Appendix B

APPENDIX B: AVAILABLE DATA

Name of File	Type of Data	Date Received
Flood Study.pdf	Wagonga Inlet Flooding Investigation by Gary Blumberg and Associates	27 April 2012
Wagonga_Inlet_Estuary_ Processes_Study.pdf	Wagonga Inlet Estuary Processes Study by MHL	28 May 2012
wagonga.xyz	Bathymetry of Wagonga Inlet	27 April 2012
53175SH1.pdf	Plan of Wagonga Inlet Hydrographic Survey	27 April 2012
ESC_lakes_REF&policies_final.pdf	Report of Eurobodalla Coastal Lakes Entrance Management Policies – Review of Environmental Factors	27 April 2012
Multiple JPG files	Photos of flooding in the 2010 event	3 May 2012
bridges_culverts.tab	Shape-file of points showing location of bridges or culverts	7 May 2012
buildings.tab	Shape-file of polylines outlining council owned buildings and land (including ovals etc)	7 May 2012
cadastre.tab	Shape-file of property polygons	7 May 2012
contour_10m.tab	Ground contours	7 May 2012
roads.tab	Centre-lines of roads including the road name as an attribute	7 May 2012
sepp14.tab	Shape-file of polygons of SEPP 14 Wetlands	7 May 2012
sepp71.tab	Shape-file of polygons of SEPP 71 Coastal Lakes	7 May 2012
sewgpipe.tab	Pipes carrying sewer water via gravity	7 May 2012
sewrpipe.tab	Pipes carrying sewer water via pressure	7 May 2012
sewnode.tab	Shape-file of points connected to sewrpipe.tab and sewgpipe.tab	7 May 2012
sewtplant.tab	Shape-file of polygons outlining treatment plant infrastructure, such as drying beds and sludge ponds	7 May 2012
stwpipe.tab	Pipes carrying stormwater	7 May 2012
stwnode.tab	Shape-file of points connected to stwpipe.tab	7 May 2012
watercourse.tab	Shape-file of polylines outlining the shoreline of waterbodies (lakes etc) and the centre-line of watercourses	7 May 2012
Narooma_2010 as TAB and ECW files	Aerials from 2010	7 May 2012
KE#### as TAB and ECW files	Aerials from 2006	7 May 2012
Multiple THN files	Raw LiDAR collected in 2006	7 May 2012
LSZ_20120316.shp	Eurobodalla LEP 2012 (specifying lot size)	10 May 2012
LZN_20120315.shp	Eurobodalla LEP 2011 (specifying zones)	10 May 2012
Rain Gauge Data.csv	Continuous Pluviometer Rainfall Data for Council owned stations at Narooma and Tuross Head	29 May 2012

Bridge Data Wagonga and Dalmeny.xlsx	Data for Council owned bridges on Wagonga Scenic Drive and Dalmeny Drive	29 May 2012
Barlows Bay (Live).csv Bermagui (Live).csv Ulladulla Harbour (Live).csv	Data from Water Level Stations owned by MHL	25 June 2012
Barlows Bay Rain (Live).csv	Data from Continuous Pluviometer Stations owned by MHL	25 June 2012
HM01X_Data_069017.txt HM01X_Data_069148.txt	Data from Continuous Pluviometer Stations owned by BOM	6 July 2012
Multiple XYZ files	Raw LiDAR collected in 2012	12 April 2013

Appendix C

APPENDIX C: COMMUNITY CONSULTATION

C1. MEDIA RELEASE

Image C 1: Media Release, 12th September 2012

Wednesday, 12 September 2012

Flood stories wanted for Narooma catchment study

Eurobodalla Shire Council together with WMA Water is seeking your stories and photos on flooding in the Wagonga Inlet and Mummuga and Kianga lakes for a study they are preparing on the catchment areas.

"We are after local knowledge and personal experiences from residents and businesses to contribute to the development of a flood study," said Eurobodalla Shire Council's Planning and Sustainability Director, Lindsay Usher.

The catchments around Narooma are known to be at risk from flooding and Mr Usher says the study will help council meet its responsibilities under the NSW Government's Flood Prone Land Policy and also help council to plan for and manage flood risks in these areas.

"Community involvement in the study is vital. We are specifically interested in any historical records of flooding like photographs and flood marks and in hearing people's stories about floods in these catchments," Mr Usher said.

A newsletter and questionnaire will soon be mailed to residents within each catchment although people do not need to live in the flood prone areas to participate, says Mr Usher. "Anyone with flood information on these areas can jump online and complete the questionnaire."

The questionnaire can be completed at https://www.surveymonkey.com/s/W5VZV9R or via a link on council's homepage, www.esc.nsw.gov.au. Hard copies of the survey are available at Narooma library.

Residents can also bring their photos and stories of past flood events to the WMA Water information booth at Narooma library on Monday 17 September, between 4.00 and 7.00pm.

Residents wanting more information on the flood study are invited to contact Eurobodalla Shire Council's coastal and flood planner, Norm Lenehan, on 4474 1374 or via email to norman.lenehan@eurocoast.nsw.gov.au.

For all **media enquiries**, please contact Eurobodalla Shire Council, on **T** 4474 1012, **M** 0408 200 191 or via email to council.media@eurocoast.nsw.gov.au

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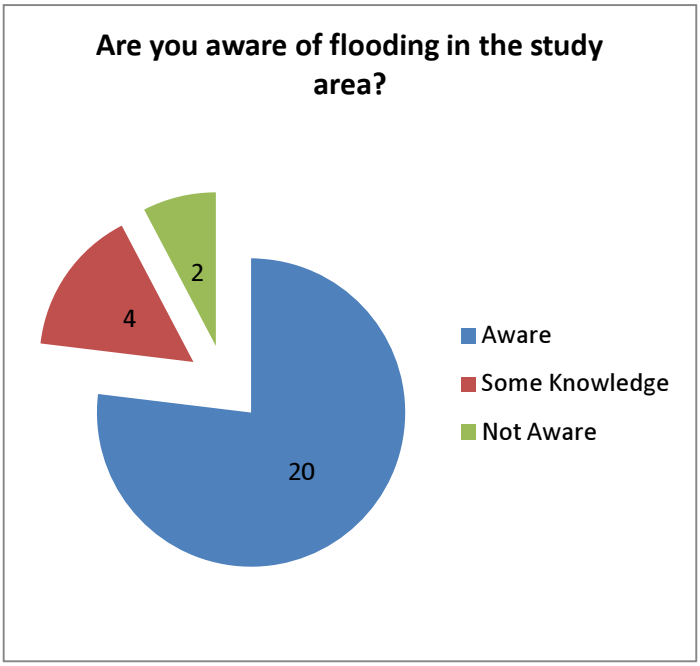
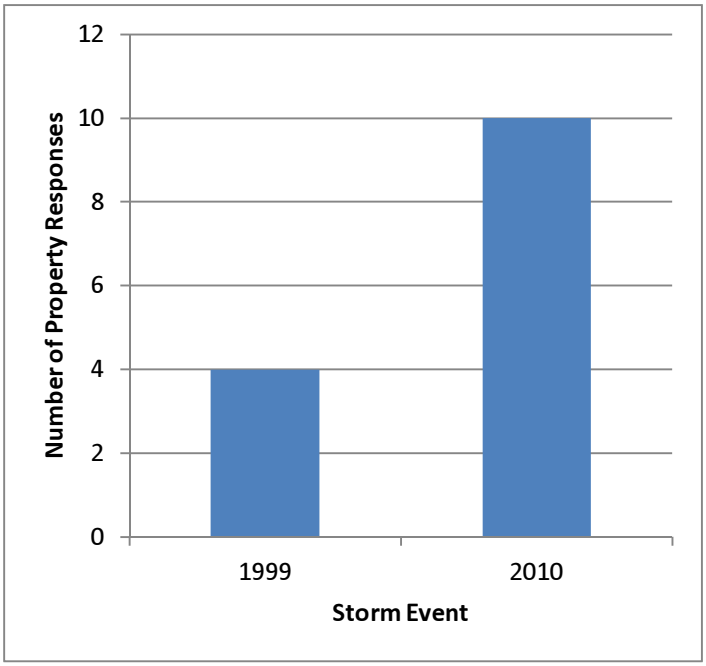
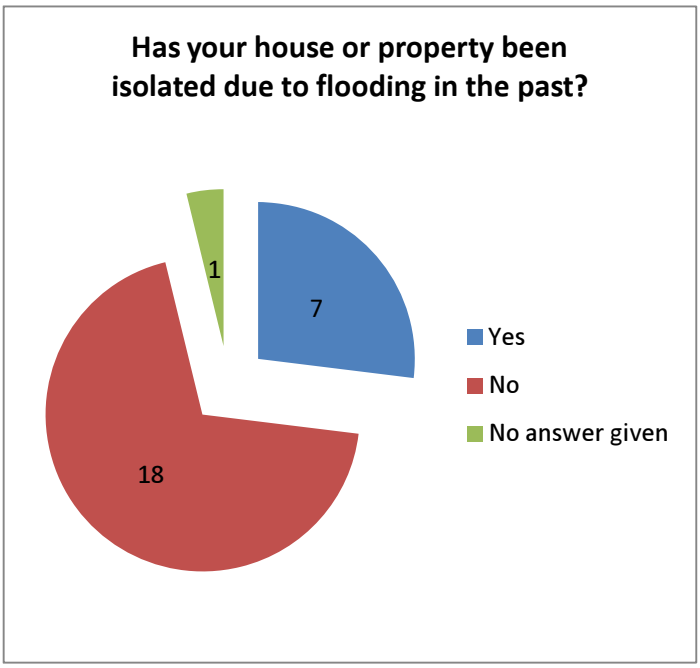
Eurobodalla Shire Council

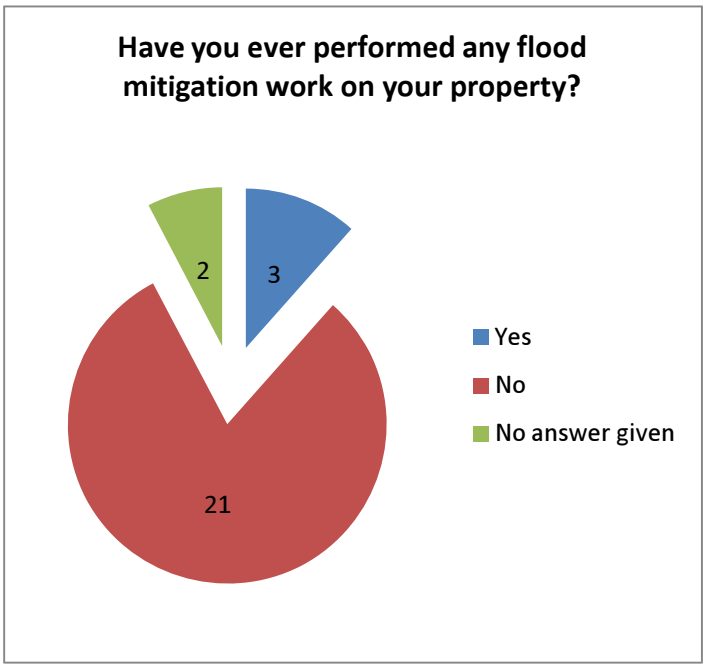
FIGURE C1

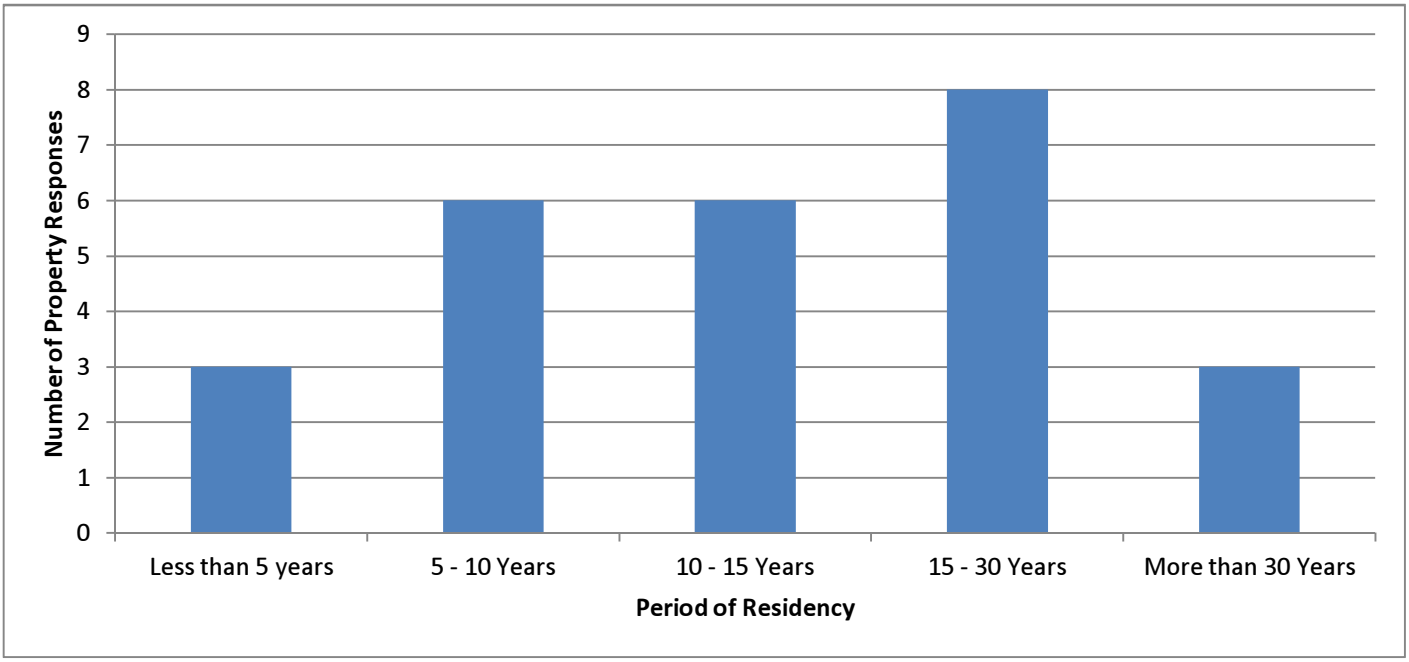
COMMUNITY RESPONSE ANAYLSIS











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Item No.	Respondent	Catchment	Issue	Response	Changes to Report
1	Joan Lynch	Wagonga Inlet	Identification of "property" as flooded, buildings are 20m above lake	The Flood Study aims to define flood behaviour and identify parcels of land which are subject to inundation during the 1% AEP event. Properties are classified as flood affected if any part of the total land area within the property boundary is affected by inundation from the 1% AEP (or 100 year ARI) event. This is irrespective of the location of the dwellings or buildings on the property. These lots or parcels of land have been referred to as properties in the flood study report.	The terminology within the Flood Study report relating to parcel of land, lot, property or building has been clarified.
2	Peter and Eva Wilson	Duck Pond	Clearly define what impact the flood study has on their land, advised to build back so not in flood line. Has this changed?	The Flood Study aims to define flood behaviour, this information will allow Council to provide landowners with accurate information regarding their flood affectation.	Nil
3.1	J Keenan	Mummaga Lake	Flood level information and descriptions provided for January 1999, February 2010 and October 2014 events.	Additional information regarding historical flood events has come to light, this has allowed the flood model to be calibrated and provide further confidence in the model results.	Addition of the 2014 event to the historical events investigated and further documentation of the calibration process in Section 8
3.2	J Keenan	Mummaga Lake	Channel Flood mitigation works suggested.	The Flood Study aims to define flood behaviour. The second stage in the Floodplain Risk Management Process is the Floodplain Risk Management Study (that is yet to be undertaken). The purpose of the Floodplain Risk Management Study is to evaluate flood management and mitigation options for the catchment. During this stage it is possible to investigate the benefit of options such as enclosing the stormwater channel adjacent to your property, reviewing berm opening policies or modifications to structures.	Nil
4.1	R Peady	Mummaga Lake	Title of Figure E17C is incorrect.	Figure title has been amended.	Title of Figure E17C has been amended.
4.2	R Peady	Mummaga Lake	Flood level information for the February 2010 event provided.	Refer to Response 3.1	Refer to Response 3.1
4.3	R Peady	Mummaga Lake	Review of berm opening triggers required to minimise flood damage.	Refer to Response 3.2	Nil
5	I Peady	Mummaga Lake	Review of berm opening triggers required to minimise flood damage.	Refer to Response 3.2	Nil
6.1	P Hattersley	Duck Pond	Flood level information and descriptions provided for February 2010 event.	Refer to Response 3.1	Refer to Response 3.1
6.2	P Hattersley	Duck Pond	Identification of "property" as flooded. A number of properties are only impacted to a minimal extent.	Refer to Response 1	Refer to Response 1
6.3	P Hattersley	Duck Pond	Classification as Rising Road Access perceived as alarming	Flood emergency response classifications for communities are developed in accordance with NSW SES guidelines. Classifications aim to assist the NSW SES in targeting emergency functions during events up to and including the PMF.	Section 13.4 reworded to provide clarification.
6.4	P Hattersley	Duck Pond	Terminology related to description of Dalmeny Drive structure.	-	Clarification is provided in Section 1.1
6.5	P Hattersley	Duck Pond	Potential impacts of the Dalmeny Drive structure on flooding should be investigated.	Refer to Response 3.2	Nil
6.6	P Hattersley	Duck Pond	Duck Ponds classification as an ICOLL.	Mummuga and Kianga Lakes are classified as ICOLLs by the NSW Government.	Clarification is provided in Section 1.1 and 7.1

6.7	P Hattersley	Duck Pond	Raising of the concrete structure upstream of Dalmeny Drive to maintain significant ecological habitat.	Refer to Response 3.2	Nil
6.8	P Hattersley	Duck Pond	Use of terrain data from 2012 suggests project is out of date.	The acquisition of large scale topography data is a large project and as such it is common industry practice to use the best available information and supplement this with field survey of more recent changes that may impact the flood behaviour. It is common that such a review is undertaken as part of the Floodplain Risk Management Study.	Nil
6.9	P Hattersley	Duck Pond	Statement of aim of Flood Study to define the current flood behaviour	The primary aim of the flood study is to define flood behaviour under current catchment conditions at the studies commencement.	Clarification is provided in Section 1.2
7.1	Ian Hitchcock	Mummaga Lake	Report contains no executive summary, conclusions or recommendations	The Flood Study aims to define flood behaviour. It is a technical investigation of flood behaviour in the various catchments, the outcomes of the flood study are presentation of the flood behaviour. Typically a flood study does not contain recommendations for the management of flooding or conclusions.	An executive summary has been added.
7.2	Ian Hitchcock	Mummaga Lake	Discrepancy between modelled levels and actual peak flood levels for historical events. Information related to historical events provided.	Refer to Response 3.1	Refer to Response 3.1
7.3	Ian Hitchcock	Mummaga Lake	Use of rainfall information from Tuross and Captains Flat	The rainfall patterns for the eastern catchment areas of Mummaga Lake were calibrated by recordings at pluviometers located at the Narooma (1999 event) and Barlows Bay (2007, 2010 events). Rainfall patterns for the western sub-catchments of Mummaga Lake were calibrated with the Tuross recordings. The recorded rainfall patterns from the Captains Flat radar were used to verify pluviometer patterns (at Narooma, Barlows Bay and Tuross) and was not directly applied to the models. The recorded rainfall patterns were found to have replicated well across the catchments. The radar is useful in confirming rainfall duration and intensity and is used as an additional analysis tool to support the recorded rainfall data.	Nil
7.4	Ian Hitchcock	Mummaga Lake	Assumptions used regarding lake starting level and berm height	No survey data were available to determine the precise height of the Mummaga Lake sand berm at the commencement of the 2010 flood event. It is known the entrance was closed at the commencement of the event and a natural break out occurred. Given no survey data were available, it was assumed the entrance opened at the management trigger level of 1.175mAHD. No survey data was available to accurately determine the lake level at the commencement of the event therefore an assumption needed to be made. The model indicates peak levels in Mummaga Lake are relatively insensitive to variations in the Initial Water Level as demonstrated in Table 26 on page 61 of the draft study.	Nil

7.5	Ian Hitchcock	Mummaga Lake	Failure for the berm to be artificially opened in historical events.	The flood study modelled a range of entrance conditions. Please refer to page 50 and page 60 of the report that describes the entrance conditions modelled. The National Parks and Wildlife Service (NPWS) has management responsibility for the entrance of Mummaga Lake as part of the Eurobodalla National Park. This flood study may provide additional information to assist with managing the entrance.	Nil
7.6	Ian Hitchcock	Mummaga Lake	The sea level issues has not been properly addressed.	The flood study assessed the sensitivity of design flood levels in combination with climate change scenarios. Please refer to Section 14.	Nil
7.7	Ian Hitchcock	Mummaga Lake	Independent Peer Review requested	The study has been undertaken in accordance with standard industry practice, using established methods.	Nil
7.8	Ian Hitchcock	Mummaga Lake	Use of Stage 1 results to set FPL	Australian Rainfall and Runoff provides national guidance on flood estimation. The 1987 version and the current recently revised version of Australian Rainfall and Runoff and the National Flood Manual (Managing the floodplain: a guide to best practice in flood risk management in Australia), encourage the dissemination of the best available information on flood behaviour so that flood risk can be understood and actively managed.	Nil
7.9	Ian Hitchcock	Mummaga Lake	Title of Figure E17C is incorrect.	Refer to Response 4.1	Refer to Response 4.1
7.10	Ian Hitchcock	Mummaga Lake	Adequate community consultation was not undertaken	Local consultation has occurred as follows: • Media release "Flood Stories wanted for Narooma catchment study" published 12 September 2012 • Questionnaire and information sheet distributed to local residents and businesses September 2012 • On-line "survey monkey" publicised in information sheet • Community drop-in session 17 September 2012 • Council report seeking endorsement to exhibit draft plan 9 June 2015 • Website notice of exhibition and public meeting 12 June 2015 • Media release 10 June 2015 Narooma News • Mail out to all residents within identified flood planning area 15 June 2015 • Eurobodalla News – advice on public information sessions and exhibition 3 July • Website notice "what's on" of public meeting • Follow-up media release 8 July Narooma News (website 8 July) • Public information session 8 July 2015 • Business information session 8 July 2015 • Public information session 9 July 2015.	Nil
7.11	Ian Hitchcock	Mummaga Lake	37 Myuna Street garage level at 1.8 mAHD and it has never been inundated.	The level of this garage was surveyed at 2.227 mAHD. This level was used in the calibration process.	Nil
7.12	Ian Hitchcock	Mummaga Lake	Further information provided in relation to historic events including 2014.	Refer to Response 3.1	Refer to Response 3.1
7.13	Ian Hitchcock	Mummaga Lake	Why was the 2014 event not included in the Flood Study	Refer to Response 3.1	Refer to Response 3.1

7.14	Ian Hitchcock	Mummaga Lake	Berm management and some drainage structure inadequate.	Refer to Response 3.2	Nil

Appendix D

APPENDIX D: MATRIX OF SCENARIOS

D1. WAGONGA INLET

	Rainfall Probability	Ocean Probability	Ocean Conditions – Initial Water Level	Ocean Conditions – Continuing	Entrance Conditions – Initial	Entrance Conditions – Continuing	Lake Conditions – Initial Water Level
Historic Flood Modelling							
2008 (Calibration Tidal)	2008 Rainfall (No Rainfall)	2008 Tide	+ 0.346 m AHD	As recorded	Training Wall– 90% Impervious	Constant	+0.07 m AHD (Narooma Wharf) -0.18 m AHD (Barlows Bay)
1999 (Calibration Rainfall)	1999 Rainfall	1999 Tide	+ 0.454 m AHD	As recorded	Training Wall– 90% Impervious	Constant	+0.23 m AHD (Narooma Wharf) +0.03 m AHD (Barlows Bay)
2007 (Validation Rainfall)	2007 Rainfall	2007 Tide	+ 0.107 m AHD	As recorded	Training Wall– 90% Impervious	Constant	+0.04 m AHD (Narooma Wharf) +0.06 m AHD (Barlows Bay)
2010 (Validation Rainfall)	2010 Rainfall	2010 Tide	- 0.565 m AHD	As recorded	Training Wall– 90% Impervious	Constant	-0.08 m AHD (Narooma Wharf) -0.24 m AHD (Barlows Bay)
Historic Flood Modelling – Sensitivity							
Tide Level (without 0.1 m decrease)	No Rainfall	2008 Tide (without 0.1 m decrease)	+ 0.446 m AHD	As recorded	Training Wall– 90% Impervious	Constant	+0.07 m AHD (Narooma Wharf) -0.18 m AHD (Barlows Bay)
Training Wall Gaps – 100% Impervious	No Rainfall	2008 Tide	+ 0.346 m AHD	As recorded	Training Wall– 100% Impervious	Constant	+0.07 m AHD (Narooma Wharf) -0.18 m AHD (Barlows Bay)
Training Wall Gaps – 50% Impervious	No Rainfall	2008 Tide	+ 0.346 m AHD	As recorded	Training Wall– 50% Impervious	Constant	+0.07 m AHD (Narooma Wharf) -0.18 m AHD (Barlows Bay)
Design Flood Modelling – Critical Storm Duration							
1% AEP Rainfall Event	1% AEP Rainfall	Constant Water Level	0.60 m AHD	0.60 m AHD	Training Wall– 90% Impervious	Constant	0.60 m AHD
PMF Rainfall Event	PMF Rainfall	Constant Water Level	0.60 m AHD	0.60 m AHD	Training Wall– 90% Impervious	Constant	0.60 m AHD
Design Flood Modelling							
HHWS Ocean Event	No Rainfall	HHWS	0.445 m AHD	0.995 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
5% AEP Ocean Event	No Rainfall	5% AEP Elevated Ocean Level	0.64 m AHD	1.90 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
1% AEP Ocean Event	No Rainfall	1% AEP Elevated Ocean Level	0.66 m AHD	2.00 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
20% AEP Rainfall Event	20% AEP Rainfall	HHWS + Neap Tide	0.075 m AHD	0.995 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
10% AEP Rainfall Event	10% AEP Rainfall	HHWS + Neap Tide	0.075 m AHD	0.995 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
5% AEP Rainfall Event	5% AEP Rainfall	HHWS + Neap Tide	0.075 m AHD	0.995 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
2% AEP Rainfall Event	2% AEP Rainfall	5% AEP Elevated Ocean Level	0.95 m AHD	1.90 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
1% AEP Rainfall Event	1% AEP Rainfall	5% AEP Elevated Ocean Level	0.95 m AHD	1.90 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
	5% AEP Rainfall	1% AEP Elevated Ocean Level	1.01 m AHD	2.00 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
	1% AEP Rainfall	HHWS + Neap Tide	0.075 m AHD	0.995 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
0.5% AEP Rainfall Event	0.5% AEP Rainfall	1% AEP Elevated Ocean Level	1.01 m AHD	2.00 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level

PMF Rainfall Event	PMF Rainfall	1% AEP Elevated Ocean Level	1.01 m AHD	2.00 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
Design Flood Modelling – Sensitivity							
Roughness Variation	1% AEP Rainfall	HHWS + Neap Tide	0.075 m AHD	0.995 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
Climate Change (Rainfall Increase)	1% AEP Rainfall Increased	HHWS + Neap Tide	0.075 m AHD	0.995 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
Climate Change (Sea Level Rise)	1% AEP Rainfall	5% AEP Elevated Ocean Level	1.05 m AHD 1.18 m AHD 1.34 m AHD 1.67 m AHD	2.00 m AHD (2030 Scenario) 2.13 m AHD (2050 Scenario) 2.29 m AHD (2070 Scenario) 2.62 m AHD (2100 Scenario)	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
	5% AEP Rainfall	1% AEP Elevated Ocean Level	1.11 m AHD 1.24 m AHD 1.40 m AHD 1.73 m AHD	2.10 m AHD (2030 Scenario) 2.23 m AHD (2050 Scenario) 2.39 m AHD (2070 Scenario) 2.72 m AHD (2100 Scenario)	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
Timing of Ocean Peak	1% AEP Rainfall	5% AEP Elevated Ocean Level	1.46 m AHD (- 3 hrs) 0.07 m AHD (+ 3 hrs)	1.90 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level
	5% AEP Rainfall	1% AEP Elevated Ocean Level	1.53 m AHD (- 3 hrs) 0.09 m AHD (+ 3 hrs)	2.00 m AHD Peak	Training Wall– 90% Impervious	Constant	Ocean – Initial Water Level

D2. KIANGA LAKE

	Rainfall Probability	Ocean Probability	Ocean Conditions – Initial Water Level	Ocean Conditions – Continuing	Entrance Conditions – Initial	Entrance Conditions – Continuing	Lake Conditions – Initial Water Level
Historic Flood Modelling							
1999 (Calibration Rainfall)	1999 Rainfall	1999 Tide	+ 0.454 m AHD	As recorded	Closed Entrance (2.0 m AHD)	Breakout: Commences at 2.0 m AHD Duration of 4 hours	0.6 m AHD
2007 (Validation Rainfall)	2007 Rainfall	2007 Tide	+ 0.107 m AHD	As recorded	Closed Entrance (2.0 m AHD)	Breakout: Commences at 2.0 m AHD Duration of 4 hours	0.6 m AHD
2010 (Validation Rainfall)	2010 Rainfall	2010 Tide	- 0.565 m AHD	As recorded	Closed Entrance (2.0 m AHD)	Breakout: Commences at 2.0 m AHD Duration of 4 hours	0.6 m AHD
Historic Flood Modelling – Sensitivity							
IWL 2.0 m AHD	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Closed Entrance (2.0 m AHD)	Constant (i.e. Closed)	2.0 m AHD
IWL 1.0 m AHD	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Closed Entrance (2.0 m AHD)	Constant (i.e. Closed)	1.0 m AHD
Entrance Open	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Open Entrance	Constant (i.e. Open)	Ocean – Initial Water Level
Entrance Closed	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Closed Entrance (2.0 m AHD)	Constant (i.e. Closed)	2.0 m AHD
Breakout Duration 2 hrs	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Closed Entrance	Breakout: Commences at 2.0 m AHD Duration of 2 hours	0.6 m AHD
Breakout Duration 6 hrs	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Closed Entrance	Breakout: Commences at 2.0 m AHD Duration of 6 hours	0.6 m AHD
Breakout Duration 12 hrs	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Closed Entrance	Breakout: Commences at 2.0 m AHD Duration of 12 hours	0.6 m AHD
Design Flood Modelling – Critical Storm Duration							
1% AEP Rainfall Event	1% AEP Rainfall	Constant Water Level	0.60 m AHD	0.60 m AHD	Closed Entrance	Constant	0.60 m AHD

PMF Rainfall Event	PMF Rainfall	Constant Water Level	0.60 m AHD	0.60 m AHD	Closed Entrance	Constant	0.60 m AHD
Design Flood Modelling							
HHWS Ocean Event	No Rainfall	HHWS	0.445 m AHD	0.995 m AHD Peak	Open Entrance	Constant	Ocean – Initial Water Level
5% AEP Ocean Event	No Rainfall	5% AEP Elevated Ocean Level	0.640 m AHD	2.35 m AHD Peak	Open Entrance	Constant	Ocean – Initial Water Level
1% AEP Ocean Event	No Rainfall	1% AEP Elevated Ocean Level	0.66 m AHD	2.55 m AHD Peak	Open Entrance	Constant	Ocean – Initial Water Level
20% AEP Rainfall Event	20% AEP Rainfall	HHWS + Neap Tide	-0.155 m AHD	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
10% AEP Rainfall Event	10% AEP Rainfall	HHWS + Neap Tide	-0.155 m AHD	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
5% AEP Rainfall Event	5% AEP Rainfall	HHWS + Neap Tide	-0.155 m AHD	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
2% AEP Rainfall Event	2% AEP Rainfall	5% AEP Elevated Ocean Level	1.02 m AHD	2.35 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
1% AEP Rainfall Event	1% AEP Rainfall	5% AEP Elevated Ocean Level	1.02 m AHD	2.35 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
	5% AEP Rainfall	1% AEP Elevated Ocean Level	1.17 m AHD	2.55 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
	1% AEP Rainfall	HHWS + Neap Tide	-0.155 m AHD	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
0.5% AEP Rainfall Event	0.5% AEP Rainfall	1% AEP Elevated Ocean Level	1.17 m AHD	2.55 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
PMF Rainfall Event	PMF Rainfall	1% AEP Elevated Ocean Level	2.45 m AHD (45min, 60min) 2.16 m AHD (2 hr)	2.55 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
Design Flood Modelling – Sensitivity							
Roughness Variation	1% AEP Rainfall	HHWS + Neap Tide	0.075 m AHD	0.995 m AHD Peak	Closed Entrance (2.0 m AHD)	Constant	0.6 m AHD
Climate Change (Rainfall Increase)	1% AEP Rainfall Increased	HHWS + Neap Tide	0.075 m AHD	0.995 m AHD Peak	Closed Entrance (2.0 m AHD)	Constant	0.6 m AHD
Climate Change (Sea Level Rise)	1% AEP Rainfall	5% AEP Elevated Ocean Level	1.12 m AHD 1.25 m AHD 1.41 m AHD 1.74 m AHD	2.45 m AHD (2030 Scenario) 2.58 m AHD (2050 Scenario) 2.74 m AHD (2070 Scenario) 3.07 m AHD (2100 Scenario)	Closed Entrance (2.0 m AHD)	Constant	0.6 m AHD
Timing of Ocean Peak	1% AEP Rainfall	5% AEP Elevated Ocean Level	1.02 m AHD (- 3 hrs) 1.97 m AHD (+ 3 hrs)	2.35 m AHD Peak	Closed Entrance (2.0 m AHD)	Constant	0.6 m AHD
	5% AEP Rainfall	1% AEP Elevated Ocean Level	1.17 m AHD (- 3 hrs) 2.16 m AHD (+ 3 hrs)	2.55 m AHD Peak	Closed Entrance (2.0 m AHD)	Constant	0.6 m AHD

D3. MUMMUGA LAKE

	Rainfall Probability	Ocean Probability	Ocean Conditions – Initial Water Level	Ocean Conditions – Continuing	Entrance Conditions – Initial	Entrance Conditions – Continuing	Lake Conditions – Initial Water Level
Historic Flood Modelling							
1999 (Calibration Rainfall)	1999 Rainfall	1999 Tide	+ 0.454 m AHD	As recorded	Closed Entrance (1.175 m AHD)	Breakout: Commences at 1.175 m AHD Duration of 4 hours	0.6 m AHD
2007 (Validation Rainfall)	2007 Rainfall	2007 Tide	+ 0.107 m AHD	As recorded	Closed Entrance (1.175 m AHD)	Breakout: Commences at 1.175 m AHD Duration of 4 hours	0.6 m AHD
2010 (Validation Rainfall)	2010 Rainfall	2010 Tide	- 0.565 m AHD	As recorded	Closed Entrance (1.175 m AHD)	Breakout: Commences at 1.175 m AHD Duration of 4 hours	0.6 m AHD
Historic Flood Modelling – Sensitivity							
IWL 1.175 m AHD	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Closed Entrance	Constant (i.e. Closed)	1.175 m AHD
Entrance Open	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Open Entrance	Constant (i.e. Open)	Ocean – Initial Water Level
Entrance Closed	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Closed Entrance	Constant (i.e. Closed)	1.175 m AHD

Breakout Duration 2 hrs	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Closed Entrance	Breakout: Commences at 1.175 m AHD Duration of 2 hours	0.6 m AHD
Breakout Duration 4 hrs	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Closed Entrance	Breakout: Commences at 1.175 m AHD Duration of 4 hours	0.6 m AHD
Breakout Duration 6 hrs	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Closed Entrance	Breakout: Commences at 1.175 m AHD Duration of 6 hours	0.6 m AHD
Breakout Duration 12 hrs	2010 Rainfall	2010 Tide	-0.565 m AHD	As recorded	Closed Entrance	Breakout: Commences at 1.175 m AHD Duration of 12 hours	0.6 m AHD
Design Flood Modelling – Critical Storm Duration							
1% AEP Rainfall Event	1% AEP Rainfall	Constant Water Level	0.60 m AHD	0.60 m AHD	Closed Entrance	Constant	0.60 m AHD
PMF Rainfall Event	PMF Rainfall	Constant Water Level	0.60 m AHD	0.60 m AHD	Closed Entrance	Constant	0.60 m AHD
Design Flood Modelling							
HHWS Ocean Event	No Rainfall	HHWS	0.445 m AHD	0.995 m AHD Peak	Open Entrance	Constant	Ocean – Initial Water Level
5% AEP Ocean Event	No Rainfall	5% AEP Elevated Ocean Level	0.64 m AHD	2.35 m AHD Peak	Open Entrance	Constant	Ocean – Initial Water Level
1% AEP Ocean Event	No Rainfall	1% AEP Elevated Ocean Level	0.66 m AHD	2.55 m AHD Peak	Open Entrance	Constant	Ocean – Initial Water Level
20% AEP Rainfall Event	20% AEP Rainfall	HHWS + Neap Tide	0.845 m AHD (120min) -0.295 m AHD (540min) 0.075 m AHD (2880min)	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
10% AEP Rainfall Event	10% AEP Rainfall	HHWS + Neap Tide	0.845 m AHD (120min) -0.295 m AHD (540min) 0.075 m AHD (2880min)	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
2% AEP Rainfall Event	2% AEP Rainfall	5% AEP Elevated Ocean Level	1.97 m AHD (120min) 1.31 m AHD (540min) 1.23 m AHD (2880min)	2.35 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
1% AEP Rainfall Event	1% AEP Rainfall	5% AEP Elevated Ocean Level	1.97 m AHD (120min) 1.31 m AHD (540min) 1.23 m AHD (2880min)	2.35 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
	5% AEP Rainfall	1% AEP Elevated Ocean Level	2.16 m AHD (120min) 1.47 m AHD (540min) 1.35 m AHD (2880min)	2.55 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
	1% AEP Rainfall	HHWS + Neap Tide	0.845 m AHD (120min) -0.295 m AHD (540min) 0.075 m AHD (2880min)	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
0.5% AEP Rainfall Event	0.5% AEP Rainfall	1% AEP Elevated Ocean Level	2.16 m AHD (120min) 1.47 m AHD (540min) 1.35 m AHD (2880min)	2.55 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
PMF Rainfall Event	PMF Rainfall	1% AEP Elevated Ocean Level	2.16 m AHD (120min) 1.47 m AHD (540min) 1.35 m AHD (2880min)	2.55 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
Design Flood Modelling – Sensitivity							
Roughness Variation	1% AEP Rainfall	HHWS + Neap Tide	0.845 m AHD (120min) -0.295 m AHD (540min) 0.075 m AHD (2880min)	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
Climate Change (Rainfall Increase)	1% AEP Rainfall Increased	HHWS + Neap Tide	0.845 m AHD (120min) -0.295 m AHD (540min) 0.075 m AHD (2880min)	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD

Climate Change (Sea Level Rise)	1% AEP Rainfall	5% AEP Elevated Ocean Level	2.07 m AHD (120min) 1.41 m AHD (540min) 1.33 m AHD (2880min)	2.45 m AHD (2030 Scenario)	Closed Entrance	Constant	0.6 m AHD
			2.20 m AHD (120min) 1.54 m AHD (540min) 1.46 m AHD (2880min)	2.58 m AHD (2050 Scenario)			
			2.36 m AHD (120min) 1.70 m AHD (540min) 1.62 m AHD (2880min)	2.74 m AHD (2070 Scenario)			
			2.69 m AHD (120min) 2.03 m AHD (540min) 1.95 m AHD (2880min)	3.07 m AHD (2100 Scenario)			
Timing of Ocean Peak	1% AEP Rainfall	5% AEP Elevated Ocean Level	Add 3 hrs 2.26 m AHD (120min) 1.02 m AHD (540min) 0.40 m AHD (2880min)	2.35 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
			Minus 3 hrs 1.02 m AHD (120min) 1.78 m AHD (540min) 1.69 m AHD (2880min)				
	5% AEP Rainfall	1% AEP Elevated Ocean Level	Add 3 hrs 2.45 m AHD (120min) 1.17 m AHD (540min) 0.51 m AHD (2880min)	2.55 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
			Minus 3 hrs 1.17 m AHD (120min) 1.96 m AHD (540min) 1.80 m AHD (2880min)				

D4. DUCK POND

	Rainfall Probability	Ocean Probability	Ocean Conditions – Initial Water Level	Ocean Conditions – Continuing	Entrance Conditions – Initial	Entrance Conditions – Continuing	Lake Conditions – Initial Water Level
Historic Flood Modelling							
1999 (Calibration Rainfall)	1999 Rainfall	1999 Tide	+ 0.454 m AHD	As recorded	Closed Entrance	Constant	0.6 m AHD
2007 (Validation Rainfall)	2007 Rainfall	2007 Tide	+ 0.107 m AHD	As recorded	Closed Entrance	Constant	0.6 m AHD
2010 (Validation Rainfall)	2010 Rainfall	2010 Tide	- 0.565 m AHD	As recorded	Closed Entrance	Constant	0.6 m AHD
Design Flood Modelling – Critical Storm Duration							
1% AEP Rainfall Event	1% AEP Rainfall	Constant Water Level	0.60 m AHD	0.60 m AHD	Closed Entrance	Constant	0.60 m AHD
PMF Rainfall Event	PMF Rainfall	Constant Water Level	0.60 m AHD	0.60 m AHD	Closed Entrance	Constant	0.60 m AHD
Design Flood Modelling							
HHWS Ocean Event	No Rainfall	HHWS	0.445 m AHD	0.995 m AHD Peak	Open Entrance	Constant	Ocean – Initial Water Level
5% AEP Ocean Event	No Rainfall	5% AEP Elevated Ocean Level	0.640 m AHD	2.35 m AHD Peak	Open Entrance	Constant	Ocean – Initial Water Level
1% AEP Ocean Event	No Rainfall	1% AEP Elevated Ocean Level	0.66 m AHD	2.55 m AHD Peak	Open Entrance	Constant	Ocean – Initial Water Level
20% AEP Rainfall Event	20% AEP Rainfall	HHWS + Neap Tide	-0.155 m AHD	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD

10% AEP Rainfall Event	10% AEP Rainfall	HHWS + Neap Tide	-0.155 m AHD	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
5% AEP Rainfall Event	5% AEP Rainfall	HHWS + Neap Tide	-0.155 m AHD	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
2% AEP Rainfall Event	2% AEP Rainfall	5% AEP Elevated Ocean Level	1.02 m AHD	2.35 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
1% AEP Rainfall Event	1% AEP Rainfall	5% AEP Elevated Ocean Level	1.02 m AHD	2.35 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
	5% AEP Rainfall	1% AEP Elevated Ocean Level	1.17 m AHD	2.55 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
	1% AEP Rainfall	HHWS + Neap Tide	-0.155 m AHD	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
0.5% AEP Rainfall Event	0.5% AEP Rainfall	1% AEP Elevated Ocean Level	1.17 m AHD	2.55 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
PMF Rainfall Event	PMF Rainfall	1% AEP Elevated Ocean Level	1.17 m AHD	2.55 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
Design Flood Modelling – Sensitivity							
Roughness Variation	1% AEP Rainfall	HHWS + Neap Tide	0.075 m AHD	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
Climate Change (Rainfall Increase)	1% AEP Rainfall Increased	HHWS + Neap Tide	0.075 m AHD	0.995 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
Climate Change (Sea Level Rise)	1% AEP Rainfall	5% AEP Elevated Ocean Level	1.12 m AHD 1.25 m AHD 1.41 m AHD 1.74 m AHD	2.45 m AHD (2030 Scenario) 2.58 m AHD (2050 Scenario) 2.74 m AHD (2070 Scenario) 3.07 m AHD (2100 Scenario)	Closed Entrance	Constant	0.6 m AHD
Timing of Ocean Peak	1% AEP Rainfall	5% AEP Elevated Ocean Level	1.02 m AHD (- 3 hrs) 1.97 m AHD (+ 3 hrs)	2.35 m AHD Peak	Closed Entrance	Constant	0.6 m AHD
	5% AEP Rainfall	1% AEP Elevated Ocean Level	1.17 m AHD (- 3 hrs) 2.16 m AHD (+ 3 hrs)	2.55 m AHD Peak	Closed Entrance	Constant	0.6 m AHD

Appendix E

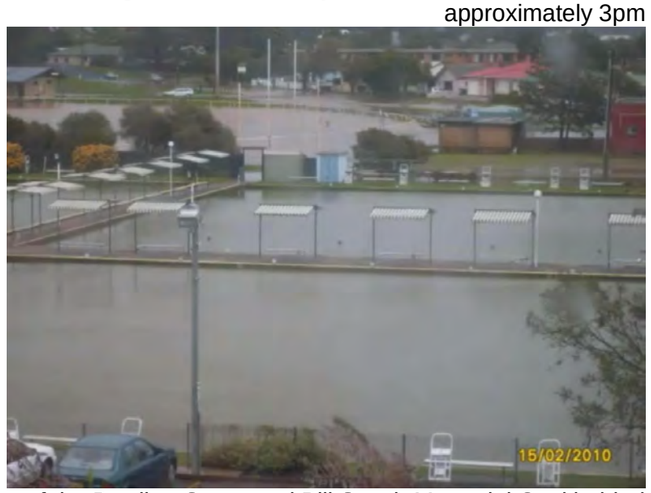
FIGURE E1A

PHOTOGRAPHS OF FLOODING ON THE 15 FEBRAURAY 2010
WAGONGA INLET CATCHMENT

Above: Flooding at the corner of Lynch Street and Brice Street at approximately 3pm

Above: Lynch Street, near the junction with Nichelsen Street (Narooma Newspaper)

Above: McMillian Street



Above: Flooding of the Bowling Green and Bill Smyth Memorial Oval behind it at approximately 3pm

Above: 8 Lynch Street, near the junction with Nichelsen Street

Above: Riverside Dr (Narooma Newspaper)

Above: Flooding on Bluewater Drive near the intersection with Bay Street

FIGURE E1B
PHOTOGRAPHS OF FLOODING ON THE 15 FEBRAURAY 2010
DUCK POND AND KIANGA LAKE CATCHMENTS

Above: DUCK POND – Junction of Eucalyptus Drive and Dalmeny Drive at approximately 3pm

Above: DUCK POND – Dalmeny Dr (Narooma Newspaper)

Above: DUCK POND – Eucalyptus Dr (Narooma Newspaper)

Above: KIANGA LAKE – Junction of Princes Hwy and Kianga Rd (Narooma Newspaper)

Above: KIANGA LAKE – Kianga Ck downstream of Princes Hwy (Narooma Newspaper

Above: KIANGA LAKE – Junction of Dalmeny Dr and Centenary Dr (Narooma Newspaper

Above: KIANGA LAKE –Dalmeny Dr Bridge (Narooma Newspaper)

FIGURE E1C

PHOTOGRAPHS OF FLOODING ON THE 15 FEBRAURAY 2010
MUMMUGA LAKE CATCHMENT

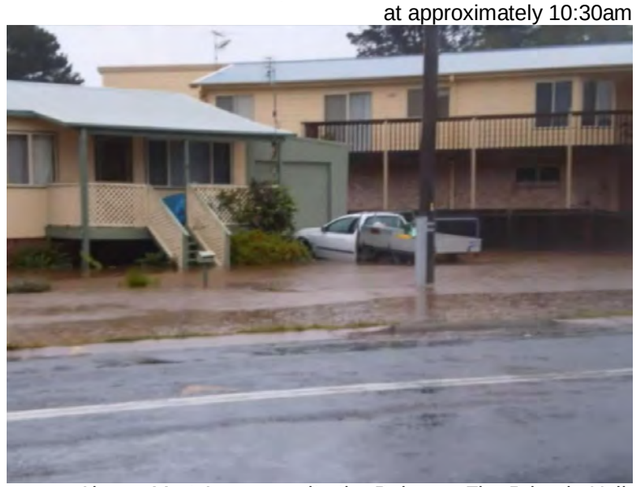
Above: Dalmeny Pedestrian Bridge, over Mummuga Lake on the16th February 2010

Above: Corner of Binalong Street, at approximately 10:30am

Above: Acacia Close

Above: Mummuga Lake ICOLL entrance was open to the ocean at the time of photo at approximately 10:30am

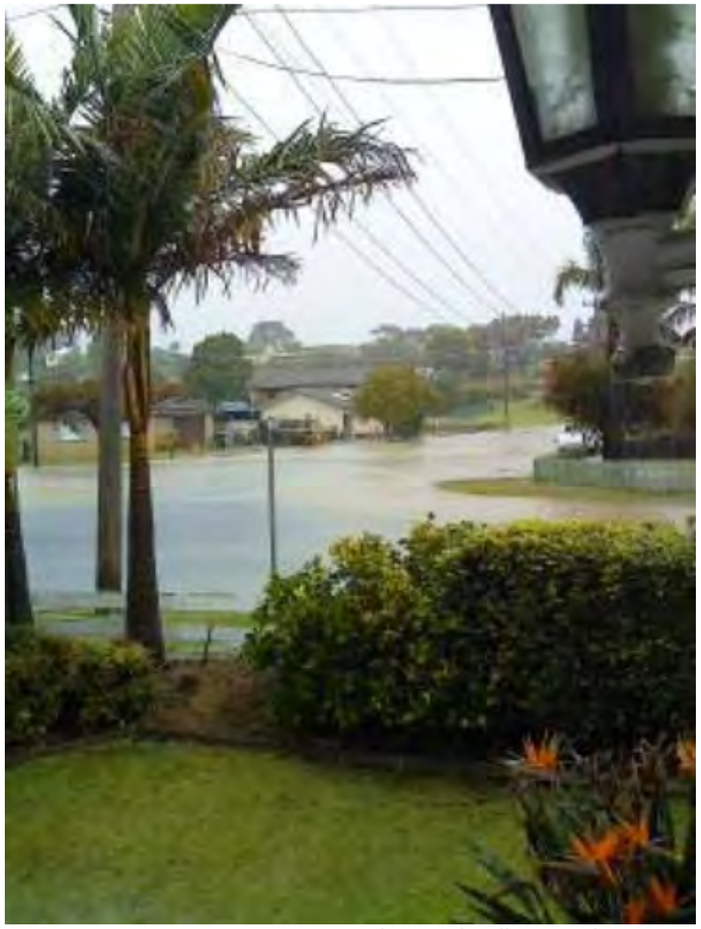
Above: Corner of Binalong Street time unknown



Above: Mort Ave, opposite the Dalmeny Fire Brigade Hall, at approximately 3pm

Above: Mort Ave, Dalmeny Fire Brigade Hall (Narooma Newspaper)

FIGURE E1D
PHOTOGRAPHS OF FLOODING ON THE 14 OCTOBER 2014
WAGONGA INLET CATCHMENT



Above: Flooding at Brice Street

Above: Flooding of the Bowling Green

Above: Lynch Street, near the junction with Nichelsen Street

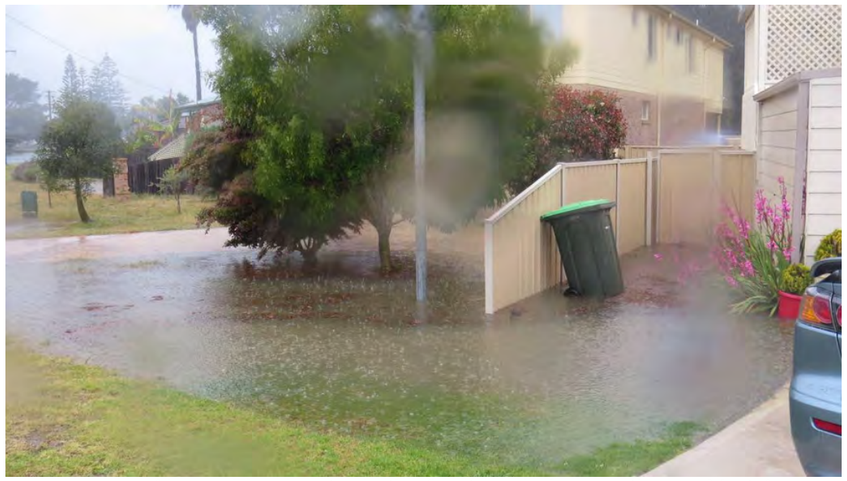
Above: Flooding on Bill Smyth Oval

Above: Riverside Drive

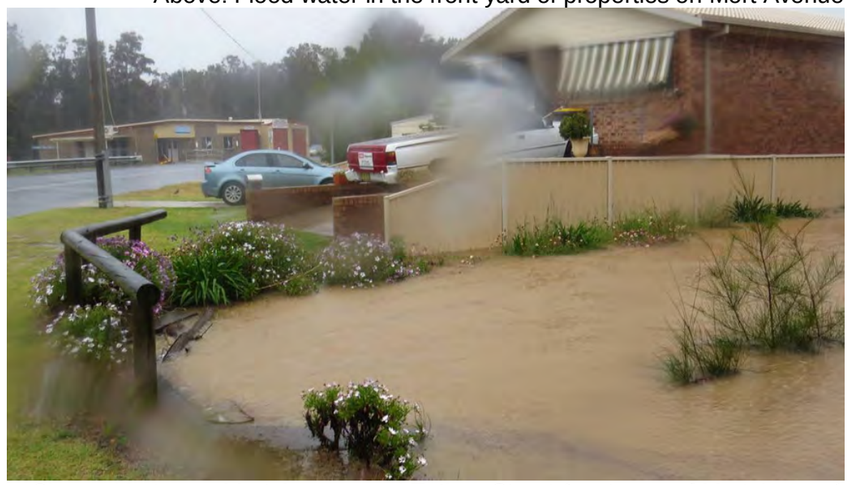
Above: McMillian Street

Above: Panorama at McMillian Road

FIGURE E1E
PHOTOGRAPHS OF FLOODING ON THE 14 OCTOBER 2014
MUMMUGA LAKE CATCHMENT



Above: Flood water in the front yard of properties on Mort Avenue



Above: Channel between Mort Avenue and Tatiara Street (upstream of Mort Avenue)

Above: White-wash from flow discharging into Mummuga Lake from the channel between Mort Avenue and Tatiara Street (downstream of Mort Avenue)

Above: Flood water inside garage on Mort Avenue

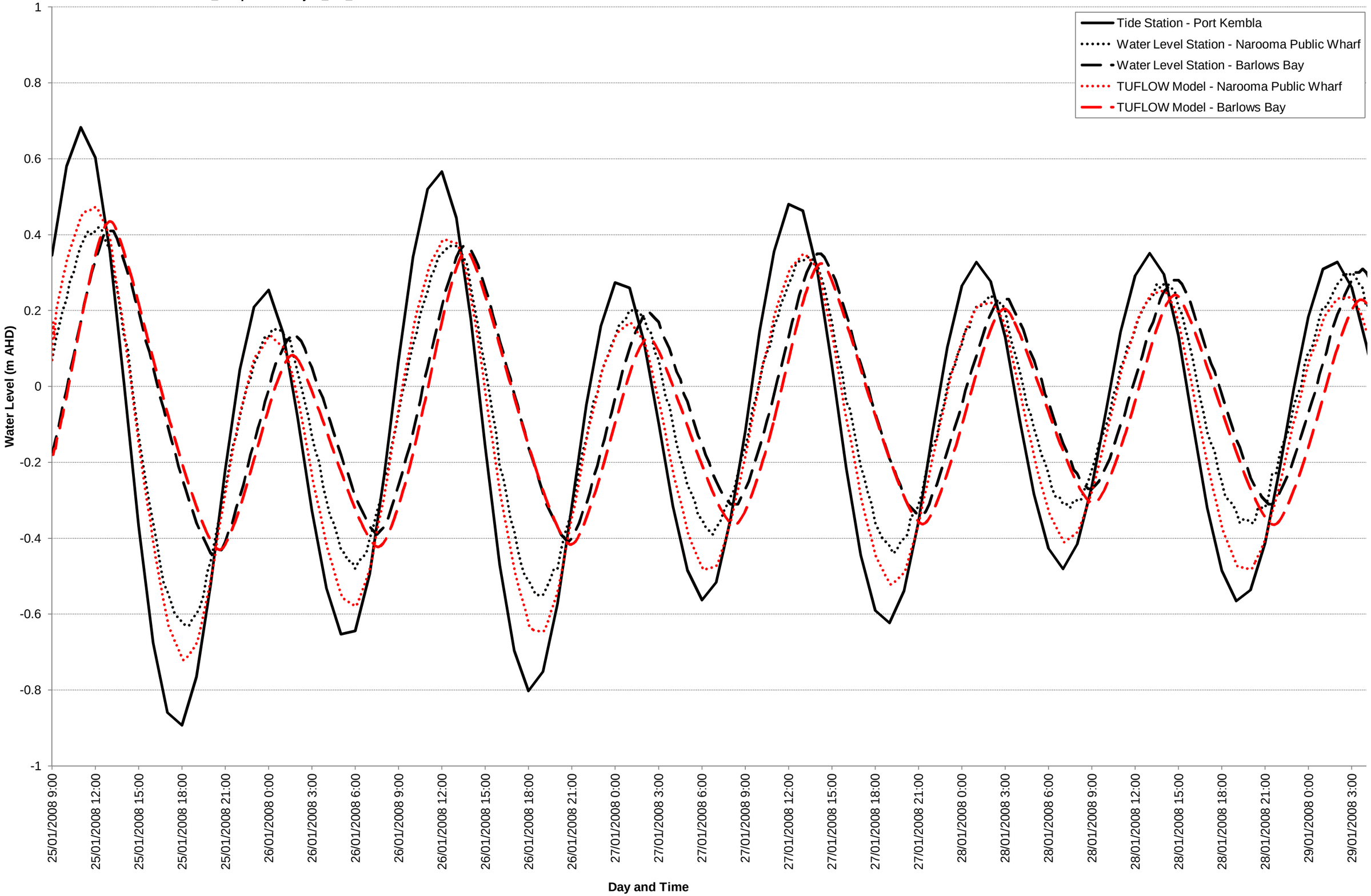
Above: Channel between Mort Avenue and Tatiara Street (upstream of Mort Avenue)

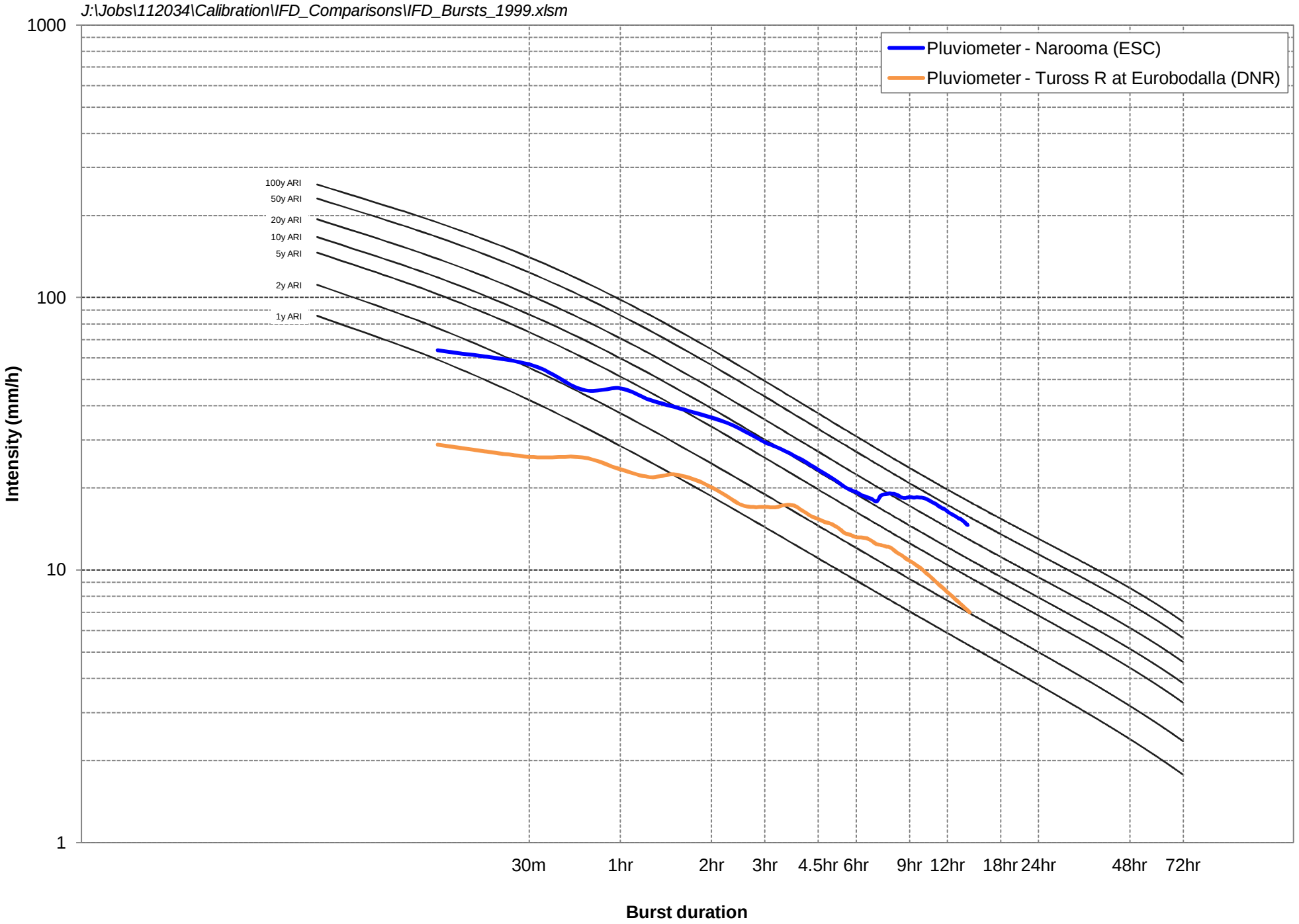
Above: White-wash from flow discharging into Mummuga Lake from the channel between Mort Avenue and Tatiara Street (downstream of Mort Avenue)

FIGURE E2

25TH-29TH JANUARY 2008 EVENT
RECORDED WATER LEVELS AND STAGE HYDROGRAPHS

J:\Jobs\112034\Calibration\Tide_Comparison\Analysis_tide_20080125.xlsx

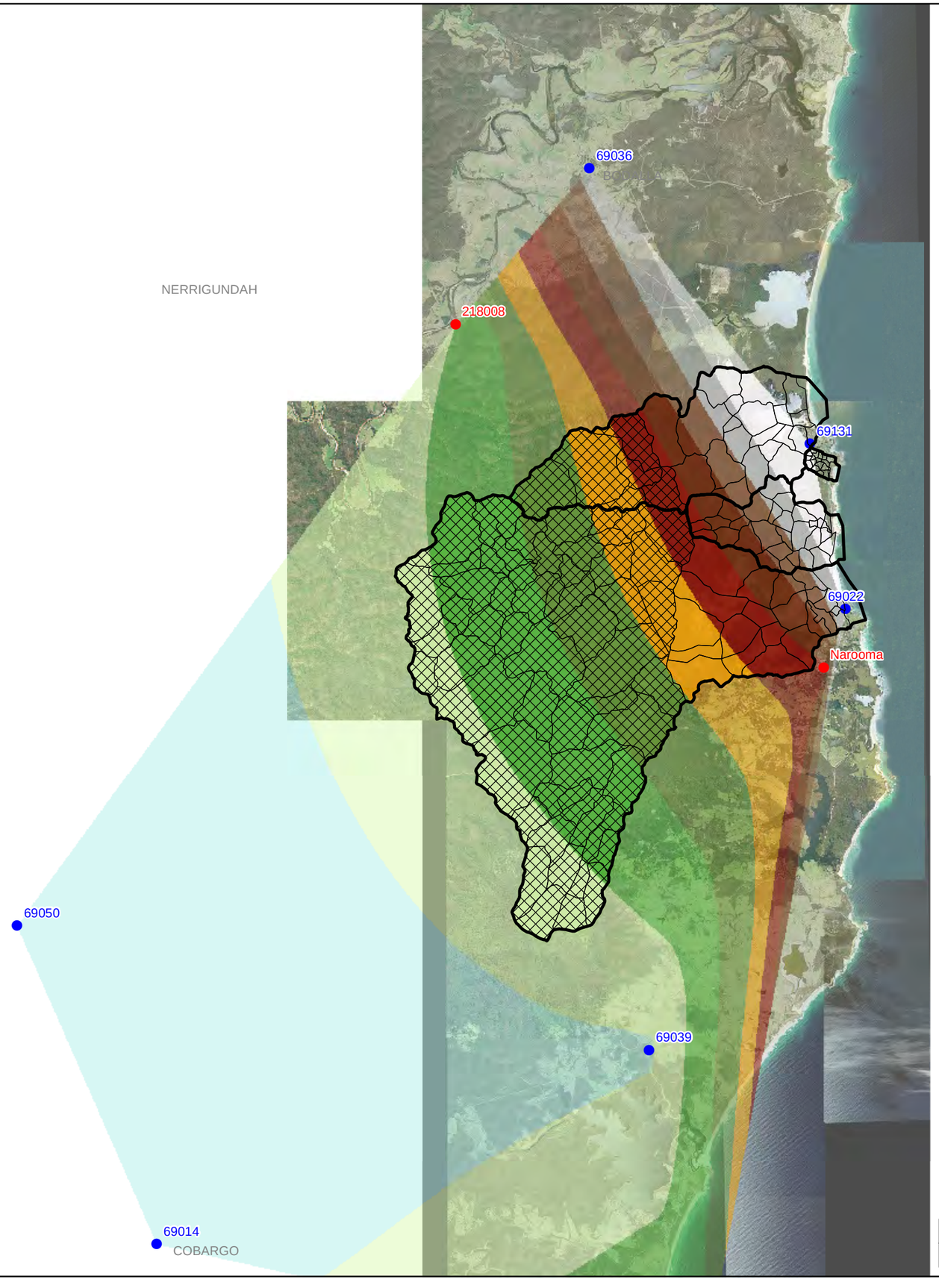




28TH JANUARY 1999 EVENT
IFD DATA

FIGURE E3

FIGURE E4
28TH JANUARY 1999 EVENT
RAINFALL DISTRIBUTION



N

Eurobodalla Catchments

Temporal Pattern Applied to Subcatchments

Narooma

Tuross R at Eurobodalla (218008)

Rainfall Stations Operating During Event

Continuous

Daily

Rainfall Depth in mm (24 hours to 9am)

53 - 80
80 - 100
100 - 120
120 - 140
140 - 160
160 - 180
180 - 200
200 - 220
220 - 240
240 - 275

0 5 10 15 km

J:\Jobs\112034\ArcView\ArcMaps\DraftReport_Eurobodalla\Figure_E04_1999_Distribution.mxd

FIGURE E5

28TH JANUARY 1999 EVENT
RAINFALL HYETOGRAPH COMPARISON

J:\Jobs\112033\Calibration\Model_Rainfall\Analysis_15min_AdjustEDST_1999.xlsx

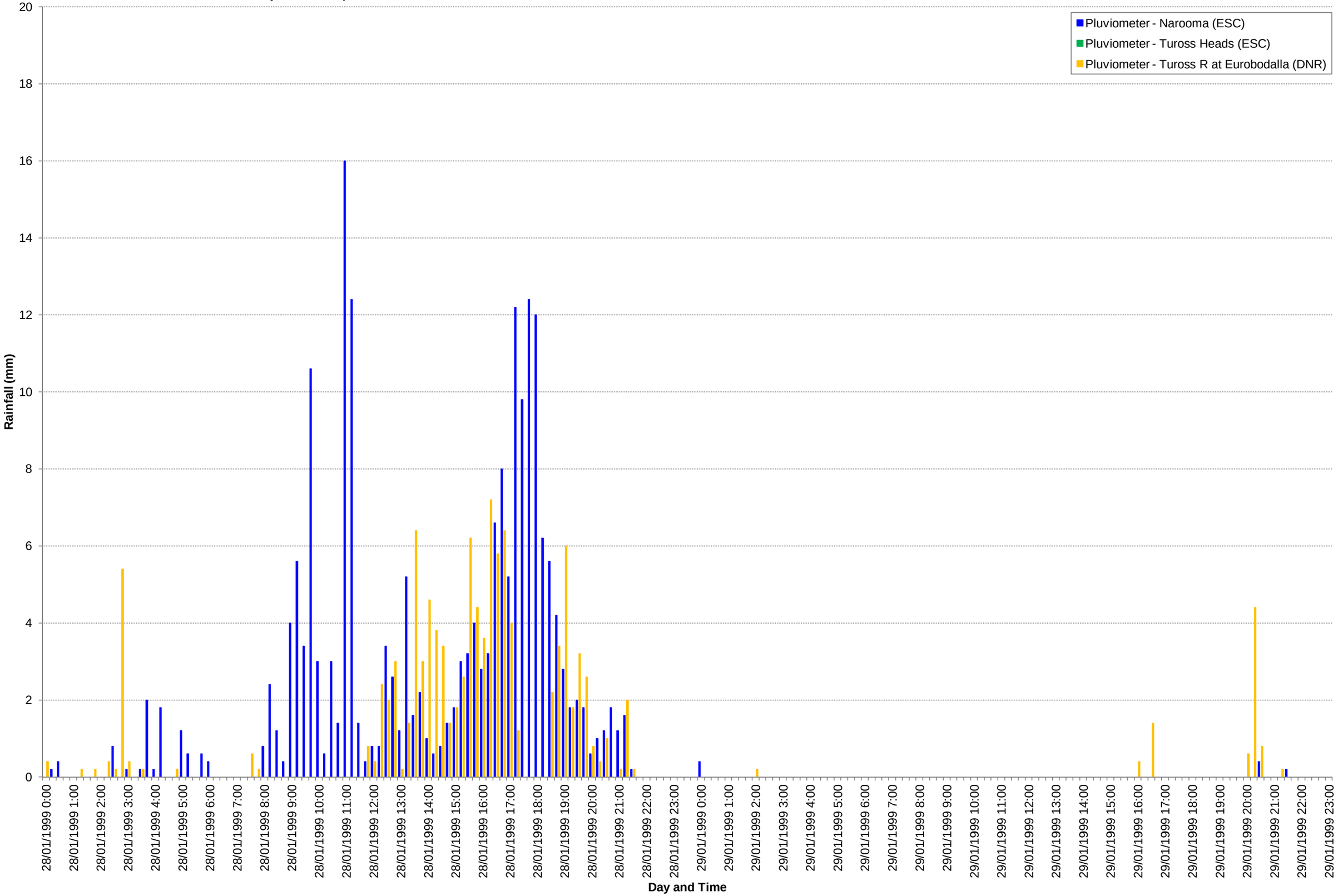


FIGURE E6

28TH JANUARY 1999 EVENT
STAGE HYDROGRAPHS

J:\Jobs\112033\Calibration\Model_Rainfall\Analysis_15min_AdjustEDST_1999.xlsx

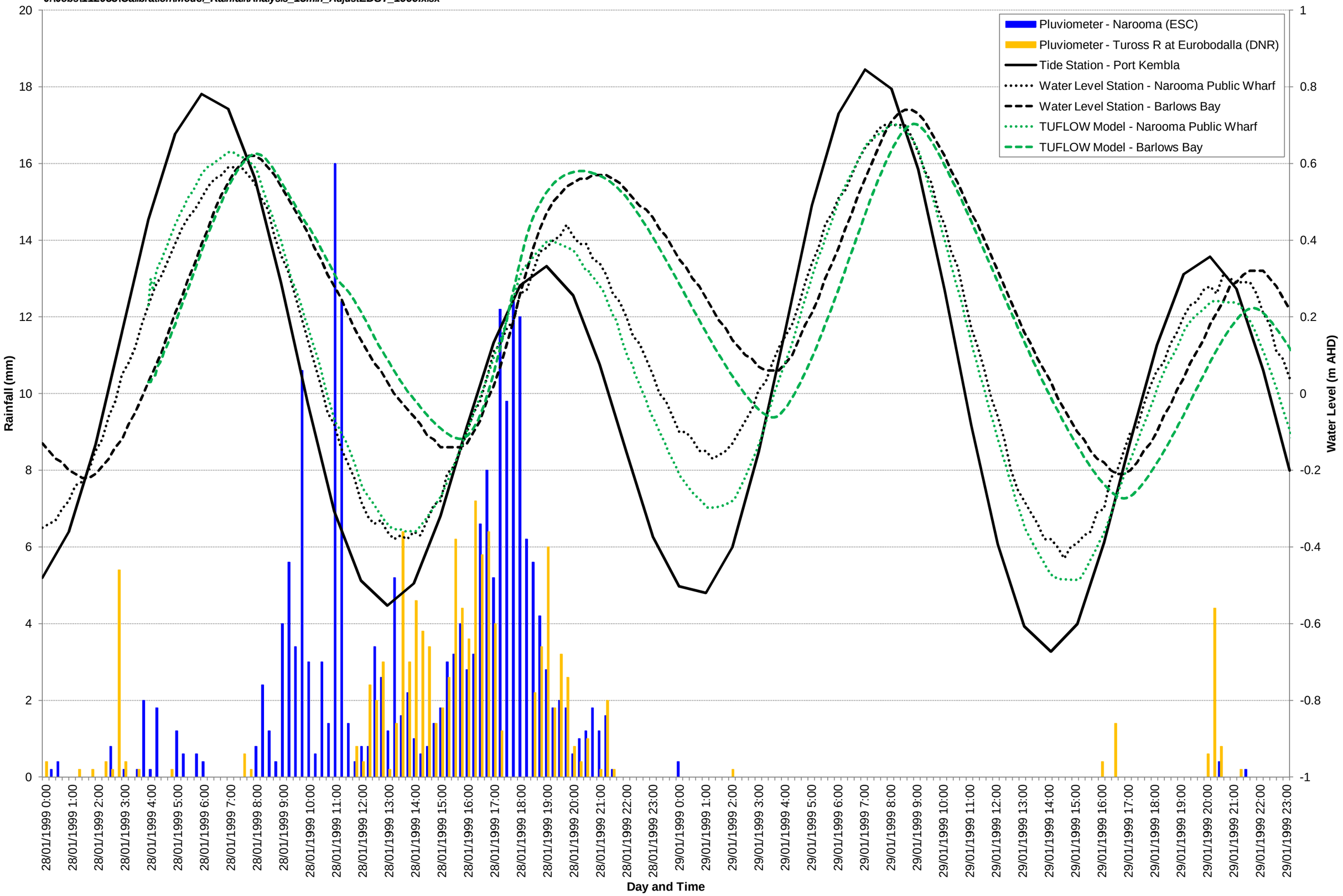


FIGURE E7A
28TH JANUARY 1999 EVENT
PEAK FLOOD DEPTH
WAGONGA INLET

0.75
0.75
1
0.75

N

Eurobodalla Catchments

Calibration Locations:

Water Level Station - Barlows Bay

Water Level Station - Narooma Public Wharf

Peak Flood Level Contours (m AHD)

Peak Flood Depth (m)

0.00 to 0.15
0.15 to 0.30
0.30 to 0.50
0.50 to 1.00
1.00 to 2.00
2.00 to 3.00
> 3.00

0 0.5 1 1.5 km

J:\Jobs\112034\ArcView\ArcMaps\DraftReport_EurobodallaAppendix_E\Figure_E07A_1999_Depth_WA_INLET.mxd

FIGURE E7B
28TH JANUARY 1999 EVENT
PEAK FLOOD DEPTH
NAROOMA FLAT

0.75
0.75
0.75
0.75
1
1.25
1
1.25
1.25
1.5
1.5
1
2
3.25
3.5
4
5
0.75

N

Eurobodalla Catchments
Surveyed Flood Marks
Peak Flood Level Contours (m AHD)

Peak Flood Depth (m)

0.00 to 0.15
0.15 to 0.30
0.30 to 0.50
0.50 to 1.00
1.00 to 2.00
2.00 to 3.00
> 3.00

0 0.25 0.5 0.75
km

J:\Jobs\112034\ArcView1\ArcMaps\DraftReport_EurobodallaAppendix_E\Figure_E07B_1999_Depth_WA_TOWN.mxd

FIGURE E7C
28TH JANUARY 1999 EVENT
PEAK FLOOD DEPTH
KIANGA LAKE

N

Eurobodalla Catchments

Peak Flood Level Contours (m AHD)

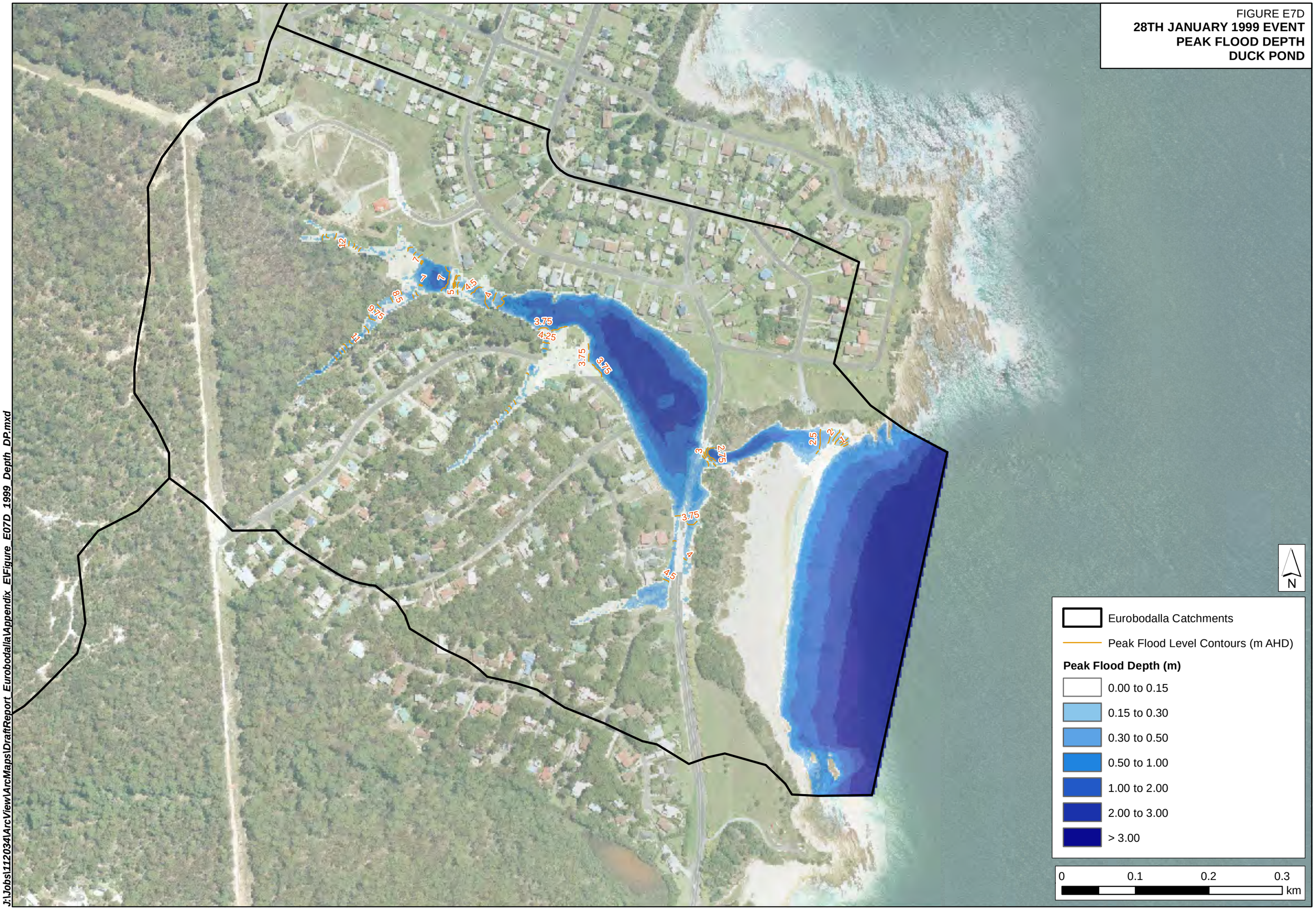
Peak Flood Depth (m)

- 0.00 to 0.15
- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 1.00
- 1.00 to 2.00
- 2.00 to 3.00
- > 3.00

0 0.25 0.5 0.75 km

J:\Jobs\112034\ArcView\ArcMaps\DraftReport_Eurobodalla\Appendix_E\Figure_E07C_1999_Depth_KI.mxd

FIGURE E7D
28TH JANUARY 1999 EVENT
PEAK FLOOD DEPTH
DUCK POND



J:\Jobs\112034\ArcView\ArcMaps\DraftReport_Eurobodalla\Appendix_E\Figure_E07D_1999_Depth_DP.mxd

FIGURE E7E
28TH JANUARY 1999 EVENT
PEAK FLOOD DEPTH
MUMMUGA LAKE

N

Eurobodalla Catchments

Peak Flood Level Contours (m AHD0

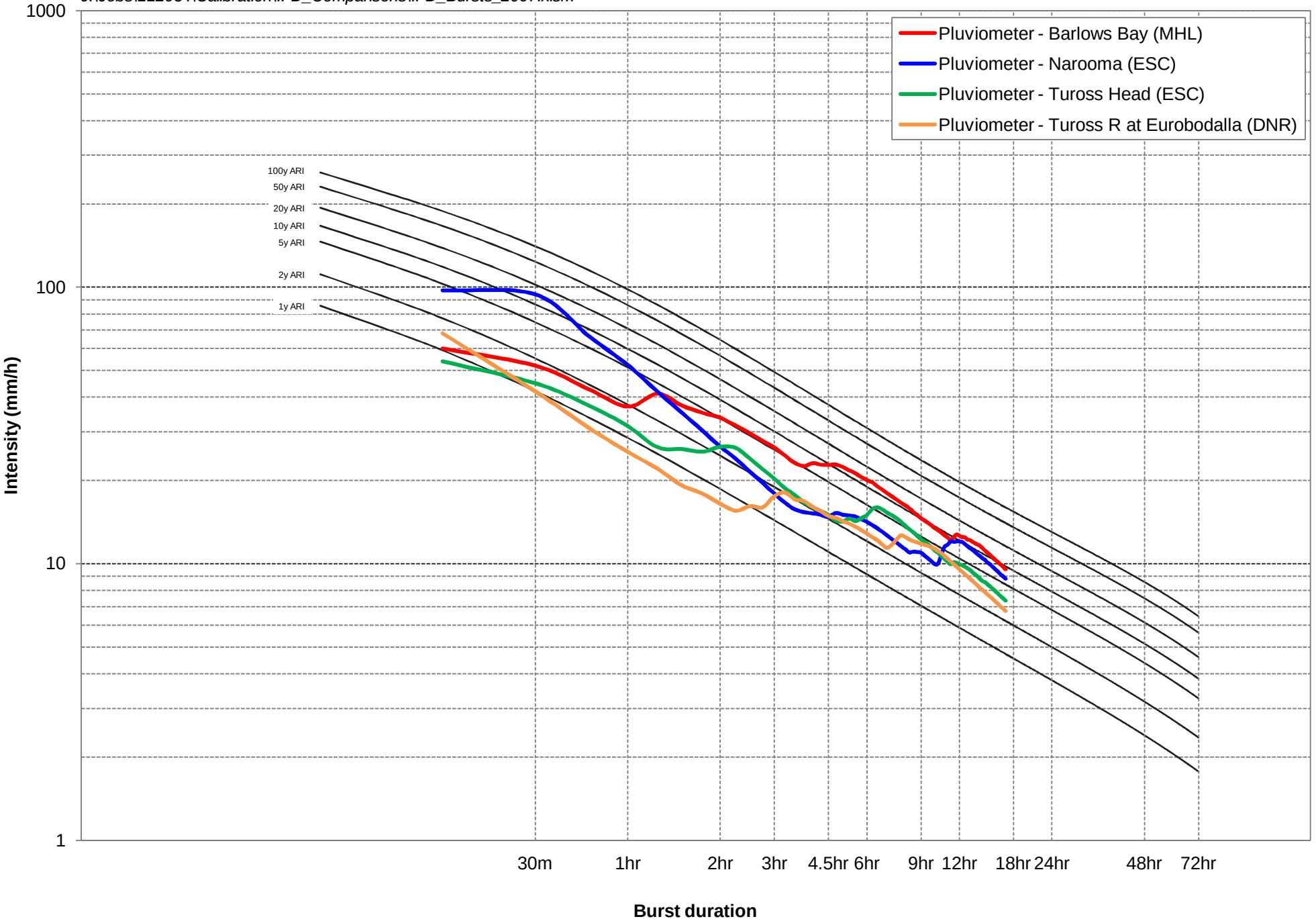
Peak Flood Depth (m)

- 0.00 to 0.15
- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 1.00
- 1.00 to 2.00
- 2.00 to 3.00
- > 3.00

0 0.25 0.5 0.75 km

J:\Jobs\112034\ArcView\ArcMaps\DraftReport_Eurobodalla\Appendix_E\Figure_E07E_1999_Depth_MU.mxd

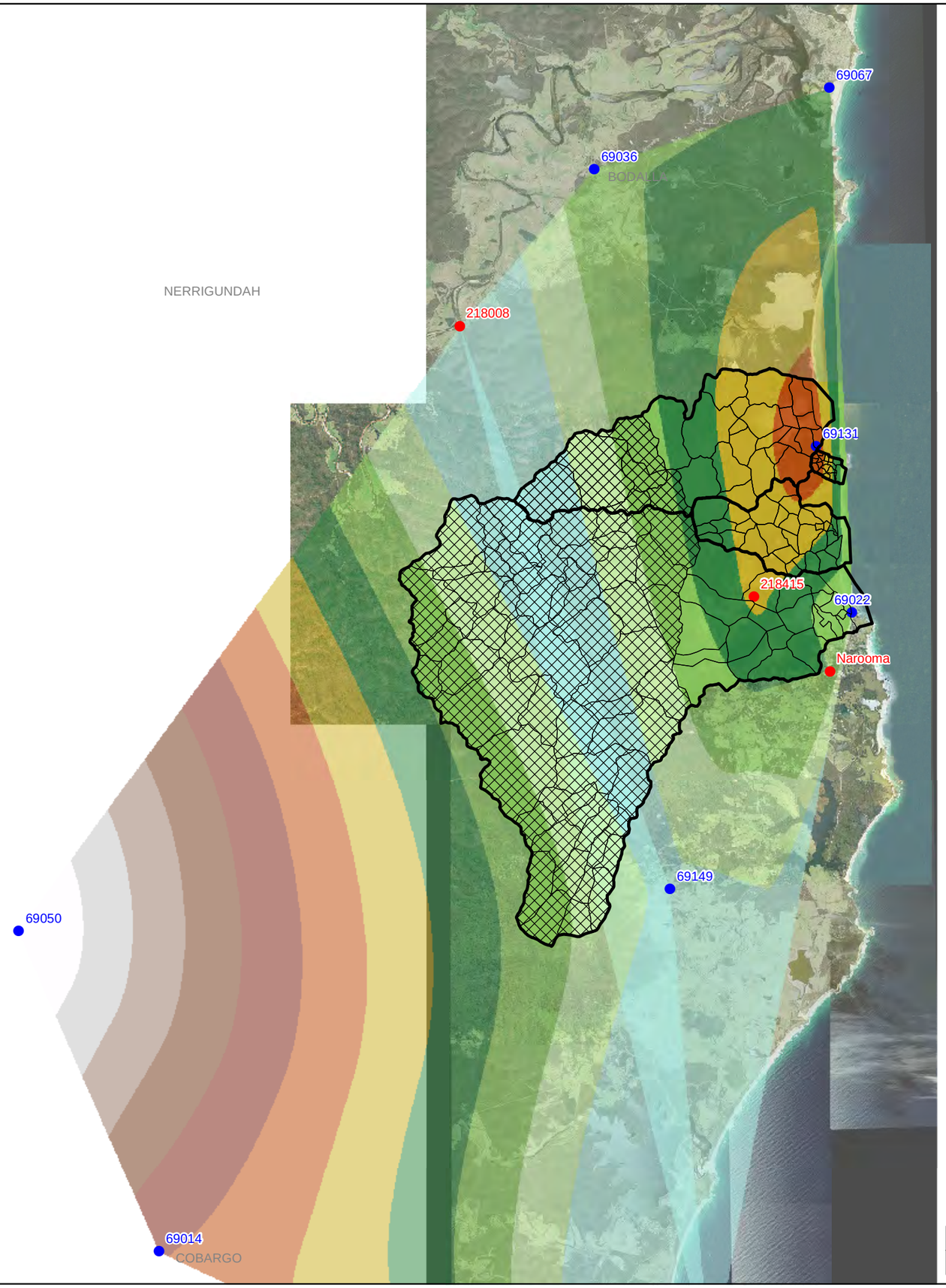
J:\Jobs\112034\Calibration\IFD_Comparisons\IFD_Bursts_2007.xlsm



11TH FEBRUARY 2007 EVENT
IFD DATA

FIGURE E8

FIGURE E9
11TH FEBRUARY 2007 EVENT RAINFALL DISTRIBUTION



N

Eurobodalla Catchments

Temporal Pattern Applied to Subcatchments

- Barlows Bay (218415)
- Tuross R at Eurobodalla (218008)

Rainfall Stations Operating During Event

- Continuous
- Daily

Rainfall Depth in mm (48 hours to 9am)

- 115 - 130
- 130 - 140
- 140 - 150
- 150 - 160
- 160 - 170
- 170 - 180
- 180 - 190
- 190 - 200
- 200 - 210
- 210 - 220
- 220 - 234

0 5 10 15 km

J:\Jobs\112034\ArcView\ArcMaps\DraftReport_EurobodallaFigure_E09_2007_Distribution.mxd

FIGURE E10

11TH FEBRUARY 2007 EVENT
RAINFALL HYETOGRAPH COMPARISON

J:\Jobs\112033\Calibration\Model_Rainfall\Analysis_15min_AdjustEDST_2007.xlsx

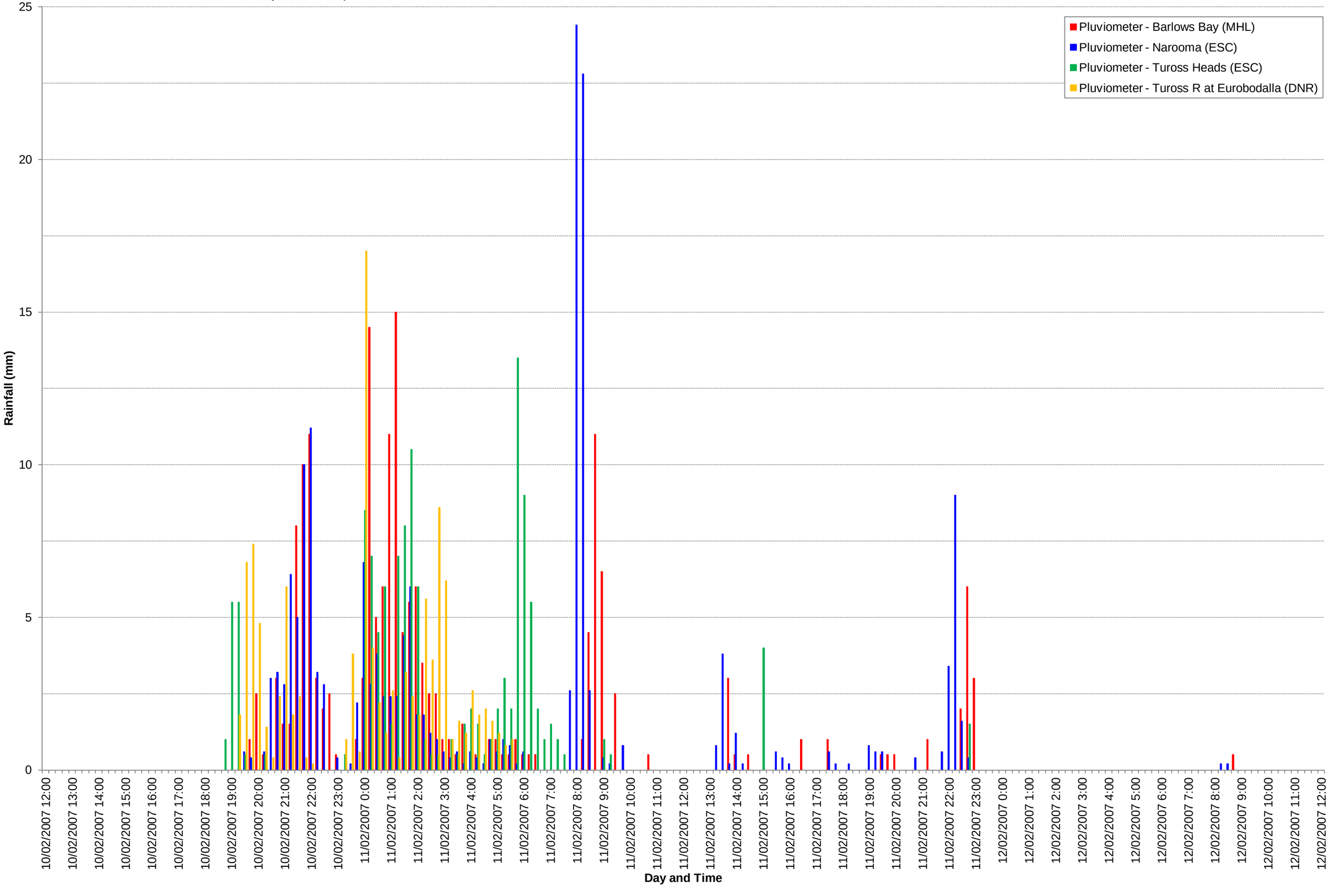


FIGURE E11

11TH FEBRUARY 2007 EVENT
STAGE HYDROGRAPHS

J:\Jobs\112033\Calibration\Model_Rainfall\Analysis_15min_AdjustEDST_2007.xlsx

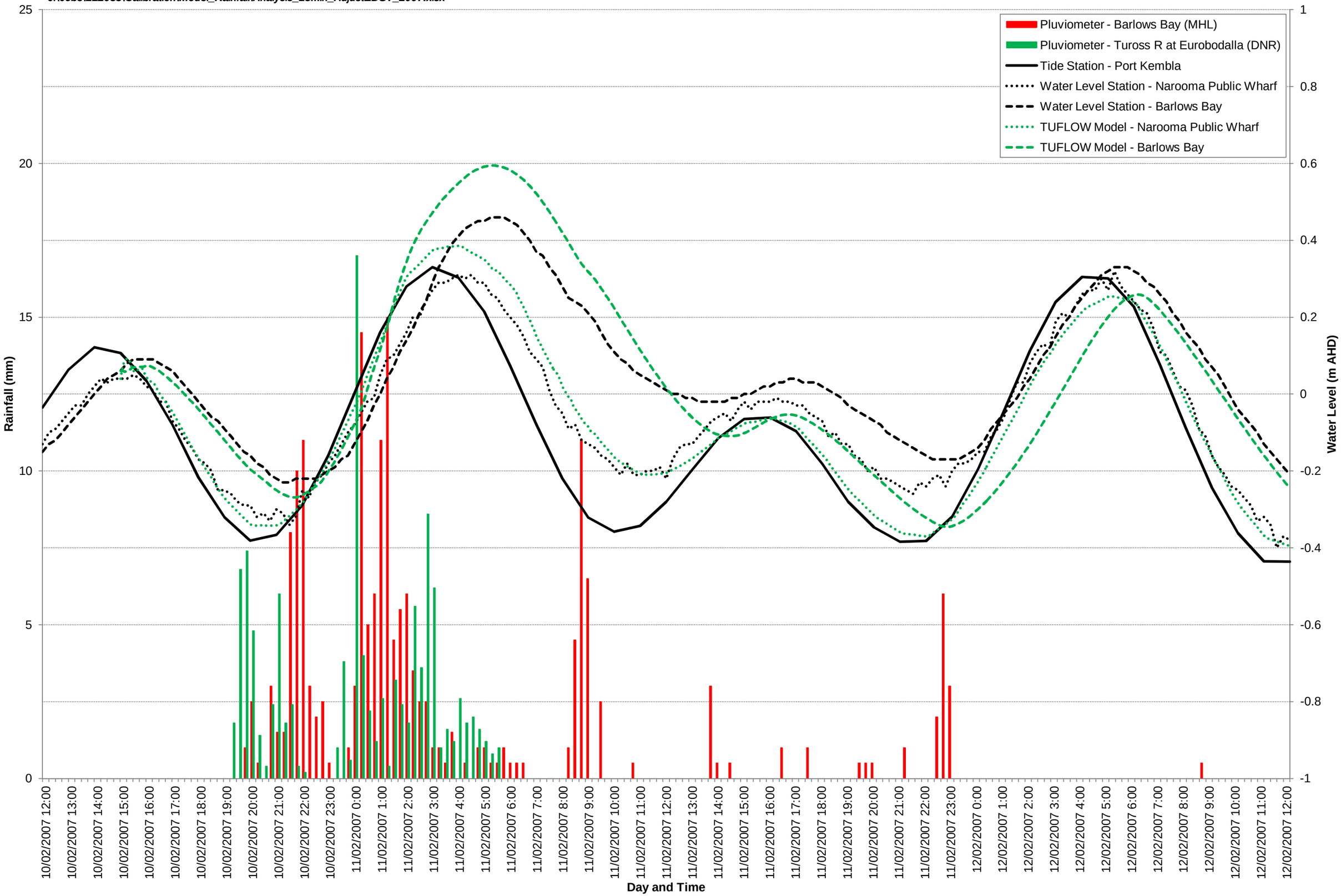


FIGURE E12A
11TH FEBRUARY 2007 EVENT
PEAK FLOOD DEPTH
WAGONGA INLET

0.5

0.5

1

N

Eurobodalla Catchments

Calibration Locations:

Water Level Station - Barlows Bay

Water Level Station - Narooma Public Wharf

Peak Flood Level Contours (m AHD)

Peak Flood Depth (m)

0.00 to 0.15

0.15 to 0.30

0.30 to 0.50

0.50 to 1.00

1.00 to 2.00

2.00 to 3.00

> 3.00

0 0.5 1 1.5 km

J:\Jobs\112034\ArcView\ArcMaps\DraftReport_Eurobodalla\Appendix_E\Figure_E12A_2007_Depth_WA_INLET.mxd

FIGURE E12B
11TH FEBRUARY 2007 EVENT
PEAK FLOOD DEPTH
NAROOMA FLAT

0.5
0.5
0.5
1
1
1.75
2
2
4

N

Eurobodalla Catchments
Peak Flood Level Contours (m AHD)

Peak Flood Depth (m)

- 0.00 to 0.15
- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 1.00
- 1.00 to 2.00
- 2.00 to 3.00
- > 3.00

0 0.25 0.5 0.75 km

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FIGURE E12C
11TH FEBRUARY 2007 EVENT
PEAK FLOOD DEPTH
KIANGA LAKE

N

Eurobodalla Catchments

Calibration Locations

Peak Flood Level Contours (m AHD)

Peak Flood Depth (m)

- 0.00 to 0.15
- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 1.00
- 1.00 to 2.00
- 2.00 to 3.00
- > 3.00

0 0.25 0.5 0.75 km

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FIGURE E12D
11TH FEBRUARY 2007 EVENT
PEAK FLOOD DEPTH
DUCK POND

7.5
4.5
4
4
2.5
2.25
3.5
4.5

N

Eurobodalla Catchments

Peak Flood Level Contours (m AHD)

Peak Flood Depth (m)

- 0.00 to 0.15
- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 1.00
- 1.00 to 2.00
- 2.00 to 3.00
- > 3.00

0 0.1 0.2 0.3 km

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FIGURE E12E
11TH FEBRUARY 2007 EVENT
PEAK FLOOD DEPTH
MUMMUGA LAKE

N

Eurobodalla Catchments

Peak Flood Level Contours (m AHD)

Peak Flood Depth (m)

- 0.00 to 0.15
- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 1.00
- 1.00 to 2.00
- 2.00 to 3.00
- > 3.00

0 0.25 0.5 0.75 km

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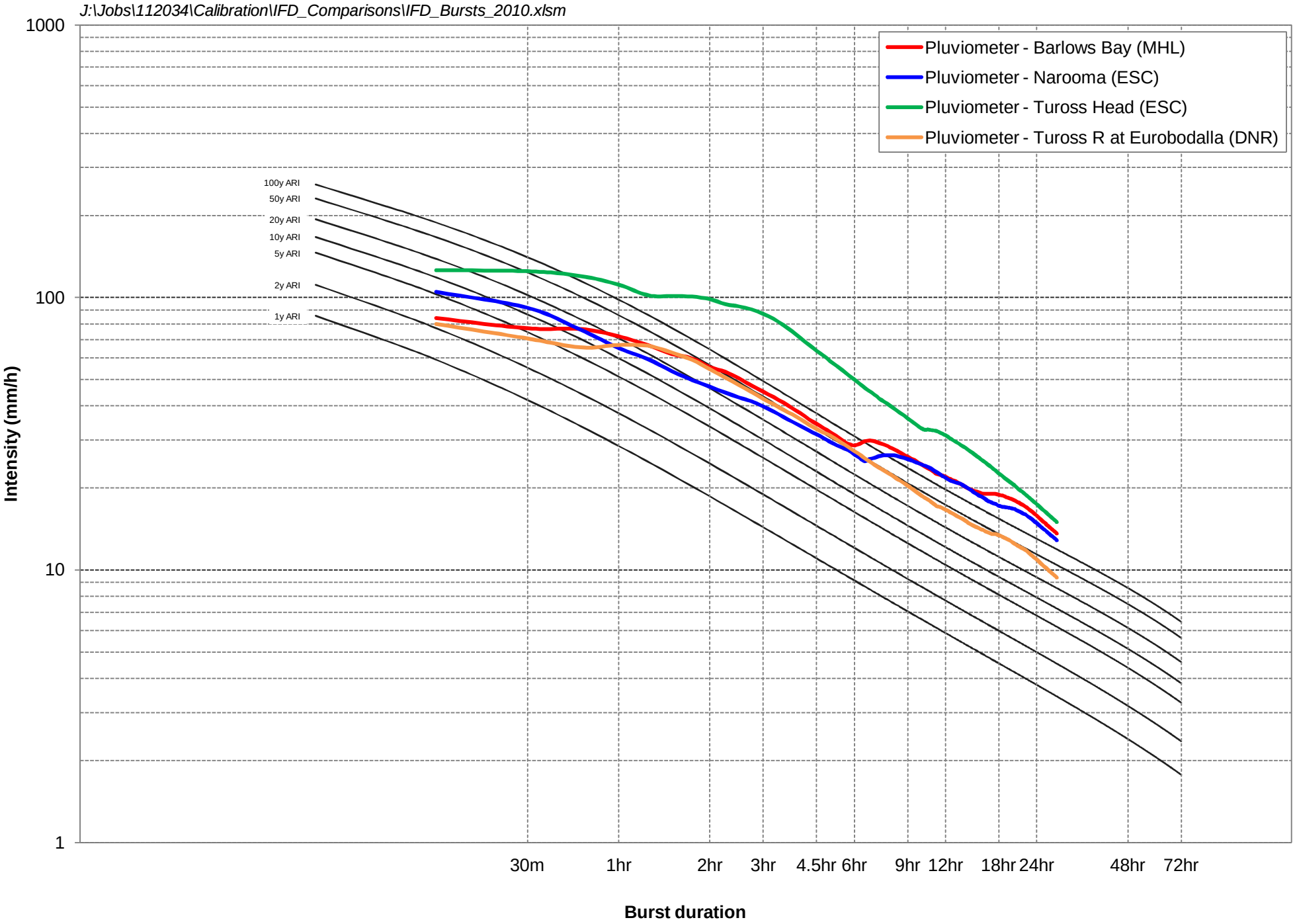
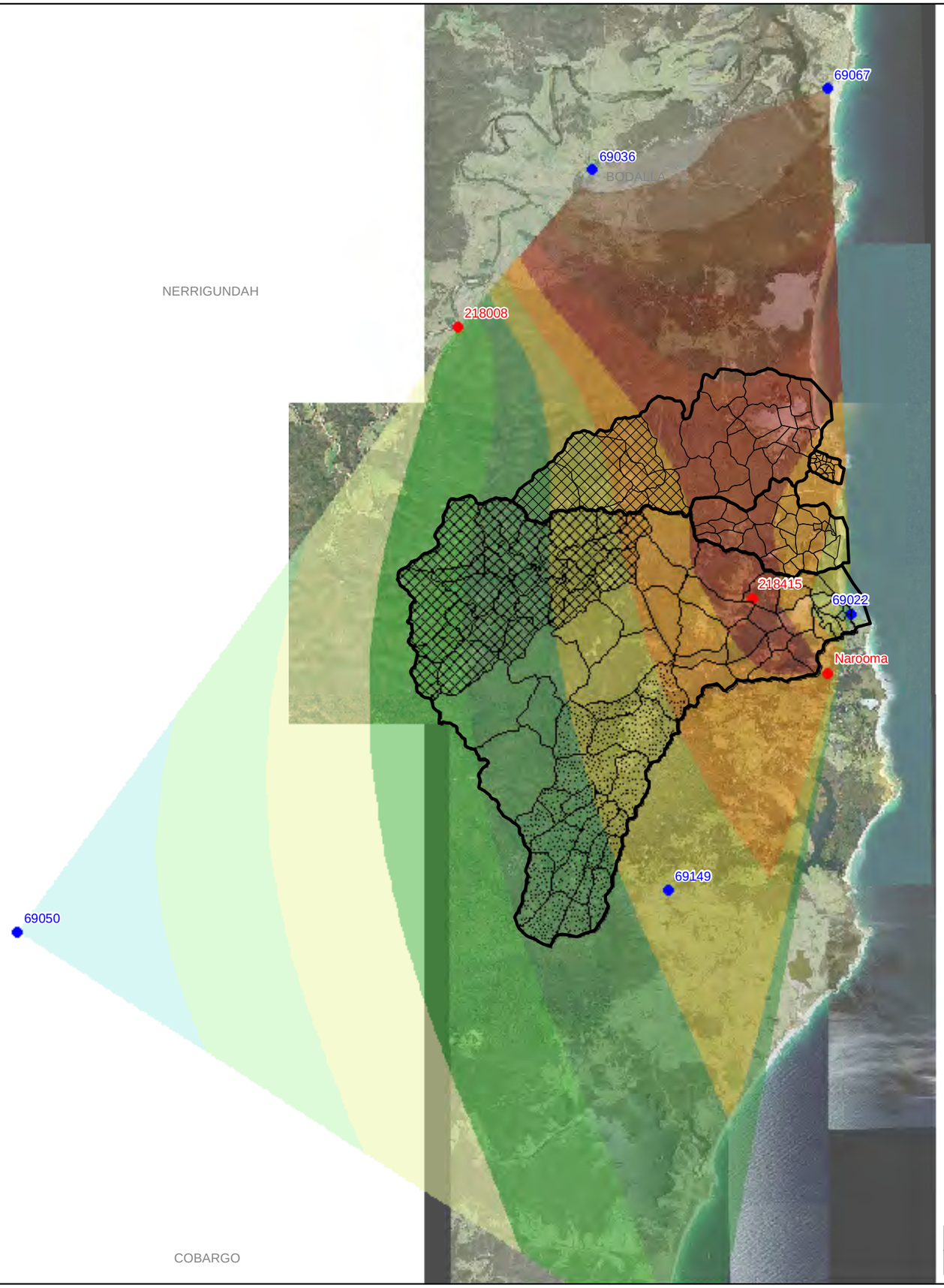


FIGURE E13

15TH FEBRUARY 2010 EVENT

IFD DATA

FIGURE E14
15TH-16TH FEBRUARY 2010 EVENT
RAINFALL DISTRIBUTION
EXCLUDING GAUGE 69149



N

Eurobodalla Catchments

Temporal Pattern Applied to Subcatchments

- Barlows Bay (218415)
- Central Tilba (69149)
- Tuross R at Eurobodalla (218008)

Rainfall Stations Operating During Event

- Continuous
- Daily

Rainfall Depth in mm (48 hours to 9am)

- 195 - 225
- 225 - 250
- 250 - 275
- 275 - 300
- 300 - 325
- 325 - 350
- 350 - 375
- 375 - 400
- 400 - 425
- 425 - 450
- 450 - 475
- 475 - 500
- 500 - 525
- 525 - 541

0 5 10 15 km

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FIGURE E15

15TH FEBRUARY 2010 EVENT
RAINFALL HYETOGRAPH COMPARISON

J:\Jobs\112033\Calibration\Model_Rainfall\Analysis_30min_AdjustEDST_2010.xlsx

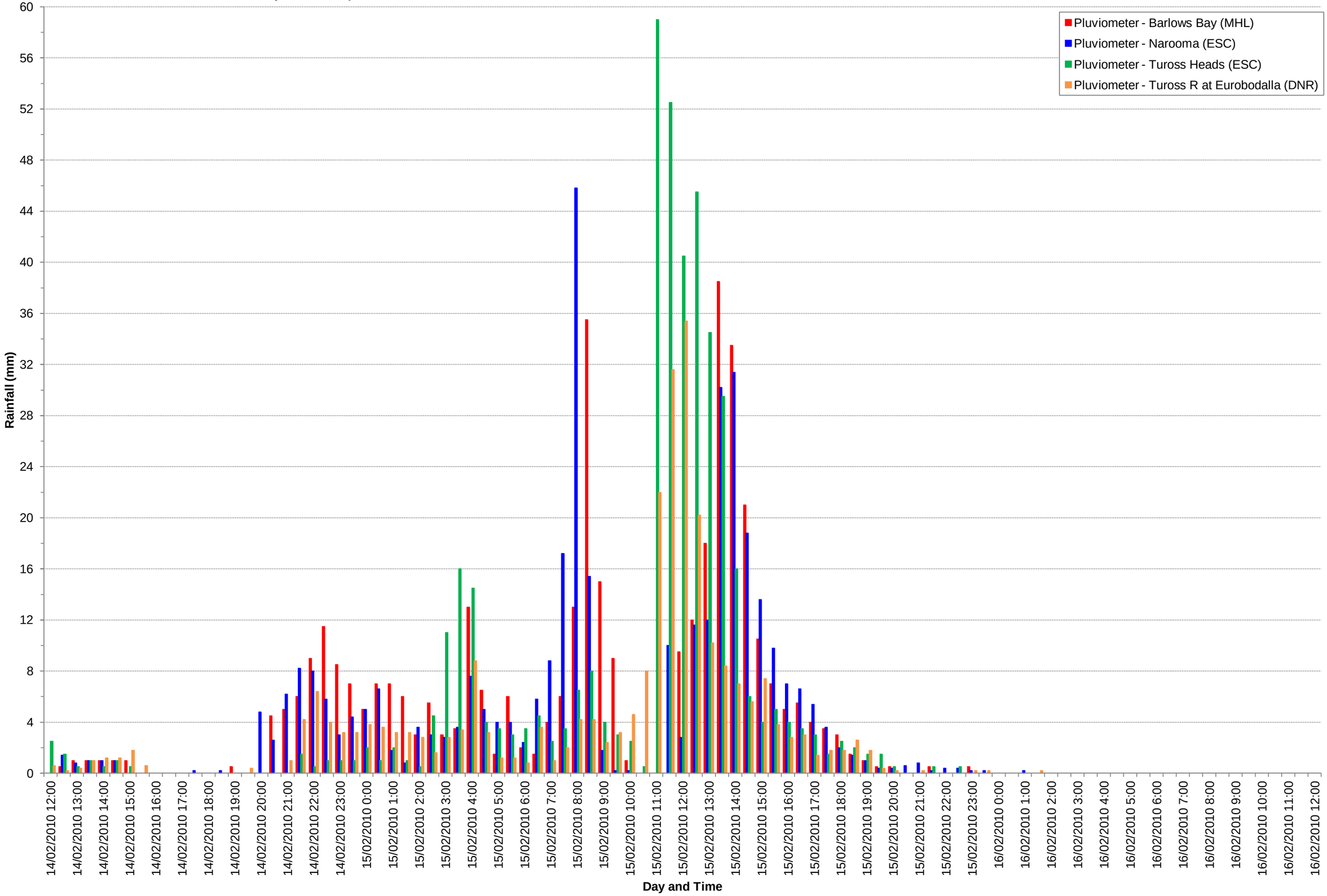

FIGURE E16

15TH FEBRUARY 2010 EVENT
STAGE HYDGROGRAPHS

J:\Jobs\112033\Calibration\Model_Rainfall\Analysis_30min_AdjustEDST_2010.xlsx

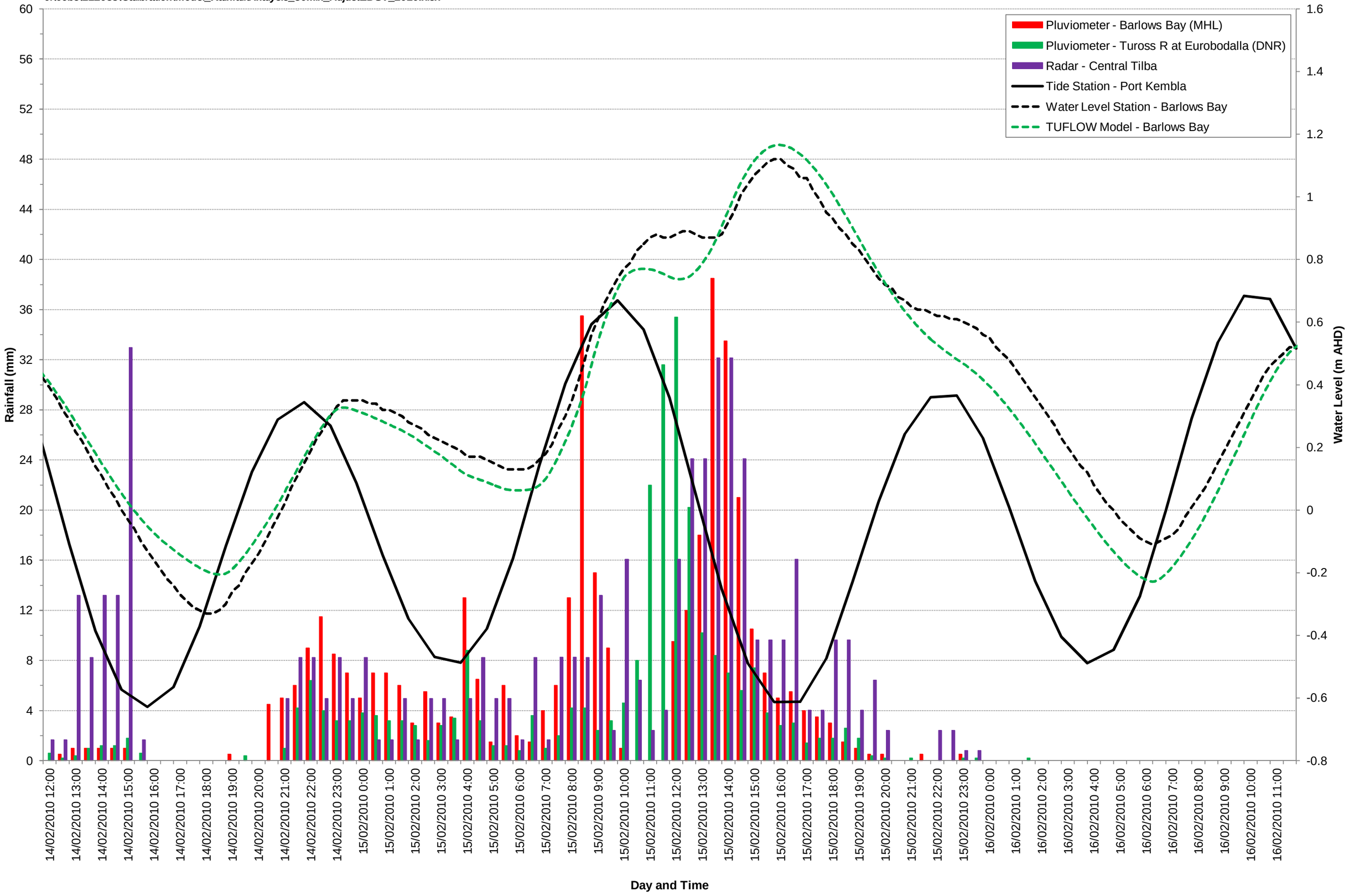

FIGURE E17A
15TH FEBRUARY 2010 EVENT
PEAK FLOOD DEPTH
WAGONGA INLET

1
0.75
0.75
0.75
1

N

Eurobodalla Catchments

Calibration Locations:

Water Level Station - Barlows Bay

Water Level Station - Narooma Public Wharf

Peak Flood Level Contours (m AHD)

Peak Flood Depth (m)

0.00 to 0.15
0.15 to 0.30
0.30 to 0.50
0.50 to 1.00
1.00 to 2.00
2.00 to 3.00
> 3.00

0 0.5 1 1.5 km

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FIGURE E17B
15TH FEBRUARY 2010 EVENT
PEAK FLOOD DEPTH
NAROOMA FLAT

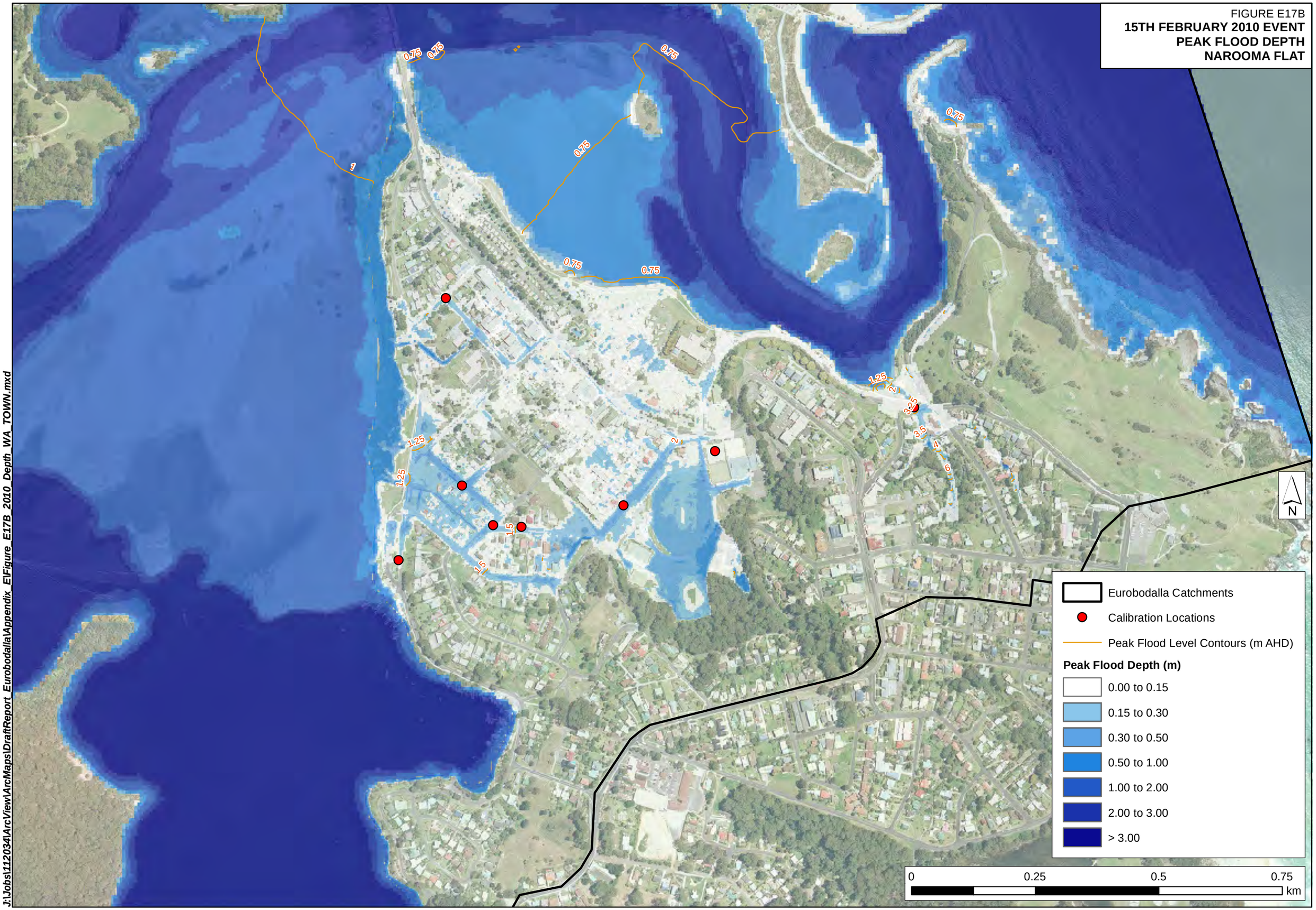

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FIGURE E17C
15TH FEBRUARY 2010 EVENT
PEAK FLOOD DEPTH
KIANGA LAKE

N

Eurobodalla Catchments

Calibration Locations

Peak Flood Level Contours (m AHD)

Peak Flood Depth (m)

- 0.00 to 0.15
- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 1.00
- 1.00 to 2.00
- 2.00 to 3.00
- > 3.00

0 0.25 0.5 0.75 km

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FIGURE E17D
15TH FEBRUARY 2010 EVENT
PEAK FLOOD DEPTH
DUCK POND

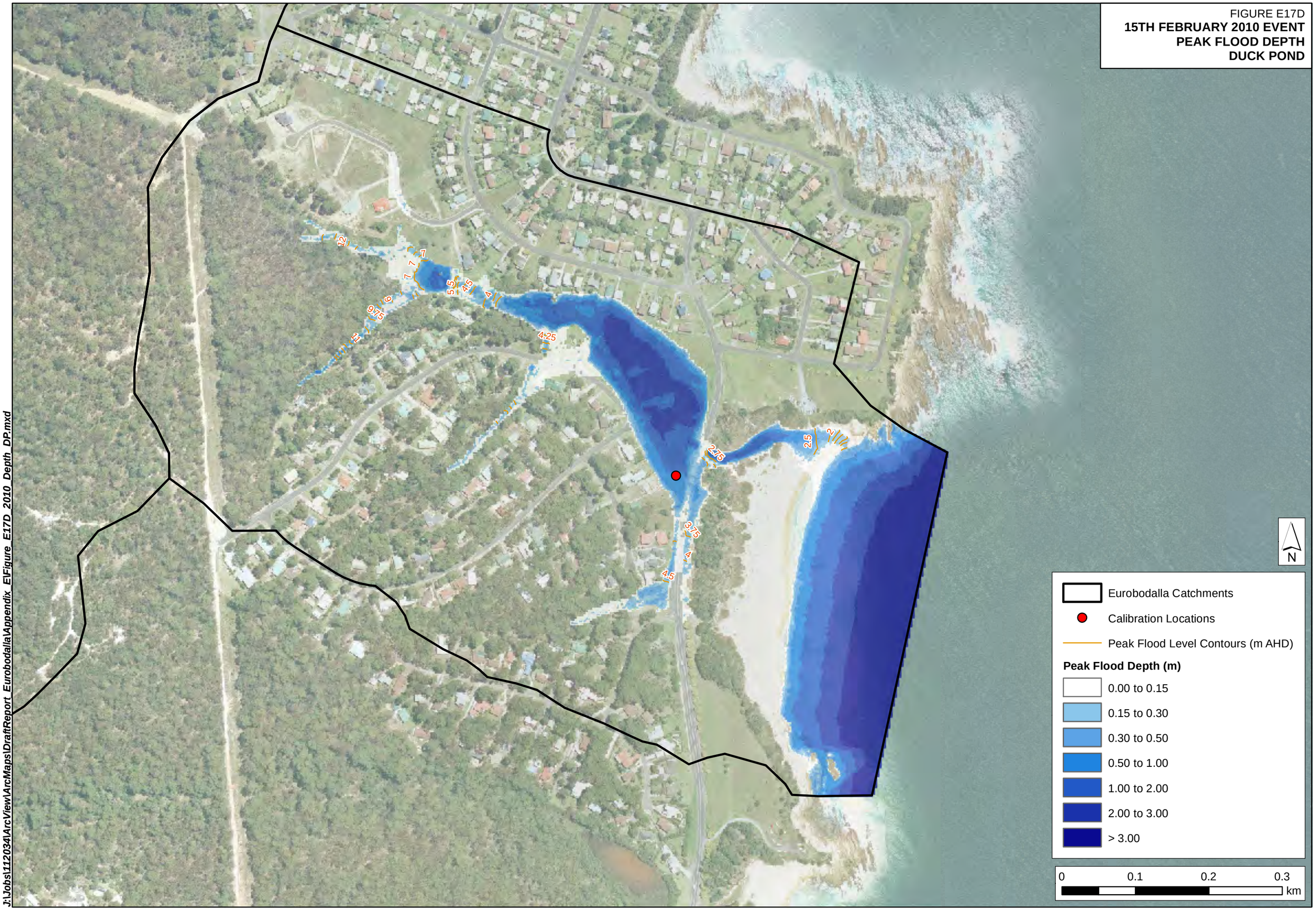

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FIGURE E17E
15TH FEBRUARY 2010 EVENT
PEAK FLOOD DEPTH
MUMMUGA LAKE

N

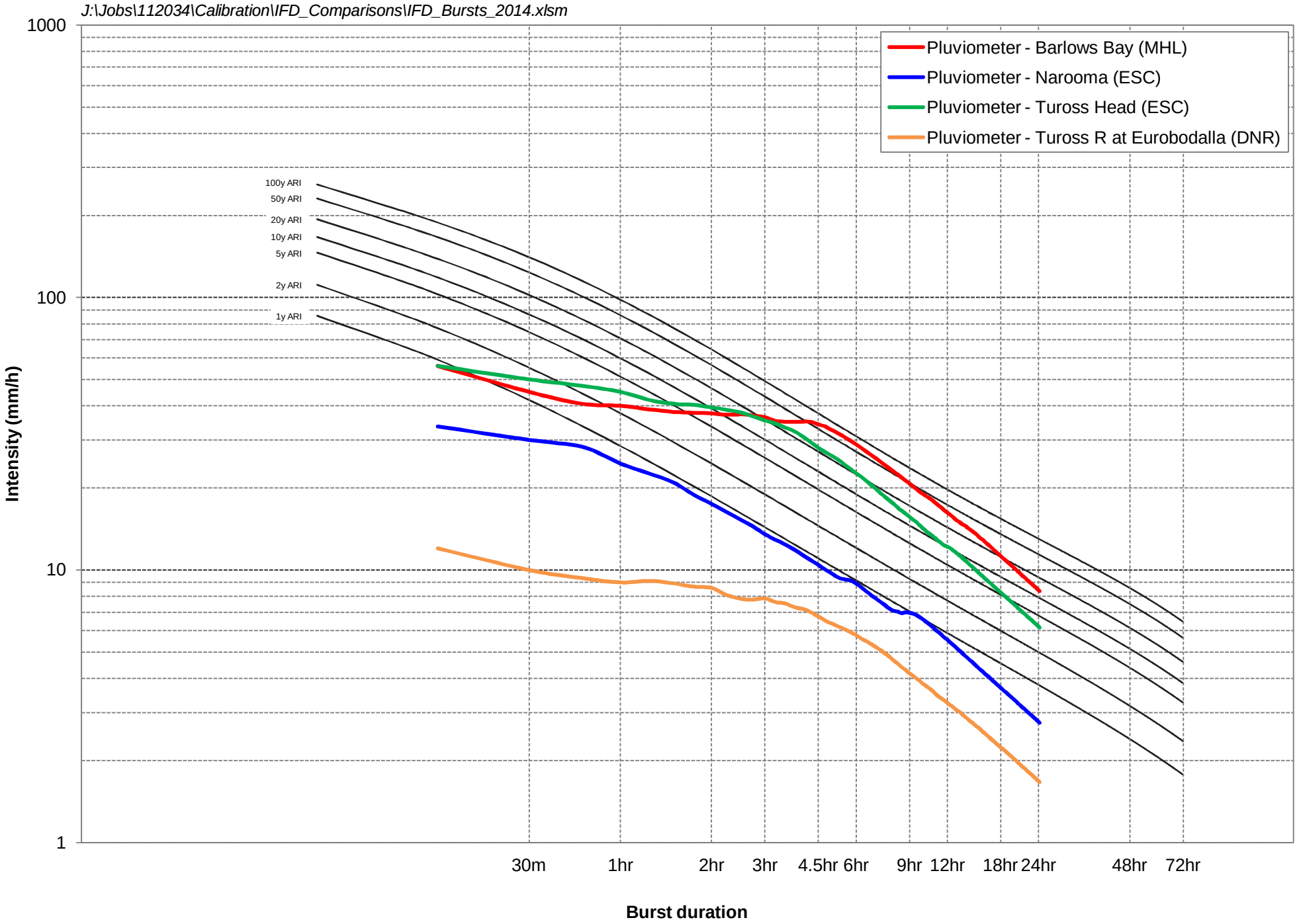
Eurobodalla Catchments

Peak Food Depth (m)

- 0.00 to 0.15
- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 1.00
- 1.00 to 2.00
- 2.00 to 3.00
- > 3.00

0 0.25 0.5 0.75 km

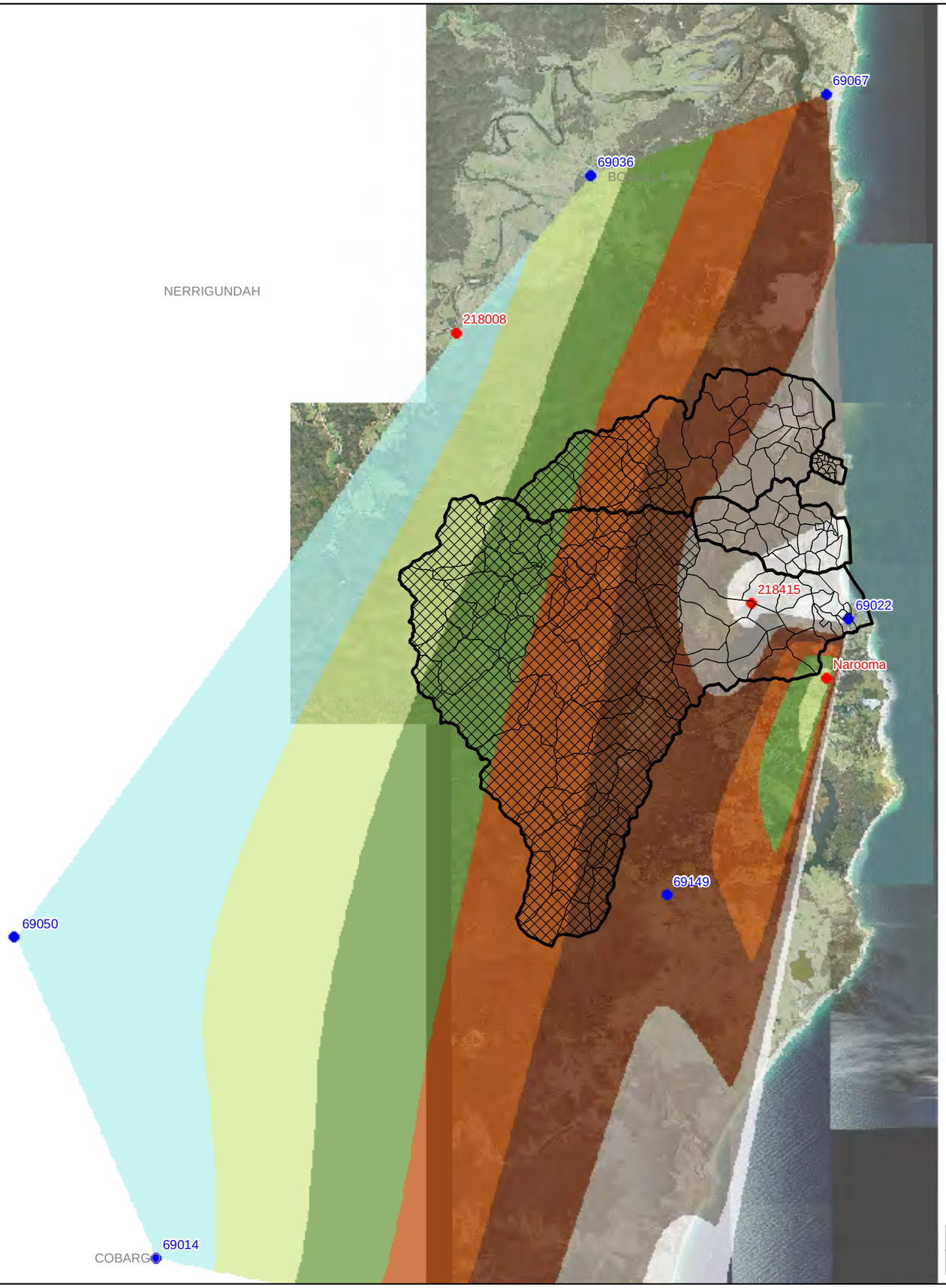
J:\Jobs\112034\ArcView\ArcMaps\DraftReport_Eurobodalla\Appendix_E\Figure_E17E_2010_Depth_MU.mxd



14TH OCTOBER 2014 EVENT
IFD DATA

FIGURE E18

FIGURE E19
13TH-14TH OCTOBER 2014 EVENT RAINFALL DISTRIBUTION



N

Eurobodalla Catchments

Temporal Pattern Applied to Subcatchments

Barlows Bay (218415)

Tuross R at Eurobodalla (218008)

Rainfall Stations Operating During Event

Continuous

Daily

Rainfall Depth in mm (48 hours to 9am)

43 - 75

75 - 100

100 - 125

125 - 150

150 - 175

175 - 200

200 - 228

0 5 10 15 km

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FIGURE E20

14TH OCTOBER 2014 EVENT
RAINFALL HYETOGRAPH COMPARISON

J:\Jobs\112034\Calibration\Model_Rainfall\Analysis_015min_AdjustEDST_2014.xlsx

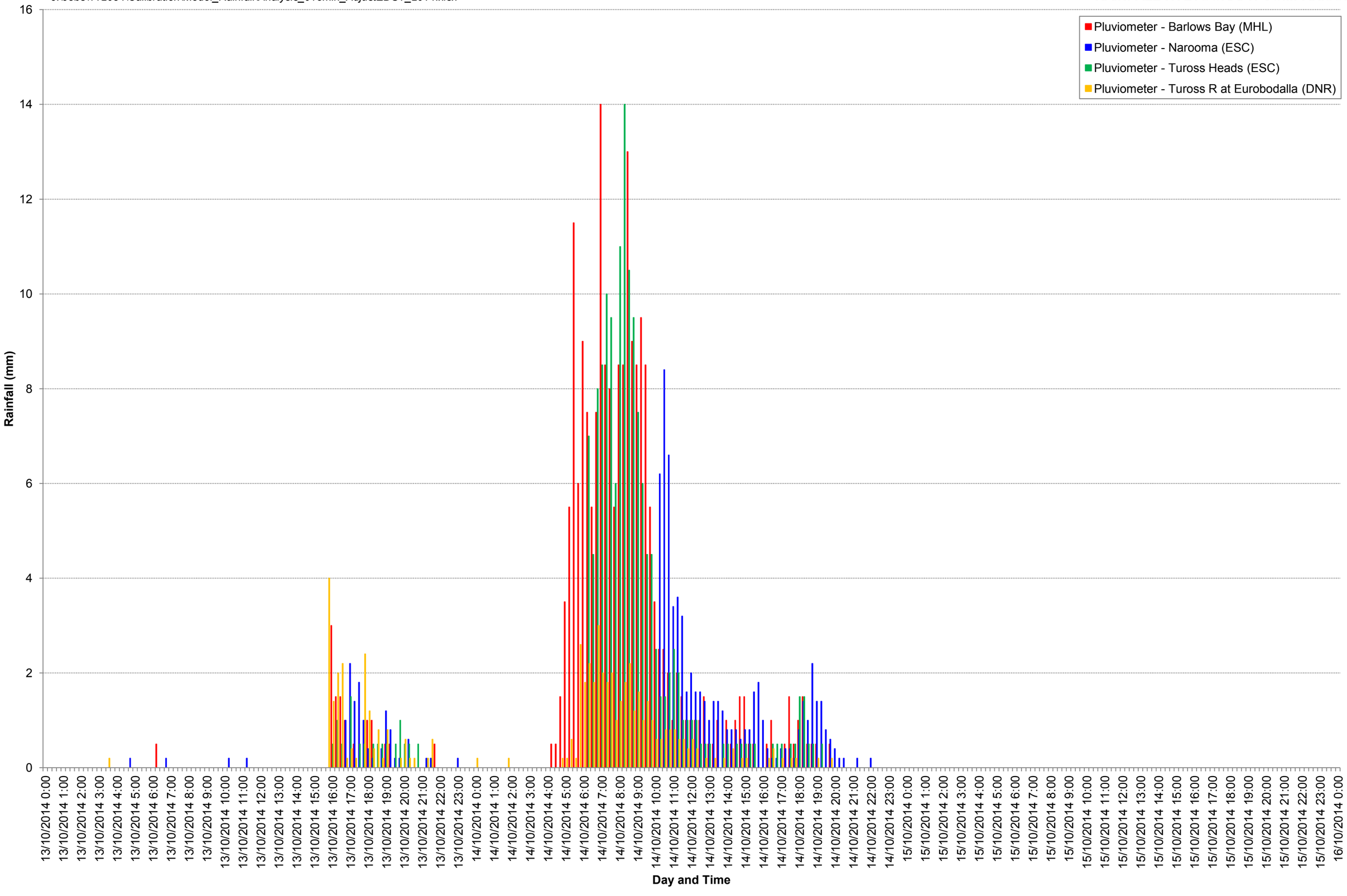

FIGURE E21

14TH OCTOBER 2014 EVENT
STAGE HYDROGRAPHS

J:\Jobs\112034\Calibration\Model_Rainfall\Analysis_015min_AdjustEDST_2014.xlsx

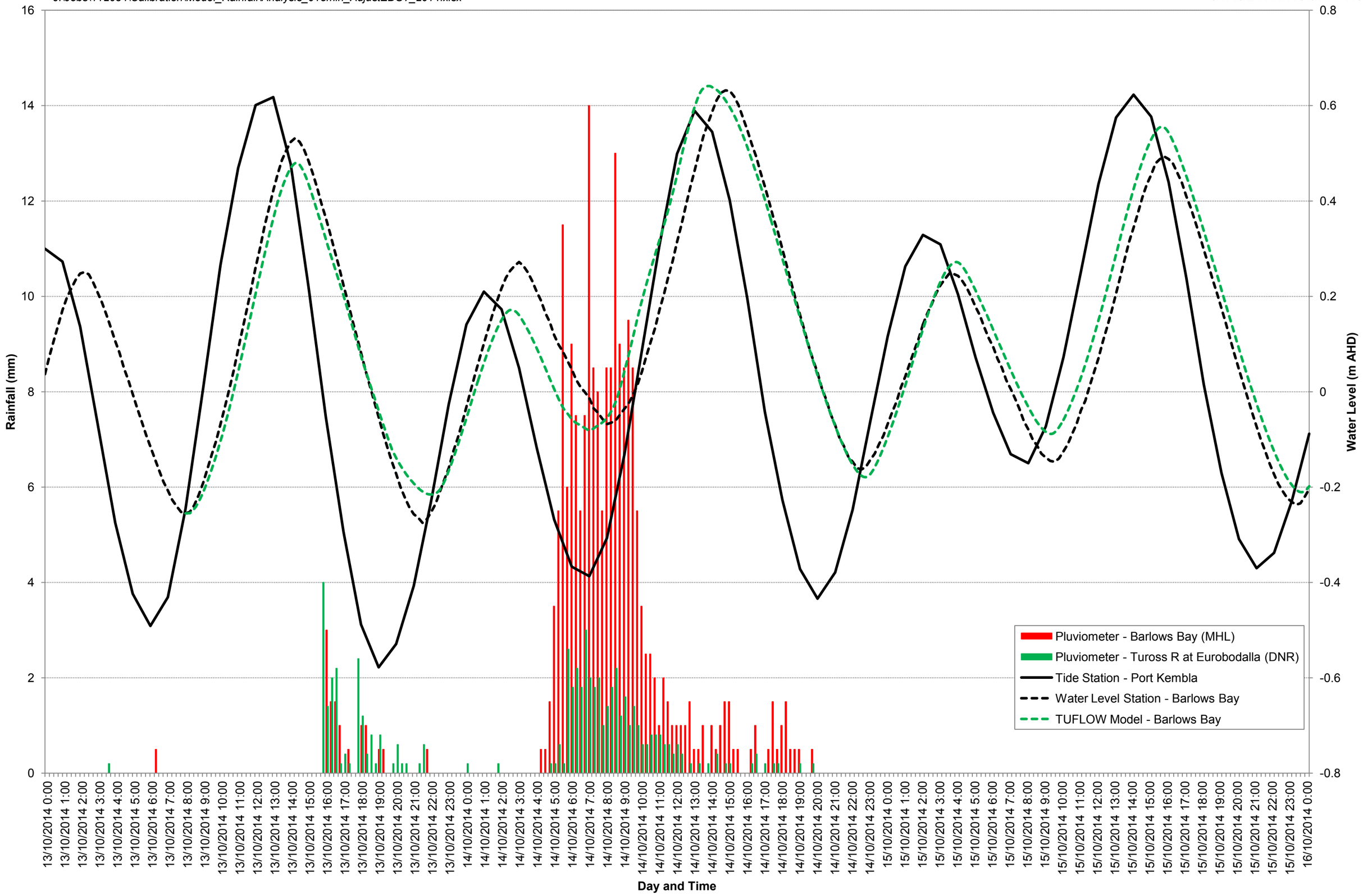

FIGURE E22A
14TH OCTOBER 2014 EVENT
PEAK FLOOD DEPTH
WAGONGA INLET

0.75

1

N

Eurobodalla Catchments

Calibration Locations:

Water Level Station - Barlows Bay

Peak Flood Level Contours (m AHD)

Peak Flood Depth (m)

- 0.00 to 0.15
- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 1.00
- 1.00 to 2.00
- 2.00 to 3.00
- > 3.00

0 0.5 1 1.5 km

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FIGURE E22B
14TH OCTOBER 2014 EVENT
PEAK FLOOD DEPTH
NAROOMA FLAT

0.75
0.75
1
1
1.5
1
2
4

N

Eurobodalla Catchments
Peak Flood Level Contours (m AHD)

Peak Flood Depth (m)

- 0.00 to 0.15
- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 1.00
- 1.00 to 2.00
- 2.00 to 3.00
- > 3.00

0 0.25 0.5 0.75
km

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FIGURE E22C
14TH OCTOBER 2014 EVENT
PEAK FLOOD DEPTH
KIANGA LAKE

N

Eurobodalla Catchments

Peak Flood Level Contours (m AHD)

Peak Flood Depth (m)

- 0.00 to 0.15
- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 1.00
- 1.00 to 2.00
- 2.00 to 3.00
- > 3.00

0 0.25 0.5 0.75 km

J:\Jobs\112034\ArcView\ArcMaps\DraftReport_Eurobodalla\Appendix_E\Figure_E22C_2014_Depth_KI.mxd