM
BOTH SUPPORTS ARE IDENTICAL
ROADWAY
9·0
TITLE BRIDGE 18
YARRAMALONG VILLAGE
PLAN CROSS-SECTION AND PROFILE OF SUPPORTS
DATE 15/8/9
NOT TO SCALE
REF: 96/110
SURVEYOR
MONTEATH & POWYS PTY LTD
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST NEWCASTLE
PHONE (049) 261388 P.O. BOX 743, NEWCASTLE 2300
FAX (049) 293475 DX 7888

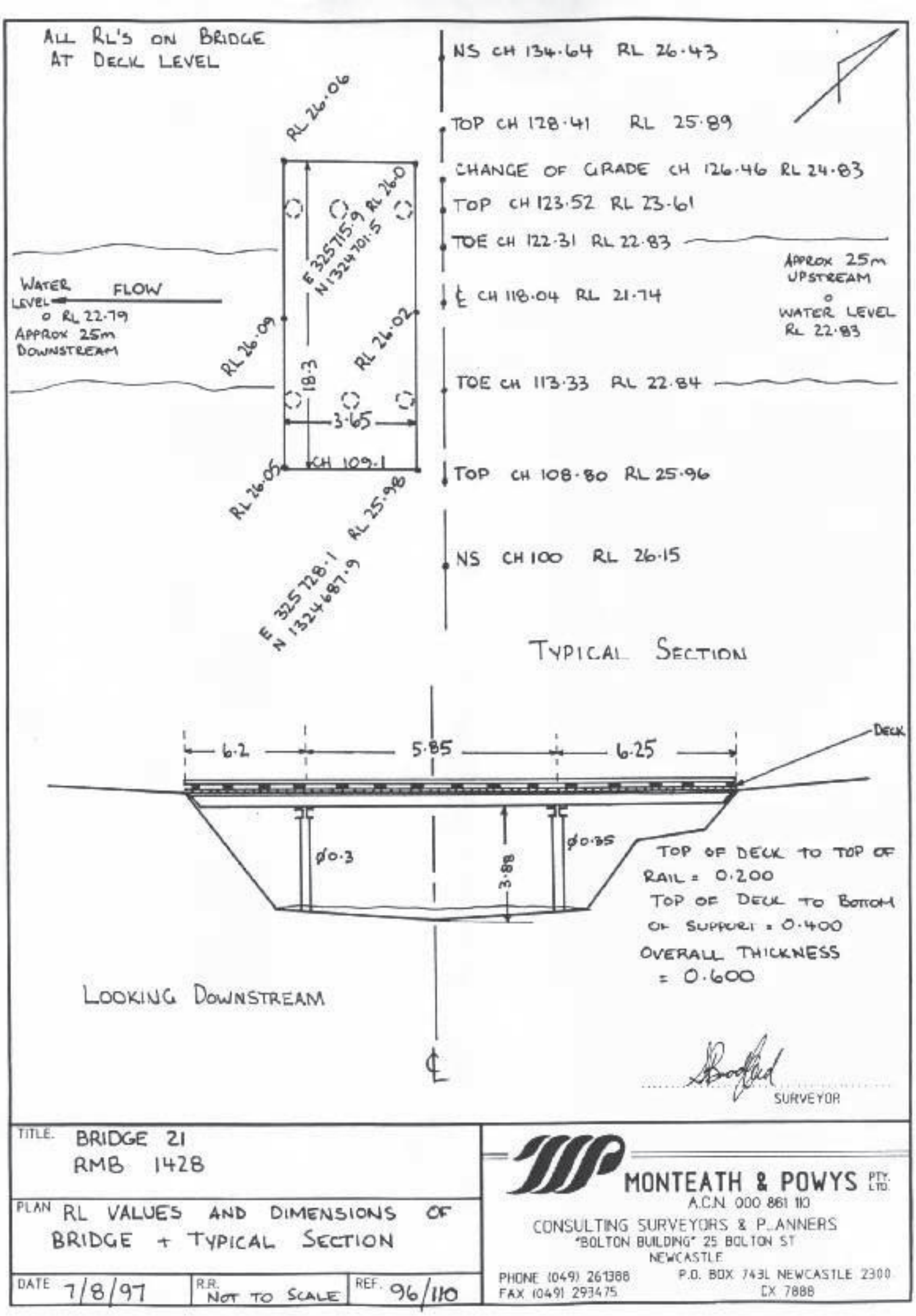

EB CH 100 RL 26·74
E 325716·7
N 1322730·4
TOP CH 107·2 RL 26·84
TOP CH 126·54 RL 27·05
TOE CH 127·04 RL 23·28
CG CH 131·95 RL 22·13
CG CH 136·70 RL 20·29
TOP CH 142·42 RL 19·36
TOP CH 145·95 RL 19·08
TOE CH 146·77 RL 18·43
℄ CH 150·50 RL 17·59
TOE CH 153·74 RL 18·43
CG CH 158·61 RL 20·04
CG CH 169·49 RL 24·51
TOE CH 171·17 RL 24·48
TOE CH 171·72 RL 24·47
TOP CH 172·4 RL 26·99
NS CH 185·78 RL 26·87
E 325735·5
N 1322686·2
EB CH 196·01 RL 27·04
EB CH 100 RL 26·90
E 325724·9
N 1322732·2
NS CH 109·15 RL 26·95
NS CH 115·38 RL 26·86
TOP CH 122·51 RL 27·01
TOE CH 122·91 RL 23·17
CG CH 135·3 RL 19·41
TOE CH 136·69 RL 19·37
TOP CH 138·79 RL 19·37
TOE CH 138·98 RL 18·53
TOE CH 139·47 RL 18·29
℄ CH 144·21 RL 17·81
FLOW
TOE CH 149·76 RL 18·41
TOP CH 152·01 RL 19·37
CG CH 153·62 RL 19·66
CG CH 159·38 RL 21·70
TOE CH 167·13 RL 25·03
TOP CH 167·43 RL 27·03
E 325743·0
N 1322637·1
EB CH 196·83 RL 27·04
E 325729·7
N 1322710·2
BRIDGE CH 122·51
RL 27·01
E 325721·3
N 1322704·3
BRIDGE CH 126·54
RL 27·05
RL 27·02
14·09
15·76
2·07
2·11
45·12
44·88
RL 27·01
2·28
2·0
ø1·0
3·2
9·0
5·8
1·6
16·05
14·01
RL 27·00
E 325738·5
N 1322666·2
BRIDGE CH 167·39
RL 27·01
BRIDGE CH 171·66
RL 27·01
E 325730·0
N 1322660·0
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388 P.O. BOX 743L NEWCASTLE 2300
FAX (049) 293475 DX 7888
TITLE BRIDGE 18
YARRAMALONG VILLAGE
PLAN DETAILS OF BRIDGE PLAN VIEW
AND CROSS SECTIONS AT BRIDGE
DATE 15/8/97
R.R. NOT TO SCALE
REF. 96/110
SURVEYOR
CHAINAGES ON EAST SIDE OF BRIDGE RELATE TO EASTERN CROSS-SECTION
CHAINAGES ON WEST SIDE OF BRIDGE RELATE TO WESTERN CROSS-SECTION
EB = EDGE OF BITUMEN
CG = CHANGE OF GRADE

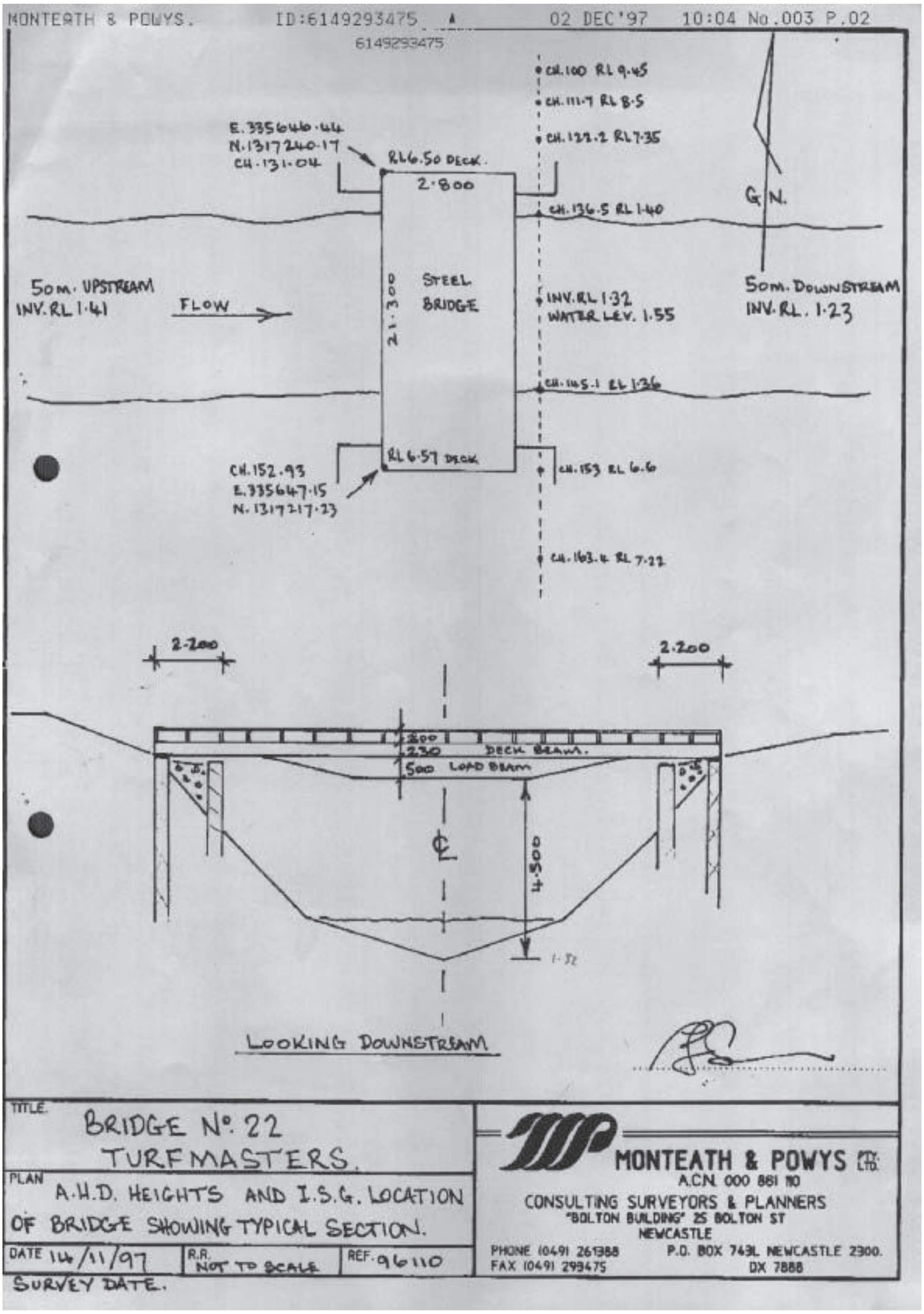

MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
P.O. BOX 743L NEWCASTLE 2300
DX 7888
PHONE (049) 261388
FAX (049) 293475
TITLE BRIDGE 18
YARRAMALONG VILLAGE
PLAN DETAILS OF SECTIONS
AT APPROX 5m, 25m + 50m
DATE 14/8/97
R.R. NOT TO SCALE
REF. 96/110
SURVEYOR
FLOW
CG = CHANGE OF GRADE

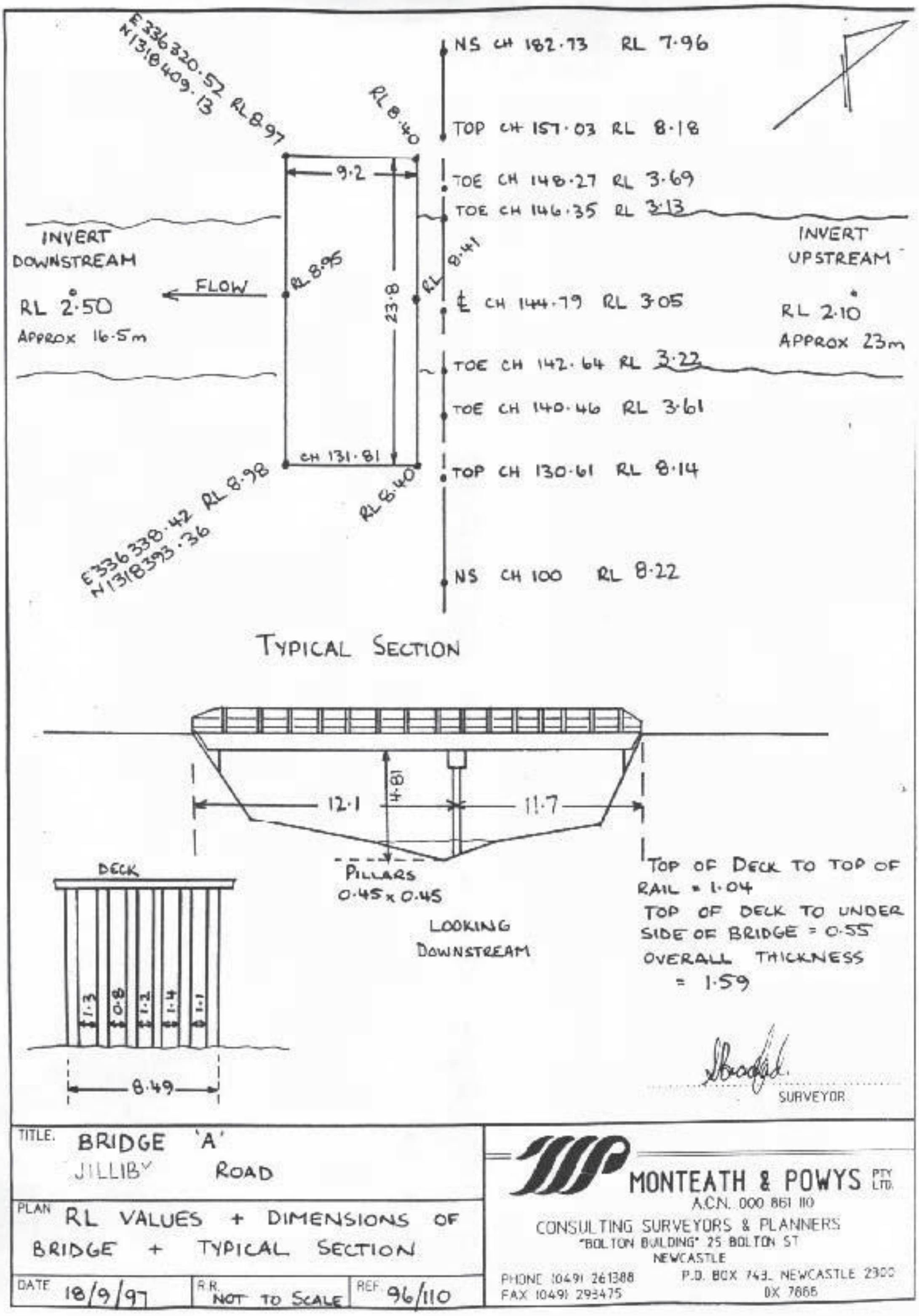

ALL RL'S ON BRIDGE AT DECK LEVEL
NS CH 125·25 RL 22·73
CH 119·7
RL 22·61
E 325302·4 N1322987·4
TOP CH 119·44 RL 22·48
4·0
TOE OF BANK CH 117·13 RL 20·02
APPROX 25m DOWNSTREAM CREEK INVERT RL 19·37
℄ CH 113·82 RL 19·37
RL 22·41
RL 22·51
APPROX 25m UPSTREAM CREEK INVERT RL 19·51
FLOW
14·4
TOE OF BANK CH 108·82 RL 19·87
RL 22·80
E 325307·4 N1322974·0
TOP CH 105·71 RL 22·61
NS CH100 RL 23·05
TYPICAL SECTION
DECK
2·14
TOP OF DECK TO LOWER SUPPORT = 0·900
TOP OF DECK TO UPPER SUPPORT = 0·400
OVERALL THICKNESS = 1·300
LOOKING DOWNSTREAM
NOTE: DOWNSTREAM SUPPORT BROKEN. TOP OF DECK DOWN TO UNDERSIDE OF SUPPORT = 1·07
SURVEYOR
TITLE. BRIDGE No. 19 RMB 1392
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 5/8/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300
DX 7888

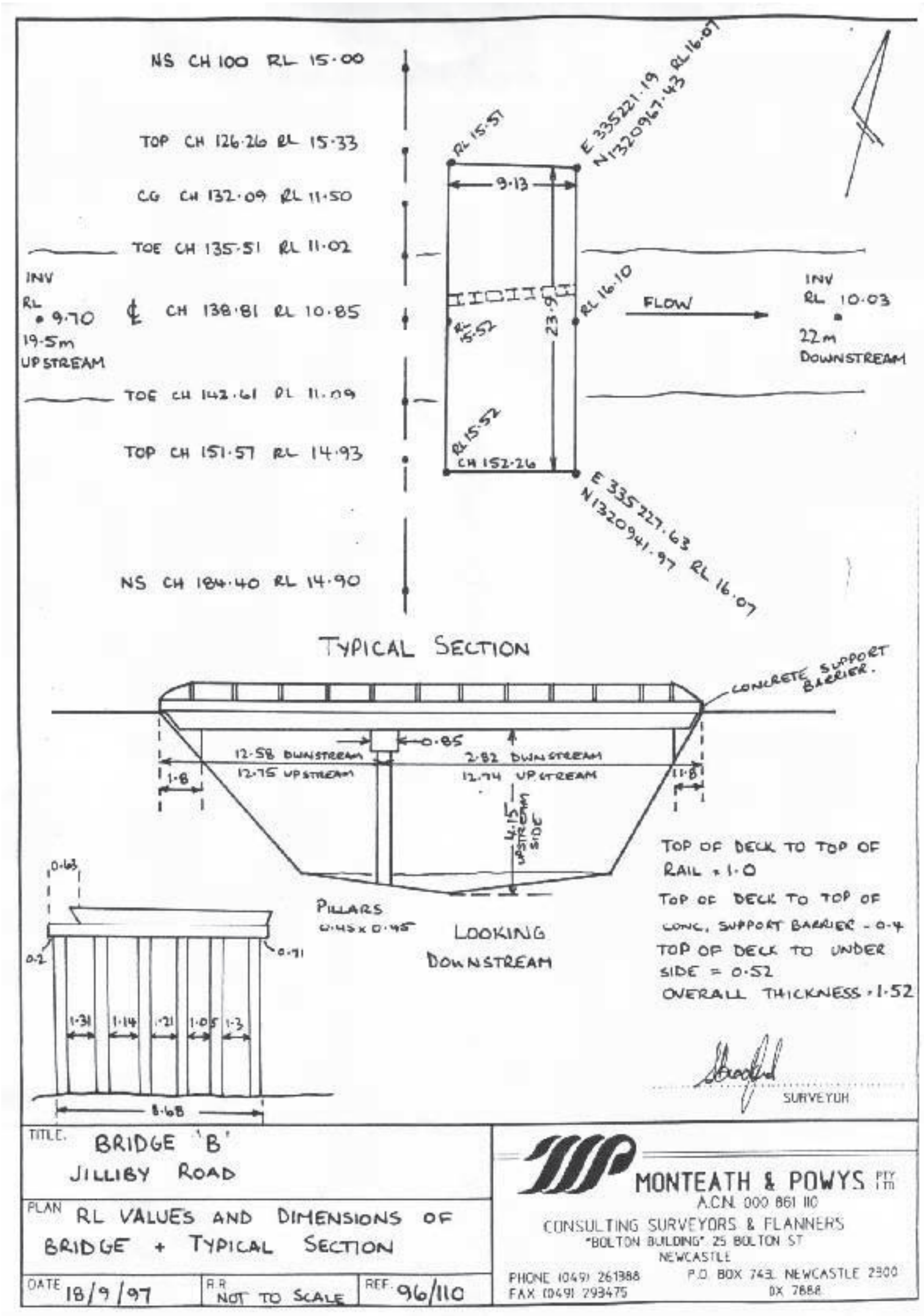


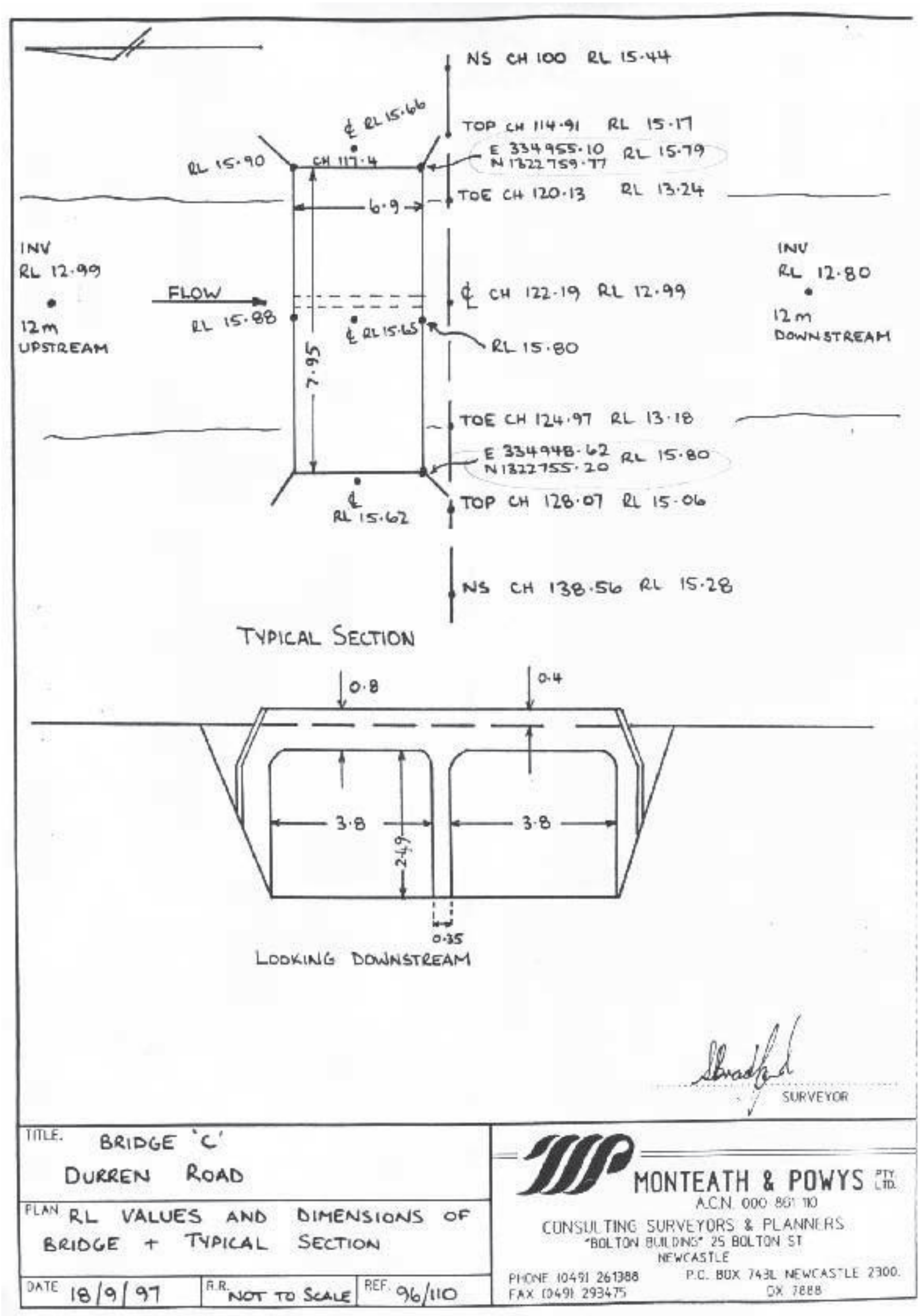
TITLE. BRIDGE No. 20 BUNNING CREEK ROAD	MONTEATH & POWYS PTY LTD. A.C.N. 000 861 110 CONSULTING SURVEYORS & PLANNERS "BOLTON BUILDING" 25 BOLTON ST NEWCASTLE PHONE (049) 261388 FAX (049) 293475 P.O. BOX 743 NEWCASTLE 2300 DX 7888
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION	
DATE 29/7/97 · R.R. NOT TO SCALE · REF. 96/110	

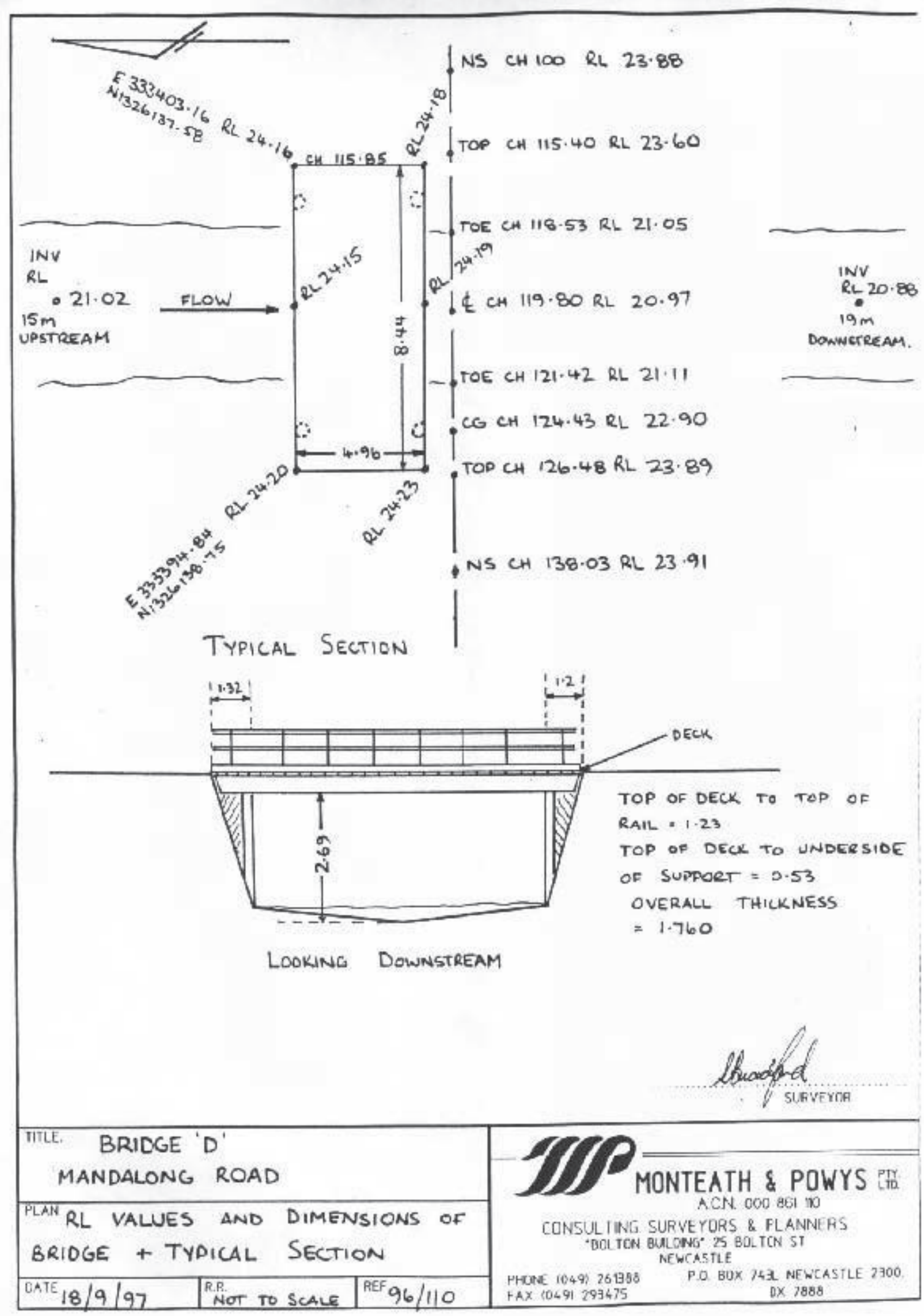

ALL RL'S ON BRIDGE AT DECK LEVEL
NS CH 134·64 RL 26·43
TOP CH 128·41 RL 25·89
CHANGE OF GRADE CH 126·46 RL 24·83
TOP CH 123·52 RL 23·61
TOE CH 122·31 RL 22·83
℄ CH 118·04 RL 21·74
TOE CH 113·33 RL 22·84
TOP CH 108·80 RL 25·96
NS CH 100 RL 26·15
RL 26·06
RL 26·0
E 325715·9
N 1324701·5
RL 26·09
RL 26·02
18·3
3·65
CH 109·1
RL 26·05
RL 25·98
E 325728·1
N 1324687·9
WATER LEVEL @ RL 22·79 APPROX 25m DOWNSTREAM
FLOW
APPROX 25m UPSTREAM @ WATER LEVEL RL 22·83
TYPICAL SECTION
6·2
5·85
6·25
DECK
ø0·3
3·88
ø0·35
TOP OF DECK TO TOP OF RAIL = 0·200
TOP OF DECK TO BOTTOM OF SUPPORT = 0·400
OVERALL THICKNESS = 0·600
LOOKING DOWNSTREAM
℄
SURVEYOR
TITLE. BRIDGE 21 RMB 1428
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 7/8/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300
DX 7888

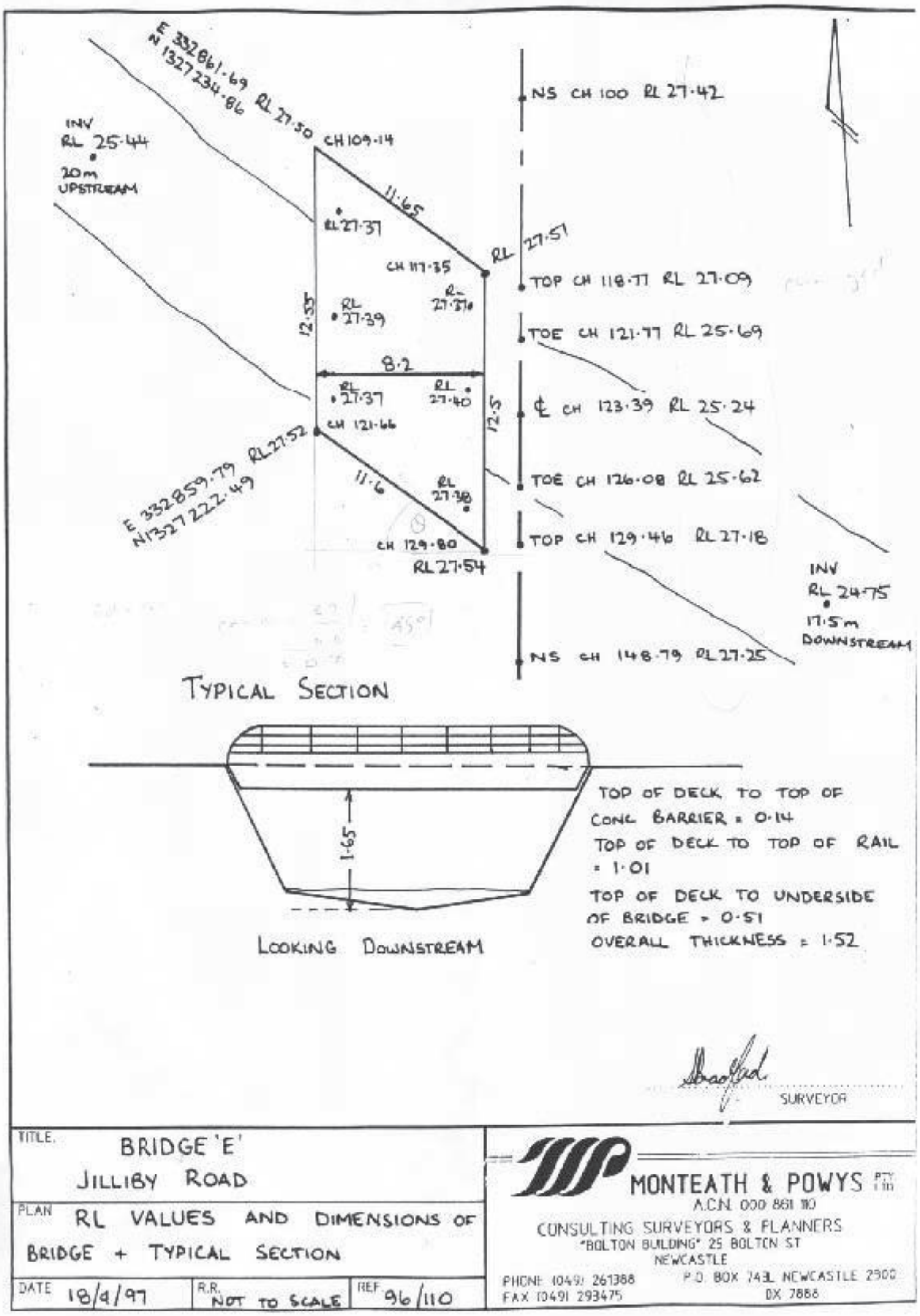

MONTEATH & POWYS. ID:6149293475 02 DEC'97 10:04 No.003 P.02
6149293475
CH.100 RL 9.45
CH.111.7 RL 8.5
CH.122.2 RL 7.35
E.335646.44
N.1317240.17
CH.131.04
RL6.50 DECK.
2.800
CH.136.5 RL 1.40
G.N.
STEEL
BRIDGE
21.300
50m. UPSTREAM
INV. RL 1.41
FLOW
INV. RL 1.32
WATER LEV. 1.55
50m. DOWNSTREAM
INV. RL. 1.23
CH.145.1 RL 1.36
RL 6.57 DECK
CH.152.93
E.335647.15
N.1317217.23
CH.153 RL 6.6
CH.163.4 RL 7.22
2.200
2.200
200
230 DECK BEAM.
500 LOAD BEAM
4.500
1.32
LOOKING DOWNSTREAM
TITLE.
BRIDGE No. 22
TURFMASTERS.
PLAN
A.H.D. HEIGHTS AND I.S.G. LOCATION OF BRIDGE SHOWING TYPICAL SECTION.
DATE 14/11/97
R.R. NOT TO SCALE
REF. 96110
SURVEY DATE.
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300.
DX 7888


E336320.52
N1318409.13
RL 8.97
RL 8.40
NS CH 182.73 RL 7.96
TOP CH 157.03 RL 8.18
TOE CH 148.27 RL 3.69
TOE CH 146.35 RL 3.13
9.2
INVERT DOWNSTREAM
RL 2.50
APPROX 16.5m
FLOW
RL 8.95
23.8
RL 8.41
℄ CH 144.79 RL 3.05
INVERT UPSTREAM
RL 2.10
APPROX 23m
TOE CH 142.64 RL 3.22
TOE CH 140.46 RL 3.61
CH 131.81
TOP CH 130.61 RL 8.14
RL 8.98
E336338.42
N1318393.36
RL 8.40
NS CH 100 RL 8.22
TYPICAL SECTION
4.81
12.1
11.7
PILLARS 0.45 x 0.45
LOOKING DOWNSTREAM
TOP OF DECK TO TOP OF RAIL = 1.04
TOP OF DECK TO UNDER SIDE OF BRIDGE = 0.55
OVERALL THICKNESS = 1.59
DECK
1.3
0.8
1.2
1.4
1.1
8.49
SURVEYOR
TITLE. BRIDGE 'A' JILLIBY ROAD
PLAN RL VALUES + DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 18/9/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743, NEWCASTLE 2300
DX 7868


NS CH 100 RL 15·00
TOP CH 126·26 RL 15·33
CG CH 132·09 RL 11·50
TOE CH 135·51 RL 11·02
INV RL • 9.70 19·5m UPSTREAM
℄ CH 138·81 RL 10·85
TOE CH 142·61 RL 11·09
TOP CH 151·57 RL 14·93
NS CH 184·40 RL 14·90
RL 15·57
E 335221·19 N1320967·43 RL 16·07
9·13
23·9
RL 16·10
RL 15·52
RL 15·52
CH 152·26
FLOW
INV RL 10·03 22m DOWNSTREAM
E 335227·63 N1320941·97 RL 16·07
TYPICAL SECTION
CONCRETE SUPPORT BARRIER.
0·85
12·58 DOWNSTREAM
12·75 UPSTREAM
2·82 DOWNSTREAM
12·74 UPSTREAM
1·8
1·8
4·15 UPSTREAM SIDE
PILLARS 0·45 x 0·45
LOOKING DOWNSTREAM
TOP OF DECK TO TOP OF RAIL = 1·0
TOP OF DECK TO TOP OF CONC. SUPPORT BARRIER - 0·4
TOP OF DECK TO UNDER SIDE = 0·52
OVERALL THICKNESS = 1·52
0·63
0·2
0·91
1·31
1·14
1·21
1·05
1·3
8·68
SURVEYOR
TITLE. BRIDGE 'B' JILLIBY ROAD
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 18/9/97
R.R NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY LTD
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743 NEWCASTLE 2300
DX 7888


NS CH 100 RL 15·44
℄ RL 15·66
TOP CH 114·91 RL 15·17
RL 15·90
CH 117·4
E 334955·10
N 1322759·77
RL 15·79
6·9
TOE CH 120·13 RL 13·24
INV
RL 12·99
12m
UPSTREAM
FLOW
RL 15·88
℄ CH 122·19 RL 12·99
℄ RL 15·65
RL 15·80
INV
RL 12·80
12m
DOWNSTREAM
7·95
TOE CH 124·97 RL 13·18
E 334948·62
N 1322755·20
RL 15·80
℄
RL 15·62
TOP CH 128·07 RL 15·06
NS CH 138·56 RL 15·28
TYPICAL SECTION
0·8
0·4
3·8
3·8
2·49
0·35
LOOKING DOWNSTREAM
SURVEYOR
TITLE. BRIDGE 'C'
DURREN ROAD
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 18/9/97
H.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.C. BOX 743L NEWCASTLE 2300.
DX 7888


E 333403.16
N1326187.58
RL 24.16
CH 115.85
RL 24.18
NS CH 100 RL 23.88
TOP CH 115.40 RL 23.60
TOE CH 118.53 RL 21.05
INV
RL
21.02
15m
UPSTREAM
FLOW
RL 24.15
RL 24.19
8.44
℄ CH 119.80 RL 20.97
INV
RL 20.88
19m
DOWNSTREAM.
TOE CH 121.42 RL 21.11
CG CH 124.43 RL 22.90
4.96
TOP CH 126.48 RL 23.89
RL 24.20
RL 24.23
E 333394.84
N1326138.75
NS CH 138.03 RL 23.91
TYPICAL SECTION
1.32
1.2
DECK
2.69
TOP OF DECK TO TOP OF
RAIL = 1.23
TOP OF DECK TO UNDERSIDE
OF SUPPORT = 0.53
OVERALL THICKNESS
= 1.760
LOOKING DOWNSTREAM
SURVEYOR
TITLE. BRIDGE 'D'
MANDALONG ROAD
PLAN RL VALUES AND DIMENSIONS OF
BRIDGE + TYPICAL SECTION
DATE 18/9/97
R.R. NOT TO SCALE
REF 96/110
MONTEATH & POWYS PTY LTD
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300
DX 7888


E 332861.69
N 1327234.86
RL 27.50
CH 109.14
INV
RL 25.44
20m
UPSTREAM
11.65
RL 27.37
RL 27.51
CH 117.35
RL 27.39
RL 27.37
12.35
8.2
RL 27.37
RL 27.40
CH 121.66
RL 27.52
12.5
E 332859.79
N 1327222.49
11.6
RL 27.38
CH 129.80
RL 27.54
NS CH 100 RL 27.42
TOP CH 118.77 RL 27.09
TOE CH 121.77 RL 25.69
℄ CH 123.39 RL 25.24
TOE CH 126.08 RL 25.62
TOP CH 129.46 RL 27.18
NS CH 148.79 RL 27.25
INV
RL 24.75
17.5m
DOWNSTREAM
TYPICAL SECTION
1.65
LOOKING DOWNSTREAM
TOP OF DECK TO TOP OF CONC BARRIER = 0.14
TOP OF DECK TO TOP OF RAIL = 1.01
TOP OF DECK TO UNDERSIDE OF BRIDGE = 0.51
OVERALL THICKNESS = 1.52
SURVEYOR
TITLE. BRIDGE 'E'
JILLIBY ROAD
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 18/4/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY LTD
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743 NEWCASTLE 2300
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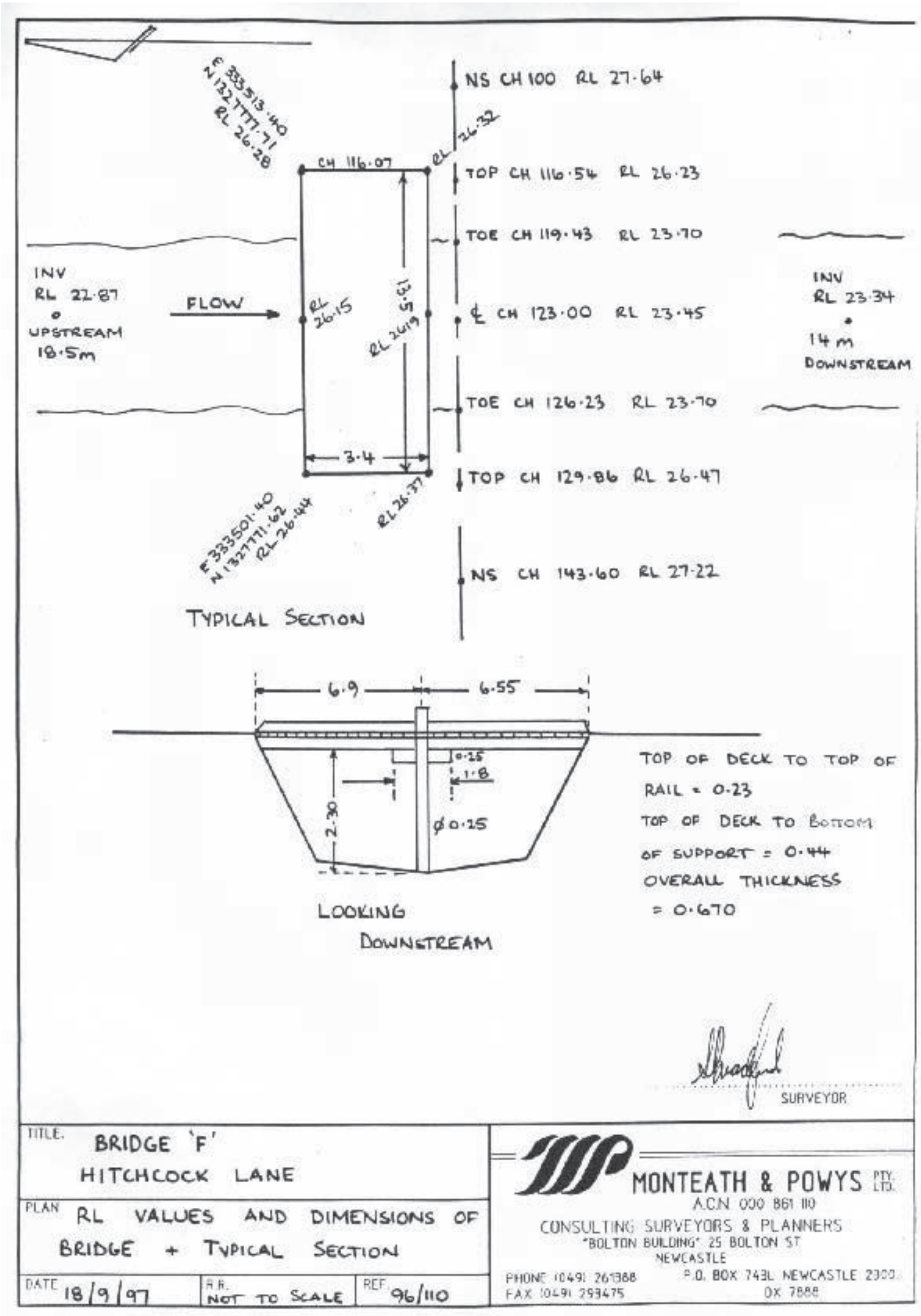
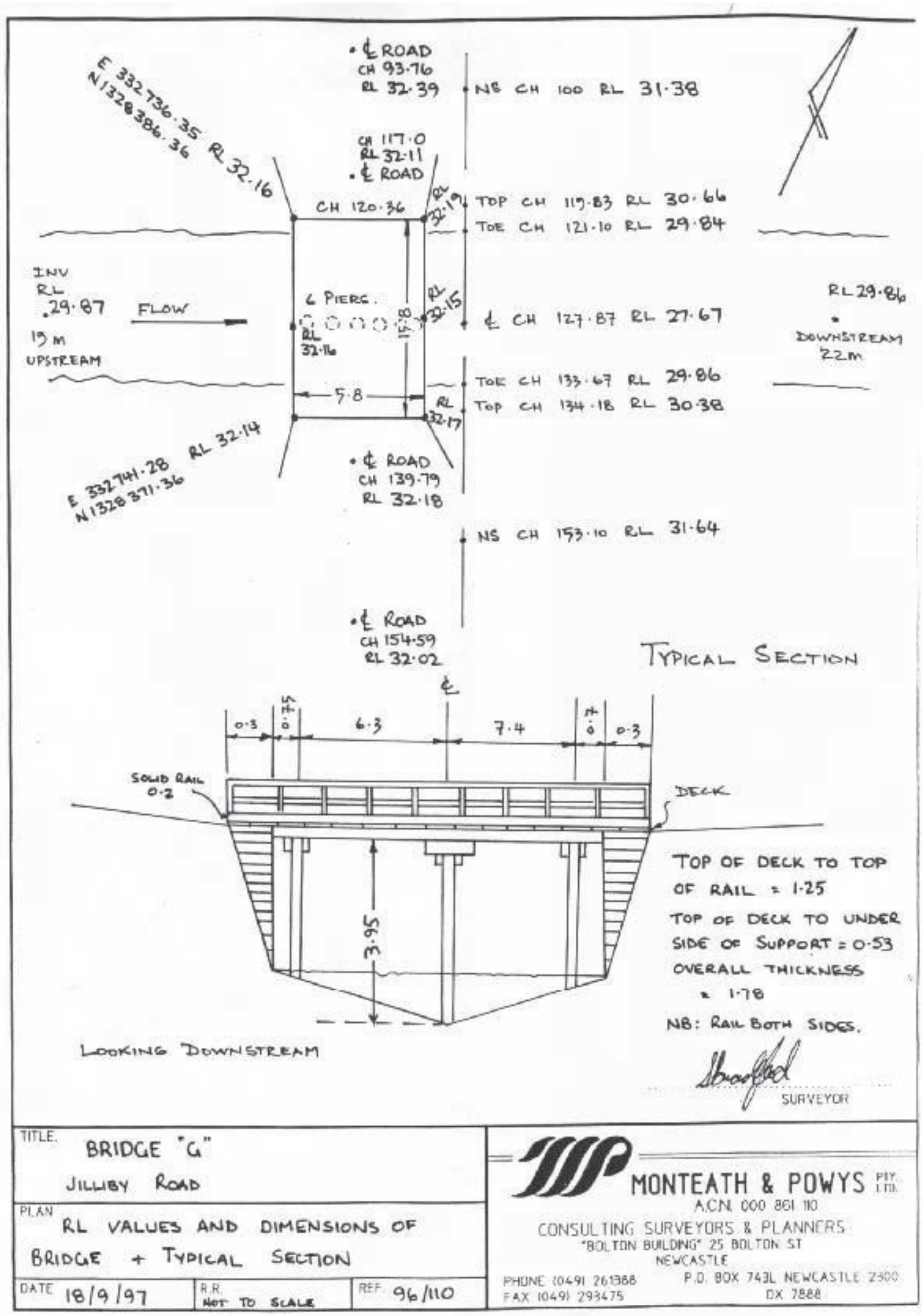
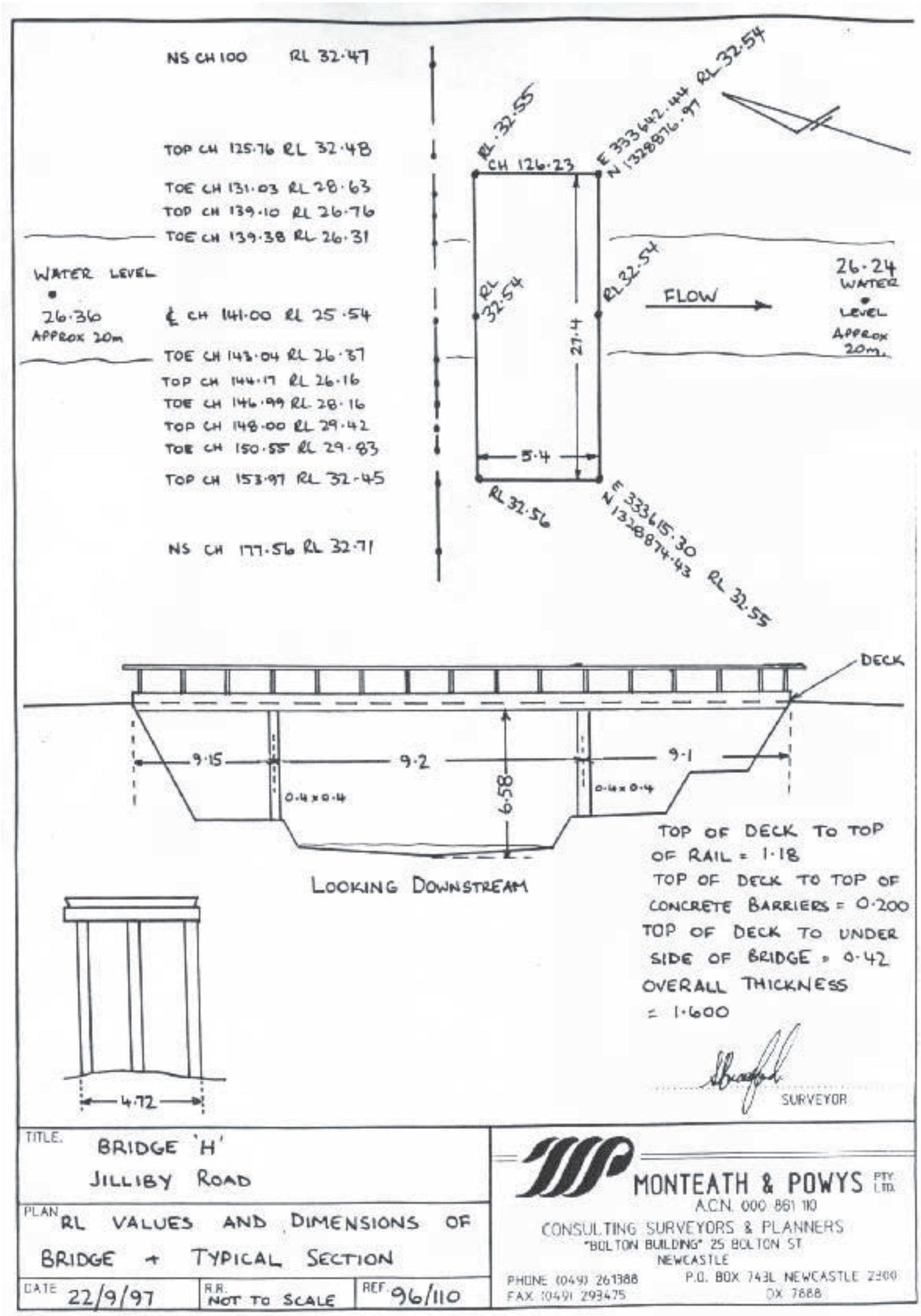
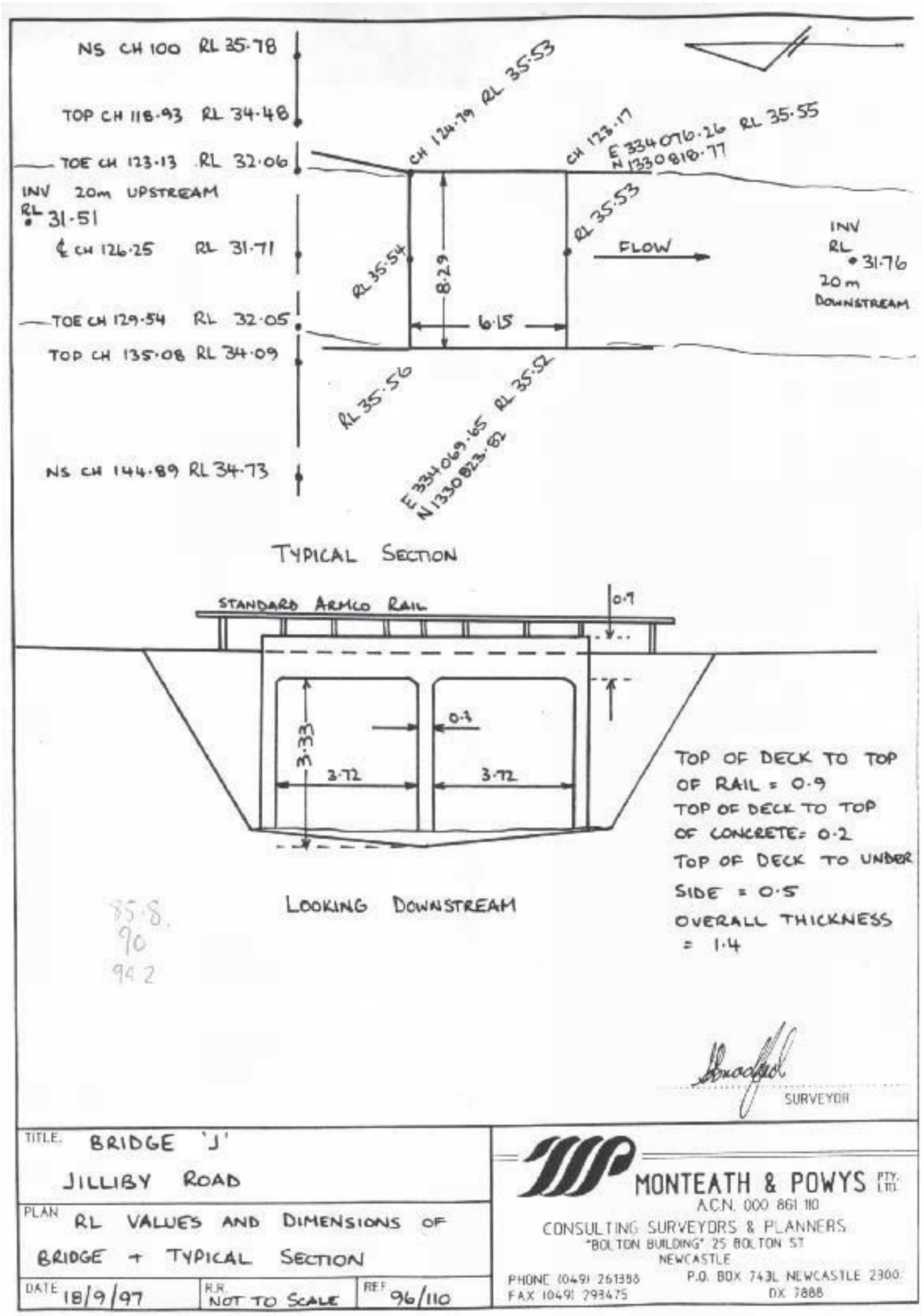

NS CH 100 RL 27·64
TOP CH 116·54 RL 26·23
TOE CH 119·43 RL 23·70
℄ CH 123·00 RL 23·45
TOE CH 126·23 RL 23·70
TOP CH 129·86 RL 26·47
NS CH 143·60 RL 27·22
CH 116·07
INV RL 22·87 UPSTREAM 18·5m
FLOW
INV RL 23·34 14 m DOWNSTREAM
3·4
TYPICAL SECTION
6·9
6·55
TOP OF DECK TO TOP OF RAIL = 0·23
TOP OF DECK TO BOTTOM OF SUPPORT = 0·44
OVERALL THICKNESS = 0·670
LOOKING DOWNSTREAM
SURVEYOR
TITLE. BRIDGE 'F' HITCHCOCK LANE
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 18/9/97
NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300
DX 7888


℄ ROAD
CH 93·76
RL 32·39
NS CH 100 RL 31·38
E 332 736·35
N 1328 386·36 RL 32·16
CH 117·0
RL 32·11
℄ ROAD
CH 120·36
TOP CH 119·83 RL 30·66
TOE CH 121·10 RL 29·84
INV
RL
29·87
FLOW
19 m
UPSTREAM
6 PIERS
RL 32·16
RL 32·15
℄ CH 127·87 RL 27·67
RL 29·86
DOWNSTREAM
22m
TOE CH 133·67 RL 29·86
TOP CH 134·18 RL 30·38
5·8
RL 32·17
E 332 741·28
N 1328 371·36 RL 32·14
℄ ROAD
CH 139·79
RL 32·18
NS CH 153·10 RL 31·64
℄ ROAD
CH 154·59
RL 32·02
TYPICAL SECTION
0·3
6·3
7·4
0·3
SOLID RAIL 0·2
DECK
3·95
TOP OF DECK TO TOP OF RAIL = 1·25
TOP OF DECK TO UNDER SIDE OF SUPPORT = 0·53
OVERALL THICKNESS = 1·78
NB: RAIL BOTH SIDES.
LOOKING DOWNSTREAM
SURVEYOR
TITLE BRIDGE "G"
JILLIBY ROAD
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 18/9/97
R.R. NOT TO SCALE
REF 96/110
MONTEATH & POWYS PTY LTD
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300
DX 7888


NS CH 100 RL 32·47
TOP CH 125·76 RL 32·48
TOE CH 131·03 RL 28·63
TOP CH 139·10 RL 26·76
TOE CH 139·38 RL 26·31
WATER LEVEL
26·36
APPROX 20m
℄ CH 141·00 RL 25·54
TOE CH 143·04 RL 26·37
TOP CH 144·17 RL 26·16
TOE CH 146·99 RL 28·16
TOP CH 148·00 RL 29·42
TOE CH 150·55 RL 29·83
TOP CH 153·97 RL 32·45
NS CH 177·56 RL 32·71
RL 32·55
CH 126·23
E 333642·44
N 1328876·97
RL 32·54
RL 32·54
RL 32·54
27·4
5·4
FLOW
26·24
WATER
LEVEL
APPROX
20m.
RL 32·56
E 333615·30
N 1328874·43
RL 32·55
DECK
9·15
9·2
9·1
0·4×0·4
0·4×0·4
6·58
LOOKING DOWNSTREAM
TOP OF DECK TO TOP OF RAIL = 1·18
TOP OF DECK TO TOP OF CONCRETE BARRIERS = 0·200
TOP OF DECK TO UNDER SIDE OF BRIDGE = 0·42
OVERALL THICKNESS = 1·600
4·72
SURVEYOR
TITLE. BRIDGE 'H'
JILLIBY ROAD
PLAN RL VALUES AND DIMENSIONS OF
BRIDGE + TYPICAL SECTION
DATE 22/9/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300
DX 7888


NS CH 100 RL 35·78
TOP CH 118·93 RL 34·48
TOE CH 123·13 RL 32·06
INV 20m UPSTREAM RL 31·51
℄ CH 126·25 RL 31·71
TOE CH 129·54 RL 32·05
TOP CH 135·08 RL 34·09
NS CH 144·89 RL 34·73
CH 124·79 RL 35·53
CH 123·17 E 334076·26 N 1330818·77 RL 35·55
RL 35·53
RL 35·54
8·29
6·15
FLOW
INV RL 31·76 20 m DOWNSTREAM
RL 35·56
RL 35·52
E 334069·65 N 1330823·82
TYPICAL SECTION
STANDARD ARMCO RAIL
0·7
0·3
3·33
3·72
3·72
TOP OF DECK TO TOP OF RAIL = 0·9
TOP OF DECK TO TOP OF CONCRETE = 0·2
TOP OF DECK TO UNDER SIDE = 0·5
OVERALL THICKNESS = 1·4
LOOKING DOWNSTREAM
SURVEYOR
TITLE: BRIDGE 'J' JILLIBY ROAD
PLAN: RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 18/9/97
R.R. NOT TO SCALE
REF 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST NEWCASTLE
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FAX (049) 293475
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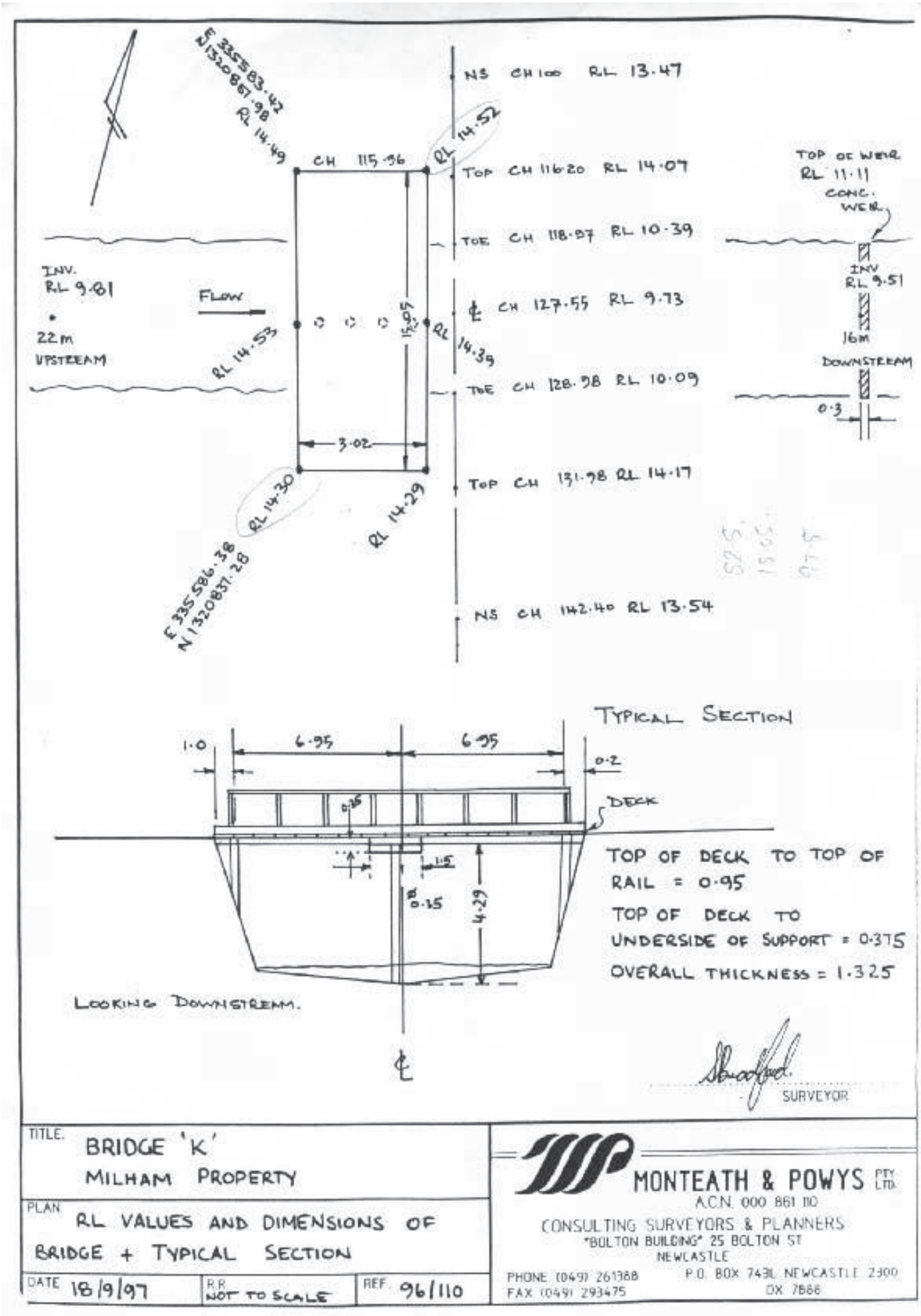
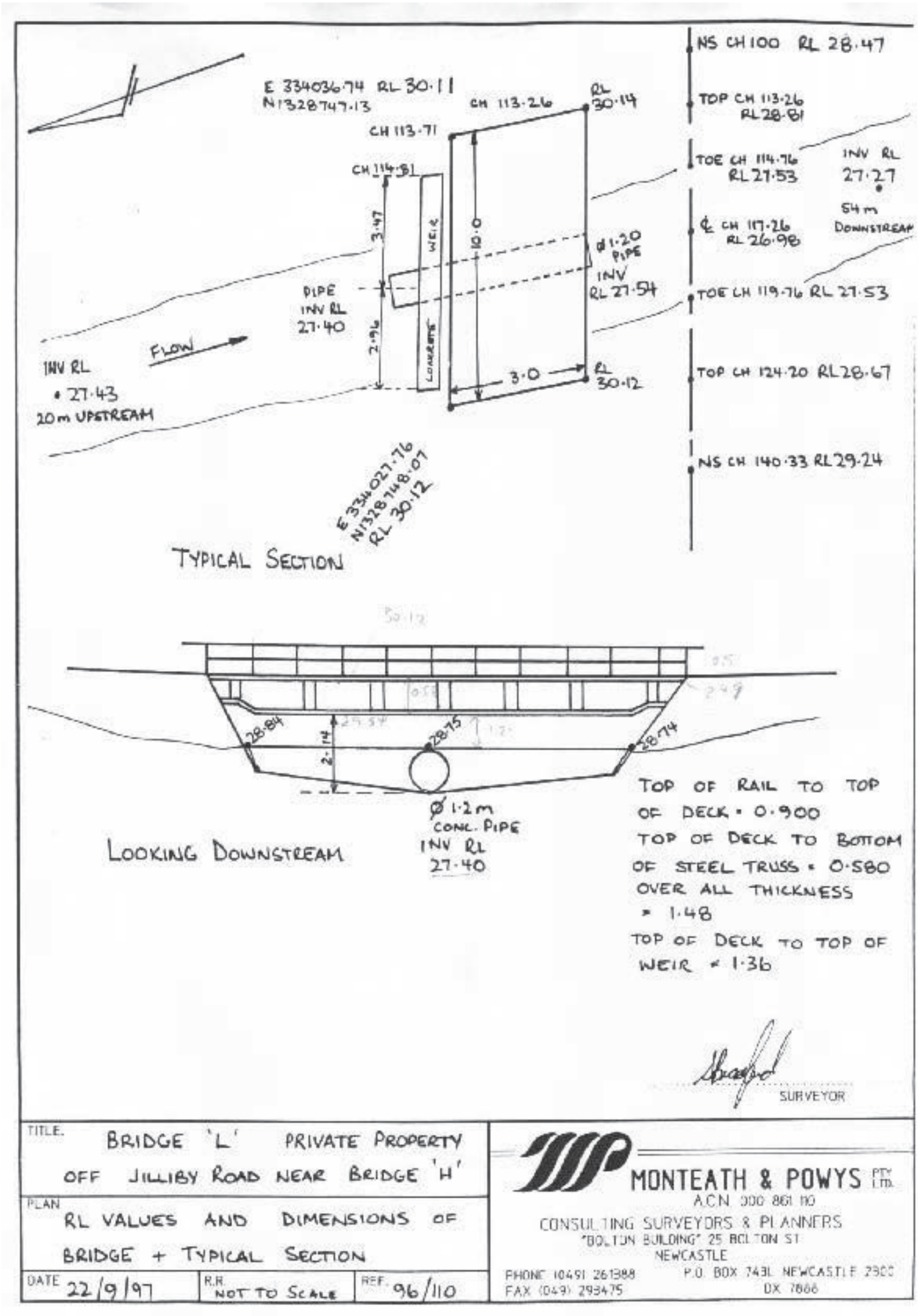
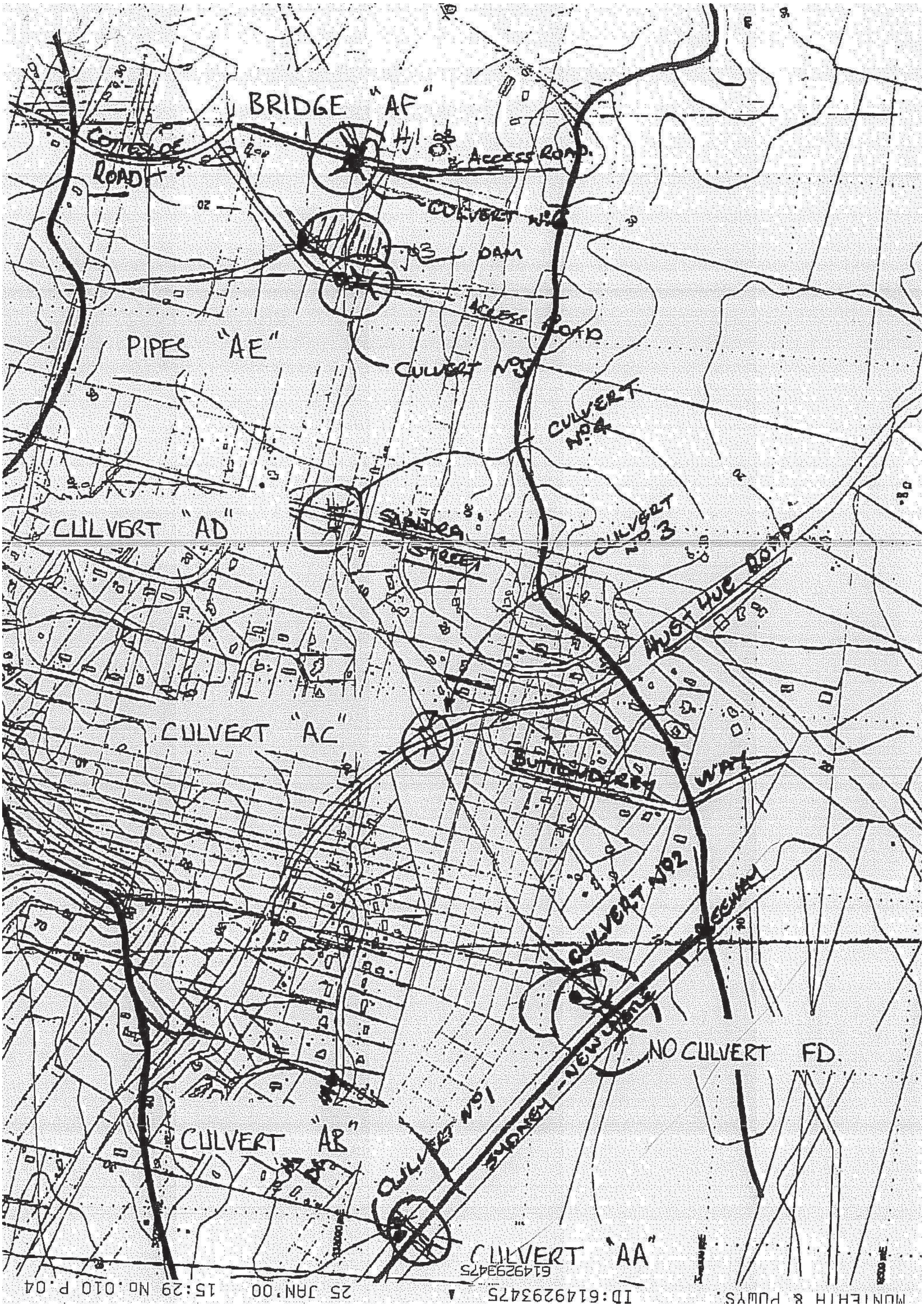
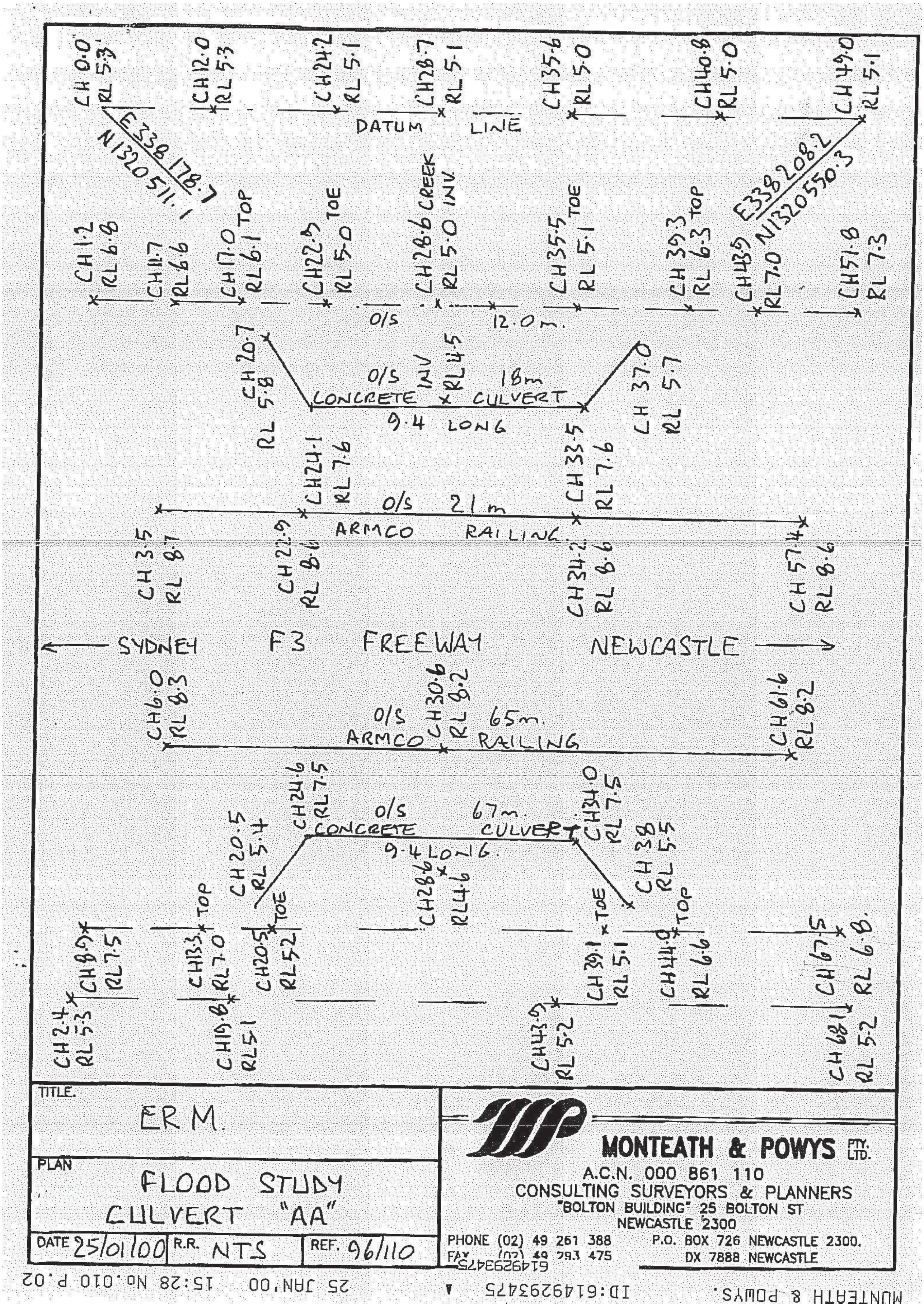
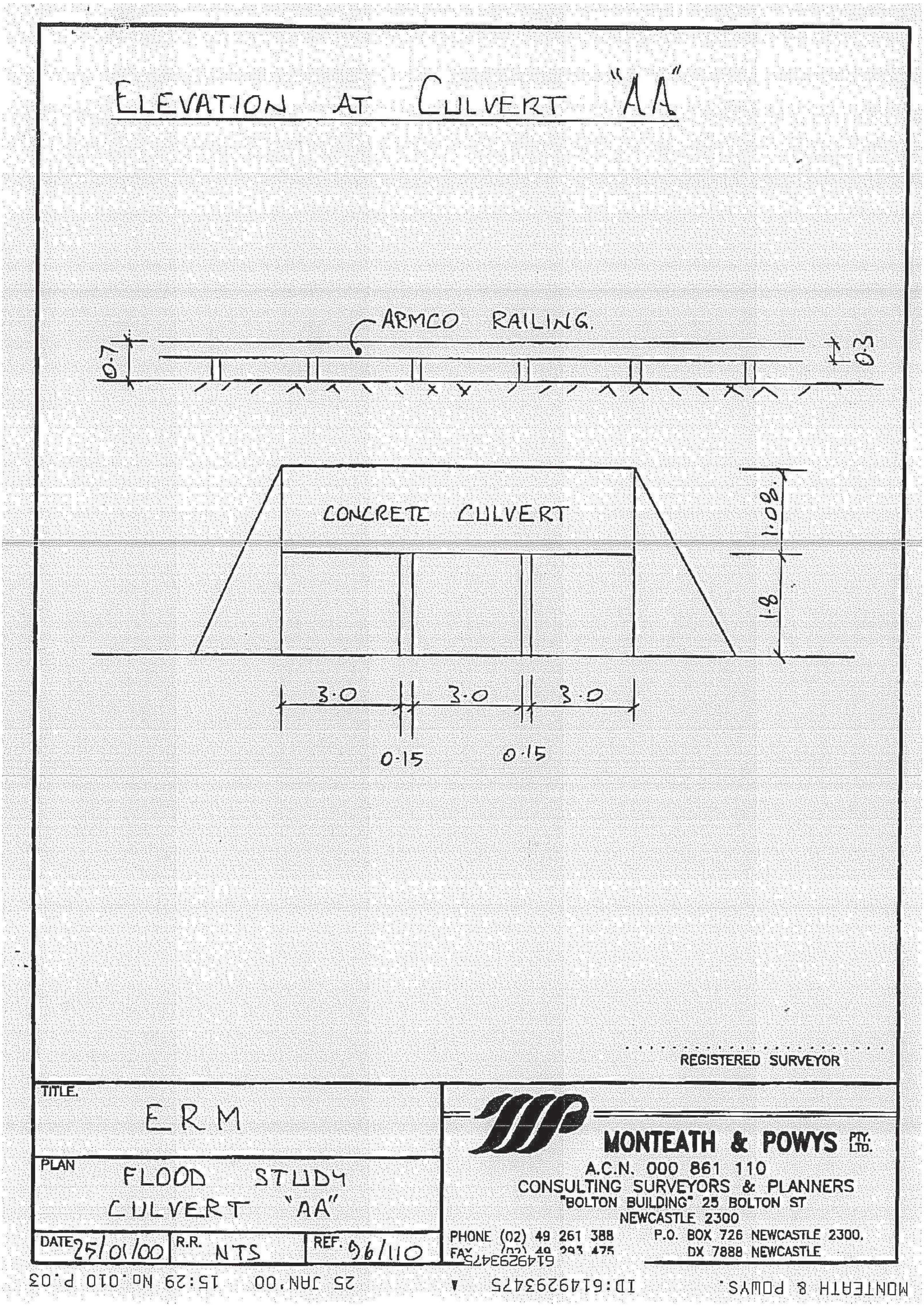
DX 7888

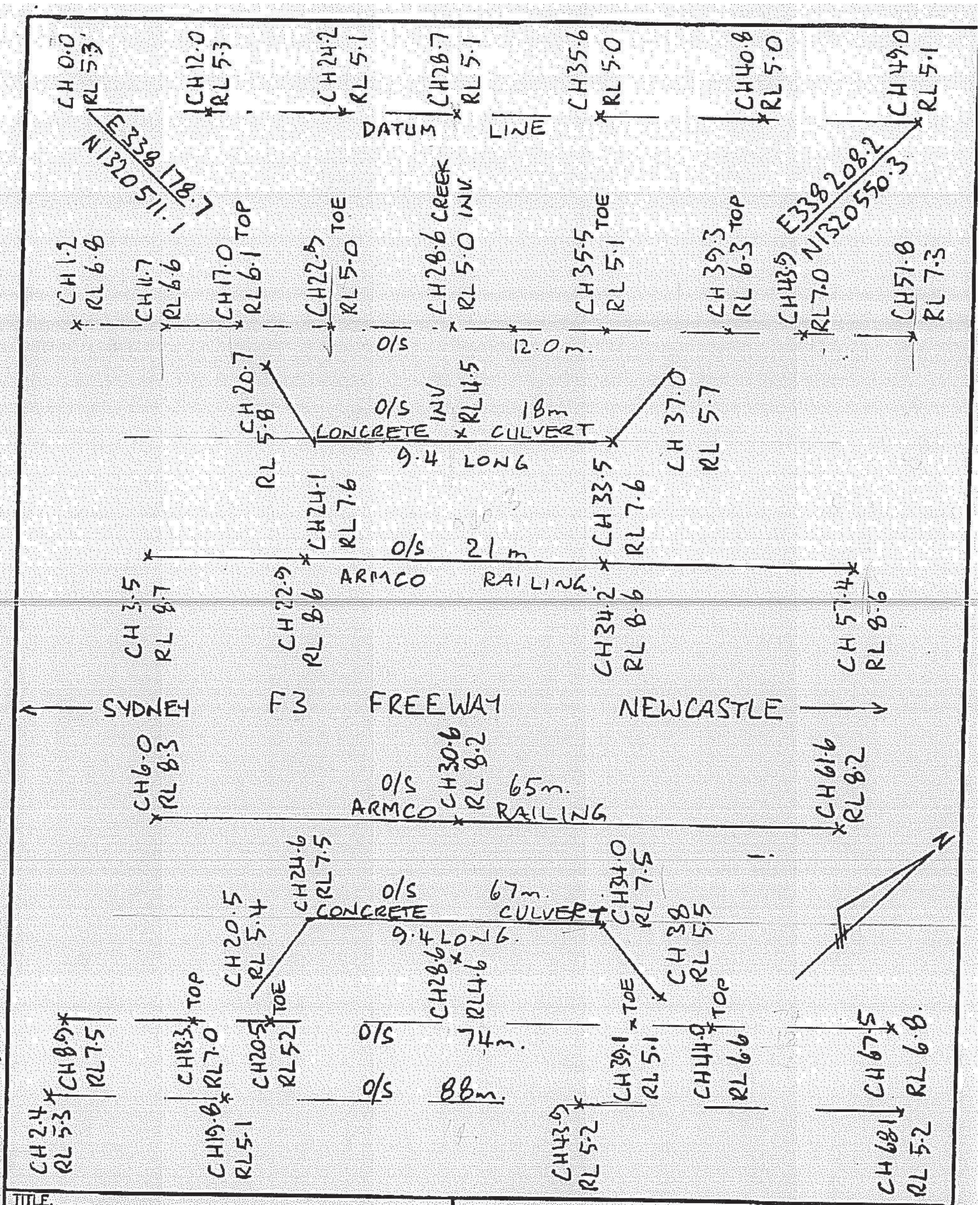

E 335583.42
N 1320867.98
RL 14.49
CH 115.56
RL 14.52
NS CH100 RL 13.47
TOP CH 116.20 RL 14.07
TOE CH 118.07 RL 10.39
℄ CH 127.55 RL 9.73
TOE CH 128.98 RL 10.09
TOP CH 131.98 RL 14.17
NS CH 142.40 RL 13.54
INV. RL 9.81
22m UPSTREAM
FLOW
RL 14.53
15.05
RL 14.39
3.02
RL 14.30
RL 14.29
E 335586.38
N 1320837.28
TOP OF WEIR RL 11.11
CONC. WEIR
INV RL 9.51
16m DOWNSTREAM
0.3
TYPICAL SECTION
1.0
6.95
6.95
0.2
DECK
0.35
1.15
0.15
4.29
TOP OF DECK TO TOP OF RAIL = 0.95
TOP OF DECK TO UNDERSIDE OF SUPPORT = 0.375
OVERALL THICKNESS = 1.325
LOOKING DOWNSTREAM.
℄
SURVEYOR
TITLE. BRIDGE 'K' MILHAM PROPERTY
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 18/9/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300
DX 7886


E 334036.74 RL 30.11
N1328747.13
CH 113.26
RL 30.14
CH 113.71
CH 114.81
3.47
WEIR
10.0
Ø1.20 PIPE
INV RL 27.54
PIPE INV RL 27.40
2.96
CONCRETE
FLOW
INV RL • 27.43
20m UPSTREAM
3.0
RL 30.12
E 334027.76
N1328748.07
RL 30.12
TYPICAL SECTION
NS CH 100 RL 28.47
TOP CH 113.26 RL 28.81
TOE CH 114.76 RL 27.53
INV RL 27.27
54 m DOWNSTREAM
℄ CH 117.26 RL 26.98
TOE CH 119.76 RL 27.53
TOP CH 124.20 RL 28.67
NS CH 140.33 RL 29.24
28.84
2.14
28.75
28.74
Ø 1.2m CONC. PIPE INV RL 27.40
LOOKING DOWNSTREAM
TOP OF RAIL TO TOP OF DECK = 0.900
TOP OF DECK TO BOTTOM OF STEEL TRUSS = 0.580
OVER ALL THICKNESS = 1.48
TOP OF DECK TO TOP OF WEIR = 1.36
SURVEYOR
TITLE. BRIDGE 'L' PRIVATE PROPERTY OFF JILLIBY ROAD NEAR BRIDGE 'H'
PLAN RL VALUES AND DIMENSIONS OF BRIDGE + TYPICAL SECTION
DATE 22/9/97
R.R. NOT TO SCALE
REF. 96/110
MONTEATH & POWYS PTY LTD
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE
PHONE (049) 261388
FAX (049) 293475
P.O. BOX 743L NEWCASTLE 2300
DX 7866


BRIDGE "AF"
ACCESS ROAD
CULVERT No 6
DAM
ACCESS ROAD
PIPES "AE"
CULVERT No 5
CULVERT No 4
CULVERT "AD"
SANDRA STREET
CULVERT No 3
HUE HUE ROAD
CULVERT "AC"
BUTTONDERRY WAY
CULVERT No 2
FREEWAY
NO CULVERT FD.
SYDNEY - NEWCASTLE
CULVERT "AB"
CULVERT No 1
CULVERT "AA"


DATUM LINE
E338 178·7
N1320511·1
E338208·2
N1320550·3
0/S 12·0m.
0/S 18m
CONCRETE CULVERT
9·4 LONG
0/S 21m
ARMCO RAILING
SYDNEY
F3 FREEWAY
NEWCASTLE
0/S 65m.
ARMCO RAILING
0/S 67m.
CONCRETE CULVERT
9·4 LONG.
TITLE.
ERM.
PLAN
FLOOD STUDY
CULVERT "AA"
DATE 25/01/00
R.R. NTS
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE 2300
PHONE (02) 49 261 388
FAX (02) 49 293 475
P.O. BOX 726 NEWCASTLE 2300.
DX 7888 NEWCASTLE


ELEVATION AT CULVERT "AA"
ARMCO RAILING.
0.7
0.3
CONCRETE CULVERT
1.00
1.8
3.0
3.0
3.0
0.15
0.15
REGISTERED SURVEYOR
TITLE.
ERM
PLAN
FLOOD STUDY
CULVERT "AA"
DATE 25/01/00
R.R. NTS
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE 2300
PHONE (02) 49 261 388
P.O. BOX 726 NEWCASTLE 2300.
DX 7888 NEWCASTLE
614929 3475
MONTEATH & POWYS ID:61492 93475 25 JAN'00 15:29 No.010 P.03



TITLE. ER M.

PLAN FLOOD STUDY- WYONG CULVERT "AA"

DATE 25/01/00 R.R. NTS REF. 96/110

MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
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NEWCASTLE 2300
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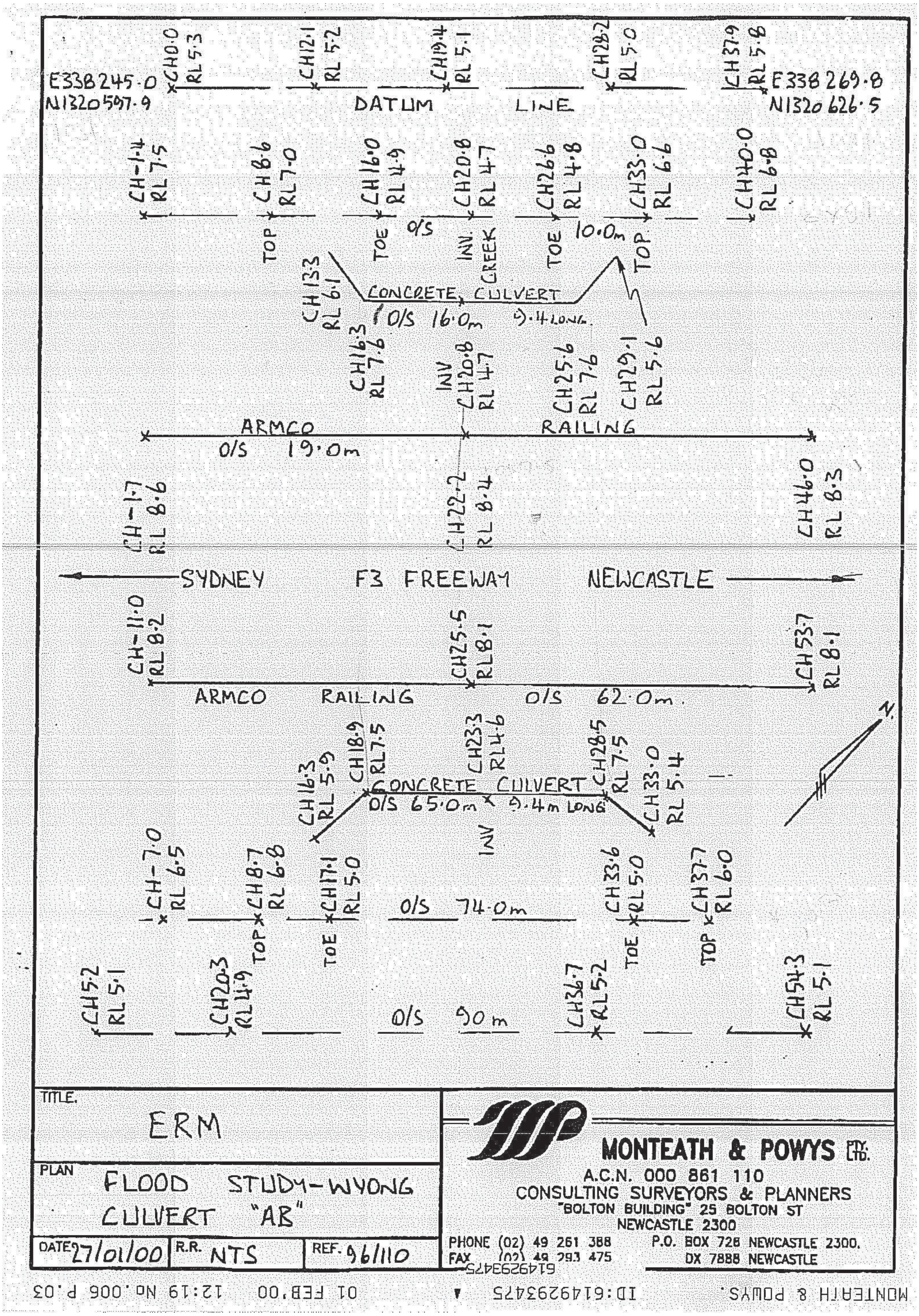
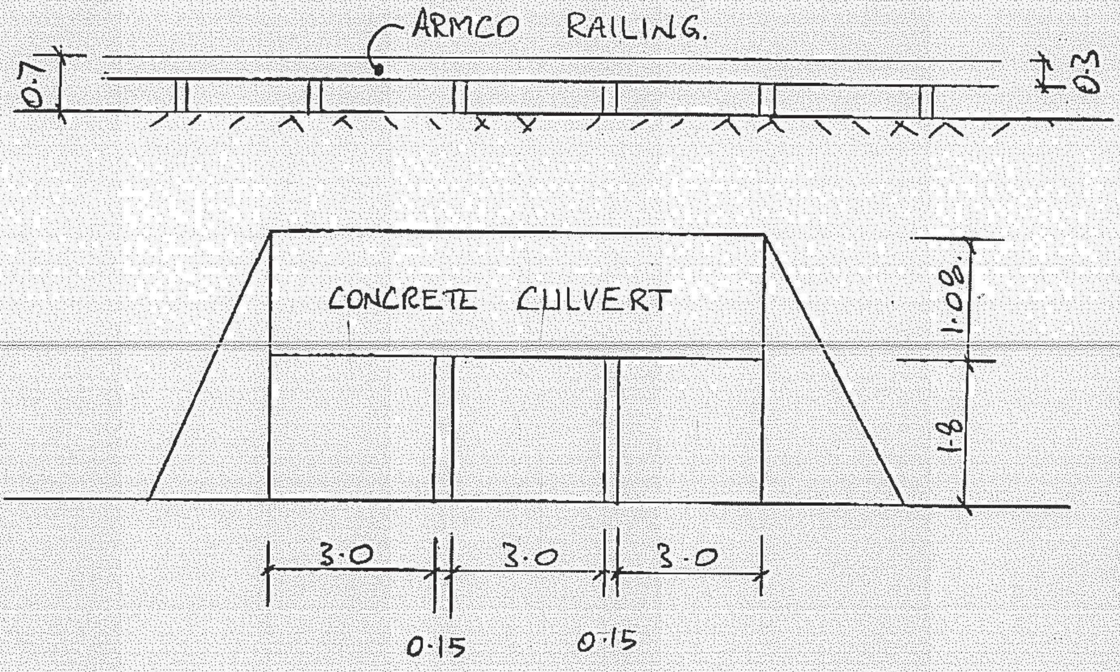
FAX (02) 49 293 475 DX 7888 NEWCASTLE

MONTEATH & POWYS. ID:6149293475 01 FEB '00 12:18 No.006 P.02


E338245·0
N1320597·9
E338269·8
N1320626·5
DATUM LINE
CH0·0 RL 5·3
CH12·1 RL 5·2
CH19·4 RL 5·1
CH28·2 RL 5·0
CH37·9 RL 5·8
CH-1·4 RL 7·5
CH8·6 RL 7·0
CH16·0 RL 4·9
CH20·8 RL 4·7
CH26·6 RL 4·8
CH33·0 RL 6·6
CH40·0 RL 6·8
TOP
TOE
O/S
INV. CREEK
TOE
10·0m
TOP
CH13·3 RL 6·1
CONCRETE CULVERT
O/S 16·0m
9·4 LONG
CH16·3 RL 7·6
INV CH20·8 RL 4·7
CH25·6 RL 7·6
CH29·1 RL 5·6
ARMCO RAILING
O/S 19·0m
CH-1·7 RL 8·6
CH22·2 RL 8·4
CH46·0 RL 8·3
SYDNEY F3 FREEWAY NEWCASTLE
CH-11·0 RL 8·2
CH25·5 RL 8·1
CH53·7 RL 8·1
ARMCO RAILING O/S 62·0m
N.
CH16·3 RL 5·9
CH18·9 RL 7·5
CH23·3 RL 4·6
CH28·5 RL 7·5
CH33·0 RL 5·4
CONCRETE CULVERT
O/S 65·0m
9·4m LONG
INV
CH-7·0 RL 6·5
CH8·7 RL 6·8
CH17·1 RL 5·0
O/S 74·0m
CH33·6 RL 5·0
CH37·7 RL 6·0
TOP
TOE
TOE
TOP
CH5·2 RL 5·1
CH20·3 RL 4·9
O/S 90m
CH36·7 RL 5·2
CH54·3 RL 5·1
TITLE.
ERM
PLAN
FLOOD STUDY-WYONG CULVERT "AB"
DATE 27/01/00
R.R. NTS
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE 2300
PHONE (02) 49 261 388
FAX (02) 49 293 475
P.O. BOX 726 NEWCASTLE 2300.
DX 7888 NEWCASTLE
MONTEATH & POWYS ID:61492934 75 01 FEB'00 12:19 No.006 P.03

ELEVATION AT CULVERT "AA"

AND CULVERT "AB"



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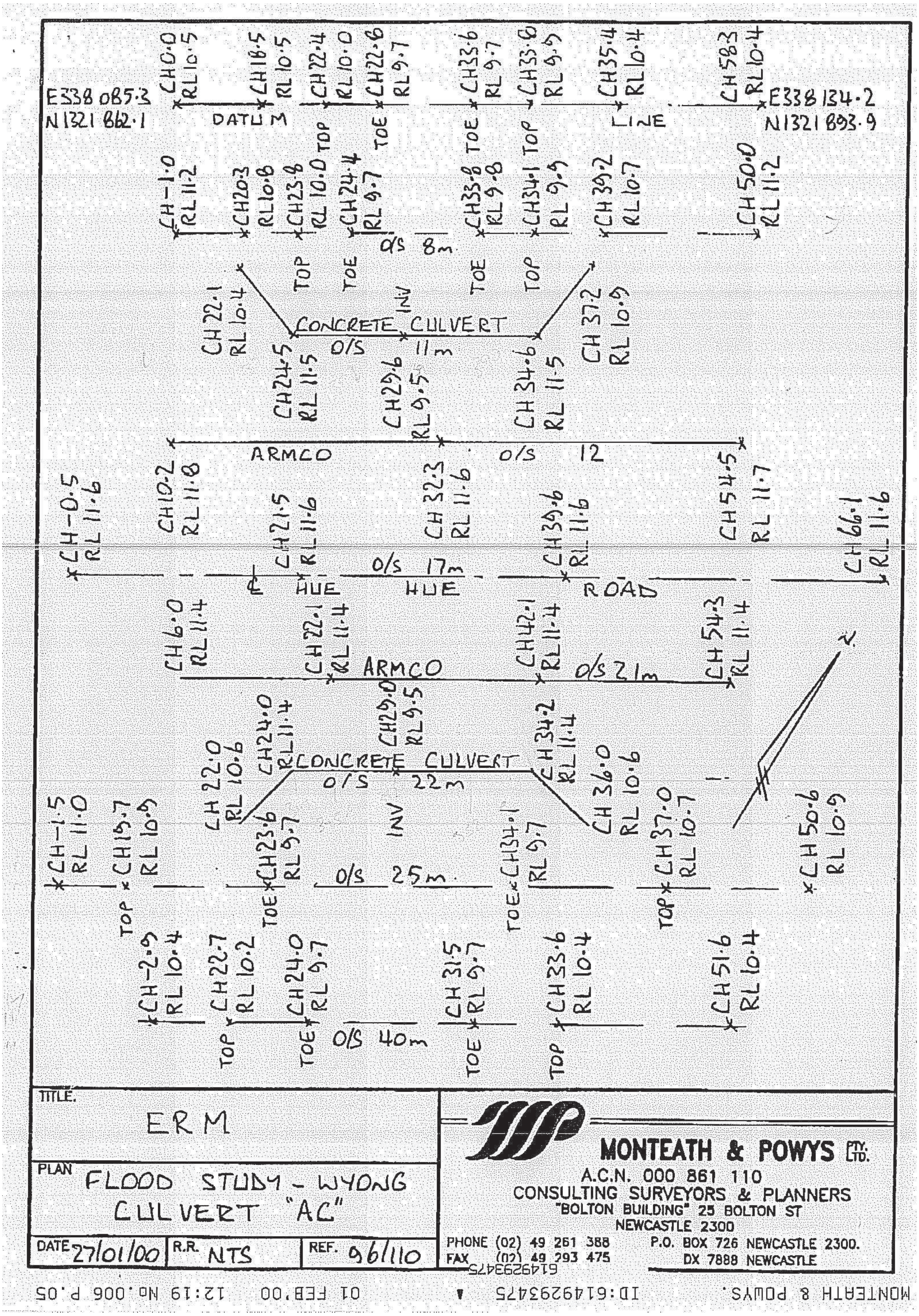
TITLE. ERM	MONTEATH & POWYS PTY. LTD. A.C.N. 000 861 110 CONSULTING SURVEYORS & PLANNERS "BOLTON BUILDING" 25 BOLTON ST NEWCASTLE 2300
PLAN FLOOD STUDY CULVERT "AA"	PHONE (02) 49 261 388 FAX (02) 49 293 475 P.O. BOX 726 NEWCASTLE 2300. DX 7888 NEWCASTLE
DATE 25/01/00 R.R. NTS REF. 96/110	

MONTEATH & POWYS. ID:61492933475 01 FEB'00 12:19 No.006 P.04


TITLE.
ERM
PLAN
FLOOD STUDY - WYONG
CULVERT "AC"
DATE 27/01/00
R.R. NTS
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE 2300
PHONE (02) 49 261 388
FAX (02) 49 293 475
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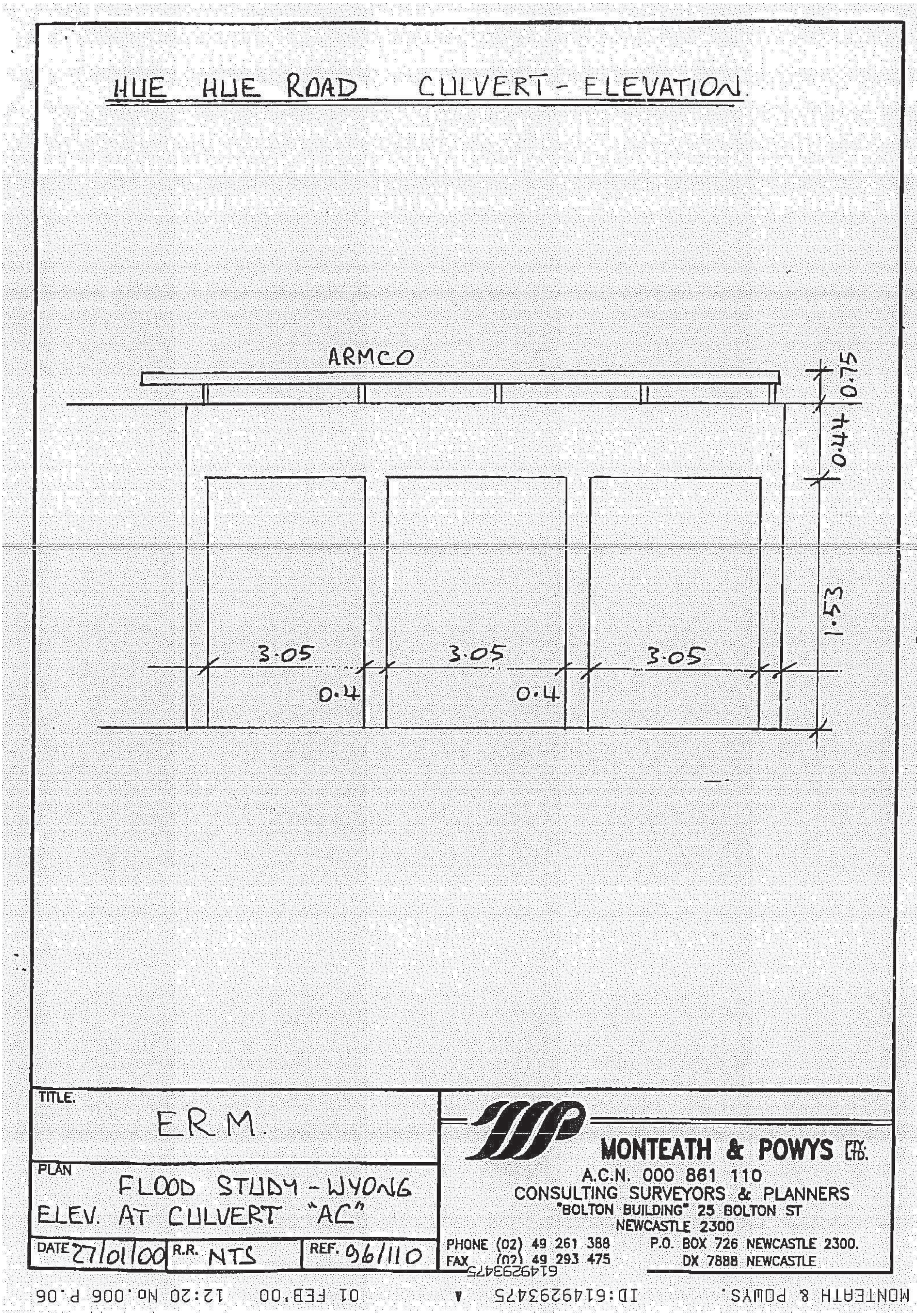
HUE HUE ROAD CULVERT - ELEVATION
ARMCO
0.75
0.44
1.53
3.05
3.05
3.05
0.4
0.4
TITLE.
ERM.
PLAN
FLOOD STUDY - WYONG
ELEV. AT CULVERT "AC"
DATE 27/01/00
R.R. NTS
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE 2300
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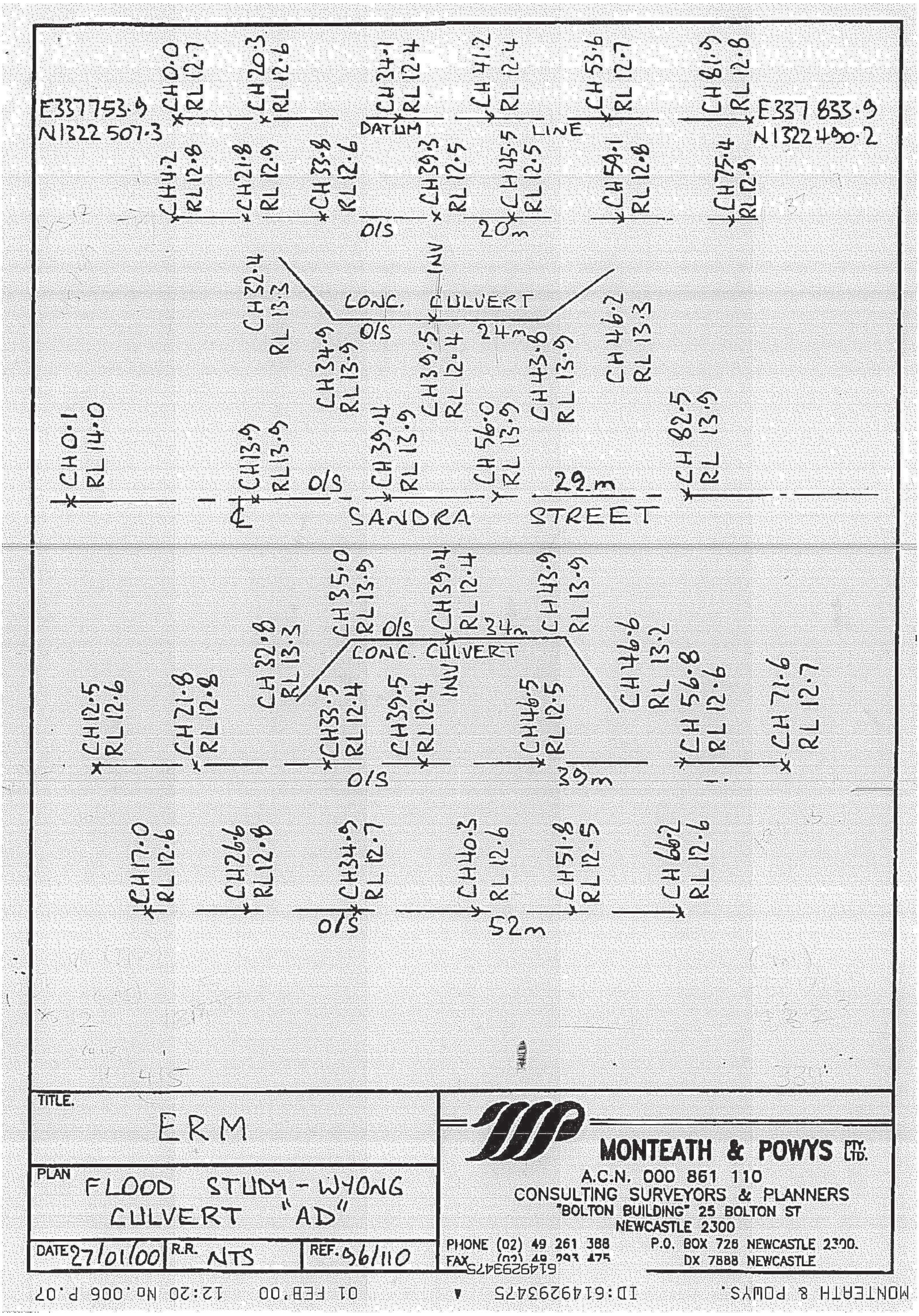
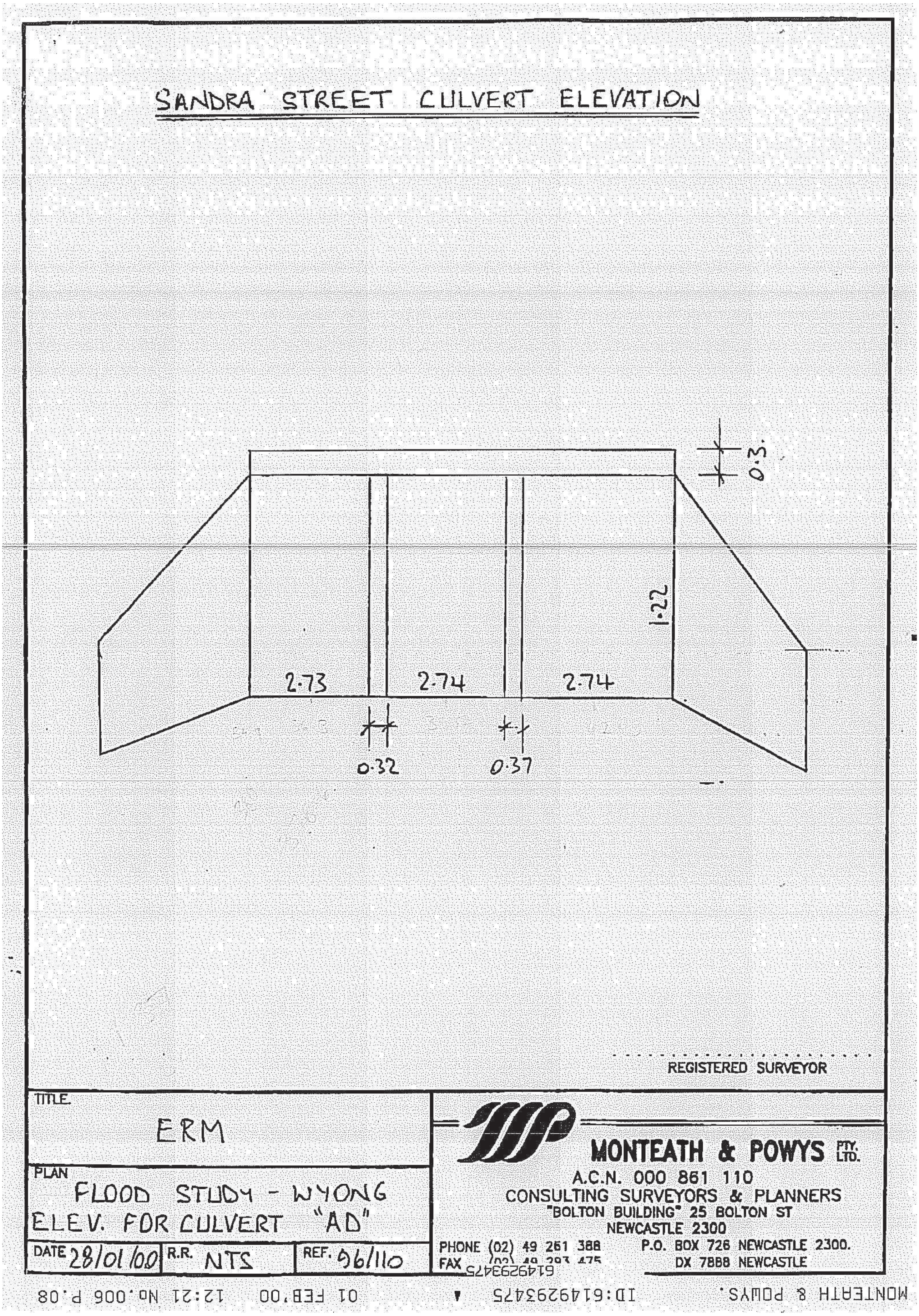
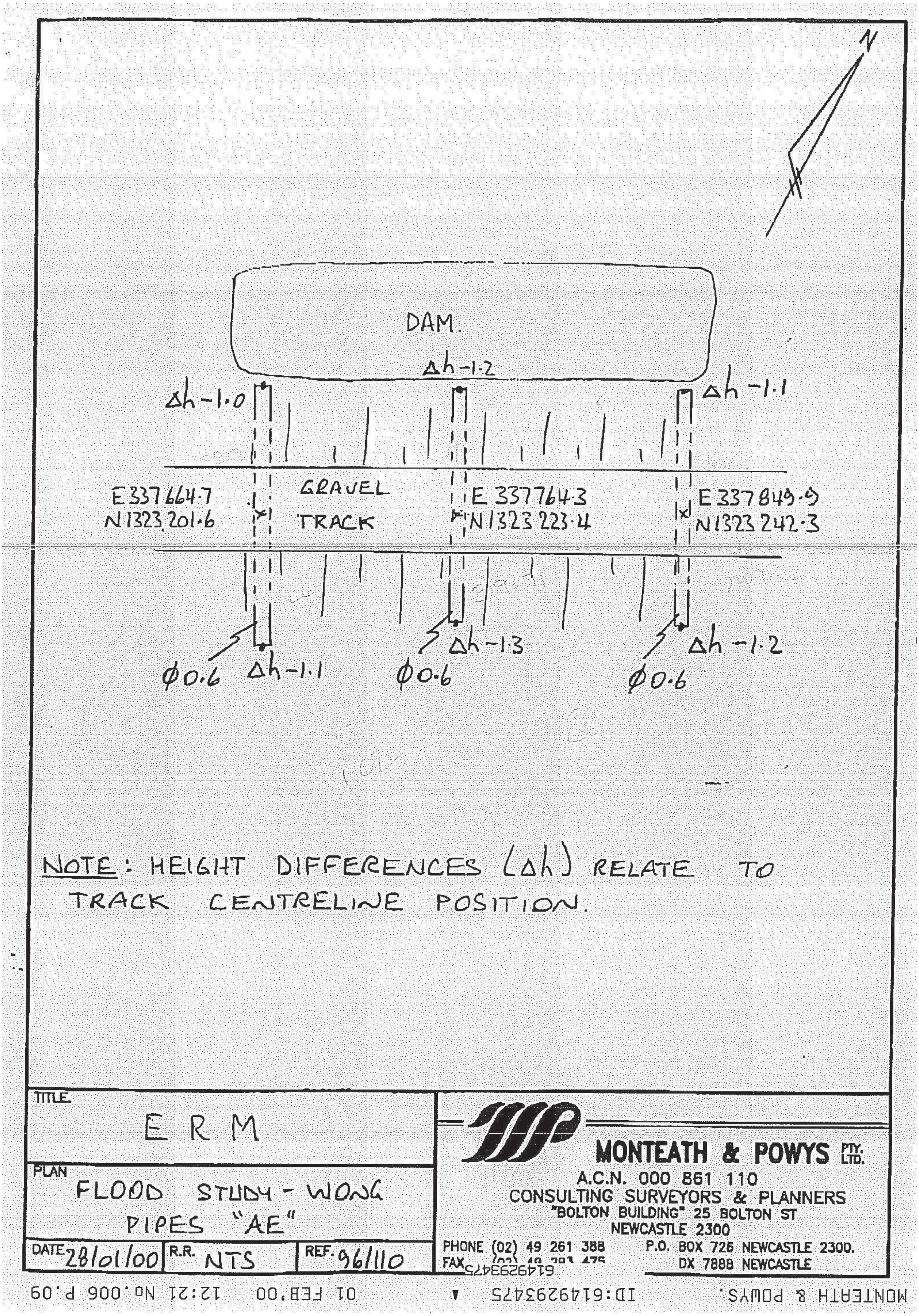
FAX (02) 49 293 475
P.O. BOX 726 NEWCASTLE 2300.
DX 7888 NEWCASTLE
61492934 75


E337753.9
N1322 507.3
E337 833.9
N1322 490.2
DATUM
LINE
O/S
20m
INV
CONC. CULVERT
O/S
24m
SANDRA STREET
29m
O/S
34m
CONC. CULVERT
INV
O/S
39m
O/S
52m
TITLE.
ERM
PLAN
FLOOD STUDY - WYONG CULVERT "AD"
DATE 27/01/00
R.R. NTS
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE 2300
PHONE (02) 49 261 388
P.O. BOX 726 NEWCASTLE 2300.
DX 7888 NEWCASTLE


SANDRA STREET CULVERT ELEVATION
0.3
1.22
2.73
2.74
2.74
0.32
0.37
REGISTERED SURVEYOR
TITLE
ERM
PLAN
FLOOD STUDY - WYONG
ELEV. FOR CULVERT "AD"
DATE 28/01/00
R.R. NTS
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE 2300
PHONE (02) 49 261 388
P.O. BOX 726 NEWCASTLE 2300.
DX 7888 NEWCASTLE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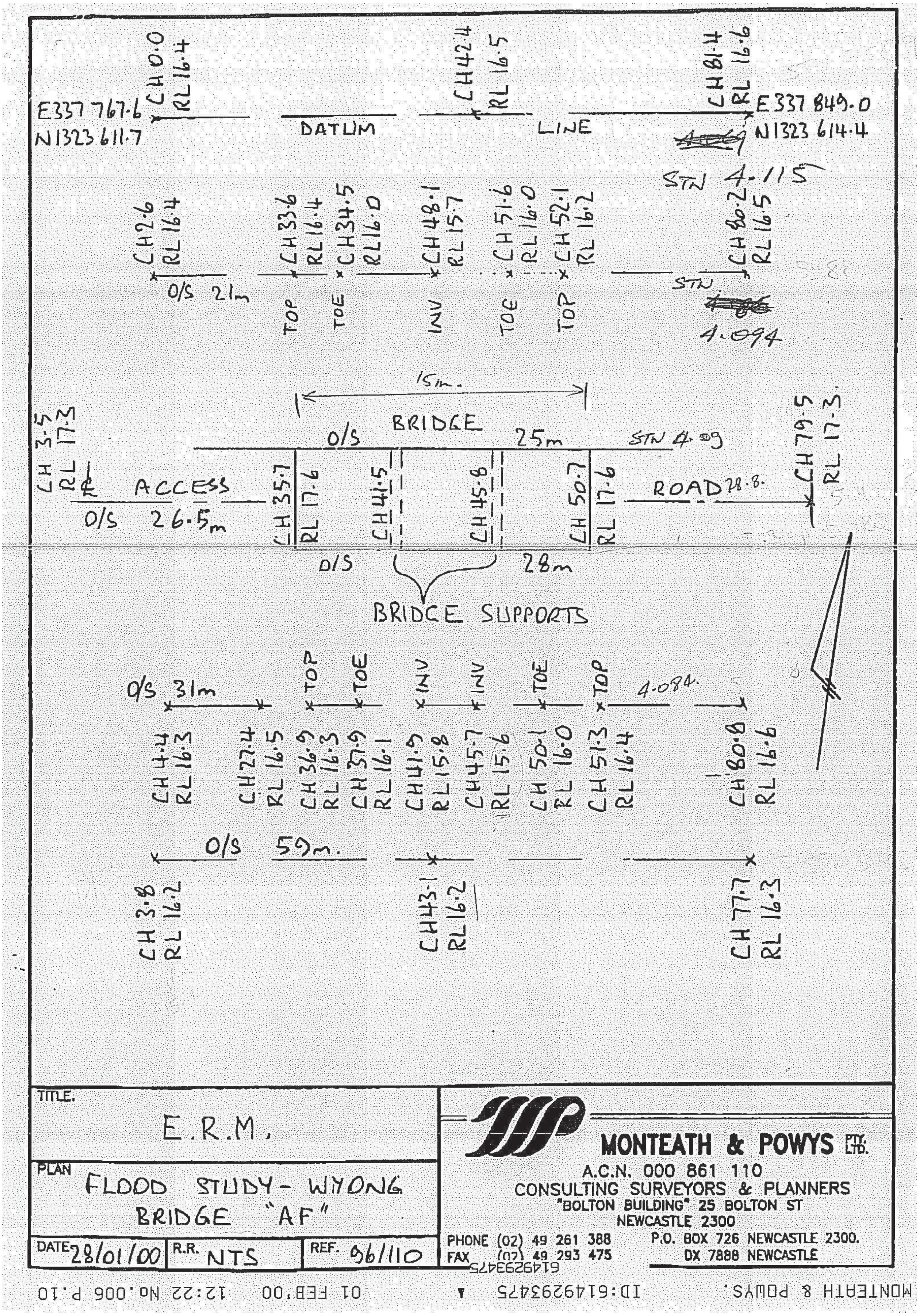
DAM.
Δh -1.2
Δh -1.0
Δh -1.1
E 337 664.7
N 1323 201.6
GRAVEL
TRACK
E 337 764.3
N 1323 223.4
E 337 849.9
N 1323 242.3
φ0.6 Δh -1.1
φ0.6 Δh -1.3
φ0.6 Δh -1.2
NOTE: HEIGHT DIFFERENCES (Δh) RELATE TO
TRACK CENTRELINE POSITION.
TITLE. ERM
PLAN FLOOD STUDY - WONG
PIPES "AE"
DATE 28/01/00
R.R. NTS
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE 2300
PHONE (02) 49 261 388
P.O. BOX 725 NEWCASTLE 2300.
DX 7888 NEWCASTLE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CH2·6
RL 16·4
O/S 21m
CH33·6
RL 16·4
TOP
CH34·5
RL 16·0
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CH48·1
RL 15·7
INV
CH 51·6
RL 16·0
TOE
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RL 16·2
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CH80·2
RL 16·5
STN
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15m
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CH 3·5
RL 17·3
ACCESS
O/S 26·5m
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CH 45·8
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E.R.M.
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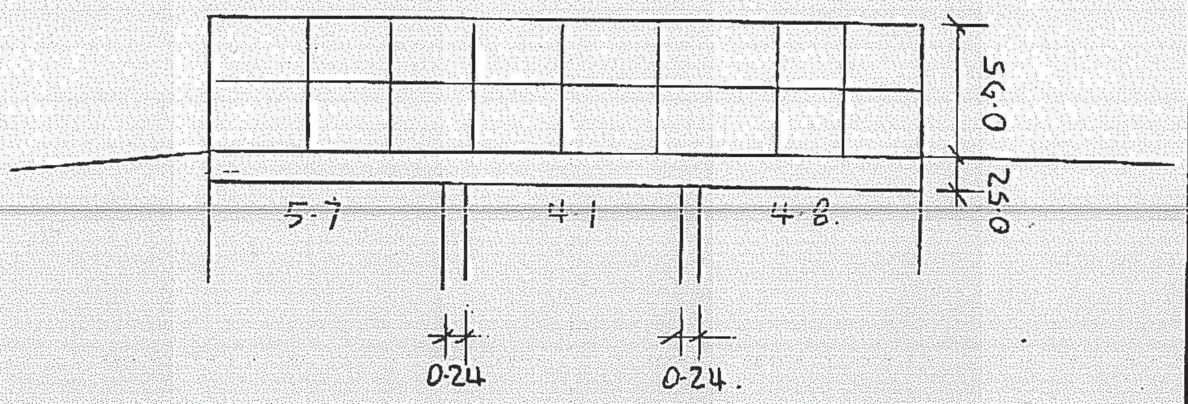
FLOOD STUDY - WYONG
BRIDGE "AF"
DATE 28/01/00
R.R. NTS
REF. 96/110
MONTEATH & POWYS PTY. LTD.
A.C.N. 000 861 110
CONSULTING SURVEYORS & PLANNERS
"BOLTON BUILDING" 25 BOLTON ST
NEWCASTLE 2300
PHONE (02) 49 261 388
FAX (02) 49 293 475
P.O. BOX 726 NEWCASTLE 2300.
DX 7888 NEWCASTLE

PARRY - JONES BRIDGE ELEVATION



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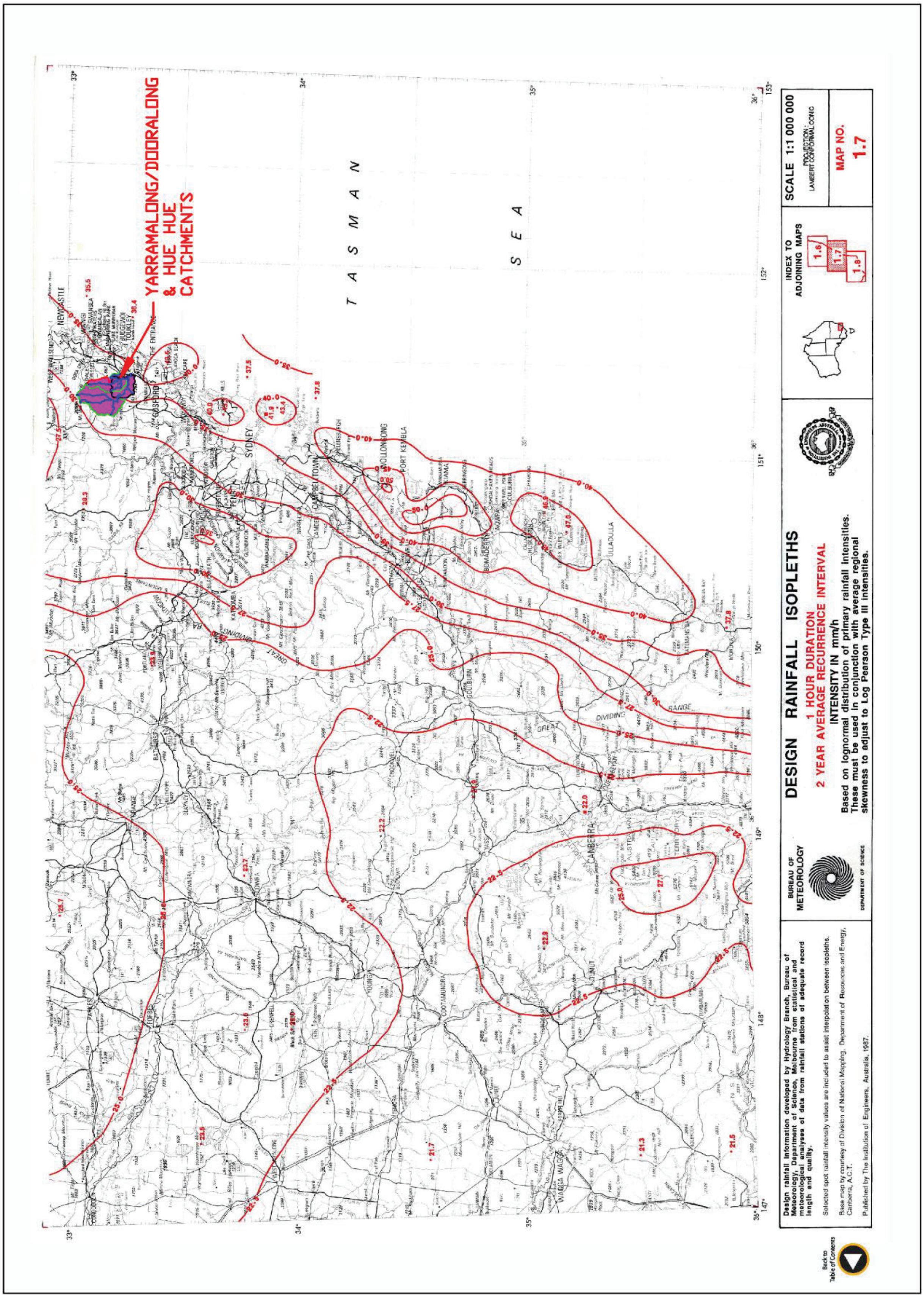
PLAN FLOOD STUDY - WYONG ELEV. AT BRIDGE "AF"	PHONE (02) 49 261 388 FAX (02) 49 293 475 P.O. BOX 726 NEWCASTLE 2300. DX 7888 NEWCASTLE
DATE 28/01/00 R.R. NTS REF. 96/110	

MONTEATH & POWYS. ID:61492935475 01 FEB'00 12:22 No.006 P.11

Annex B

Design Rainfall



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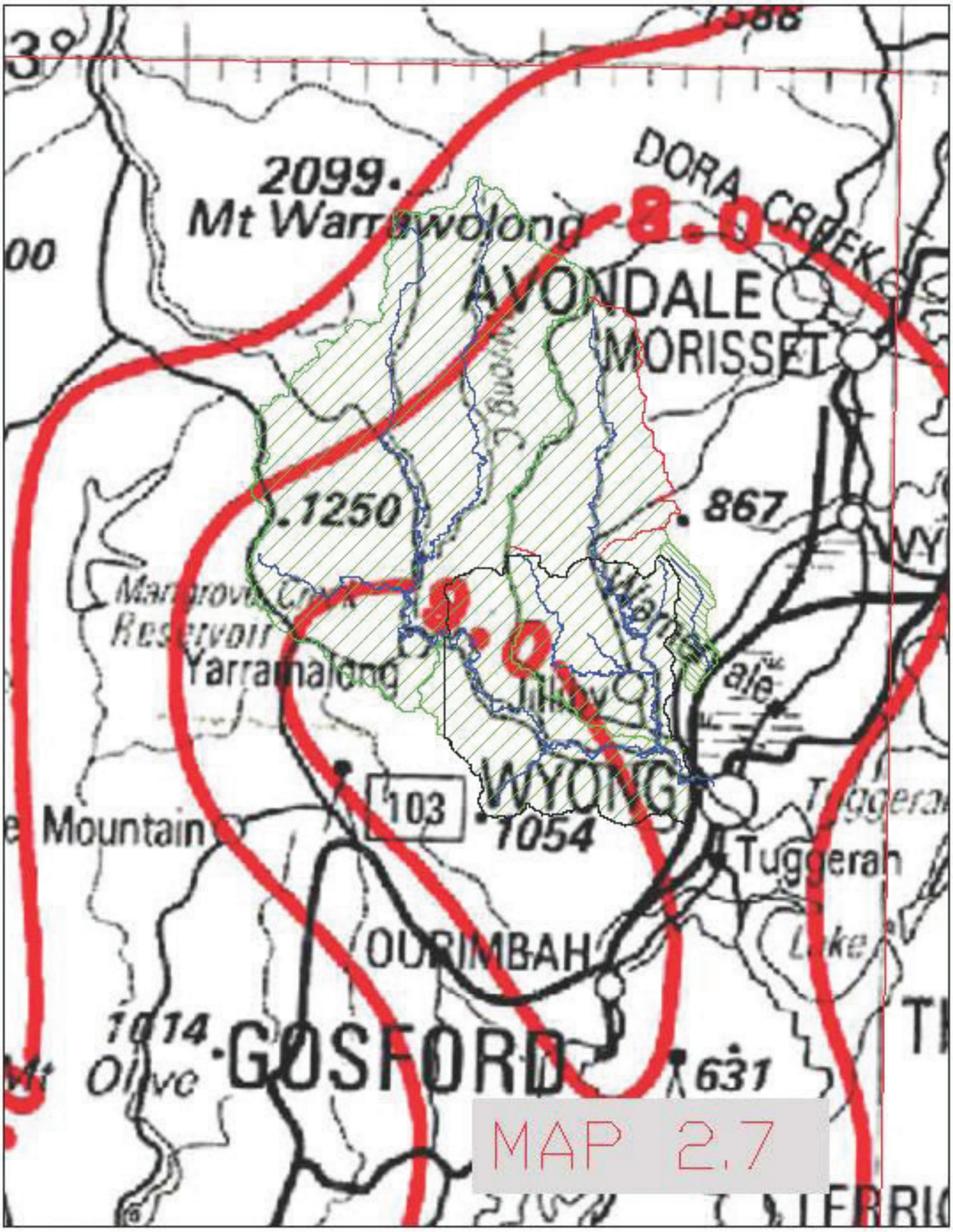
Mangrove Creek Reservoir
Yarramalong
WYONG
103
1054
Mountain
Tuggeran
OURIMBAH
Lake
1014
Mt Olive
GOSFORD
631
MAP 1.7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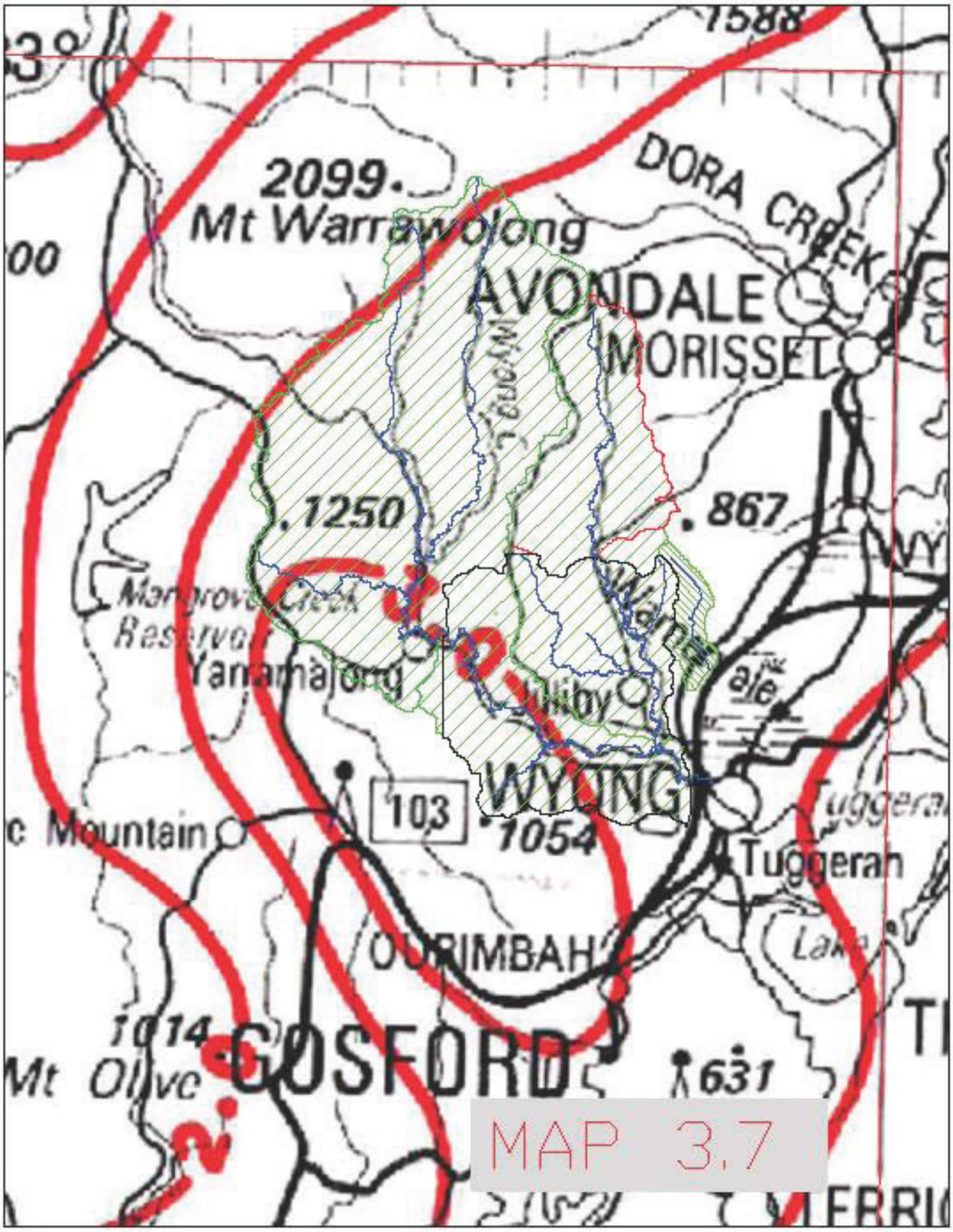
MAP 2.7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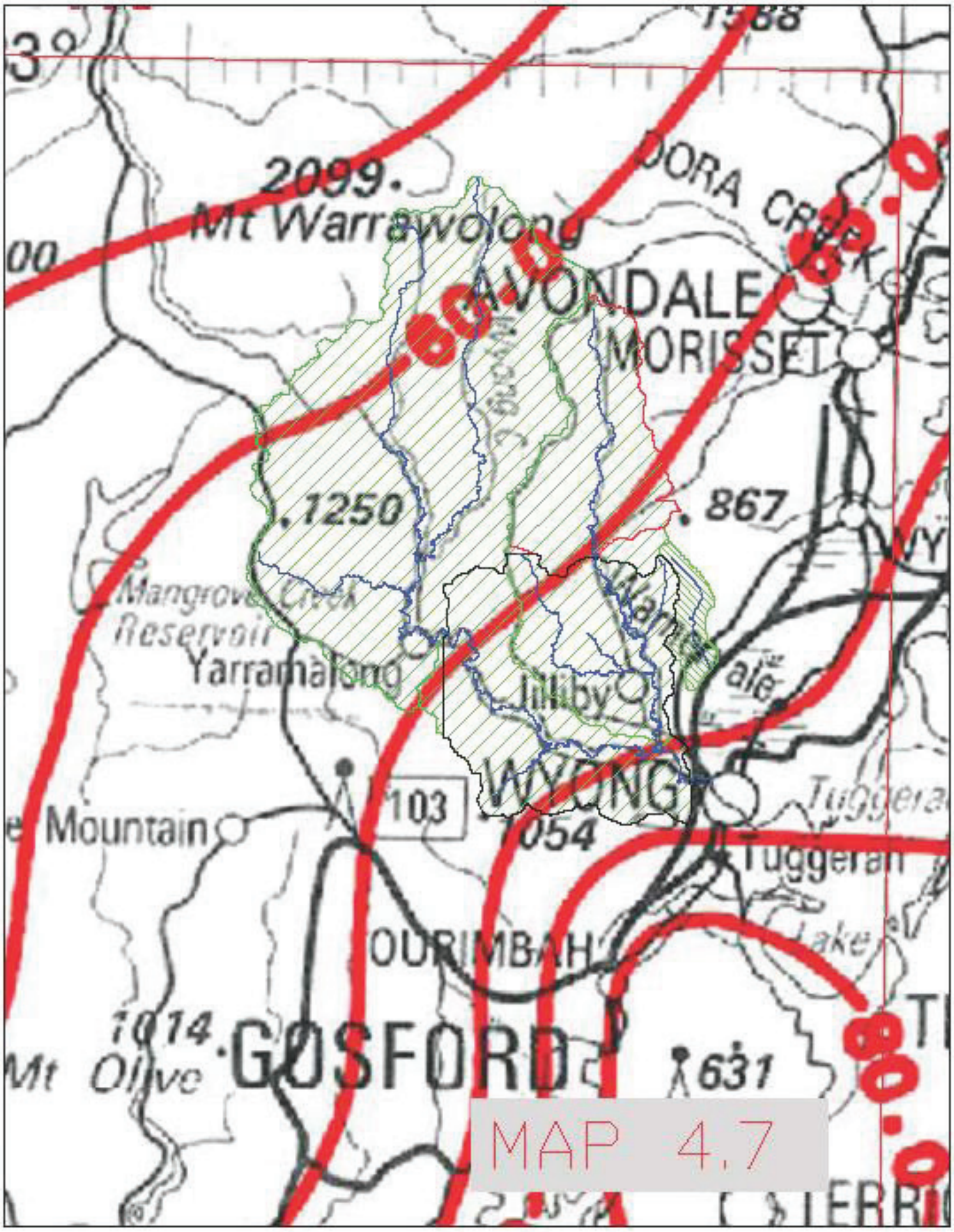
MAP 3.7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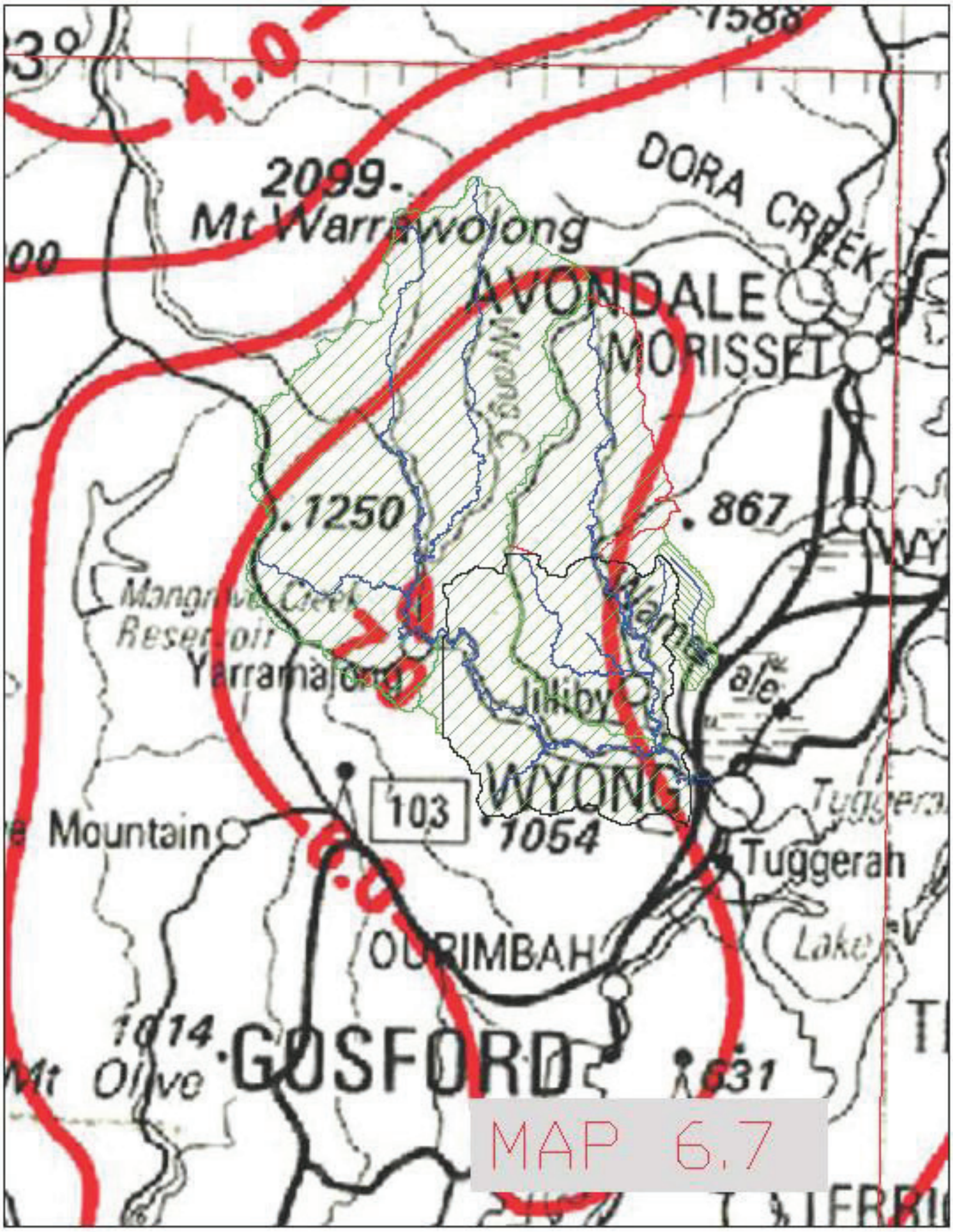
MAP 5.7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Jilliby
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Mountain
Tuggerah
OURIMBAH
Lake
1014
Mt Olive
GOSFORD
631
MAP 6.7

INTENSITY - FREQUENCY - DURATION DESIGN RAINFALL (Ref. A.R.&R. 2007)

G. HERMAN AND ASSOCIATES
14 HORNBY AVE SUTHERLAND
Tel. (02) 9545 2251

PROJECT: Wallarah 2 coal Project
JOB No.: 120011
DATE: 1/04/2012

BASIC RAINFALL INTENSITIES (Maps 1-6): AVERAGE RECURRENCE INTERVALS: 1,2,5,10,20,50 & 100 YEARS

	6 mins.	1 hour	12 hour	72 hour
I (ARI=2)	100.26	33.0	8.2	2.9
I (ARI=50)	194.60	65.0	18.1	6.0

Skewness, G (Map 7): 0.01
Factor F2 (Map 8): 4.31
Factor F50 (Map 9): 15.90

DUR. min	DUR. hours	I(1yr) (mm/hr)	I(2yr) (mm/hr)	I(5yr) (mm/hr)	I(10yr) (mm/hr)	I(20yr) (mm/hr)	I(50yr) (mm/hr)	I(100yr) (mm/hr)
4		87.07	111.98	143.53	161.79	185.98	217.59	241.63
5		83.09	106.87	137.02	154.47	177.58	207.80	230.78
6	0.1	77.89	100.20	128.51	144.90	166.61	194.99	216.58
8		69.76	89.76	115.19	129.93	149.43	174.93	194.34
10		63.67	81.94	105.21	118.70	136.55	159.89	177.66
20		46.31	59.63	76.70	86.61	99.70	116.85	129.91
30	0.5	37.60	48.44	62.38	70.48	81.18	95.19	105.86
40		32.17	41.46	53.43	60.40	69.59	81.64	90.82
45	0.75	30.13	38.83	50.06	56.60	65.22	76.53	85.14
60	1	25.58	32.98	42.55	48.13	55.49	65.13	72.49
90	1.5	20.44	26.43	34.35	39.00	45.10	53.13	59.27
120	2	17.38	22.52	29.42	33.50	38.83	45.85	51.24
180	3	13.80	17.92	23.59	26.96	31.36	37.17	41.63
240	4	11.70	15.23	20.15	23.10	26.92	31.99	35.90
300	5	10.29	13.41	17.83	20.48	23.91	28.47	31.99
360	6	9.27	12.10	16.14	18.57	21.71	25.90	29.13
480	8	7.87	10.30	13.80	15.93	18.67	22.32	25.15
600	10	6.93	9.08	12.23	14.14	16.60	19.89	22.44
660	11	6.56	8.60	11.60	13.43	15.78	18.92	21.36
720	12	6.25	8.19	11.07	12.82	15.07	18.09	20.44
780	13	5.98	7.84	10.58	12.25	14.40	17.27	19.50
840	14	5.75	7.53	10.15	11.74	13.79	16.54	18.66
900	15	5.54	7.26	9.77	11.29	13.26	15.89	17.93
960	16	5.35	7.00	9.42	10.89	12.78	15.30	17.26
1080	18	5.02	6.57	8.81	10.18	11.94	14.28	16.10
1200	20	4.74	6.20	8.31	9.59	11.24	13.44	15.14
1320	22	4.50	5.88	7.87	9.07	10.63	12.70	14.30
1440	24	4.29	5.61	7.49	8.63	10.10	12.07	13.58
1620	27	4.02	5.25	7.00	8.05	9.42	11.24	12.64
1800	30	3.79	4.94	6.58	7.57	8.85	10.55	11.86
1980	33	3.59	4.68	6.22	7.15	8.35	9.95	11.18
2160	36	3.42	4.45	5.91	6.79	7.92	9.43	10.59
2340	39	3.26	4.25	5.63	6.46	7.54	8.97	10.07
2520	42	3.12	4.07	5.39	6.18	7.20	8.56	9.61
2700	45	3.00	3.90	5.16	5.92	6.89	8.19	9.19
2880	48	2.89	3.75	4.96	5.68	6.62	7.86	8.82
3240	54	2.69	3.49	4.60	5.27	6.13	7.27	8.15
3600	60	2.51	3.27	4.30	4.91	5.72	6.77	7.59
3960	66	2.36	3.07	4.03	4.61	5.35	6.34	7.10
4320	72	2.23	2.90	3.80	4.34	5.04	5.96	6.67

Annex C

Observed Flood Marks

Table C.1 *FLOOD HEIGHTS OBSERVED BY RESIDENTS*

Station	Year	RL (mAHD)	Description
1A(a)	1964	18.48	RMB 197 Yarramalong Rd
1A(a)	1977	NS	RMB 197 Yarramalong Rd
1A(b)	1985	17.39	RMB 197 Yarramalong Rd (Base of orange tree)
1A(c)	1985	16.47	Near RMB 1198 50m east of tree
1A(d)	1985	16.76	Intersection of RMB 1194 "New Dawn" driveway and Yarramalong Rd
1B(a)	1985	15.15	Rear of Community Hall (base of pier nearest Wyong Creek)
1B(b)	1985	15.46	Intersection "Yarramalong Park" driveway and Yarramalong Rd
1D(a)	1985	17.09	Driveway RMB 1216
1D(b)	1985	15.26	Edge of bitumen near flood marker
1D(b)	1985	17.30	Edge of bitumen near power pole
1D(c)	1985	17.71	Edge of bitumen near driveway.
1D(d)	1985	18.07	Ground level at fourth post
3A	1998	30.02	Frog Lodge, Dooralong Rd (ground level at star picket)
6B	1990	10.06	Little Jilliby Rd (Mike Cambell's house) top of wire fence
6C(a)	1990	15.86	Cnr Jilliby Rd and Durren Rd
6C(b)(i)	1990	16.02	Corner of Jilliby Rd and Durren Rd (edge of bitumen of Jilliby Rd)
6C(b)(ii)	1990	15.93	Corner of Jilliby Rd and Durren Rd (edge of Bitumen of Jilliby Rd)
6D(a)	1990	17.89	"Grey Gums" (Driveway and Little Jilliby Rd)
6D(b)	1990	18.54	"Grey Gums" (Edge of Bitumen opposite gap in trees)
8B(b)	1964	10.31	Porter's Rail Bridge (mark on power pole, believed to be 1964 flood)
8A(a)	1989	8.72	Cnr of Wattagan Forrest Drive and Jilliby Rd (Stay Pole)
8A(b)	1989	8.62	Cnr of Wattagan Forrest Drive and Jilliby Rd (power pole)
8A(c)	1989	9.49	Cnr of Wattagan Forrest Drive and Jilliby Rd (top of large stump)
8B(a)	1989	9.20	Cnr of Wattagan Forrest Drive and Jilliby Rd (House corner)
8C	1989	8.46	"Fatheringham" property, top of flood plain.
10A (a)	1992	30.44	RMB 1437 Bunning Creek Road at base of small tree adjacent to power pole
11A (a)	1992	NS	Ravensdale Road at base of cattleyard closest to the creek.
12A (a)	1963	28.59	1429A Yarramalong Road, mark engraved on shed support
12A (b)	1964	28.82	1429A Yarramalong Road, mark engraved on shed support
12A (c)	1977	28.91	1429A Yarramalong Road, mark engraved on shed support
12A (d)	1978	29.04	1429A Yarramalong Road, mark engraved on shed support
13A (a)	1985	35.87	1550 Yarramalong Road at mark on entry steps.

Source: *Historical flood marks were obtained by consulting the public in Yarramalong and Dooralong Valleys.*
m AHD - metres, Australian Height Datum
YARR - Yarramalong Valley
Chainage - distance along the river branch in metres
DOOR - Dooralong Valley
NS – abbreviates not surveyed.

Table C.2 *FLOOD HEIGHTS FOR HISTORICAL STORMS OBTAINED FROM UPPER WYONG RIVER FLOOD STUDY*

Station	Year	RL (mAHD)	Description
8	1989	6.60	Yarramalong Road (collies waterhole) Ti -tree opposite flood height marker
11	1989	9.67	Watagan Road mark on p.pole and gate of house opposite
12	1964	10.10	Dunks lane approx floor level of old house(Fotheringham) put fire out in open fireplace (Bill Daniels) see G.Bisset survey
13	1990	9.68	Dooralong Road bottom of rail "grey gums"
14	1989	16.11	Durren Road G.L.Stake 200m south of Smiths Lane
14	1992	16.41	Durren Road G.L.Stake 200m south of Smiths Lane
15	1989	25.14	Mandalong Road bridge notch in sapling R.H.S. Approx 1.5m above ground
16	1989	24.14	Mandalong Road 600m above ground--gate lot 144
17	1989	36.79	Lemon Tree 50m west of bridge base of p.pole L.H.S.
18	1989	12.19	Yarramalong Road plastic on p.pole S.W.corner Lauffs Lane(maybe old flood mark)
19	1989	11.71	Yarramalong Road 100m west Lauffs Lane top rail on wooden gate north side of road
20	1989	12.69	Kidmans Lane axe cut E.H.S. in gum 1.5 above ground
21	1989	12.14	Kidmans Lane near "Lyons" 100mm above base of strut
21	1992	12.37	Kidmans Lane near "Lyons" 100mm above base of strut
22	1949	12.53	Kidmans Lane house R.H.S. end of lane ground level at back steps
23	1989	14.30	Chandlers Lane top wire on fence 2nd p.pole from Yarramalong Road R.H.S
24	1989	15.72	Yarramalong Road "Wyong Creek Hall"1st p.pole past 1st wire up
25	1989	17.32	Boyds Lane 500m down base stake L.H.S
26	1989	18.29	Yarramalong Road take near loading ramp RMB 1216 (gears)
26	1992	18.19	Yarramalong Road take near loading ramp RMB 1216 (gears)
27	1989	18.28	Yarramalong Road old gate opposite "Gleneagles" top of top rail
28	1989	19.20	Yarramalong Road bottom 3rd wire (gap)on gate
29	1989	17.92	Yarramalong Road base of gum in Paddock 100m west of horse yard (old milk can shed) Yarramalong
30	1989	23.77	Yarramalong road edge of seal 90 of stake 30m west of "Robinvale" gate
31	1989	27.56	Binga Longa Road Cl. Opposite letterbox no 7 "Jones"
32	1990	28.03	Bunning Creek Road dumpy 200m L.H.S from Yarramalong Rd
33	1992	27.53	Bunning Creek Road dumpy 200m L.H.S from Yarramalong Rd
34	1989	20.66	Stints Lane stake 500m down L.H.S

Source: *Department of Public Works (Feb 1988) Upper Wyong River Flood Study*

m AHD - metres, Australian Height Datum

YARR - Yarramalong Valley

DOOR - Dooralong Valley

Chainage - distance along the river branch in kilometres

Ppole – Power Pole

Table C.3 *FLOOD HEIGHTS FOR JUNE 2007 FLOOD*

Photo	EstFloodLevel mAHD	EASTING	NORTHING
BoydsLane03	16.5	330347.7	1319086
ChandlersLane01	14.5	331418.4	1317466
ChandlersLane-D0040-02	14.0	331266.7	1317677
DicksonRoad-D0432-3	14.5	335950.9	1323385
DicksonRoad-D0447-3	12.0	336671.9	1320487
DurrenRoad-D0776-02	16.0	334638	1322881
DurrenRoad-D0851-04	15.5	334825.9	1322568
DurrenRoad-D0852-06	15.5	334789.9	1322645
DurrenRoad-JillibyCk06	15.5	335075.1	1322820
JilibyCemetry-02	8.0	336289	1318464
JillibyCemetry	8.0	336473	1318303
KidmansLane04	12.0	333407.3	1317220
KidmansLane10	12.0	333371	1317453
SmithsRoad-D0875-5	18.0	335260.7	1323313
WataganForestRoad-D0058-09	8.5	335774.7	1318880
WataganForestRoad-D0-58-4	8.5	335852	1318735
WyongCreekHall-D0869	15.5	330981.1	1318360
WyongCreek-D0035-01	13.5	332658.8	1317526
WyongCreekHall-D0048	15.5	331007.3	1318232
YarraParkStud06	34.0	330580.9	1318743

Source: Kores staff measurements

m AHD - metres, Australian Height Datum

BoydsLane03 16.5m (344140.859, 6319324.778)

ChandlersLane01 14.5m (345242.331, 6317725.47)

'ChandlersLane-D0040-02 14m (345086.56, 6317933.68)

DicksonRoad-D0432-3 14.5m (349660.389, 6323730.149)

DicksonRoad-D0447-3 12m (350436.679, 6320846.64)

DurrenRoad-D0776-02 16.0m (348357.447, 6323200.588)

DurrenRoad-D0851-04 15.5m (348551.343, 6322891.38)

DurrenRoad-D0852-06 15.5m (348513.843, 6322967.841)

DurrenRoad-JillibyCk06 15.5m (348795.655, 6323148.024)

JilibyCemetry-02 8.0m (350092.563, 6318816.49)

JillibyCemetry 8.0m (350279.625, 6318659.495)

KidmansLane04 12.0m (347235.456, 6317517.643)

KidmansLane10 12m (347194.685, 6317749.513)

SmithsRoad-D0875-5 18.0m (348971.82, 6323644.553)

WataganForestRoad-D0058-09 8.5m (349570.397, 6319222.872)

WataganForestRoad-D058-4 8.5m (349650.54, 6319079.057)

WyongCreekHall-D0869 15.5m (344787.994, 6318610.662)

WyongCreek-D0035-01 13.5m (346481.226, 6317809.423)

WyongCreekHall-D0048 15.5m (344816.626, 6318483.178)

YarraParkStud06 16.5m (344379.656, 6318986.137)

Annex D

Hydrological Parameters

Material Property Table - Base Case

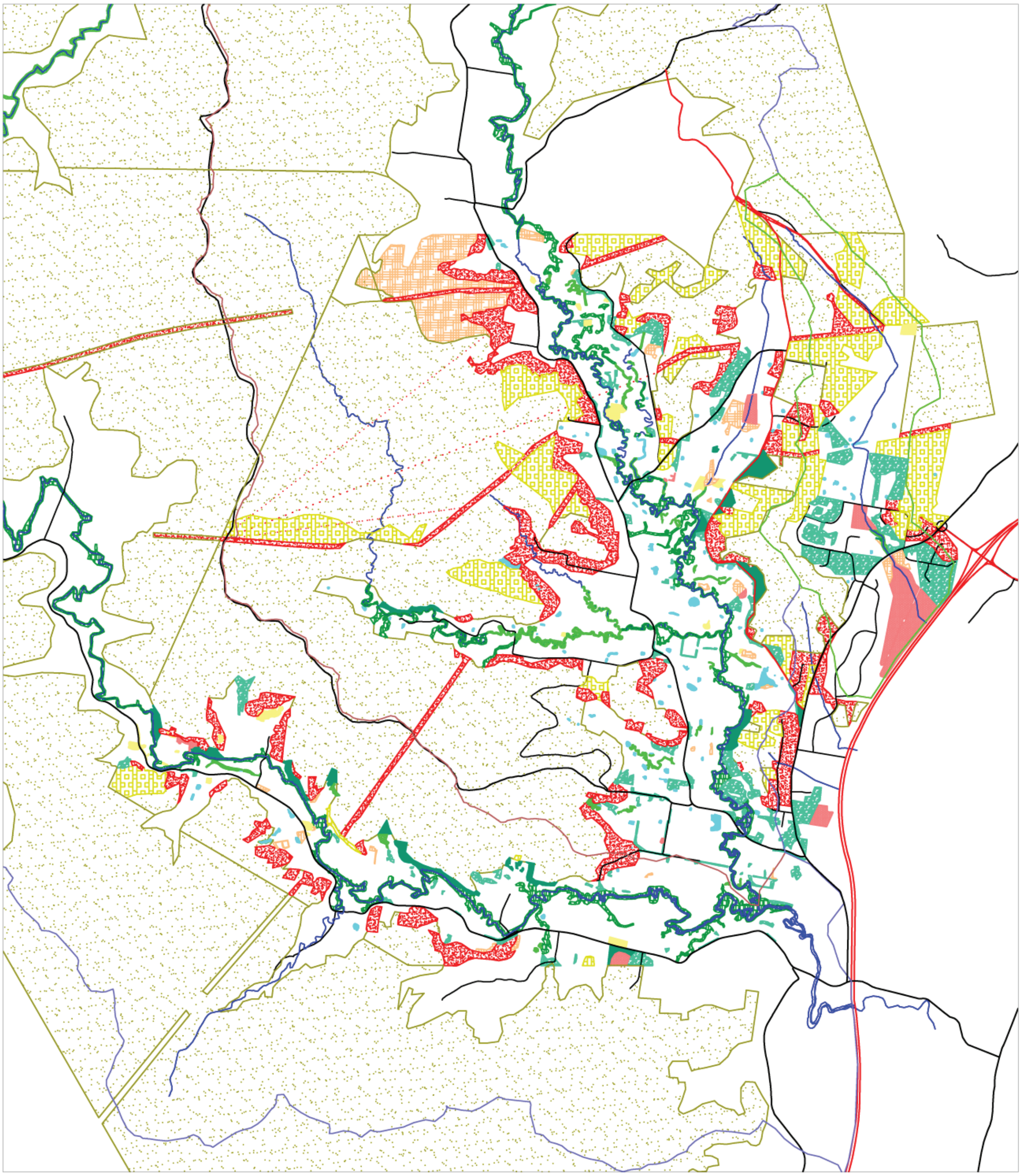
Material ID	Manning's n	Initial Loss (mm)	Continuing Loss (mm/hr)	h1	n1	h2	n2	Comments
1	0.03							water bodies
2	0.06	15	1.5	0.3	0.08	0.5	0.06	light riparian veg with long grass or sparse shrubs to 0.3m high
3	0.07	15	1.5	2.0	0.15	2.5	0.07	dense riparian veg with dense shrubs to 2m high
4	0.035	15	1.5	0.2	0.045	0.25	0.035	grazing land
5	0.05	15	1.5	0.4	0.06	0.45	0.05	tall grass and crops
6	0.08	15	1.5	1.5	0.09	1.7	0.08	Light scrub generally to 1.5m
7	0.1	15	1.5	1.5	0.17	1.7	0.10	Dense scrub generally to 1.5m
8	0.07	15	1.5	0.3	0.08	0.5	0.07	Light or scattered trees with grass to 0.3m high
9	0.11	15	1.5	1.5	0.18	1.7	0.11	Dense trees with scrub generally to 1.5m
10	0.08	20	2.0	0.8	0.12	0.9	0.08	Light highland trees with light scrub to 0.8m high
11	0.16	20	2.0	1.5	0.25	1.7	0.16	Dense highland trees with dense scrub generally to 1.5m
12	0.05	20	1.5					highland cleared areas

Material Property Table - High Roughness Case

Material ID	Manning's n	Initial Loss (mm)	Continuing Loss (mm/hr)	h1	n1	h2	n2	Comments
1	0.03							water bodies
2	0.066	15	1.5	0.3	0.088	0.5	0.066	light riparian veg with long grass or sparse shrubs to 0.3m high
3	0.077	15	1.5	2.0	0.165	2.5	0.077	dense riparian veg with dense shrubs to 2m high
4	0.039	15	1.5	0.2	0.05	0.25	0.039	grazing land
5	0.055	15	1.5	0.4	0.066	0.45	0.055	tall grass and crops
6	0.088	15	1.5	1.5	0.099	1.7	0.088	Light scrub generally to 1.5m
7	0.11	15	1.5	1.5	0.19	1.7	0.11	Dense scrub generally to 1.5m
8	0.077	15	1.5	0.3	0.088	0.5	0.077	Light or scattered trees with grass to 0.3m high
9	0.12	15	1.5	1.5	0.2	1.7	0.12	Dense trees with scrub generally to 1.5m
10	0.088	20	2.0	0.8	0.13	0.9	0.088	Light highland trees with light scrub to 0.8m high
11	0.18	20	2.0	1.5	0.28	1.7	0.18	Dense highland trees with dense scrub generally to 1.5m
12	0.055	20	1.5					highland cleared areas

Material Property Table - Low Losses Case

Material ID	Manning's n	Initial Loss (mm)	Continuing Loss (mm/hr)	h1	n1	h2	n2	Comments
1	0.03							water bodies
2	0.066	15	1.5	0.3	0.088	0.5	0.066	light riparian veg with long grass or sparse shrubs to 0.3m high
3	0.077	15	1.5	2.0	0.165	2.5	0.077	dense riparian veg with dense shrubs to 2m high
4	0.039	15	1.5	0.2	0.05	0.25	0.039	grazing land
5	0.055	15	1.5	0.4	0.066	0.45	0.055	tall grass and crops
6	0.088	15	1.5	1.5	0.099	1.7	0.088	Light scrub generally to 1.5m
7	0.11	15	1.5	1.5	0.19	1.7	0.11	Dense scrub generally to 1.5m
8	0.077	15	1.5	0.3	0.088	0.5	0.077	Light or scattered trees with grass to 0.3m high
9	0.12	15	1.5	1.5	0.2	1.7	0.12	Dense trees with scrub generally to 1.5m
10	0.088	20	2.0	0.8	0.13	0.9	0.088	Light highland trees with light scrub to 0.8m high
11	0.18	20	2.0	1.5	0.28	1.7	0.18	Dense highland trees with dense scrub generally to 1.5m
12	0.055	20	1.5					highland cleared areas

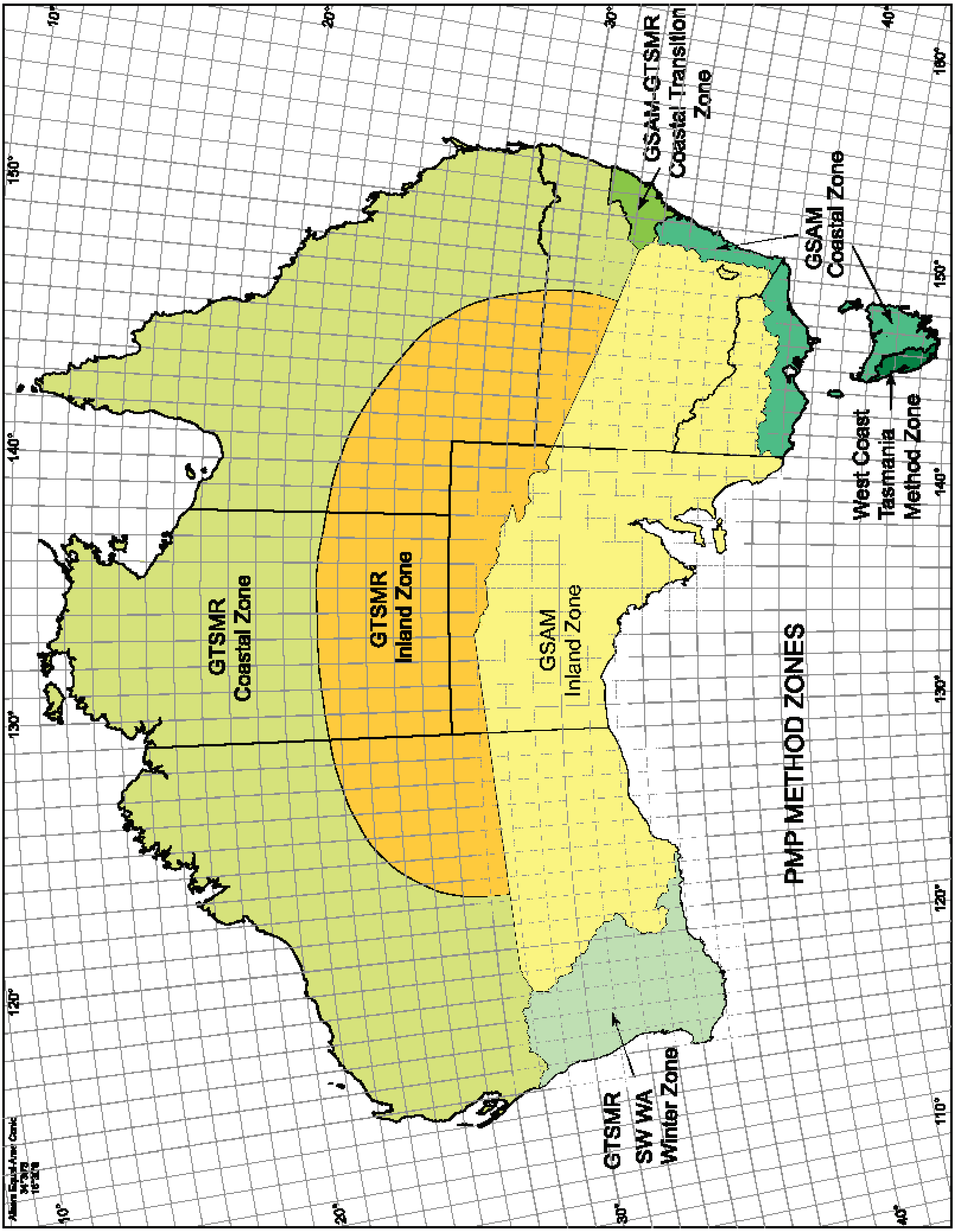


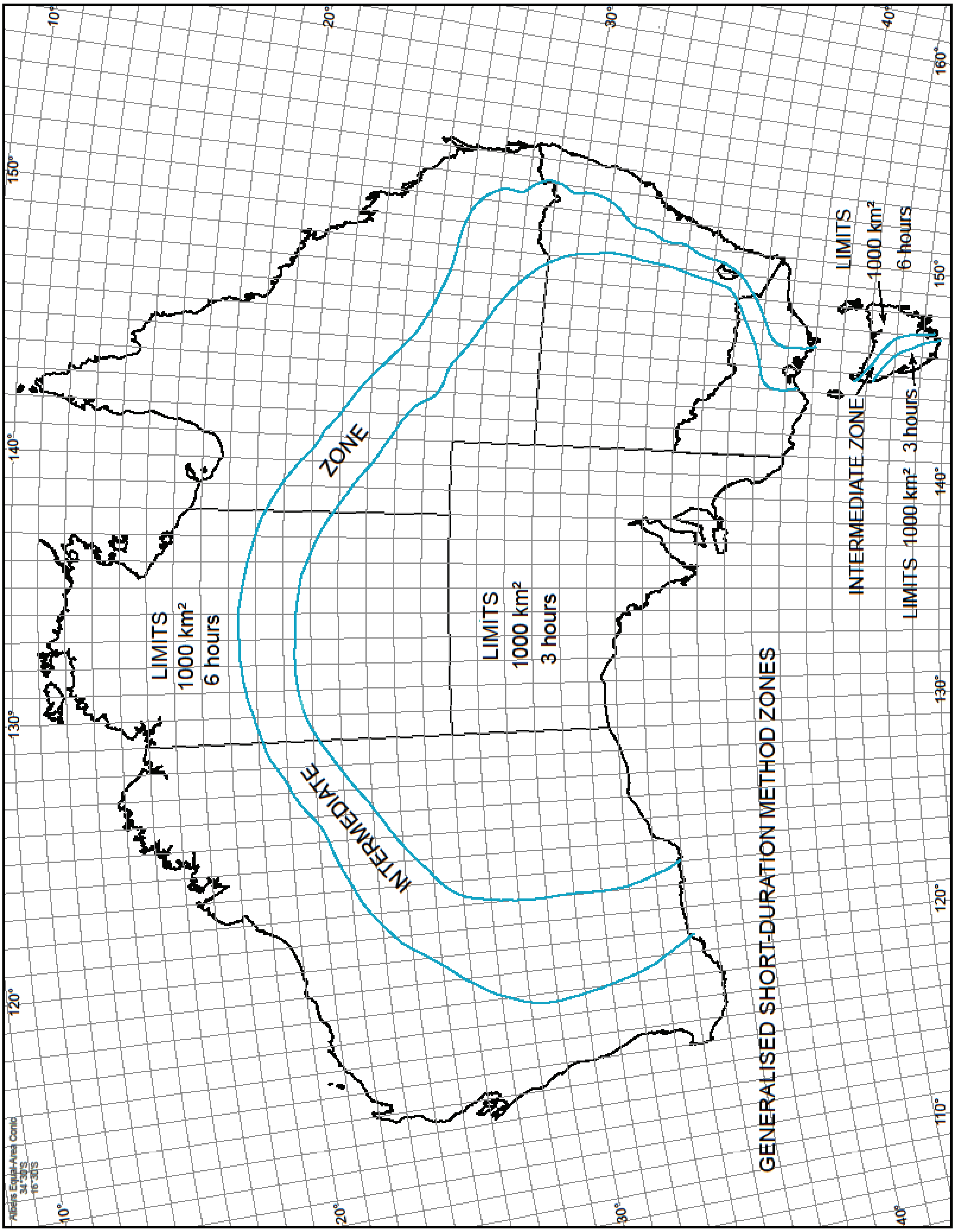
LEGEND:

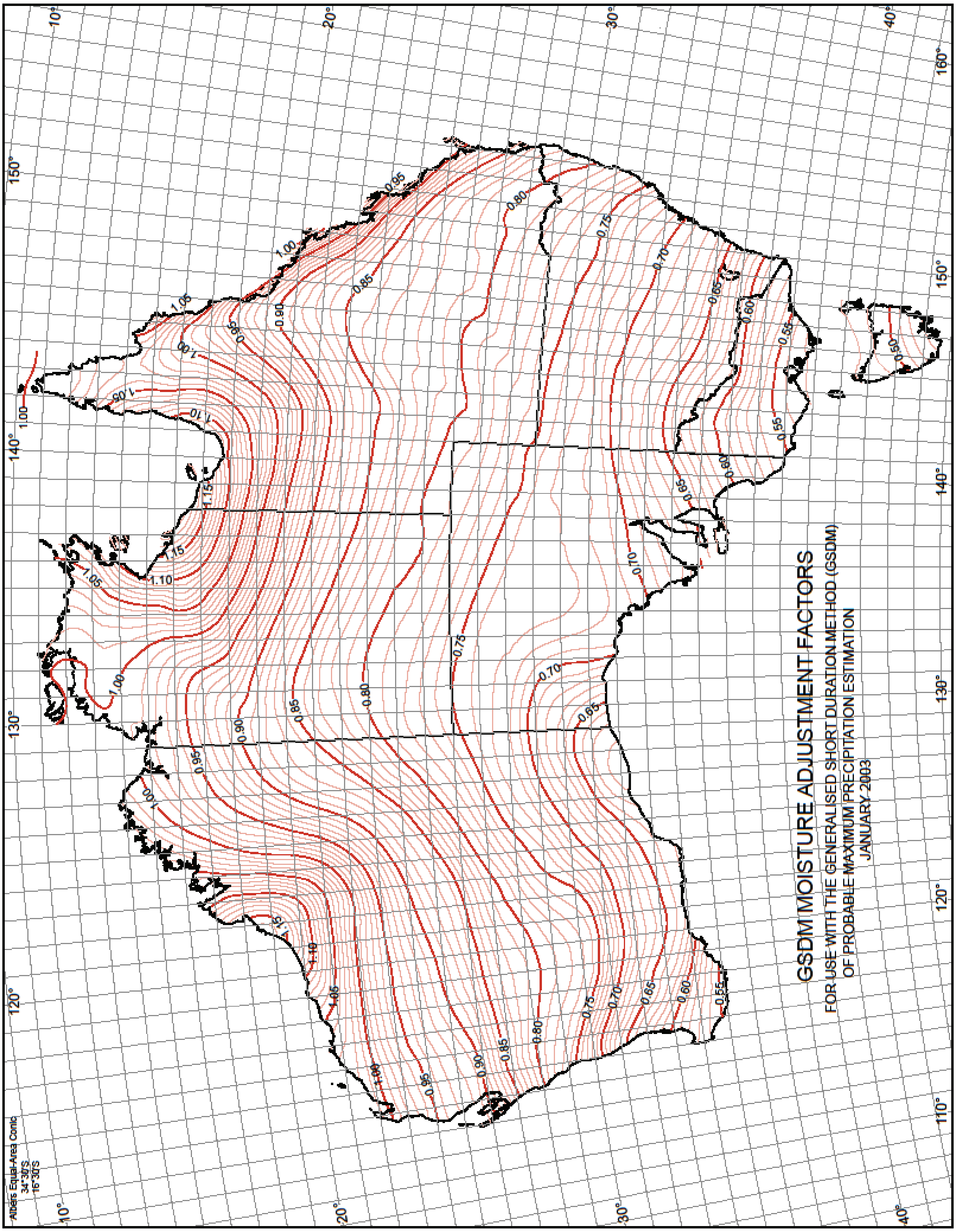
MAT 1 - WATER BODIES	MAT 5 - HIGH GRASS	MAT 9 - DENSE TREES AND SCRUB
MAT 2 - LIGHT RIPARIAN	MAT 6 - LIGHT SCRUB	MAT 10 - LIGHT MOUNTAIN FOREST
MAT 3 - DENSE RIPARIAN	MAT 7 - DENSE SCRUB	MAT 11 - DENSE MOUNTAIN FOREST
MAT 4 - LOW GRASS	MAT 8 - LIGHT TREES AND GRASS	MAT 12 - HIGHLAND CLEARED LAND

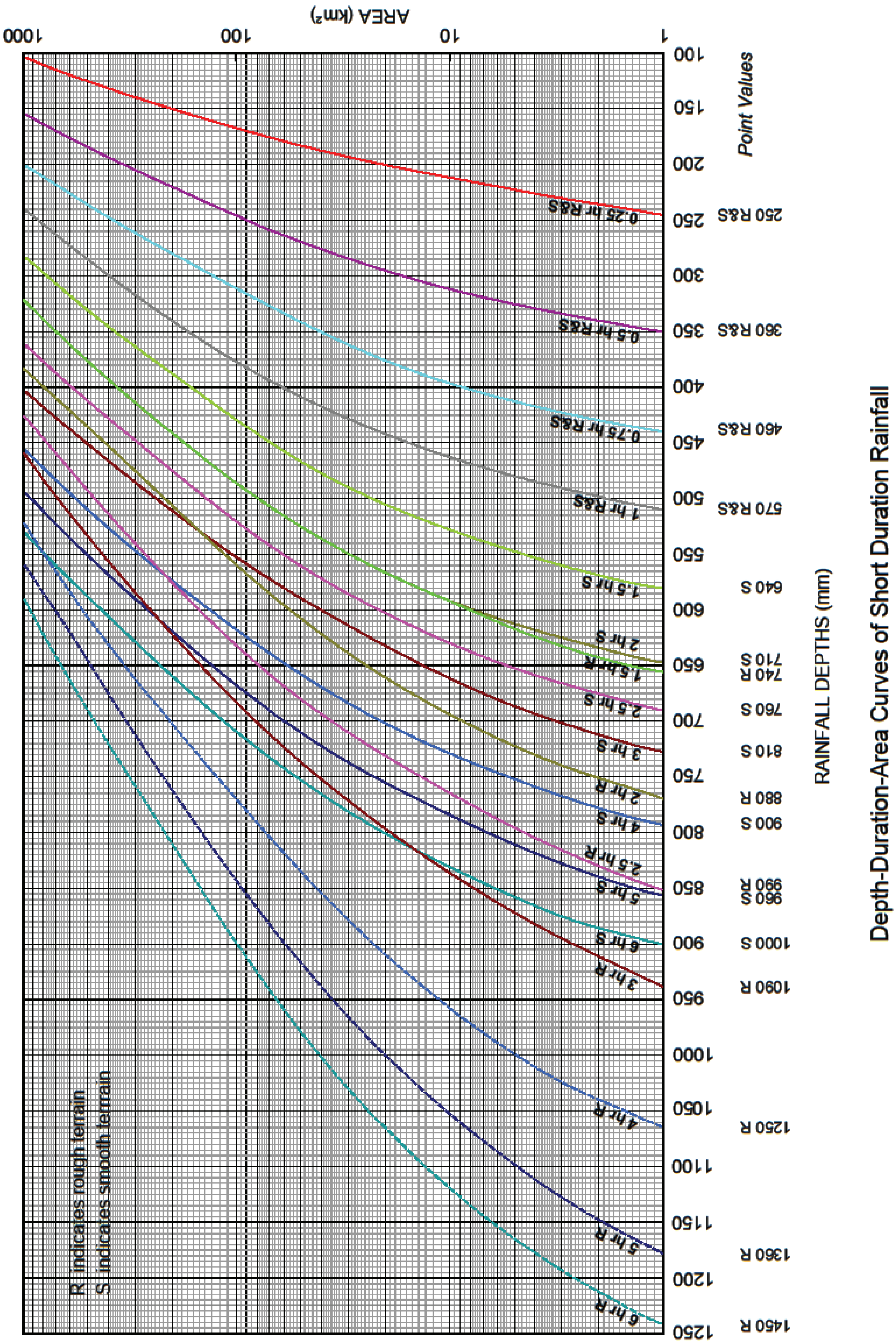
Annex E

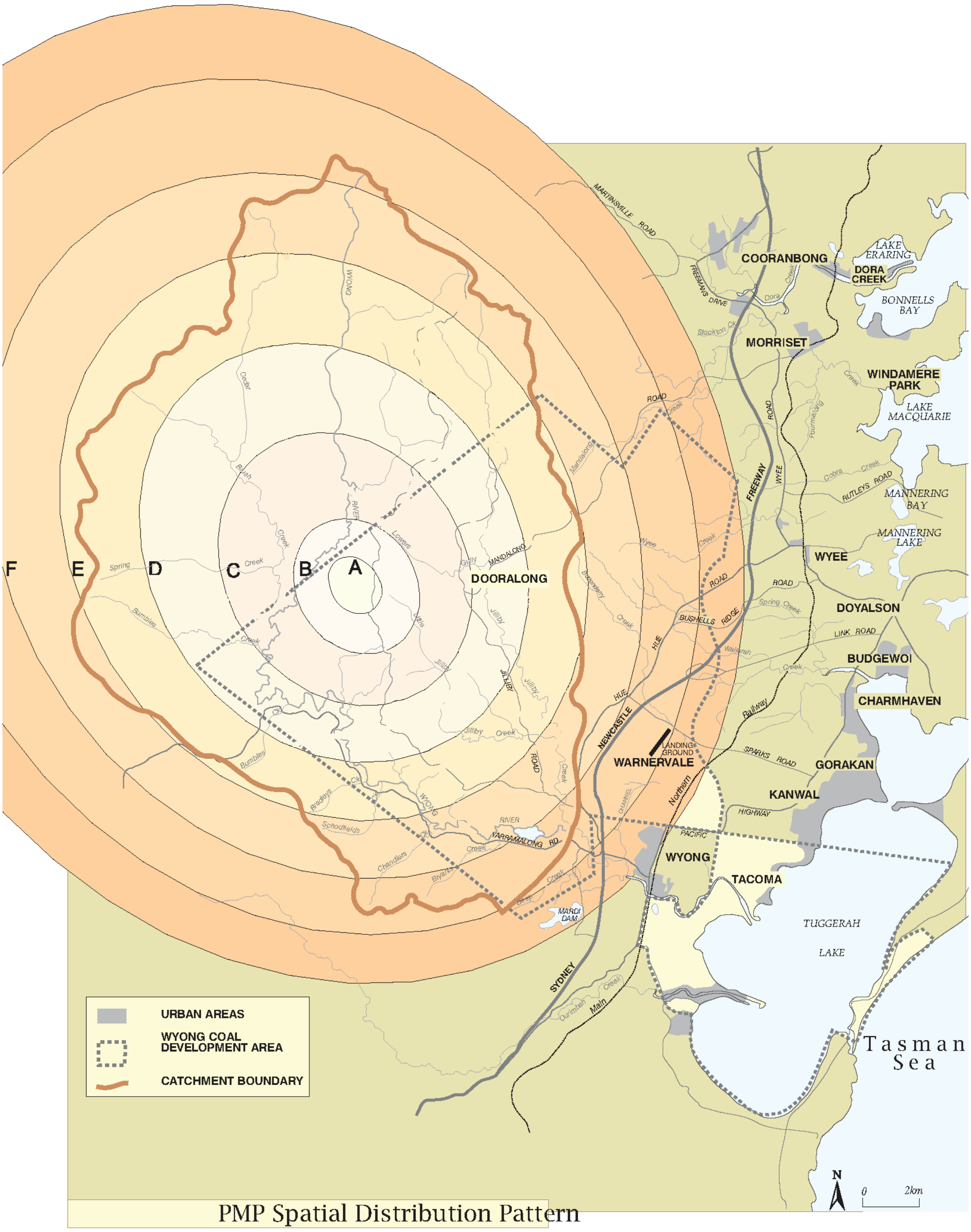
PMP Data


PMP METHOD ZONES
GTSMR
Coastal Zone
GTSMR
Inland Zone
GSAM
Inland Zone
GSAM-GTSMR
Coastal Transition
Zone
GSAM
Coastal Zone
West Coast
Tasmania
Method Zone
GTSMR
SW WA
Winter Zone
10°
20°
30°
40°
110°
120°
130°
140°
150°
160°


GENERALISED SHORT-DURATION METHOD ZONES
LIMITS
1000 km²
6 hours
INTERMEDIATE
ZONE
LIMITS
1000 km²
3 hours
LIMITS
1000 km²
6 hours
INTERMEDIATE ZONE
LIMITS 1000 km² 3 hours
Albers Equal-Area Conic
10°
20°
30°
40°
110°
120°
130°
140°
150°
160°


GSDM MOISTURE ADJUSTMENT FACTORS
FOR USE WITH THE GENERALISED SHORT DURATION METHOD (GSDM)
OF PROBABLE MAXIMUM PRECIPITATION ESTIMATION
JANUARY 2003
Albers Equal-Area Conic


Depth-Duration-Area Curves of Short Duration Rainfall
AREA (km²)
1000
100
10
1
RAINFALL DEPTHS (mm)
Point Values
250 R&S
360 R&S
460 R&S
570 R&S
640 S
710 S
740 R
760 S
810 S
880 R
900 S
960 S
990 R
1000 S
1090 R
1250 R
1360 R
1450 R
0.25 hr R&S
0.5 hr R&S
0.75 hr R&S
1 hr R&S
1.5 hr S
2 hr S
1.5 hr R
2.5 hr S
3 hr S
2 hr R
4 hr S
2.5 hr R
5 hr S
6 hr S
3 hr R
4 hr R
5 hr R
6 hr R
R indicates rough terrain
S indicates smooth terrain

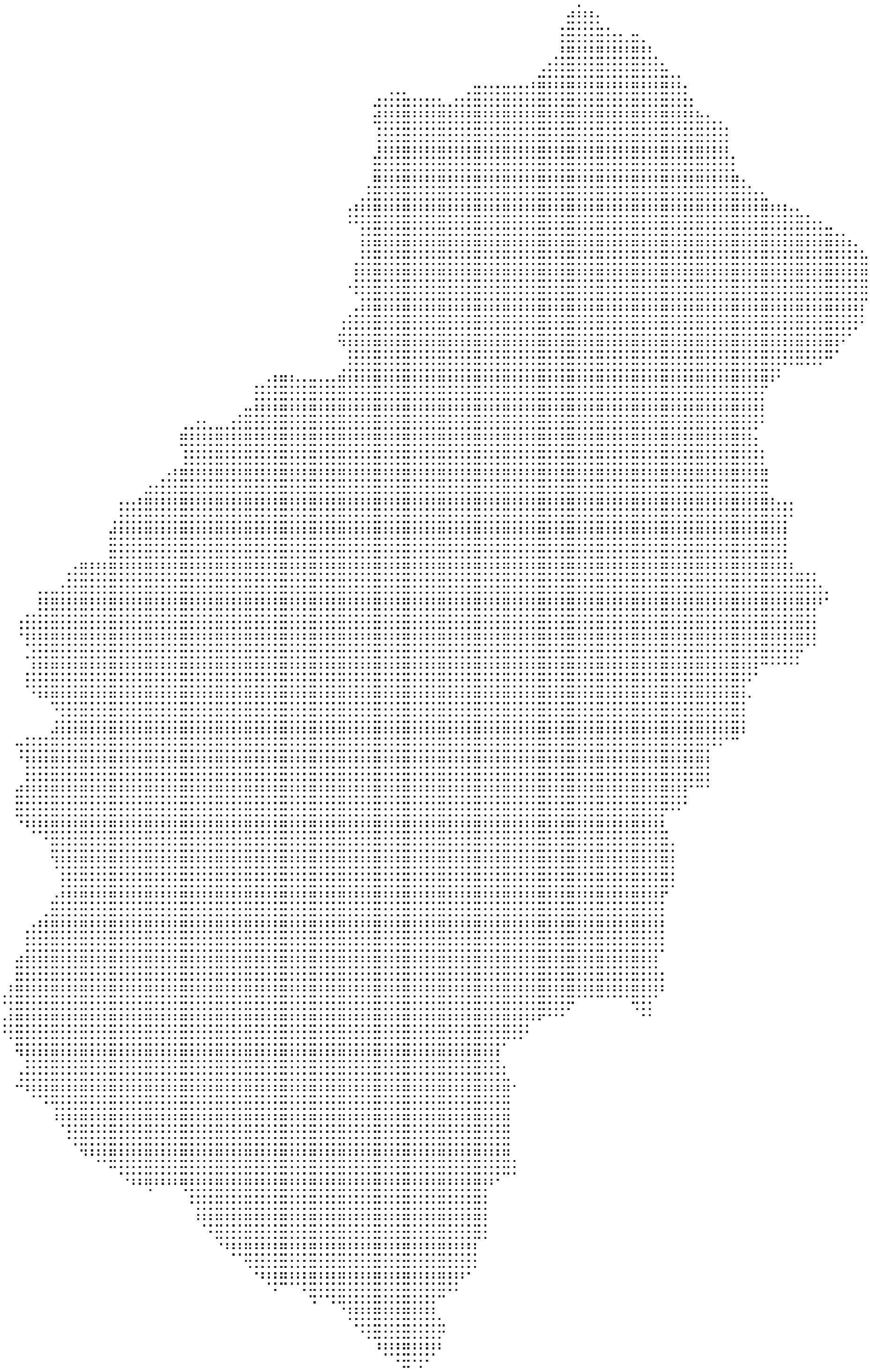


PMP Spatial Distribution Pattern

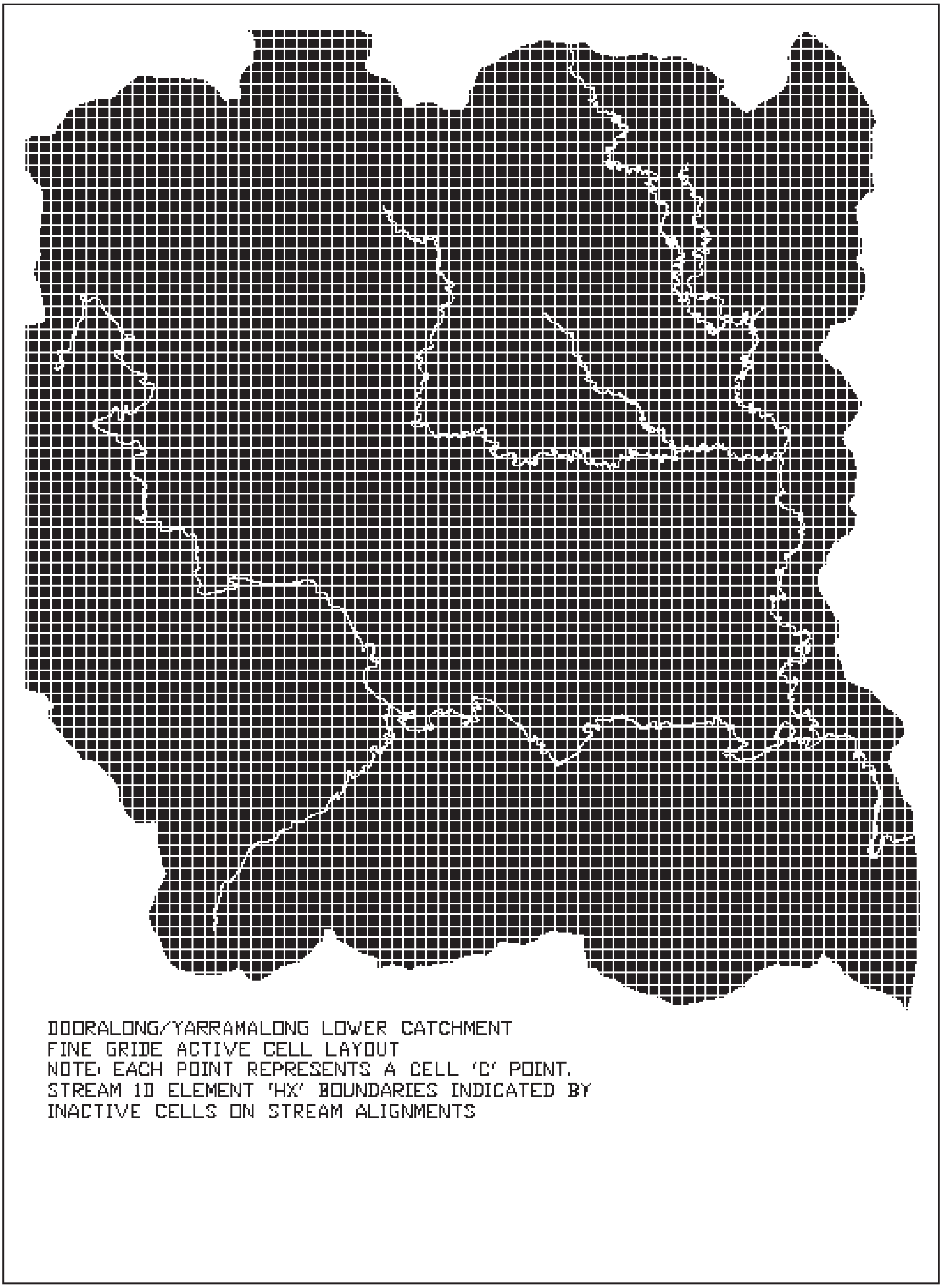
Annex F

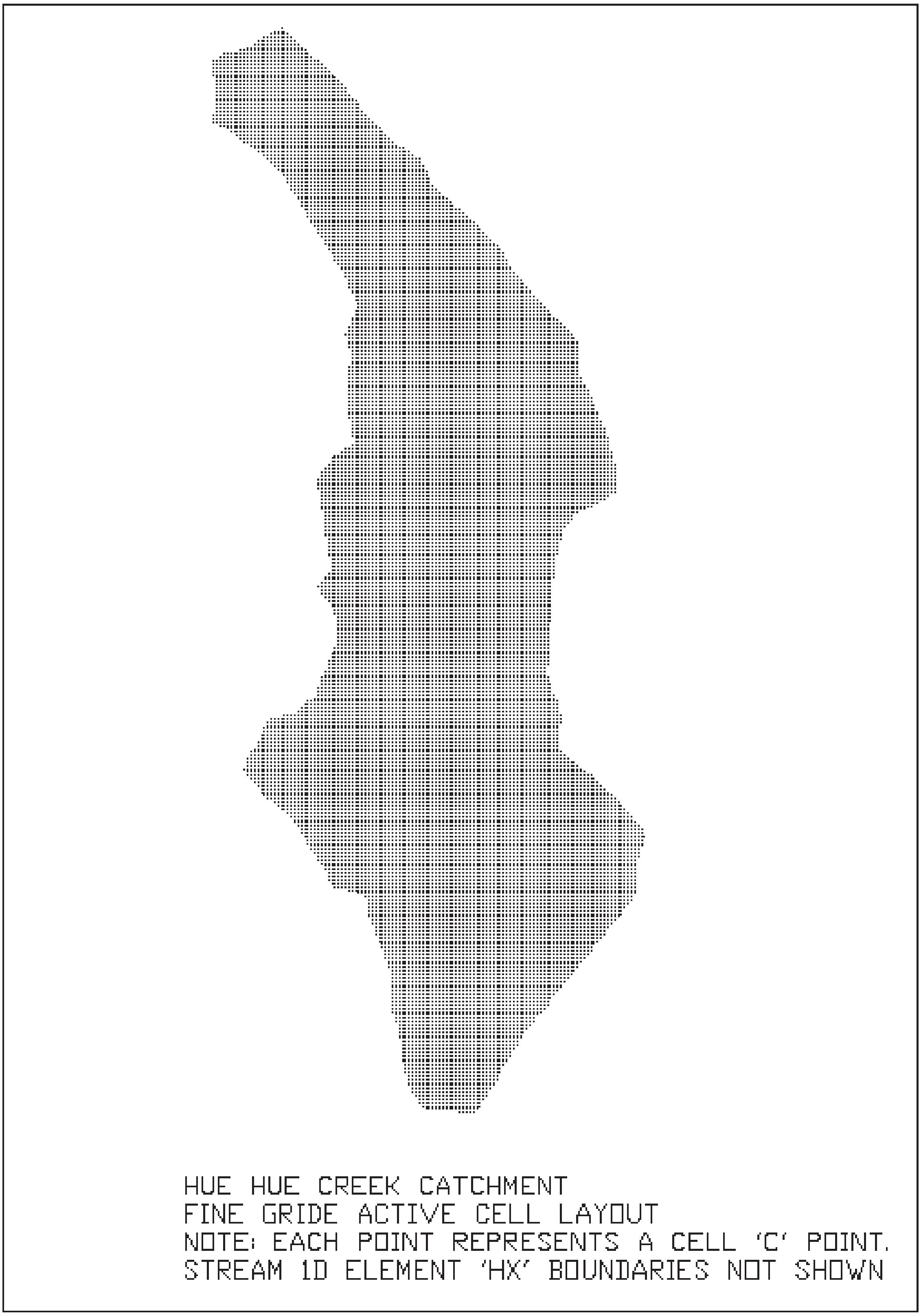
TUFLOW Model Layouts

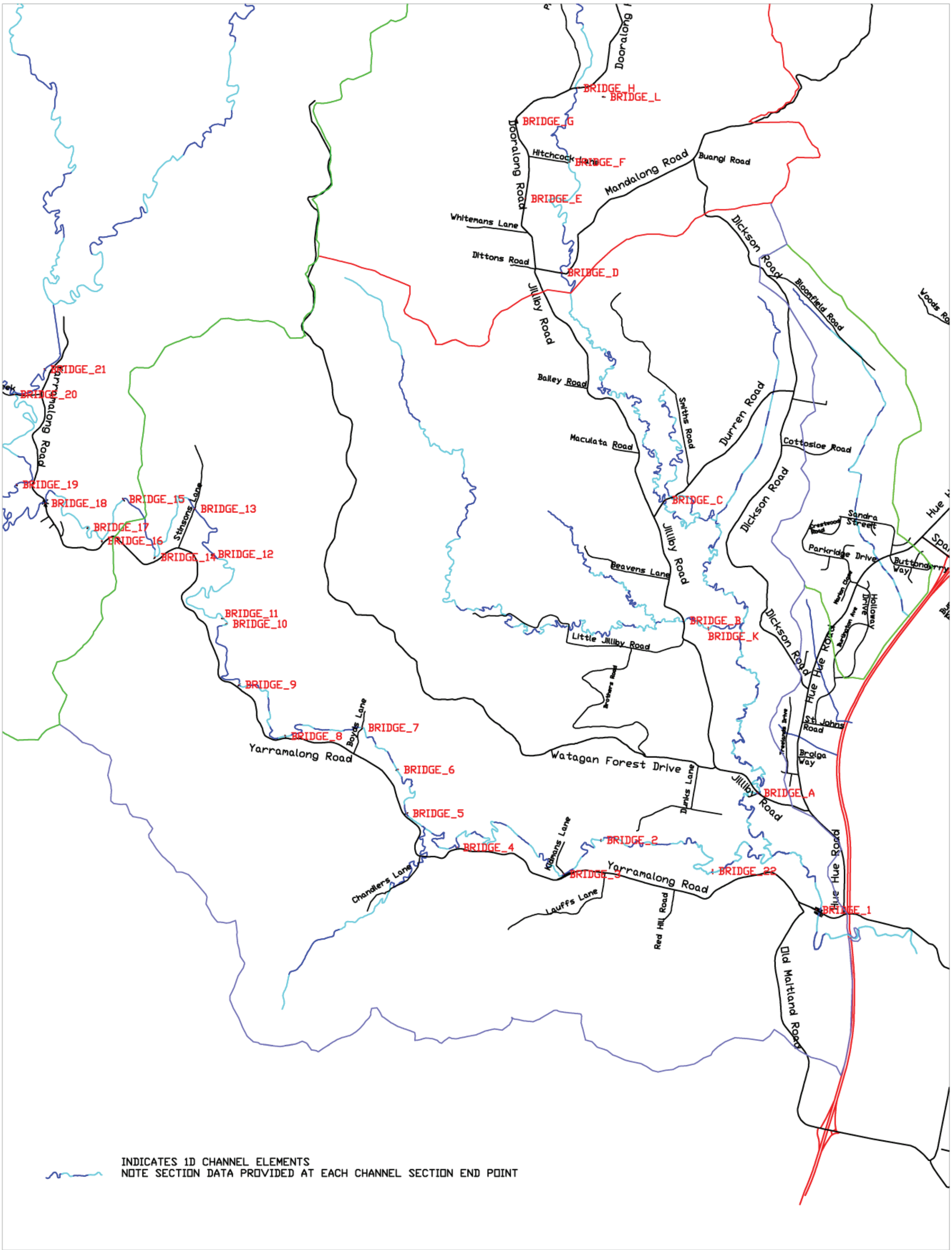
UPPER JILLIBY JILLIBY CATCHMENT
COARSE GRIDE ACTIVE CELL LAYOUT
NOTE: EACH POINT REPRESENTS A CELL QUADRANT POINT.
STREAM 1D ELEMENT 'HX' BOUNDARIES NOT SHOWN



UPPER JILLIBY JILLIBY CATCHMENT
COARSE GRID ACTIVE CELL LAYOUT
NOTE: EACH POINT REPRESENTS A CELL QUADRANT POINT.
STREAM 1D ELEMENT 'HK' BOUNDARIES NOT SHOWN


DOORALONG/YARRAMALONG LOWER CATCHMENT
FINE GRIDE ACTIVE CELL LAYOUT
NOTE: EACH POINT REPRESENTS A CELL 'C' POINT.
STREAM 1D ELEMENT 'HX' BOUNDARIES INDICATED BY
INACTIVE CELLS ON STREAM ALIGNMENTS


HUE HUE CREEK CATCHMENT
FINE GRIDE ACTIVE CELL LAYOUT
NOTE: EACH POINT REPRESENTS A CELL 'C' POINT.
STREAM 1D ELEMENT 'HX' BOUNDARIES NOT SHOWN


BRIDGE_H
BRIDGE_L
BRIDGE_G
BRIDGE_F
BRIDGE_E
BRIDGE_D
BRIDGE_C
BRIDGE_B
BRIDGE_K
BRIDGE_A
BRIDGE_1
BRIDGE_2
BRIDGE_3
BRIDGE_4
BRIDGE_5
BRIDGE_6
BRIDGE_7
BRIDGE_8
BRIDGE_9
BRIDGE_10
BRIDGE_11
BRIDGE_12
BRIDGE_13
BRIDGE_14
BRIDGE_15
BRIDGE_16
BRIDGE_17
BRIDGE_18
BRIDGE_19
BRIDGE_20
BRIDGE_21
BRIDGE_22
Dooralong Road
Mandalong Road
Buangi Road
Whitemans Lane
Dittons Road
Jilliby Road
Dickson Road
Bloomfield Road
Bailey Road
Maculata Road
Smiths Road
Durren Road
Cottesloe Road
Yarramalong Road
Stinsons Lane
Beavens Lane
Little Jilliby Road
Watagan Forest Drive
Boyds Lane
Chandlers Lane
Lauffs Lane
Red Hill Road
Hue Hue Road
Old Maitland Road
St Johns Road
Brolga Way
Parkridge Drive
Sandra Street
Buttonderry Way
Dunks Lane
INDICATES 1D CHANNEL ELEMENTS
NOTE SECTION DATA PROVIDED AT EACH CHANNEL SECTION END POINT

Annex G

Input Parameters

Important Note:
Because of the very large size of data files, the data examples shown in this Annex are parts only of data files used in the TUFLOW modelling. Complete copies of all files and all model runs were peer reviewed by WRM Water and Environment Pty Ltd.

Typical TUFLOW .tcf Control File (2D Network)

```
! Set the geographic projection and create empty GIS layers in first run of TUFLOW
MI Projection == ..\model\mi\Projection.mif ! Before first run create an empty GIS layer with the right projection
and export it as a .mif file for this command to read

Geometry Control File == ..\model\W2CP_Unsubsided.tgc
Log Folder == log
Output Folder == ..\results\Unsubsided\100y30h  ! Change this for each new storm - set up folder before run
xxxxxxxxxx
! Write Check Files == ..\check\2d\  ! write check files to this folder (ensure there is a "\" as the last
character)
Bed Resistance Cell Sides == AVERAGE n
Cell Wet/Dry Depth == 0.0002
Map Cutoff Depth == 0.05
Shallow Depth Stability Factor == 6
Read Materials File == ..\model\W2CP_001.tmf !
Set IWL == 3.
BC Control File == ..\model\W2CP_001.tbc
BC Database == ..\bc_dbase\bc_dbase_W2CP.csv
BC Event Text == _event_ ! uncomment this command for batch runs
BC Event Name == 100y30hr_Storm ! Change this for each new storm - set up folder before run
xxxxxxxxxxxxxxxxxxxxxxxxx
ESTRY Control File Auto ! uncomment this command for fourth run after 1D network is defined

Read GIS PO == ..\model\mi\2d_po_JillibyMID.mif
Read GIS PO == ..\model\mi\2d_po_WyongDS.mif
Read GIS PO == ..\model\mi\2d_po_houses.mif
Start Time Series Output == 0
Time Series Output Interval == 1800

Start Time == 1  ! start simulation at 1 hours
End Time == 30 ! end simulation at 48 hours sufficient for 36hr to 72hr storms - use 30hrs for shorter storms
Timestep == 2  ! use a timestep of 2 seconds - should be ok but reduce if errors or warnings noted in .tlf
Map Output Data Types == hVqd ! output levels, velocities, unit flows & depths
Start Map Output == 0 ! start map output at zero hours
Map Output Interval == 1800  ! output SMS data every 30 minutes
Store Maximums and Minimums == ON MAXIMUMS ONLY  ! save peak values only
! Write Restart File at Time == 3
! Read Restart File == ..\results\restart\01y01h\W2CP_restart_setup.trf
```

Typical TUFLOW .ecf ESTRY Control File (1D Network)

```
Start Output == 1  ! start output at 1 hour
Output Interval (s) == 300  ! output 1D results every 5 minutes
Output Folder == ..\results\Unsubsided\100y30h  ! Change this for each new storm - set up folder before run
xxxxxxxxxx
Read GIS Table Links == ..\model\xs\1d_xs_W2CP_Unsubsided.mif
Read GIS Network == ..\model\mi\1d_nwk_W2CP_Channels_Unsubsided.mif ! see Section 4 of manual to set this file up
```

Typical TUFLOW .tgc Geometry Control File

```
! Set the grid location and dimensions in second and subsequent runs of TUFLOW
Origin == 327000, 1314000  ! bottom left corner of grid
Orientation == 339000, 1314000  ! another point along the x-axis of the grid
Cell Size == 25.  ! cell size in meters
Grid Size (X,Y) == 12000, 12000  ! grid dimensions in meters
! Set Zpts == 111.111  ! Sets every 2D elevation point to 111.111m
Read RowCol Zpts == mi\2d_zpt_Fine_Processed.mid !
Interpolate ZUVH ALL
Set Code == 0 !
Read RowCol Code == mi\2d_code_W2CP.mid ! uncomment this command for third run after digitising regions of active
cells
Set Mat == 4
Read RowCol Mat == mi\2d_mat_Fine.mid ! uncomment this command for third run after digitising materials of active
cells
! Write MI Grid == ..\check\2d_grid_check ! uncomment this command for third run after active cells are defined
! Stop
```

Typical TUFLOW .tmf Materials File

```
!Matl ID, Manning's n, Initial Loss mm, Continuing Loss mm/hr
1, 0.03   ! water bodies
2, 0.06, 15, 1.5, 0.3, 0.08, 0.5, 0.06   ! light riparian veg with long grass or sparse shrubs to 0.3m high
3, 0.07, 15, 1.5, 2.0, 0.15, 2.5, 0.07   ! dense riparian veg with dense shrubs to 2m high
4, 0.035, 15, 1.5, 0.2, 0.045, 0.25, 0.035 ! grazing land
5, 0.05, 15, 1.5, 0.4, 0.06, 0.45, 0.05   ! tall grass and crops
6, 0.08, 15, 1.5, 1.5, 0.09, 1.7, 0.08   ! Light scrub generally to 1.5m
7, 0.10, 15, 1.5, 1.5, 0.17, 1.7, 0.10   ! Dense scrub generally to 1.5m
8, 0.07, 15, 1.5, 0.3, 0.08, 0.5, 0.07   ! Light or scattered trees with grass to 0.3m high
9, 0.11, 15, 1.5, 1.5, 0.18, 1.7, 0.11   ! Dense trees with scrub generally to 1.5m
10,0.08, 20, 2, 0.8, 0.12, 0.9, 0.08   ! Light highland trees with light scrub to 0.8m high
11, 0.16, 20, 2, 1.5, 0.25, 1.7, 0.16   ! Dense highland trees with dense scrub generally to 1.5m
12, 0.05, 20, 1.5  ! highland cleared areas
```

Typical TUFLOW .tbc Boundary Condition Control File

```
Read GIS BC == mi\2d_bc_W2CP_Fine.mif
! Global Rainfall BC == rain ! this command has some problems
Read RowCol RF == mi\2d_rf_W2CP.mid !alternative to global rainfall command after creating .mid file
! Read GIS SA RF == mi\2d_sa_rf_W2CP.mif ! alternative to previous but needs more areas covered before it can be
used.
```

Typical 2d_zpt_ .mif Geometry Input File (first 30 lines only of 1,850,899 lines)

```
Version 300
Charset "WindowsLatin1"
Delimiter ","
CoordSys Earth Projection 8, 104, "m", 153, 0, 0.9996, 500000, 10000000
Columns 4
  n Integer
  m Integer
  Type Char(1)
  Elevation Float
Data

Point    326987.500000  1313987.500000
    Symbol (33,16711935,5)
Point    327012.500000  1313987.500000
    Symbol (33,16711935,5)
Point    327037.500000  1313987.500000
    Symbol (33,16711935,5)
Point    327062.500000  1313987.500000
    Symbol (33,16711935,5)
Point    327087.500000  1313987.500000
    Symbol (33,16711935,5)
Point    327112.500000  1313987.500000
    Symbol (33,16711935,5)
Point    327137.500000  1313987.500000
    Symbol (33,16711935,5)
Point    327162.500000  1313987.500000
    Symbol (33,16711935,5)
Point    327187.500000  1313987.500000
    Symbol (33,16711935,5)
Point    327212.500000  1313987.500000
```

Typical 2d_zpt_ .mif Geometry Input File (first 20 lines only of 925,444 lines)

```
     0,      0,"C",   107.116
     0,      1,"C",   108.781
     0,      2,"C",   116.351
     0,      3,"C",   129.851
     0,      4,"C",   138.923
     0,      5,"C",   145.68
     0,      6,"C",   152.371
     0,      7,"C",   152.11
     0,      8,"C",   147.241
     0,      9,"C",   146.947
     0,     10,"C",   146.652
     0,     11,"C",   144.508
     0,     12,"C",   135.664
     0,     13,"C",   128.653
     0,     14,"C",   129.368
     0,     15,"C",   130.571
     0,     16,"C",   131.773
     0,     17,"C",   133.926
     0,     18,"C",   142.43
     0,     19,"C",   150.001
```

Typical 1d_nwk_ .mif 1D Network Input File (first 30 lines only of 53,023 lines)

```
Version 300
Charset "WindowsLatin1"
Delimiter ","
CoordSys Earth Projection 8, 104, "m", 153, 0, 0.9996, 500000, 10000000
Columns 20
  ID Char(12)
  Channel_Type Char(4)
  Ignore Logical
  Use_Chan_Storage_at_Nodes Logical
  Length_or_ANA Float
  Manning_n Float
  Upstream_Invert Float
  Downstream_Invert Float
  Form_or_Bend_Loss Float
  Blockage Float
  Branch Char(50)
  Topo_ID Char(50)
  XSect_ID_or_Chainage Integer
  Diameter_or_Width Float
  Weir_Factor_or_Height Float
  No_of_Culverts Integer
  Culv_H_Contraction_Coef Float
  Culv_W_Contraction_Coef Float
  Culv_Entry_Loss Float
  Culv_Exit_Loss Float
Data

Pline 138
327357.426189115 1322006.11284034
327353.608413 1321936.554789
```

Typical 1d_nwk_ .mid 1D Network Input File (first 20 lines only of 201 lines)

```
"Wyong81","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong80","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong79","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong78","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong77","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong76","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong75","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong74","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong73","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong72","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong71","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong70","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong69","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong68","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong67","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong66","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong65","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong64","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong63","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
"Wyong62","S",F,T,0,0.07,-99999,-99999,0,0,"","",0,0,0,0,0,0,0,0
```

Typical 2d_bc_ .mif Boundary Conditions Input File (first 30 lines only of 9,062 lines)

```
Version 300
Charset "WindowsLatin1"
Delimiter ","
CoordSys Earth Projection 8, 104, "m", 153, 0, 0.9996, 500000, 10000000
Columns 8
  Type Char(2)
  Flags Char(3)
  Name Char(100)
  f Float
  d Float
  td Float
  a Float
  b Float
Data

Pline 11
332949.95 1325802.377
333076.243 1325826.898
333193.686 1325878.591
333540.154033393 1325828.45133376
333727.60351913 1325847.10571779
333850.743201357 1325721.89112613
333976.827 1325699.653
334086.451 1325659.387
334195.657 1325684.244
334437.092 1325717.624
334483.384490233 1325724.02424571
    Pen (1,2,0)
Pline 15
327000 1321722.66158882
```

Typical 2d_bc_ .mid Boundary Conditions Input File (first 20 lines only of 411 lines)

```
"QT","","Jinflow",0,0,0,0,0
"QT","","Winflow",0,0,0,0,0
"HQ","","Woutflow",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
"HX","","",0,0,0,0,0
```

Typical bc_dbase .csv Boundary Conditions Control File

Name	Source	Column 1	Column 2	Add Col 1	Mult Col 1	Add Col 2	Column 3	Column 4
rain	_event_.csv	Time_rain	Rainfall	0	1	0		
Jinflow	_event_.csv	Time_Jilliby	Jilliby_inflow					
Winflow	_event_.csv	Time_Wyong	Wyong_inflow					
Woutflow	Wout.csv	Outflow	Stage					

Typical Rainfall and Inflow .csv Data File

Time_rain	Rainfall	Time_Jilliby	Jilliby_inflow	Time_Wyong	Wyong_inflow
0	0	0	0	0	0
1	0	0.5	0	0.5	0
2	4.62	1	0	1	0
3	5.87	1.5	0	1.5	0
4	5.87	2	0	2	0
5	7.65	2.5	0	2.5	0
6	7.65	3	0	3	6.0696
7	12.81	3.5	0	3.5	38.6889
8	12.81	4	0.0261	4	10.0686
9	7.65	4.5	0.1204	4.5	55.35
10	7.65	5	0.2508	5	53.76
11	27.22	5.5	0.8334	5.5	57.07
12	27.22	6	1.4351	6	53.42
13	14.41	6.5	2.2935	6.5	60.96
14	14.41	7	3.4157	7	71.02
15	17.61	7.5	4.5529	7.5	77.97
16	17.61	8	5.5588	8	90.04
17	39.86	8.5	6.0097	8.5	87.59
18	39.86	9	6.2832	9	75.68
19	22.42	9.5	6.5072	9.5	68.59
20	22.42	10	7.0417	10	64.24
21	9.25	10.5	10.8021	10.5	109.27
22	9.25	11	16.2988	11	170.64
23	4.09	11.5	22.5022	11.5	204.89
24	4.09	12	27.59	12	222.82
25	4.09	12.5	31.4396	12.5	185.78
26	4.09	13	33.8622	13	154.32
27	2.31	13.5	39.8402	13.5	138.78
28	2.31	14	46.7346	14	131.4
29	0.36	14.5	54.4995	14.5	290.79
30	0.36	15	59.6154	15	457.19
		15.5	66.2053	15.5	528.7
		16	72.0465	16	565.78
		16.5	86.9285	16.5	759.17
		17	106.2444	17	942.89
		17.5	132.145	17.5	1079.96
		18	147.6239	18	1196.8
		18.5	155.8964	18.5	1156.07
		19	160.2618	19	1167.57
		19.5	163.6095	19.5	1224.49
		20	167.6524	20	1440
		20.5	166.6386	20.5	2009.8
		21	164.2	21	2926.28
		21.5	160.7485	21.5	3746.13
		22	156.6878	22	4002.07
		22.5	148.4665	22.5	3951.42
		23	138.5849	23	3771.33
		23.5	128.0134	23.5	3473.76
		24	117.5578	24	3194.35
		24.5	107.9868	24.5	2946.63
		25	99.4581	25	2761
		25.5	91.3495	25.5	2586.02
		26	84.6258	26	2420.97
		26.5	77.4744	26.5	2262.54
		27	71.4488	27	2113
		27.5	65.0663	27.5	1967.72
		28	59.5818	28	1823.96
		28.5	56.7965	28.5	1692.27
		29	48.0762	29	1572.48
		29.5	45.4805	29.5	1463.1
		30	42.3236	30	1362.89
		30.5	40.8722	30.5	1269.84
		31	37.5067	31	1185.32
		31.5	36.8508	31.5	1105.37
		32	33.9585	32	1031.62
		32.5	32.8572	32.5	963.79

			33	29.3059		33	900.6
			33.5	28.4571		33.5	842.12
			34	26.4819		34	787.74
			34.5	25.2159		34.5	737.59
			35	23.8376		35	691.65
			35.5	22.4037		35.5	649.59
			36	21.2827		36	610.42
			36.5	20.3451		36.5	573.86
			37	19.3603		37	540.12
			37.5	18.2757		37.5	508.14
			38	16.7353		38	477.53
			38.5	15.837		38.5	449.73
			39	15.1992		39	424.53
			39.5	14.8133		39.5	400.6
			40	13.9593		40	379.02
			40.5	13.7119		40.5	359.3
			41	12.837		41	340.92
			41.5	12.6175		41.5	323.87
			42	11.7778		42	308.07
			42.5	11.4622		42.5	293.78
			43	11.0256		43	280.14
			43.5	10.6508		43.5	267.29
			44	10.0162		44	255.28
			44.5	9.6285		44.5	244.02
			45	9.4304		45	233.51
			45.5	8.9944		45.5	223.66
			46	8.5526		46	214.42
			46.5	8.3994		46.5	205.76
			47	8.0982		47	198.67
			47.5	7.7176		47.5	191.58
			48	7.5261		48	184.45
			48.5	7.2601		48.5	177.91
			49	7.0103		49	171.59
			49.5	6.7723		49.5	165.67
			50	6.5683		50	159.93
			50.5	6.374		50.5	154.51
			51	6.1862		51	149.33
			51.5	6.0054		51.5	144.37
			52	5.8316		52	139.61
			52.5	5.6647		52.5	135.09
			53	5.5035		53	130.92
			53.5	5.3579		53.5	127.27
			54	5.2069		54	124.1
			54.5	5.0593		54.5	121.28
			55	4.9172		55	118.55
			55.5	4.7786		55.5	115.89
			56	4.6452		56	113.33
			56.5	4.5186		56.5	111.23
			57	4.3955		57	109.57
			57.5	4.2751		57.5	108.14
			58	4.159		58	106.68
			58.5	4.0471		58.5	105.04
			59	3.9396		59	103.25
			59.5	3.8361		59.5	101.17
			60	3.7365		60	98.98

Typical Tailwater Stage-Discharge .csv Data File

Outflow	Stage
0	0
0.1	0.5
1	0.88
2.8	1.26
12.5	1.6
27.3	2.02
48.8	2.4
89.9	2.78
148.6	3.16
231.8	3.54
341.6	3.92
485.5	4.3
665.4	4.68
877.7	5.06
1125	5.44
1413	5.82
1760	6.2
2167	6.58
2666	6.96
3292	7.34
4026	7.72
4855	8.1
5855	8.48
6779	8.86
7873	9.24
9050	9.62
10306	10
21109	11.9
41735	14.2
64323	16.1
91337	18
129124	20.3
231012	25.2
357938	30.2
652829	39.3

Annex H

TUFLOW Model Results

Important Notes:
Because of the very large size of data files, the output data examples shown in this Annex are parts only of data files output from TUFLOW modelling. Complete copies of all files and all model output were peer reviewed by WRM Water and Environment Pty Ltd. The relevant information regarding pre and post-subsidence flood conditions is represented graphically in ***Annex I.***

Extract From .eof ESTRY Output File for 1% AEP Unsubsided Run

MAXIMUM AND MINIMUM VELOCITIES (M/S)

CHANNEL	Chand01	Chand02	Chand03	Chand04	Durren01	Durren02	Jilliby01	Jilliby02	Jilliby03	Jilliby04	Jilliby05	Jilliby06
MINIMUM	-0.001	0	0.000S	0.000S	-0.2	-0.258	0	0.000S	-0.23	-0.007	-0.114	-0.02
TIME	44:02:10	3:47:28	79:59:54	80:00:00	11:01:16	10:19:12	3:47:26	6:17:16	5:18:48	5:56:50	22:27:02	18:24:22
MAXIMUM	1.185	1.303	1.22	4.278	0.664	0.194	1.169	1.972	0.993	1.023	0.662	0.743
TIME	4:27:20	17:48:30	3:56:20	3:47:40	13:02:10	14:42:54	23:32:14	23:47:52	11:34:00	12:06:16	7:40:32	11:44:18
CHANNEL	Jilliby07	Jilliby08	Jilliby09	Jilliby10	Jilliby11	Jilliby12	Jilliby13	Jilliby14	Jilliby15	Jilliby16	Jilliby17	Jilliby18
MINIMUM	0	-0.169	-0.182	-0.204	0.000S	0.000S	0.000S	0	0	0	0	0
TIME	5:23:58	5:22:50	22:28:02	19:20:58	3:47:08	1:47:18	1:38:12	1:33:56	3:47:28	3:47:28	3:47:28	3:47:28
MAXIMUM	1.389	0.815	0.769	0.84	1.026	1.148	0.869	0.519	1.103	1.155	0.937	1.199
TIME	7:04:14	11:44:14	11:43:28	11:35:08	15:54:42	18:05:46	19:10:50	34:56:56	36:38:26	17:23:58	16:10:28	18:35:18
CHANNEL	Jilliby19	Jilliby20	Jilliby21	Jilliby22	Jilliby23	Jilliby24	Jilliby25	Jilliby26	Jilliby27	Jilliby28	Jilliby29	Jilliby30
MINIMUM	0	0	0	0	0	-0.356	-0.279	-0.205	-0.31	-0.137	-0.084	0
TIME	3:47:28	3:47:28	3:47:28	3:47:28	3:47:28	4:55:54	5:09:56	6:54:32	6:45:22	7:15:14	7:17:24	3:47:28
MAXIMUM	0.993	1.503	1.18	1.541	1.695	1.578	0.571	0.795	0.757	0.52	0.747	0.776
TIME	13:21:28	18:58:22	18:40:36	20:11:04	19:47:16	19:35:44	47:24:42	47:10:00	13:06:06	45:23:18	32:45:26	16:39:40
CHANNEL	Jilliby31	Jilliby32	Jilliby33	Jilliby34	Jilliby35	Jilliby36	Jilliby37	Jilliby38	Jilliby39	Jilliby40	Jilliby41	Jilliby42
MINIMUM	0	0	-0.125	-0.078	-0.675	0	0	0	0	-0.163	-0.025	0.000S
TIME	3:47:28	3:47:28	3:48:10	4:01:24	13:51:40	3:47:28	3:47:30	3:47:30	5:25:22	5:14:08	5:06:42	3:47:42
MAXIMUM	0.762	0.577	0.471	0.371	0.525	0.878	0.62	0.665	0.991	0.869	0.758	0.393
TIME	44:51:24	19:59:56	15:39:40	20:00:56	11:02:20	12:23:28	18:30:22	12:21:22	20:06:50	20:01:32	20:01:10	20:06:10
CHANNEL	Jilliby43	Jilliby44	Jilliby45	Jilliby46	Jilliby47	Jilliby48	Jilliby49	Jilliby50	Jilliby51	Jilliby52	Jilliby53	Jilliby54
MINIMUM	0	-0.116	0	-0.015	-0.114	0	0	0	0	0	0	0
TIME	3:47:30	6:20:58	3:47:30	4:17:34	5:06:44	3:47:30	3:47:30	3:47:28	3:47:28	3:47:30	3:47:30	3:47:28
MAXIMUM	0.389	0.296	0.42	0.245	0.534	0.655	0.56	0.745	0.519	0.707	0.487	0.632
TIME	6:48:30	20:04:20	14:57:40	20:02:20	19:58:16	12:25:06	24:46:30	20:07:56	8:48:42	11:48:22	66:19:28	28:44:06
CHANNEL	Jilliby55	LittleJ01	LittleJ02	LittleJ03	LittleJ04	LittleJ05	LittleJ06	LittleJ07	LittleJ08	LittleJ09	LittleJ10	LittleJ11
MINIMUM	0	0	0	0.000S	-0.038	0.000S	0.000S	0.000S	0.000S	0.000S	-0.232	0.000S
TIME	3:47:28	3:47:30	3:47:28	3:49:44	3:50:38	3:37:56	3:47:28	3:47:14	1:32:26	1:31:28	4:32:04	1:28:40
MAXIMUM	0.653	0.948	1.848	2.111	1.311	0.938	1.026	1.082	1.409	1.257	0.857	1.252
TIME	20:05:32	6:39:34	11:53:56	13:04:48	18:29:58	20:53:48	20:15:36	20:15:54	18:26:14	18:23:14	6:07:38	5:52:12

CHANNEL	LittleJ12	LittleJ13	LittleJ14	LittleJ15	LittleJ16	LittleJ17	LittleJ18	LittleJ19	LittleJ20	LittleJ21	LittleJ22	LittleJ23
MINIMUM	0.000S	0	0	0.000S	-0.888	0	-0.665	0	-0.051	0	0	-0.689
TIME	1:28:08	2:34:06	3:47:28	3:51:10	3:56:54	3:47:36	3:55:58	3:47:28	3:51:54	3:47:28	3:47:28	3:55:26
MAXIMUM	1.41	1.193	0.947	1.168	0.932	1.353	1.001	1.095	1.689	1.558	1.512	1.15
TIME	17:22:26	18:17:10	11:54:20	11:41:44	24:24:06	18:28:10	18:19:50	12:04:44	18:16:20	3:57:02	18:09:06	11:13:32
CHANNEL	LittleJ24	LittleJ25	LittleJ26	LittleJ27	LittleJ28	Myrtle01	Myrtle02	Myrtle03	Myrtle04	Myrtle05	Myrtle06	Smith01
MINIMUM	-0.293	-0.181	0	0	0	0.000S	0.000S	0.000S	0.000S	-0.191	0.000S	0
TIME	3:57:42	3:59:26	3:47:28	3:47:28	3:47:28	2:57:30	2:57:28	2:57:28	2:57:26	31:22:26	80:00:00	3:47:30
MAXIMUM	1.768	1.281	1.27	1.077	0.944	1.243	1.153	1.461	1.627	1.235	1.238	1.067
TIME	18:06:44	11:07:02	18:10:16	17:13:24	18:07:38	4:21:32	16:55:48	3:59:52	3:54:38	3:49:42	16:42:32	18:29:40
CHANNEL	Smith02	Smith03	Smith04	Smith05	Smith06	Smith07	Smith08	Smith09	Smith10	Smith11	Smith12	Smith13
MINIMUM	0	-0.044	-0.242	-0.021	0	0	0	-0.062	0	0	0	0
TIME	3:47:28	3:48:04	3:47:34	3:57:08	3:47:28	3:47:28	3:47:28	4:17:02	3:47:28	3:47:28	3:47:28	3:47:34
MAXIMUM	0.88	0.691	1.066	1.161	1.114	0.599	0.461	0.675	0.326	0.69	0.423	0.502
TIME	11:06:42	20:06:32	18:26:04	20:05:32	20:05:28	20:04:34	20:00:06	19:59:50	20:00:46	11:35:38	20:09:14	20:00:28
CHANNEL	Wyong01	Wyong02	Wyong03	Wyong04	Wyong05	Wyong06	Wyong07	Wyong08	Wyong09	Wyong10	Wyong11	Wyong12
MINIMUM	-0.115	-0.257	-0.1	-0.05	-0.16	-0.125	-0.052	-0.033	0	0	0.000S	0.000S
TIME	1:00:20	24:19:10	1:01:48	1:36:42	1:03:18	3:49:28	3:56:48	3:47:32	3:47:28	3:47:34	1:06:08	1:03:38
MAXIMUM	0.878	0.227	2.688	3.323	1.785	0.921	1.069	2.868	1.102	1.809	1.697	2.38
TIME	19:55:52	19:59:08	22:35:28	23:03:26	23:25:58	23:38:56	22:16:42	23:06:10	53:48:38	41:09:40	15:14:22	22:27:34
CHANNEL	Wyong13	Wyong14	Wyong15	Wyong16	Wyong17	Wyong18	Wyong19	Wyong20	Wyong21	Wyong22	Wyong23	Wyong24
MINIMUM	0.000S	-0.013	-0.681	0	0	-0.038	0	0	-0.24	-0.145	-0.257	-0.325
TIME	1:01:40	3:53:10	23:30:30	3:47:28	3:47:28	3:48:16	3:47:26	3:47:28	4:03:00	4:06:16	4:09:08	4:09:04
MAXIMUM	3.272	4.405	1.073	1.452	1.517	2.075	3.148	2.343	1.961	1.586	1.913	2.579
TIME	23:01:24	23:29:54	13:05:56	13:40:54	13:21:46	21:31:38	23:15:56	23:27:54	23:32:46	23:29:44	23:32:12	23:32:14
CHANNEL	Wyong25	Wyong26	Wyong27	Wyong28	Wyong29	Wyong30	Wyong31	Wyong32	Wyong33	Wyong34	Wyong35	Wyong36
MINIMUM	0	0	0	0	0	-0.038	-0.068	0	0	0	-0.047	-3.984
TIME	3:47:28	3:47:28	3:47:28	3:47:28	3:47:28	3:47:34	3:55:08	3:47:28	3:47:28	3:47:28	3:48:10	23:24:08
MAXIMUM	1.556	1.099	1.637	3.587	4.63	3.934	1.783	1.771	2.214	2.51	5.282	1.294
TIME	22:06:04	21:52:06	13:20:26	23:26:00	23:30:56	23:30:56	22:35:46	23:27:50	23:28:46	23:28:22	23:24:10	11:08:42
CHANNEL	Wyong37	Wyong38	Wyong39	Wyong40	Wyong41	Wyong42	Wyong43	Wyong44	Wyong45	Wyong46	Wyong47	Wyong48
MINIMUM	-0.2	-0.144	0	-0.399	-0.269	-0.055	0	-0.33	-0.151	-0.38	-0.485	-0.776
TIME	4:00:28	4:13:02	3:47:28	23:29:56	3:47:48	3:50:26	3:47:28	23:28:32	3:48:18	4:37:14	4:37:10	4:39:58

MAXIMUM	1.133	1.339	1.456	1.586	2.118	1.846	1.361	1.028	1.395	2.963	2.673	1.926
TIME	10:37:34	23:26:56	23:27:30	13:46:36	23:25:10	23:25:30	45:45:16	55:29:18	18:05:56	21:57:40	21:55:44	21:01:22
CHANNEL	Wyong49	Wyong50	Wyong51	Wyong52	Wyong53	Wyong54	Wyong55	Wyong56	Wyong57	Wyong58	Wyong59	Wyong60
MINIMUM	-2.191	-0.417	-0.351	-0.239	-0.889	-1.048	-0.857	-0.542	-0.454	-0.401	-0.189	-2.361
TIME	4:33:48	4:35:02	4:44:42	4:48:34	4:16:08	4:15:56	4:17:04	4:18:40	4:22:20	4:24:36	4:25:48	3:47:36
MAXIMUM	3.804	3.278	1.654	1.392	1.332	2.243	2.139	1.654	3.872	1.627	2.264	0.984
TIME	4:29:06	22:21:32	22:36:18	23:00:22	21:26:40	22:37:26	22:43:12	21:39:52	22:51:06	22:53:28	23:04:20	8:45:52
CHANNEL	Wyong61	Wyong62	Wyong63	Wyong64	Wyong65	Wyong66	Wyong67	Wyong68	Wyong69	Wyong70	Wyong71	Wyong72
MINIMUM	-0.951	-0.174	-0.108	0	0	-0.239	-0.187	-0.529	-0.126	-0.063	-0.411	-0.289
TIME	3:49:02	3:49:36	3:54:42	3:47:28	3:47:28	3:48:00	4:56:56	3:47:34	4:56:58	4:56:36	4:18:02	5:17:24
MAXIMUM	0.959	1.268	2.217	2.999	2.547	0.75	4.242	4.456	3.975	1.952	2.032	3.217
TIME	8:45:48	16:35:32	22:02:16	22:14:12	22:06:30	9:17:22	23:02:14	23:02:16	22:16:58	18:08:40	22:42:14	22:40:08
CHANNEL	Wyong73	Wyong74	Wyong75	Wyong76	Wyong77	Wyong78	Wyong79	Wyong80	Wyong81			
MINIMUM	-0.42	-0.386	-1.945	-3.145	-3.103	-0.099	0.000S	0.000S	0.000S			
TIME	3:48:40	4:10:24	18:02:52	22:52:16	17:58:34	4:10:48	3:39:04	3:26:54	3:21:16			
MAXIMUM	1.484	1.834	0.341	0.207	0.241	3.359	1.523	1.246	1.728			
TIME	22:01:04	22:56:12	3:52:04	3:47:38	3:54:26	21:36:38	15:49:42	11:44:24	22:03:56			

Extract From .eof ESTRY Output File for 1% AEP Unsubsided Run

MAXIMUM AND MINIMUM VOLUME FLOWS, CU.M/S

CHANNEL	Chand01	Chand02	Chand03	Chand04	Durren01	Durren02	Jilliby01	Jilliby02	Jilliby03	Jilliby04	Jilliby05	Jilliby06
MINIMUM	-0.1	0	0.0S	0.0S	-3.7	-2.3	0	0.0S	-8.8	0	-16.4	-1.8
TIME	44:02:10	3:47:28	79:59:54	80:00:00	11:01:30	10:20:50	3:47:26	6:17:16	47:01:44	5:56:58	22:31:26	18:24:22
MAXIMUM	44.8	49.7	49.3	42.1	24.8	9.6	285.7	359.6	110.6	53.9	39.7	49.9
TIME	4:31:20	4:11:26	3:58:52	3:47:38	15:57:46	16:23:22	23:35:08	23:49:34	23:48:20	24:10:12	15:05:46	22:51:38
CHANNEL	Jilliby07	Jilliby08	Jilliby09	Jilliby10	Jilliby11	Jilliby12	Jilliby13	Jilliby14	Jilliby15	Jilliby16	Jilliby17	Jilliby18
MINIMUM	0	-0.1	-25	-19.9	0.0S	0.0S	0.0S	0	0	0	0	0
TIME	5:23:58	5:22:48	22:29:20	23:07:04	3:47:08	1:47:18	1:38:12	1:33:56	3:47:28	3:47:28	3:47:28	3:47:28
MAXIMUM	124.1	124.1	38.7	37.7	44.2	65.9	104.3	52.3	63.1	70.5	60.8	85.5
TIME	24:11:00	24:10:56	11:46:08	11:52:00	16:51:24	18:16:20	19:17:46	19:09:50	19:32:16	19:30:40	17:26:56	19:28:22
CHANNEL	Jilliby19	Jilliby20	Jilliby21	Jilliby22	Jilliby23	Jilliby24	Jilliby25	Jilliby26	Jilliby27	Jilliby28	Jilliby29	Jilliby30
MINIMUM	0	0	0	0	0	-3	-2.4	-1.7	-1.4	-0.8	-0.3	0
TIME	3:47:28	3:47:28	3:47:28	3:47:28	3:47:28	6:57:26	7:02:10	7:14:04	7:17:46	7:25:00	7:27:52	3:47:28
MAXIMUM	67.8	118.1	90.5	141.6	198.8	194.2	49.6	22.7	24.8	20.8	40.3	42
TIME	19:22:08	19:14:08	19:21:40	19:26:34	19:39:22	19:35:44	19:34:40	41:11:50	13:11:28	20:03:08	30:04:18	17:14:16
CHANNEL	Jilliby31	Jilliby32	Jilliby33	Jilliby34	Jilliby35	Jilliby36	Jilliby37	Jilliby38	Jilliby39	Jilliby40	Jilliby41	Jilliby42
MINIMUM	0	0	0	0	-23.5	0	0	0	0	0	0	0.0S
TIME	3:47:28	3:47:28	3:49:42	4:45:24	15:24:58	3:47:28	3:47:30	3:47:30	5:25:22	5:22:12	5:06:58	3:47:42
MAXIMUM	38.4	37.5	34.7	31.7	8.8	24.9	24.4	16.9	32.5	29.6	29.6	13
TIME	20:00:30	20:00:22	20:01:08	20:00:56	11:06:42	13:13:38	20:09:30	12:23:32	20:06:36	20:05:28	20:05:10	20:06:06
CHANNEL	Jilliby43	Jilliby44	Jilliby45	Jilliby46	Jilliby47	Jilliby48	Jilliby49	Jilliby50	Jilliby51	Jilliby52	Jilliby53	Jilliby54
MINIMUM	0	-0.2	0	0	-0.1	0	0	0	0	0	0	0
TIME	3:47:30	6:21:08	3:47:30	4:37:58	5:37:06	3:47:30	3:47:30	3:47:28	3:47:28	3:47:30	3:47:30	3:47:28
MAXIMUM	7.3	4.5	4.3	2.7	8.1	11.4	16	22.2	6.5	11.6	4.3	8.3
TIME	20:05:32	20:04:22	20:02:24	20:02:20	19:58:10	20:01:56	23:50:22	20:08:48	11:18:00	18:05:10	20:06:34	19:55:32
CHANNEL	Jilliby55	LittleJ01	LittleJ02	LittleJ03	LittleJ04	LittleJ05	LittleJ06	LittleJ07	LittleJ08	LittleJ09	LittleJ10	LittleJ11
MINIMUM	0	0	0	0.0S	0	0.0S	0.0S	0.0S	0.0S	0.0S	-1.3	0.0S
TIME	3:47:28	3:47:30	3:47:28	3:49:44	3:50:34	3:37:56	3:47:28	3:47:14	1:32:26	1:31:28	4:32:50	1:28:40
MAXIMUM	16.7	47.5	42	43.9	39.6	42.3	61.7	62.5	78.2	105.4	45.7	31.6
TIME	20:05:32	19:37:22	17:29:30	18:01:24	18:29:34	17:06:52	18:46:28	20:15:54	18:26:14	18:23:16	18:28:40	18:24:00
CHANNEL	LittleJ12	LittleJ13	LittleJ14	LittleJ15	LittleJ16	LittleJ17	LittleJ18	LittleJ19	LittleJ20	LittleJ21	LittleJ22	LittleJ23
MINIMUM	0.0S	0	0	0.0S	-12.1	0	-2.7	0	0	0	0	-11.6

TIME	1:28:08	2:34:06	3:47:28	3:51:10	18:17:38	3:47:36	3:58:08	3:47:28	3:49:02	3:47:28	3:47:28	3:55:16
MAXIMUM	48.7	68.8	51.5	42.1	18.9	68.2	54.2	47.6	110.1	108.1	104.8	59.6
TIME	18:20:48	18:17:12	18:14:04	18:12:04	24:10:42	18:24:34	18:20:58	17:12:00	18:16:20	18:15:26	18:12:42	18:09:52
CHANNEL	LittleJ24	LittleJ25	LittleJ26	LittleJ27	LittleJ28	Myrtle01	Myrtle02	Myrtle03	Myrtle04	Myrtle05	Myrtle06	Smith01
MINIMUM	-1.2	-0.1	0	0	0	0.0S	0.0S	0.0S	0.0S	-0.6	0.0S	0
TIME	3:57:46	3:59:44	3:47:28	3:47:28	3:47:28	2:57:30	2:57:28	2:57:28	2:57:26	31:22:10	80:00:00	3:47:30
MAXIMUM	103.6	53	80.6	49.2	39.2	22.4	20.8	31.8	46.5	25	12.7	47.7
TIME	18:08:38	18:01:52	18:10:32	17:34:28	18:06:02	18:00:34	4:12:52	4:01:22	3:55:24	3:53:52	16:43:32	20:10:58
CHANNEL	Smith02	Smith03	Smith04	Smith05	Smith06	Smith07	Smith08	Smith09	Smith10	Smith11	Smith12	Smith13
MINIMUM	0	0	0	0	0	0	0	0	0	0	0	0
TIME	3:47:28	5:02:44	4:09:20	3:57:10	3:47:28	3:47:28	3:47:28	4:30:50	3:47:28	3:47:28	3:47:28	3:47:34
MAXIMUM	12.5	24	57.8	64.9	63.1	32.4	17.5	24.3	11.2	8.8	7.3	14
TIME	12:15:46	20:06:32	20:05:18	20:05:34	20:05:30	20:04:48	20:00:50	19:59:48	20:00:44	20:00:02	20:00:04	20:00:26
CHANNEL	Wyong01	Wyong02	Wyong03	Wyong04	Wyong05	Wyong06	Wyong07	Wyong08	Wyong09	Wyong10	Wyong11	Wyong12
MINIMUM	-1.4	-128.3	-0.3	-0.3	-0.7	-2.6	-0.6	0	0	0	0.0S	0.0S
TIME	1:00:24	24:19:12	1:37:02	1:39:56	3:59:30	3:49:30	3:57:38	4:15:20	3:47:28	3:47:34	1:06:08	1:03:38
MAXIMUM	384.4	91.6	1169.8	1497.3	804.7	748	700.9	767.2	187.3	345.7	230.9	493.9
TIME	24:06:50	19:59:10	23:01:18	23:26:40	23:39:38	23:44:04	22:19:38	23:32:30	23:28:16	23:50:16	15:24:34	22:45:54
CHANNEL	Wyong13	Wyong14	Wyong15	Wyong16	Wyong17	Wyong18	Wyong19	Wyong20	Wyong21	Wyong22	Wyong23	Wyong24
MINIMUM	0.0S	0	-148.3	0	0	0	0	0	-1.5	-0.2	-0.3	-0.3
TIME	1:01:40	3:53:10	23:30:32	3:47:28	3:47:28	3:48:18	3:47:26	3:47:28	4:02:58	4:07:04	4:09:42	4:10:08
MAXIMUM	725.2	978	132.5	202.7	184.7	329.2	624.3	593.1	494.6	382.5	467.2	574.2
TIME	23:17:18	23:30:02	13:12:18	16:54:22	23:29:24	22:36:16	23:28:18	23:27:54	23:32:46	23:29:44	23:32:12	23:32:12
CHANNEL	Wyong25	Wyong26	Wyong27	Wyong28	Wyong29	Wyong30	Wyong31	Wyong32	Wyong33	Wyong34	Wyong35	Wyong36
MINIMUM	0	0	0	0	0	0	-0.1	0	0	0	0	-1039.1
TIME	3:47:28	3:47:28	3:47:28	3:47:28	3:47:28	3:47:36	3:55:04	3:47:28	3:47:28	3:47:28	3:48:08	23:24:08
MAXIMUM	445.7	300.4	347.1	762.9	1002.4	906.4	427.1	435.7	560	637.3	1431.7	121.6
TIME	23:31:58	23:28:58	23:28:50	23:26:00	23:30:58	23:28:30	23:28:14	23:27:48	23:28:46	23:28:22	23:26:46	11:54:16
CHANNEL	Wyong37	Wyong38	Wyong39	Wyong40	Wyong41	Wyong42	Wyong43	Wyong44	Wyong45	Wyong46	Wyong47	Wyong48
MINIMUM	-0.6	-0.2	0	-89.7	-0.1	0	0	-74.1	-15.9	-14.8	-12.9	-11.6
TIME	4:00:28	4:13:22	3:47:28	23:29:56	3:47:44	3:50:26	3:47:28	23:28:32	23:29:28	4:37:30	4:41:14	4:42:38
MAXIMUM	109.4	302.6	344.3	192.4	462	411.1	296.2	130.6	227.8	639.9	571.4	333.8
TIME	23:04:34	23:29:16	23:27:30	13:56:36	23:31:32	23:30:00	23:28:24	54:17:48	18:11:42	22:57:36	22:24:28	21:16:08
CHANNEL	Wyong49	Wyong50	Wyong51	Wyong52	Wyong53	Wyong54	Wyong55	Wyong56	Wyong57	Wyong58	Wyong59	Wyong60

MINIMUM	-29.9	-10.8	-8.6	-5.3	-12.1	-10.3	-9.5	-6.4	-3.1	-1.7	-0.7	-35.5
TIME	4:33:48	4:43:30	4:46:10	4:50:22	4:16:22	4:17:04	4:17:28	4:19:12	4:22:34	4:25:54	4:27:26	20:39:20
MAXIMUM	477	770.6	402.1	342.3	284.3	511.7	507.8	400.6	947.8	410.1	597.4	126.4
TIME	21:45:34	22:53:10	23:00:24	23:05:56	22:35:06	23:00:12	23:00:14	22:38:40	22:59:28	22:59:00	23:05:52	23:10:44
CHANNEL	Wyong61	Wyong62	Wyong63	Wyong64	Wyong65	Wyong66	Wyong67	Wyong68	Wyong69	Wyong70	Wyong71	Wyong72
MINIMUM	-35.9	-0.1	0	0	0	-34.8	-2.5	-2.3	-2	-0.9	-2.6	-1.3
TIME	20:38:34	3:49:34	3:54:40	3:47:28	3:47:28	21:41:46	4:57:12	4:57:10	4:57:08	4:56:46	4:18:56	5:30:16
MAXIMUM	215	248.6	539	787.2	700.6	94.6	1174.2	1247.9	1131	395.2	589.3	895.6
TIME	23:15:54	20:44:40	22:18:22	22:49:24	22:43:08	11:55:10	23:02:08	23:00:02	22:59:56	18:30:38	22:46:26	22:48:28
CHANNEL	Wyong73	Wyong74	Wyong75	Wyong76	Wyong77	Wyong78	Wyong79	Wyong80	Wyong81			
MINIMUM	-1.3	-2.3	-529.4	-1212.1	-925.2	-0.4	0.0S	0.0S	0.0S			
TIME	3:48:28	4:10:34	30:09:32	22:52:30	23:01:32	4:11:48	3:39:04	3:26:54	3:21:16			
MAXIMUM	411.4	588.8	0.6	0.3	0.8	1171.6	309.3	243.4	471.3			
TIME	22:19:52	22:56:10	4:14:28	3:58:56	4:03:48	22:10:02	16:10:58	21:37:24	22:04:16			

Extract From .eof ESTRY Output File for 1% AEP Unsubsided Run

MAXIMUM AND MINIMUM HEADS (METRES)

NODE	Chand01.1	Chand01.2	Chand02.1	Chand03.1	Chand04.1	Durren01.1	Durren01.2	Durren02.1	Jilliby01.1	Jilliby01.2	Jilliby02.1
MINIMUM	13.999*	7.443	15.999	18.999	79.999	11.199	10.623	11.249	1.1	0.433	2.604
TIME	80:00:00	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:32	3:47:26	1:00:00	6:17:10
MAXIMUM	17.125	17.136	20.271	22.352	81.704	14.444	14.432	14.448	10.226	10.057	10.648
TIME	23:30:52	23:27:28	17:31:04	3:56:10	3:47:36	20:00:20	20:00:40	19:59:46	23:52:54	23:54:06	23:51:58
NODE	Jilliby03.1	Jilliby04.1	Jilliby05.1	Jilliby06.1	Jilliby07.1	Jilliby08.1	Jilliby09.1	Jilliby10.1	Jilliby11.1	Jilliby12.1	Jilliby13.1
MINIMUM	1.611	2.42	2.847	2.931	3.476	3.065	3.172	3.533	4.171	4.653	4.937
TIME	3:47:26	3:47:26	3:47:26	3:47:26	5:23:56	1:01:40	1:01:18	1:01:16	1:40:48	3:50:26	1:33:56
MAXIMUM	10.669	10.689	10.689	10.676	10.693	10.698	10.697	10.698	10.697	10.702	10.707
TIME	23:49:18	23:52:04	23:51:26	23:52:44	23:52:44	23:52:44	23:52:06	23:49:08	23:52:02	23:50:14	23:50:46
NODE	Jilliby14.1	Jilliby15.1	Jilliby16.1	Jilliby17.1	Jilliby18.1	Jilliby19.1	Jilliby20.1	Jilliby21.1	Jilliby22.1	Jilliby23.1	Jilliby24.1
MINIMUM	5.276	5.832	5.918	6.102	6.539	6.623	7.146	7.136	7.231	7.392	7.296
TIME	1:33:54	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:22
MAXIMUM	10.709	10.728	10.809	10.969	11.352	11.669	12.165	12.484	12.856	13.113	13.277
TIME	23:51:44	23:52:06	23:48:54	19:32:04	19:28:14	19:27:48	19:22:40	19:13:18	19:25:42	19:32:36	19:34:54
NODE	Jilliby25.1	Jilliby26.1	Jilliby27.1	Jilliby28.1	Jilliby29.1	Jilliby30.1	Jilliby31.1	Jilliby32.1	Jilliby33.1	Jilliby35.1	Jilliby36.1
MINIMUM	7.852	8.886	8.361	9.202	9.288	10.042	10.702	10.886	10.649	10.806	11.635
TIME	3:47:18	5:22:50	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26
MAXIMUM	13.308	13.312	13.33	13.357	13.427	13.561	14.067	14.31	14.415	14.434	14.461
TIME	19:33:42	19:33:58	19:30:38	19:32:36	19:35:58	19:49:36	20:00:28	20:01:48	20:01:02	20:00:24	19:59:58
NODE	Jilliby37.1	Jilliby38.1	Jilliby39.1	Jilliby40.1	Jilliby41.1	Jilliby42.1	Jilliby43.1	Jilliby44.1	Jilliby45.1	Jilliby46.1	Jilliby47.1
MINIMUM	11.786	12.398	13.609	13.036	13.079	14.372	15.066	15.406	16.289	16.168	15.843
TIME	3:47:26	3:47:26	5:25:16	3:47:30	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26
MAXIMUM	15.041	15.153	15.841	15.994	16.032	16.217	16.498	16.757	17.033	17.345	17.788
TIME	20:05:44	20:04:14	20:06:32	20:06:10	20:06:02	20:06:04	20:05:32	20:04:16	20:02:20	20:03:20	19:57:56
NODE	Jilliby48.1	Jilliby49.1	Jilliby50.1	Jilliby51.1	Jilliby52.1	Jilliby53.1	Jilliby54.1	Jilliby55.1	LittleJ01.1	LittleJ02.1	LittleJ03.1
MINIMUM	16.226	16.239	16.686	17.046	17.899	18.099	18.645	20.626	9.468	9.899	9.949
TIME	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	64:42:14	3:47:26	3:47:34
MAXIMUM	18.107	18.415	19.239	19.287	20.176	20.484	21.239	22.893	13.296	13.447	13.481
TIME	20:01:54	20:08:46	20:08:16	20:02:18	18:05:08	20:05:12	19:56:12	20:05:30	19:31:24	19:07:24	19:03:40
NODE	LittleJ04.1	LittleJ05.1	LittleJ06.1	LittleJ07.1	LittleJ08.1	LittleJ09.1	LittleJ10.1	LittleJ11.1	LittleJ12.1	LittleJ13.1	LittleJ14.1
MINIMUM	9.899	9.999	10.966	11.067	11.139	11.646	12.84	13.999	15.02	15.624	16.761

TIME	1:36:48	1:35:46	1:34:34	1:32:26	1:31:28	1:29:14	4:18:54	1:24:04	1:24:08	2:34:02	3:47:26
MAXIMUM	14.404	14.682	14.756	14.8	16.121	16.264	16.684	17.377	19.55	20.392	21.074
TIME	18:29:10	18:33:20	18:33:10	18:46:32	18:26:14	18:25:26	18:26:52	18:25:02	18:13:06	18:17:42	18:14:54
NODE	LittleJ15.1	LittleJ16.1	LittleJ17.1	LittleJ18.1	LittleJ19.1	LittleJ20.1	LittleJ21.1	LittleJ22.1	LittleJ23.1	LittleJ24.1	LittleJ25.1
MINIMUM	19.736	18.27	20.015*	19.783	20.88	20.899	21.583	22.25	23.099	24.499	24.502
TIME	3:57:50	3:47:26	3:47:34	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:55:18	3:47:26
MAXIMUM	22.05	22.04	23.187	23.772	24.156	25.67	26.369	27.174	27.53	28.615	28.987
TIME	18:12:26	18:11:38	18:24:26	18:21:24	18:21:34	18:16:18	18:15:46	18:12:12	18:11:40	18:08:36	18:07:52
NODE	LittleJ26.1	LittleJ27.1	LittleJ28.1	Myrtle01.1	Myrtle02.1	Myrtle03.1	Myrtle04.1	Myrtle05.1	Myrtle06.1	Smith01.1	Smith02.1
MINIMUM	28.899	32.899	39.599	15.282	17.499	19.087	20.61	20.799	35.499	11.976	13.126
TIME	3:47:26	3:47:26	3:47:26	2:35:50	2:30:34	2:27:48	2:25:40	2:25:40	3:47:26	3:47:26	3:47:26
MAXIMUM	32.776	35.448	44.681	17.31	19.998	21.365	23.008	23.41	38.2	14.998	15.137
TIME	18:10:10	17:19:46	18:11:34	4:21:30	16:58:14	3:59:22	3:54:30	3:49:48	16:31:02	20:07:24	20:06:32
NODE	Smith03.1	Smith04.1	Smith05.1	Smith06.1	Smith07.1	Smith08.1	Smith09.1	Smith10.1	Smith11.1	Smith12.1	Smith13.1
MINIMUM	12.959	12.774	12.805	12.913	14.356	15.389	15.127	15.491	16.299	16.499	17.228*
TIME	4:01:16	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:30
MAXIMUM	15.85	15.918	16.003	16.445	16.633	16.951	17.502	17.585	17.855	18.293	18.68
TIME	20:06:28	20:06:12	20:05:54	20:05:26	20:05:10	20:00:52	19:59:46	20:00:00	20:00:04	20:01:56	20:00:24
NODE	Wyong01.1	Wyong01.2	Wyong02.1	Wyong03.1	Wyong04.1	Wyong05.1	Wyong06.1	Wyong07.1	Wyong09.1	Wyong10.1	Wyong11.1
MINIMUM	0.215	0.264	0.205	0.199	0.215	0.204	0.213	0.439	0.745	0.624	0.815
TIME	1:00:00	1:00:00	1:00:00	1:00:00	1:00:00	1:00:00	1:00:00	1:00:00	3:47:26	1:06:08	1:03:38
MAXIMUM	8.126	8.051	8.111	8.526	8.902	9.28	9.386	9.468	10.108	10.521	10.607
TIME	24:20:06	24:20:54	24:19:38	24:14:14	24:08:36	24:02:54	24:01:08	24:00:18	23:53:44	23:52:04	23:51:16
NODE	Wyong12.1	Wyong13.1	Wyong14.1	Wyong15.1	Wyong16.1	Wyong17.1	Wyong18.1	Wyong19.1	Wyong20.1	Wyong21.1	Wyong22.1
MINIMUM	1.099	1.274	1.307	2.026	2.21	2.699	2.699	2.759	3.027	3.313	3.431
TIME	1:01:40	1:00:34	1:00:00	1:00:00	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26
MAXIMUM	10.89	11.39	11.47	11.306	11.377	11.501	11.84	12.581	13.178	13.393	13.521
TIME	23:38:50	23:35:30	23:35:28	23:35:54	23:34:30	23:34:40	23:31:12	23:30:50	23:30:28	23:32:28	23:29:32
NODE	Wyong23.1	Wyong24.1	Wyong25.1	Wyong26.1	Wyong27.1	Wyong28.1	Wyong29.1	Wyong30.1	Wyong31.1	Wyong32.1	Wyong33.1
MINIMUM	3.419	3.542	3.789	4.105	4.161	4.245	4.61	4.524	4.637	4.708	5.279
TIME	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26
MAXIMUM	13.587	13.616	13.803	13.953	14.122	14.759	14.822	14.931	15.164	15.535	15.9
TIME	23:29:28	23:29:24	23:31:48	23:28:44	23:28:44	23:28:36	23:28:34	23:25:52	23:27:58	23:27:40	23:28:34
NODE	Wyong34.1	Wyong35.1	Wyong36.1	Wyong37.1	Wyong38.1	Wyong39.1	Wyong40.1	Wyong41.1	Wyong42.1	Wyong43.1	Wyong44.1

MINIMUM	5.918	5.612	5.799	6.151	6.354	6.607	6.858	6.862	6.899	6.999	7.46
TIME	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26
MAXIMUM	16.262	17.729	16.831	16.773	16.817	16.963	16.972	16.985	17.098	17.157	17.144
TIME	23:25:32	23:26:42	23:28:46	23:25:02	23:27:58	23:28:36	23:26:04	23:28:36	23:28:50	23:26:50	23:29:06
NODE	Wyong46.1	Wyong47.1	Wyong48.1	Wyong49.1	Wyong50.1	Wyong51.1	Wyong52.1	Wyong53.1	Wyong54.1	Wyong55.1	Wyong56.1
MINIMUM	8.264	7.657	9.200*	7.569	7.886	8.171	8.397	8.434	8.358	8.384	8.469
TIME	4:11:38	3:47:26	4:32:38	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26
MAXIMUM	17.235	17.627	17.644	17.662	17.966	18.27	18.46	18.506	18.52	18.636	18.756
TIME	23:27:48	23:15:46	23:15:54	23:15:54	23:13:54	23:11:58	23:11:42	23:11:36	23:11:36	23:11:06	23:10:52
NODE	Wyong57.1	Wyong58.1	Wyong59.1	Wyong60.1	Wyong61.1	Wyong62.1	Wyong63.1	Wyong64.1	Wyong65.1	Wyong66.1	Wyong67.1
MINIMUM	8.499	8.55	9.031	8.841	9.099*	9.199	9.399	9.466	9.859	9.428	9.739
TIME	3:47:26	3:47:26	3:47:26	3:47:26	3:47:46	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:50:24
MAXIMUM	19.594	19.729	19.957	19.956	19.964	19.979	20.26	20.748	20.99	20.992	21.303
TIME	23:07:02	23:07:06	23:06:26	23:06:26	23:06:18	23:06:58	23:04:30	23:01:06	22:58:10	22:57:46	22:58:34
NODE	Wyong68.1	Wyong69.1	Wyong70.1	Wyong71.1	Wyong72.1	Wyong73.1	Wyong74.1	Wyong75.1	Wyong76.1	Wyong77.1	Wyong78.1
MINIMUM	9.583	9.649	9.695	9.799	9.829	9.849	9.869*	9.899	9.919	9.939	9.999
TIME	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:51:58	3:47:26	3:47:26	3:47:26	3:39:04
MAXIMUM	21.33	21.653	21.685	21.905	22.402	22.52	22.625	22.593	22.544	22.518	24.555
TIME	22:58:44	22:58:50	22:59:20	22:57:08	22:56:46	22:52:22	22:52:46	22:52:54	22:52:56	22:52:54	22:44:56
NODE	Wyong79.1	Wyong80.1	Wyong81.1								
MINIMUM	13.899	14.799	15.499								
TIME	3:26:54	3:21:16	3:17:32								
MAXIMUM	24.599	24.774	25.488								
TIME	22:42:38	22:43:50	22:31:12								

Extract From .eof ESTRY Output File for 1% AEP Subsided Run

MAXIMUM AND MINIMUM VELOCITIES (M/S)

CHANNEL	Chand01	Chand02	Chand03	Chand04	Durren01	Durren02	Jilliby01	Jilliby02	Jilliby03	Jilliby04	Jilliby05	Jilliby06
MINIMUM	-0.001	0	0.000S	0.000S	-0.19	-0.269	0	0.000S	-0.23	-0.01	-0.116	-0.016
TIME	44:04:40	3:47:28	79:59:32	80:00:00	10:44:44	10:36:50	3:47:26	6:17:48	5:18:44	5:56:30	22:30:16	3:48:40
MAXIMUM	1.183	1.304	1.22	4.278	0.67	0.184	1.162	1.972	0.997	0.924	0.65	0.665
TIME	4:26:46	17:48:48	3:56:20	3:47:40	13:19:16	16:06:24	23:35:12	23:56:38	11:35:36	11:39:08	7:50:08	13:02:14
CHANNEL	Jilliby07	Jilliby08	Jilliby09	Jilliby10	Jilliby11	Jilliby12	Jilliby13	Jilliby14	Jilliby15	Jilliby16	Jilliby17	Jilliby18
MINIMUM	0.000S	0	-0.184	-0.177	0.000S	0.000S	0	0	0	-0.188	0	0.000S
TIME	5:24:32	5:24:16	22:26:18	19:52:06	2:53:04	1:35:10	1:24:26	1:22:54	3:47:28	29:51:26	3:47:28	5:08:20
MAXIMUM	1.415	0.803	0.679	0.775	0.986	0.999	0.685	0.437	0.85	0.735	1.135	1.169
TIME	7:20:16	24:26:28	12:27:08	15:05:48	16:01:54	18:15:44	19:15:08	6:42:06	7:09:32	8:41:44	16:01:34	18:18:26
CHANNEL	Jilliby19	Jilliby20	Jilliby21	Jilliby22	Jilliby23	Jilliby24	Jilliby25	Jilliby26	Jilliby27	Jilliby28	Jilliby29	Jilliby30
MINIMUM	-0.157	0	0	0	0	-0.521	-0.487	-0.276	-0.507	-0.242	-0.204	-0.059
TIME	3:48:10	3:47:28	3:47:28	3:47:28	3:47:28	5:08:26	5:16:40	5:37:44	5:47:06	6:15:34	6:24:06	6:38:16
MAXIMUM	0.792	2.011	1.705	1.727	1.751	1.518	0.495	0.479	0.574	0.45	0.598	0.62
TIME	20:35:30	20:23:46	17:40:42	20:44:48	20:41:50	20:33:38	44:22:10	53:28:00	46:30:52	57:47:14	13:14:08	39:14:28
CHANNEL	Jilliby31	Jilliby32	Jilliby33	Jilliby34	Jilliby35	Jilliby36	Jilliby37	Jilliby38	Jilliby39	Jilliby40	Jilliby41	Jilliby42
MINIMUM	0	0	-0.109	-0.071	-0.596	-0.167	0	0	0.000S	-0.124	0	0
TIME	3:47:28	3:47:28	3:49:42	4:07:22	14:43:14	20:29:52	3:47:30	3:47:30	5:23:42	3:47:36	3:47:30	3:47:30
MAXIMUM	0.758	0.544	0.432	0.325	0.524	0.852	0.671	0.587	1.001	0.807	0.722	0.395
TIME	43:47:14	52:13:40	16:28:28	12:41:14	10:50:28	12:01:40	17:57:34	11:18:02	18:30:22	20:01:34	20:02:02	10:46:14
CHANNEL	Jilliby43	Jilliby44	Jilliby45	Jilliby46	Jilliby47	Jilliby48	Jilliby49	Jilliby50	Jilliby51	Jilliby52	Jilliby53	Jilliby54
MINIMUM	0	-0.031	0	0	-0.066	0	0	0	0	0	0	0
TIME	3:47:30	5:48:58	3:47:30	3:47:28	4:47:46	3:47:30	3:47:30	3:47:28	3:47:28	3:47:30	3:47:30	3:47:28
MAXIMUM	0.382	0.339	0.579	0.401	0.572	0.696	0.551	0.745	0.508	0.705	0.487	0.632
TIME	6:55:30	33:38:58	15:20:24	20:00:54	20:00:12	12:24:36	23:48:38	20:08:42	11:12:12	11:52:02	66:23:22	28:44:10
CHANNEL	Jilliby55	LittleJ01	LittleJ02	LittleJ03	LittleJ04	LittleJ05	LittleJ06	LittleJ07	LittleJ08	LittleJ09	LittleJ10	LittleJ11
MINIMUM	0	0	0	0.000S	-0.1	-0.019	-0.218	0.000S	0	0.000S	-0.019	0.000S
TIME	3:47:28	3:47:30	3:47:28	4:33:38	3:49:34	3:47:52	68:29:00	3:47:28	3:12:54	1:31:22	4:34:40	1:28:04
MAXIMUM	0.653	1.205	2.074	2.471	1.453	1.109	1.227	1.293	1.44	1.072	0.824	1.358
TIME	20:04:48	13:10:28	17:13:38	17:13:10	17:36:06	18:29:42	18:26:18	18:26:06	18:28:14	18:27:26	6:14:02	4:59:08
CHANNEL	LittleJ12	LittleJ13	LittleJ14	LittleJ15	LittleJ16	LittleJ17	LittleJ18	LittleJ19	LittleJ20	LittleJ21	LittleJ22	LittleJ23

MINIMUM	0.000S	0	0	0.000S	-0.929	0	-0.852	0	-0.035	0	0	-0.689
TIME	1:27:44	2:34:34	3:47:28	3:52:22	3:53:56	3:47:36	3:53:32	3:47:28	3:49:16	3:47:28	3:47:28	3:55:44
MAXIMUM	1.537	1.257	0.921	1.175	1.007	1.374	0.985	1.088	1.628	1.439	1.802	1.168
TIME	17:08:30	18:15:42	11:54:14	11:40:54	24:06:32	18:26:26	18:15:20	16:39:38	18:15:02	3:57:06	3:54:28	11:54:20
CHANNEL	LittleJ24	LittleJ25	LittleJ26	LittleJ27	LittleJ28	Myrtle01	Myrtle02	Myrtle03	Myrtle04	Myrtle05	Myrtle06	Smith01
MINIMUM	-0.418	-0.306	0	0	0	0.000S	0.000S	0.000S	0.000S	-0.308	0.000S	0
TIME	3:57:22	3:59:18	3:47:28	3:47:28	3:47:28	1:41:34	1:39:14	1:36:44	1:35:46	32:10:32	80:00:00	3:47:30
MAXIMUM	1.731	1.275	1.12	0.966	0.982	1.173	1.107	1.218	1.166	0.73	1.294	0.923
TIME	18:05:52	11:27:32	18:10:44	3:57:54	18:08:56	4:27:48	17:01:20	4:01:58	3:55:34	18:00:38	3:57:38	17:46:30
CHANNEL	Smith02	Smith03	Smith04	Smith05	Smith06	Smith07	Smith08	Smith09	Smith10	Smith11	Smith12	Smith13
MINIMUM	0	-0.07	-0.247	-0.065	0	0	0	0	0	0	0	0
TIME	3:47:28	5:07:52	3:47:34	3:58:58	3:47:28	3:47:28	3:47:28	3:47:30	3:47:28	3:47:28	3:47:28	3:47:34
MAXIMUM	0.746	0.654	1.046	1.084	1.074	0.589	0.518	1.004	0.765	0.815	0.432	0.501
TIME	10:25:28	20:04:36	20:02:06	20:02:12	20:03:32	20:02:18	11:55:26	20:00:24	20:00:10	10:48:36	20:10:54	20:00:34
CHANNEL	Wyong01	Wyong02	Wyong03	Wyong04	Wyong05	Wyong06	Wyong07	Wyong08	Wyong09	Wyong10	Wyong11	Wyong12
MINIMUM	-0.115	-0.255	-0.1	-0.05	-0.16	-0.125	-0.052	-0.033	0	0	0.000S	0.000S
TIME	1:00:20	24:26:12	1:01:48	1:36:42	1:03:18	3:49:28	3:56:48	3:47:32	3:47:28	3:47:28	1:05:58	1:03:30
MAXIMUM	0.877	0.226	2.69	3.333	1.78	0.918	1.069	2.873	1.082	1.799	1.69	2.386
TIME	20:15:26	20:18:44	22:40:02	23:03:28	23:32:52	23:42:38	22:19:52	23:05:00	55:41:34	41:32:52	15:24:58	22:32:00
CHANNEL	Wyong13	Wyong14	Wyong15	Wyong16	Wyong17	Wyong18	Wyong19	Wyong20	Wyong21	Wyong22	Wyong23	Wyong24
MINIMUM	0.000S	-0.014	-0.68	0	0	-0.061	0	-0.058	-0.225	0	-0.518	-0.841
TIME	1:01:38	3:53:10	23:34:08	3:47:28	3:47:28	3:48:12	3:47:26	3:52:58	4:03:12	3:47:28	4:02:28	4:02:54
MAXIMUM	3.266	4.365	1.07	1.444	1.502	2.07	3.177	2.36	1.96	1.593	1.921	2.593
TIME	23:01:36	23:26:08	13:11:28	13:47:36	13:26:50	21:28:42	23:15:46	23:31:40	23:36:34	23:33:30	23:35:56	23:36:02
CHANNEL	Wyong25	Wyong26	Wyong27	Wyong28	Wyong29	Wyong30	Wyong31	Wyong32	Wyong33	Wyong34	Wyong35	Wyong36
MINIMUM	-0.132	0	0	0	0	-0.038	-0.068	0	0	0	-0.047	-3.981
TIME	4:06:40	3:47:28	3:47:28	3:47:28	3:47:28	3:47:34	3:55:08	3:47:28	3:47:28	3:47:28	3:48:10	23:27:54
MAXIMUM	1.572	1.11	1.65	3.591	4.633	3.936	1.786	1.771	2.212	2.508	5.278	1.292
TIME	22:07:32	21:52:38	13:27:18	23:29:46	23:34:44	23:34:44	22:36:38	23:31:36	23:32:32	23:32:08	23:27:56	11:11:32
CHANNEL	Wyong37	Wyong38	Wyong39	Wyong40	Wyong41	Wyong42	Wyong43	Wyong44	Wyong45	Wyong46	Wyong47	Wyong48
MINIMUM	-0.2	-0.144	0	-0.397	-0.269	-0.055	0	-0.33	-0.151	-0.422	-0.58	-0.875
TIME	4:00:28	4:13:04	3:47:28	23:33:42	3:47:48	3:50:26	3:47:28	23:32:18	3:48:18	4:28:00	4:26:26	4:40:46
MAXIMUM	1.131	1.338	1.454	1.586	2.113	1.844	1.361	1.029	1.394	2.963	2.673	1.926
TIME	10:39:24	23:30:42	23:31:16	13:52:52	23:28:58	23:29:16	45:51:14	54:59:04	17:57:54	21:59:00	21:56:28	21:01:32
CHANNEL	Wyong49	Wyong50	Wyong51	Wyong52	Wyong53	Wyong54	Wyong55	Wyong56	Wyong57	Wyong58	Wyong59	Wyong60

MINIMUM	-1.948	-0.416	-0.384	-0.269	-0.707	-0.831	-0.618	-0.36	-0.314	-0.271	-0.114	-2.311
TIME	4:31:52	4:42:08	4:45:46	4:49:52	4:23:36	4:23:28	4:24:22	4:26:02	4:29:14	4:32:22	4:33:14	3:47:36
MAXIMUM	3.316	3.274	1.66	1.392	1.314	2.237	2.139	1.632	3.85	1.615	2.268	0.95
TIME	4:31:40	22:22:26	22:37:24	23:01:20	21:21:54	22:40:42	22:45:08	21:41:18	22:47:30	22:53:46	23:04:52	8:36:30
CHANNEL	Wyong61	Wyong62	Wyong63	Wyong64	Wyong65	Wyong66	Wyong67	Wyong68	Wyong69	Wyong70	Wyong71	Wyong72
MINIMUM	-0.844	-0.142	-0.091	0	0	-0.239	-0.185	-0.529	-0.124	-0.06	-0.405	-0.279
TIME	3:48:56	3:49:22	3:53:50	3:47:28	3:47:28	3:48:00	4:56:32	3:47:34	4:56:28	4:55:58	4:17:38	5:16:50
MAXIMUM	0.93	1.317	2.255	3.033	2.566	0.765	4.235	4.458	3.995	1.965	2.036	3.222
TIME	8:36:28	16:38:12	22:03:20	22:13:52	22:06:06	9:22:38	22:54:18	22:42:20	22:17:24	18:10:58	22:47:28	22:42:40
CHANNEL	Wyong73	Wyong74	Wyong75	Wyong76	Wyong77	Wyong78	Wyong79	Wyong80	Wyong81			
MINIMUM	-0.436	-0.393	-1.947	-3.143	-3.106	-0.102	0.000S	0.000S	0.000S			
TIME	4:04:28	4:10:12	18:03:08	22:52:02	17:58:56	4:10:42	3:39:04	3:26:54	3:21:16			
MAXIMUM	1.487	1.833	0.376	0.207	0.265	3.361	1.524	1.246	1.728			
TIME	22:01:38	22:56:14	3:51:44	3:47:38	3:54:40	21:36:34	15:49:14	11:45:30	22:03:52			

Extract From .eof ESTRY Output File for 1% AEP Subsided Run

MAXIMUM AND MINIMUM VOLUME FLOWS, CU.M/S

CHANNEL	Chand01	Chand02	Chand03	Chand04	Durren01	Durren02	Jilliby01	Jilliby02	Jilliby03	Jilliby04	Jilliby05	Jilliby06
MINIMUM	-0.1	0	0.0S	0.0S	-3.5	-2.7	0	0.0S	-10	0	-16.5	0
TIME	44:04:40	3:47:28	79:59:32	80:00:00	10:56:24	10:51:24	3:47:26	6:17:48	48:37:54	5:56:42	22:31:20	3:48:40
MAXIMUM	43.8	49.7	49.3	42.1	25.6	8.8	283.5	359	114.4	56.3	36.5	48.9
TIME	4:31:18	4:11:26	3:58:52	3:47:38	15:31:56	16:31:46	23:41:58	23:56:42	23:55:22	24:20:30	15:26:08	22:55:58
CHANNEL	Jilliby07	Jilliby08	Jilliby09	Jilliby10	Jilliby11	Jilliby12	Jilliby13	Jilliby14	Jilliby15	Jilliby16	Jilliby17	Jilliby18
MINIMUM	0.0S	0	-25.1	-19.2	0.0S	0.0S	0	0	0	-9.5	0	0.0S
TIME	5:24:32	5:24:16	22:33:06	23:14:14	2:53:04	1:35:10	1:24:26	1:22:54	3:47:28	29:25:30	3:47:28	5:08:20
MAXIMUM	125.5	125.5	34.3	37	41.7	53.6	83.1	25.3	22.2	26.8	51.6	61.2
TIME	24:22:54	24:22:56	13:05:10	15:05:48	17:05:02	18:29:34	19:26:30	19:26:38	11:20:04	19:26:20	17:58:10	19:53:54
CHANNEL	Jilliby19	Jilliby20	Jilliby21	Jilliby22	Jilliby23	Jilliby24	Jilliby25	Jilliby26	Jilliby27	Jilliby28	Jilliby29	Jilliby30
MINIMUM	-0.1	0	0	0	0	-12.7	-10	-3.5	-3	-2.2	-1.3	-0.1
TIME	3:48:16	3:47:28	3:47:28	3:47:28	3:47:28	13:03:46	13:02:40	7:00:32	7:01:32	7:01:14	6:57:20	6:58:38
MAXIMUM	55.3	161.1	120.9	154.7	204.1	189.3	53.6	15.7	19.1	13.3	30.5	27.8
TIME	20:27:04	20:23:48	20:19:30	20:40:56	20:32:20	20:33:38	20:32:58	49:17:20	45:42:56	20:26:10	13:18:46	37:52:42
CHANNEL	Jilliby31	Jilliby32	Jilliby33	Jilliby34	Jilliby35	Jilliby36	Jilliby37	Jilliby38	Jilliby39	Jilliby40	Jilliby41	Jilliby42
MINIMUM	0	0	0	0	-20.2	-8.9	0	0	0.0S	0	0	0
TIME	3:47:28	3:47:28	3:49:40	4:49:52	15:08:18	20:29:30	3:47:30	3:47:30	5:23:42	5:13:52	3:47:30	3:47:30
MAXIMUM	27.3	34.4	27.6	23.1	17.8	22.5	26	14.9	35.5	29	29.2	12.5
TIME	20:27:26	20:26:16	17:47:34	18:00:48	20:29:30	12:40:50	18:26:36	12:19:52	20:04:22	20:04:10	20:03:54	20:03:40
CHANNEL	Jilliby43	Jilliby44	Jilliby45	Jilliby46	Jilliby47	Jilliby48	Jilliby49	Jilliby50	Jilliby51	Jilliby52	Jilliby53	Jilliby54
MINIMUM	0	0	0	0	0	0	0	0	0	0	0	0
TIME	3:47:30	5:50:00	3:47:30	3:47:28	5:17:12	3:47:30	3:47:30	3:47:28	3:47:28	3:47:30	3:47:30	3:47:28
MAXIMUM	7.6	5.2	5.8	3	9.4	12.5	15.9	22.1	6.5	11.6	4.3	8.3
TIME	20:03:38	20:02:28	19:59:50	20:00:54	20:00:12	20:00:16	23:48:54	20:08:42	11:15:38	18:05:14	20:06:24	19:55:28
CHANNEL	Jilliby55	LittleJ01	LittleJ02	LittleJ03	LittleJ04	LittleJ05	LittleJ06	LittleJ07	LittleJ08	LittleJ09	LittleJ10	LittleJ11
MINIMUM	0	0	0	0.0S	0	0	-0.8	0.0S	0	0.0S	-0.1	0.0S
TIME	3:47:28	3:47:30	3:47:28	4:33:38	4:31:22	3:50:44	68:29:02	3:47:28	3:12:54	1:31:22	4:34:48	1:28:04
MAXIMUM	16.7	57.6	64.1	64	64.2	85.5	109.5	110	111.2	112.9	40.8	22.4
TIME	20:04:48	13:35:42	17:32:30	17:34:48	18:13:34	18:29:44	18:26:18	18:26:06	18:28:12	18:27:26	16:20:38	18:22:08
CHANNEL	LittleJ12	LittleJ13	LittleJ14	LittleJ15	LittleJ16	LittleJ17	LittleJ18	LittleJ19	LittleJ20	LittleJ21	LittleJ22	LittleJ23
MINIMUM	0.0S	0	0	0.0S	-7.5	0	-6.3	0	0	0	0	-13.7

TIME	1:27:44	2:34:34	3:47:28	3:52:22	18:13:44	3:47:36	3:56:06	3:47:28	3:49:16	3:47:28	3:47:28	3:55:44
MAXIMUM	45.5	68.8	52.2	43.2	20.5	68.5	52.7	48.2	106.1	103.6	100.1	58.1
TIME	18:19:40	18:15:42	18:13:52	18:10:44	23:50:04	18:22:44	18:17:06	17:20:42	18:15:02	18:14:34	18:11:54	18:08:36
CHANNEL	LittleJ24	LittleJ25	LittleJ26	LittleJ27	LittleJ28	Myrtle01	Myrtle02	Myrtle03	Myrtle04	Myrtle05	Myrtle06	Smith01
MINIMUM	-2.8	-0.5	0	0	0	0.0S	0.0S	0.0S	0.0S	-0.9	0.0S	0
TIME	3:57:36	3:59:20	3:47:28	3:47:28	3:47:28	1:41:34	1:39:14	1:36:44	1:35:46	32:10:40	80:00:00	3:47:30
MAXIMUM	98.9	52.2	74.9	47.5	39.6	26.8	23.1	22	25.1	22.9	13.5	26.3
TIME	18:07:52	18:06:58	18:09:50	17:35:46	18:06:32	18:14:30	18:02:06	18:00:42	3:58:20	18:00:48	3:57:48	18:22:46
CHANNEL	Smith02	Smith03	Smith04	Smith05	Smith06	Smith07	Smith08	Smith09	Smith10	Smith11	Smith12	Smith13
MINIMUM	0	0	0	0	0	0	0	0	0	0	0	0
TIME	3:47:28	5:27:52	3:51:40	3:58:58	3:47:28	3:47:28	3:47:28	3:47:30	3:47:28	3:47:28	3:47:28	3:47:34
MAXIMUM	6	21.1	55.6	59.2	60.5	32.2	20.3	32.8	22.2	9.8	7.3	13.9
TIME	11:51:30	20:04:36	20:02:16	20:02:14	20:03:32	20:03:10	20:01:26	20:00:24	20:00:22	20:00:14	20:01:52	20:00:32
CHANNEL	Wyong01	Wyong02	Wyong03	Wyong04	Wyong05	Wyong06	Wyong07	Wyong08	Wyong09	Wyong10	Wyong11	Wyong12
MINIMUM	-1.4	-127.3	-0.3	-0.3	-0.7	-2.6	-0.6	0	0	0	0.0S	0.0S
TIME	1:00:24	24:26:14	1:37:02	1:39:56	3:59:30	3:49:30	3:57:38	4:15:20	3:47:28	3:47:28	1:05:58	1:03:30
MAXIMUM	383.3	91.3	1164.2	1493.1	801.6	744.7	700.7	765.4	186.1	345.3	229.8	493.7
TIME	24:12:08	20:18:44	23:10:44	23:30:44	23:46:36	23:52:56	22:22:50	23:36:06	23:35:16	23:57:22	15:36:32	22:47:20
CHANNEL	Wyong13	Wyong14	Wyong15	Wyong16	Wyong17	Wyong18	Wyong19	Wyong20	Wyong21	Wyong22	Wyong23	Wyong24
MINIMUM	0.0S	0	-147.7	0	0	0	0	-0.1	-1.3	0	-1.9	-2.2
TIME	1:01:38	3:53:10	23:34:10	3:47:28	3:47:28	3:48:12	3:47:26	3:52:42	4:03:26	3:47:28	4:02:36	4:02:56
MAXIMUM	719.9	965	132.6	201	187.3	329.5	632.1	598.4	495.2	385.1	469	576.1
TIME	23:14:38	23:33:44	13:16:06	14:47:50	23:28:40	22:35:24	23:26:14	23:31:38	23:33:54	23:33:30	23:35:56	23:36:00
CHANNEL	Wyong25	Wyong26	Wyong27	Wyong28	Wyong29	Wyong30	Wyong31	Wyong32	Wyong33	Wyong34	Wyong35	Wyong36
MINIMUM	-0.4	0	0	0	0	0	-0.1	0	0	0	0	-1037.9
TIME	4:06:36	3:47:28	3:47:28	3:47:28	3:47:28	3:47:36	3:55:04	3:47:28	3:47:28	3:47:28	3:48:08	23:27:54
MAXIMUM	447.9	301.7	348.1	763.3	1002.5	906.4	427.5	435.5	559.3	636.4	1429.5	120.8
TIME	23:35:44	23:32:46	23:32:36	23:29:46	23:29:40	23:32:16	23:32:00	23:31:34	23:32:32	23:32:08	23:30:32	12:01:28
CHANNEL	Wyong37	Wyong38	Wyong39	Wyong40	Wyong41	Wyong42	Wyong43	Wyong44	Wyong45	Wyong46	Wyong47	Wyong48
MINIMUM	-0.6	-0.2	0	-89.2	-0.1	0	0	-74	-15.1	-13.9	-12.7	-11.6
TIME	4:00:28	4:13:24	3:47:28	23:33:42	3:47:44	3:50:26	3:47:28	23:32:18	23:33:14	4:40:24	4:41:58	4:43:44
MAXIMUM	109.4	302.1	343.6	192.4	460.6	410.4	295.6	130.6	227.7	640	571.4	333.8
TIME	23:05:36	23:33:02	23:31:16	14:02:52	23:35:18	23:33:46	23:32:10	54:23:06	18:12:58	22:58:22	22:25:26	21:16:40
CHANNEL	Wyong49	Wyong50	Wyong51	Wyong52	Wyong53	Wyong54	Wyong55	Wyong56	Wyong57	Wyong58	Wyong59	Wyong60

MINIMUM	-18.8	-10.8	-8.6	-5.4	-6.8	-5.7	-5.1	-3.4	-2.1	-1.2	-0.3	-47.4
TIME	4:31:52	4:44:38	4:48:30	4:52:30	4:23:44	4:24:08	4:24:50	4:55:38	4:55:10	4:54:42	4:34:44	20:40:18
MAXIMUM	476.8	769.5	403.4	343.2	283.7	514.9	513.3	402.2	953.9	410.5	604.2	127.8
TIME	21:46:20	22:51:18	23:01:56	23:06:00	22:35:54	23:00:52	23:01:10	22:40:10	23:00:42	23:00:20	23:05:20	23:14:20
CHANNEL	Wyong61	Wyong62	Wyong63	Wyong64	Wyong65	Wyong66	Wyong67	Wyong68	Wyong69	Wyong70	Wyong71	Wyong72
MINIMUM	-51.8	-0.1	0	0	0	-34.9	-2.5	-2.3	-2	-0.9	-2.6	-1.3
TIME	20:39:06	3:49:20	3:53:48	3:47:28	3:47:28	21:42:58	4:56:42	4:56:40	4:56:38	4:56:10	4:18:38	5:28:20
MAXIMUM	214.3	255.5	545.8	792.5	703.7	96.7	1170.5	1246.1	1132.3	397.6	590.5	896.4
TIME	23:20:00	20:50:34	22:19:00	22:51:14	22:42:20	11:57:30	22:54:26	22:54:26	22:49:06	18:32:22	22:47:30	22:45:02
CHANNEL	Wyong73	Wyong74	Wyong75	Wyong76	Wyong77	Wyong78	Wyong79	Wyong80	Wyong81			
MINIMUM	-1.5	-2.4	-530.8	-1210.7	-923.3	-0.4	0.0S	0.0S	0.0S			
TIME	4:04:28	4:10:22	30:07:58	22:52:06	23:01:20	4:12:18	3:39:04	3:26:54	3:21:16			
MAXIMUM	412.1	588.1	0.6	0.1	0.8	1172.6	309.3	243.4	471.3			
TIME	22:20:26	22:56:16	4:13:00	3:56:42	4:04:40	22:09:22	16:11:00	21:37:22	22:04:12			

Extract From .eof ESTRY Output File for 1% AEP Subsided Run

MAXIMUM AND MINIMUM HEADS (METRES)

NODE	Chand01.1	Chand01.2	Chand02.1	Chand03.1	Chand04.1	Durren01.1	Durren01.2	Durren02.1	Jilliby01.1	Jilliby01.2	Jilliby02.1
MINIMUM	13.999*	7.443	15.999	18.999	79.999	9.899	9.423	10.049	1.1	0.433	2.604
TIME	80:00:00	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	5:56:48	3:47:26	1:00:00	6:17:40
MAXIMUM	17.119	17.131	20.275	22.352	81.704	13.388	13.385	13.389	10.215	10.048	10.638
TIME	23:34:38	23:31:14	17:30:58	3:56:10	3:47:36	20:28:56	20:28:00	20:24:48	23:59:38	24:01:40	23:59:16
NODE	Jilliby03.1	Jilliby04.1	Jilliby05.1	Jilliby06.1	Jilliby07.1	Jilliby08.1	Jilliby09.1	Jilliby10.1	Jilliby11.1	Jilliby12.1	Jilliby13.1
MINIMUM	1.611	2.42	2.847	2.931	3.476	3.065	3.172	3.533	4.171	4.543	4.537
TIME	3:47:26	3:47:26	3:47:26	3:47:26	5:24:16	1:01:40	1:01:18	1:01:16	1:35:10	1:24:26	1:22:54
MAXIMUM	10.661	10.683	10.683	10.67	10.687	10.692	10.693	10.693	10.692	10.697	10.701
TIME	23:58:06	24:00:14	23:57:28	23:59:42	23:59:42	23:59:42	23:59:02	24:00:54	23:59:14	23:59:58	24:00:10
NODE	Jilliby14.1	Jilliby15.1	Jilliby16.1	Jilliby17.1	Jilliby18.1	Jilliby19.1	Jilliby20.1	Jilliby21.1	Jilliby22.1	Jilliby23.1	Jilliby24.1
MINIMUM	4.976	5.232	5.568	5.812	6.189	5.523	6.746	7.036	7.201	7.322	7.116
TIME	1:22:30	3:47:26	3:47:26	3:47:26	5:08:10	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	4:33:42
MAXIMUM	10.701	10.705	10.711	10.719	10.752	10.841	11.654	12.286	12.77	13.047	13.197
TIME	24:00:18	23:59:12	24:00:04	23:58:58	24:00:06	23:55:56	20:34:10	20:19:26	20:30:38	20:31:58	20:33:08
NODE	Jilliby25.1	Jilliby26.1	Jilliby27.1	Jilliby28.1	Jilliby29.1	Jilliby30.1	Jilliby31.1	Jilliby32.1	Jilliby33.1	Jilliby35.1	Jilliby36.1
MINIMUM	6.672	7.586	7.161	8.002	7.988	8.742	9.402	9.586	9.449	9.506	10.435
TIME	1:39:10	5:16:20	3:41:42	2:55:04	1:34:12	1:29:16	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26
MAXIMUM	13.218	13.219	13.221	13.224	13.23	13.236	13.276	13.346	13.379	13.392	13.371
TIME	20:32:46	20:30:14	20:30:02	20:28:56	20:28:24	20:30:58	20:31:18	20:29:32	20:30:00	20:29:22	20:30:24
NODE	Jilliby37.1	Jilliby38.1	Jilliby39.1	Jilliby40.1	Jilliby41.1	Jilliby42.1	Jilliby43.1	Jilliby44.1	Jilliby45.1	Jilliby46.1	Jilliby47.1
MINIMUM	10.586	11.098	12.309	11.736	11.779	12.969	13.666	14.106	15.289	15.918	15.793
TIME	3:47:26	3:47:26	3:47:26	3:47:30	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26
MAXIMUM	13.896	13.968	14.615	14.741	14.774	14.939	15.216	15.501	15.997	16.804	17.709
TIME	20:07:52	20:06:32	20:04:18	20:04:04	20:03:52	20:03:34	20:03:42	20:02:26	19:59:52	20:00:54	20:00:10
NODE	Jilliby48.1	Jilliby49.1	Jilliby50.1	Jilliby51.1	Jilliby52.1	Jilliby53.1	Jilliby54.1	Jilliby55.1	LittleJ01.1	LittleJ02.1	LittleJ03.1
MINIMUM	16.226	16.239	16.686	17.046	17.899	18.099	18.645	20.626	9.018	9.649	9.699
TIME	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26
MAXIMUM	18.111	18.415	19.239	19.287	20.176	20.484	21.239	22.893	13.207	13.416	13.463
TIME	20:00:12	20:09:32	20:08:38	20:05:58	18:05:16	20:05:30	20:00:06	20:05:22	20:31:26	19:35:52	19:35:16
NODE	LittleJ04.1	LittleJ05.1	LittleJ06.1	LittleJ07.1	LittleJ08.1	LittleJ09.1	LittleJ10.1	LittleJ11.1	LittleJ12.1	LittleJ13.1	LittleJ14.1
MINIMUM	8.849	8.799	9.916	10.067	10.039	10.496	12.09	13.349	14.87	15.554	16.561

TIME	3:47:26	3:47:08	3:41:14	3:12:54	1:31:22	1:28:46	1:28:04	1:23:52	1:23:50	2:34:30	3:47:26
MAXIMUM	14.333	14.576	14.648	14.689	15.633	15.71	15.892	16.379	19.264	20.265	20.956
TIME	18:22:50	18:25:44	18:26:12	18:25:58	18:27:54	18:27:20	18:23:34	18:23:06	18:17:12	18:15:42	18:14:10
NODE	LittleJ15.1	LittleJ16.1	LittleJ17.1	LittleJ18.1	LittleJ19.1	LittleJ20.1	LittleJ21.1	LittleJ22.1	LittleJ23.1	LittleJ24.1	LittleJ25.1
MINIMUM	19.666	18.2	19.965*	19.753	20.78	20.799	21.503	22.17	23.019	24.399	24.402
TIME	3:52:30	3:47:26	3:47:34	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:50:38	3:47:26
MAXIMUM	21.943	21.939	23.131	23.707	24.109	25.516	26.215	27.032	27.402	28.469	28.853
TIME	18:10:42	18:10:58	18:20:54	18:17:54	18:17:12	18:15:00	18:14:30	18:11:40	18:11:12	18:07:52	18:07:56
NODE	LittleJ26.1	LittleJ27.1	LittleJ28.1	Myrtle01.1	Myrtle02.1	Myrtle03.1	Myrtle04.1	Myrtle05.1	Myrtle06.1	Smith01.1	Smith02.1
MINIMUM	27.499	29.799	38.899	14.082	16.199	17.687	19.01	18.849	33.099	11.799	11.926
TIME	3:47:26	3:47:26	3:47:26	1:39:14	1:36:44	1:35:46	1:34:44	1:28:14	3:47:26	3:47:26	3:47:26
MAXIMUM	31.668	33.481	44.803	15.938	18.638	19.678	20.899	21.605	36.088	13.794	13.913
TIME	18:10:18	17:32:06	18:12:34	18:17:04	17:05:16	4:02:52	3:56:18	18:00:50	3:56:46	20:09:42	18:01:10
NODE	Smith03.1	Smith04.1	Smith05.1	Smith06.1	Smith07.1	Smith08.1	Smith09.1	Smith10.1	Smith11.1	Smith12.1	Smith13.1
MINIMUM	11.759	11.574	11.605	11.613	13.056	14.089	14.499	15.441	16.299	16.499	17.228*
TIME	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:30
MAXIMUM	14.614	14.682	14.758	15.171	15.351	15.731	16.799	17.366	17.829	18.294	18.679
TIME	20:04:34	20:04:38	20:04:16	20:03:28	20:03:08	20:01:30	20:00:22	20:00:16	20:00:12	20:01:52	20:00:32
NODE	Wyong01.1	Wyong01.2	Wyong02.1	Wyong03.1	Wyong04.1	Wyong05.1	Wyong06.1	Wyong07.1	Wyong09.1	Wyong10.1	Wyong11.1
MINIMUM	0.215	0.264	0.205	0.199	0.215	0.204	0.213	0.439	0.745	0.624	0.815
TIME	1:00:00	1:00:00	1:00:00	1:00:00	1:00:00	1:00:00	1:00:00	1:00:00	3:47:26	1:05:58	1:03:30
MAXIMUM	8.115	8.04	8.101	8.517	8.893	9.272	9.377	9.46	10.099	10.513	10.594
TIME	24:26:56	24:25:52	24:26:58	24:20:16	24:14:52	24:09:54	24:08:10	24:07:26	24:00:14	23:58:52	23:56:46
NODE	Wyong12.1	Wyong13.1	Wyong14.1	Wyong15.1	Wyong16.1	Wyong17.1	Wyong18.1	Wyong19.1	Wyong20.1	Wyong21.1	Wyong22.1
MINIMUM	1.099	1.274	1.307	2.006	2.19	2.664	2.649	2.709	3.007	3.273	3.411
TIME	1:01:38	1:00:30	1:00:00	1:00:00	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26
MAXIMUM	10.87	11.364	11.442	11.279	11.344	11.471	11.808	12.559	13.162	13.376	13.505
TIME	23:39:42	23:39:16	23:39:14	23:39:44	23:38:14	23:38:26	23:34:56	23:34:36	23:34:12	23:31:10	23:33:14
NODE	Wyong23.1	Wyong24.1	Wyong25.1	Wyong26.1	Wyong27.1	Wyong28.1	Wyong29.1	Wyong30.1	Wyong31.1	Wyong32.1	Wyong33.1
MINIMUM	3.419	3.542	3.789	4.105	4.161	4.245	4.61	4.524	4.637	4.708	5.279
TIME	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26
MAXIMUM	13.573	13.602	13.79	13.945	14.115	14.754	14.817	14.928	15.16	15.531	15.896
TIME	23:33:14	23:33:14	23:35:36	23:32:30	23:32:30	23:32:22	23:32:20	23:29:38	23:31:44	23:31:26	23:32:20
NODE	Wyong34.1	Wyong35.1	Wyong36.1	Wyong37.1	Wyong38.1	Wyong39.1	Wyong40.1	Wyong41.1	Wyong42.1	Wyong43.1	Wyong44.1

MINIMUM	5.918	5.612	5.799	6.151	6.354	6.607	6.858	6.862	6.899	6.999	7.46
TIME	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26
MAXIMUM	16.259	17.723	16.826	16.77	16.814	16.957	16.968	16.981	17.093	17.153	17.139
TIME	23:29:18	23:30:28	23:32:32	23:28:48	23:31:44	23:32:22	23:29:50	23:29:52	23:30:08	23:30:36	23:32:52
NODE	Wyong46.1	Wyong47.1	Wyong48.1	Wyong49.1	Wyong50.1	Wyong51.1	Wyong52.1	Wyong53.1	Wyong54.1	Wyong55.1	Wyong56.1
MINIMUM	8.264	7.657	9.200*	7.569	7.886	8.171	8.357	8.364	8.288	8.284	8.329
TIME	4:11:38	3:47:26	4:31:20	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26
MAXIMUM	17.23	17.626	17.644	17.661	17.965	18.271	18.46	18.505	18.518	18.633	18.748
TIME	23:31:34	23:16:44	23:16:50	23:16:50	23:14:22	23:13:08	23:12:28	23:12:18	23:11:52	23:12:04	23:11:28
NODE	Wyong57.1	Wyong58.1	Wyong59.1	Wyong60.1	Wyong61.1	Wyong62.1	Wyong63.1	Wyong64.1	Wyong65.1	Wyong66.1	Wyong67.1
MINIMUM	8.399	8.45	8.891	8.711	8.979*	9.179	9.399	9.466	9.859	9.428	9.739
TIME	3:47:26	3:47:26	3:47:26	3:47:26	3:47:46	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:50:24
MAXIMUM	19.563	19.695	19.92	19.919	19.927	19.941	20.229	20.73	20.977	20.979	21.29
TIME	23:07:00	23:06:48	23:07:34	23:07:32	23:07:28	23:07:50	23:03:54	23:02:28	22:59:32	23:00:18	22:57:52
NODE	Wyong68.1	Wyong69.1	Wyong70.1	Wyong71.1	Wyong72.1	Wyong73.1	Wyong74.1	Wyong75.1	Wyong76.1	Wyong77.1	Wyong78.1
MINIMUM	9.583	9.649	9.695	9.799	9.829	9.849	9.869*	9.899	9.919	9.939	9.999
TIME	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:47:26	3:51:32	3:47:26	3:47:26	3:47:26	3:39:04
MAXIMUM	21.317	21.641	21.674	21.896	22.396	22.514	22.619	22.587	22.538	22.513	24.555
TIME	22:57:54	22:57:00	22:57:30	22:56:44	22:56:48	22:53:12	22:52:40	22:52:38	22:52:40	22:52:36	22:44:54
NODE	Wyong79.1	Wyong80.1	Wyong81.1								
MINIMUM	13.899	14.799	15.499								
TIME	3:26:54	3:21:16	3:17:32								
MAXIMUM	24.599	24.774	25.488								
TIME	22:42:34	22:43:48	22:31:08								

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Node:	H Chand01.1	H Chand01.2	H Chand02.1	H Chand03.1	H Chand04.1	H Durren01.1	H Durren01.2	H Durren02.1	H Jilliby01.1
	Max 17.119	Max 17.131	Max 20.275	Max 22.352	Max 81.704	Max 13.388	Max 13.385	Max 13.389	Max 10.215
Time	Min 13.999	Min 7.443	Min 15.999	Min 18.999	Min 79.999	Min 9.899	Min 9.423	Min 10.049	Min 1.100
1	13.999	7.443	15.999	18.999	79.999	9.899	9.423	10.049	1.1
1.5	13.999	7.443	15.999	18.999	79.999	9.899	9.423	10.049	1.1
2	13.999	7.443	15.999	18.999	79.999	9.899	9.423	10.049	1.1
2.5	13.999	7.443	15.999	18.999	79.999	9.899	9.423	10.049	1.1
3	13.999	7.443	15.999	18.999	79.999	9.899	9.423	10.049	1.1
3.5	13.999	7.443	15.999	18.999	79.999	9.899	9.423	10.049	1.1
4	15.302	7.8	19.383	22.131	81.092	9.925	9.516	10.049	1.231
4.5	16.246	9.865	18.731	19.772	80.312	9.922	9.658	10.049	1.204
5	14.669	10.497	18.149	19.432	80.731	9.91	9.727	10.049	1.169
5.5	14.072	10.324	18.203	19.064	80.539	9.912	9.8	10.049	1.131
6	14.082	10.335	18.23	19.284	80.5	10.132	9.867	10.065	1.104
6.5	14.077	10.409	18.303	19.44	80.529	10.325	10.017	10.318	1.151
7	14.121	10.565	18.477	19.473	80.523	10.379	10.207	10.377	1.18
7.5	14.095	10.884	18.677	19.68	80.512	10.497	10.465	10.502	1.236
8	14.12	11.406	18.735	19.405	80.573	10.792	10.792	10.789	1.455
8.5	14.145	11.925	18.702	19.398	80.49	11.107	11.107	11.106	2.034
9	14.159	12.387	18.627	19.302	80.484	11.315	11.316	11.315	2.407
9.5	13.999	12.748	18.544	19.166	80.702	11.404	11.409	11.369	2.709
10	13.999	13.105	18.576	19.318	80.512	11.435	11.44	11.362	2.973
10.5	13.999	13.439	18.877	19.982	80.731	11.461	11.473	11.345	3.282
11	13.999	13.759	19.559	20.202	80.765	11.542	11.556	11.466	3.707
11.5	14.094	13.99	19.864	20.26	80.771	11.663	11.661	11.657	4.264
12	14.264	14.189	19.975	20.353	80.78	11.835	11.787	11.842	4.962
12.5	14.308	14.287	19.744	20.04	80.617	11.993	11.898	12.006	5.568
13	14.345	14.333	19.414	19.822	80.607	12.134	12.03	12.148	5.862
13.5	14.377	14.367	19.236	19.751	80.607	12.257	12.168	12.272	6.023
14	14.402	14.393	19.155	19.739	80.611	12.366	12.292	12.382	6.265
14.5	14.419	14.408	19.165	19.858	80.661	12.464	12.401	12.477	6.497
15	14.429	14.418	19.236	19.9	80.666	12.555	12.501	12.567	6.715
15.5	14.438	14.426	19.273	19.91	80.667	12.642	12.595	12.655	6.934
16	14.443	14.431	19.296	19.918	80.669	12.723	12.685	12.736	7.105
16.5	14.535	14.502	19.773	20.542	80.927	12.817	12.786	12.828	7.273
17	14.639	14.597	20.199	20.707	80.929	12.93	12.906	12.938	7.459
17.5	14.751	14.714	20.275	20.761	80.933	13.037	13.02	13.042	7.723
18	14.862	14.836	20.245	20.761	80.935	13.135	13.126	13.138	8.074
18.5	14.951	14.941	19.858	20.354	80.748	13.221	13.217	13.223	8.397
19	15.053	15.047	19.467	20.176	80.744	13.294	13.29	13.294	8.648
19.5	15.137	15.133	19.28	20.147	80.745	13.345	13.342	13.346	8.847
20	15.191	15.187	19.192	20.149	80.745	13.378	13.376	13.38	8.999
20.5	15.223	15.223	18.888	19.7	80.541	13.388	13.385	13.389	9.088
21	15.325	15.326	18.451	19.528	80.515	13.379	13.377	13.381	9.129
21.5	15.676	15.679	18.112	19.622	80.514	13.36	13.357	13.362	9.175
22	16.323	16.321	17.771	19.767	80.514	13.336	13.333	13.338	9.332
22.5	16.858	16.858	17.389	19.725	80.398	13.31	13.306	13.311	9.666
23	17.084	17.083	17.194	19.628	80.348	13.28	13.277	13.282	9.998
23.5	17.112	17.103	17.191	19.574	80.342	13.248	13.244	13.249	10.171
24	17.039	17.04	17.148	19.558	80.341	13.213	13.209	13.214	10.215
24.5	16.916	16.914	17.06	19.586	80.341	13.176	13.171	13.177	10.186
25	16.756	16.756	16.957	19.64	80.341	13.138	13.133	13.14	10.121
25.5	16.623	16.598	16.864	19.705	80.341	13.101	13.095	13.103	10.039
26	16.431	16.437	16.786	19.768	80.341	13.063	13.056	13.065	9.967
26.5	16.311	16.311	16.695	19.761	80.29	13.026	13.016	13.029	9.886
27	16.204	16.201	16.562	19.703	80.245	12.989	12.978	12.992	9.803
27.5	16.093	16.088	16.427	19.673	80.228	12.953	12.94	12.957	9.725
28	15.962	15.966	16.314	19.68	80.222	12.921	12.905	12.926	9.651
28.5	15.835	15.838	16.223	19.714	80.194	12.891	12.872	12.897	9.618

Node:	H Chand01.1	H Chand01.2	H Chand02.1	H Chand03.1	H Chand04.1	H Durren01.1	H Durren01.2	H Durren02.1	H Jilliby01.1
	Max 17.119	Max 17.131	Max 20.275	Max 22.352	Max 81.704	Max 13.388	Max 13.385	Max 13.389	Max 10.215
Time	Min 13.999	Min 7.443	Min 15.999	Min 18.999	Min 79.999	Min 9.899	Min 9.423	Min 10.049	Min 1.100
29	15.726	15.728	16.193	19.723	80.157	12.863	12.842	12.869	9.43
29.5	15.597	15.601	16.279	19.73	80.368	12.837	12.814	12.844	9.347
30	15.48	15.478	16.263	19.747	80.146	12.815	12.789	12.823	9.266
30.5	15.377	15.377	16.309	19.778	80.235	12.797	12.77	12.806	9.186
31	15.284	15.283	16.262	19.73	80.132	12.781	12.753	12.79	9.107
31.5	15.2	15.2	16.166	19.7	80.302	12.765	12.736	12.775	9.028
32	15.127	15.127	16.113	19.711	80.074	12.751	12.721	12.762	8.95
32.5	15.051	15.053	16.158	19.634	80.06	12.739	12.707	12.75	8.871
33	14.992	14.992	16.064	19.616	80.184	12.729	12.696	12.74	8.794
33.5	14.941	14.941	16.043	19.643	80.057	12.721	12.687	12.733	8.71
34	14.896	14.896	16.103	19.669	80.078	12.714	12.679	12.725	8.631
34.5	14.855	14.855	16.118	19.605	80.051	12.707	12.672	12.718	8.561
35	14.818	14.818	16.106	19.598	80.134	12.699	12.664	12.71	8.486
35.5	14.781	14.782	16.088	19.574	80.112	12.69	12.654	12.702	8.417
36	14.751	14.751	16.051	19.534	80.058	12.682	12.646	12.694	8.352
36.5	14.723	14.723	16.396	19.442	80.039	12.673	12.636	12.685	8.29
37	14.694	14.694	16.349	19.405	80.063	12.664	12.626	12.676	8.23
37.5	14.666	14.666	16.358	19.666	80.05	12.654	12.617	12.665	8.168
38	14.637	14.637	16.367	19.546	80.094	12.645	12.607	12.656	8.112
38.5	14.614	14.613	16.495	19.415	80.09	12.636	12.597	12.646	8.05
39	14.592	14.592	16.439	19.287	80.07	12.625	12.587	12.635	7.989
39.5	14.565	14.566	16.37	19.192	80.063	12.614	12.577	12.623	7.933
40	14.535	14.535	16.3	19.138	80.061	12.602	12.566	12.611	7.871
40.5	14.51	14.509	16.229	19.099	80.054	12.589	12.553	12.597	7.796
41	14.489	14.489	16.224	19.062	80.023	12.574	12.539	12.582	7.714
41.5	14.473	14.473	16.159	19.024	80.001	12.559	12.524	12.566	7.621
42	14.461	14.462	16.082	19.002	80.001	12.544	12.509	12.551	7.519
42.5	14.45	14.449	16.005	19.002	80.001	12.528	12.494	12.535	7.42
43	14.44	14.44	16.011	19.002	80.001	12.513	12.479	12.519	7.335
43.5	14.431	14.431	16.004	19.003	80.001	12.498	12.464	12.504	7.261
44	14.42	14.42	16.004	19.004	80.001	12.482	12.448	12.489	7.191
44.5	14.412	14.412	16.07	19.001	80.001	12.466	12.431	12.473	7.133
45	14.401	14.401	16.004	19.001	80.001	12.451	12.416	12.457	7.083
45.5	14.391	14.391	16.004	19.001	80.001	12.435	12.401	12.441	7.037
46	14.385	14.383	16.004	19.001	80.001	12.419	12.386	12.425	6.994
46.5	14.373	14.373	16.004	19.001	80.001	12.404	12.372	12.41	6.953
47	14.359	14.359	16.004	19.001	80.001	12.389	12.358	12.395	6.91
47.5	14.346	14.346	16.003	19.001	80.001	12.375	12.344	12.381	6.871
48	14.333	14.333	16.015	19.001	80.001	12.363	12.331	12.368	6.833
48.5	14.316	14.316	16.119	19.001	80.001	12.35	12.32	12.355	6.798
49	14.304	14.303	16.127	19.001	80.001	12.338	12.308	12.343	6.764
49.5	14.287	14.288	16.116	19.001	80.001	12.325	12.296	12.33	6.729
50	14.27	14.271	16.1	19.001	80.001	12.312	12.283	12.317	6.692
50.5	14.257	14.257	16.111	19.001	80.001	12.3	12.272	12.304	6.656
51	14.242	14.242	16.116	19.001	80.001	12.287	12.259	12.29	6.62
51.5	14.269	14.253	16.143	19.001	80.001	12.274	12.246	12.277	6.584
52	14.267	14.239	16.147	19.001	80.001	12.261	12.233	12.264	6.547
52.5	14.253	14.226	16.141	19.001	80.001	12.247	12.221	12.251	6.51
53	14.191	14.208	16.134	19.001	80.001	12.234	12.208	12.237	6.483
53.5	14.053	14.223	16.125	19.001	80.001	12.221	12.193	12.223	6.454
54	13.999	14.206	16.124	19.001	80.001	12.207	12.18	12.21	6.424
54.5	14.041	14.168	16.131	19.001	80.001	12.194	12.167	12.197	6.393
55	14.133	14.124	16.134	19.001	80.001	12.181	12.153	12.183	6.36
55.5	14.181	14.084	16.136	19.001	80.001	12.167	12.14	12.169	6.324
56	14.099	14.075	16.137	19.001	80.001	12.153	12.127	12.156	6.291
56.5	13.999	14.061	16.139	19.001	80.001	12.14	12.114	12.142	6.261
57	14.06	14.021	16.142	19.001	80.001	12.126	12.101	12.128	6.235
57.5	13.999	14.001	16.144	19.001	80.001	12.112	12.087	12.114	6.209
58	13.999	13.991	16.147	19.001	80.001	12.098	12.073	12.1	6.182

Node:	H Chand01.1	H Chand01.2	H Chand02.1	H Chand03.1	H Chand04.1	H Durren01.1	H Durren01.2	H Durren02.1	H Jilliby01.1
	Max 17.119	Max 17.131	Max 20.275	Max 22.352	Max 81.704	Max 13.388	Max 13.385	Max 13.389	Max 10.215
Time	Min 13.999	Min 7.443	Min 15.999	Min 18.999	Min 79.999	Min 9.899	Min 9.423	Min 10.049	Min 1.100
58.5	13.999	13.986	16.384	19.001	80.001	12.084	12.06	12.086	6.154
59	13.999	13.98	16.387	19.001	80.001	12.071	12.046	12.073	6.128
59.5	13.999	13.974	16.381	19.001	80.001	12.057	12.033	12.059	6.1
60	13.999	13.968	16.374	19.001	80.001	12.044	12.02	12.046	6.077
60.5	13.999	13.962	16.366	19.001	80.001	12.03	12.007	12.032	6.057
61	13.999	13.956	16.358	19.001	80.001	12.017	11.994	12.019	6.042
61.5	13.999	13.949	16.35	19.001	80.001	12.004	11.981	12.006	6.028
62	13.999	13.942	16.343	19.001	80.001	11.991	11.968	11.993	6.016
62.5	13.999	13.936	16.335	19.001	80.001	11.978	11.955	11.98	6.005
63	13.999	13.93	16.328	19.001	80.001	11.965	11.943	11.967	5.997
63.5	13.999	13.925	16.321	19.001	80.001	11.953	11.931	11.955	5.986
64	13.999	13.922	16.314	19.001	80.001	11.94	11.919	11.943	5.978
64.5	13.999	13.919	16.308	19.001	80.001	11.928	11.907	11.93	5.971
65	13.999	13.917	16.302	19.001	80.001	11.916	11.895	11.918	5.965
65.5	13.999	13.916	16.298	19.001	80.001	11.904	11.884	11.906	5.958
66	13.999	13.914	16.292	19.001	80.001	11.892	11.872	11.895	5.952
66.5	13.999	13.913	16.286	19.001	80.001	11.881	11.861	11.883	5.946
67	13.999	13.913	16.281	19.001	80.001	11.87	11.85	11.872	5.94
67.5	13.999	13.912	16.275	19.001	80.001	11.859	11.839	11.861	5.936
68	13.999	13.912	16.27	19.001	80.001	11.848	11.829	11.85	5.932
68.5	13.999	13.911	16.265	19.001	80.001	11.837	11.818	11.839	5.929
69	13.999	13.911	16.26	19.001	80.001	11.826	11.808	11.829	5.926
69.5	13.999	13.911	16.256	19.001	80.001	11.816	11.799	11.819	5.923
70	13.999	13.911	16.252	19.001	80.001	11.806	11.79	11.809	5.921
70.5	13.999	13.911	16.247	19.001	80.001	11.796	11.782	11.799	5.919
71	13.999	13.911	16.243	19.001	80.001	11.787	11.773	11.789	5.918
71.5	13.999	13.91	16.241	19.001	80.001	11.778	11.765	11.78	5.916
72	13.999	13.91	16.237	19.001	80.001	11.769	11.757	11.771	5.915
72.5	13.999	13.91	16.234	19.001	80.001	11.76	11.749	11.762	5.914
73	13.999	13.91	16.23	19.001	80.001	11.751	11.742	11.753	5.913
73.5	13.999	13.91	16.226	19.001	80.001	11.743	11.734	11.745	5.912
74	13.999	13.909	16.223	19.001	80.001	11.734	11.727	11.736	5.911
74.5	13.999	13.909	16.219	19.001	80.001	11.726	11.719	11.728	5.91
75	13.999	13.909	16.216	19.001	80.001	11.719	11.712	11.72	5.91
75.5	13.999	13.908	16.213	19.001	80.001	11.711	11.705	11.712	5.909
76	13.999	13.908	16.21	19.001	80.001	11.703	11.698	11.705	5.908
76.5	13.999	13.908	16.207	19.001	80.001	11.696	11.691	11.697	5.907
77	13.999	13.908	16.204	19.001	80.001	11.689	11.685	11.69	5.904
77.5	13.999	13.908	16.201	19.001	80.001	11.682	11.678	11.683	5.901
78	13.999	13.908	16.198	19.001	80.001	11.675	11.672	11.676	5.9
78.5	13.999	13.908	16.196	19.001	80.001	11.668	11.665	11.67	5.898
79	13.999	13.908	16.193	19.001	80.001	11.662	11.66	11.663	5.897
79.5	13.999	13.908	16.191	19.001	80.001	11.656	11.653	11.656	5.896
80	13.999	13.908	16.188	19.001	80.001	11.649	11.647	11.65	5.895

..\results\Subsided\100y30h\W2CP_Subsided_100y30h_1d_H.csv Continued......

Node:	H Jilliby01.2	H Jilliby02.1	H Jilliby03.1	H Jilliby04.1	H Jilliby05.1	H Jilliby06.1	H Jilliby07.1	H Jilliby08.1	H Jilliby09.1
	Max 10.048	Max 10.638	Max 10.661	Max 10.683	Max 10.683	Max 10.670	Max 10.687	Max 10.692	Max 10.693
Time	Min 0.433	Min 2.604	Min 1.611	Min 2.420	Min 2.847	Min 2.931	Min 3.476	Min 3.065	Min 3.172
1	0.433	2.604	1.611	2.42	2.847	2.931	3.476	3.065	3.172
1.5	0.495	2.604	1.611	2.42	2.847	2.931	3.476	3.088	3.189
2	0.499	2.604	1.611	2.42	2.847	2.931	3.476	3.112	3.174
2.5	0.502	2.604	1.611	2.42	2.847	2.931	3.476	3.119	3.174
3	0.507	2.604	1.611	2.42	2.847	2.931	3.476	3.126	3.174
3.5	0.511	2.604	1.611	2.42	2.847	2.931	3.476	3.132	3.174
4	0.609	2.623	1.799	2.516	2.93	2.933	3.476	3.369	3.28
4.5	0.654	2.604	1.899	2.48	2.919	2.933	3.476	3.354	3.356
5	0.688	2.604	2.06	2.426	2.94	2.94	3.476	3.409	3.413
5.5	0.709	2.604	2.307	2.427	2.965	3.029	3.497	3.497	3.511
6	0.725	2.604	2.564	2.566	3.168	3.228	3.587	3.595	3.649
6.5	0.749	2.68	2.684	2.731	3.378	3.422	3.648	3.671	3.776
7	0.781	2.816	2.821	2.915	3.533	3.588	3.723	3.765	3.966
7.5	0.828	3.013	3.035	3.303	4.046	4.128	4.175	4.235	4.649
8	0.949	3.616	3.707	4.291	4.786	4.863	4.897	4.942	5.321
8.5	1.402	4.278	4.429	4.985	5.282	5.338	5.362	5.394	5.712
9	1.938	4.589	4.785	5.408	5.613	5.654	5.672	5.697	5.96
9.5	2.326	4.815	5.042	5.681	5.861	5.896	5.912	5.932	6.165
10	2.695	4.909	5.163	5.834	6.008	6.041	6.055	6.075	6.299
10.5	3.087	4.999	5.286	5.998	6.159	6.19	6.204	6.222	6.439
11	3.571	5.149	5.47	6.253	6.407	6.436	6.449	6.467	6.678
11.5	4.184	5.298	5.661	6.515	6.659	6.686	6.698	6.714	6.915
12	4.908	5.641	5.922	6.724	6.876	6.906	6.919	6.936	7.134
12.5	5.547	5.92	6.125	6.878	7.02	7.049	7.062	7.079	7.28
13	5.842	6.103	6.217	6.995	7.133	7.162	7.174	7.191	7.388
13.5	6.006	6.246	6.296	7.089	7.223	7.247	7.258	7.273	7.44
14	6.248	6.44	6.452	7.132	7.268	7.29	7.3	7.314	7.467
14.5	6.48	6.616	6.617	7.187	7.321	7.34	7.349	7.36	7.492
15	6.693	6.846	6.842	7.236	7.368	7.38	7.39	7.404	7.518
15.5	6.906	7.08	7.079	7.271	7.403	7.414	7.423	7.435	7.543
16	7.073	7.255	7.256	7.349	7.436	7.445	7.453	7.462	7.561
16.5	7.233	7.435	7.437	7.486	7.539	7.543	7.548	7.555	7.619
17	7.411	7.635	7.637	7.669	7.7	7.702	7.706	7.712	7.752
17.5	7.667	7.886	7.886	7.903	7.916	7.916	7.92	7.925	7.939
18	8.018	8.222	8.221	8.229	8.233	8.234	8.237	8.24	8.242
18.5	8.331	8.556	8.557	8.566	8.567	8.567	8.57	8.572	8.573
19	8.582	8.84	8.844	8.855	8.857	8.858	8.86	8.862	8.86
19.5	8.773	9.068	9.073	9.087	9.086	9.086	9.089	9.091	9.089
20	8.918	9.243	9.251	9.266	9.265	9.265	9.268	9.269	9.268
20.5	9.001	9.343	9.355	9.37	9.37	9.369	9.372	9.375	9.372
21	9.04	9.392	9.404	9.42	9.42	9.418	9.422	9.425	9.422
21.5	9.083	9.442	9.453	9.468	9.467	9.466	9.47	9.472	9.469
22	9.223	9.613	9.619	9.633	9.631	9.629	9.634	9.636	9.631
22.5	9.524	9.996	10.002	10.014	10.011	10.007	10.015	10.016	10.011
23	9.828	10.382	10.398	10.411	10.411	10.402	10.414	10.415	10.415
23.5	10	10.587	10.609	10.627	10.626	10.614	10.629	10.633	10.634
24	10.048	10.638	10.661	10.683	10.682	10.669	10.686	10.692	10.692
24.5	10.022	10.6	10.622	10.645	10.644	10.632	10.649	10.655	10.655
25	9.96	10.521	10.542	10.563	10.564	10.552	10.567	10.572	10.572
25.5	9.881	10.422	10.442	10.462	10.462	10.451	10.466	10.47	10.47
26	9.811	10.337	10.356	10.374	10.374	10.365	10.377	10.381	10.381
26.5	9.735	10.244	10.261	10.278	10.277	10.27	10.281	10.285	10.284
27	9.658	10.15	10.165	10.18	10.18	10.173	10.183	10.186	10.185
27.5	9.587	10.061	10.076	10.09	10.09	10.084	10.093	10.096	10.094
28	9.519	9.975	9.989	10.003	10.002	9.998	10.005	10.008	10.006
28.5	9.405	9.87	9.892	9.895	9.902	9.898	9.905	9.908	9.911

Node:	H Jilliby01.2	H Jilliby02.1	H Jilliby03.1	H Jilliby04.1	H Jilliby05.1	H Jilliby06.1	H Jilliby07.1	H Jilliby08.1	H Jilliby09.1
	Max 10.048	Max 10.638	Max 10.661	Max 10.683	Max 10.683	Max 10.670	Max 10.687	Max 10.692	Max 10.693
Time	Min 0.433	Min 2.604	Min 1.611	Min 2.420	Min 2.847	Min 2.931	Min 3.476	Min 3.065	Min 3.172
29	9.369	9.769	9.783	9.797	9.797	9.794	9.8	9.803	9.8
29.5	9.286	9.668	9.68	9.694	9.693	9.691	9.696	9.698	9.696
30	9.207	9.57	9.579	9.594	9.593	9.591	9.595	9.598	9.595
30.5	9.13	9.469	9.477	9.491	9.49	9.488	9.493	9.495	9.491
31	9.052	9.364	9.369	9.382	9.381	9.38	9.384	9.387	9.382
31.5	8.975	9.263	9.266	9.278	9.277	9.275	9.28	9.284	9.278
32	8.899	9.168	9.17	9.18	9.18	9.18	9.182	9.184	9.18
32.5	8.823	9.076	9.078	9.087	9.086	9.087	9.089	9.09	9.087
33	8.745	8.985	8.987	8.994	8.995	8.995	8.997	8.999	8.995
33.5	8.667	8.89	8.891	8.897	8.898	8.898	8.9	8.901	8.899
34	8.59	8.798	8.799	8.805	8.805	8.805	8.806	8.808	8.806
34.5	8.502	8.714	8.715	8.719	8.719	8.719	8.72	8.722	8.72
35	8.433	8.634	8.634	8.638	8.638	8.638	8.639	8.641	8.64
35.5	8.365	8.556	8.556	8.559	8.56	8.56	8.561	8.563	8.562
36	8.302	8.483	8.483	8.487	8.487	8.488	8.489	8.491	8.49
36.5	8.241	8.418	8.418	8.421	8.421	8.421	8.423	8.424	8.423
37	8.183	8.355	8.355	8.357	8.358	8.358	8.36	8.361	8.36
37.5	8.124	8.29	8.29	8.294	8.294	8.294	8.295	8.296	8.297
38	8.068	8.232	8.233	8.234	8.235	8.236	8.237	8.239	8.239
38.5	8.008	8.173	8.173	8.176	8.177	8.177	8.179	8.18	8.18
39	7.947	8.114	8.114	8.116	8.118	8.118	8.12	8.121	8.12
39.5	7.892	8.054	8.054	8.057	8.059	8.059	8.06	8.062	8.061
40	7.828	7.988	7.988	7.991	7.993	7.994	7.995	7.997	7.997
40.5	7.757	7.915	7.914	7.918	7.921	7.922	7.923	7.925	7.926
41	7.67	7.833	7.833	7.837	7.841	7.842	7.844	7.847	7.849
41.5	7.574	7.743	7.743	7.748	7.754	7.755	7.757	7.76	7.765
42	7.476	7.651	7.652	7.658	7.666	7.668	7.67	7.673	7.686
42.5	7.379	7.555	7.555	7.563	7.575	7.577	7.579	7.583	7.602
43	7.298	7.465	7.466	7.474	7.491	7.494	7.497	7.502	7.533
43.5	7.228	7.387	7.387	7.398	7.424	7.43	7.434	7.437	7.489
44	7.16	7.318	7.317	7.331	7.374	7.382	7.387	7.393	7.465
44.5	7.106	7.252	7.253	7.272	7.328	7.339	7.345	7.353	7.447
45	7.062	7.196	7.196	7.221	7.288	7.302	7.309	7.318	7.431
45.5	7.017	7.147	7.146	7.178	7.254	7.27	7.278	7.288	7.415
46	6.974	7.1	7.099	7.141	7.225	7.243	7.251	7.262	7.401
46.5	6.933	7.056	7.053	7.11	7.202	7.221	7.23	7.242	7.388
47	6.891	7.011	7.008	7.082	7.18	7.202	7.211	7.223	7.373
47.5	6.852	6.969	6.964	7.055	7.157	7.178	7.187	7.2	7.354
48	6.815	6.928	6.923	7.03	7.132	7.154	7.163	7.175	7.329
48.5	6.78	6.891	6.885	7.006	7.109	7.13	7.139	7.151	7.303
49	6.745	6.853	6.848	6.983	7.086	7.106	7.115	7.127	7.277
49.5	6.71	6.815	6.811	6.957	7.059	7.079	7.088	7.1	7.247
50	6.675	6.778	6.774	6.93	7.031	7.051	7.06	7.071	7.215
50.5	6.641	6.739	6.736	6.902	7.002	7.021	7.03	7.041	7.183
51	6.606	6.7	6.698	6.871	6.97	6.989	6.997	7.008	7.147
51.5	6.57	6.661	6.66	6.837	6.935	6.954	6.962	6.973	7.109
52	6.534	6.619	6.619	6.805	6.9	6.918	6.926	6.936	7.069
52.5	6.499	6.576	6.576	6.785	6.875	6.891	6.899	6.909	7.036
53	6.473	6.543	6.543	6.763	6.848	6.864	6.871	6.881	7.001
53.5	6.444	6.511	6.512	6.735	6.817	6.832	6.839	6.848	6.963
54	6.415	6.478	6.479	6.694	6.774	6.788	6.795	6.804	6.916
54.5	6.385	6.445	6.447	6.647	6.721	6.735	6.741	6.749	6.854
55	6.353	6.409	6.413	6.581	6.645	6.657	6.663	6.67	6.763
55.5	6.318	6.369	6.375	6.522	6.58	6.591	6.596	6.603	6.69
56	6.285	6.334	6.341	6.474	6.528	6.538	6.543	6.549	6.632
56.5	6.257	6.304	6.313	6.436	6.488	6.498	6.502	6.509	6.588
57	6.231	6.275	6.285	6.403	6.454	6.463	6.468	6.474	6.553
57.5	6.205	6.245	6.257	6.373	6.422	6.432	6.436	6.442	6.518
58	6.177	6.217	6.231	6.344	6.392	6.402	6.406	6.412	6.488

Node:	H Jilliby01.2	H Jilliby02.1	H Jilliby03.1	H Jilliby04.1	H Jilliby05.1	H Jilliby06.1	H Jilliby07.1	H Jilliby08.1	H Jilliby09.1
	Max 10.048	Max 10.638	Max 10.661	Max 10.683	Max 10.683	Max 10.670	Max 10.687	Max 10.692	Max 10.693
Time	Min 0.433	Min 2.604	Min 1.611	Min 2.420	Min 2.847	Min 2.931	Min 3.476	Min 3.065	Min 3.172
58.5	6.15	6.188	6.203	6.315	6.363	6.373	6.377	6.383	6.458
59	6.125	6.159	6.178	6.287	6.335	6.344	6.348	6.354	6.429
59.5	6.097	6.131	6.151	6.26	6.308	6.317	6.322	6.327	6.402
60	6.074	6.106	6.125	6.232	6.279	6.289	6.293	6.299	6.373
60.5	6.054	6.085	6.104	6.208	6.255	6.264	6.268	6.274	6.348
61	6.039	6.067	6.086	6.188	6.234	6.243	6.247	6.253	6.326
61.5	6.025	6.051	6.07	6.17	6.215	6.224	6.228	6.234	6.306
62	6.013	6.039	6.056	6.154	6.198	6.207	6.211	6.217	6.288
62.5	6.003	6.027	6.044	6.14	6.183	6.192	6.196	6.201	6.272
63	5.995	6.018	6.035	6.128	6.17	6.179	6.183	6.189	6.258
63.5	5.985	6.007	6.024	6.115	6.157	6.165	6.169	6.175	6.243
64	5.977	5.998	6.015	6.104	6.145	6.154	6.158	6.163	6.23
64.5	5.97	5.991	6.007	6.093	6.134	6.142	6.146	6.151	6.217
65	5.963	5.984	5.999	6.084	6.123	6.132	6.135	6.14	6.206
65.5	5.956	5.977	5.992	6.074	6.112	6.12	6.124	6.129	6.193
66	5.95	5.97	5.985	6.065	6.103	6.111	6.114	6.119	6.182
66.5	5.944	5.963	5.978	6.056	6.093	6.101	6.105	6.109	6.171
67	5.939	5.957	5.972	6.048	6.085	6.092	6.096	6.1	6.16
67.5	5.935	5.952	5.966	6.04	6.076	6.084	6.087	6.092	6.152
68	5.93	5.948	5.961	6.034	6.069	6.076	6.079	6.084	6.142
68.5	5.927	5.945	5.958	6.028	6.062	6.069	6.072	6.077	6.134
69	5.925	5.941	5.954	6.023	6.056	6.063	6.066	6.071	6.127
69.5	5.922	5.938	5.951	6.017	6.05	6.057	6.06	6.065	6.119
70	5.92	5.936	5.948	6.013	6.045	6.051	6.054	6.059	6.113
70.5	5.918	5.933	5.945	6.008	6.04	6.046	6.049	6.053	6.106
71	5.917	5.931	5.943	6.004	6.035	6.041	6.044	6.048	6.1
71.5	5.915	5.93	5.941	6.001	6.03	6.037	6.04	6.043	6.094
72	5.914	5.928	5.939	5.998	6.027	6.033	6.036	6.04	6.09
72.5	5.913	5.927	5.938	5.995	6.023	6.029	6.032	6.035	6.084
73	5.912	5.925	5.936	5.992	6.02	6.026	6.028	6.032	6.081
73.5	5.911	5.924	5.934	5.988	6.016	6.022	6.024	6.028	6.075
74	5.91	5.923	5.933	5.986	6.013	6.019	6.022	6.025	6.071
74.5	5.909	5.922	5.932	5.984	6.01	6.016	6.019	6.022	6.068
75	5.909	5.921	5.931	5.982	6.008	6.014	6.016	6.02	6.064
75.5	5.908	5.92	5.93	5.98	6.005	6.01	6.013	6.016	6.06
76	5.907	5.919	5.928	5.978	6.003	6.008	6.011	6.014	6.057
76.5	5.906	5.918	5.927	5.976	6	6.006	6.008	6.011	6.055
77	5.903	5.915	5.924	5.972	5.997	6.002	6.004	6.007	6.049
77.5	5.9	5.912	5.921	5.968	5.992	5.997	6	6.003	6.044
78	5.898	5.909	5.918	5.965	5.989	5.994	5.996	5.999	6.041
78.5	5.896	5.908	5.916	5.962	5.985	5.99	5.993	5.996	6.036
79	5.895	5.906	5.915	5.96	5.983	5.988	5.99	5.993	6.034
79.5	5.895	5.905	5.914	5.958	5.981	5.985	5.988	5.991	6.03
80	5.895	5.904	5.913	5.956	5.978	5.983	5.985	5.988	6.028

..\results\Subsided\100y30h\W2CP_Subsided_100y30h_1d_H.csv Continued......

Node:	H Jilliby10.1	H Jilliby11.1	H Jilliby12.1	H Jilliby13.1	H Jilliby14.1	H Jilliby15.1	H Jilliby16.1	H Jilliby17.1	H Jilliby18.1
	Max 10.693	Max 10.692	Max 10.697	Max 10.701	Max 10.701	Max 10.705	Max 10.711	Max 10.719	Max 10.752
Time	Min 3.533	Min 4.171	Min 4.543	Min 4.537	Min 4.976	Min 5.232	Min 5.568	Min 5.812	Min 6.189
1	3.533	4.171	4.543	4.537	4.976	5.232	5.568	5.812	6.189
1.5	3.592	4.171	4.544	4.56	5.076	5.232	5.568	5.812	6.189
2	3.591	4.173	4.555	4.613	5.118	5.232	5.568	5.812	6.189
2.5	3.591	4.173	4.578	4.651	5.093	5.232	5.568	5.812	6.189
3	3.591	4.173	4.603	4.674	5.059	5.232	5.568	5.812	6.189
3.5	3.592	4.173	4.627	4.687	5.018	5.232	5.568	5.812	6.189
4	3.616	4.205	4.706	4.727	5.121	5.367	5.732	6.05	6.31
4.5	3.652	4.25	4.76	4.853	5.331	5.58	5.844	6.044	6.189
5	3.707	4.279	4.892	4.968	5.334	5.648	5.869	6.098	6.189
5.5	3.835	4.412	5.017	5.056	5.341	5.7	5.907	6.162	6.459
6	3.949	4.513	5.1	5.13	5.366	5.923	6.501	7.101	7.584
6.5	4.057	4.596	5.315	5.457	6.082	7.018	7.428	7.731	8.073
7	4.36	5.179	6.232	6.287	6.575	7.409	7.836	8.118	8.422
7.5	5.138	6.019	6.846	6.891	7.039	7.666	8.101	8.379	8.67
8	5.742	6.514	7.218	7.26	7.375	7.866	8.272	8.547	8.83
8.5	6.086	6.795	7.426	7.47	7.573	8.002	8.391	8.659	8.939
9	6.297	6.969	7.575	7.616	7.712	8.11	8.481	8.734	9
9.5	6.471	7.103	7.676	7.716	7.806	8.177	8.533	8.777	9.035
10	6.595	7.215	7.782	7.824	7.9	8.235	8.574	8.815	9.073
10.5	6.733	7.342	7.966	8.01	8.083	8.386	8.704	8.936	9.179
11	6.977	7.589	8.12	8.164	8.233	8.532	8.848	9.083	9.329
11.5	7.207	7.822	8.344	8.39	8.441	8.679	8.968	9.235	9.499
12	7.423	8.031	8.527	8.572	8.602	8.755	9.025	9.337	9.629
12.5	7.573	8.183	8.679	8.711	8.726	8.806	9.044	9.408	9.735
13	7.673	8.279	8.762	8.791	8.803	8.85	9.075	9.48	9.83
13.5	7.721	8.331	8.811	8.838	8.848	8.881	9.1	9.559	9.935
14	7.747	8.371	8.852	8.883	8.891	8.914	9.124	9.631	10.028
14.5	7.772	8.409	8.891	8.924	8.932	8.954	9.142	9.687	10.097
15	7.801	8.44	8.928	8.964	8.971	8.991	9.159	9.72	10.136
15.5	7.81	8.465	8.957	8.995	9.002	9.022	9.175	9.747	10.167
16	7.826	8.48	8.978	9.018	9.025	9.046	9.192	9.767	10.192
16.5	7.857	8.506	9.015	9.058	9.067	9.089	9.227	9.792	10.231
17	7.899	8.541	9.073	9.127	9.138	9.16	9.276	9.822	10.269
17.5	7.994	8.554	9.112	9.174	9.186	9.212	9.327	9.854	10.314
18	8.242	8.541	9.163	9.234	9.249	9.28	9.417	9.907	10.38
18.5	8.568	8.64	9.222	9.311	9.33	9.367	9.514	9.956	10.43
19	8.853	8.873	9.274	9.38	9.401	9.446	9.599	10.004	10.467
19.5	9.081	9.091	9.339	9.443	9.463	9.509	9.656	10.033	10.49
20	9.261	9.269	9.426	9.515	9.532	9.575	9.702	10.049	10.501
20.5	9.366	9.372	9.492	9.569	9.584	9.623	9.732	10.057	10.5
21	9.416	9.422	9.524	9.593	9.606	9.642	9.741	10.059	10.497
21.5	9.464	9.468	9.549	9.607	9.618	9.651	9.738	10.054	10.49
22	9.628	9.628	9.66	9.687	9.692	9.713	9.765	10.055	10.478
22.5	10.009	10.01	10.014	10.014	10.014	10.018	10.018	10.147	10.468
23	10.412	10.416	10.418	10.419	10.419	10.422	10.427	10.44	10.54
23.5	10.633	10.634	10.637	10.639	10.64	10.643	10.648	10.656	10.695
24	10.692	10.692	10.697	10.701	10.701	10.705	10.711	10.719	10.752
24.5	10.655	10.655	10.661	10.666	10.667	10.671	10.677	10.686	10.724
25	10.573	10.571	10.579	10.584	10.585	10.59	10.596	10.606	10.653
25.5	10.469	10.469	10.477	10.483	10.484	10.489	10.496	10.508	10.573
26	10.38	10.381	10.388	10.394	10.395	10.399	10.406	10.421	10.507
26.5	10.282	10.283	10.291	10.297	10.298	10.303	10.308	10.332	10.449
27	10.183	10.185	10.193	10.199	10.2	10.205	10.206	10.251	10.403
27.5	10.092	10.094	10.102	10.109	10.11	10.114	10.113	10.178	10.372
28	10.004	10.006	10.015	10.022	10.023	10.028	10.023	10.113	10.346
28.5	9.913	9.905	9.915	9.926	9.928	9.933	9.928	10.054	10.334

Node:	H Jilliby10.1	H Jilliby11.1	H Jilliby12.1	H Jilliby13.1	H Jilliby14.1	H Jilliby15.1	H Jilliby16.1	H Jilliby17.1	H Jilliby18.1
	Max 10.693	Max 10.692	Max 10.697	Max 10.701	Max 10.701	Max 10.705	Max 10.711	Max 10.719	Max 10.752
Time	Min 3.533	Min 4.171	Min 4.543	Min 4.537	Min 4.976	Min 5.232	Min 5.568	Min 5.812	Min 6.189
29	9.795	9.799	9.811	9.82	9.822	9.827	9.815	9.993	10.319
29.5	9.693	9.696	9.709	9.719	9.722	9.727	9.712	9.94	10.302
30	9.592	9.595	9.61	9.622	9.624	9.63	9.615	9.894	10.278
30.5	9.488	9.491	9.511	9.525	9.528	9.534	9.528	9.863	10.262
31	9.379	9.382	9.407	9.424	9.428	9.436	9.439	9.831	10.244
31.5	9.275	9.279	9.309	9.328	9.333	9.342	9.355	9.805	10.23
32	9.177	9.181	9.221	9.242	9.247	9.257	9.295	9.785	10.215
32.5	9.084	9.088	9.14	9.164	9.169	9.181	9.247	9.773	10.2
33	8.993	8.998	9.07	9.095	9.102	9.115	9.215	9.762	10.186
33.5	8.896	8.902	9.008	9.035	9.042	9.058	9.19	9.749	10.17
34	8.804	8.812	8.965	8.992	8.998	9.017	9.173	9.733	10.154
34.5	8.72	8.731	8.935	8.962	8.968	8.988	9.162	9.717	10.135
35	8.639	8.657	8.915	8.944	8.95	8.971	9.154	9.702	10.118
35.5	8.561	8.589	8.899	8.927	8.934	8.955	9.147	9.687	10.1
36	8.49	8.528	8.882	8.911	8.918	8.94	9.14	9.673	10.083
36.5	8.424	8.478	8.867	8.896	8.903	8.927	9.134	9.656	10.061
37	8.362	8.439	8.852	8.881	8.888	8.913	9.126	9.641	10.043
37.5	8.299	8.412	8.838	8.866	8.875	8.902	9.12	9.624	10.022
38	8.24	8.393	8.825	8.852	8.862	8.892	9.115	9.607	10
38.5	8.185	8.37	8.816	8.842	8.852	8.885	9.109	9.591	9.979
39	8.133	8.357	8.806	8.833	8.843	8.878	9.104	9.574	9.958
39.5	8.083	8.35	8.795	8.822	8.833	8.872	9.099	9.558	9.935
40	8.03	8.341	8.784	8.811	8.822	8.864	9.089	9.542	9.916
40.5	7.973	8.329	8.771	8.799	8.81	8.856	9.082	9.526	9.896
41	7.916	8.316	8.759	8.787	8.799	8.849	9.081	9.509	9.872
41.5	7.859	8.302	8.749	8.777	8.789	8.843	9.075	9.488	9.843
42	7.813	8.286	8.738	8.767	8.779	8.837	9.07	9.463	9.808
42.5	7.777	8.281	8.729	8.757	8.769	8.83	9.061	9.441	9.779
43	7.739	8.259	8.719	8.746	8.759	8.824	9.054	9.421	9.751
43.5	7.713	8.246	8.706	8.733	8.747	8.817	9.049	9.398	9.719
44	7.697	8.234	8.69	8.719	8.734	8.811	9.046	9.378	9.689
44.5	7.684	8.221	8.674	8.704	8.72	8.804	9.042	9.352	9.65
45	7.671	8.206	8.655	8.686	8.705	8.797	9.038	9.327	9.612
45.5	7.656	8.187	8.633	8.666	8.687	8.788	9.031	9.303	9.576
46	7.642	8.167	8.611	8.646	8.669	8.779	9.022	9.278	9.541
46.5	7.624	8.142	8.586	8.623	8.648	8.767	9.009	9.25	9.502
47	7.606	8.117	8.56	8.598	8.626	8.755	8.994	9.223	9.466
47.5	7.584	8.091	8.533	8.571	8.602	8.742	8.978	9.196	9.431
48	7.556	8.06	8.501	8.54	8.575	8.728	8.963	9.17	9.396
48.5	7.529	8.031	8.471	8.508	8.548	8.711	8.943	9.14	9.358
49	7.499	7.997	8.436	8.474	8.516	8.689	8.917	9.107	9.319
49.5	7.466	7.959	8.399	8.436	8.48	8.66	8.887	9.071	9.279
50	7.431	7.919	8.359	8.396	8.441	8.628	8.858	9.036	9.239
50.5	7.394	7.877	8.317	8.354	8.399	8.589	8.817	8.994	9.196
51	7.355	7.833	8.273	8.309	8.355	8.546	8.773	8.949	9.151
51.5	7.314	7.787	8.226	8.262	8.307	8.498	8.724	8.898	9.098
52	7.269	7.735	8.173	8.208	8.252	8.437	8.657	8.828	9.027
52.5	7.227	7.68	8.115	8.15	8.192	8.376	8.596	8.767	8.967
53	7.184	7.624	8.055	8.089	8.132	8.317	8.54	8.713	8.916
53.5	7.139	7.566	7.994	8.027	8.071	8.261	8.488	8.664	8.871
54	7.087	7.505	7.932	7.965	8.01	8.206	8.439	8.619	8.829
54.5	7.012	7.403	7.801	7.83	7.888	8.121	8.38	8.57	8.787
55	6.906	7.272	7.676	7.705	7.767	8.026	8.307	8.509	8.737
55.5	6.826	7.182	7.593	7.624	7.687	7.959	8.251	8.46	8.695
56	6.761	7.109	7.532	7.562	7.626	7.908	8.206	8.419	8.659
56.5	6.714	7.057	7.484	7.514	7.579	7.867	8.17	8.386	8.629
57	6.674	7.013	7.443	7.473	7.539	7.832	8.14	8.358	8.602
57.5	6.64	6.977	7.41	7.44	7.507	7.804	8.114	8.333	8.58
58	6.608	6.945	7.382	7.412	7.479	7.78	8.092	8.312	8.559

Node:	H Jilliby10.1	H Jilliby11.1	H Jilliby12.1	H Jilliby13.1	H Jilliby14.1	H Jilliby15.1	H Jilliby16.1	H Jilliby17.1	H Jilliby18.1
	Max 10.693	Max 10.692	Max 10.697	Max 10.701	Max 10.701	Max 10.705	Max 10.711	Max 10.719	Max 10.752
Time	Min 3.533	Min 4.171	Min 4.543	Min 4.537	Min 4.976	Min 5.232	Min 5.568	Min 5.812	Min 6.189
58.5	6.579	6.915	7.355	7.386	7.453	7.755	8.068	8.288	8.535
59	6.549	6.886	7.33	7.361	7.427	7.731	8.044	8.263	8.511
59.5	6.522	6.857	7.304	7.334	7.401	7.706	8.02	8.24	8.489
60	6.492	6.829	7.279	7.31	7.377	7.684	7.999	8.219	8.469
60.5	6.466	6.803	7.256	7.287	7.354	7.663	7.979	8.2	8.45
61	6.443	6.779	7.235	7.266	7.333	7.644	7.96	8.181	8.432
61.5	6.423	6.757	7.215	7.245	7.313	7.625	7.942	8.163	8.414
62	6.403	6.736	7.196	7.226	7.294	7.608	7.925	8.146	8.397
62.5	6.386	6.717	7.178	7.208	7.276	7.591	7.908	8.129	8.381
63	6.37	6.699	7.161	7.191	7.258	7.574	7.891	8.113	8.364
63.5	6.354	6.681	7.144	7.174	7.241	7.557	7.875	8.095	8.348
64	6.34	6.664	7.127	7.157	7.224	7.54	7.858	8.078	8.33
64.5	6.325	6.646	7.11	7.14	7.206	7.523	7.84	8.061	8.313
65	6.312	6.63	7.093	7.123	7.19	7.507	7.824	8.044	8.297
65.5	6.298	6.613	7.077	7.107	7.173	7.491	7.808	8.028	8.281
66	6.285	6.598	7.061	7.091	7.157	7.476	7.792	8.012	8.266
66.5	6.273	6.582	7.046	7.075	7.142	7.461	7.778	7.998	8.251
67	6.261	6.568	7.031	7.061	7.127	7.447	7.763	7.983	8.237
67.5	6.25	6.554	7.017	7.046	7.112	7.433	7.749	7.969	8.223
68	6.239	6.54	7.003	7.032	7.098	7.419	7.735	7.955	8.209
68.5	6.229	6.527	6.989	7.018	7.084	7.405	7.722	7.941	8.196
69	6.22	6.514	6.976	7.005	7.07	7.392	7.708	7.928	8.182
69.5	6.211	6.502	6.963	6.992	7.057	7.379	7.695	7.914	8.169
70	6.203	6.49	6.951	6.979	7.044	7.367	7.683	7.901	8.157
70.5	6.195	6.479	6.939	6.967	7.032	7.355	7.67	7.889	8.144
71	6.187	6.468	6.927	6.955	7.02	7.343	7.658	7.877	8.132
71.5	6.18	6.457	6.915	6.943	7.008	7.331	7.647	7.865	8.121
72	6.173	6.447	6.904	6.932	6.996	7.321	7.636	7.854	8.11
72.5	6.167	6.438	6.894	6.921	6.986	7.31	7.625	7.844	8.1
73	6.161	6.429	6.883	6.911	6.975	7.3	7.615	7.834	8.09
73.5	6.155	6.42	6.874	6.901	6.965	7.291	7.606	7.824	8.081
74	6.15	6.412	6.864	6.892	6.956	7.282	7.597	7.815	8.072
74.5	6.145	6.404	6.856	6.883	6.947	7.274	7.589	7.807	8.064
75	6.141	6.397	6.848	6.875	6.939	7.266	7.581	7.799	8.056
75.5	6.136	6.39	6.84	6.867	6.931	7.257	7.572	7.79	8.047
76	6.132	6.383	6.832	6.859	6.922	7.249	7.563	7.781	8.039
76.5	6.127	6.376	6.824	6.851	6.914	7.241	7.555	7.773	8.03
77	6.122	6.37	6.816	6.843	6.906	7.233	7.546	7.764	8.021
77.5	6.116	6.362	6.807	6.834	6.897	7.225	7.538	7.756	8.014
78	6.111	6.354	6.8	6.827	6.89	7.218	7.531	7.749	8.007
78.5	6.106	6.348	6.793	6.82	6.882	7.211	7.524	7.742	8
79	6.102	6.342	6.786	6.812	6.875	7.203	7.516	7.734	7.992
79.5	6.098	6.335	6.778	6.805	6.867	7.195	7.507	7.725	7.983
80	6.094	6.329	6.77	6.797	6.859	7.186	7.499	7.716	7.974

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Node:	H Jilliby19.1	H Jilliby20.1	H Jilliby21.1	H Jilliby22.1	H Jilliby23.1	H Jilliby24.1	H Jilliby25.1	H Jilliby26.1	H Jilliby27.1
	Max 10.841	Max 11.654	Max 12.286	Max 12.770	Max 13.047	Max 13.197	Max 13.218	Max 13.219	Max 13.221
Time	Min 5.523	Min 6.746	Min 7.036	Min 7.201	Min 7.322	Min 7.116	Min 6.672	Min 7.586	Min 7.161
1	5.523	6.746	7.036	7.201	7.322	7.116	6.672	7.586	7.161
1.5	5.523	6.746	7.036	7.201	7.322	7.116	6.672	7.586	7.161
2	5.523	6.746	7.036	7.201	7.322	7.116	6.766	7.586	7.161
2.5	5.523	6.746	7.036	7.201	7.322	7.116	6.78	7.586	7.161
3	5.523	6.746	7.036	7.201	7.322	7.116	6.783	7.586	7.161
3.5	5.523	6.746	7.036	7.201	7.322	7.116	6.784	7.586	7.161
4	5.82	6.863	7.294	7.332	7.423	7.17	7.014	7.619	7.253
4.5	6.033	6.764	7.279	7.285	7.403	7.116	7.096	7.593	7.332
5	6.156	6.767	7.3	7.414	7.832	7.302	7.183	7.593	7.42
5.5	6.779	7.674	8.435	8.539	8.623	8.524	8.38	8.09	7.553
6	7.854	8.137	8.846	8.971	9.042	9.022	8.987	8.85	8.543
6.5	8.328	8.526	9.086	9.228	9.301	9.287	9.261	9.18	9.079
7	8.67	8.844	9.327	9.475	9.548	9.538	9.52	9.466	9.406
7.5	8.91	9.067	9.495	9.642	9.712	9.709	9.703	9.686	9.67
8	9.067	9.215	9.617	9.766	9.836	9.836	9.835	9.838	9.841
8.5	9.172	9.314	9.691	9.835	9.901	9.902	9.905	9.914	9.927
9	9.225	9.362	9.725	9.867	9.932	9.936	9.943	9.96	9.984
9.5	9.255	9.388	9.742	9.882	9.947	9.951	9.961	9.98	10.019
10	9.297	9.433	9.792	9.937	10.003	10.008	10.02	10.044	10.079
10.5	9.399	9.537	9.895	10.045	10.114	10.119	10.131	10.153	10.184
11	9.553	9.69	10.026	10.175	10.243	10.245	10.25	10.271	10.294
11.5	9.759	9.909	10.186	10.316	10.375	10.375	10.375	10.393	10.424
12	9.916	10.076	10.367	10.508	10.571	10.569	10.564	10.588	10.641
12.5	10.052	10.234	10.549	10.707	10.776	10.771	10.763	10.764	10.828
13	10.159	10.364	10.728	10.909	10.986	10.979	10.971	10.971	10.992
13.5	10.218	10.468	10.895	11.103	11.189	11.187	11.186	11.185	11.194
14	10.283	10.587	11.064	11.293	11.386	11.386	11.387	11.386	11.391
14.5	10.324	10.673	11.192	11.447	11.546	11.548	11.55	11.55	11.552
15	10.349	10.735	11.294	11.571	11.678	11.682	11.686	11.687	11.688
15.5	10.379	10.816	11.417	11.699	11.806	11.814	11.823	11.823	11.825
16	10.402	10.881	11.518	11.819	11.931	11.942	11.96	11.96	11.962
16.5	10.432	10.966	11.636	11.96	12.078	12.097	12.123	12.124	12.125
17	10.473	11.067	11.79	12.14	12.27	12.301	12.326	12.326	12.327
17.5	10.532	11.22	11.974	12.347	12.503	12.556	12.573	12.574	12.575
18	10.618	11.399	12.119	12.538	12.734	12.808	12.826	12.826	12.829
18.5	10.689	11.523	12.207	12.649	12.888	12.993	13.013	13.013	13.015
19	10.739	11.598	12.247	12.71	12.973	13.102	13.122	13.122	13.125
19.5	10.763	11.63	12.268	12.743	13.017	13.158	13.179	13.179	13.182
20	10.775	11.648	12.281	12.765	13.041	13.188	13.209	13.21	13.212
20.5	10.777	11.652	12.285	12.77	13.047	13.196	13.218	13.218	13.221
21	10.773	11.643	12.277	12.764	13.04	13.188	13.209	13.21	13.212
21.5	10.763	11.626	12.263	12.746	13.023	13.167	13.187	13.188	13.19
22	10.749	11.602	12.247	12.729	13.002	13.14	13.16	13.161	13.163
22.5	10.733	11.581	12.234	12.711	12.98	13.111	13.13	13.131	13.133
23	10.741	11.558	12.218	12.694	12.956	13.08	13.099	13.1	13.102
23.5	10.81	11.55	12.204	12.676	12.931	13.047	13.066	13.067	13.068
24	10.841	11.538	12.189	12.656	12.902	13.011	13.029	13.03	13.031
24.5	10.817	11.507	12.171	12.633	12.87	12.97	12.988	12.988	12.99
25	10.764	11.471	12.147	12.608	12.834	12.927	12.943	12.943	12.945
25.5	10.709	11.435	12.131	12.583	12.797	12.881	12.896	12.898	12.898
26	10.667	11.401	12.106	12.554	12.759	12.837	12.851	12.852	12.853
26.5	10.629	11.366	12.079	12.522	12.717	12.789	12.803	12.804	12.805
27	10.603	11.334	12.057	12.487	12.674	12.741	12.755	12.755	12.756
27.5	10.583	11.297	12.032	12.451	12.628	12.691	12.704	12.705	12.706
28	10.565	11.258	12.004	12.411	12.579	12.638	12.651	12.652	12.653
28.5	10.543	11.22	11.975	12.367	12.526	12.582	12.596	12.596	12.597

Node:	H Jilliby19.1	H Jilliby20.1	H Jilliby21.1	H Jilliby22.1	H Jilliby23.1	H Jilliby24.1	H Jilliby25.1	H Jilliby26.1	H Jilliby27.1
	Max 10.841	Max 11.654	Max 12.286	Max 12.770	Max 13.047	Max 13.197	Max 13.218	Max 13.219	Max 13.221
Time	Min 5.523	Min 6.746	Min 7.036	Min 7.201	Min 7.322	Min 7.116	Min 6.672	Min 7.586	Min 7.161
29	10.524	11.178	11.94	12.319	12.472	12.524	12.538	12.539	12.54
29.5	10.505	11.131	11.898	12.271	12.416	12.466	12.479	12.48	12.481
30	10.484	11.085	11.855	12.22	12.358	12.405	12.419	12.419	12.42
30.5	10.468	11.055	11.807	12.163	12.296	12.341	12.355	12.356	12.357
31	10.451	11.014	11.748	12.099	12.226	12.273	12.288	12.289	12.29
31.5	10.436	10.97	11.69	12.033	12.156	12.203	12.219	12.22	12.221
32	10.424	10.933	11.637	11.966	12.085	12.133	12.15	12.151	12.153
32.5	10.411	10.897	11.583	11.899	12.014	12.063	12.082	12.083	12.084
33	10.396	10.858	11.523	11.826	11.937	11.992	12.014	12.014	12.016
33.5	10.381	10.819	11.464	11.756	11.865	11.92	11.945	11.945	11.948
34	10.365	10.776	11.399	11.683	11.789	11.848	11.875	11.876	11.879
34.5	10.348	10.731	11.331	11.606	11.708	11.775	11.807	11.808	11.81
35	10.333	10.691	11.268	11.536	11.635	11.702	11.739	11.74	11.743
35.5	10.318	10.652	11.207	11.463	11.563	11.632	11.672	11.673	11.676
36	10.303	10.616	11.15	11.399	11.495	11.562	11.607	11.608	11.612
36.5	10.287	10.576	11.086	11.325	11.42	11.487	11.544	11.545	11.55
37	10.269	10.539	11.03	11.262	11.354	11.421	11.482	11.484	11.489
37.5	10.25	10.504	10.977	11.201	11.291	11.357	11.422	11.424	11.43
38	10.231	10.471	10.928	11.144	11.232	11.297	11.363	11.365	11.373
38.5	10.215	10.441	10.88	11.09	11.175	11.239	11.305	11.308	11.317
39	10.198	10.41	10.834	11.037	11.12	11.182	11.25	11.252	11.263
39.5	10.181	10.382	10.79	10.985	11.066	11.128	11.195	11.199	11.212
40	10.168	10.356	10.747	10.936	11.014	11.074	11.143	11.147	11.163
40.5	10.149	10.326	10.703	10.886	10.962	11.021	11.091	11.096	11.117
41	10.128	10.296	10.66	10.836	10.91	10.968	11.04	11.045	11.073
41.5	10.106	10.265	10.617	10.788	10.86	10.917	10.989	10.996	11.033
42	10.069	10.224	10.569	10.737	10.808	10.864	10.939	10.947	10.996
42.5	10.037	10.184	10.52	10.683	10.752	10.808	10.886	10.899	10.967
43	10.004	10.145	10.472	10.63	10.697	10.752	10.832	10.853	10.941
43.5	9.963	10.1	10.42	10.574	10.641	10.695	10.78	10.811	10.916
44	9.922	10.053	10.367	10.518	10.583	10.636	10.728	10.775	10.894
44.5	9.876	10.005	10.316	10.464	10.528	10.582	10.679	10.742	10.876
45	9.831	9.958	10.267	10.413	10.477	10.531	10.63	10.709	10.859
45.5	9.792	9.917	10.225	10.368	10.432	10.486	10.586	10.678	10.838
46	9.754	9.877	10.184	10.326	10.389	10.443	10.543	10.648	10.815
46.5	9.712	9.835	10.143	10.284	10.346	10.401	10.502	10.618	10.791
47	9.673	9.795	10.102	10.242	10.304	10.358	10.46	10.588	10.762
47.5	9.634	9.754	10.061	10.198	10.26	10.314	10.416	10.557	10.73
48	9.595	9.713	10.017	10.152	10.213	10.266	10.367	10.522	10.693
48.5	9.552	9.668	9.971	10.105	10.165	10.219	10.32	10.489	10.653
49	9.509	9.624	9.927	10.058	10.118	10.172	10.273	10.455	10.617
49.5	9.467	9.58	9.883	10.013	10.073	10.126	10.227	10.42	10.582
50	9.424	9.536	9.839	9.968	10.027	10.081	10.182	10.379	10.544
50.5	9.379	9.491	9.796	9.924	9.984	10.039	10.138	10.34	10.508
51	9.334	9.446	9.753	9.881	9.939	9.993	10.095	10.301	10.472
51.5	9.277	9.387	9.691	9.814	9.871	9.922	10.017	10.249	10.432
52	9.204	9.313	9.623	9.746	9.803	9.856	9.955	10.201	10.392
52.5	9.145	9.255	9.573	9.696	9.754	9.808	9.91	10.163	10.358
53	9.095	9.208	9.532	9.656	9.714	9.769	9.872	10.129	10.326
53.5	9.052	9.166	9.497	9.621	9.679	9.735	9.839	10.1	10.298
54	9.012	9.128	9.465	9.589	9.648	9.704	9.808	10.071	10.27
54.5	8.973	9.091	9.434	9.558	9.617	9.673	9.777	10.043	10.243
55	8.929	9.05	9.403	9.527	9.587	9.644	9.749	10.018	10.218
55.5	8.89	9.013	9.374	9.499	9.559	9.616	9.722	9.994	10.195
56	8.856	8.981	9.349	9.474	9.534	9.592	9.698	9.972	10.175
56.5	8.827	8.954	9.326	9.451	9.511	9.569	9.676	9.952	10.155
57	8.802	8.929	9.306	9.43	9.491	9.549	9.656	9.934	10.138
57.5	8.78	8.908	9.288	9.412	9.473	9.532	9.639	9.918	10.122
58	8.758	8.887	9.269	9.392	9.452	9.511	9.617	9.893	10.095

Node:	H Jilliby19.1	H Jilliby20.1	H Jilliby21.1	H Jilliby22.1	H Jilliby23.1	H Jilliby24.1	H Jilliby25.1	H Jilliby26.1	H Jilliby27.1
	Max 10.841	Max 11.654	Max 12.286	Max 12.770	Max 13.047	Max 13.197	Max 13.218	Max 13.219	Max 13.221
Time	Min 5.523	Min 6.746	Min 7.036	Min 7.201	Min 7.322	Min 7.116	Min 6.672	Min 7.586	Min 7.161
58.5	8.734	8.862	9.246	9.369	9.429	9.488	9.593	9.871	10.073
59	8.71	8.838	9.226	9.348	9.408	9.467	9.573	9.852	10.056
59.5	8.688	8.817	9.207	9.329	9.389	9.448	9.554	9.836	10.039
60	8.667	8.797	9.19	9.311	9.371	9.431	9.537	9.819	10.023
60.5	8.648	8.778	9.174	9.295	9.355	9.414	9.521	9.804	10.008
61	8.63	8.76	9.158	9.278	9.338	9.398	9.503	9.787	9.991
61.5	8.612	8.742	9.143	9.263	9.322	9.382	9.488	9.774	9.978
62	8.595	8.726	9.129	9.248	9.307	9.368	9.473	9.759	9.963
62.5	8.579	8.709	9.114	9.232	9.292	9.352	9.457	9.743	9.947
63	8.562	8.692	9.098	9.216	9.276	9.336	9.441	9.727	9.931
63.5	8.544	8.675	9.083	9.201	9.26	9.32	9.425	9.711	9.915
64	8.526	8.657	9.067	9.184	9.243	9.304	9.408	9.695	9.899
64.5	8.509	8.639	9.052	9.168	9.227	9.288	9.392	9.68	9.884
65	8.492	8.623	9.038	9.154	9.213	9.274	9.377	9.666	9.87
65.5	8.476	8.607	9.024	9.14	9.199	9.259	9.363	9.652	9.856
66	8.461	8.592	9.011	9.126	9.185	9.246	9.349	9.639	9.843
66.5	8.446	8.577	8.999	9.113	9.172	9.233	9.336	9.626	9.83
67	8.431	8.562	8.986	9.1	9.158	9.219	9.322	9.613	9.817
67.5	8.416	8.548	8.973	9.087	9.145	9.206	9.309	9.6	9.804
68	8.402	8.534	8.961	9.074	9.133	9.194	9.296	9.588	9.792
68.5	8.388	8.52	8.949	9.062	9.12	9.181	9.284	9.576	9.779
69	8.374	8.506	8.938	9.049	9.108	9.169	9.271	9.564	9.768
69.5	8.361	8.493	8.926	9.038	9.096	9.157	9.259	9.552	9.756
70	8.348	8.48	8.915	9.026	9.084	9.146	9.247	9.541	9.745
70.5	8.335	8.467	8.905	9.015	9.073	9.135	9.236	9.53	9.734
71	8.323	8.455	8.895	9.004	9.063	9.124	9.226	9.52	9.724
71.5	8.311	8.444	8.885	8.994	9.052	9.114	9.215	9.51	9.714
72	8.3	8.433	8.876	8.985	9.043	9.105	9.206	9.501	9.705
72.5	8.289	8.422	8.867	8.975	9.034	9.095	9.196	9.491	9.695
73	8.279	8.412	8.859	8.967	9.025	9.087	9.187	9.482	9.686
73.5	8.269	8.402	8.851	8.958	9.016	9.079	9.179	9.477	9.679
74	8.26	8.394	8.844	8.952	9.01	9.072	9.172	9.468	9.671
74.5	8.252	8.386	8.837	8.944	9.002	9.064	9.164	9.46	9.663
75	8.243	8.377	8.829	8.936	8.994	9.056	9.155	9.451	9.654
75.5	8.234	8.367	8.822	8.928	8.986	9.048	9.147	9.446	9.646
76	8.225	8.359	8.814	8.92	8.978	9.04	9.139	9.436	9.638
76.5	8.216	8.35	8.807	8.912	8.97	9.032	9.131	9.426	9.63
77	8.207	8.341	8.8	8.905	8.962	9.024	9.123	9.419	9.623
77.5	8.199	8.333	8.794	8.899	8.957	9.019	9.118	9.416	9.617
78	8.193	8.327	8.789	8.894	8.951	9.014	9.112	9.411	9.61
78.5	8.185	8.319	8.781	8.885	8.943	9.005	9.103	9.398	9.601
79	8.175	8.31	8.773	8.877	8.934	8.996	9.094	9.39	9.593
79.5	8.166	8.3	8.766	8.869	8.926	8.988	9.086	9.382	9.585
80	8.157	8.292	8.759	8.862	8.919	8.981	9.078	9.375	9.578

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Node:	H Jilliby28.1	H Jilliby29.1	H Jilliby30.1	H Jilliby31.1	H Jilliby32.1	H Jilliby33.1	H Jilliby35.1	H Jilliby36.1	H Jilliby37.1
	Max 13.224	Max 13.230	Max 13.236	Max 13.276	Max 13.346	Max 13.379	Max 13.392	Max 13.371	Max 13.896
Time	Min 8.002	Min 7.988	Min 8.742	Min 9.402	Min 9.586	Min 9.449	Min 9.506	Min 10.435	Min 10.586
1	8.002	7.988	8.742	9.402	9.586	9.449	9.506	10.435	10.586
1.5	8.002	7.988	8.742	9.402	9.586	9.449	9.506	10.435	10.586
2	8.002	7.994	8.756	9.402	9.586	9.449	9.506	10.435	10.586
2.5	8.002	7.999	8.759	9.402	9.586	9.449	9.506	10.435	10.586
3	8.002	8.004	8.757	9.402	9.586	9.449	9.506	10.435	10.586
3.5	8.003	8.007	8.753	9.402	9.586	9.449	9.506	10.435	10.586
4	8.11	8.108	8.817	9.53	9.795	9.588	9.577	10.561	10.672
4.5	8.108	8.148	8.849	9.643	9.752	9.67	9.634	10.589	10.7
5	8.093	8.213	8.9	9.749	9.78	9.73	9.726	10.612	10.733
5.5	8.088	8.3	8.927	9.798	9.816	9.799	9.802	10.629	10.764
6	8.32	8.382	8.914	9.832	9.858	9.86	9.867	10.635	10.883
6.5	8.964	8.831	8.867	9.918	9.968	9.983	10.017	10.752	11.491
7	9.341	9.304	9.302	9.974	10.111	10.168	10.222	11.071	11.889
7.5	9.657	9.653	9.654	10.001	10.316	10.426	10.507	11.403	12.168
8	9.849	9.86	9.866	10.201	10.619	10.759	10.846	11.653	12.343
8.5	9.95	9.973	9.994	10.513	10.941	11.079	11.154	11.789	12.419
9	10.029	10.068	10.114	10.798	11.169	11.293	11.358	11.863	12.416
9.5	10.083	10.133	10.202	10.95	11.278	11.39	11.457	11.942	12.361
10	10.139	10.189	10.26	11.004	11.315	11.422	11.491	11.977	12.307
10.5	10.246	10.298	10.357	11.054	11.353	11.454	11.535	12.077	12.301
11	10.396	10.471	10.519	11.114	11.424	11.535	11.629	12.406	12.636
11.5	10.558	10.655	10.702	11.204	11.51	11.637	11.683	12.812	13.132
12	10.753	10.872	10.921	11.35	11.639	11.764	11.781	12.926	13.348
12.5	10.892	11.045	11.118	11.464	11.742	11.873	11.863	12.937	13.499
13	11.031	11.244	11.37	11.636	11.878	12.008	11.977	12.919	13.545
13.5	11.206	11.39	11.543	11.801	12.027	12.156	12.104	12.919	13.548
14	11.396	11.492	11.654	11.963	12.156	12.282	12.226	12.918	13.543
14.5	11.555	11.596	11.756	12.168	12.307	12.393	12.335	12.915	13.55
15	11.69	11.711	11.826	12.264	12.395	12.492	12.442	12.91	13.578
15.5	11.827	11.84	11.909	12.327	12.477	12.585	12.547	12.918	13.617
16	11.963	11.973	12.008	12.386	12.549	12.674	12.649	12.925	13.638
16.5	12.127	12.135	12.158	12.477	12.644	12.775	12.765	12.951	13.668
17	12.33	12.336	12.354	12.591	12.778	12.892	12.893	13.016	13.712
17.5	12.578	12.583	12.595	12.737	12.915	13.007	13.016	13.082	13.788
18	12.831	12.836	12.844	12.922	13.047	13.114	13.127	13.151	13.847
18.5	13.018	13.023	13.03	13.079	13.164	13.209	13.218	13.224	13.879
19	13.128	13.133	13.138	13.179	13.248	13.283	13.294	13.288	13.887
19.5	13.185	13.19	13.196	13.235	13.303	13.336	13.348	13.333	13.889
20	13.215	13.221	13.227	13.267	13.336	13.369	13.382	13.362	13.896
20.5	13.224	13.229	13.236	13.276	13.346	13.379	13.392	13.371	13.891
21	13.215	13.22	13.227	13.267	13.337	13.37	13.383	13.363	13.876
21.5	13.193	13.198	13.205	13.246	13.317	13.351	13.363	13.347	13.859
22	13.166	13.171	13.178	13.22	13.291	13.327	13.338	13.326	13.846
22.5	13.136	13.141	13.147	13.19	13.263	13.299	13.31	13.303	13.832
23	13.104	13.109	13.116	13.159	13.232	13.27	13.28	13.277	13.812
23.5	13.071	13.076	13.082	13.126	13.199	13.237	13.246	13.248	13.786
24	13.033	13.038	13.044	13.088	13.162	13.201	13.211	13.213	13.757
24.5	12.992	12.997	13.003	13.047	13.122	13.164	13.173	13.179	13.727
25	12.947	12.952	12.958	13.003	13.081	13.125	13.134	13.145	13.7
25.5	12.9	12.905	12.911	12.957	13.039	13.086	13.095	13.111	13.687
26	12.855	12.859	12.865	12.912	12.996	13.047	13.055	13.079	13.671
26.5	12.807	12.811	12.817	12.866	12.953	13.008	13.016	13.047	13.659
27	12.758	12.762	12.768	12.818	12.911	12.969	12.976	13.016	13.654
27.5	12.708	12.712	12.717	12.77	12.866	12.931	12.937	12.99	13.635
28	12.654	12.658	12.664	12.72	12.822	12.896	12.9	12.971	13.618
28.5	12.599	12.603	12.608	12.67	12.779	12.863	12.866	12.951	13.599

Node:	H Jilliby28.1	H Jilliby29.1	H Jilliby30.1	H Jilliby31.1	H Jilliby32.1	H Jilliby33.1	H Jilliby35.1	H Jilliby36.1	H Jilliby37.1
	Max 13.224	Max 13.230	Max 13.236	Max 13.276	Max 13.346	Max 13.379	Max 13.392	Max 13.371	Max 13.896
Time	Min 8.002	Min 7.988	Min 8.742	Min 9.402	Min 9.586	Min 9.449	Min 9.506	Min 10.435	Min 10.586
29	12.541	12.545	12.551	12.621	12.738	12.832	12.832	12.936	13.572
29.5	12.482	12.486	12.492	12.575	12.701	12.804	12.801	12.925	13.547
30	12.422	12.426	12.432	12.528	12.67	12.78	12.771	12.923	13.526
30.5	12.358	12.362	12.368	12.488	12.642	12.76	12.748	12.922	13.503
31	12.291	12.295	12.302	12.464	12.623	12.743	12.729	12.915	13.48
31.5	12.223	12.227	12.236	12.447	12.605	12.727	12.71	12.912	13.462
32	12.154	12.159	12.169	12.429	12.59	12.711	12.692	12.912	13.444
32.5	12.086	12.091	12.105	12.404	12.573	12.697	12.675	12.914	13.419
33	12.018	12.024	12.042	12.393	12.563	12.686	12.661	12.914	13.394
33.5	11.95	11.956	11.979	12.392	12.556	12.678	12.651	12.913	13.361
34	11.881	11.888	11.923	12.385	12.55	12.67	12.643	12.912	13.321
34.5	11.813	11.822	11.88	12.379	12.544	12.662	12.635	12.906	13.28
35	11.745	11.757	11.845	12.376	12.537	12.654	12.627	12.903	13.237
35.5	11.679	11.695	11.815	12.372	12.531	12.645	12.617	12.899	13.185
36	11.615	11.635	11.78	12.369	12.524	12.637	12.609	12.891	13.139
36.5	11.553	11.582	11.758	12.363	12.517	12.627	12.598	12.889	13.105
37	11.494	11.535	11.742	12.356	12.508	12.617	12.589	12.882	13.08
37.5	11.435	11.492	11.718	12.348	12.499	12.608	12.579	12.875	13.054
38	11.378	11.457	11.698	12.343	12.491	12.598	12.57	12.866	13.029
38.5	11.324	11.419	11.666	12.344	12.485	12.588	12.56	12.857	13.007
39	11.272	11.384	11.635	12.339	12.477	12.578	12.551	12.844	12.985
39.5	11.224	11.352	11.605	12.335	12.469	12.568	12.541	12.829	12.96
40	11.178	11.317	11.573	12.325	12.459	12.557	12.532	12.813	12.934
40.5	11.135	11.286	11.54	12.314	12.447	12.545	12.522	12.789	12.9
41	11.096	11.256	11.505	12.299	12.433	12.53	12.509	12.774	12.875
41.5	11.061	11.222	11.468	12.285	12.419	12.516	12.495	12.756	12.848
42	11.03	11.19	11.434	12.268	12.404	12.5	12.48	12.741	12.825
42.5	11.005	11.162	11.402	12.253	12.389	12.485	12.466	12.726	12.803
43	10.983	11.137	11.372	12.237	12.375	12.47	12.452	12.711	12.782
43.5	10.964	11.114	11.345	12.219	12.361	12.455	12.437	12.698	12.763
44	10.948	11.094	11.322	12.2	12.346	12.439	12.423	12.683	12.744
44.5	10.934	11.077	11.301	12.179	12.33	12.422	12.407	12.673	12.726
45	10.922	11.061	11.281	12.159	12.315	12.407	12.394	12.652	12.703
45.5	10.907	11.044	11.261	12.139	12.3	12.392	12.381	12.63	12.675
46	10.893	11.027	11.24	12.118	12.285	12.376	12.368	12.607	12.648
46.5	10.875	11.004	11.21	12.078	12.259	12.362	12.356	12.584	12.62
47	10.851	10.976	11.176	12.039	12.238	12.347	12.343	12.564	12.595
47.5	10.826	10.947	11.142	12.001	12.218	12.333	12.331	12.544	12.573
48	10.798	10.913	11.098	11.945	12.186	12.319	12.319	12.525	12.548
48.5	10.771	10.882	11.066	11.917	12.172	12.307	12.309	12.505	12.523
49	10.75	10.859	11.042	11.891	12.158	12.295	12.298	12.486	12.498
49.5	10.726	10.834	11.016	11.868	12.145	12.283	12.287	12.467	12.474
50	10.7	10.808	10.99	11.845	12.131	12.27	12.275	12.453	12.46
50.5	10.672	10.781	10.964	11.825	12.118	12.258	12.265	12.429	12.437
51	10.646	10.754	10.938	11.805	12.105	12.244	12.253	12.413	12.421
51.5	10.624	10.732	10.915	11.786	12.091	12.231	12.241	12.396	12.404
52	10.593	10.704	10.89	11.769	12.077	12.218	12.229	12.378	12.386
52.5	10.562	10.675	10.864	11.755	12.064	12.205	12.217	12.359	12.368
53	10.535	10.648	10.841	11.741	12.05	12.192	12.205	12.342	12.352
53.5	10.509	10.624	10.818	11.723	12.032	12.173	12.192	12.326	12.336
54	10.483	10.598	10.793	11.706	12.016	12.157	12.178	12.311	12.321
54.5	10.457	10.573	10.771	11.692	12.003	12.144	12.166	12.295	12.306
55	10.434	10.551	10.751	11.679	11.99	12.13	12.153	12.28	12.291
55.5	10.413	10.531	10.733	11.667	11.977	12.117	12.14	12.264	12.276
56	10.394	10.512	10.715	11.655	11.964	12.104	12.127	12.247	12.26
56.5	10.375	10.493	10.698	11.642	11.952	12.091	12.114	12.23	12.243
57	10.359	10.478	10.683	11.629	11.939	12.077	12.101	12.215	12.228
57.5	10.343	10.462	10.667	11.616	11.925	12.063	12.087	12.2	12.214
58	10.32	10.441	10.649	11.604	11.912	12.049	12.073	12.187	12.201

Node:	H Jilliby28.1	H Jilliby29.1	H Jilliby30.1	H Jilliby31.1	H Jilliby32.1	H Jilliby33.1	H Jilliby35.1	H Jilliby36.1	H Jilliby37.1
	Max 13.224	Max 13.230	Max 13.236	Max 13.276	Max 13.346	Max 13.379	Max 13.392	Max 13.371	Max 13.896
Time	Min 8.002	Min 7.988	Min 8.742	Min 9.402	Min 9.586	Min 9.449	Min 9.506	Min 10.435	Min 10.586
58.5	10.299	10.421	10.63	11.592	11.9	12.036	12.06	12.172	12.188
59	10.282	10.405	10.615	11.579	11.887	12.023	12.046	12.159	12.175
59.5	10.266	10.388	10.599	11.567	11.874	12.009	12.033	12.145	12.162
60	10.249	10.371	10.583	11.554	11.861	11.996	12.02	12.132	12.149
60.5	10.233	10.355	10.568	11.543	11.849	11.983	12.007	12.117	12.136
61	10.217	10.339	10.553	11.531	11.837	11.97	11.994	12.103	12.123
61.5	10.204	10.326	10.54	11.519	11.825	11.957	11.981	12.091	12.111
62	10.187	10.31	10.524	11.508	11.813	11.944	11.968	12.078	12.1
62.5	10.171	10.293	10.509	11.496	11.801	11.932	11.955	12.066	12.088
63	10.154	10.277	10.494	11.485	11.789	11.919	11.943	12.055	12.078
63.5	10.137	10.26	10.479	11.474	11.777	11.907	11.931	12.044	12.067
64	10.12	10.243	10.464	11.464	11.766	11.896	11.919	12.033	12.057
64.5	10.105	10.229	10.451	11.454	11.756	11.884	11.907	12.022	12.048
65	10.091	10.214	10.437	11.444	11.745	11.873	11.896	12.012	12.038
65.5	10.077	10.201	10.425	11.434	11.734	11.861	11.884	12.002	12.029
66	10.063	10.188	10.412	11.424	11.723	11.85	11.873	11.992	12.021
66.5	10.049	10.173	10.399	11.414	11.713	11.839	11.861	11.983	12.013
67	10.035	10.16	10.387	11.404	11.702	11.828	11.85	11.975	12.005
67.5	10.022	10.147	10.374	11.395	11.692	11.817	11.84	11.966	11.998
68	10.01	10.135	10.363	11.386	11.682	11.807	11.829	11.959	11.991
68.5	9.997	10.122	10.351	11.377	11.673	11.797	11.819	11.951	11.984
69	9.985	10.11	10.34	11.368	11.663	11.787	11.809	11.944	11.978
69.5	9.972	10.098	10.329	11.36	11.655	11.778	11.8	11.938	11.972
70	9.961	10.087	10.32	11.353	11.647	11.769	11.791	11.932	11.967
70.5	9.95	10.076	10.31	11.346	11.639	11.76	11.783	11.926	11.962
71	9.939	10.066	10.301	11.338	11.631	11.752	11.775	11.921	11.957
71.5	9.929	10.056	10.292	11.332	11.623	11.744	11.768	11.916	11.953
72	9.919	10.046	10.283	11.325	11.616	11.736	11.76	11.911	11.948
72.5	9.91	10.037	10.274	11.318	11.609	11.728	11.753	11.906	11.944
73	9.901	10.028	10.266	11.312	11.601	11.721	11.746	11.902	11.941
73.5	9.891	10.019	10.258	11.305	11.594	11.713	11.739	11.897	11.937
74	9.884	10.012	10.25	11.299	11.588	11.706	11.732	11.893	11.933
74.5	9.875	10.003	10.243	11.293	11.581	11.699	11.726	11.889	11.93
75	9.866	9.994	10.235	11.287	11.574	11.692	11.719	11.885	11.927
75.5	9.857	9.986	10.227	11.281	11.568	11.685	11.713	11.881	11.923
76	9.849	9.978	10.22	11.275	11.561	11.678	11.706	11.878	11.92
76.5	9.841	9.969	10.212	11.269	11.555	11.671	11.7	11.874	11.917
77	9.833	9.962	10.205	11.264	11.549	11.664	11.694	11.87	11.914
77.5	9.825	9.954	10.198	11.258	11.543	11.658	11.688	11.867	11.912
78	9.818	9.947	10.192	11.253	11.537	11.652	11.682	11.864	11.909
78.5	9.81	9.939	10.185	11.248	11.531	11.645	11.676	11.86	11.906
79	9.802	9.931	10.178	11.243	11.526	11.64	11.673	11.858	11.904
79.5	9.794	9.924	10.172	11.238	11.52	11.634	11.667	11.855	11.902
80	9.787	9.917	10.165	11.233	11.514	11.628	11.661	11.852	11.899

..\results\Subsided\100y30h\W2CP_Subsided_100y30h_1d_H.csv Continued......

Node:	H Jilliby38.1	H Jilliby39.1	H Jilliby40.1	H Jilliby41.1	H Jilliby42.1	H Jilliby43.1	H Jilliby44.1	H Jilliby45.1	H Jilliby46.1
	Max 13.968	Max 14.615	Max 14.741	Max 14.774	Max 14.939	Max 15.216	Max 15.501	Max 15.997	Max 16.804
Time	Min 11.098	Min 12.309	Min 11.736	Min 11.779	Min 12.969	Min 13.666	Min 14.106	Min 15.289	Min 15.918
1	11.098	12.309	11.736	11.779	12.969	13.666	14.106	15.289	15.918
1.5	11.098	12.309	11.736	11.779	12.969	13.666	14.106	15.289	15.918
2	11.098	12.309	11.736	11.779	12.969	13.666	14.106	15.289	15.918
2.5	11.098	12.309	11.736	11.779	12.969	13.666	14.106	15.289	15.918
3	11.098	12.309	11.736	11.779	12.969	13.666	14.106	15.289	15.918
3.5	11.098	12.309	11.736	11.779	12.969	13.666	14.106	15.289	15.918
4	11.136	12.311	11.765	11.812	13.023	13.738	14.151	15.318	16.019
4.5	11.17	12.31	11.875	11.885	13.051	13.774	14.223	15.351	16.058
5	11.193	12.311	11.975	11.979	13.278	13.808	14.304	15.348	16.077
5.5	11.197	12.428	12.49	12.495	13.433	14.247	14.33	15.334	16.091
6	11.61	12.913	12.997	13.002	13.408	14.434	14.433	15.332	16.151
6.5	11.971	12.978	13.135	13.143	13.537	14.545	14.547	15.302	16.277
7	12.157	13.127	13.3	13.312	13.763	14.614	14.629	15.302	16.416
7.5	12.404	13.228	13.429	13.444	13.887	14.612	14.672	15.326	16.562
8	12.57	13.304	13.514	13.531	13.938	14.611	14.729	15.49	16.6
8.5	12.625	13.295	13.51	13.527	13.948	14.601	14.869	15.574	16.618
9	12.605	13.245	13.46	13.476	13.884	14.593	14.955	15.626	16.622
9.5	12.532	13.171	13.389	13.404	13.815	14.599	14.98	15.659	16.606
10	12.468	13.131	13.352	13.366	13.784	14.599	15.018	15.703	16.578
10.5	12.47	13.175	13.403	13.418	13.853	14.597	15.022	15.738	16.568
11	12.932	13.683	13.815	13.834	14.251	14.62	15.034	15.775	16.54
11.5	13.365	13.898	14.008	14.027	14.305	14.615	15.041	15.784	16.533
12	13.583	14.024	14.113	14.131	14.337	14.605	15.075	15.854	16.496
12.5	13.701	14.211	14.308	14.33	14.398	14.725	15.128	15.928	16.455
13	13.719	14.247	14.352	14.376	14.419	14.755	15.138	15.919	16.462
13.5	13.719	14.246	14.35	14.374	14.417	14.75	15.133	15.918	16.462
14	13.717	14.241	14.343	14.367	14.411	14.745	15.134	15.918	16.462
14.5	13.722	14.253	14.359	14.384	14.424	14.767	15.147	15.924	16.463
15	13.74	14.287	14.403	14.431	14.477	14.826	15.168	15.94	16.488
15.5	13.757	14.32	14.443	14.473	14.536	14.87	15.194	15.949	16.517
16	13.77	14.351	14.475	14.506	14.579	14.898	15.221	15.949	16.54
16.5	13.783	14.398	14.528	14.562	14.656	14.957	15.265	15.95	16.599
17	13.815	14.477	14.605	14.638	14.757	15.04	15.337	15.966	16.674
17.5	13.866	14.534	14.661	14.693	14.833	15.113	15.398	15.975	16.722
18	13.918	14.58	14.707	14.739	14.895	15.175	15.457	15.986	16.772
18.5	13.951	14.608	14.734	14.766	14.929	15.207	15.489	15.995	16.796
19	13.959	14.61	14.736	14.769	14.932	15.209	15.492	15.995	16.798
19.5	13.961	14.61	14.736	14.769	14.932	15.209	15.494	15.995	16.8
20	13.967	14.615	14.741	14.773	14.939	15.216	15.501	15.997	16.804
20.5	13.963	14.609	14.735	14.768	14.93	15.208	15.496	15.996	16.801
21	13.948	14.596	14.722	14.754	14.911	15.19	15.482	15.994	16.789
21.5	13.931	14.58	14.706	14.739	14.891	15.17	15.464	15.988	16.778
22	13.918	14.568	14.695	14.728	14.877	15.157	15.453	15.987	16.769
22.5	13.903	14.557	14.684	14.716	14.861	15.141	15.439	15.985	16.758
23	13.885	14.541	14.668	14.7	14.838	15.119	15.419	15.981	16.738
23.5	13.863	14.519	14.646	14.679	14.81	15.092	15.395	15.972	16.72
24	13.838	14.498	14.623	14.656	14.778	15.06	15.371	15.969	16.693
24.5	13.818	14.475	14.603	14.635	14.748	15.031	15.346	15.965	16.674
25	13.807	14.452	14.581	14.614	14.719	15.004	15.325	15.959	16.659
25.5	13.797	14.429	14.559	14.592	14.689	14.977	15.304	15.952	16.64
26	13.786	14.407	14.535	14.568	14.658	14.951	15.281	15.948	16.619
26.5	13.779	14.383	14.51	14.542	14.626	14.926	15.26	15.942	16.589
27	13.772	14.36	14.485	14.516	14.591	14.901	15.24	15.935	16.562
27.5	13.765	14.335	14.457	14.487	14.551	14.874	15.207	15.943	16.525
28	13.753	14.31	14.429	14.458	14.51	14.849	15.187	15.941	16.508
28.5	13.745	14.289	14.402	14.429	14.467	14.822	15.171	15.939	16.484

Node:	H Jilliby38.1	H Jilliby39.1	H Jilliby40.1	H Jilliby41.1	H Jilliby42.1	H Jilliby43.1	H Jilliby44.1	H Jilliby45.1	H Jilliby46.1
	Max 13.968	Max 14.615	Max 14.741	Max 14.774	Max 14.939	Max 15.216	Max 15.501	Max 15.997	Max 16.804
Time	Min 11.098	Min 12.309	Min 11.736	Min 11.779	Min 12.969	Min 13.666	Min 14.106	Min 15.289	Min 15.918
29	13.728	14.266	14.37	14.394	14.423	14.793	15.155	15.931	16.464
29.5	13.715	14.239	14.334	14.356	14.386	14.755	15.146	15.922	16.458
30	13.703	14.214	14.299	14.318	14.351	14.723	15.133	15.903	16.463
30.5	13.69	14.176	14.251	14.268	14.301	14.672	15.117	15.89	16.465
31	13.677	14.141	14.199	14.211	14.239	14.646	15.11	15.89	16.463
31.5	13.663	14.102	14.151	14.161	14.191	14.615	15.106	15.876	16.467
32	13.641	14.053	14.098	14.108	14.141	14.591	15.102	15.862	16.475
32.5	13.612	13.997	14.038	14.046	14.083	14.579	15.095	15.848	16.482
33	13.584	13.95	13.988	13.995	14.032	14.561	15.09	15.836	16.489
33.5	13.543	13.905	13.939	13.946	13.985	14.538	15.087	15.823	16.497
34	13.495	13.855	13.886	13.892	13.935	14.526	15.08	15.798	16.511
34.5	13.439	13.796	13.824	13.828	13.876	14.504	15.075	15.773	16.526
35	13.387	13.741	13.764	13.767	13.818	14.488	15.064	15.756	16.536
35.5	13.318	13.664	13.68	13.683	13.742	14.484	15.058	15.736	16.555
36	13.261	13.607	13.62	13.622	13.685	14.486	15.047	15.72	16.563
36.5	13.218	13.566	13.576	13.578	13.643	14.488	15.034	15.708	16.568
37	13.187	13.533	13.542	13.543	13.611	14.491	15.024	15.693	16.575
37.5	13.155	13.497	13.505	13.506	13.582	14.494	15.013	15.678	16.585
38	13.124	13.467	13.476	13.477	13.568	14.546	14.993	15.663	16.591
38.5	13.1	13.444	13.453	13.455	13.555	14.548	14.987	15.648	16.589
39	13.074	13.416	13.427	13.428	13.537	14.549	14.992	15.632	16.587
39.5	13.045	13.387	13.399	13.4	13.517	14.55	14.98	15.617	16.584
40	13.014	13.356	13.369	13.37	13.498	14.55	14.956	15.599	16.587
40.5	12.977	13.324	13.337	13.339	13.476	14.547	14.924	15.589	16.588
41	12.948	13.291	13.307	13.308	13.456	14.548	14.909	15.582	16.589
41.5	12.917	13.257	13.274	13.275	13.437	14.549	14.904	15.575	16.592
42	12.889	13.227	13.245	13.246	13.42	14.551	14.9	15.572	16.592
42.5	12.864	13.199	13.219	13.22	13.406	14.552	14.896	15.57	16.592
43	12.84	13.172	13.193	13.195	13.394	14.553	14.893	15.569	16.592
43.5	12.817	13.145	13.168	13.17	13.384	14.554	14.891	15.57	16.591
44	12.795	13.119	13.145	13.147	13.375	14.555	14.889	15.569	16.591
44.5	12.773	13.087	13.118	13.12	13.368	14.556	14.887	15.568	16.592
45	12.746	13.055	13.09	13.093	13.362	14.557	14.886	15.567	16.592
45.5	12.716	13.022	13.063	13.066	13.356	14.558	14.882	15.566	16.593
46	12.685	12.987	13.036	13.039	13.353	14.558	14.88	15.564	16.593
46.5	12.653	12.948	13.008	13.011	13.352	14.558	14.878	15.562	16.593
47	12.626	12.917	12.987	12.99	13.353	14.558	14.876	15.56	16.594
47.5	12.6	12.881	12.966	12.97	13.356	14.557	14.874	15.558	16.594
48	12.57	12.832	12.943	12.947	13.36	14.557	14.873	15.557	16.594
48.5	12.54	12.776	12.925	12.929	13.363	14.556	14.872	15.556	16.595
49	12.51	12.707	12.921	12.925	13.367	14.556	14.871	15.555	16.595
49.5	12.481	12.628	12.921	12.925	13.368	14.555	14.87	15.554	16.596
50	12.466	12.616	12.922	12.926	13.369	14.555	14.87	15.553	16.596
50.5	12.444	12.609	12.922	12.926	13.369	14.555	14.869	15.552	16.597
51	12.428	12.604	12.922	12.926	13.369	14.555	14.868	15.551	16.597
51.5	12.412	12.599	12.922	12.926	13.369	14.555	14.868	15.551	16.598
52	12.395	12.596	12.922	12.926	13.369	14.555	14.868	15.551	16.598
52.5	12.377	12.592	12.922	12.926	13.369	14.555	14.868	15.551	16.599
53	12.361	12.59	12.922	12.926	13.369	14.555	14.868	15.551	16.599
53.5	12.346	12.588	12.922	12.926	13.369	14.555	14.868	15.551	16.599
54	12.331	12.586	12.922	12.926	13.369	14.555	14.868	15.551	16.6
54.5	12.317	12.585	12.922	12.926	13.369	14.555	14.868	15.551	16.6
55	12.302	12.585	12.921	12.926	13.369	14.555	14.868	15.55	16.6
55.5	12.288	12.585	12.921	12.926	13.369	14.555	14.868	15.55	16.601
56	12.273	12.586	12.921	12.926	13.369	14.555	14.868	15.55	16.601
56.5	12.257	12.586	12.921	12.926	13.369	14.555	14.868	15.55	16.601
57	12.243	12.588	12.921	12.926	13.369	14.555	14.869	15.551	16.602
57.5	12.229	12.589	12.921	12.926	13.369	14.555	14.869	15.551	16.602
58	12.217	12.591	12.921	12.926	13.369	14.555	14.87	15.552	16.602

Node:	H Jilliby38.1	H Jilliby39.1	H Jilliby40.1	H Jilliby41.1	H Jilliby42.1	H Jilliby43.1	H Jilliby44.1	H Jilliby45.1	H Jilliby46.1
	Max 13.968	Max 14.615	Max 14.741	Max 14.774	Max 14.939	Max 15.216	Max 15.501	Max 15.997	Max 16.804
Time	Min 11.098	Min 12.309	Min 11.736	Min 11.779	Min 12.969	Min 13.666	Min 14.106	Min 15.289	Min 15.918
58.5	12.204	12.593	12.921	12.926	13.369	14.555	14.87	15.552	16.602
59	12.192	12.596	12.921	12.926	13.369	14.555	14.871	15.553	16.602
59.5	12.18	12.598	12.921	12.926	13.369	14.555	14.871	15.553	16.602
60	12.168	12.601	12.922	12.926	13.369	14.555	14.872	15.553	16.602
60.5	12.156	12.604	12.922	12.926	13.369	14.555	14.872	15.554	16.602
61	12.144	12.608	12.922	12.926	13.369	14.555	14.872	15.554	16.603
61.5	12.132	12.611	12.922	12.926	13.369	14.555	14.873	15.555	16.603
62	12.122	12.614	12.922	12.926	13.369	14.555	14.873	15.555	16.603
62.5	12.112	12.617	12.922	12.926	13.369	14.555	14.874	15.556	16.603
63	12.102	12.621	12.922	12.926	13.369	14.555	14.874	15.556	16.603
63.5	12.093	12.624	12.922	12.926	13.369	14.555	14.875	15.556	16.603
64	12.084	12.627	12.922	12.926	13.369	14.555	14.875	15.557	16.603
64.5	12.075	12.631	12.922	12.926	13.369	14.555	14.875	15.557	16.603
65	12.067	12.634	12.922	12.926	13.369	14.555	14.876	15.557	16.603
65.5	12.059	12.637	12.922	12.926	13.369	14.555	14.876	15.557	16.603
66	12.051	12.64	12.922	12.926	13.369	14.555	14.876	15.557	16.603
66.5	12.044	12.643	12.922	12.926	13.369	14.555	14.876	15.557	16.603
67	12.037	12.646	12.922	12.926	13.369	14.555	14.876	15.557	16.603
67.5	12.031	12.649	12.922	12.926	13.369	14.555	14.876	15.557	16.603
68	12.025	12.651	12.922	12.926	13.369	14.555	14.876	15.557	16.603
68.5	12.019	12.654	12.922	12.926	13.369	14.555	14.876	15.558	16.603
69	12.013	12.656	12.922	12.926	13.369	14.555	14.876	15.558	16.603
69.5	12.009	12.658	12.922	12.926	13.369	14.555	14.876	15.558	16.603
70	12.004	12.66	12.922	12.926	13.369	14.555	14.876	15.558	16.603
70.5	12	12.662	12.922	12.926	13.369	14.555	14.876	15.558	16.603
71	11.996	12.664	12.922	12.926	13.369	14.555	14.876	15.558	16.603
71.5	11.992	12.666	12.922	12.926	13.369	14.555	14.876	15.558	16.603
72	11.989	12.668	12.922	12.926	13.369	14.555	14.876	15.558	16.603
72.5	11.985	12.669	12.922	12.926	13.369	14.555	14.876	15.558	16.603
73	11.982	12.671	12.922	12.926	13.369	14.555	14.876	15.558	16.603
73.5	11.979	12.672	12.922	12.926	13.369	14.555	14.876	15.558	16.603
74	11.976	12.674	12.922	12.926	13.369	14.555	14.876	15.558	16.603
74.5	11.973	12.675	12.922	12.926	13.369	14.555	14.876	15.558	16.603
75	11.97	12.676	12.922	12.926	13.369	14.555	14.876	15.558	16.603
75.5	11.968	12.678	12.922	12.926	13.369	14.555	14.876	15.558	16.603
76	11.965	12.679	12.922	12.926	13.369	14.555	14.876	15.558	16.603
76.5	11.963	12.68	12.922	12.926	13.369	14.555	14.876	15.558	16.603
77	11.96	12.681	12.922	12.926	13.369	14.555	14.876	15.558	16.603
77.5	11.958	12.682	12.922	12.926	13.369	14.555	14.876	15.558	16.603
78	11.956	12.684	12.922	12.926	13.369	14.555	14.876	15.558	16.603
78.5	11.954	12.685	12.922	12.926	13.369	14.555	14.876	15.558	16.603
79	11.952	12.686	12.922	12.926	13.369	14.555	14.876	15.558	16.603
79.5	11.95	12.686	12.922	12.926	13.369	14.555	14.876	15.558	16.603
80	11.948	12.687	12.922	12.926	13.369	14.555	14.876	15.558	16.603

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Node:	H Jilliby47.1	H Jilliby48.1	H Jilliby49.1	H Jilliby50.1	H Jilliby51.1	H Jilliby52.1	H Jilliby53.1	H Jilliby54.1	H Jilliby55.1
	Max 17.709	Max 18.111	Max 18.415	Max 19.239	Max 19.287	Max 20.176	Max 20.484	Max 21.239	Max 22.893
Time	Min 15.793	Min 16.226	Min 16.239	Min 16.686	Min 17.046	Min 17.899	Min 18.099	Min 18.645	Min 20.626
1	15.793	16.226	16.239	16.686	17.046	17.899	18.099	18.645	20.626
1.5	15.793	16.226	16.239	16.686	17.046	17.899	18.099	18.645	20.626
2	15.793	16.226	16.239	16.686	17.046	17.899	18.099	18.645	20.626
2.5	15.793	16.226	16.239	16.686	17.046	17.899	18.099	18.645	20.626
3	15.793	16.226	16.239	16.686	17.046	17.899	18.099	18.645	20.626
3.5	15.793	16.226	16.239	16.686	17.046	17.899	18.099	18.645	20.626
4	15.845	16.243	16.273	16.716	17.166	17.944	18.151	18.726	20.684
4.5	15.898	16.311	16.32	16.859	17.378	17.903	18.207	18.771	20.731
5	15.974	16.351	16.393	16.968	17.463	18.12	18.302	18.829	20.779
5.5	16.072	16.402	16.486	17.052	17.532	18.169	18.434	18.89	20.837
6	16.236	16.442	16.587	17.11	17.588	18.255	18.56	18.997	21.06
6.5	16.376	16.508	16.682	17.17	17.674	18.355	18.811	19.214	21.232
7	16.515	16.603	16.771	17.255	17.834	18.672	19.235	19.541	21.397
7.5	16.648	16.728	16.903	17.496	18.282	19.275	19.81	19.897	21.405
8	16.805	16.972	17.225	17.886	18.6	19.451	20.03	20.176	21.322
8.5	17.09	17.313	17.528	18.078	18.739	19.565	20.1	20.313	21.207
9	17.214	17.508	17.701	18.177	18.796	19.577	20.103	20.346	21.097
9.5	17.201	17.577	17.764	18.201	18.788	19.567	20.102	20.393	21.712
10	17.193	17.594	17.786	18.228	18.831	19.631	20.104	20.571	21.775
10.5	17.215	17.653	17.836	18.276	18.869	19.67	20.033	20.869	21.799
11	17.227	17.702	17.884	18.31	18.886	19.872	20.042	21.042	21.799
11.5	17.227	17.725	17.919	18.405	18.902	19.979	20.087	21.07	21.854
12	17.221	17.939	18.191	18.756	18.968	20.032	20.1	21.095	21.918
12.5	17.276	18.025	18.274	18.771	18.97	20.002	20.092	21.112	21.955
13	17.285	18.025	18.272	18.762	18.962	19.932	20.083	21.123	21.978
13.5	17.279	18.019	18.262	18.751	18.945	19.918	20.076	21.136	22.02
14	17.283	18.022	18.27	18.767	18.949	19.921	20.075	21.154	22.081
14.5	17.304	18.03	18.287	18.796	18.972	19.934	20.08	21.164	22.154
15	17.347	18.034	18.301	18.816	18.987	19.931	20.093	21.166	22.212
15.5	17.368	18.039	18.317	18.843	18.991	19.995	20.111	21.174	22.262
16	17.379	18.047	18.333	18.867	19.007	20.025	20.131	21.181	22.312
16.5	17.485	18.049	18.376	18.935	19.097	20.066	20.197	21.194	22.426
17	17.581	18.058	18.401	19.016	19.153	20.113	20.292	21.202	22.555
17.5	17.641	18.066	18.405	19.092	19.202	20.139	20.364	21.215	22.7
18	17.681	18.095	18.408	19.187	19.262	20.174	20.438	21.222	22.805
18.5	17.7	18.105	18.411	19.222	19.28	20.167	20.46	21.228	22.839
19	17.701	18.104	18.411	19.22	19.271	20.15	20.466	21.231	22.863
19.5	17.703	18.106	18.413	19.227	19.275	20.152	20.475	21.234	22.88
20	17.709	18.11	18.415	19.238	19.286	20.156	20.483	21.239	22.892
20.5	17.704	18.106	18.414	19.232	19.276	20.144	20.478	21.238	22.886
21	17.693	18.1	18.41	19.21	19.254	20.123	20.462	21.236	22.876
21.5	17.682	18.093	18.408	19.189	19.238	20.111	20.449	21.235	22.865
22	17.675	18.088	18.408	19.174	19.226	20.103	20.439	21.233	22.846
22.5	17.666	18.08	18.408	19.151	19.207	20.09	20.419	21.23	22.811
23	17.651	18.07	18.407	19.114	19.176	20.067	20.39	21.224	22.766
23.5	17.632	18.058	18.403	19.069	19.143	20.056	20.35	21.223	22.714
24	17.609	18.052	18.404	19.031	19.118	20.041	20.309	21.219	22.662
24.5	17.58	18.049	18.397	18.995	19.094	20.028	20.277	21.213	22.602
25	17.561	18.043	18.392	18.962	19.074	20.014	20.243	21.205	22.545
25.5	17.527	18.039	18.383	18.94	19.043	20.005	20.213	21.201	22.491
26	17.49	18.038	18.369	18.911	19.015	19.99	20.183	21.2	22.435
26.5	17.444	18.037	18.347	18.888	19.001	19.952	20.157	21.191	22.378
27	17.393	18.035	18.325	18.852	18.976	19.891	20.127	21.188	22.326
27.5	17.368	18.032	18.311	18.83	18.966	19.831	20.109	21.177	22.274
28	17.362	18.021	18.293	18.805	18.956	19.779	20.086	21.17	22.225
28.5	17.339	18.014	18.279	18.785	18.942	19.74	20.066	21.17	22.187

Node:	H Jilliby47.1	H Jilliby48.1	H Jilliby49.1	H Jilliby50.1	H Jilliby51.1	H Jilliby52.1	H Jilliby53.1	H Jilliby54.1	H Jilliby55.1
	Max 17.709	Max 18.111	Max 18.415	Max 19.239	Max 19.287	Max 20.176	Max 20.484	Max 21.239	Max 22.893
Time	Min 15.793	Min 16.226	Min 16.239	Min 16.686	Min 17.046	Min 17.899	Min 18.099	Min 18.645	Min 20.626
29	17.313	18.009	18.269	18.775	18.938	19.708	20.061	21.164	22.133
29.5	17.289	18.009	18.264	18.763	18.935	19.599	20.05	21.154	22.083
30	17.266	17.996	18.242	18.727	18.918	19.542	20.049	21.145	22.055
30.5	17.242	17.979	18.222	18.705	18.906	19.528	20.052	21.138	22.031
31	17.227	17.959	18.196	18.669	18.886	19.499	20.053	21.13	22.005
31.5	17.216	17.927	18.157	18.617	18.851	19.481	20.055	21.132	21.982
32	17.212	17.89	18.114	18.57	18.823	19.475	20.056	21.127	21.965
32.5	17.205	17.861	18.08	18.531	18.789	19.435	20.057	21.118	21.945
33	17.203	17.82	18.035	18.479	18.74	19.396	20.059	21.11	21.924
33.5	17.199	17.77	17.978	18.405	18.688	19.351	20.058	21.099	21.897
34	17.197	17.707	17.909	18.326	18.631	19.315	20.056	21.09	21.879
34.5	17.194	17.649	17.846	18.258	18.587	19.29	20.054	21.083	21.868
35	17.189	17.595	17.785	18.188	18.543	19.252	20.052	21.075	21.856
35.5	17.183	17.542	17.725	18.122	18.489	19.201	20.049	21.066	21.844
36	17.175	17.496	17.671	18.064	18.442	19.165	20.044	21.06	21.833
36.5	17.165	17.454	17.622	18.006	18.399	19.121	20.033	21.055	21.823
37	17.165	17.413	17.57	17.941	18.354	19.081	20.025	21.049	21.814
37.5	17.174	17.374	17.517	17.875	18.318	19.057	20.012	21.04	21.808
38	17.161	17.339	17.471	17.816	18.289	19.025	19.988	21.04	21.792
38.5	17.125	17.292	17.418	17.749	18.255	18.992	19.979	21.022	21.784
39	17.078	17.24	17.364	17.7	18.233	18.978	19.981	21.008	21.781
39.5	17.037	17.198	17.326	17.676	18.223	18.97	19.978	21.02	21.767
40	17.009	17.17	17.302	17.664	18.219	18.972	19.981	21.012	21.759
40.5	16.991	17.153	17.288	17.659	18.218	18.967	19.983	21.002	21.758
41	16.981	17.143	17.28	17.655	18.213	18.962	19.984	20.996	21.754
41.5	16.973	17.136	17.274	17.652	18.211	18.96	19.984	20.987	21.753
42	16.969	17.131	17.27	17.649	18.207	18.956	19.985	20.983	21.749
42.5	16.965	17.128	17.266	17.645	18.204	18.953	19.987	20.974	21.745
43	16.962	17.124	17.263	17.643	18.202	18.95	19.991	20.969	21.742
43.5	16.959	17.121	17.26	17.641	18.201	18.951	19.993	20.963	21.739
44	16.957	17.119	17.259	17.641	18.202	18.955	19.994	20.957	21.735
44.5	16.956	17.119	17.259	17.642	18.204	18.954	19.995	20.948	21.731
45	16.956	17.119	17.259	17.642	18.201	18.947	19.997	20.94	21.728
45.5	16.956	17.118	17.257	17.638	18.194	18.937	19.999	20.932	21.726
46	16.954	17.115	17.253	17.631	18.188	18.934	20.001	20.924	21.722
46.5	16.95	17.111	17.249	17.628	18.186	18.934	20.002	20.916	21.718
47	16.946	17.107	17.246	17.626	18.186	18.935	20.003	20.91	21.714
47.5	16.944	17.105	17.244	17.626	18.186	18.935	20.004	20.904	21.706
48	16.943	17.104	17.243	17.626	18.187	18.935	20.006	20.896	21.696
48.5	16.943	17.104	17.243	17.626	18.187	18.936	20.007	20.889	21.687
49	16.943	17.104	17.243	17.627	18.187	18.936	20.009	20.881	21.68
49.5	16.943	17.104	17.244	17.627	18.188	18.937	20.01	20.874	21.67
50	16.943	17.104	17.244	17.628	18.189	18.939	20.015	20.861	21.661
50.5	16.943	17.105	17.245	17.629	18.191	18.942	20.018	20.851	21.658
51	16.944	17.106	17.246	17.631	18.193	18.944	20.021	20.844	21.651
51.5	16.946	17.108	17.248	17.633	18.195	18.945	20.023	20.837	21.644
52	16.947	17.109	17.25	17.635	18.196	18.947	20.026	20.829	21.638
52.5	16.949	17.111	17.251	17.636	18.198	18.949	20.028	20.822	21.632
53	16.95	17.112	17.253	17.638	18.2	18.951	20.03	20.816	21.624
53.5	16.952	17.114	17.254	17.639	18.201	18.952	20.032	20.81	21.618
54	16.953	17.116	17.256	17.641	18.203	18.954	20.035	20.802	21.614
54.5	16.954	17.117	17.257	17.642	18.205	18.957	20.038	20.795	21.61
55	16.956	17.119	17.259	17.644	18.207	18.959	20.041	20.786	21.606
55.5	16.957	17.12	17.261	17.646	18.209	18.962	20.044	20.779	21.605
56	16.959	17.122	17.263	17.648	18.211	18.964	20.046	20.771	21.602
56.5	16.961	17.124	17.265	17.65	18.213	18.965	20.048	20.763	21.599
57	16.963	17.126	17.267	17.651	18.214	18.967	20.049	20.753	21.599
57.5	16.964	17.128	17.268	17.653	18.216	18.97	20.055	20.743	21.601
58	16.966	17.13	17.27	17.655	18.218	18.972	20.057	20.734	21.603

Node:	H Jilliby47.1	H Jilliby48.1	H Jilliby49.1	H Jilliby50.1	H Jilliby51.1	H Jilliby52.1	H Jilliby53.1	H Jilliby54.1	H Jilliby55.1
	Max 17.709	Max 18.111	Max 18.415	Max 19.239	Max 19.287	Max 20.176	Max 20.484	Max 21.239	Max 22.893
Time	Min 15.793	Min 16.226	Min 16.239	Min 16.686	Min 17.046	Min 17.899	Min 18.099	Min 18.645	Min 20.626
58.5	16.967	17.131	17.272	17.657	18.22	18.973	20.057	20.729	21.596
59	16.969	17.133	17.274	17.658	18.222	18.975	20.059	20.723	21.587
59.5	16.97	17.135	17.275	17.66	18.223	18.976	20.061	20.716	21.578
60	16.972	17.136	17.277	17.661	18.225	18.979	20.063	20.707	21.567
60.5	16.973	17.138	17.278	17.663	18.226	18.981	20.067	20.697	21.559
61	16.974	17.139	17.28	17.665	18.229	18.984	20.069	20.686	21.556
61.5	16.976	17.141	17.282	17.667	18.231	18.986	20.073	20.676	21.557
62	16.978	17.143	17.284	17.669	18.234	18.989	20.073	20.67	21.557
62.5	16.98	17.145	17.286	17.671	18.235	18.99	20.076	20.665	21.556
63	16.982	17.147	17.288	17.672	18.236	18.991	20.077	20.662	21.555
63.5	16.983	17.149	17.289	17.673	18.237	18.992	20.078	20.66	21.554
64	16.984	17.15	17.29	17.674	18.237	18.992	20.078	20.659	21.554
64.5	16.985	17.151	17.291	17.675	18.238	18.992	20.078	20.657	21.553
65	16.985	17.151	17.291	17.675	18.238	18.992	20.079	20.656	21.553
65.5	16.986	17.152	17.292	17.675	18.238	18.992	20.078	20.656	21.553
66	16.986	17.152	17.292	17.675	18.238	18.993	20.079	20.655	21.553
66.5	16.986	17.152	17.292	17.675	18.238	18.993	20.079	20.655	21.553
67	16.986	17.152	17.292	17.675	18.238	18.993	20.079	20.654	21.552
67.5	16.986	17.152	17.292	17.675	18.238	18.993	20.079	20.654	21.552
68	16.987	17.152	17.293	17.676	18.239	18.993	20.079	20.654	21.552
68.5	16.987	17.153	17.293	17.676	18.239	18.993	20.079	20.654	21.552
69	16.987	17.153	17.293	17.676	18.239	18.993	20.079	20.654	21.552
69.5	16.987	17.153	17.293	17.676	18.239	18.993	20.079	20.654	21.552
70	16.987	17.153	17.293	17.676	18.239	18.993	20.079	20.654	21.552
70.5	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.654	21.552
71	16.987	17.153	17.293	17.676	18.239	18.993	20.079	20.654	21.552
71.5	16.987	17.153	17.293	17.676	18.239	18.993	20.079	20.654	21.552
72	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.654	21.552
72.5	16.987	17.153	17.293	17.676	18.239	18.993	20.079	20.654	21.552
73	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.654	21.552
73.5	16.987	17.153	17.293	17.676	18.239	18.993	20.079	20.654	21.552
74	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.654	21.552
74.5	16.987	17.153	17.293	17.676	18.239	18.993	20.079	20.654	21.552
75	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.654	21.552
75.5	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.654	21.552
76	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.653	21.552
76.5	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.653	21.552
77	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.653	21.552
77.5	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.653	21.552
78	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.653	21.552
78.5	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.653	21.552
79	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.653	21.552
79.5	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.654	21.552
80	16.987	17.153	17.293	17.676	18.239	18.993	20.08	20.653	21.552

Pre-subsidence Flood Levels at Specific Dwelling Locations

..\results\Unsubsided\100y30h\W2CP_Existing_100y30h_PO.csv

Location Time	Water Level D0017	Water Level D0041	Water Level D0042os	Water Level D0049os	Water Level D0050os	Water Level D0051os	Water Level D0058	Water Level D0060os	Water Level D0061	Water Level D0063	Water Level D0147os	Water Level D0170
1	10.275	17.243	14.432	13.46	12.027	12.286	9.638	11.457	10.61	10.406	21.741	21.625
1.5	10.275	17.243	14.432	13.46	12.027	12.286	9.638	11.457	10.61	10.406	21.741	21.625
2	10.275	17.243	14.432	13.46	12.027	12.286	9.638	11.457	10.61	10.406	21.741	21.625
2.5	10.275	17.243	14.432	13.46	12.027	12.286	9.638	11.457	10.61	10.406	21.741	21.625
3	10.275	17.243	14.432	13.46	12.027	12.286	9.638	11.457	10.61	10.406	21.741	21.625
3.5	10.275	17.243	14.432	13.46	12.027	12.286	9.638	11.457	10.61	10.406	21.741	21.625
4	10.2754	17.2445	14.437	13.4618	12.0373	12.2871	9.6387	11.4579	10.6106	10.4065	21.7416	21.6256
4.5	10.2756	17.2444	14.4348	13.4616	12.03	12.2885	9.6392	11.4593	10.6108	10.4065	21.742	21.6259
5	10.2756	17.2443	14.4346	13.4617	12.0296	12.2885	9.6393	11.4601	10.6108	10.4065	21.7421	21.6259
5.5	10.2757	17.2443	14.4339	13.4616	12.0301	12.2885	9.6393	11.4601	10.6108	10.4066	21.7421	21.6259
6	10.2757	17.2443	14.434	13.4617	12.0295	12.2886	9.6393	11.4601	10.6108	10.4066	21.7422	21.6259
6.5	10.276	17.2448	14.4348	13.4625	12.0305	12.2897	9.6399	11.4612	10.6112	10.4068	21.7426	21.6263
7	10.276	17.2448	14.4352	13.4622	12.0307	12.2899	9.6399	11.4615	10.6112	10.4068	21.7427	21.6263
7.5	10.276	17.2448	14.4352	13.462	12.0318	12.2899	9.6399	11.4615	10.6112	10.4068	21.7427	21.6264
8	10.276	17.2448	14.4344	13.4619	12.0307	12.2899	9.6399	11.4615	10.6112	10.4068	21.7427	21.6264
8.5	10.2757	17.2443	14.4339	13.4617	12.0297	12.2888	9.6393	11.4605	10.6108	10.4066	21.7422	21.626
9	10.2757	17.2443	14.4349	13.4615	12.0296	12.2887	9.6393	11.4602	10.6108	10.4066	21.7422	21.6259
9.5	10.2757	17.2443	14.4345	13.4615	12.0296	12.2888	9.6393	11.4602	10.6108	10.4067	21.7422	21.6259
10	10.2757	17.2443	14.4346	13.4616	12.0297	12.2887	9.6393	11.4602	10.6109	10.4067	21.7422	21.6259
10.5	10.2766	17.2459	14.5931	13.4632	12.0331	12.2922	9.6411	11.4638	10.612	10.4076	21.7435	21.6272
11	10.2766	17.2457	14.8819	13.4641	12.0347	12.2923	9.6411	11.4658	10.612	10.4076	21.7436	21.6272
11.5	10.2766	17.2458	15.1816	13.4645	12.0353	12.2924	9.6411	11.4658	10.612	10.4076	21.7436	21.6269
12	10.2766	17.2458	15.4366	13.4636	12.0351	12.2923	9.6411	11.4658	10.612	10.4076	21.7436	21.6272
12.5	10.276	17.2449	15.6372	13.4628	12.0324	12.2903	9.6401	11.4623	10.6114	10.4071	21.7429	21.6265
13	10.2761	17.2449	15.7838	13.4623	12.0325	12.2904	9.6401	11.462	10.6114	10.4071	21.7428	21.6265
13.5	10.2761	17.2449	15.8984	13.4625	12.0323	12.2903	9.6401	11.4619	10.6114	10.4071	21.7428	21.6265
14	10.2761	17.2449	15.9669	13.4625	12.0327	12.2904	9.6401	11.4619	10.6114	10.4071	21.7429	21.6265
14.5	10.2762	17.2453	15.9996	13.4627	12.0336	12.291	9.6403	11.4625	10.6116	10.4072	21.7431	21.6267
15	10.2763	17.2455	16.0156	13.4627	12.0336	12.291	9.6404	11.4626	10.6116	10.4076	21.7431	21.6267
15.5	10.2763	17.2455	16.0659	13.4628	12.0337	12.2911	9.6404	11.4626	10.6116	10.408	21.7431	21.6267
16	10.2763	17.2456	16.186	13.4627	12.0337	12.2912	9.6404	11.4626	10.6116	10.408	21.7432	21.6267
16.5	10.2771	17.2473	16.435	13.4649	12.0376	12.2944	9.6422	11.4665	10.6125	10.4091	21.7446	21.6277
17	10.2771	17.2474	16.7554	13.4648	12.0375	12.2931	9.6422	11.4665	10.6126	10.4089	21.7444	21.6276
17.5	10.2771	17.2475	17.0289	13.4656	12.0376	12.2926	9.6422	11.4665	10.6126	10.4092	21.7444	21.6276
18	10.2771	17.2477	17.2826	13.466	12.1325	12.293	9.6421	11.4665	10.6126	10.4123	21.7444	21.6279
18.5	10.2763	17.2461	17.5097	13.4639	12.3029	12.3028	9.6408	11.4651	10.6118	10.4122	21.7433	21.6271
19	10.2765	17.2465	17.6884	13.464	12.4271	12.429	9.6413	11.4648	10.6119	10.4126	21.7433	21.6271
19.5	10.2765	17.2483	17.7847	13.463	12.536	12.5364	9.6416	11.4636	10.6119	10.4127	21.7433	21.6271
20	10.2766	17.2498	17.8468	13.4638	12.6051	12.6052	9.6412	11.4636	10.6119	10.4127	21.7433	21.6271
20.5	10.2759	17.2486	17.9297	13.4628	12.6333	12.6325	9.6399	11.4613	10.6111	10.411	21.7425	21.6262
21	10.2759	17.2516	18.1929	13.463	12.6696	12.6696	9.6399	11.4607	10.611	10.4109	21.7424	21.6262
21.5	10.2759	17.2971	18.8239	13.4637	12.8286	12.829	9.64	11.4606	10.611	10.4108	21.7424	21.6262
22	10.2774	17.8885	19.5194	13.4648	13.2169	13.2173	9.6658	11.4606	10.611	10.4107	21.7424	21.6262
22.5	10.3525	18.2971	19.9312	13.6284	13.6284	13.6289	10.0752	11.4595	10.6106	10.4094	21.7418	21.6257
23	10.5698	18.4366	20.0499	13.8502	13.8498	13.8498	10.4734	11.459	10.611	10.4871	21.7417	21.6256
23.5	10.7318	18.4271	20.0154	13.8953	13.8906	13.8731	10.6641	11.4589	10.6644	10.6778	21.7417	21.6256
24	10.7524	18.3315	19.8872	13.8416	13.8427	13.8325	10.6965	11.4588	10.6977	10.7103	21.7417	21.6255
24.5	10.7005	18.1919	19.7196	13.7541	13.7542	13.7543	10.6442	11.4587	10.647	10.6598	21.7417	21.6255
25	10.6153	18.0434	19.5476	13.6596	13.6588	13.6592	10.5525	11.4588	10.6109	10.5698	21.7417	21.6255
25.5	10.5166	17.9084	19.3943	13.5667	13.5808	13.5827	10.446	11.4588	10.6116	10.4695	21.7417	21.6255
26	10.4738	17.7773	19.248	13.4962	13.4972	13.4972	10.3568	11.4587	10.6112	10.4099	21.7417	21.6255
26.5	10.4099	17.6646	19.1113	13.4393	13.4173	13.417	10.256	11.4585	10.6106	10.4084	21.7413	21.6253
27	10.3382	17.5571	18.9808	13.4441	13.3354	13.3355	10.1574	11.4583	10.6104	10.4081	21.7413	21.6253
27.5	10.2824	17.4494	18.8496	13.4478	13.2584	13.2612	10.0668	11.4582	10.6104	10.4079	21.7414	21.6253

Location Time	Water Level D0017	Water Level D0041	Water Level D0042os	Water Level D0049os	Water Level D0050os	Water Level D0051os	Water Level D0058	Water Level D0060os	Water Level D0061	Water Level D0063	Water Level D0147os	Water Level D0170
28	10.2794	17.3291	18.7053	13.451	13.1858	13.1858	9.9782	11.4581	10.6103	10.4078	21.7414	21.6253
28.5	10.2783	17.2118	18.5636	13.4524	13.1001	13.1061	9.8827	11.4577	10.61	10.4075	21.741	21.625
29	10.2776	17.0995	18.4318	13.453	13.0202	13.0207	9.7737	11.4576	10.61	10.4073	21.741	21.625
29.5	10.2772	16.9942	18.3199	13.4532	12.9462	12.9433	9.6574	11.4574	10.61	10.4064	21.741	21.625
30	10.2762	16.8868	18.1828	13.46	12.8694	12.8687	9.6389	11.4574	10.61	10.406	21.741	21.625
30.5	10.2753	16.7885	18.0609	13.46	12.7858	12.7842	9.6385	11.4573	10.61	10.406	21.741	21.625
31	10.275	16.7018	17.9558	13.46	12.708	12.7083	9.6382	11.4573	10.61	10.406	21.741	21.625
31.5	10.275	16.6226	17.8624	13.46	12.6372	12.6381	9.638	11.4573	10.61	10.406	21.741	21.625
32	10.275	16.6198	17.7613	13.46	12.5735	12.5745	9.638	11.4572	10.61	10.406	21.741	21.625
32.5	10.275	17.243	17.6639	13.46	12.5116	12.5113	9.638	11.457	10.61	10.406	21.741	21.625
33	10.275	17.243	17.5775	13.46	12.4437	12.4434	9.638	11.457	10.61	10.406	21.741	21.625
33.5	10.275	17.243	17.4989	13.46	12.3805	12.3807	9.638	11.457	10.61	10.406	21.741	21.625
34	10.275	17.243	17.4238	13.46	12.3217	12.321	9.638	11.457	10.61	10.406	21.741	21.625
34.5	10.275	17.243	17.3538	13.46	12.2654	12.2863	9.638	11.457	10.61	10.406	21.741	21.625
35	10.275	17.243	17.2829	13.46	12.2131	12.286	9.638	11.457	10.61	10.406	21.741	21.625
35.5	10.275	17.243	17.2114	13.46	12.1624	12.286	9.638	11.457	10.61	10.406	21.741	21.625
36	10.275	17.243	17.145	13.46	12.1107	12.286	9.638	11.457	10.61	10.406	21.741	21.625
36.5	10.275	17.243	17.0778	13.46	12.0628	12.286	9.638	11.457	10.61	10.406	21.741	21.625
37	10.275	17.243	17.0157	13.46	12.0281	12.286	9.638	11.457	10.61	10.406	21.741	21.625
37.5	10.275	17.243	16.9559	13.46	12.0276	12.286	9.638	11.457	10.61	10.406	21.741	21.625
38	10.275	17.243	16.8995	13.46	12.0274	12.286	9.638	11.457	10.61	10.406	21.741	21.625
38.5	10.275	17.243	16.8393	13.46	12.0273	12.286	9.638	11.457	10.61	10.406	21.741	21.625
39	10.275	17.243	16.774	13.46	12.0272	12.286	9.638	11.457	10.61	10.406	21.741	21.625
39.5	10.275	17.243	16.703	13.46	12.027	12.286	9.638	11.457	10.61	10.406	21.741	21.625
40	10.275	17.243	16.6205	13.46	12.027	12.286	9.638	11.457	10.61	10.406	21.741	21.625

..\results\Unsubsided\100y30h\W2CP_Existing_100y30h_PO.csv Continued......

Location Time	Water Level D0197os	Water Level D0201os	Water Level D0207	Water Level D0209os	Water Level D0220	Water Level D0221	Water Level D0236os	Water Level D0237	Water Level D0240	Water Level D0432os	Water Level D0614os	Water Level D0615os
1	13.736	20.691	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.868	10.56	9.772
1.5	13.7394	20.691	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.868	10.56	9.772
2	13.7438	20.691	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.868	10.56	9.772
2.5	13.7494	20.691	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.868	10.56	9.772
3	13.7552	20.691	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.868	10.56	9.772
3.5	13.7628	20.691	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.868	10.56	9.772
4	13.7714	20.6922	14.1056	14.0863	15.4444	15.5915	14.9202	13.9306	16.7174	13.8692	10.5667	9.7721
4.5	13.8084	20.697	14.106	14.0894	15.4445	15.5917	14.9322	13.931	16.7175	13.8712	10.5647	9.7721
5	13.8756	20.7056	14.106	14.0897	15.4445	15.5917	14.9309	13.931	16.7175	13.8719	10.5649	9.7721
5.5	13.9189	20.7069	14.106	14.0897	15.4445	15.5917	14.9286	13.931	16.7175	13.8723	10.565	9.7721
6	13.954	20.7087	14.106	14.0897	15.4445	15.5917	14.9283	13.9311	16.7175	13.8724	10.565	9.7721
6.5	13.9576	20.7122	14.1066	14.0915	15.4447	15.5921	14.9311	13.9315	16.7176	13.874	10.5671	9.7721
7	13.9583	20.7625	14.1066	14.0923	15.4447	15.592	14.9326	13.9315	16.7176	13.8743	10.5675	9.7721
7.5	13.9583	20.7647	14.1069	14.0924	15.4448	15.5921	14.933	13.9313	16.7177	13.8743	10.5675	9.7721
8	13.9583	20.7953	14.1069	14.0924	15.4448	15.5921	14.9329	13.9313	16.7177	13.8744	10.5675	9.7721
8.5	13.9555	20.8017	14.1064	14.0906	15.4446	15.5918	14.9302	13.9309	16.7175	13.8729	10.5653	9.7721
9	13.9548	20.7879	14.1064	14.0903	15.4445	15.5918	14.9288	13.9309	16.7175	13.8725	10.5652	9.7721
9.5	13.9548	20.7721	14.1064	14.0902	15.4445	15.5917	14.9288	13.9309	16.7175	13.8725	10.5652	9.7721
10	13.9548	20.7594	14.1064	14.0902	15.4445	15.5916	14.9288	13.931	16.7175	13.8725	10.5652	9.7721
10.5	13.966	20.8294	14.1079	14.097	15.4452	15.5928	14.9395	13.9321	16.7181	13.8779	10.5718	9.7721
11	13.9675	20.884	14.1079	14.0972	15.4452	15.5929	14.9415	13.932	16.7182	13.8783	10.5712	9.7721
11.5	13.9675	20.9011	14.1079	14.0972	15.4453	15.5929	14.9415	13.9321	16.7182	13.8783	10.5714	9.7721
12	13.9675	20.9069	14.1079	14.0972	15.4452	15.5929	14.9416	13.9322	16.7182	13.8783	10.5714	9.9627
12.5	13.9606	20.8867	14.1071	14.0936	15.4449	15.5923	14.9354	13.9313	16.7178	13.8747	10.5678	10.2843
13	13.9605	20.8529	14.1071	14.0931	15.4449	15.5923	14.9341	13.9314	16.7179	13.8742	10.5669	10.5769
13.5	13.9607	20.8431	14.1071	14.0931	15.4449	15.5923	14.9341	13.9315	16.718	13.8739	10.6577	10.8165
14	13.9601	20.8462	14.1071	14.0931	15.4449	15.5923	14.9341	13.9314	16.7179	13.8737	10.7987	10.9498
14.5	13.9622	20.8498	14.1073	14.0941	15.445	15.5924	14.9357	13.9317	16.7179	13.8746	10.8963	11.0421
15	13.963	20.8566	14.1073	14.0943	15.445	15.5924	14.9364	13.9317	16.7179	13.8819	10.9664	11.1068
15.5	13.9734	20.8607	14.1073	14.0943	15.445	15.5924	14.9367	13.9316	16.7179	13.9736	11.0082	11.1459
16	14.0558	20.8618	14.1073	14.0943	15.445	15.5924	14.9372	13.9315	16.7179	14.0511	11.0337	11.1711
16.5	14.1338	20.9122	14.1086	14.1001	15.4455	15.5933	14.9478	13.9328	16.719	14.1333	11.1109	11.2497
17	14.2226	20.9441	14.1086	14.1003	15.4455	15.5934	14.9279	13.9329	16.7189	14.2222	11.2941	11.4309
17.5	14.3042	20.9462	14.1088	14.1011	15.4457	15.5935	14.9812	13.9347	16.7196	14.3057	11.5512	11.6891
18	14.3779	20.9478	14.1088	14.0993	15.4458	15.5936	15.072	13.9348	16.72	14.3769	11.7718	11.9157
18.5	14.4214	20.9256	14.1077	14.0954	15.4452	15.5929	15.1246	13.9333	16.7188	14.4207	11.933	12.0798
19	14.4394	20.9024	14.1077	14.0952	15.445	15.5929	15.1337	13.933	16.7192	14.4392	12.0439	12.1962
19.5	14.4452	20.897	14.1077	14.0952	15.4451	15.5928	15.1339	13.9321	16.7189	14.4455	12.1408	12.2982
20	14.4472	20.8976	14.1076	14.0952	15.4451	15.5928	15.14	13.9318	16.7187	14.4477	12.2014	12.3627
20.5	14.4399	20.8747	14.1066	14.091	15.4446	15.592	15.1317	13.931	16.7179	14.4404	12.227	12.3899
21	14.423	20.8331	14.1066	14.0905	15.4446	15.592	15.11	13.9311	16.7178	14.4232	12.2551	12.4217
21.5	14.4026	20.8091	14.1066	14.0907	15.4446	15.5919	15.0852	13.9311	16.7177	14.4026	12.3886	12.571
22	14.3829	20.8002	14.1066	14.0905	15.4446	15.5919	15.066	13.931	16.7176	14.3826	12.7364	12.9576
22.5	14.3628	20.786	14.1059	14.0887	15.4443	15.5914	15.0403	13.9305	16.7173	14.3638	13.1822	13.3982
23	14.3428	20.7629	14.1059	14.0881	15.4443	15.5915	15.0138	13.9306	16.7173	14.3428	13.4074	13.6219
23.5	14.3213	20.7558	14.1059	14.088	15.4443	15.5915	14.9737	13.9306	16.7173	14.3214	13.4622	13.6675
24	14.2981	20.748	14.1059	14.0881	15.4443	15.5915	14.9511	13.9306	16.7173	14.2985	13.4079	13.6188
24.5	14.2735	20.736	14.1059	14.0881	15.4443	15.5915	14.9289	13.9306	16.7173	14.2724	13.3264	13.5342
25	14.2508	20.7343	14.1059	14.088	15.4443	15.5915	14.9239	13.9306	16.7173	14.2514	13.2339	13.4398
25.5	14.2292	20.7338	14.1059	14.088	15.4443	15.5915	14.9219	13.9306	16.7173	14.229	13.1408	13.3523
26	14.2083	20.7331	14.1059	14.0881	15.4443	15.5915	14.9298	13.9306	16.7173	14.2089	13.0629	13.2709
26.5	14.1887	20.7311	14.1054	14.0874	15.4442	15.5913	14.9281	13.9304	16.7172	14.1878	12.9716	13.1827
27	14.1695	20.7253	14.1054	14.0869	15.4442	15.5913	14.9252	13.9303	16.7172	14.1692	12.8905	13.1023
27.5	14.153	20.7204	14.1054	14.0867	15.4442	15.5913	14.9237	13.9303	16.7173	14.1529	12.8164	13.0241
28	14.1396	20.7167	14.1053	14.0866	15.4442	15.5913	14.923	13.9303	16.7173	14.1386	12.7398	12.9448
28.5	14.125	20.7139	14.105	14.0862	15.444	15.591	14.9223	13.93	16.717	14.1252	12.6612	12.8604

Location Time	Water Level D0197os	Water Level D0201os	Water Level D0207	Water Level D0209os	Water Level D0220	Water Level D0221	Water Level D0236os	Water Level D0237	Water Level D0240	Water Level D0432os	Water Level D0614os	Water Level D0615os
29	14.1105	20.7103	14.105	14.0859	15.444	15.591	14.9217	13.93	16.717	14.1103	12.5808	12.7754
29.5	14.096	20.7086	14.105	14.0857	15.444	15.591	14.9213	13.93	16.717	14.0957	12.5121	12.6976
30	14.0808	20.7075	14.105	14.0855	15.444	15.591	14.9214	13.93	16.717	14.081	12.4443	12.6231
30.5	14.0642	20.7095	14.105	14.0853	15.444	15.591	14.9207	13.93	16.717	14.0643	12.367	12.5397
31	14.0478	20.7008	14.105	14.085	15.444	15.591	14.9203	13.93	16.717	14.0478	12.2966	12.4646
31.5	14.0336	20.7075	14.105	14.085	15.444	15.591	14.92	13.93	16.717	14.0338	12.234	12.3995
32	14.0215	20.7048	14.105	14.085	15.444	15.591	14.9197	13.93	16.717	14.0213	12.1785	12.3402
32.5	14.0108	20.703	14.105	14.085	15.444	15.591	14.9196	13.93	16.717	14.0106	12.122	12.2803
33	14.0005	20.7016	14.105	14.085	15.444	15.591	14.9195	13.93	16.717	14.0002	12.0635	12.218
33.5	13.9895	20.7001	14.105	14.085	15.444	15.591	14.9193	13.93	16.717	13.9898	12.0068	12.158
34	13.9806	20.6994	14.105	14.085	15.444	15.591	14.9192	13.93	16.717	13.9802	11.955	12.1027
34.5	13.9709	20.6988	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.9711	11.9035	12.0503
35	13.9615	20.6982	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.9609	11.8553	12.0005
35.5	13.9512	20.7101	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.9511	11.8089	11.9523
36	13.9477	20.71	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.9414	11.7643	11.901
36.5	13.9475	20.7053	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.9311	11.7196	11.8544
37	13.9474	20.7029	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.9202	11.6747	11.8086
37.5	13.9474	20.7007	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.9087	11.6311	11.7645
38	13.9474	20.6988	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.8974	11.5904	11.7223
38.5	13.9474	20.6977	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.8855	11.5507	11.6817
39	13.9474	20.697	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.8727	11.5108	11.6412
39.5	13.9474	20.6964	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.8687	11.4687	11.5986
40	13.9474	20.696	14.105	14.085	15.444	15.591	14.919	13.93	16.717	13.8685	11.4235	11.5527

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Location Time	Water Level D0712os	Water Level D0713os	Water Level D0736	Water Level D0737	Water Level D0765	Water Level D0767os	Water Level D0773	Water Level D0776	Water Level D0851	Water Level D0852	Water Level D0863	Water Level D0870
1	20.565	15.542	10.185	11.172	28.752	15.741	16.529	15.954	16.181	15.794	14.598	11.915
1.5	20.565	15.542	10.185	11.172	28.752	15.741	16.529	15.954	16.181	15.794	14.598	11.915
2	20.565	15.542	10.185	11.172	28.752	15.741	16.529	15.954	16.181	15.794	14.598	11.915
2.5	20.565	15.542	10.185	11.172	28.752	15.741	16.529	15.954	16.181	15.794	14.598	11.915
3	20.565	15.542	10.185	11.172	28.752	15.741	16.529	15.954	16.181	15.794	14.598	11.915
3.5	20.565	15.542	10.185	11.172	28.752	15.741	16.529	15.954	16.181	15.794	14.598	11.915
4	20.5665	15.5425	10.1854	11.1729	28.7524	16.0335	16.53	15.9549	16.1816	15.7946	14.5988	11.9157
4.5	20.569	15.5428	10.1856	11.1827	28.7526	16.0029	16.5327	15.9613	16.1823	15.795	14.5995	11.9161
5	20.5692	15.5428	10.1856	11.1815	28.7526	16.0059	16.5604	15.9833	16.1829	15.795	14.5999	11.9161
5.5	20.5692	15.5428	10.1856	11.1809	28.7526	16.016	16.5538	15.974	16.1835	15.795	14.5997	11.9161
6	20.5692	15.5428	10.1856	11.1808	28.7526	16.0007	16.5472	15.9717	16.1835	15.7951	14.5997	11.9161
6.5	20.5708	15.5431	10.1858	11.1821	28.7529	16.0213	16.552	15.974	16.1842	15.7954	14.6007	11.9166
7	20.5873	15.5431	10.1858	11.1845	28.7529	16.0656	16.5562	15.9777	16.1844	15.7954	14.6009	11.9166
7.5	20.5937	15.5431	10.1858	11.1842	28.7529	16.0207	16.5574	15.9836	16.1844	15.7954	14.601	11.9166
8	20.5959	15.5432	10.1858	11.1843	28.7529	16.0212	16.5593	15.9972	16.1844	15.7954	14.601	11.9166
8.5	20.6028	15.5428	10.1856	11.183	28.7526	16.0081	16.5559	15.9876	16.1837	15.795	14.6003	11.9162
9	20.6023	15.5428	10.1856	11.1816	28.7526	16.0013	16.5514	15.9788	16.1836	15.795	14.6001	11.9162
9.5	20.5972	15.5428	10.1856	11.1811	28.7526	16.0037	16.5497	15.9764	16.1836	15.795	14.5999	11.9162
10	20.596	15.5428	10.1856	11.181	28.7526	16.0061	16.5496	15.9761	16.1835	15.795	14.5999	11.9162
10.5	20.6064	15.5439	10.1863	11.1856	28.7534	16.0424	16.5671	16.0018	16.1857	15.7963	14.6041	11.9178
11	20.6271	15.5439	10.1863	11.1905	28.7534	16.0467	16.5762	16.0178	16.1862	15.7963	14.6047	11.9186
11.5	20.6355	15.5439	10.1863	11.1904	28.7535	16.0477	16.5771	16.0206	16.1861	15.7963	14.6047	11.9187
12	20.6405	15.5439	10.1863	11.1915	28.7535	16.0482	16.5715	16.0268	16.1861	15.7967	14.6047	11.9188
12.5	20.631	15.5433	10.1859	11.1864	28.753	16.0273	16.5688	16.0061	16.1848	15.7955	14.6024	11.9176
13	20.6197	15.5433	10.1859	11.1853	28.753	16.0254	16.5619	15.9972	16.1847	15.796	14.6021	11.9171
13.5	20.614	15.5433	10.1859	11.1852	28.753	16.0256	16.5616	15.9961	16.1848	15.796	14.6019	11.917
14	20.6128	15.5433	10.1859	11.1852	28.753	16.0256	16.5617	15.9966	16.1846	15.7961	14.602	11.917
14.5	20.6158	15.5435	10.186	11.1856	28.7531	16.0335	16.5642	16	16.1849	15.7962	14.6027	11.9173
15	20.6188	15.5433	10.186	11.1861	28.7531	16.0343	16.5664	16.0031	16.1857	15.7958	14.6028	11.9175
15.5	20.6221	15.5433	10.186	11.1862	28.7531	16.0345	16.5667	16.0025	16.1868	15.7969	14.6028	11.9176
16	20.6238	15.5433	10.186	11.1862	28.7531	16.0348	16.5667	16.0026	16.1874	15.8198	14.6028	11.9176
16.5	20.6399	15.5443	10.1867	11.1958	28.7539	16.1804	16.5853	15.9945	16.1895	15.825	14.6044	11.9195
17	20.6657	15.5444	10.1867	11.2011	28.7539	16.5901	16.59	16.0293	16.1905	15.8816	14.6045	11.92
17.5	20.6691	15.5444	10.1867	11.2012	28.7539	16.9148	16.5902	16.0909	16.1911	15.9421	14.6049	11.92
18	20.6693	15.5444	10.1867	11.2002	28.7539	17.1572	16.5901	16.1472	16.1915	15.9943	14.6049	11.92
18.5	20.6557	15.5437	10.1865	11.1931	28.7534	17.3643	16.5673	16.1745	16.19	16.0214	14.6044	11.9186
19	20.638	15.5437	10.1865	11.1887	28.7534	17.5297	16.5613	16.1778	16.19	16.0252	14.6041	11.9184
19.5	20.633	15.5437	10.1868	11.1887	28.7533	17.6171	16.5612	16.1779	16.19	16.0254	14.604	11.9184
20	20.633	15.5437	10.1872	11.1887	28.7533	17.6726	16.5611	16.1834	16.19	16.0305	14.6039	11.9184
20.5	20.6241	15.5429	10.1863	11.186	28.7527	17.7464	16.5638	16.175	16.1879	16.0241	14.6015	11.917
21	20.6133	15.5429	10.1863	11.1832	28.7527	17.977	16.556	16.156	16.1877	16.0087	14.6013	11.9166
21.5	20.6061	15.5429	10.1865	11.1825	28.7527	18.5256	16.5545	16.1369	16.1876	15.9927	14.6011	11.9165
22	20.6043	15.5429	10.1865	11.1824	28.7527	19.1543	16.5543	16.1237	16.1875	15.9812	14.6011	11.9165
22.5	20.6008	15.5425	10.3208	11.1816	28.7524	19.5394	16.5511	16.1094	16.1862	15.969	14.5999	11.9158
23	20.5966	15.5425	10.5411	11.1803	28.7524	19.6521	16.5463	16.0891	16.1858	15.9519	14.5996	11.9158
23.5	20.5955	15.5425	10.6811	11.1799	28.7524	19.6214	16.5444	16.0618	16.1856	15.9295	14.5994	11.9158
24	20.5947	15.5425	10.7027	11.1789	28.7524	19.5054	16.5435	16.0307	16.1855	15.9053	14.5994	11.9157
24.5	20.5932	15.5425	10.6561	11.1792	28.7524	19.3525	16.5435	15.998	16.1854	15.8835	14.5993	11.9157
25	20.592	15.5425	10.5789	11.1788	28.7524	19.1919	16.543	15.9796	16.1853	15.8631	14.5993	11.9157
25.5	20.5911	15.5425	10.4937	11.1788	28.7524	19.0466	16.5428	15.97	16.1852	15.844	14.5993	11.9157
26	20.5906	15.5425	10.4444	11.1788	28.7524	18.911	16.5428	15.9657	16.185	15.8271	14.5993	11.9157
26.5	20.5897	15.5423	10.3854	11.1785	28.7522	18.7881	16.5417	15.9627	16.1843	15.8077	14.5989	11.9154
27	20.5875	15.5422	10.3211	11.1778	28.7522	18.6723	16.5403	15.9682	16.184	15.8262	14.5988	11.9154
27.5	20.5859	15.5422	10.2523	11.1771	28.7522	18.5567	16.5386	15.9652	16.1838	15.8018	14.5987	11.9153
28	20.5832	15.5422	10.1887	11.1767	28.7522	18.4297	16.5371	15.9634	16.1837	15.796	14.5987	11.9153
28.5	20.5806	15.542	10.1868	11.1761	28.752	18.3039	16.5357	15.9617	16.1831	15.7954	14.5985	11.915

Location Time	Water Level D0712os	Water Level D0713os	Water Level D0736	Water Level D0737	Water Level D0765	Water Level D0767os	Water Level D0773	Water Level D0776	Water Level D0851	Water Level D0852	Water Level D0863	Water Level D0870
29	20.5776	15.542	10.186	11.1755	28.752	18.1882	16.5346	15.9603	16.1827	15.7947	14.5983	11.915
29.5	20.5766	15.542	10.1853	11.175	28.752	18.0922	16.5338	15.959	16.1823	15.7943	14.5983	11.915
30	20.577	15.542	10.185	11.1744	28.752	17.969	16.5332	15.9584	16.182	15.794	14.5982	11.915
30.5	20.5766	15.542	10.185	11.1738	28.752	17.8643	16.5327	15.9579	16.1817	15.794	14.598	11.915
31	20.5748	15.542	10.185	11.1735	28.752	17.7711	16.5322	15.9574	16.1814	15.794	14.598	11.915
31.5	20.5742	15.542	10.185	11.1733	28.752	17.6855	16.5318	15.957	16.1813	15.794	14.598	11.915
32	20.5737	15.542	10.185	11.1731	28.752	17.5955	16.5314	15.9567	16.1813	15.794	14.598	11.915
32.5	20.5732	15.542	10.185	11.173	28.752	17.507	16.531	15.9563	16.1812	15.794	14.598	11.915
33	20.5725	15.542	10.185	11.1728	28.752	17.4269	16.5308	15.9561	16.181	15.794	14.598	11.915
33.5	20.5715	15.542	10.185	11.1727	28.752	17.3533	16.5306	15.9558	16.181	15.794	14.598	11.915
34	20.5705	15.542	10.185	11.1726	28.752	17.283	16.5304	15.9557	16.181	15.794	14.598	11.915
34.5	20.5701	15.542	10.185	11.1726	28.752	17.217	16.5302	15.9556	16.181	15.794	14.598	11.915
35	20.5696	15.542	10.185	11.1726	28.752	17.1531	16.5301	15.9554	16.181	15.794	14.598	11.915
35.5	20.5694	15.542	10.185	11.1726	28.752	17.0913	16.53	15.9552	16.181	15.794	14.598	11.915
36	20.5714	15.542	10.185	11.1725	28.752	17.0327	16.5299	15.9551	16.181	15.794	14.598	11.915
36.5	20.5709	15.542	10.185	11.1725	28.752	16.9683	16.5298	15.955	16.181	15.794	14.598	11.915
37	20.5697	15.542	10.185	11.1724	28.752	16.905	16.5298	15.9549	16.181	15.794	14.598	11.915
37.5	20.5692	15.542	10.185	11.1724	28.752	16.8386	16.5298	15.9548	16.181	15.794	14.598	11.915
38	20.5688	15.542	10.185	11.1723	28.752	16.767	16.5299	15.9548	16.181	15.794	14.598	11.915
38.5	20.5684	15.542	10.185	11.1723	28.752	16.6916	16.5299	15.9547	16.181	15.794	14.598	11.915
39	20.5681	15.542	10.185	11.1723	28.752	16.6109	16.5299	15.9547	16.181	15.794	14.598	11.915
39.5	20.5679	15.542	10.185	11.1723	28.752	16.5263	16.5298	15.9547	16.181	15.794	14.598	11.915
40	20.5678	15.542	10.185	11.1722	28.752	16.4252	16.5298	15.9547	16.181	15.794	14.598	11.915

Post-subsidence Flood Levels at Specific Dwelling Locations

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Location Time	Water Level D0017	Water Level D0041	Water Level D0042os	Water Level D0049os	Water Level D0050os	Water Level D0051os	Water Level D0058	Water Level D0060os	Water Level D0061	Water Level D0063	Water Level D0147os	Water Level D0170
1	10.132	17.143	13.96	13.437	12.004	12.281	9.457	10.232	10.201	9.04	21.741	21.625
1.5	10.132	17.143	13.96	13.437	12.004	12.281	9.457	10.232	10.201	9.04	21.741	21.625
2	10.132	17.143	13.96	13.437	12.004	12.281	9.457	10.232	10.201	9.04	21.741	21.625
2.5	10.132	17.143	13.96	13.437	12.004	12.281	9.457	10.232	10.201	9.04	21.741	21.625
3	10.132	17.143	13.96	13.437	12.004	12.281	9.457	10.232	10.201	9.04	21.741	21.625
3.5	10.132	17.143	13.96	13.437	12.004	12.281	9.457	10.232	10.201	9.04	21.741	21.625
4	10.1324	17.1451	13.9636	13.4389	12.0139	12.2842	9.4577	10.2329	10.2015	9.0404	21.7416	21.6256
4.5	10.1326	17.1451	13.9636	13.4386	12.0072	12.2835	9.4582	10.2347	10.2017	9.0406	21.742	21.6259
5	10.1326	17.1451	13.9628	13.4386	12.0073	12.2834	9.4582	10.2377	10.2018	9.0406	21.7421	21.6259
5.5	10.1326	17.1447	13.9622	13.4385	12.0069	12.2835	9.4582	10.2373	10.2018	9.0406	21.7421	21.6259
6	10.1326	17.1448	13.962	13.4388	12.0068	12.2836	9.4582	10.2376	10.2018	9.0406	21.7422	21.6259
6.5	10.133	17.1453	13.963	13.4392	12.0082	12.2848	9.4588	10.2389	10.2021	9.0409	21.7426	21.6263
7	10.133	17.1452	13.963	13.4391	12.0081	12.2848	9.4588	10.2412	10.2021	9.0409	21.7427	21.6263
7.5	10.133	17.1448	13.9625	13.4391	12.0082	12.2849	9.4588	10.2403	10.2021	9.0409	21.7427	21.6264
8	10.1329	17.1448	13.9626	13.439	12.0085	12.2848	9.4589	10.2411	10.2021	9.041	21.7427	21.6264
8.5	10.1327	17.1442	13.962	13.4389	12.0072	12.2838	9.4583	10.2389	10.2018	9.0407	21.7422	21.626
9	10.1327	17.1442	13.9624	13.4386	12.0071	12.2837	9.4583	10.2382	10.2018	9.041	21.7422	21.6259
9.5	10.1327	17.1442	14.0351	13.4384	12.0071	12.2837	9.4583	10.2379	10.2018	9.0411	21.7422	21.6259
10	10.1327	17.1443	14.2623	13.4385	12.0075	12.2837	9.4583	10.2379	10.2018	9.0411	21.7422	21.6259
10.5	10.1336	17.1458	14.4876	13.4405	12.0118	12.2872	9.46	10.2429	10.2028	9.0425	21.7435	21.6272
11	10.1336	17.1458	14.7853	13.4412	12.0113	12.2873	9.4601	10.2446	10.2028	9.0425	21.7436	21.6272
11.5	10.1336	17.1458	15.0831	13.442	12.0146	12.2873	9.4601	10.2434	10.2028	9.0424	21.7436	21.6268
12	10.1336	17.1459	15.3438	13.4407	12.0113	12.2873	9.4601	10.2438	10.2028	9.0423	21.7436	21.6272
12.5	10.1331	17.145	15.5538	13.4398	12.009	12.2853	9.459	10.2428	10.2022	9.0426	21.7429	21.6265
13	10.1331	17.1449	15.7071	13.4394	12.0095	12.2854	9.459	10.2416	10.2022	9.0431	21.7428	21.6265
13.5	10.1331	17.1449	15.8247	13.4395	12.0092	12.2854	9.459	10.2416	10.2022	9.0432	21.7428	21.6265
14	10.1331	17.1453	15.8989	13.4394	12.0099	12.2853	9.459	10.2416	10.2022	9.0418	21.7429	21.6265
14.5	10.1333	17.1456	15.9383	13.4397	12.0105	12.286	9.4593	10.2423	10.2024	9.0436	21.7431	21.6267
15	10.1333	17.1456	15.9574	13.4397	12.0103	12.286	9.4593	10.2428	10.2024	9.0438	21.7431	21.6267
15.5	10.1332	17.1456	16.0067	13.4397	12.0103	12.286	9.4593	10.2429	10.2024	9.044	21.7431	21.6267
16	10.1333	17.1457	16.124	13.4399	12.0113	12.2861	9.4593	10.2429	10.2024	9.0442	21.7432	21.6267
16.5	10.1341	17.1474	16.3741	13.4418	12.0144	12.2894	9.4609	10.2459	10.2033	9.077	21.7446	21.6277
17	10.1341	17.1474	16.6974	13.4418	12.014	12.2882	9.4609	10.248	10.2033	9.1482	21.7444	21.6276
17.5	10.1341	17.1475	16.973	13.4427	12.014	12.2877	9.4609	10.2483	10.2033	9.1976	21.7444	21.6276
18	10.1339	17.1478	17.2306	13.4431	12.113	12.288	9.4609	10.2483	10.2033	9.2626	21.7444	21.6279
18.5	10.1336	17.1464	17.4582	13.4411	12.2827	12.2821	9.4597	10.2443	10.2027	9.3451	21.7433	21.6271
19	10.1336	17.1467	17.6384	13.4409	12.4101	12.4069	9.46	10.2423	10.2027	9.4187	21.7433	21.6271
19.5	10.1336	17.15	17.7355	13.4401	12.521	12.5214	9.4604	10.2423	10.2027	9.4818	21.7433	21.6271
20	10.1336	17.1512	17.7978	13.4406	12.5902	12.5885	9.46	10.2423	10.2027	9.5495	21.7433	21.6271
20.5	10.133	17.15	17.8786	13.4396	12.6201	12.6196	9.4591	10.2419	10.2019	9.5992	21.7425	21.6262
21	10.1333	17.1541	18.1411	13.44	12.6568	12.6569	9.4587	10.2392	10.2019	9.6199	21.7424	21.6262
21.5	10.1333	17.279	18.7681	13.4407	12.8135	12.8145	9.4764	10.2391	10.2019	9.6304	21.7424	21.6262
22	10.1357	17.879	19.4665	13.442	13.1992	13.1987	9.6348	10.2392	10.2018	9.7001	21.7424	21.6262
22.5	10.2833	18.2935	19.8868	13.6135	13.6138	13.6132	10.0132	10.2365	10.2018	10.0156	21.7418	21.6257
23	10.519	18.4367	20.0113	13.8369	13.8374	13.838	10.418	10.4185	10.4185	10.4198	21.7417	21.6256
23.5	10.7006	18.4305	19.9794	13.8947	13.8949	13.8962	10.6359	10.6359	10.6372	10.6411	21.7417	21.6256
24	10.7451	18.3359	19.8527	13.8495	13.8384	13.8542	10.6949	10.6965	10.6966	10.7028	21.7417	21.6255
24.5	10.7059	18.2002	19.6853	13.7471	13.7461	13.748	10.6586	10.6587	10.6605	10.6686	21.7417	21.6255
25	10.6278	18.049	19.5131	13.6526	13.6527	13.6524	10.5764	10.5756	10.5797	10.5871	21.7417	21.6255
25.5	10.5308	17.9131	19.3588	13.5661	13.5594	13.5652	10.4739	10.4739	10.4767	10.4866	21.7417	21.6255
26	10.4501	17.7827	19.2117	13.4928	13.4918	13.4959	10.3847	10.3846	10.3875	10.397	21.7417	21.6255
26.5	10.3631	17.6693	19.0748	13.4088	13.4098	13.4074	10.2872	10.2877	10.2907	10.3004	21.7413	21.6253
27	10.3099	17.5638	18.9438	13.3889	13.3323	13.3316	10.1886	10.23	10.2018	10.2021	21.7413	21.6253
27.5	10.2522	17.4527	18.8117	13.3927	13.2515	13.2547	10.0976	10.2336	10.2017	10.1117	21.7414	21.6253

Location Time	Water Level D0017	Water Level D0041	Water Level D0042os	Water Level D0049os	Water Level D0050os	Water Level D0051os	Water Level D0058	Water Level D0060os	Water Level D0061	Water Level D0063	Water Level D0147os	Water Level D0170
28	10.1834	17.3342	18.6661	13.3961	13.1775	13.1767	10.0096	10.2337	10.2016	10.0251	21.7414	21.6253
28.5	10.1385	17.2103	18.5232	13.3976	13.098	13.0992	9.9039	10.2334	10.2013	9.9284	21.741	21.625
29	10.1361	17.1079	18.3913	13.3982	13.0178	13.0168	9.8011	10.2333	10.201	9.8247	21.741	21.625
29.5	10.1352	17.0002	18.2639	13.3984	12.9377	12.9368	9.6992	10.233	10.201	9.7237	21.741	21.625
30	10.1347	16.8973	18.1404	13.437	12.8611	12.8694	9.598	10.2329	10.201	9.6266	21.741	21.625
30.5	10.1341	16.7911	18.0195	13.437	12.7743	12.7739	9.4943	10.2326	10.201	9.5301	21.741	21.625
31	10.1327	16.7028	17.9109	13.437	12.701	12.7004	9.4581	10.2325	10.201	9.4303	21.741	21.625
31.5	10.1323	16.6215	17.8165	13.437	12.6283	12.6296	9.4575	10.2323	10.201	9.3358	21.741	21.625
32	10.132	16.5395	17.7152	13.437	12.563	12.5637	9.4573	10.2323	10.201	9.2502	21.741	21.625
32.5	10.132	17.143	17.62	13.437	12.4984	12.5011	9.457	10.2322	10.201	9.1727	21.741	21.625
33	10.132	17.143	17.5333	13.437	12.4324	12.4324	9.457	10.232	10.201	9.105	21.741	21.625
33.5	10.132	17.143	17.456	13.437	12.3694	12.3692	9.457	10.232	10.201	9.0466	21.741	21.625
34	10.132	17.143	17.3813	13.437	12.3099	12.3097	9.457	10.232	10.201	9.0419	21.741	21.625
34.5	10.132	17.143	17.3108	13.437	12.2549	12.281	9.457	10.232	10.201	9.0414	21.741	21.625
35	10.132	17.143	17.2406	13.437	12.2011	12.281	9.457	10.232	10.201	9.0412	21.741	21.625
35.5	10.132	17.143	17.1687	13.437	12.1505	12.281	9.457	10.232	10.201	9.041	21.741	21.625
36	10.132	17.143	17.1006	13.437	12.0986	12.281	9.457	10.232	10.201	9.0409	21.741	21.625
36.5	10.132	17.143	17.0355	13.437	12.049	12.281	9.457	10.232	10.201	9.0409	21.741	21.625
37	10.132	17.143	16.9712	13.437	12.0058	12.281	9.457	10.232	10.201	9.0408	21.741	21.625
37.5	10.132	17.143	16.9103	13.437	12.0046	12.281	9.457	10.232	10.201	9.0408	21.741	21.625
38	10.132	17.143	16.8554	13.437	12.0044	12.281	9.457	10.232	10.201	9.0407	21.741	21.625
38.5	10.132	17.143	16.7957	13.437	12.0043	12.281	9.457	10.232	10.201	9.0407	21.741	21.625
39	10.132	17.143	16.7301	13.437	12.0042	12.281	9.457	10.232	10.201	9.0406	21.741	21.625
39.5	10.132	17.143	16.6587	13.437	12.0042	12.281	9.457	10.232	10.201	9.0406	21.741	21.625
40	10.132	17.143	16.574	13.437	12.004	12.281	9.457	10.232	10.201	9.0406	21.741	21.625

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Location Time	Water Level D0197os	Water Level D0201os	Water Level D0207	Water Level D0209os	Water Level D0220	Water Level D0221	Water Level D0236os	Water Level D0237	Water Level D0240	Water Level D0432os	Water Level D0614os	Water Level D0615os
1	12.411	20.691	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.535	10.523	9.758
1.5	12.4144	20.691	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.535	10.523	9.758
2	12.4189	20.691	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.535	10.523	9.758
2.5	12.4245	20.691	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.535	10.523	9.758
3	12.4304	20.691	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.535	10.523	9.758
3.5	12.4363	20.691	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.535	10.523	9.758
4	12.4463	20.6922	12.9496	13.0373	14.2814	14.5842	13.7181	12.8116	16.3744	12.5362	10.5543	9.7581
4.5	12.4767	20.697	12.9499	13.0402	14.2815	14.5847	13.7272	12.8119	16.3745	12.5387	10.5259	9.7581
5	12.5079	20.7056	12.9499	13.0407	14.2815	14.5847	13.7291	12.812	16.3745	12.5392	10.5257	9.7581
5.5	12.5493	20.7069	12.9499	13.0408	14.2815	14.5847	13.7257	12.812	16.3745	12.5396	10.5262	9.7581
6	12.5967	20.7087	12.9499	13.0408	14.2815	14.5847	13.726	12.8119	16.3745	12.5398	10.5265	9.7581
6.5	12.6576	20.7123	12.9503	13.0427	14.2818	14.585	13.7286	12.8124	16.3747	12.5416	10.5275	9.7581
7	12.6605	20.7633	12.9503	13.0436	14.2818	14.585	13.7298	12.8125	16.3747	12.5419	10.5277	9.7581
7.5	12.6605	20.7904	12.9503	13.0437	14.2819	14.585	13.7299	12.8125	16.3747	12.542	10.5279	9.7581
8	12.6607	20.7963	12.9503	13.0437	14.2819	14.585	13.7301	12.8125	16.3747	12.542	10.5279	9.7581
8.5	12.6579	20.7879	12.9499	13.0419	14.2816	14.5847	13.7279	12.812	16.3745	12.5403	10.5265	9.7581
9	12.6571	20.7628	12.9499	13.0414	14.2816	14.5847	13.7266	12.8121	16.3745	12.54	10.5264	9.7581
9.5	12.657	20.7784	12.9499	13.0413	14.2816	14.5847	13.7264	12.812	16.3745	12.5399	10.5264	9.7581
10	12.657	20.7666	12.9499	13.0413	14.2816	14.5847	13.7264	12.812	16.3745	12.5399	10.5264	9.7581
10.5	12.6682	20.8332	12.9512	13.048	14.2822	14.5856	13.7369	12.8132	16.3751	12.5459	10.531	9.7581
11	12.6692	20.8877	12.9512	13.0482	14.2822	14.5856	13.7385	12.8131	16.3751	12.5461	10.5321	9.7581
11.5	12.6692	20.9039	12.9512	13.0482	14.2822	14.5856	13.7385	12.8132	16.3751	12.5461	10.5325	9.7581
12	12.6692	20.9055	12.9512	13.0482	14.2822	14.5855	13.7389	12.8131	16.3751	12.546	10.5326	9.9115
12.5	12.6628	20.8859	12.9505	13.0446	14.2818	14.5851	13.7335	12.8125	16.3747	12.542	10.5297	10.2307
13	12.662	20.8555	12.9505	13.0444	14.2818	14.5851	13.732	12.8126	16.3747	12.5415	10.5292	10.5073
13.5	12.6626	20.8445	12.9505	13.0444	14.2819	14.5851	13.7319	12.8126	16.3747	12.541	10.5925	10.7553
14	12.662	20.8482	12.9504	13.0443	14.2819	14.5851	13.7319	12.8126	16.3747	12.5412	10.7494	10.9074
14.5	12.664	20.8521	12.9506	13.0453	14.282	14.5852	13.7335	12.8127	16.3748	12.5421	10.8491	11.0014
15	12.6649	20.8573	12.9506	13.0454	14.282	14.5852	13.734	12.8127	16.3748	12.5671	10.9263	11.0724
15.5	12.66	20.8607	12.9506	13.0454	14.282	14.5852	13.7343	12.8128	16.3748	12.6532	10.9738	11.1169
16	12.7357	20.8639	12.9507	13.0454	14.282	14.5852	13.7344	12.8128	16.3748	12.7359	11.0044	11.1465
16.5	12.8299	20.9145	12.9518	13.051	14.2825	14.5861	13.7232	12.8137	16.3754	12.8283	11.0787	11.2239
17	12.9384	20.9416	12.9519	13.0511	14.2825	14.5865	13.7476	12.8136	16.3754	12.941	11.2623	11.4044
17.5	13.0428	20.9455	12.9518	13.0501	14.2827	14.5865	13.8772	12.8149	16.3759	13.0428	11.5223	11.6639
18	13.1387	20.9475	12.953	13.0484	14.2828	14.5867	13.9532	12.8398	16.3765	13.1389	11.7442	11.8912
18.5	13.2237	20.9255	13.0275	13.0439	14.2826	14.586	13.9942	13.0269	16.3758	13.2232	11.905	12.0548
19	13.2955	20.901	13.1361	13.1428	14.2826	14.586	14.003	13.1358	16.3757	13.2933	12.0177	12.1729
19.5	13.3463	20.8966	13.1933	13.2017	14.2825	14.586	14.0048	13.1933	16.3755	13.3464	12.1173	12.278
20	13.3802	20.8963	13.2243	13.2326	14.2823	14.5859	14.0124	13.2243	16.3753	13.3801	12.179	12.3434
20.5	13.3903	20.8744	13.2332	13.2421	14.2818	14.5849	14.0053	13.233	16.3747	13.3891	12.2056	12.3717
21	13.3821	20.833	13.2237	13.233	14.2818	14.5848	13.9849	13.224	16.3746	13.3809	12.235	12.4041
21.5	13.3618	20.8086	13.2013	13.2107	14.2818	14.5848	13.9635	13.2014	16.3745	13.3614	12.3662	12.5506
22	13.3383	20.8001	13.1742	13.1842	14.2818	14.5848	13.9457	13.1745	16.3745	13.3379	12.7117	12.9344
22.5	13.3106	20.7862	13.1436	13.1526	14.2814	14.5844	13.9266	13.1435	16.3743	13.3113	13.1585	13.3787
23	13.2827	20.7618	13.1121	13.1215	14.2814	14.5844	13.9008	13.1122	16.3743	13.2821	13.3886	13.6062
23.5	13.2493	20.7555	13.0787	13.0877	14.2814	14.5844	13.867	13.0788	16.3743	13.2497	13.4485	13.6654
24	13.2141	20.7479	13.0406	13.0499	14.2814	14.5844	13.8233	13.041	16.3743	13.2143	13.396	13.6117
24.5	13.1776	20.7357	12.999	13.0387	14.2813	14.5844	13.7661	12.9993	16.3743	13.1775	13.3111	13.5222
25	13.14	20.7342	12.9558	13.0386	14.2813	14.5844	13.7299	12.9543	16.3743	13.1402	13.22	13.4293
25.5	13.103	20.7335	12.9494	13.0386	14.2814	14.5844	13.7228	12.9066	16.3743	13.1027	13.1173	13.3349
26	13.0656	20.733	12.95	13.0386	14.2814	14.5844	13.723	12.8606	16.3743	13.0655	13.0495	13.2621
26.5	13.0296	20.731	12.9495	13.0381	14.2813	14.5842	13.7228	12.8159	16.3742	13.029	12.957	13.1723
27	12.9938	20.7253	12.9493	13.0377	14.2813	14.5842	13.725	12.8119	16.3742	12.9916	12.8767	13.0915
27.5	12.9569	20.7204	12.9493	13.0377	14.2812	14.5842	13.7217	12.8116	16.3743	12.9576	12.8024	13.013
28	12.927	20.7167	12.9493	13.0377	14.2812	14.5842	13.7204	12.8117	16.3742	12.9259	12.7262	12.9334
28.5	12.8964	20.7138	12.949	13.0372	14.281	14.584	13.7196	12.8116	16.374	12.8973	12.6472	12.8481

Location Time	Water Level D0197os	Water Level D0201os	Water Level D0207	Water Level D0209os	Water Level D0220	Water Level D0221	Water Level D0236os	Water Level D0237	Water Level D0240	Water Level D0432os	Water Level D0614os	Water Level D0615os
29	12.8693	20.7103	12.949	13.0369	14.281	14.584	13.7191	12.8113	16.374	12.8692	12.569	12.7653
29.5	12.8445	20.7062	12.949	13.0367	14.281	14.584	13.7189	12.811	16.374	12.8442	12.4954	12.6863
30	12.823	20.7024	12.949	13.0365	14.281	14.584	13.7186	12.811	16.374	12.823	12.4278	12.6096
30.5	12.8061	20.7099	12.949	13.0364	14.281	14.584	13.7193	12.811	16.374	12.8058	12.3498	12.5253
31	12.7897	20.7071	12.949	13.036	14.281	14.584	13.7206	12.811	16.374	12.7897	12.2809	12.4521
31.5	12.7743	20.7051	12.949	13.036	14.281	14.584	13.7191	12.811	16.374	12.7759	12.2174	12.3863
32	12.7612	20.7036	12.949	13.036	14.281	14.584	13.7184	12.811	16.374	12.7604	12.16	12.3245
32.5	12.75	20.7023	12.949	13.036	14.281	14.584	13.718	12.811	16.374	12.7506	12.1032	12.2645
33	12.7416	20.7013	12.949	13.036	14.281	14.584	13.7178	12.811	16.374	12.7408	12.0441	12.2018
33.5	12.7328	20.7009	12.949	13.036	14.281	14.584	13.7176	12.811	16.374	12.7326	11.9867	12.1413
34	12.7246	20.7002	12.949	13.036	14.281	14.584	13.7175	12.811	16.374	12.7249	11.9344	12.0856
34.5	12.7187	20.6992	12.949	13.036	14.281	14.584	13.7173	12.811	16.374	12.7176	11.8832	12.0338
35	12.7096	20.6988	12.949	13.036	14.281	14.584	13.7172	12.811	16.374	12.7099	11.8341	11.983
35.5	12.7015	20.7124	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.7024	11.7874	11.9348
36	12.6931	20.7101	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.6936	11.7427	11.8828
36.5	12.6846	20.7053	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.6843	11.6975	11.8359
37	12.6744	20.7035	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.6725	11.6552	11.7932
37.5	12.6657	20.7017	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.6638	11.6139	11.7509
38	12.6557	20.6997	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.6543	11.5723	11.7081
38.5	12.6495	20.6985	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.6459	11.5326	11.6676
39	12.6495	20.6977	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.6349	11.492	11.6265
39.5	12.6493	20.6969	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.6234	11.4501	11.5844
40	12.6492	20.6963	12.949	13.036	14.281	14.584	13.717	12.811	16.374	12.6106	11.4048	11.5386

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Location Time	Water Level D0712os	Water Level D0713os	Water Level D0736	Water Level D0737	Water Level D0765	Water Level D0767os	Water Level D0773	Water Level D0776	Water Level D0851	Water Level D0852	Water Level D0863	Water Level D0870
1	20.565	14.396	10.145	10.362	28.691	15.557	15.195	14.495	14.875	14.596	13.43	10.58
1.5	20.565	14.396	10.145	10.362	28.691	15.557	15.195	14.495	14.875	14.596	13.43	10.58
2	20.565	14.396	10.145	10.362	28.691	15.557	15.195	14.495	14.875	14.596	13.43	10.58
2.5	20.565	14.396	10.145	10.362	28.691	15.557	15.195	14.495	14.875	14.596	13.43	10.58
3	20.565	14.396	10.145	10.362	28.691	15.557	15.195	14.495	14.875	14.596	13.43	10.58
3.5	20.565	14.396	10.145	10.362	28.691	15.557	15.195	14.495	14.875	14.596	13.43	10.58
4	20.5665	14.3965	10.1454	10.3629	28.6914	15.5611	15.1959	14.4962	14.8756	14.5966	13.4309	10.5807
4.5	20.569	14.3968	10.1456	10.3638	28.6916	15.5712	15.1976	14.5027	14.8765	14.597	13.4317	10.5812
5	20.5692	14.3968	10.1456	10.3698	28.6916	15.7107	15.2205	14.525	14.8774	14.597	13.4318	10.5812
5.5	20.5692	14.3968	10.1456	10.3691	28.6916	15.8001	15.2131	14.5209	14.8774	14.597	13.4319	10.5812
6	20.5692	14.3968	10.1456	10.3696	28.6916	15.8063	15.2133	14.5196	14.8773	14.597	13.4319	10.5812
6.5	20.5708	14.3972	10.1458	10.3706	28.6919	15.8214	15.2169	14.524	14.878	14.5974	13.4329	10.5817
7	20.5955	14.3972	10.1458	10.3733	28.6919	15.8598	15.2201	14.5249	14.8781	14.5974	13.4327	10.5817
7.5	20.5958	14.3972	10.1458	10.3726	28.6919	15.8277	15.2216	14.5257	14.8783	14.5974	13.4327	10.5818
8	20.5966	14.3972	10.1458	10.3732	28.6919	15.8246	15.222	14.5273	14.8784	14.5974	13.4327	10.5818
8.5	20.5959	14.3969	10.1456	10.3718	28.6916	15.8094	15.2201	14.526	14.8777	14.597	13.432	10.5813
9	20.5958	14.3968	10.1456	10.3705	28.6916	15.8062	15.2168	14.5257	14.8774	14.597	13.4321	10.5813
9.5	20.601	14.3968	10.1456	10.3701	28.6916	15.8062	15.2157	14.5244	14.8774	14.597	13.4321	10.5814
10	20.5978	14.3968	10.1456	10.3701	28.6916	15.8049	15.2155	14.5227	14.8774	14.597	13.4321	10.5814
10.5	20.6076	14.398	10.1463	10.3739	28.6924	15.8479	15.2331	14.5347	14.8798	14.5983	13.4356	10.583
11	20.6292	14.398	10.1463	10.3847	28.6924	15.8496	15.2445	14.562	14.8805	14.598	13.4373	10.583
11.5	20.6374	14.398	10.1463	10.3831	28.6924	15.8522	15.2429	14.5593	14.8802	14.5981	13.4374	10.583
12	20.6392	14.398	10.1463	10.3835	28.6925	15.9043	15.2439	14.5599	14.8802	14.5981	13.4374	10.583
12.5	20.6305	14.3973	10.1459	10.3771	28.692	15.8229	15.2297	14.5268	14.8795	14.5973	13.4346	10.582
13	20.6207	14.3973	10.1459	10.3739	28.692	15.8215	15.2212	14.5061	14.8796	14.5976	13.4345	10.5821
13.5	20.6153	14.3973	10.1459	10.3739	28.692	15.8233	15.2271	14.5058	14.8796	14.5977	13.4345	10.5821
14	20.6147	14.3973	10.1459	10.374	28.692	15.8241	15.2272	14.5061	14.8796	14.5975	13.4345	10.5821
14.5	20.6177	14.3975	10.146	10.375	28.6921	15.8332	15.2301	14.5065	14.8799	14.5979	13.435	10.5824
15	20.6198	14.3975	10.146	10.3759	28.6921	15.8366	15.2322	14.5178	14.8797	14.5983	13.4349	10.5823
15.5	20.6219	14.3975	10.146	10.3764	28.6921	15.8369	15.2325	14.5312	14.8802	14.5984	13.4349	10.5823
16	20.6266	14.3974	10.146	10.3761	28.6921	15.894	15.2329	14.5696	14.8806	14.5985	13.4349	10.5823
16.5	20.6427	14.3981	10.1467	10.386	28.6929	16.1481	15.2482	14.644	14.8832	14.6173	13.44	10.5837
17	20.663	14.3981	10.1467	10.3878	28.6929	16.5702	15.2537	14.7366	14.8842	14.6513	13.4399	10.5845
17.5	20.6674	14.3983	10.1467	10.388	28.6929	16.868	15.2521	14.8104	14.885	14.6953	13.4404	10.5846
18	20.6694	14.3984	10.1467	10.388	28.6929	17.1059	15.2511	14.8711	14.8853	14.7388	13.4398	10.5846
18.5	20.6552	14.3977	10.1465	10.383	28.6924	17.3153	15.2447	14.9044	14.8837	14.7668	13.4389	10.5831
19	20.6367	14.3977	10.1465	10.3819	28.6923	17.4817	15.2364	14.9073	14.8837	14.7694	13.4362	10.5827
19.5	20.6321	14.3977	10.1469	10.3817	28.6923	17.5694	15.2364	14.9073	14.8837	14.7694	13.4362	10.5827
20	20.6319	14.3977	10.1472	10.3822	28.6923	17.625	15.2373	14.9142	14.8838	14.7748	13.4357	10.5827
20.5	20.6237	14.397	10.1463	10.3756	28.6917	17.6968	15.2227	14.905	14.8817	14.7679	13.4331	10.5815
21	20.6129	14.3969	10.1465	10.3721	28.6917	17.9296	15.2201	14.8851	14.8815	14.7526	13.4324	10.5816
21.5	20.606	14.3969	10.1465	10.3715	28.6917	18.4782	15.2191	14.8645	14.8814	14.7362	13.4325	10.5816
22	20.6044	14.3969	10.1465	10.3715	28.6917	19.1091	15.219	14.8502	14.8814	14.7251	13.4326	10.5816
22.5	20.6006	14.3965	10.2752	10.3706	28.6914	19.5016	15.2167	14.8343	14.8801	14.7139	13.4318	10.5809
23	20.5963	14.3965	10.4928	10.4163	28.6914	19.619	15.2123	14.8121	14.8797	14.6989	13.4316	10.5812
23.5	20.5956	14.3965	10.6492	10.6368	28.6914	19.5915	15.2098	14.7849	14.8796	14.6796	13.4316	10.6384
24	20.5946	14.3965	10.694	10.6955	28.6914	19.4763	15.209	14.7533	14.8794	14.6612	13.4316	10.6997
24.5	20.593	14.3965	10.659	10.6589	28.6914	19.3232	15.2091	14.7233	14.8793	14.6462	13.4316	10.6642
25	20.5919	14.3965	10.587	10.5767	28.6914	19.1628	15.2094	14.6939	14.8792	14.6346	13.4317	10.5863
25.5	20.5909	14.3965	10.4999	10.4747	28.6914	19.0176	15.2085	14.6662	14.879	14.6378	13.4317	10.5822
26	20.5904	14.3965	10.4325	10.3838	28.6914	18.8809	15.2085	14.637	14.8788	14.619	13.4317	10.5823
26.5	20.5895	14.3963	10.3747	10.3658	28.6912	18.7567	15.2078	14.6041	14.8781	14.5998	13.4312	10.5809
27	20.5875	14.3962	10.3134	10.3667	28.6912	18.6405	15.2062	14.5702	14.8778	14.5982	13.431	10.5806
27.5	20.5856	14.3963	10.2522	10.3663	28.6912	18.524	15.2047	14.5313	14.8776	14.5967	13.4309	10.5805
28	20.5829	14.3962	10.1788	10.3658	28.6912	18.3953	15.2033	14.5114	14.8774	14.5965	13.4309	10.5804
28.5	20.5805	14.396	10.1472	10.3651	28.691	18.2726	15.2021	14.5084	14.8769	14.5963	13.4306	10.58

Location Time	Water Level D0712os	Water Level D0713os	Water Level D0736	Water Level D0737	Water Level D0765	Water Level D0767os	Water Level D0773	Water Level D0776	Water Level D0851	Water Level D0852	Water Level D0863	Water Level D0870
29	20.5775	14.396	10.1463	10.3649	28.691	18.1517	15.2009	14.5054	14.8766	14.596	13.4304	10.58
29.5	20.5755	14.396	10.1455	10.3647	28.691	18.0401	15.1998	14.5035	14.8765	14.596	13.4303	10.58
30	20.5748	14.396	10.1452	10.3643	28.691	17.9305	15.199	14.5024	14.8763	14.596	13.4303	10.58
30.5	20.5744	14.396	10.145	10.364	28.691	17.8238	15.1984	14.5017	14.8762	14.596	13.43	10.58
31	20.574	14.396	10.145	10.3638	28.691	17.7277	15.1979	14.5009	14.8758	14.596	13.43	10.58
31.5	20.5736	14.396	10.145	10.3636	28.691	17.6421	15.1975	14.5	14.8755	14.596	13.43	10.58
32	20.5731	14.396	10.145	10.3634	28.691	17.5521	15.197	14.4994	14.8754	14.596	13.43	10.58
32.5	20.5725	14.396	10.145	10.3633	28.691	17.4655	15.1967	14.4987	14.8753	14.596	13.43	10.58
33	20.5717	14.396	10.145	10.3631	28.691	17.386	15.1983	14.4983	14.8752	14.596	13.43	10.58
33.5	20.5707	14.396	10.145	10.363	28.691	17.3133	15.1982	14.4996	14.8752	14.596	13.43	10.58
34	20.5703	14.396	10.145	10.3629	28.691	17.2427	15.1969	14.4997	14.875	14.596	13.43	10.58
34.5	20.5699	14.396	10.145	10.3628	28.691	17.1766	15.1965	14.4986	14.875	14.596	13.43	10.58
35	20.5695	14.396	10.145	10.3627	28.691	17.1118	15.1962	14.4978	14.875	14.596	13.43	10.58
35.5	20.5693	14.396	10.145	10.3626	28.691	17.0504	15.196	14.4973	14.875	14.596	13.43	10.58
36	20.5715	14.396	10.145	10.3626	28.691	16.9911	15.1958	14.4969	14.875	14.596	13.43	10.58
36.5	20.5708	14.396	10.145	10.3626	28.691	16.9312	15.1957	14.4967	14.875	14.596	13.43	10.58
37	20.5704	14.396	10.145	10.3625	28.691	16.87	15.1956	14.4965	14.875	14.596	13.43	10.58
37.5	20.5705	14.396	10.145	10.3625	28.691	16.8094	15.1956	14.4963	14.875	14.596	13.43	10.58
38	20.57	14.396	10.145	10.3625	28.691	16.7462	15.1955	14.4962	14.875	14.596	13.43	10.58
38.5	20.5694	14.396	10.145	10.3625	28.691	16.6828	15.1955	14.4961	14.875	14.596	13.43	10.58
39	20.5689	14.396	10.145	10.3624	28.691	16.6033	15.1955	14.496	14.875	14.596	13.43	10.58
39.5	20.5684	14.396	10.145	10.3624	28.691	16.5101	15.1954	14.4959	14.875	14.596	13.43	10.58
40	20.5681	14.396	10.145	10.3624	28.691	16.4045	15.1954	14.4959	14.875	14.596	13.43	10.58

Annex I

Flood Extents and Levels

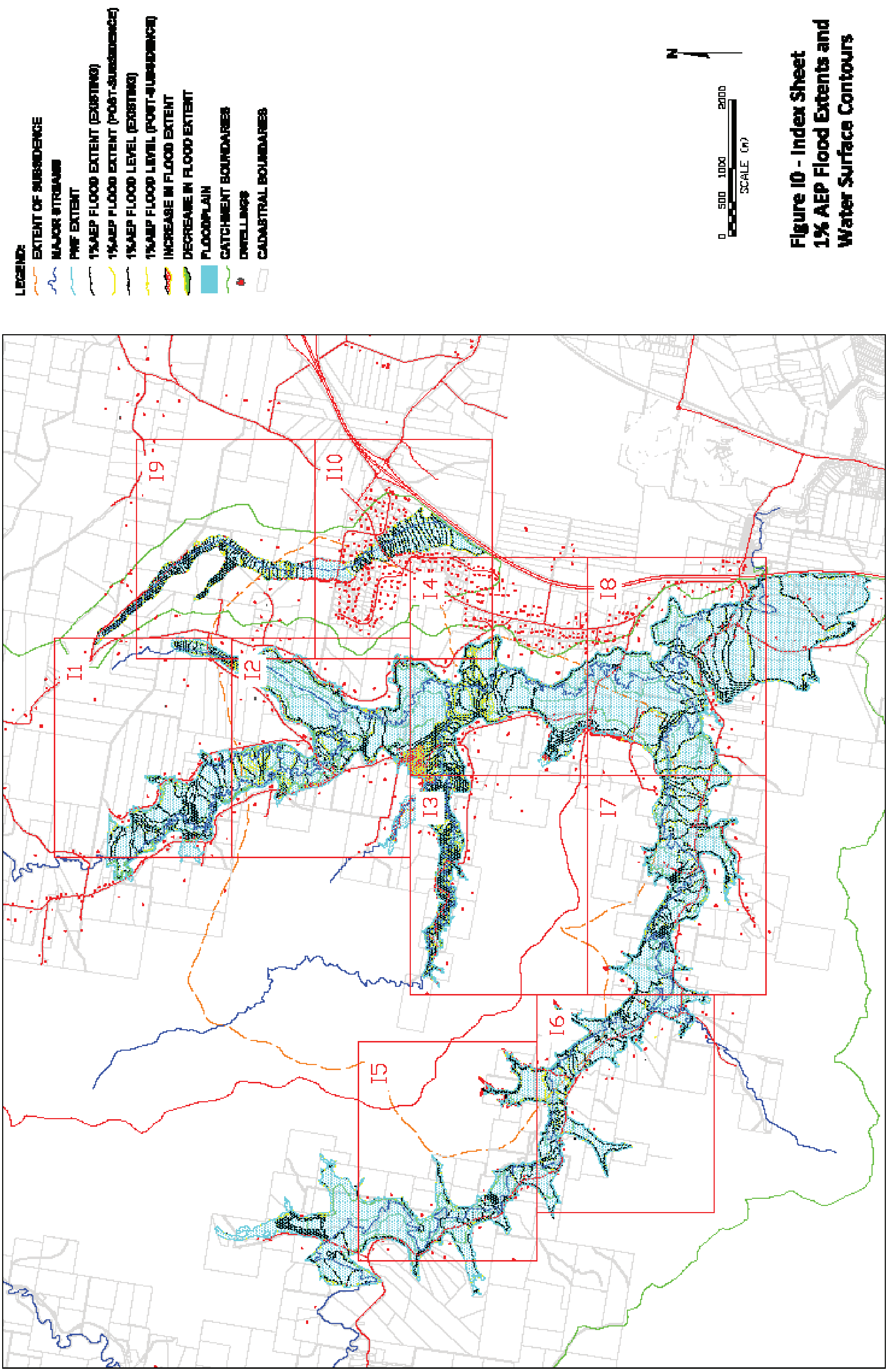

Figure 10 - Index Sheet 1% AEP Flood Extents and Water Surface Contours

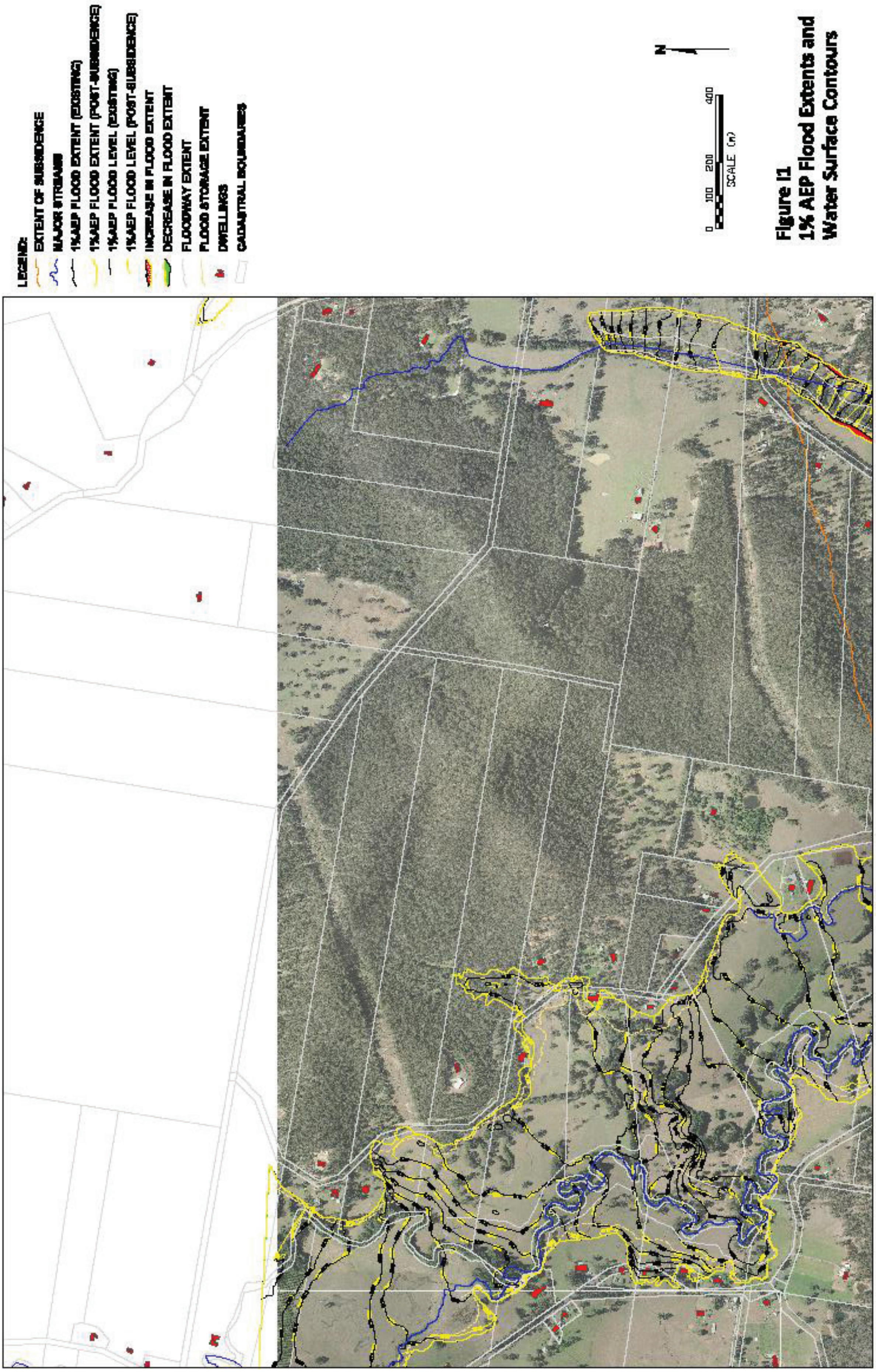

Figure I1
1% AEP Flood Extents and Water Surface Contours

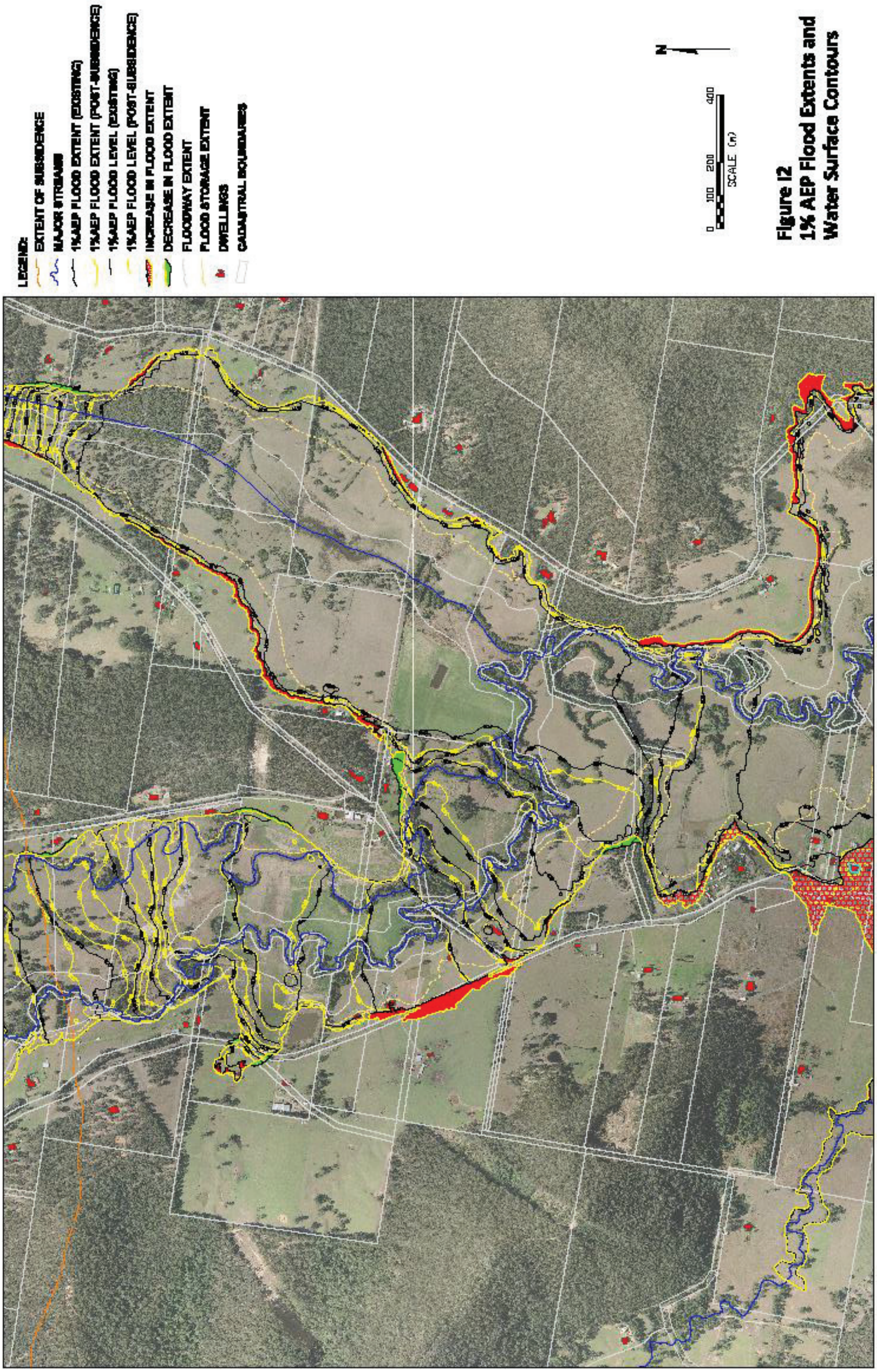

Figure 12
1% AEP Flood Extents and Water Surface Contours

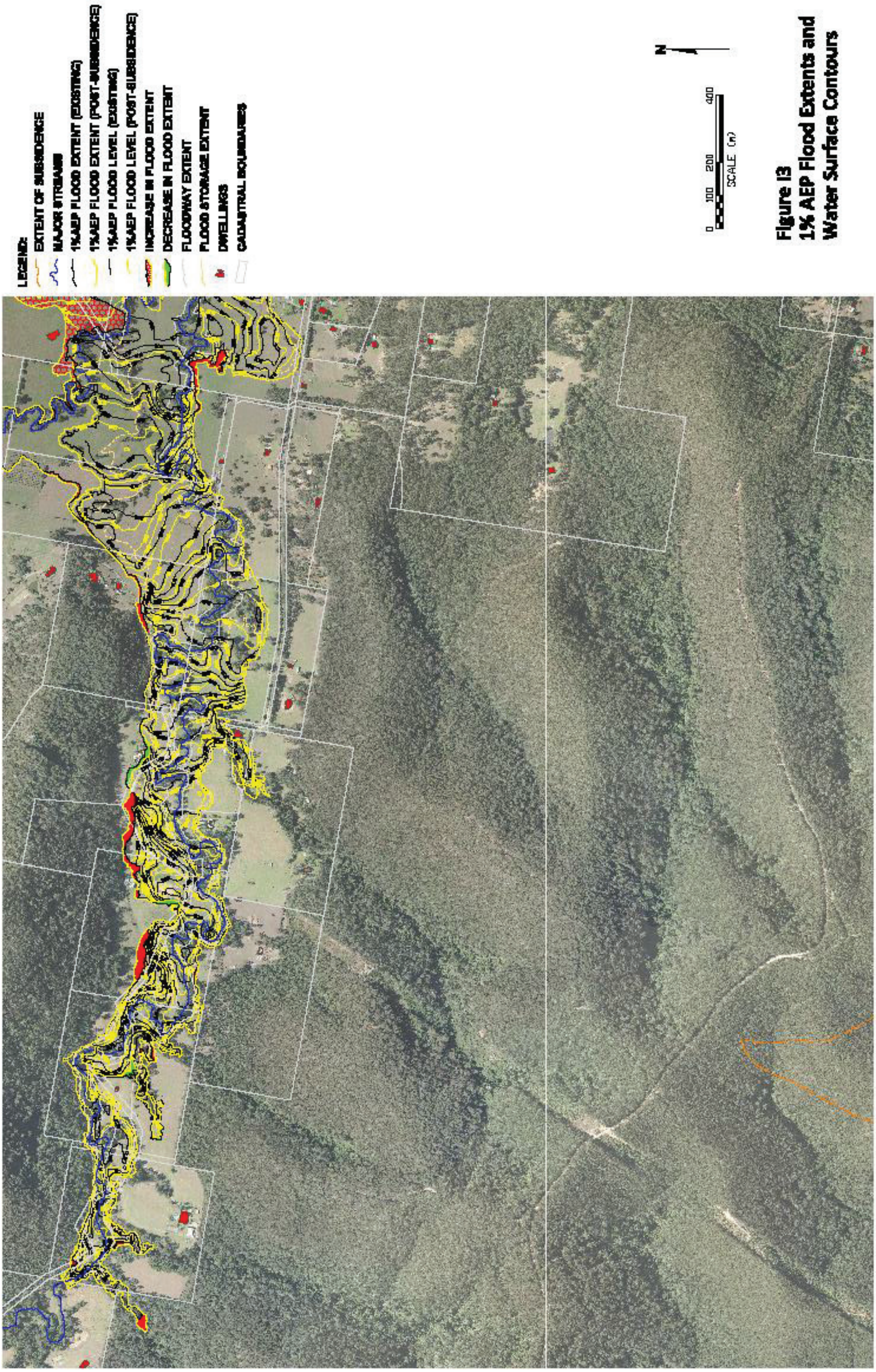

Figure 13
1% AEP Flood Extents and Water Surface Contours

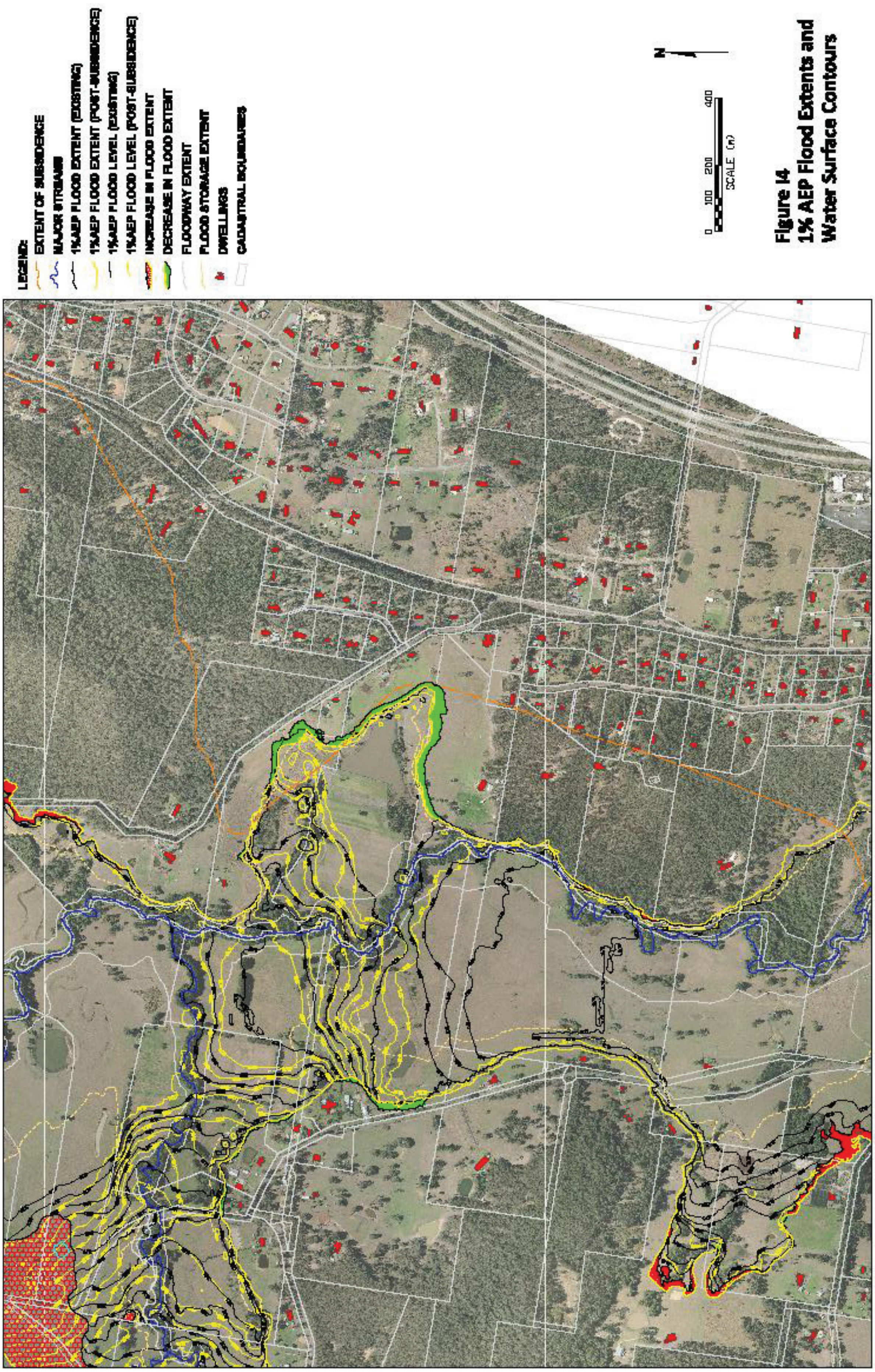

Figure 14
1% AEP Flood Extents and Water Surface Contours

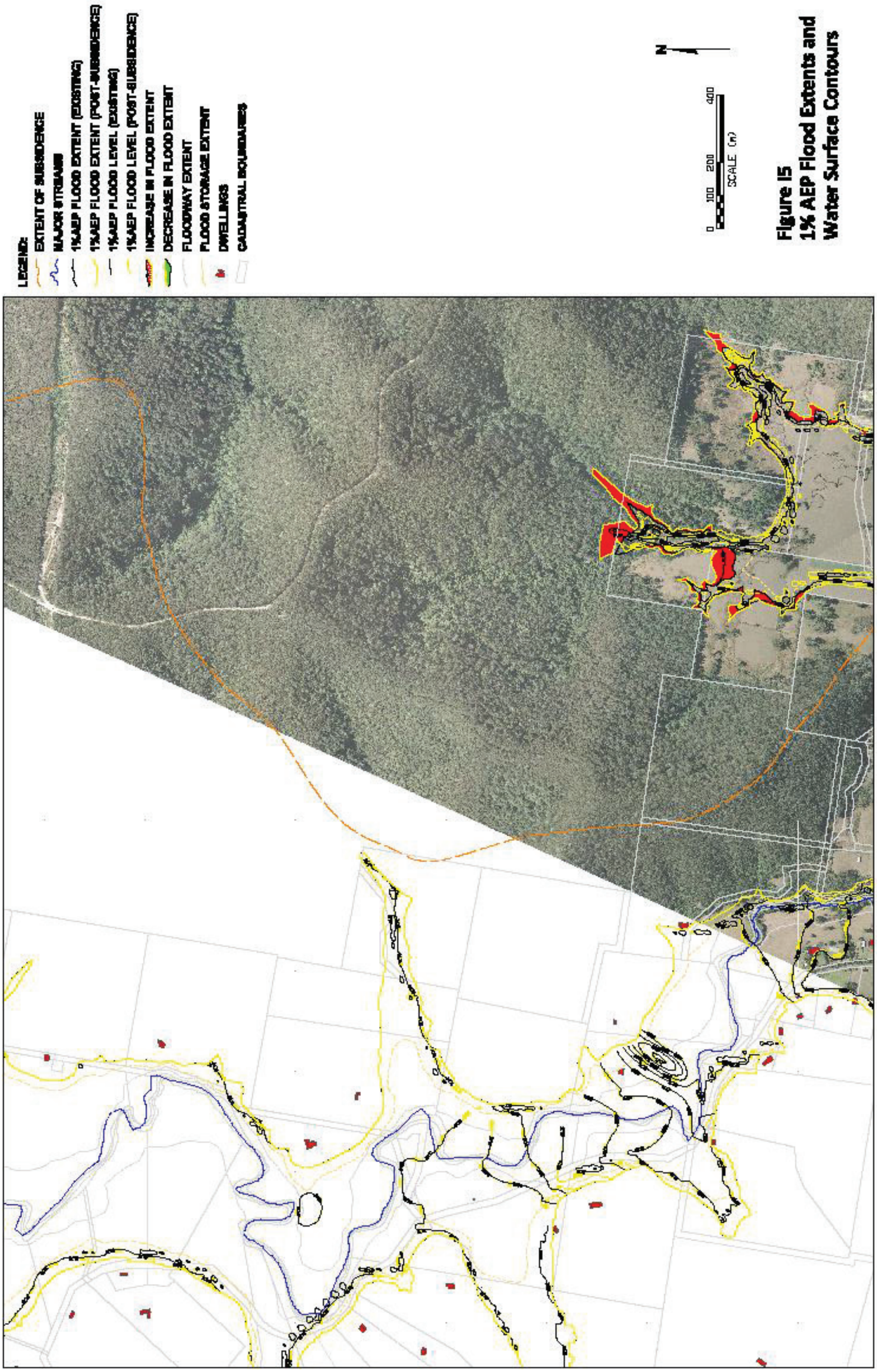

Figure 15
1% AEP Flood Extents and
Water Surface Contours

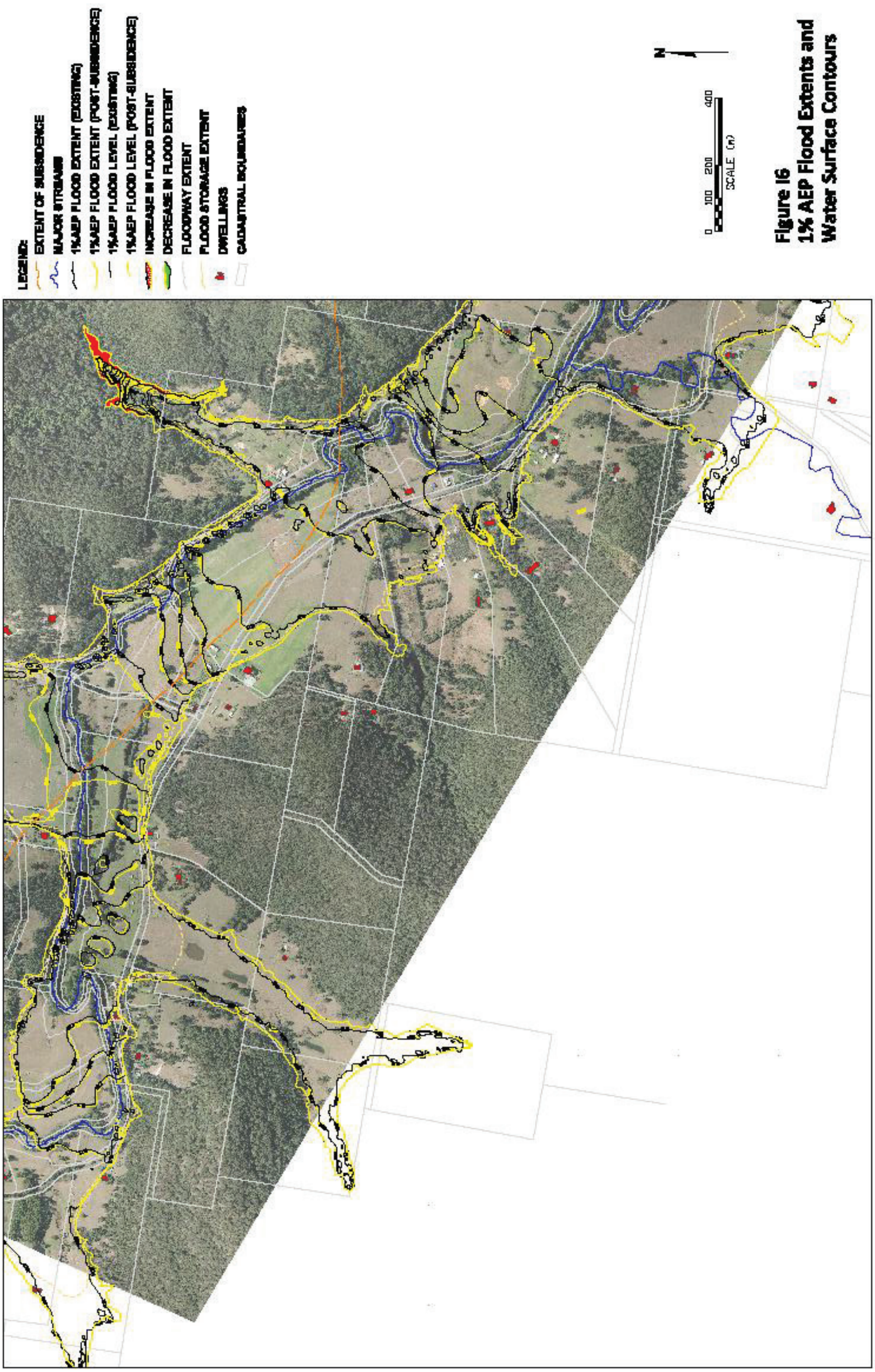

Figure 16
1% AEP Flood Extents and Water Surface Contours

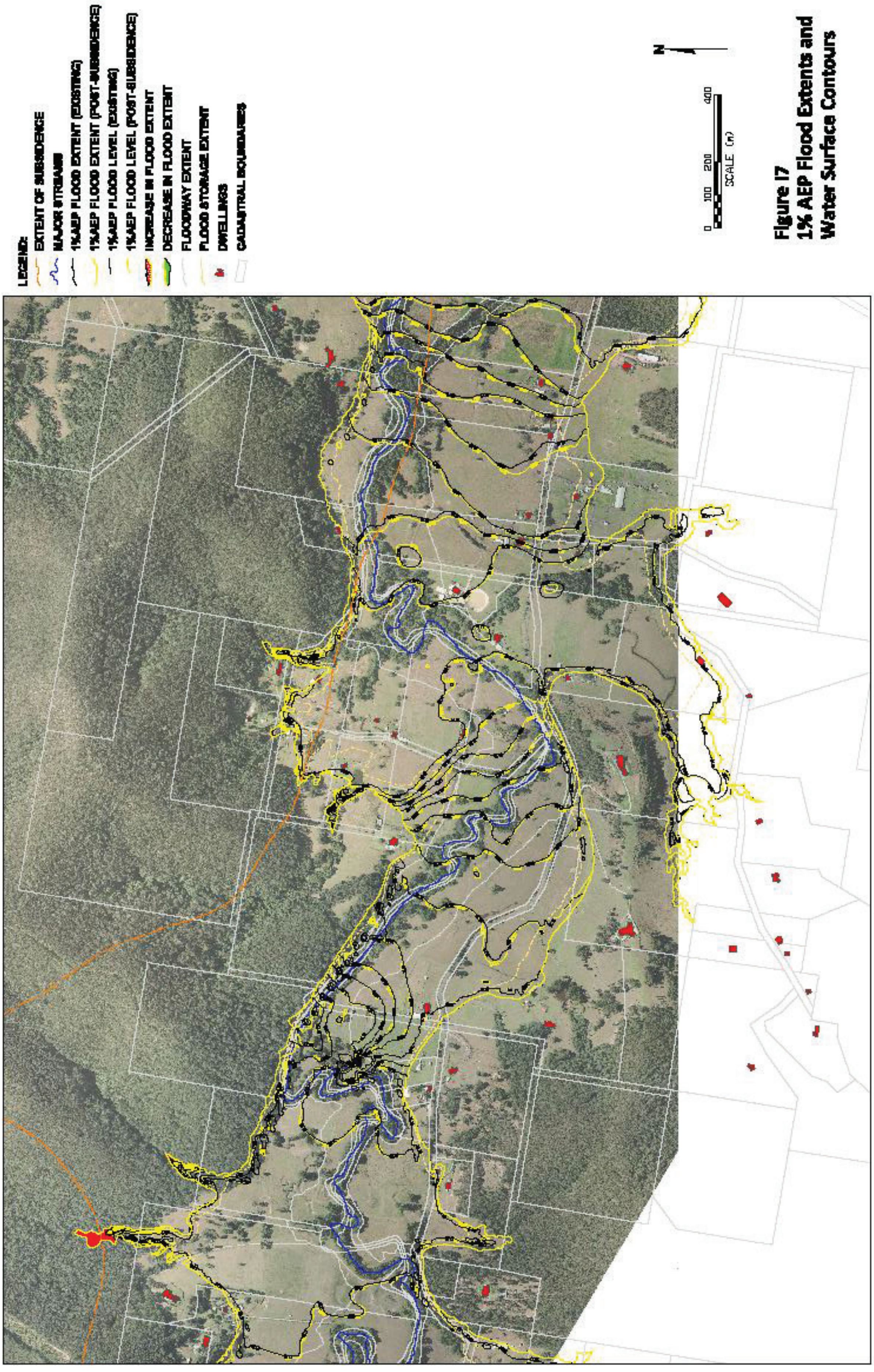

Figure 17
1% AEP Flood Extents and Water Surface Contours

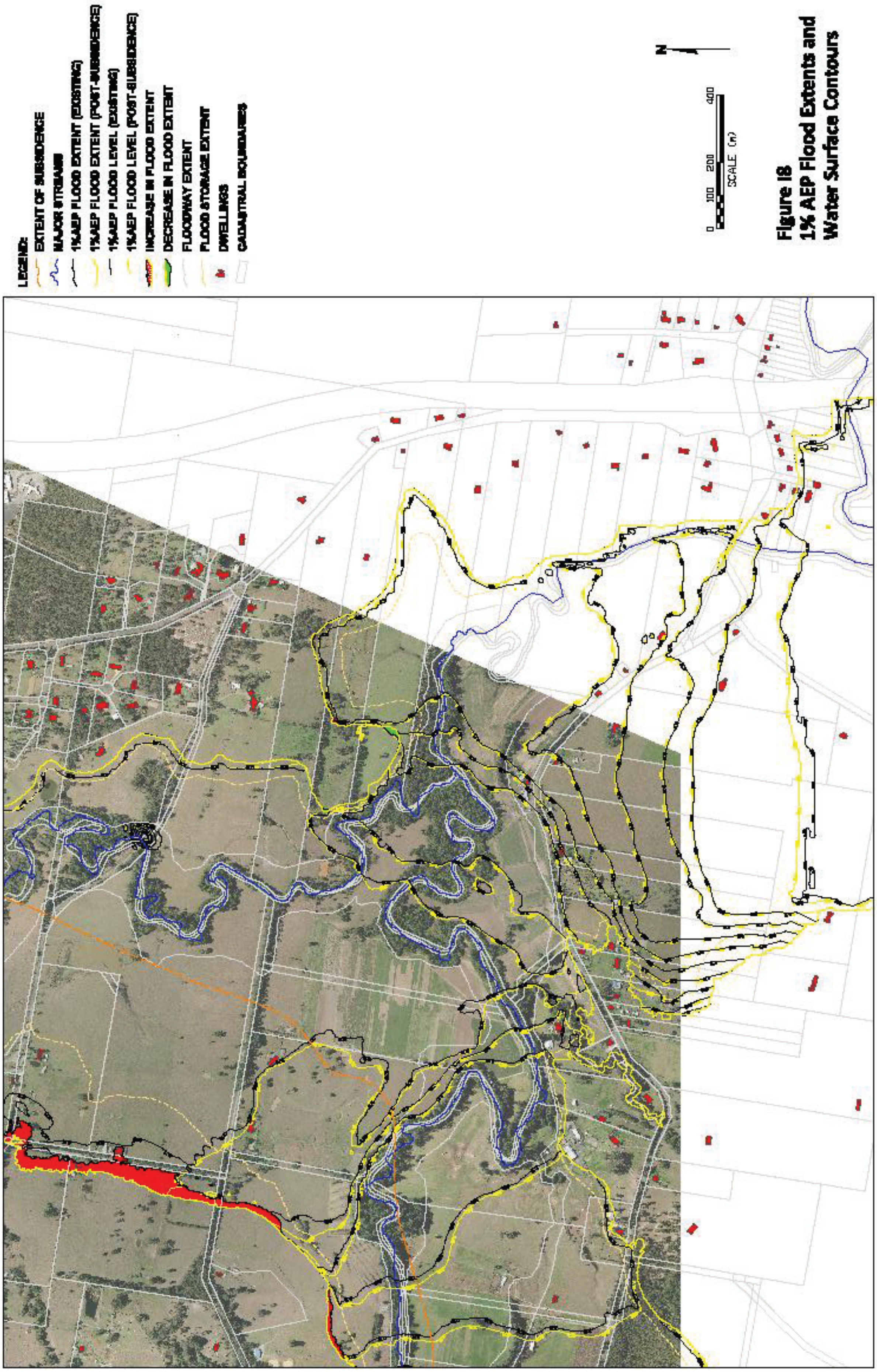

Figure 18
1% AEP Flood Extents and Water Surface Contours

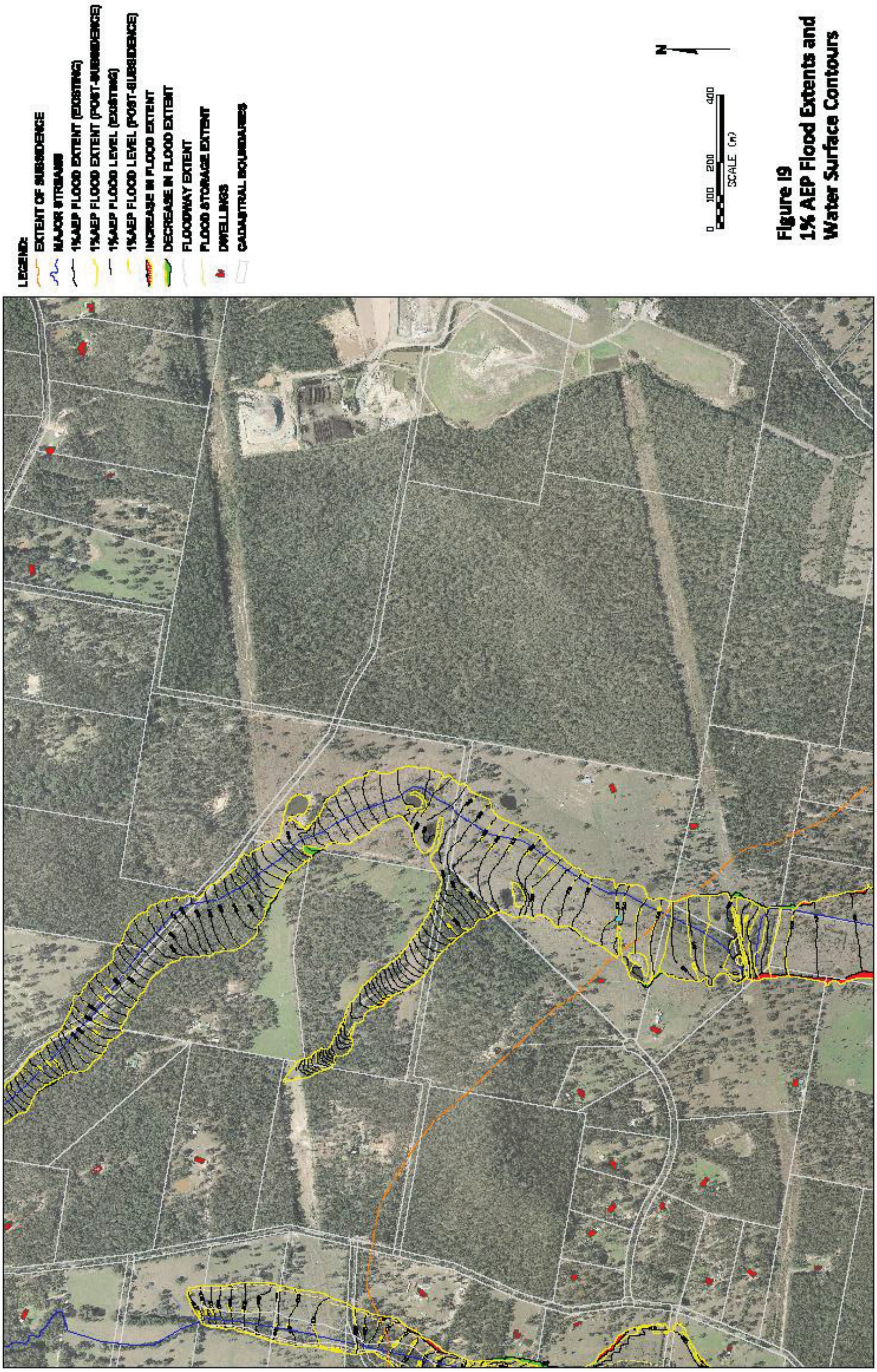

Figure 19
1% AEP Flood Extents and Water Surface Contours

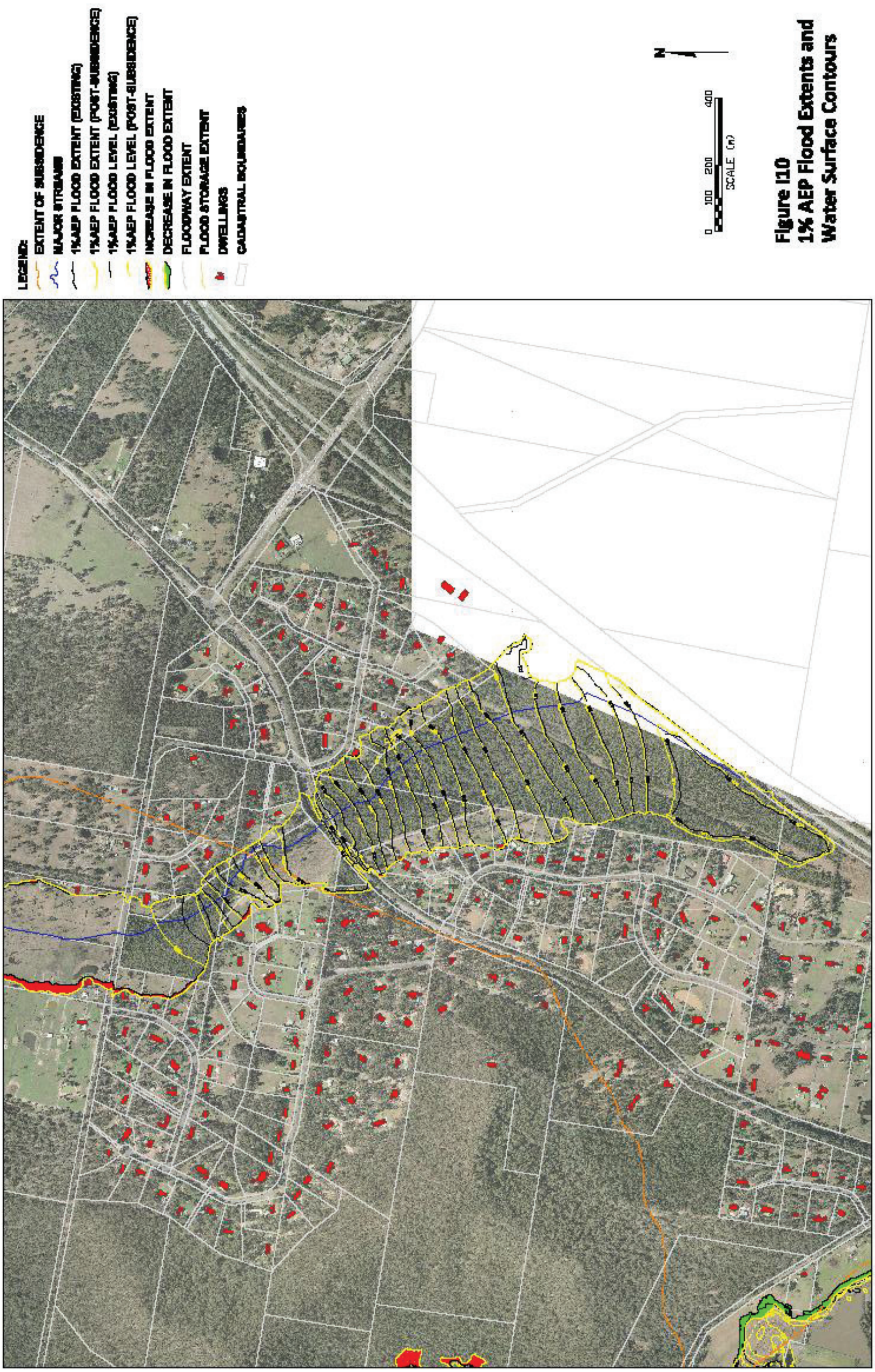

Figure I10
1% AEP Flood Extents and Water Surface Contours

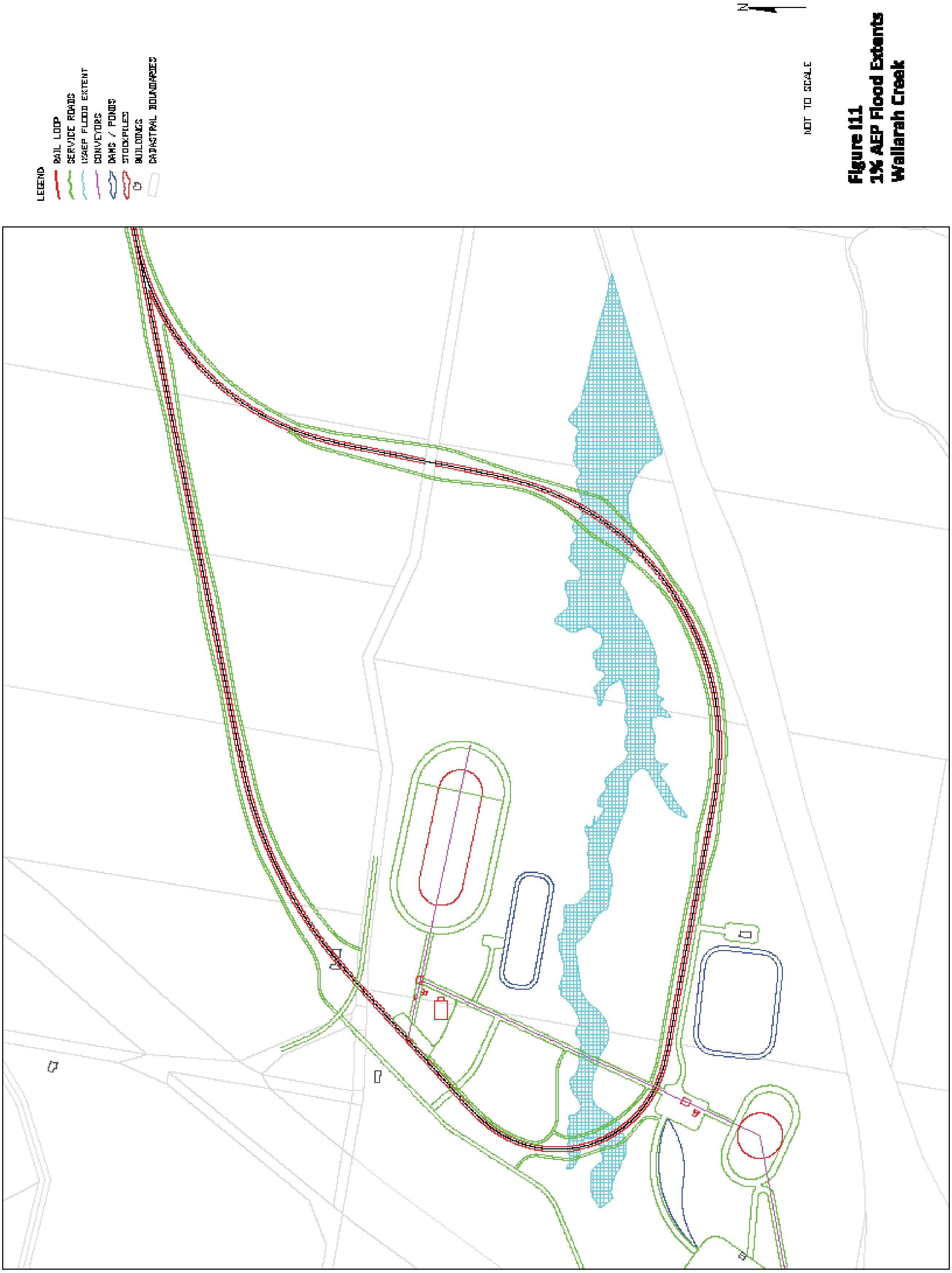

Figure I11
1% AEP Flood Extents
Wallarah Creek