Appendix A

APPENDIX A: GLOSSARY of TERMS

Taken from the Floodplain Development Manual (April 2005 edition)

Annual Exceedance Probability (AEP)	The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. For example, if a peak flood discharge of 500 m^3/s has an AEP of 5%, it means that there is a 5% chance (that is one-in-20 chance) of a 500 m^3/s or larger event occurring in any one year (see ARI).
Australian Height Datum (AHD)	A common national surface level datum approximately corresponding to mean sea level.
Average Annual Damage (AAD)	Depending on its size (or severity), each flood will cause a different amount of flood damage to a flood prone area. AAD is the average damage per year that would occur in a nominated development situation from flooding over a very long period of time.
Average Recurrence Interval (ARI)	The long term average number of years between the occurrence of a flood as big as, or larger than, the selected event. For example, floods with a discharge as great as, or greater than, the 20 year ARI flood event will occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event.
catchment	The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.
consent authority	The Council, Government agency or person having the function to determine a development application for land use under the EP&A Act. The consent authority is most often the Council, however legislation or an EPI may specify a Minister or public authority (other than a Council), or the Director General of DIPNR, as having the function to determine an application.
development	Is defined in Part 4 of the Environmental Planning and Assessment Act (EP&A Act). **infill development:** refers to the development of vacant blocks of land that are generally surrounded by developed properties and is permissible under the current zoning of the land. Conditions such as minimum floor levels may be imposed on infill development. **new development:** refers to development of a completely different nature to that associated with the former land use. For example, the urban subdivision of an area previously used for rural purposes. New developments involve rezoning and typically require major extensions of existing urban services, such as roads, water supply, sewerage and electric power. **redevelopment:** refers to rebuilding in an area. For example, as urban areas age, it may become necessary to demolish and reconstruct buildings on a relatively large scale. Redevelopment generally does not require either rezoning or major extensions to urban services.
disaster plan (DISPLAN)	A step by step sequence of previously agreed roles, responsibilities, functions, actions and management arrangements for the conduct of a single or series of connected emergency operations, with the object of ensuring the coordinated response by all agencies having responsibilities and functions in emergencies.
discharge	The rate of flow of water measured in terms of volume per unit time, for example, cubic metres per second (m^3/s). Discharge is different from the speed or velocity of flow, which is a measure of how fast the water is moving for example, metres per second (m/s).
effective warning time	The time available after receiving advice of an impending flood and before the floodwaters prevent appropriate flood response actions being undertaken. The

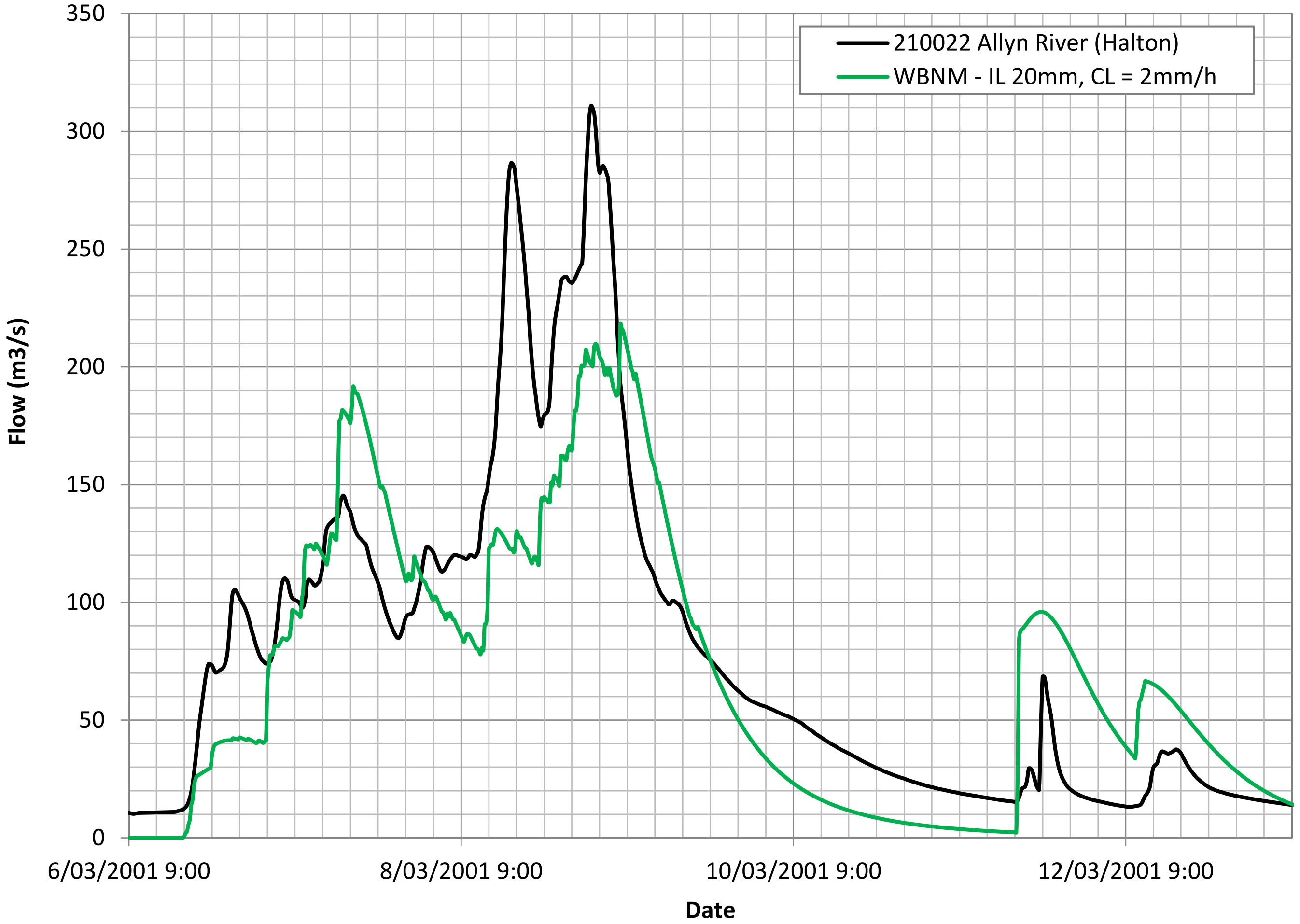
	effective warning time is typically used to move farm equipment, move stock, raise furniture, evacuate people and transport their possessions.
emergency management	A range of measures to manage risks to communities and the environment. In the flood context it may include measures to prevent, prepare for, respond to and recover from flooding.
flash flooding	Flooding which is sudden and unexpected. It is often caused by sudden local or nearby heavy rainfall. Often defined as flooding which peaks within six hours of the causative rain.
flood	Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunami.
flood awareness	Flood awareness is an appreciation of the likely effects of flooding and a knowledge of the relevant flood warning, response and evacuation procedures.
flood education	Flood education seeks to provide information to raise awareness of the flood problem so as to enable individuals to understand how to manage themselves an their property in response to flood warnings and in a flood event. It invokes a state of flood readiness.
flood fringe areas	The remaining area of flood prone land after floodway and flood storage areas have been defined.
flood liable land	Is synonymous with flood prone land (i.e. land susceptible to flooding by the probable maximum flood (PMF) event). Note that the term flood liable land covers the whole of the floodplain, not just that part below the flood planning level (see flood planning area).
flood mitigation standard	The average recurrence interval of the flood, selected as part of the floodplain risk management process that forms the basis for physical works to modify the impacts of flooding.
floodplain	Area of land which is subject to inundation by floods up to and including the probable maximum flood event, that is, flood prone land.
floodplain risk management options	The measures that might be feasible for the management of a particular area of the floodplain. Preparation of a floodplain risk management plan requires a detailed evaluation of floodplain risk management options.
floodplain risk management plan	A management plan developed in accordance with the principles and guidelines in this manual. Usually includes both written and diagrammatic information describing how particular areas of flood prone land are to be used and managed to achieve defined objectives.
flood plan (local)	A sub-plan of a disaster plan that deals specifically with flooding. They can exist at State, Division and local levels. Local flood plans are prepared under the leadership of the State Emergency Service.
flood planning area	The area of land below the flood planning level and thus subject to flood related development controls. The concept of flood planning area generally supersedes the “flood liable land” concept in the 1986 Manual.
Flood Planning Levels (FPLs)	FPL’s are the combinations of flood levels (derived from significant historical flood events or floods of specific AEPs) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans. FPLs supersede the “standard flood event” in the 1986 manual.
flood proofing	A combination of measures incorporated in the design, construction and alteration of individual buildings or structures subject to flooding, to reduce or eliminate flood damages.

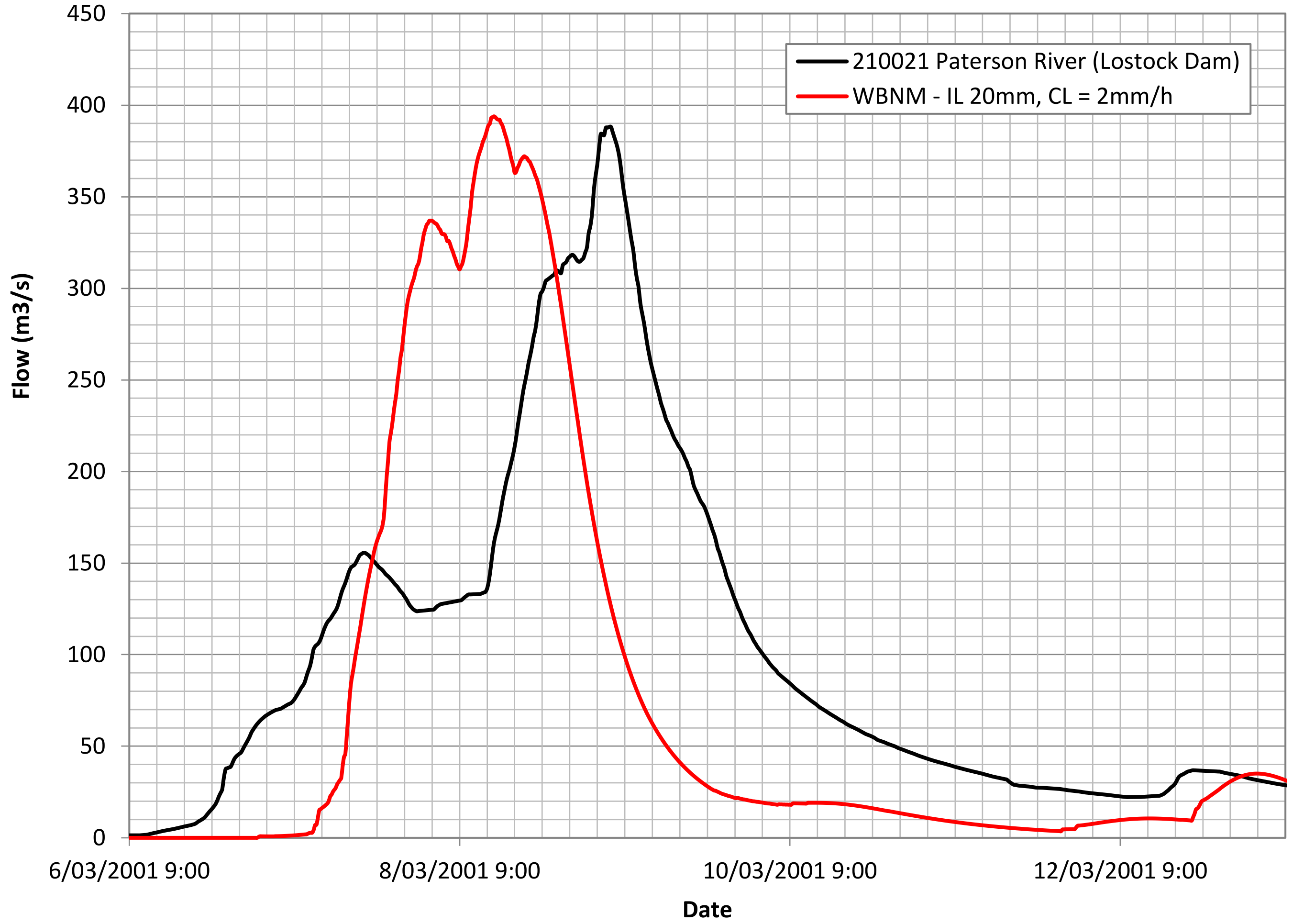
flood prone land	Is land susceptible to flooding by the Probable Maximum Flood (PMF) event. Flood prone land is synonymous with flood liable land.
flood readiness	Flood readiness is an ability to react within the effective warning time.
flood risk	Potential danger to personal safety and potential damage to property resulting from flooding. The degree of risk varies with circumstances across the full range of floods. Flood risk in this manual is divided into 3 types, existing, future and continuing risks. They are described below. **existing flood risk:** the risk a community is exposed to as a result of its location on the floodplain. **future flood risk:** the risk a community may be exposed to as a result of new development on the floodplain. **continuing flood risk:** the risk a community is exposed to after floodplain risk management measures have been implemented. For a town protected by levees, the continuing flood risk is the consequences of the levees being overtopped. For an area without any floodplain risk management measures, the continuing flood risk is simply the existence of its flood exposure.
flood storage areas	Those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation. Hence, it is necessary to investigate a range of flood sizes before defining flood storage areas.
floodway areas	Those areas of the floodplain where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood flows, or a significant increase in flood levels.
freeboard	Freeboard provides reasonable certainty that the risk exposure selected in deciding on a particular flood chosen as the basis for the FPL is actually provided. It is a factor of safety typically used in relation to the setting of floor levels, levee crest levels, etc. Freeboard is included in the flood planning level.
habitable room	**in a residential situation:** a living or working area, such as a lounge room, dining room, rumpus room, kitchen, bedroom or workroom. **in an industrial or commercial situation:** an area used for offices or to store valuable possessions susceptible to flood damage in the event of a flood.
hazard	A source of potential harm or a situation with a potential to cause loss. In relation to this manual the hazard is flooding which has the potential to cause damage to the community. Definitions of high and low hazard categories are provided in the Manual.
hydraulics	Term given to the study of water flow in waterways; in particular, the evaluation of flow parameters such as water level and velocity.
hydrograph	A graph which shows how the discharge or stage/flood level at any particular location varies with time during a flood.
hydrology	Term given to the study of the rainfall and runoff process; in particular, the evaluation of peak flows, flow volumes and the derivation of hydrographs for a range of floods.
local overland flooding	Inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.
local drainage	Are smaller scale problems in urban areas. They are outside the definition of major drainage in this glossary.
mainstream flooding	Inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam.

mathematical/computer models	The mathematical representation of the physical processes involved in runoff generation and stream flow. These models are often run on computers due to the complexity of the mathematical relationships between runoff, stream flow and the distribution of flows across the floodplain.
minor, moderate and major flooding	Both the State Emergency Service and the Bureau of Meteorology use the following definitions in flood warnings to give a general indication of the types of problems expected with a flood: **minor flooding:** causes inconvenience such as closing of minor roads and the submergence of low level bridges. The lower limit of this class of flooding on the reference gauge is the initial flood level at which landholders and townspeople begin to be flooded. **moderate flooding:** low-lying areas are inundated requiring removal of stock and/or evacuation of some houses. Main traffic routes may be covered. **major flooding:** appreciable urban areas are flooded and/or extensive rural areas are flooded. Properties, villages and towns can be isolated.
modification measures	Measures that modify either the flood, the property or the response to flooding. Examples are indicated in Table 2.1 with further discussion in the Manual.
peak discharge	The maximum discharge occurring during a flood event.
Probable Maximum Flood (PMF)	The PMF is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation, and where applicable, snow melt, coupled with the worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood prone land, that is, the floodplain. The extent, nature and potential consequences of flooding associated with a range of events rarer than the flood used for designing mitigation works and controlling development, up to and including the PMF event should be addressed in a floodplain risk management study.
Probable Maximum Precipitation (PMP)	The PMP is the greatest depth of precipitation for a given duration meteorologically possible over a given size storm area at a particular location at a particular time of the year, with no allowance made for long-term climatic trends (World Meteorological Organisation, 1986). It is the primary input to PMF estimation.
probability	A statistical measure of the expected chance of flooding (see AEP).
risk	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. In the context of the manual it is the likelihood of consequences arising from the interaction of floods, communities and the environment.
runoff	The amount of rainfall which actually ends up as streamflow, also known as rainfall excess.
stage	Equivalent to "water level". Both are measured with reference to a specified datum.
stage hydrograph	A graph that shows how the water level at a particular location changes with time during a flood. It must be referenced to a particular datum.
survey plan	A plan prepared by a registered surveyor.
water surface profile	A graph showing the flood stage at any given location along a watercourse at a particular time.

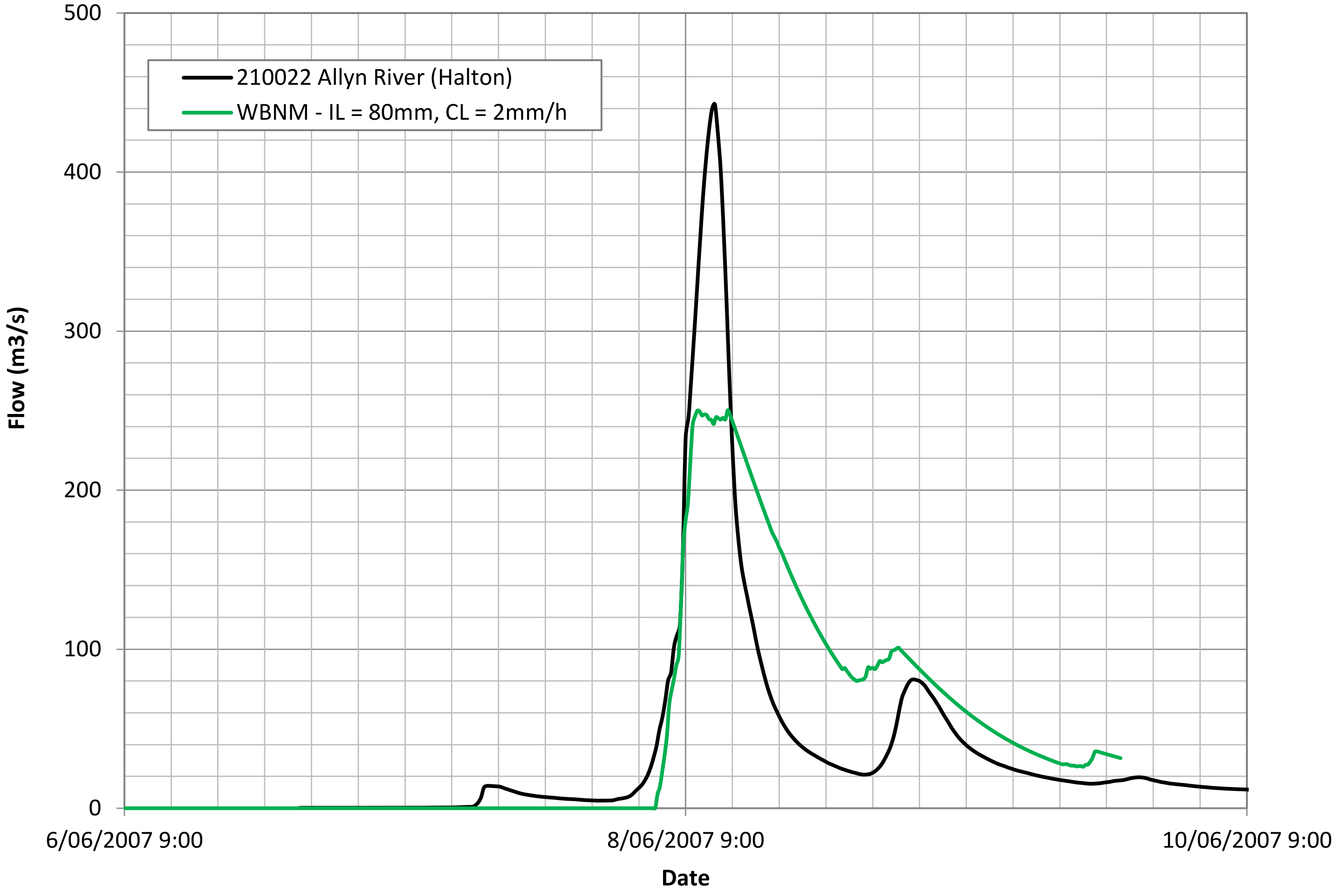
Appendix B

HYDROLOGIC MODEL CALIBRATION
MARCH 2001 EVENT





HYDROLOGIC MODEL CALIBRATION
JUNE 2007 EVENT



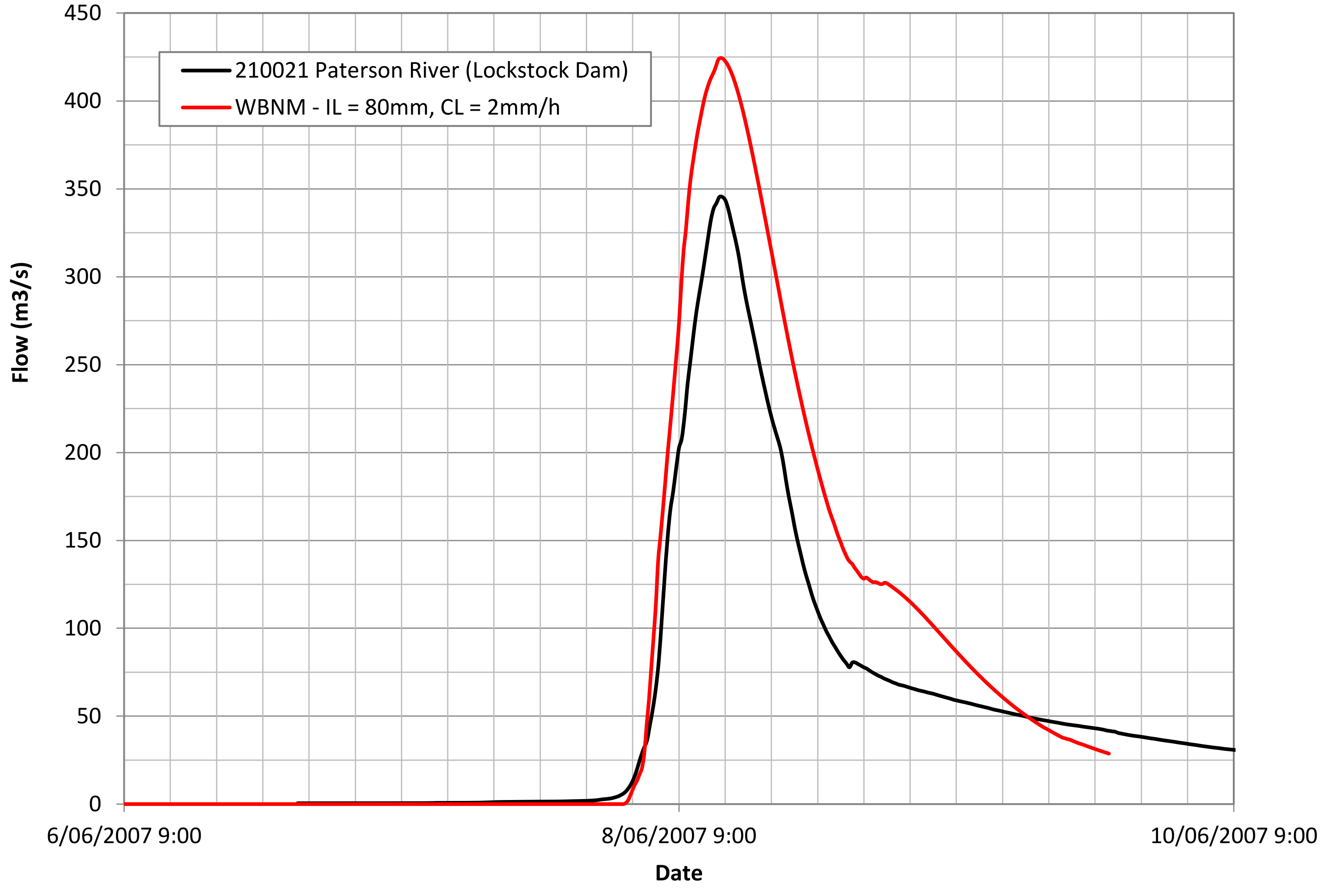
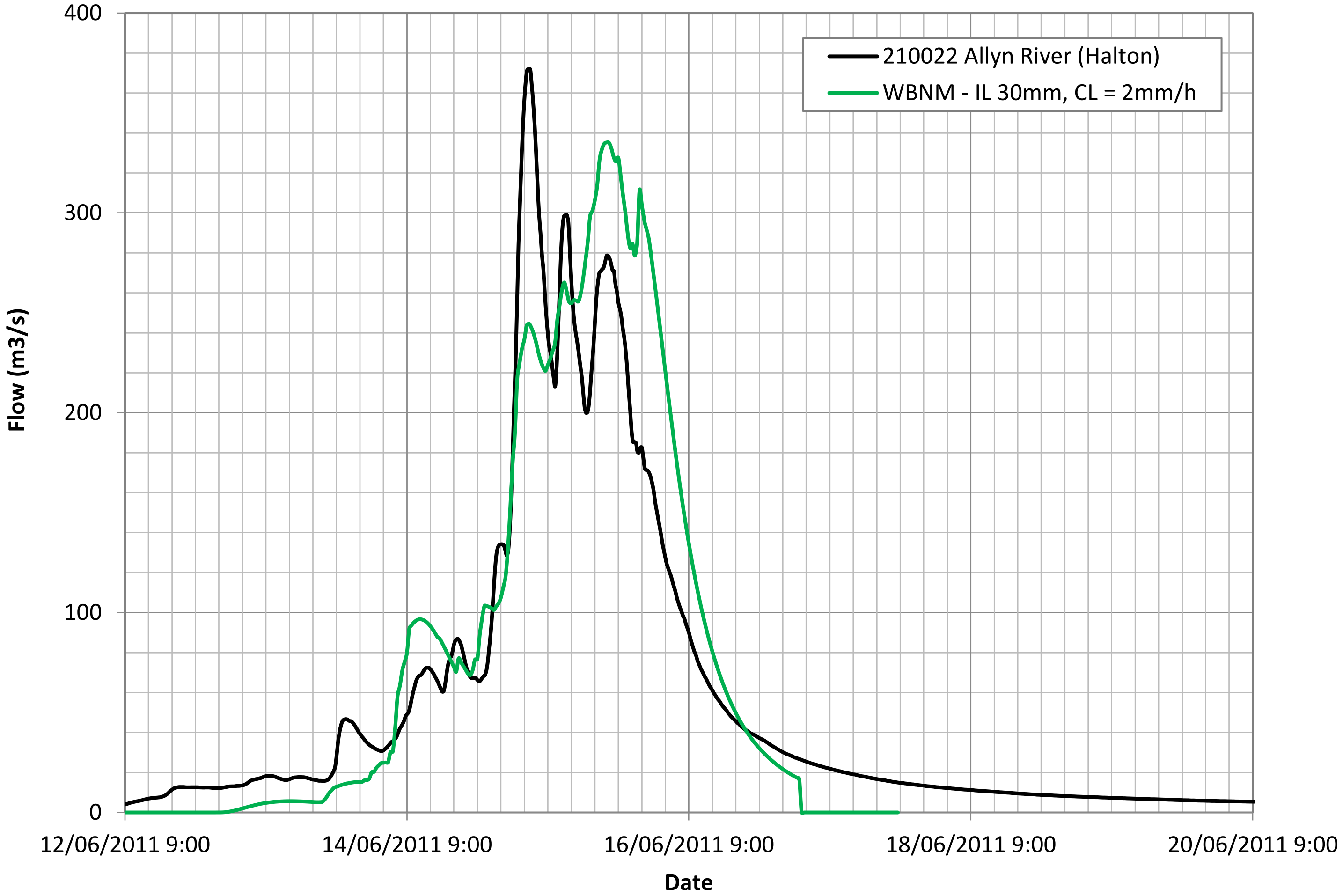
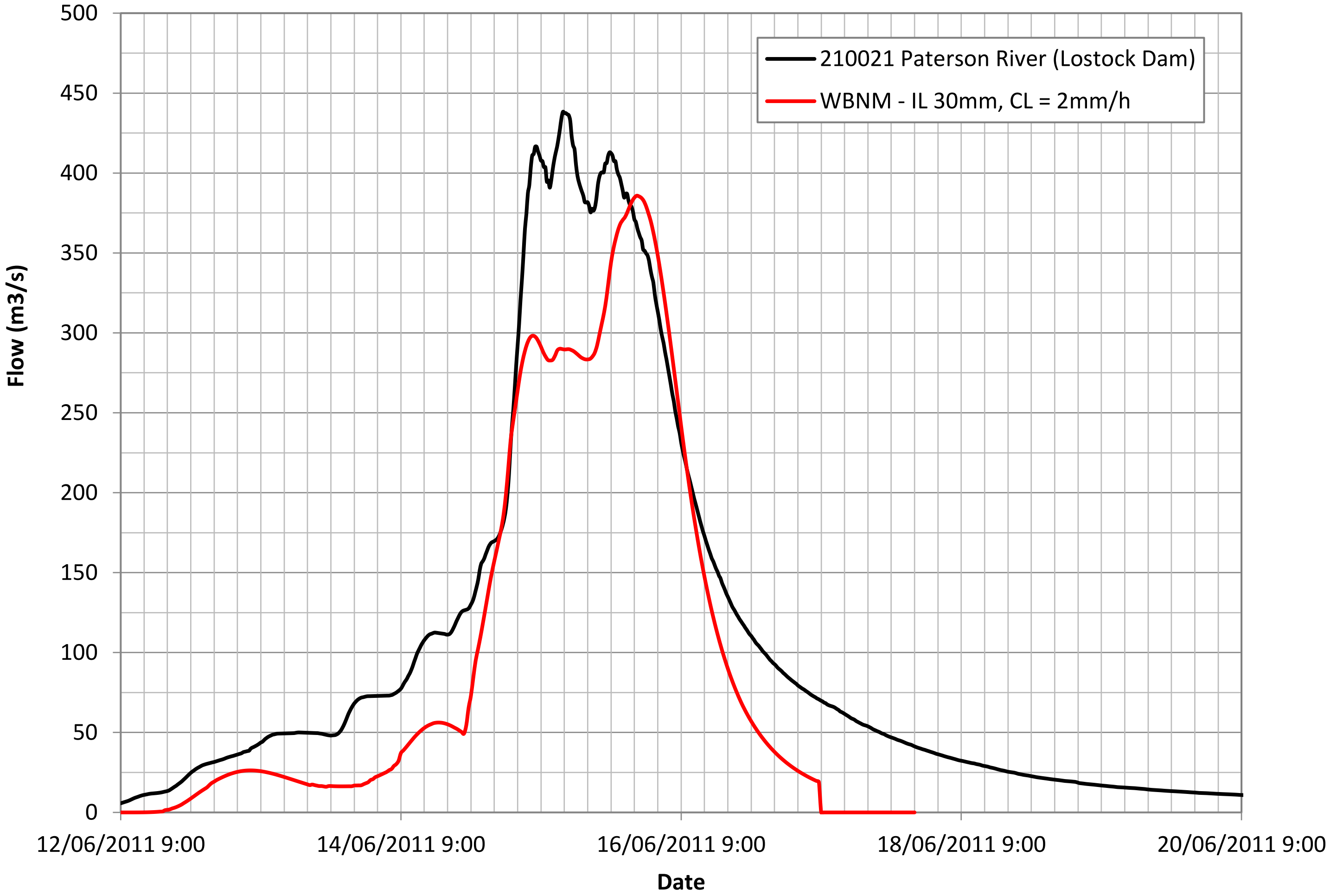


FIGURE B3
HYDROLOGIC MODEL CALIBRATION
JUNE 2011 EVENT





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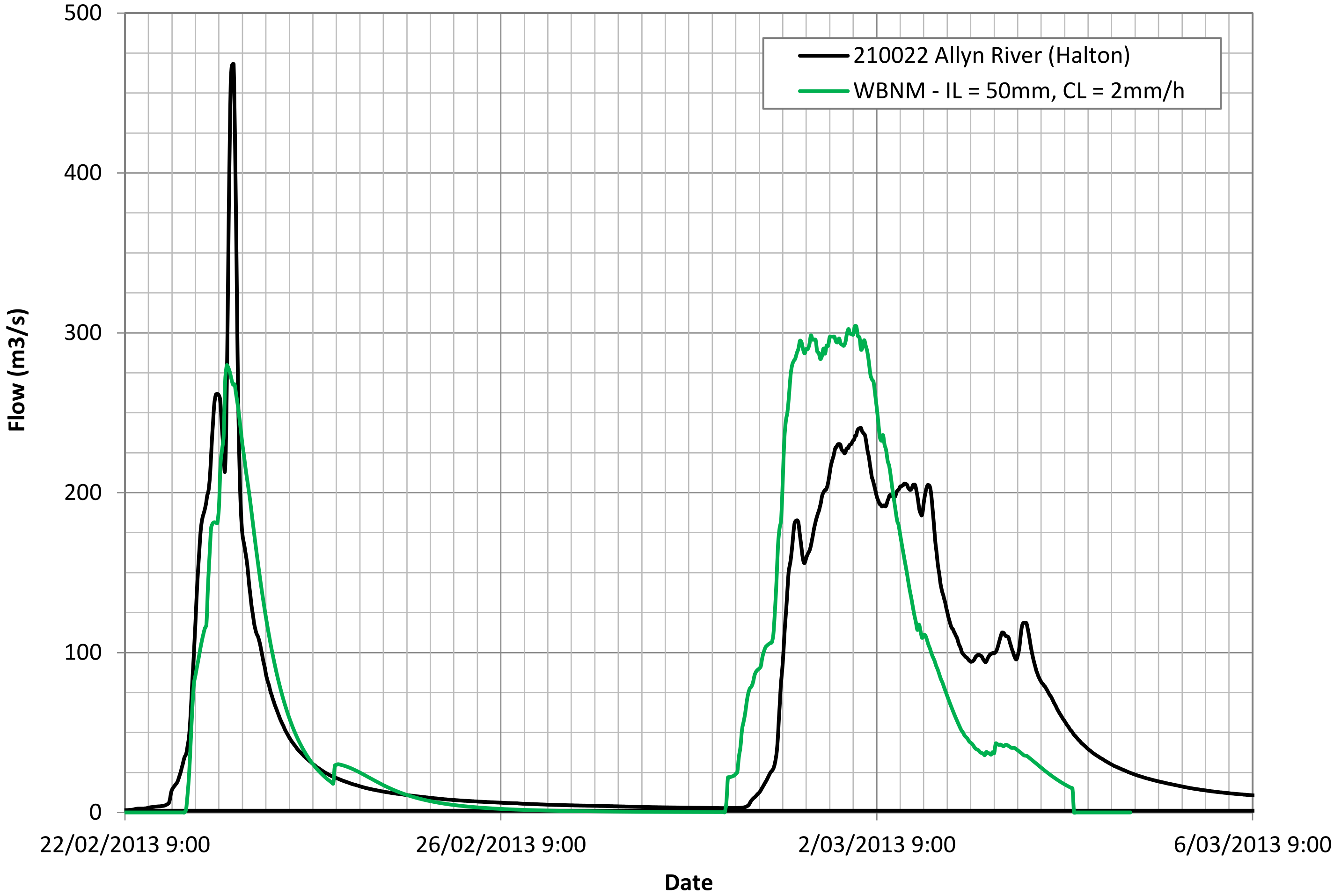

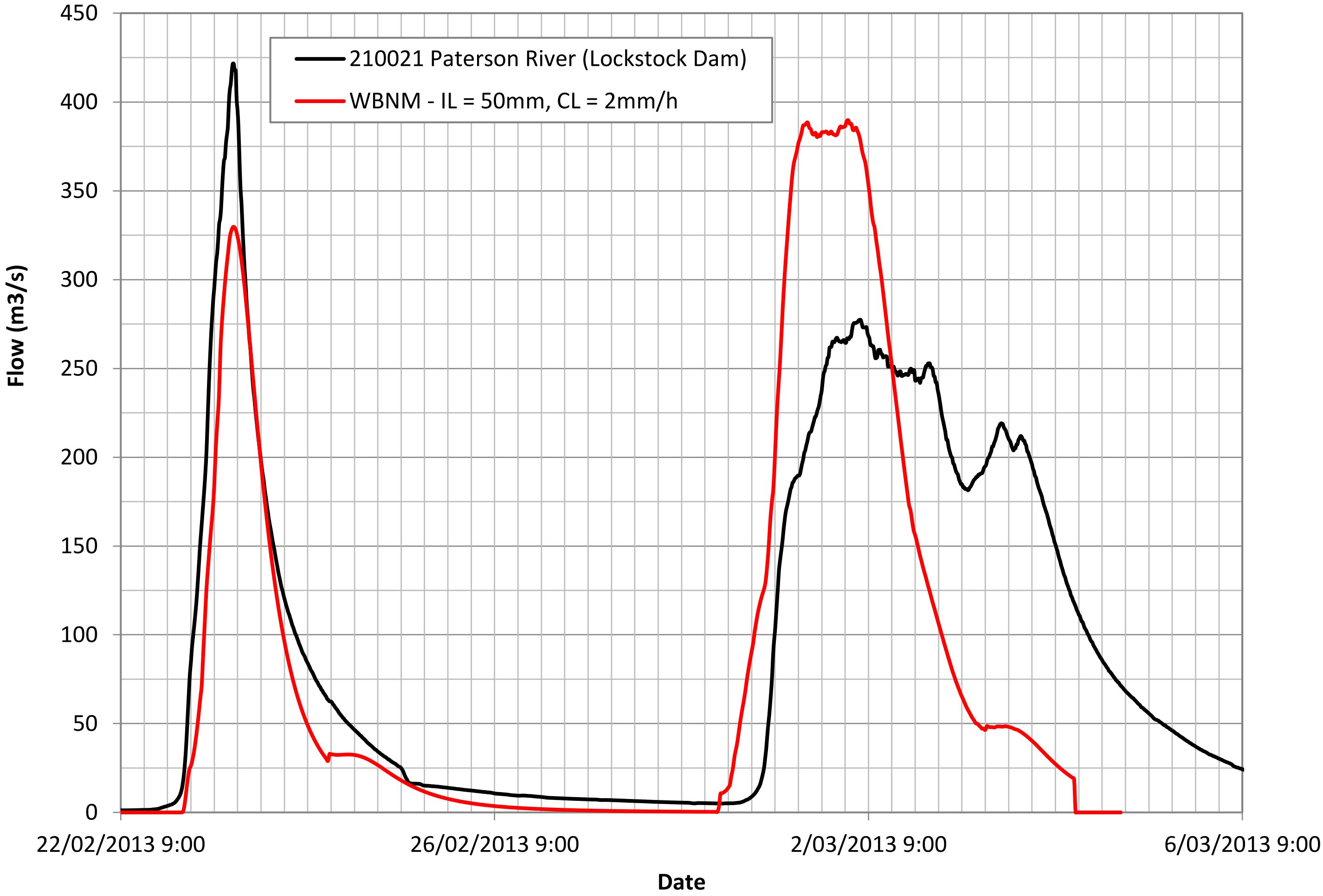

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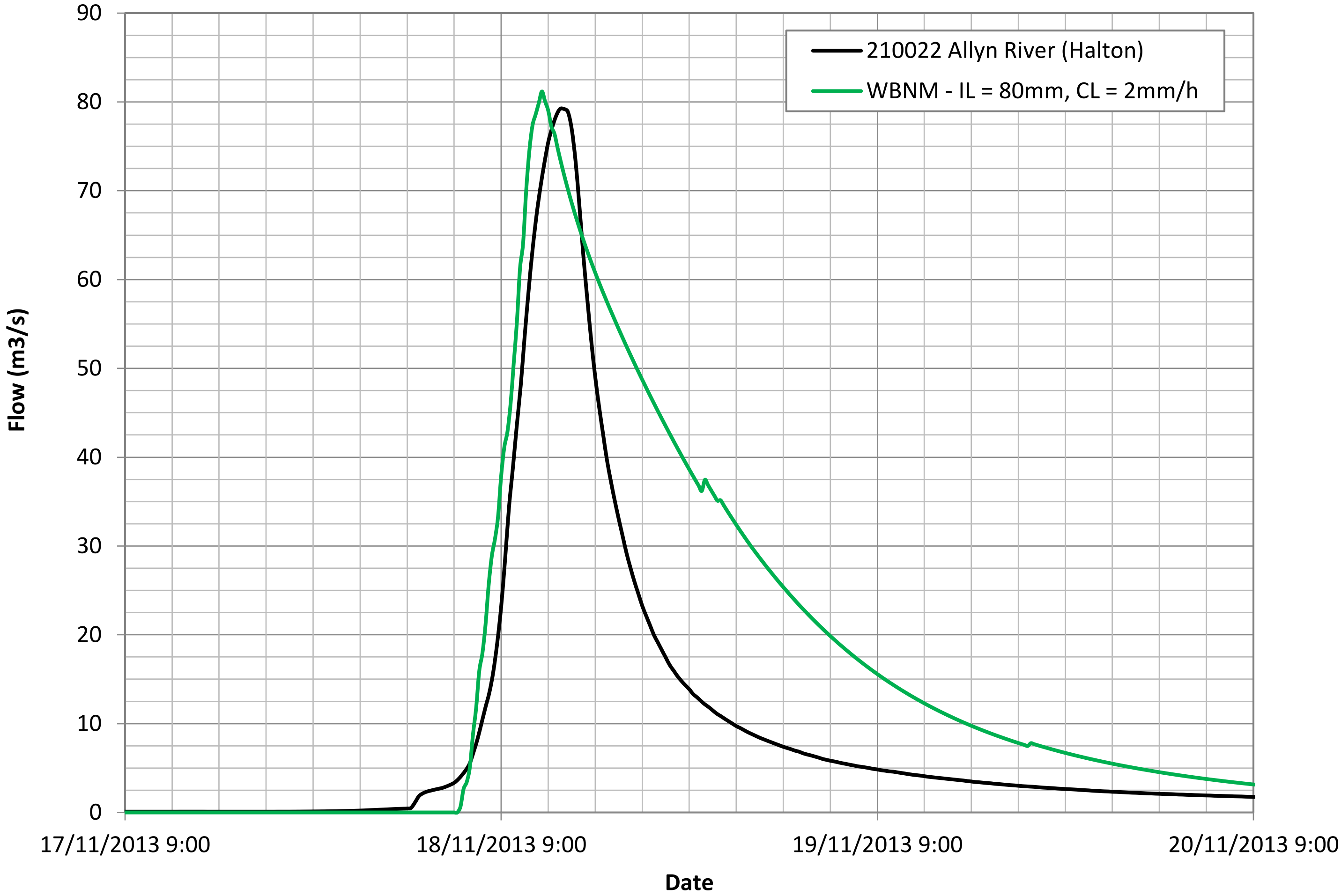
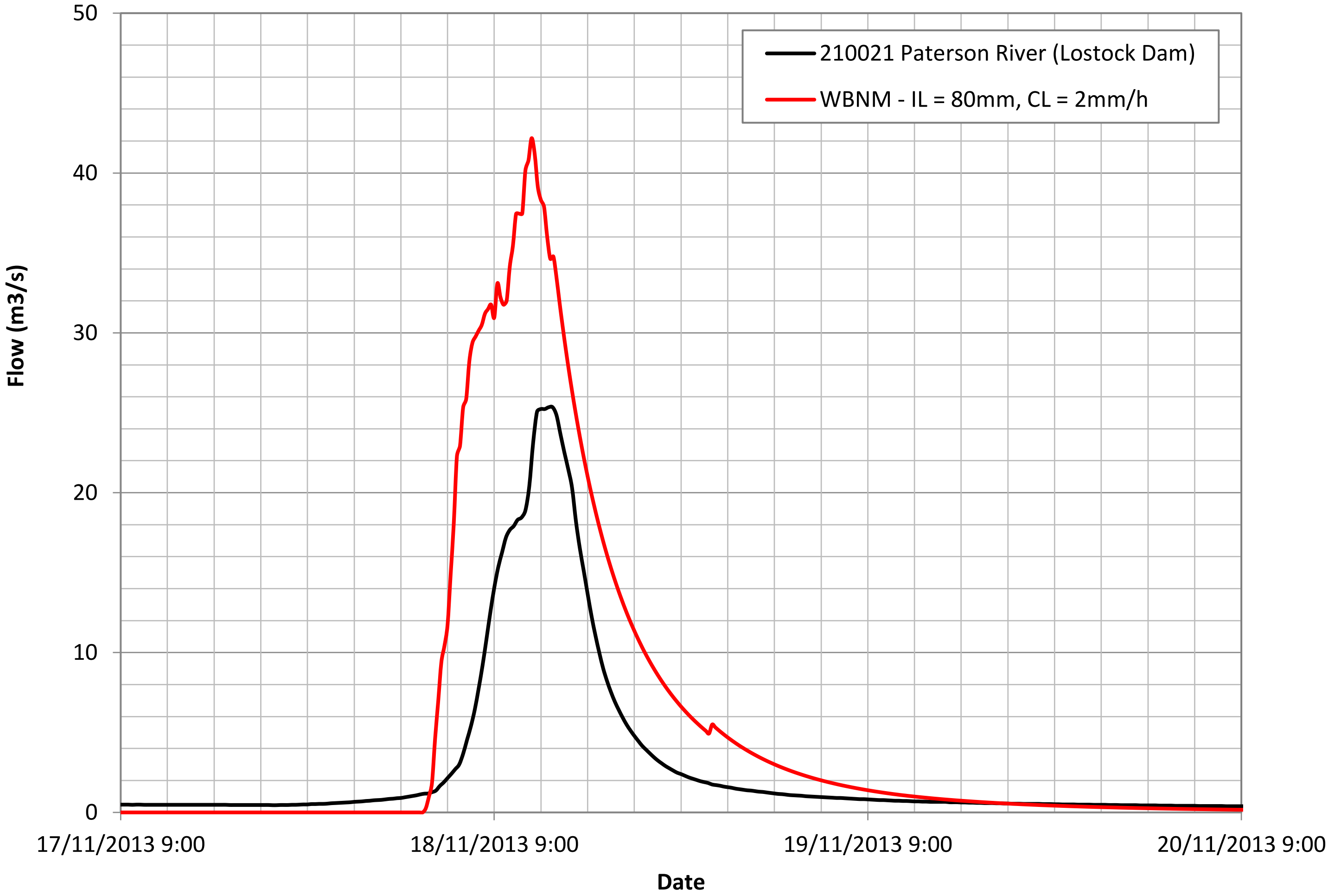
NOVEMBER 2013





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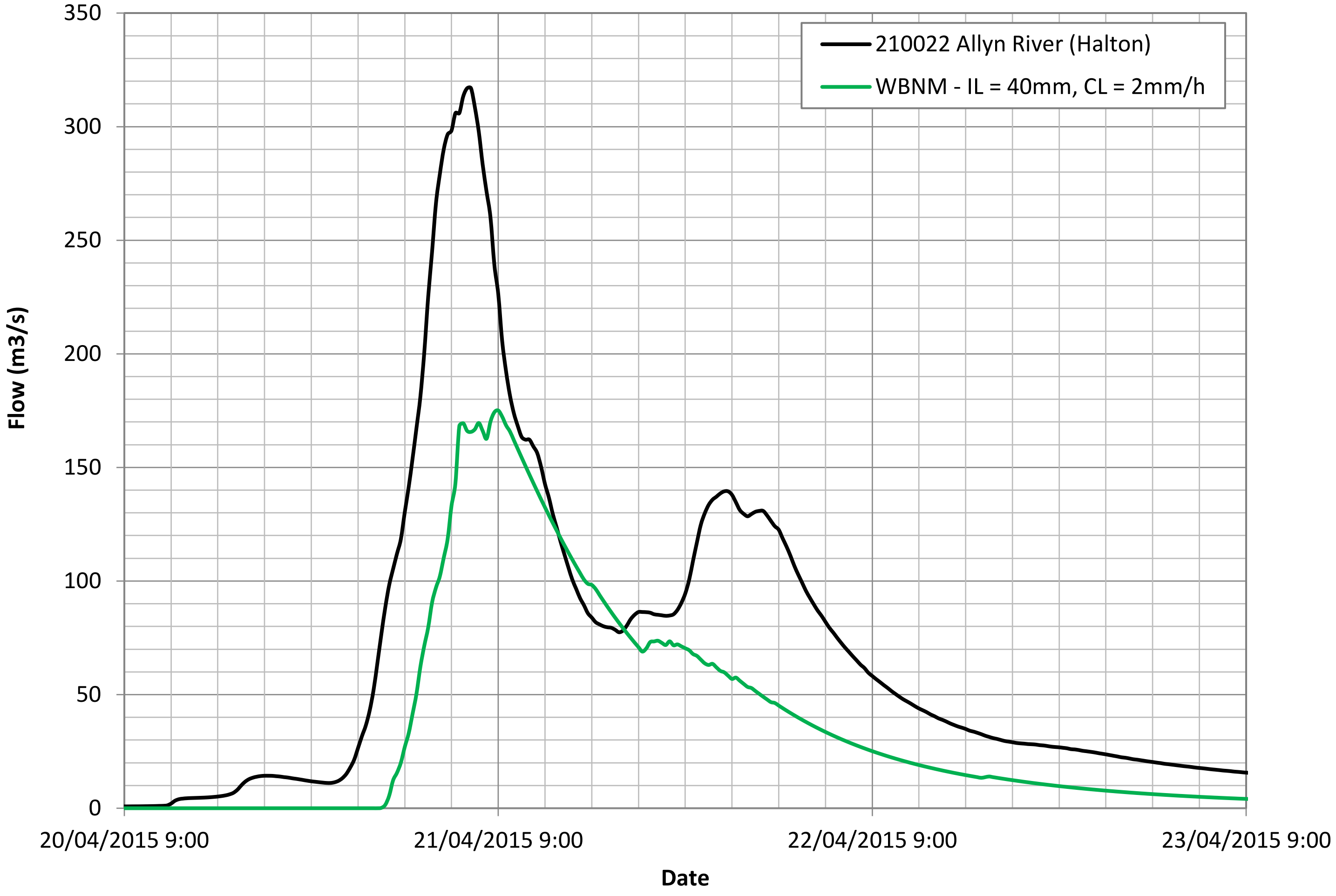

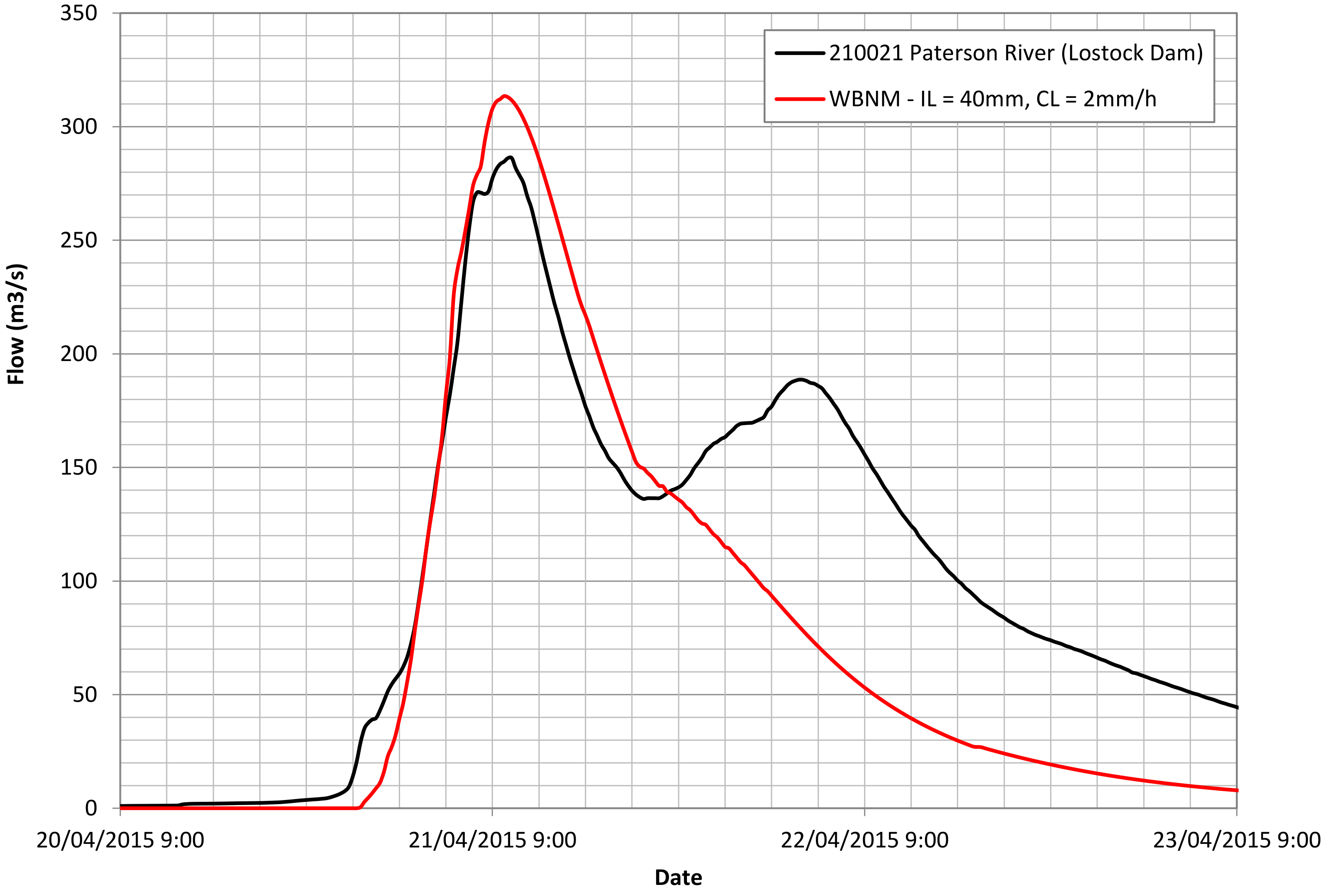

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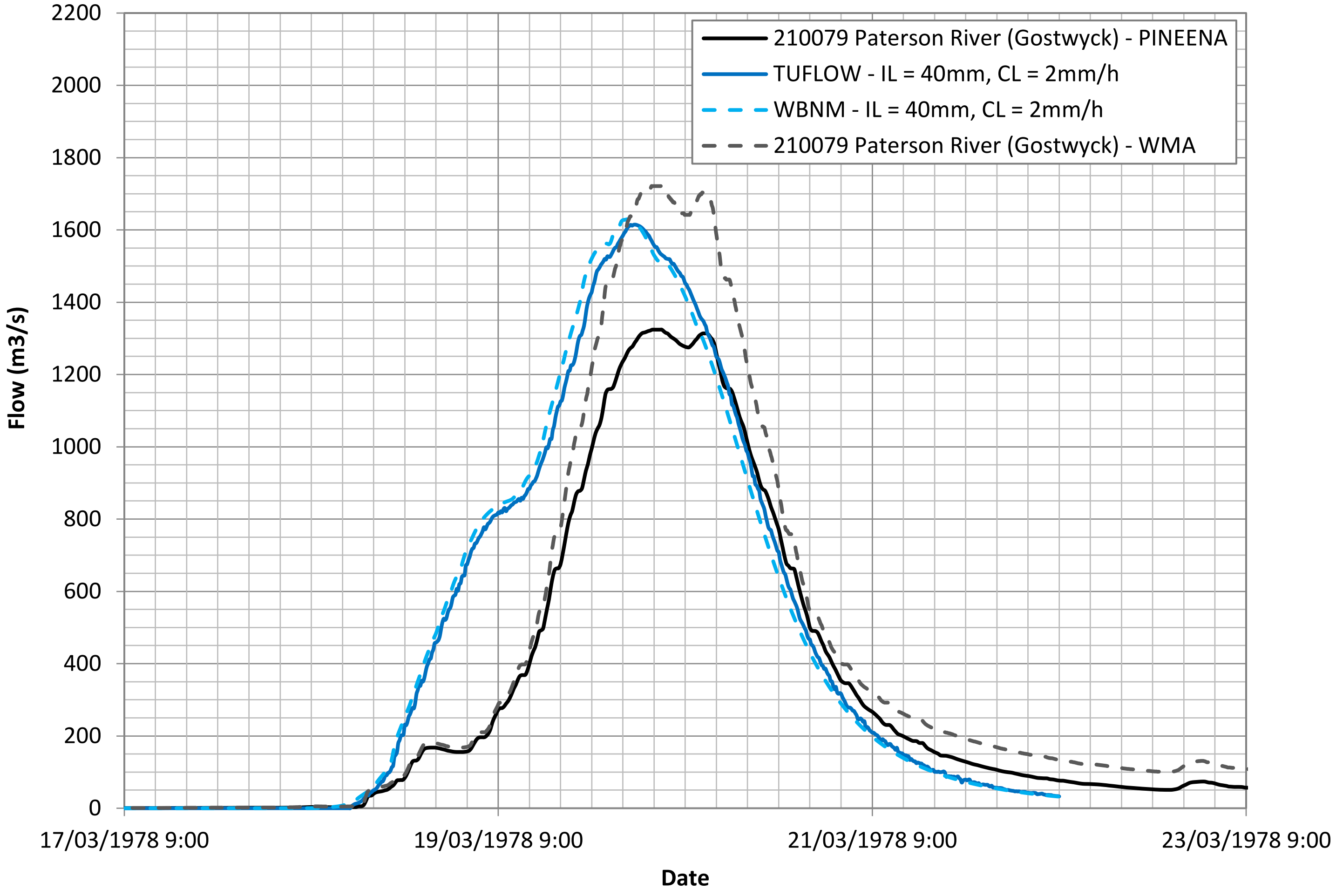

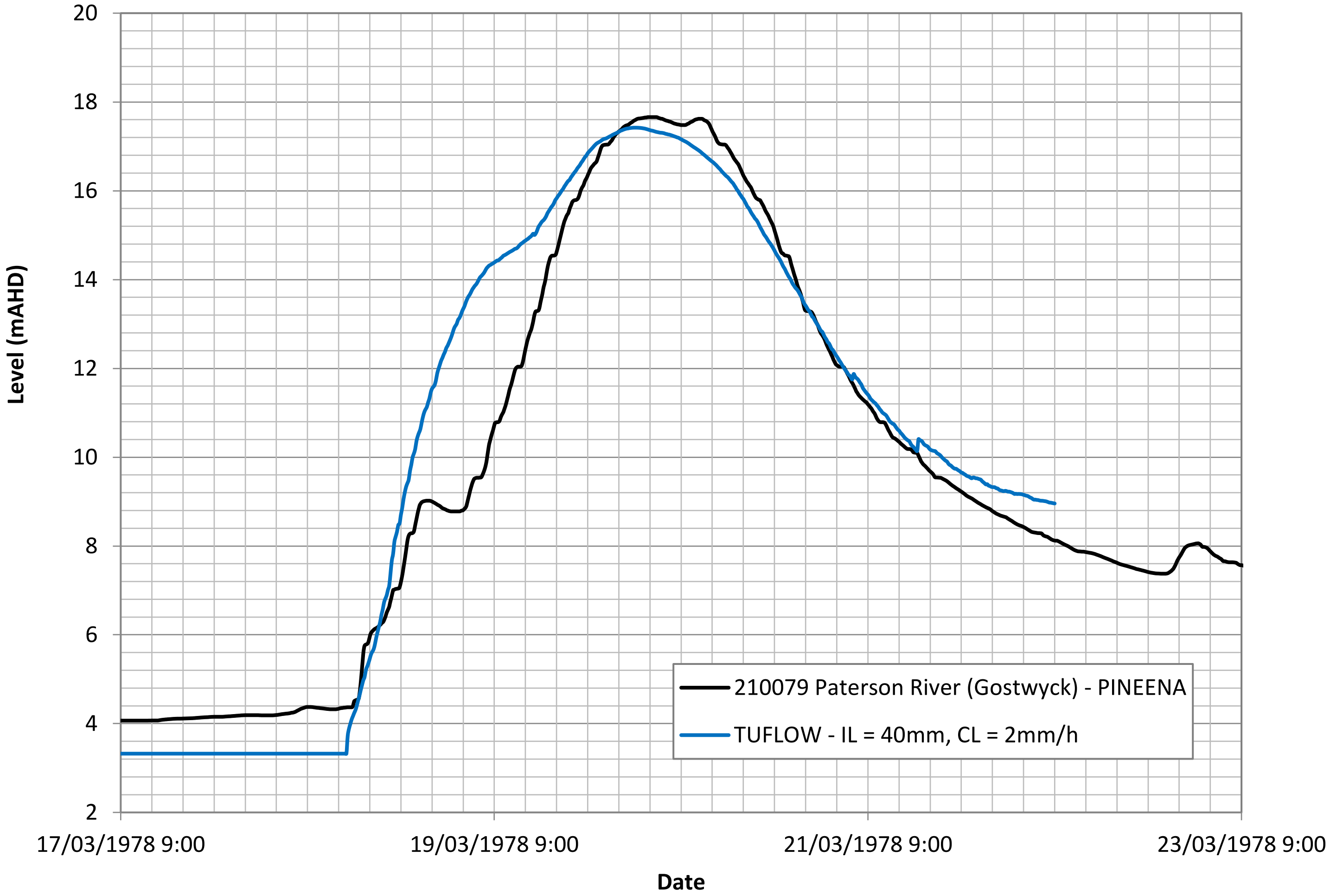

FIGURE B8
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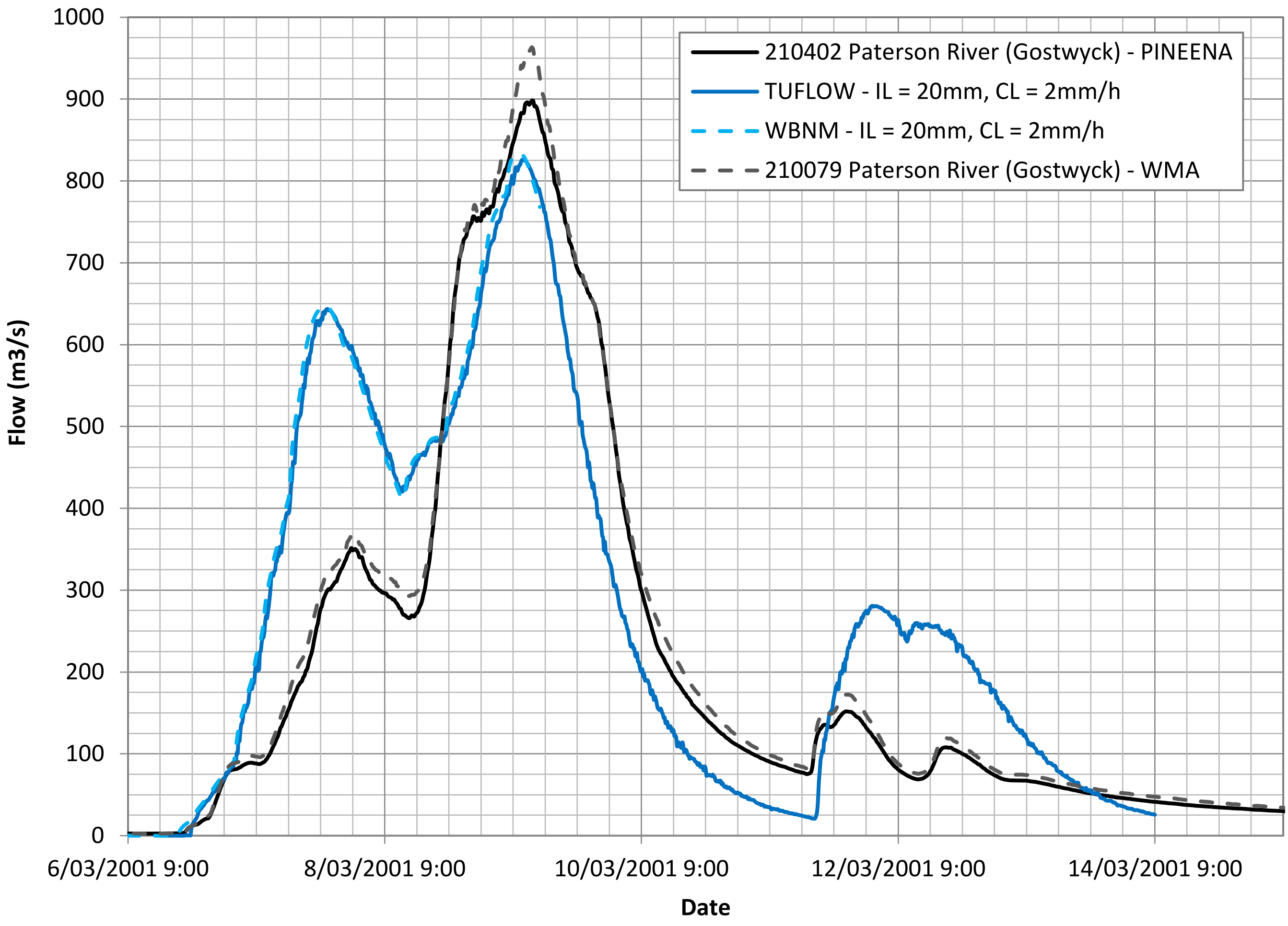
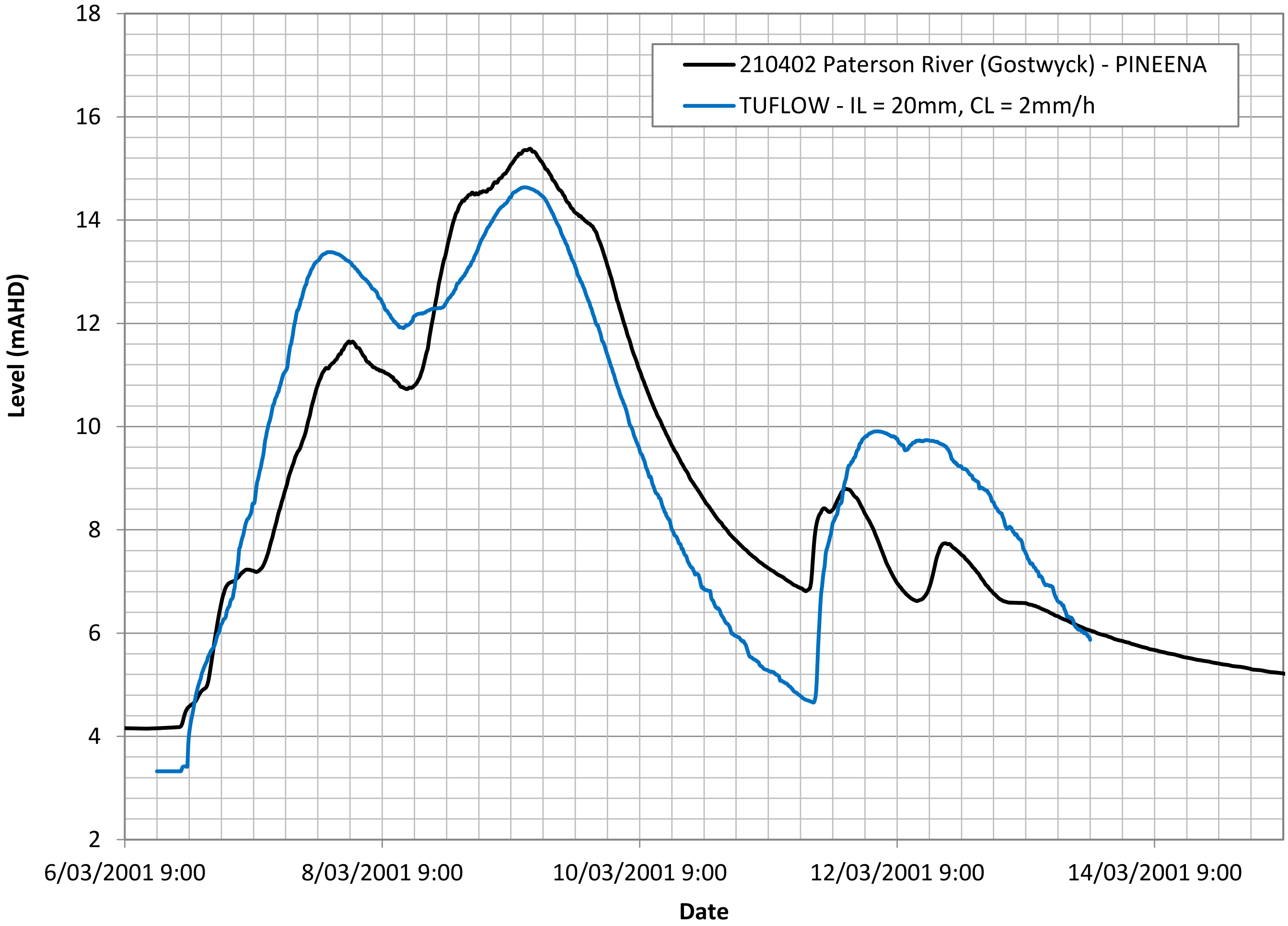
MARCH 2001 EVENT





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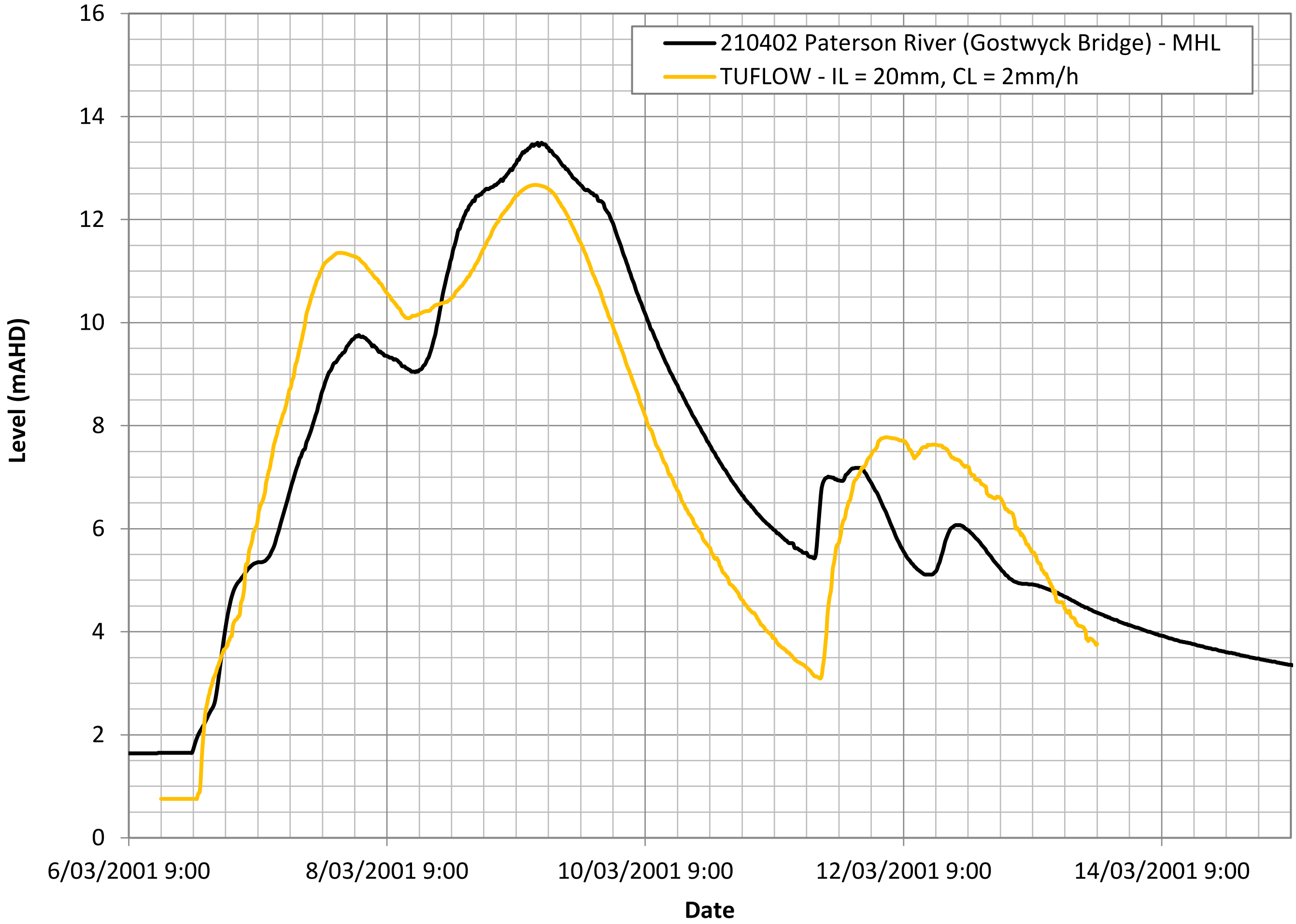

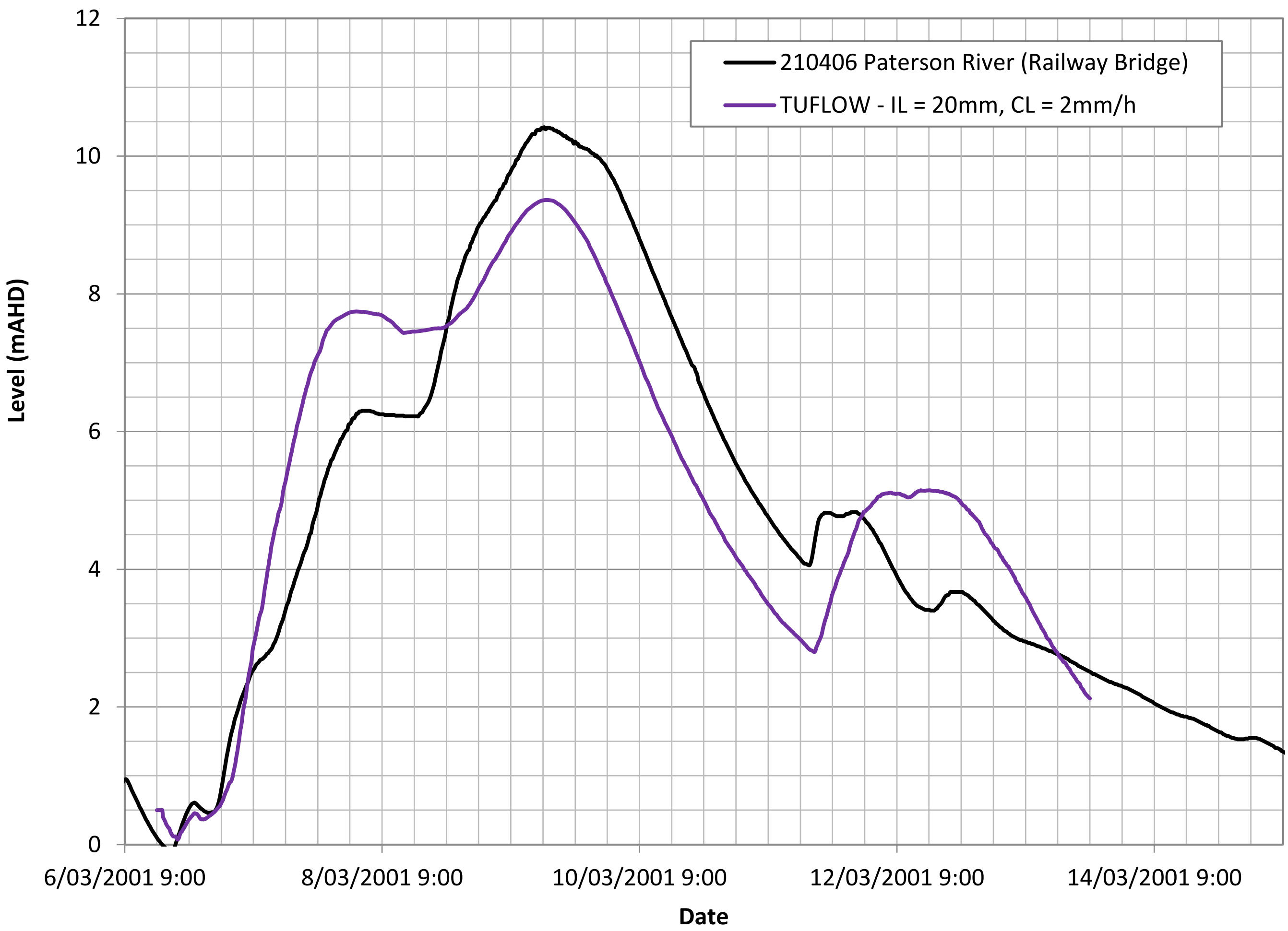

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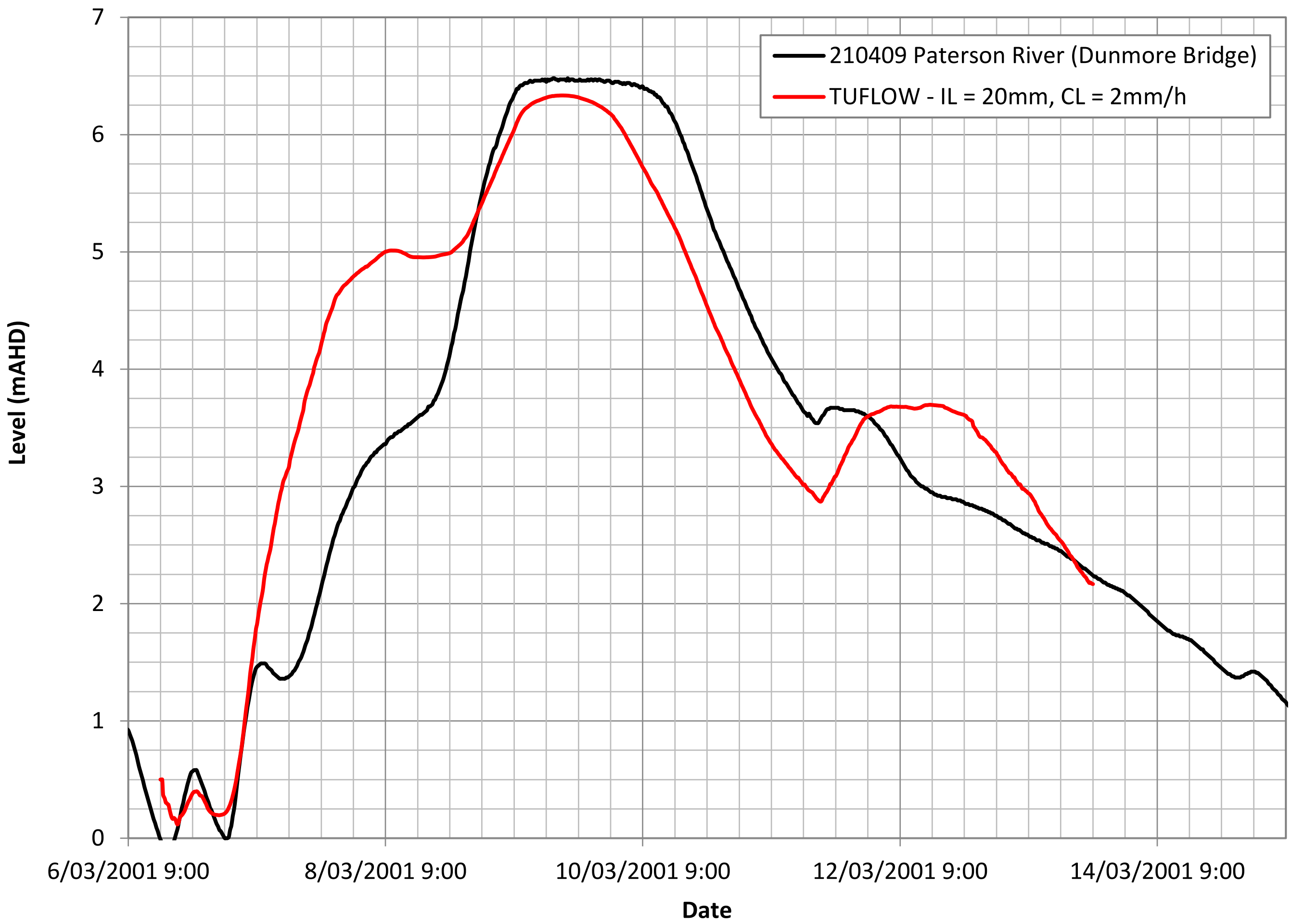

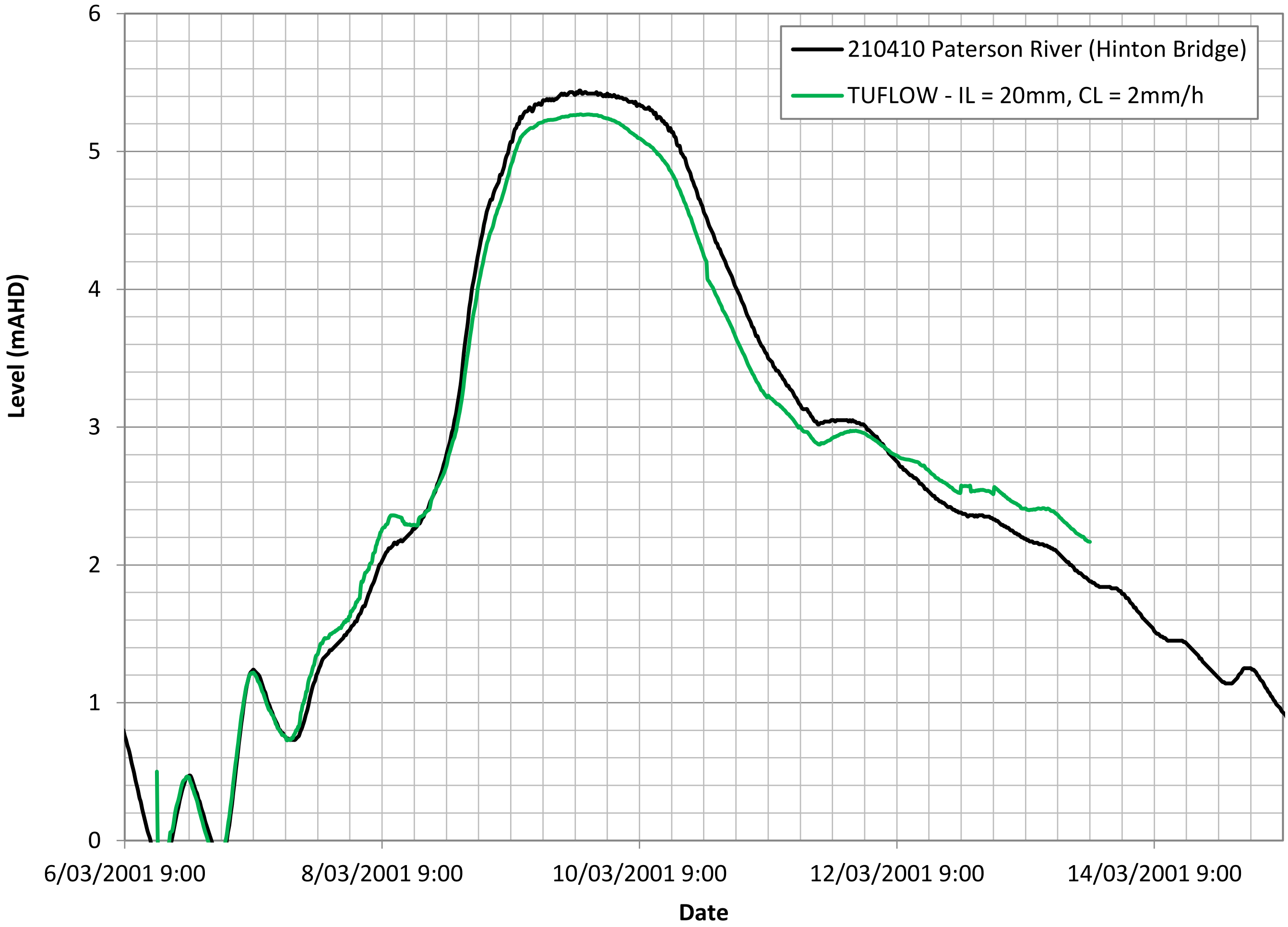

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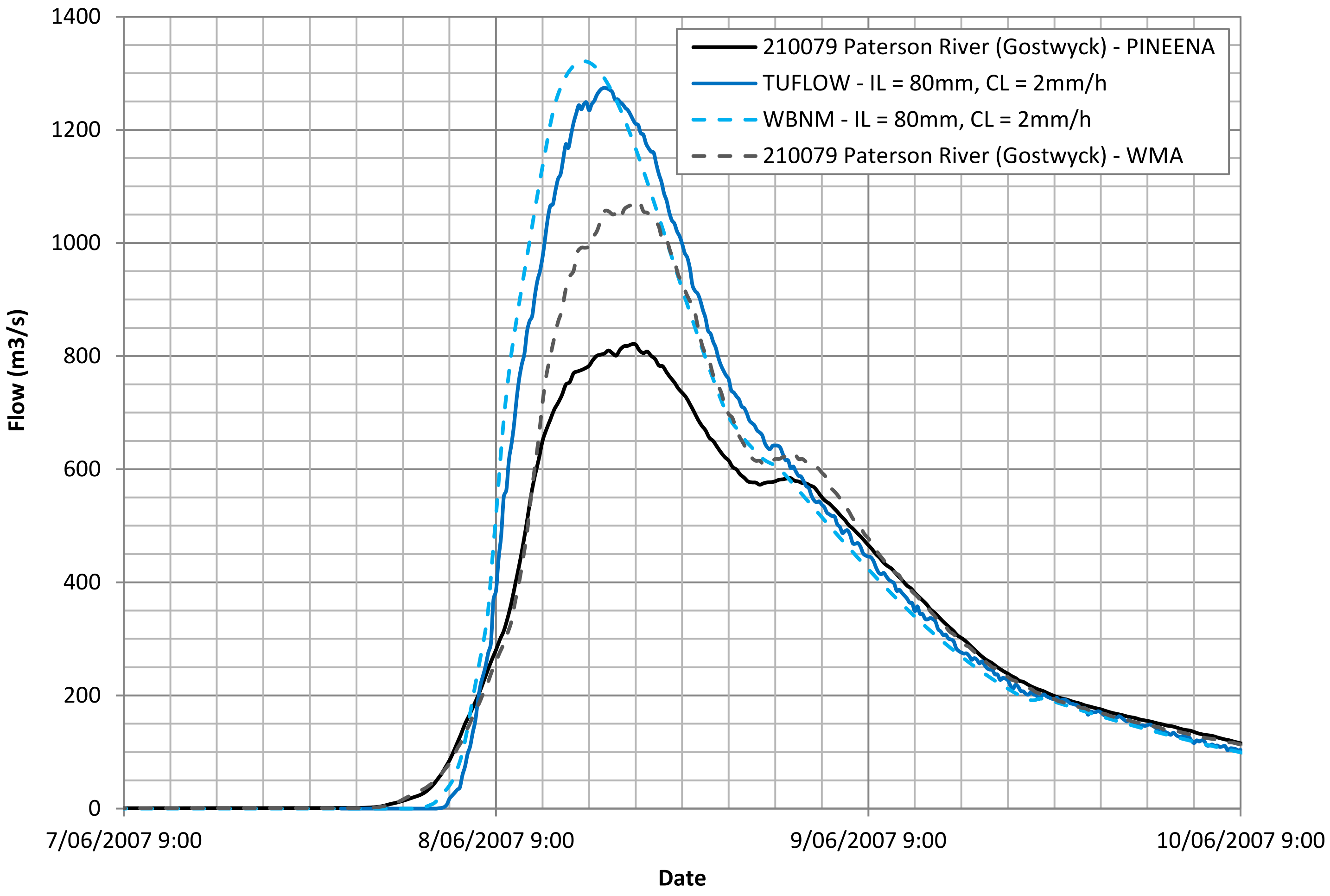

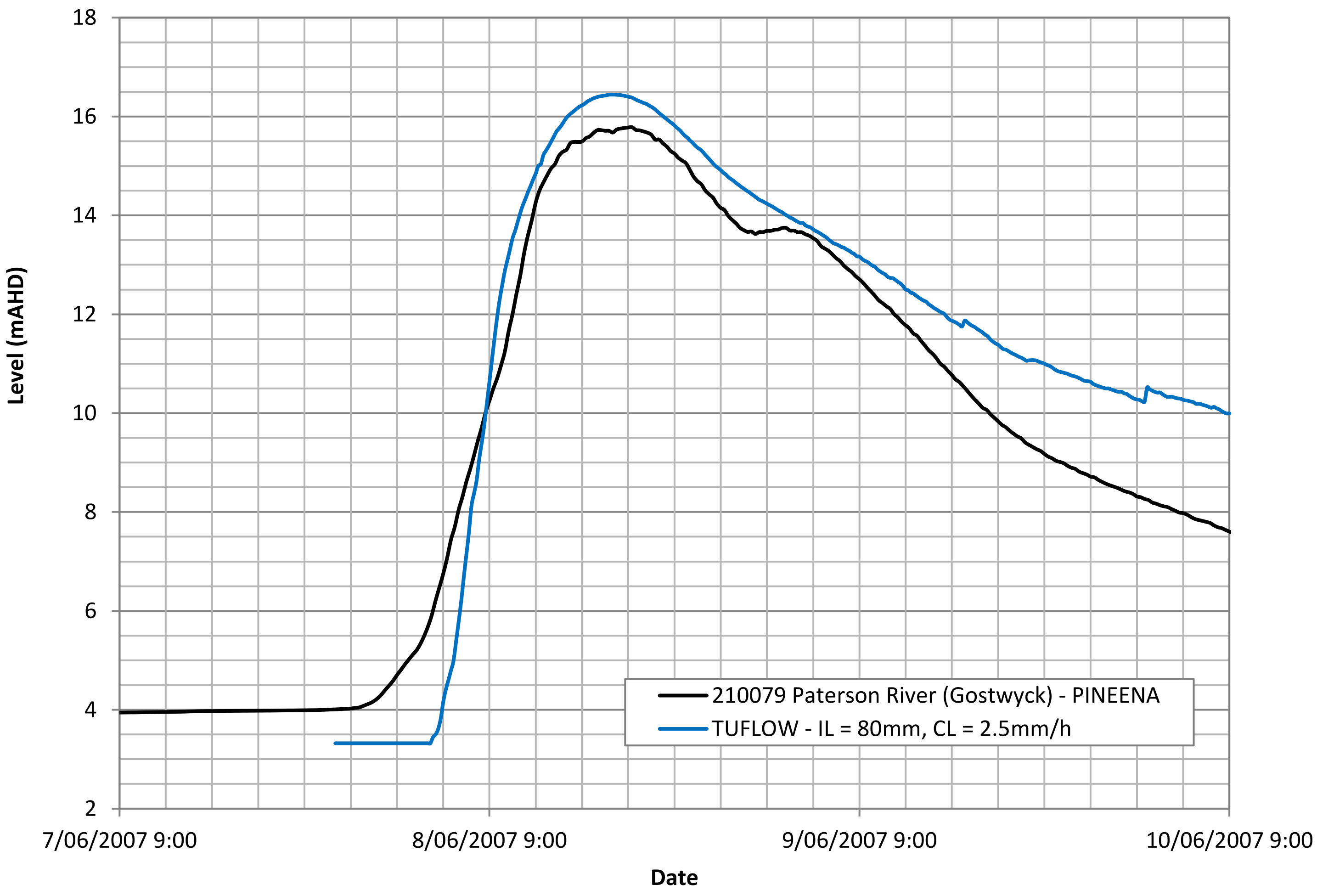

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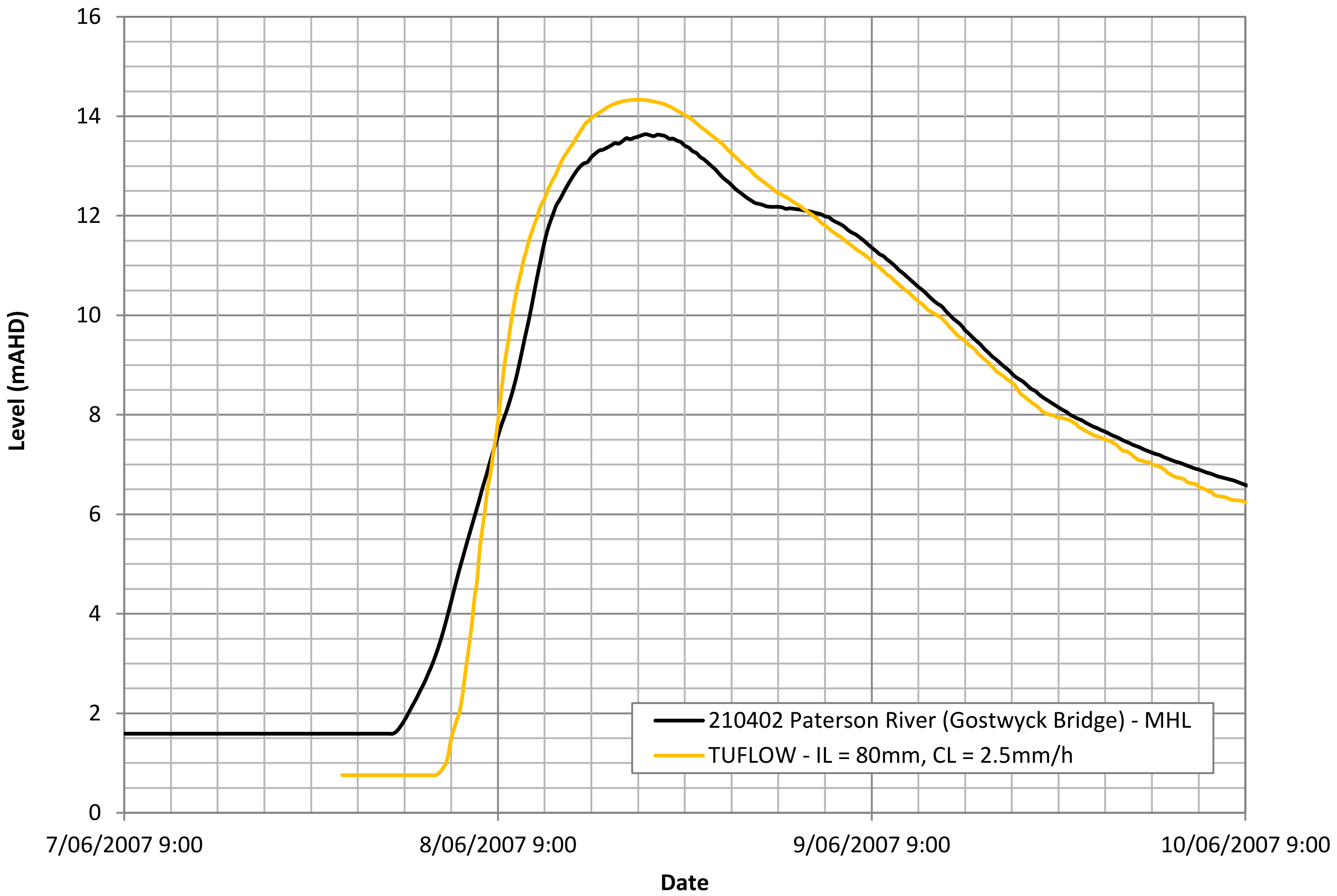

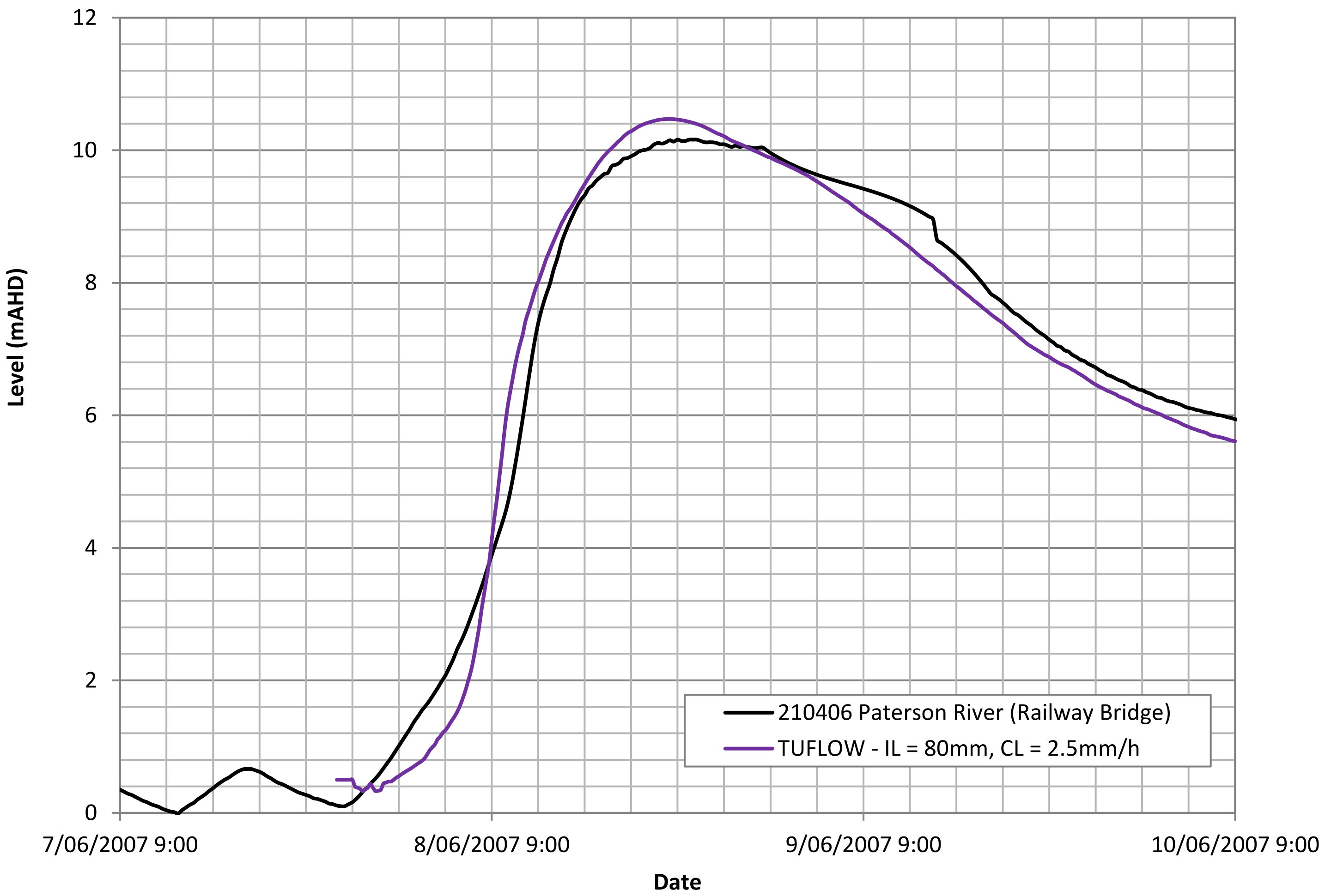

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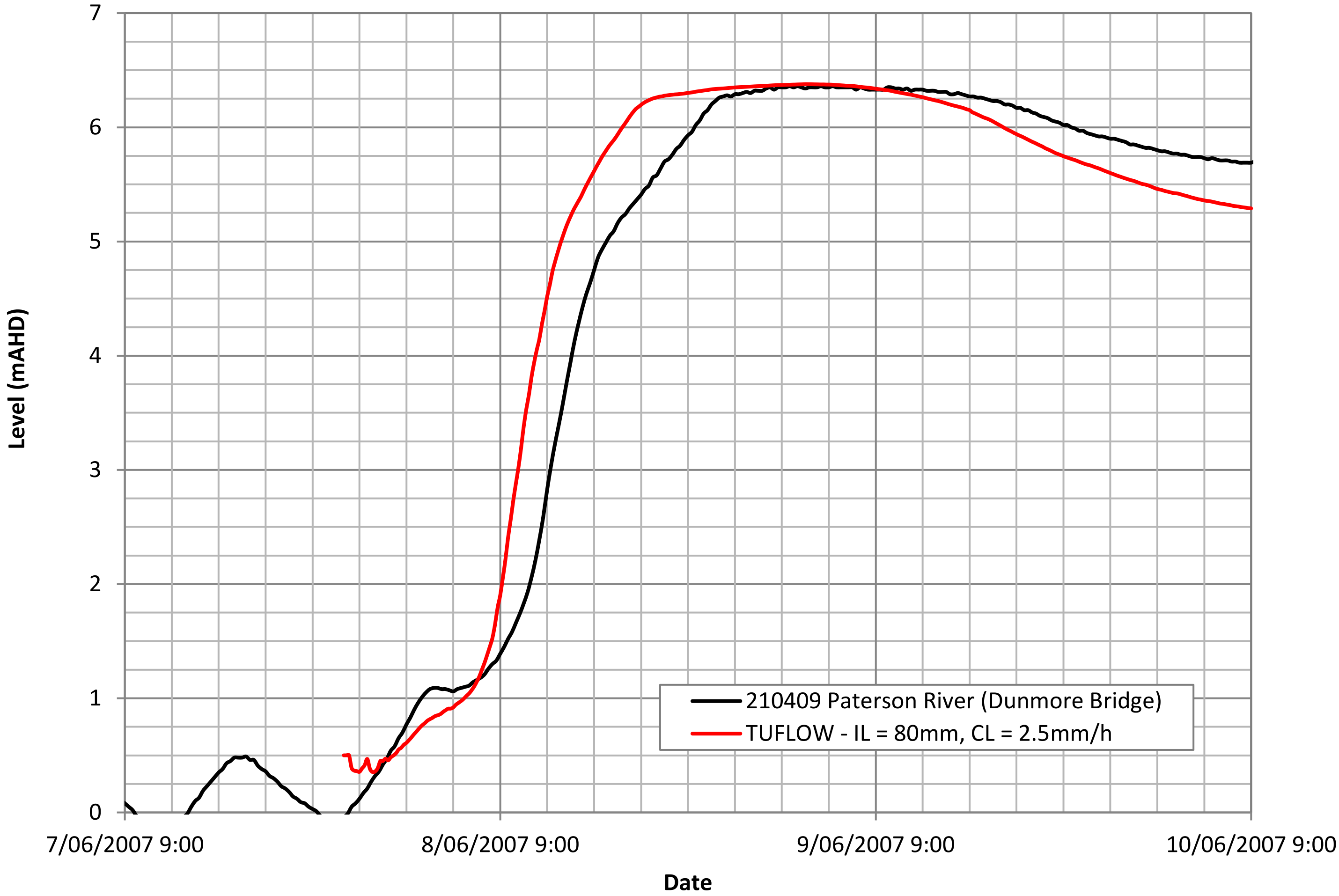

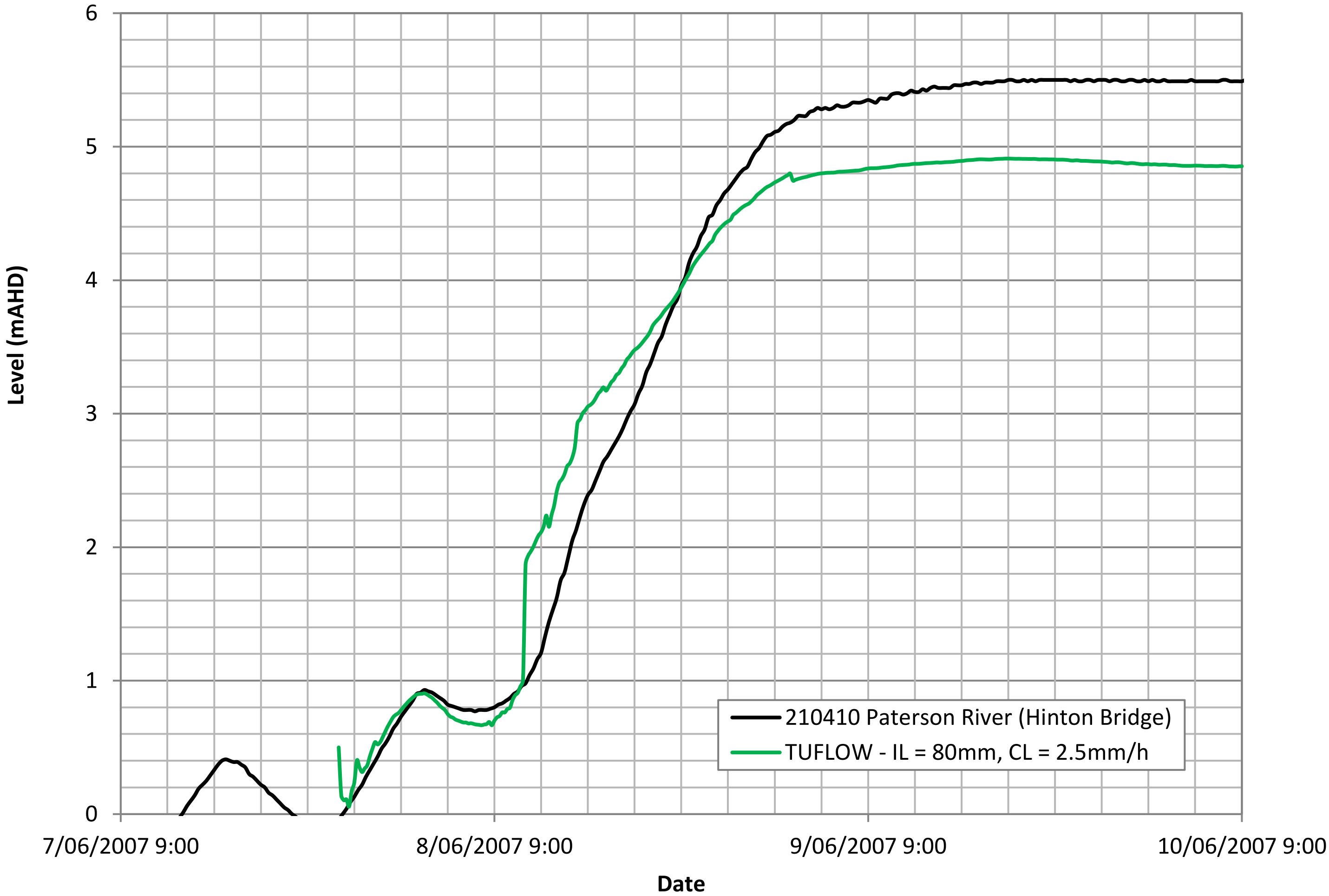

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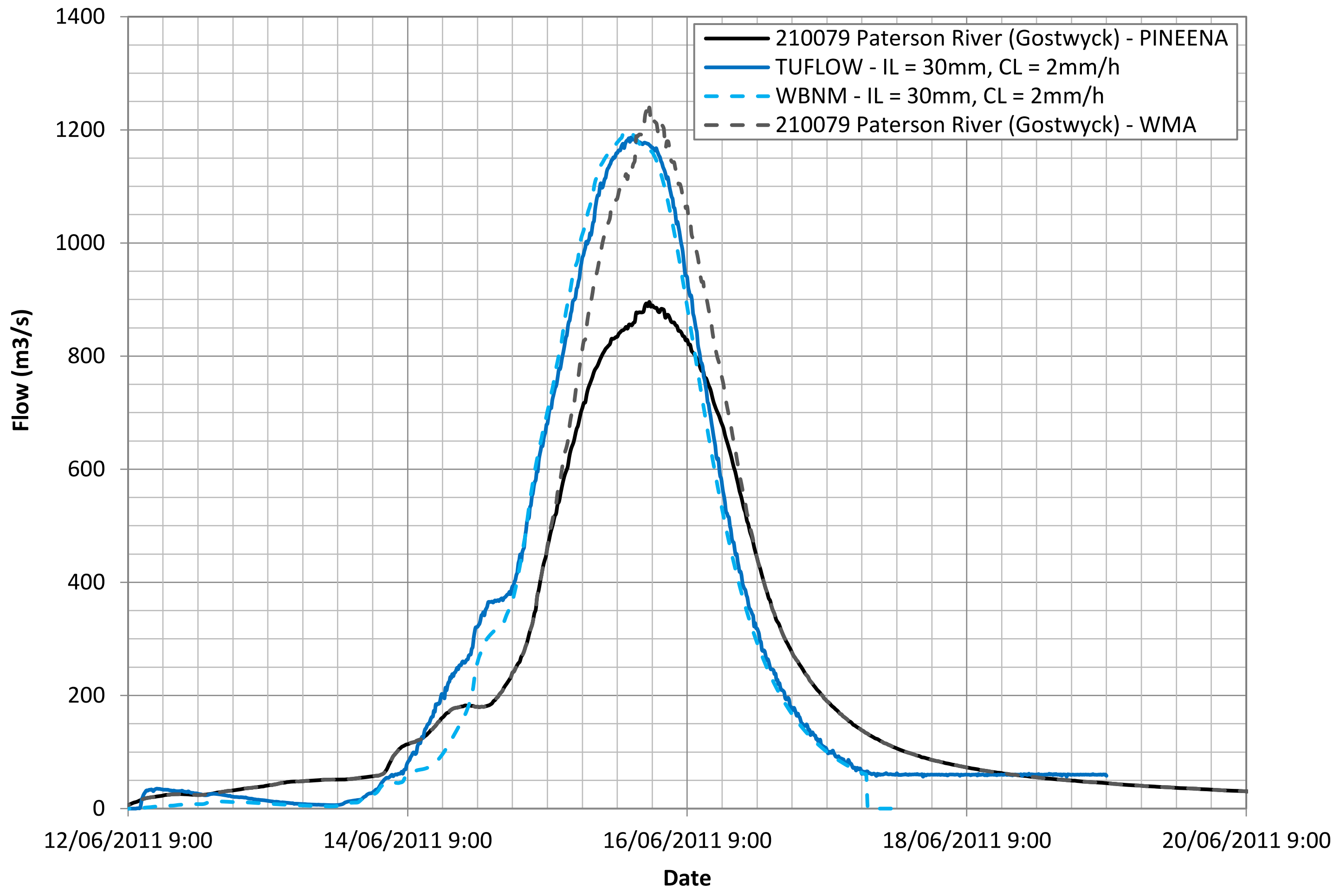

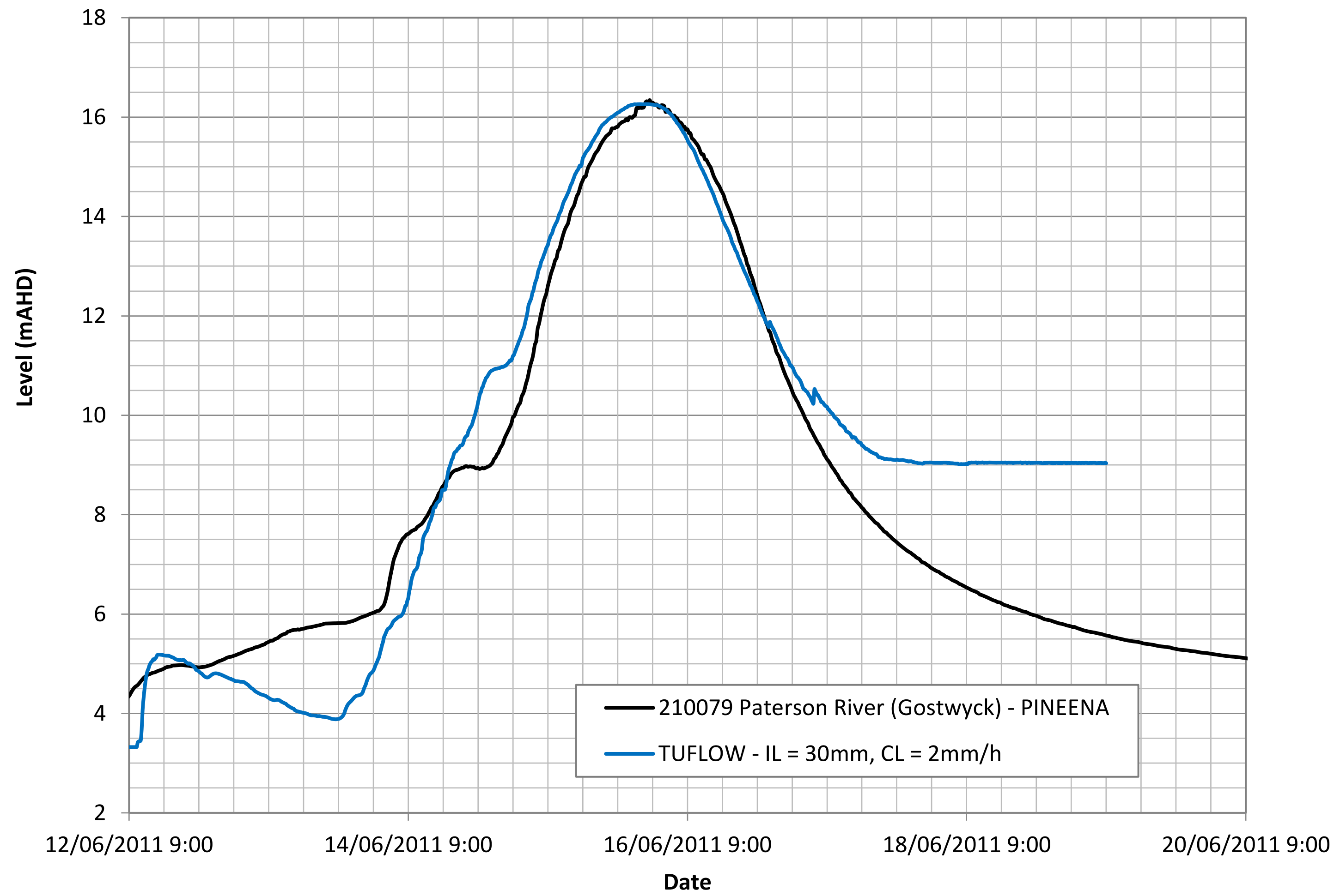

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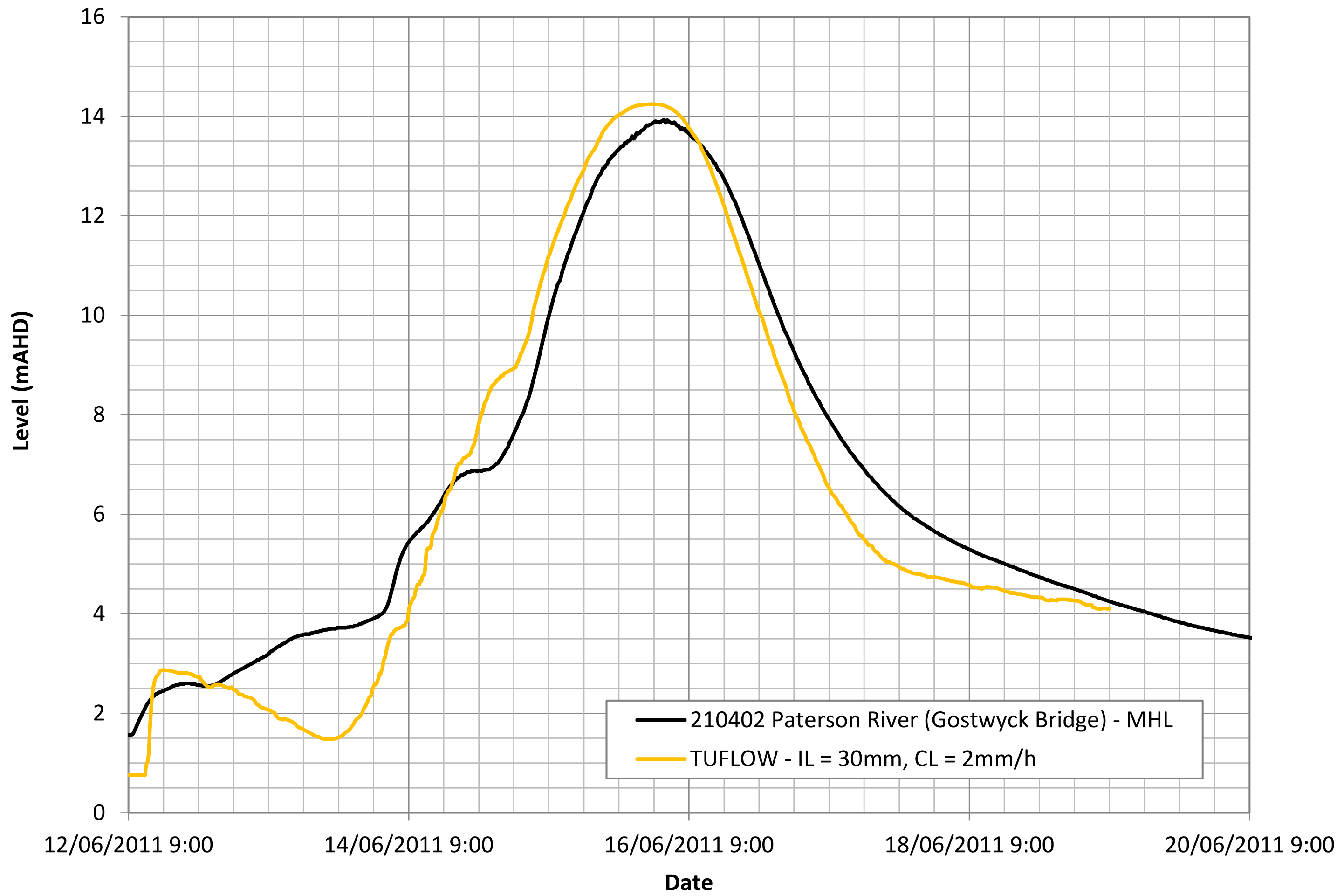


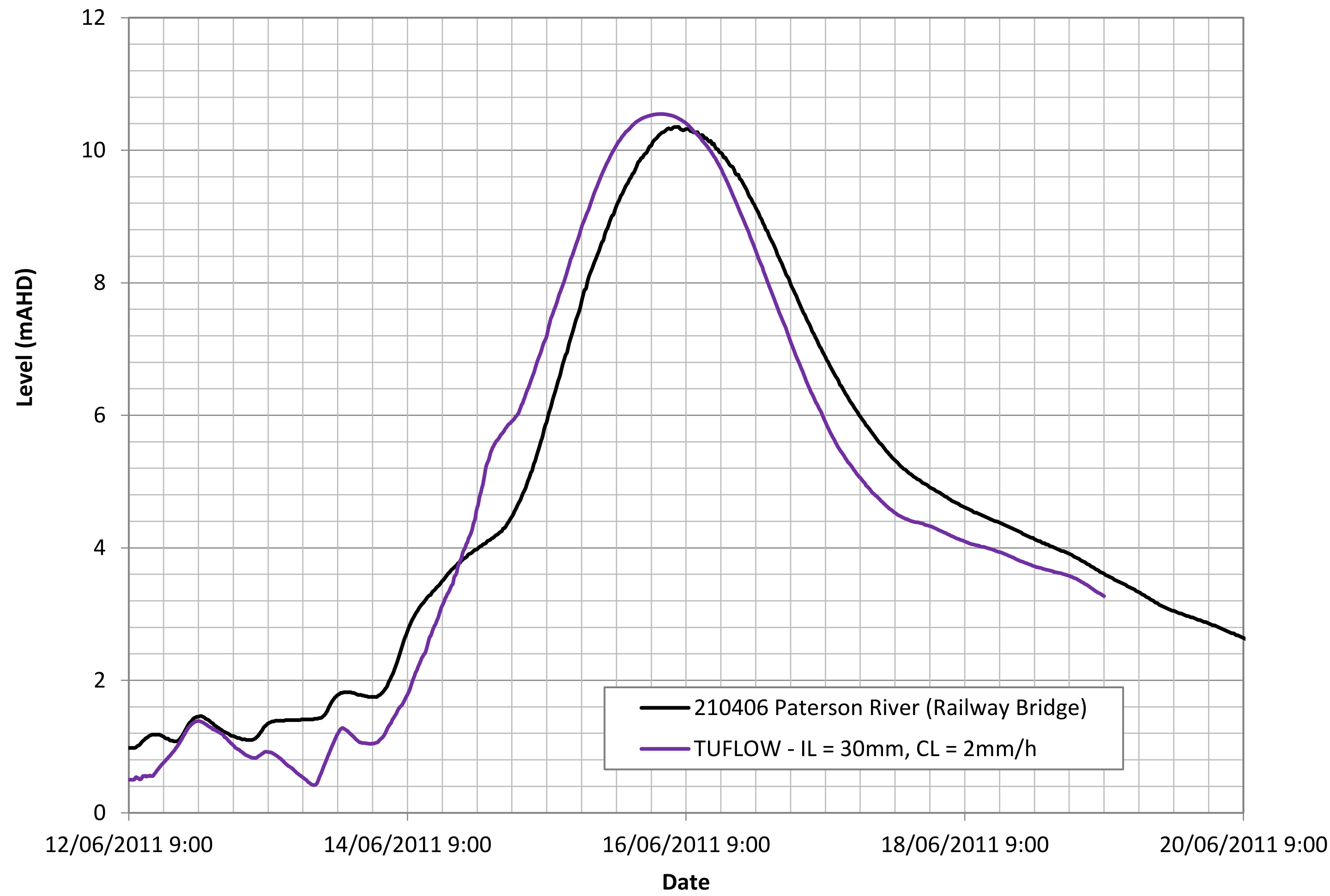
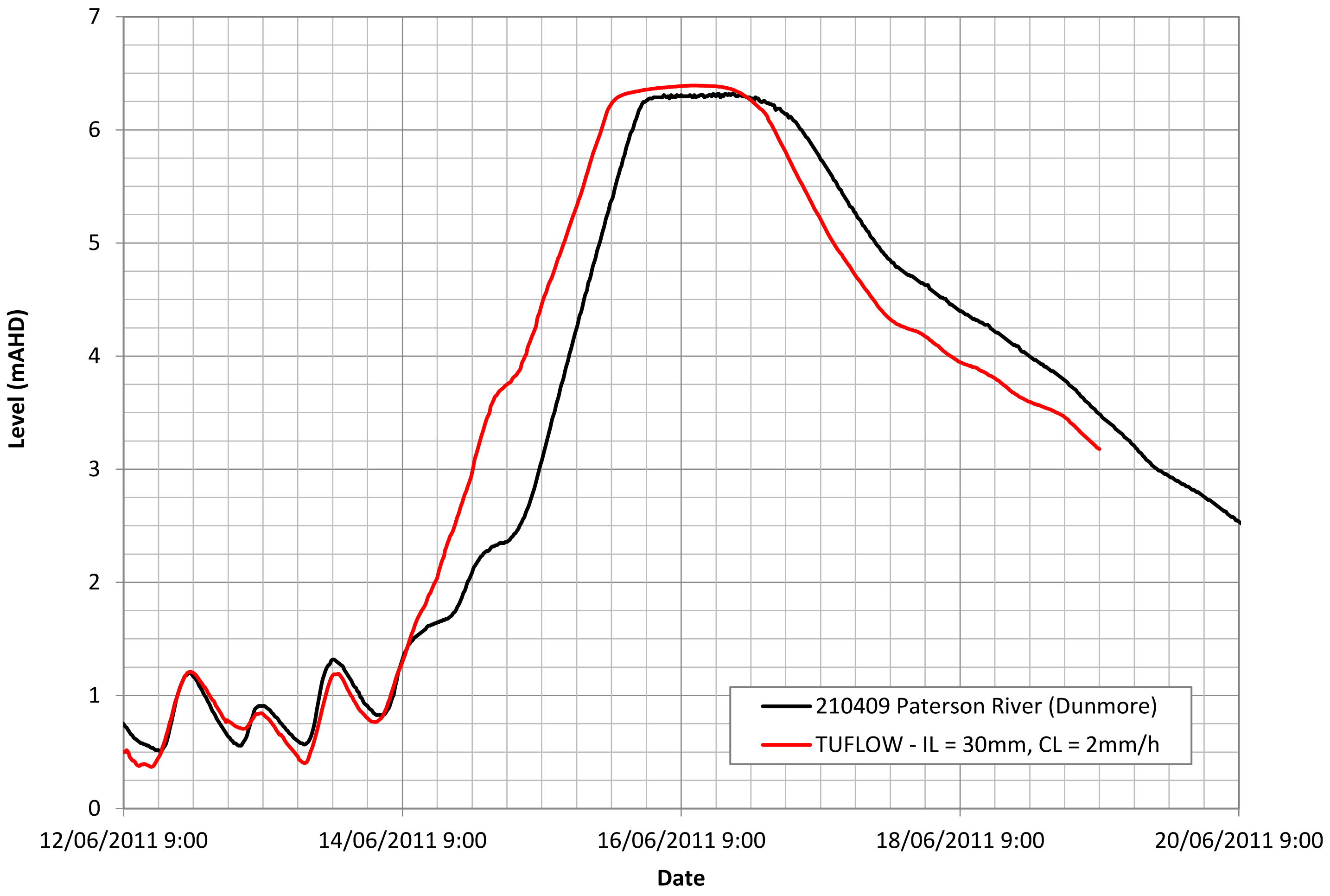
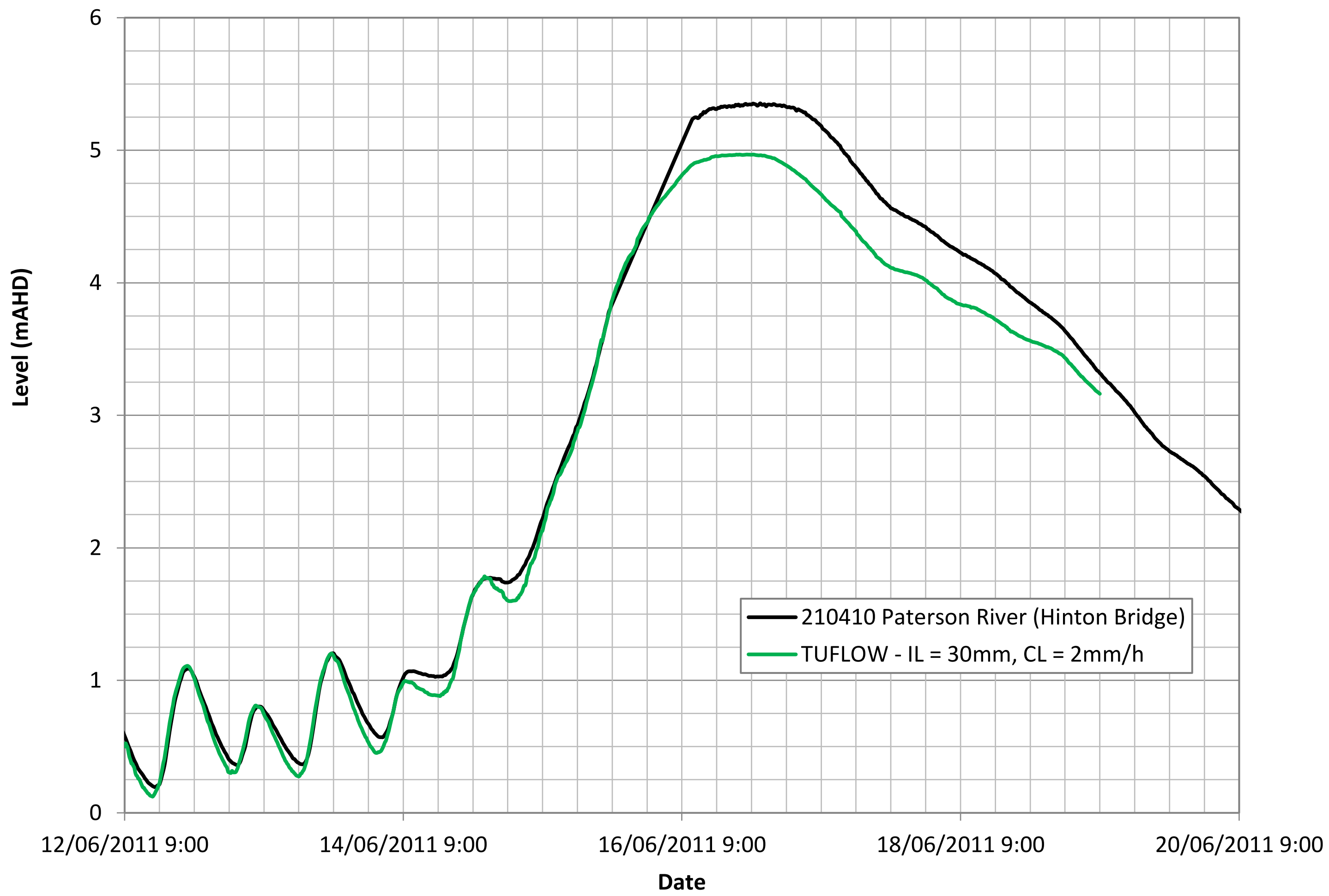


FIGURE B16

HYDRAULIC MODEL CALIBRATION

JUNE 2011 EVENT





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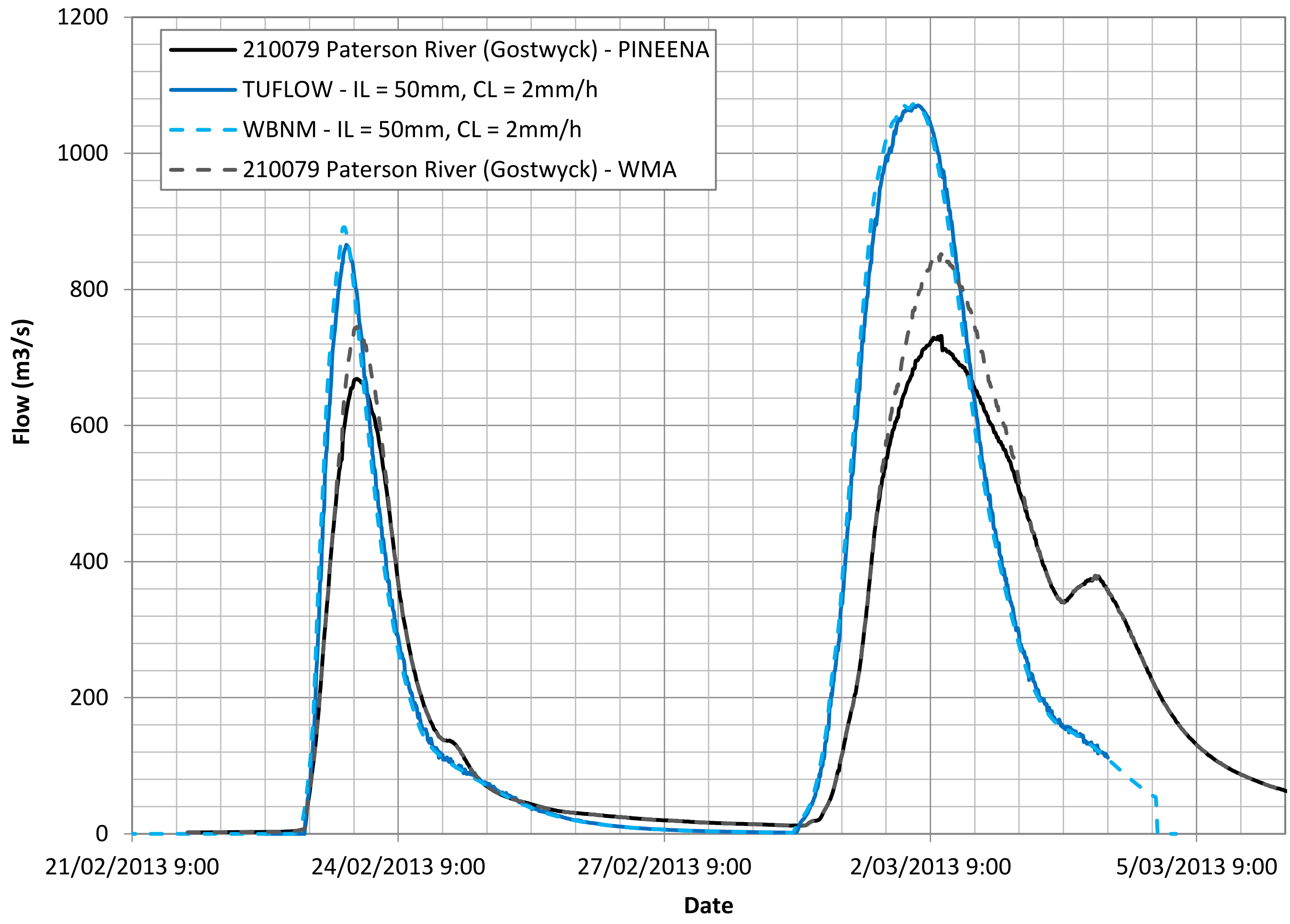

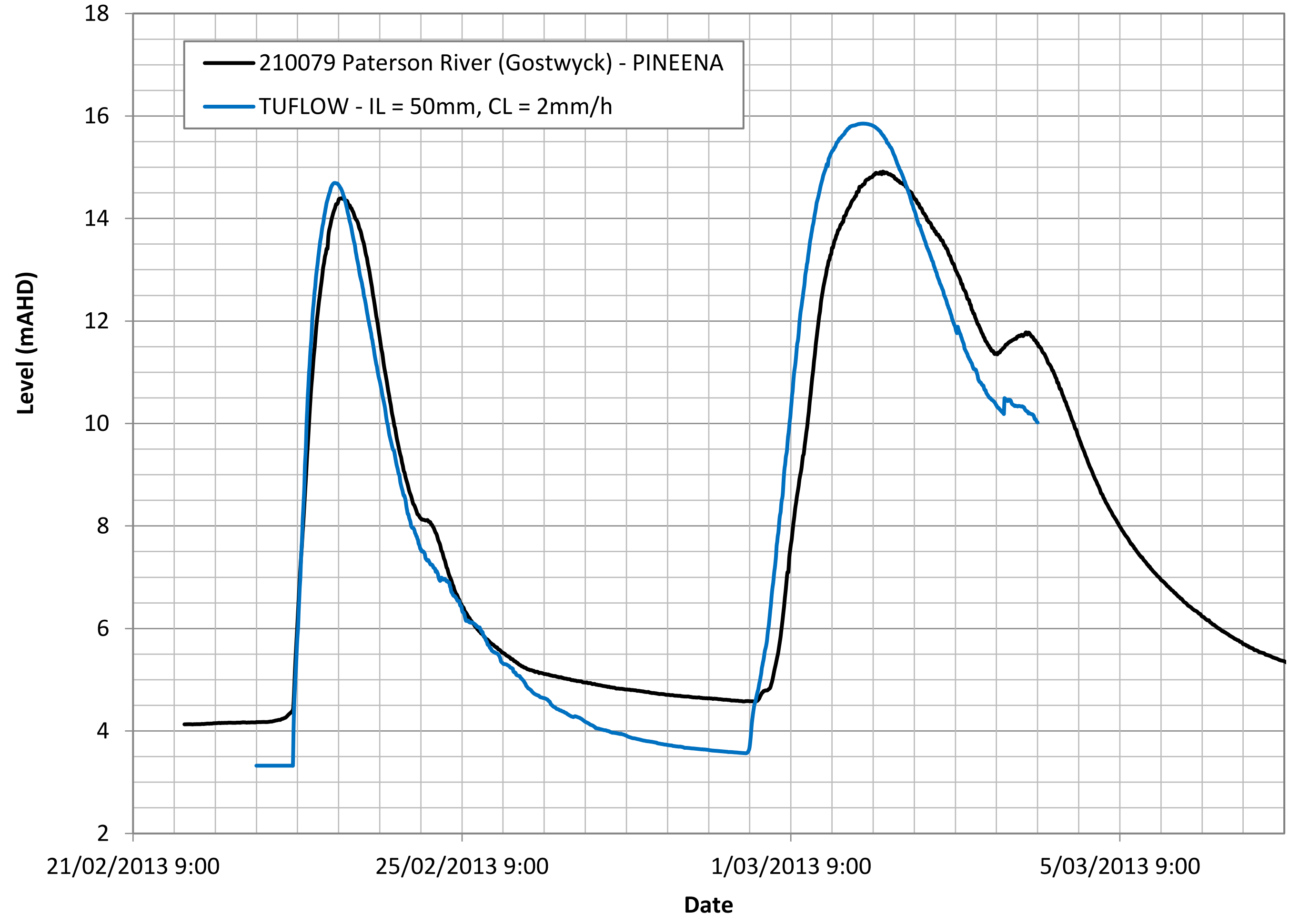

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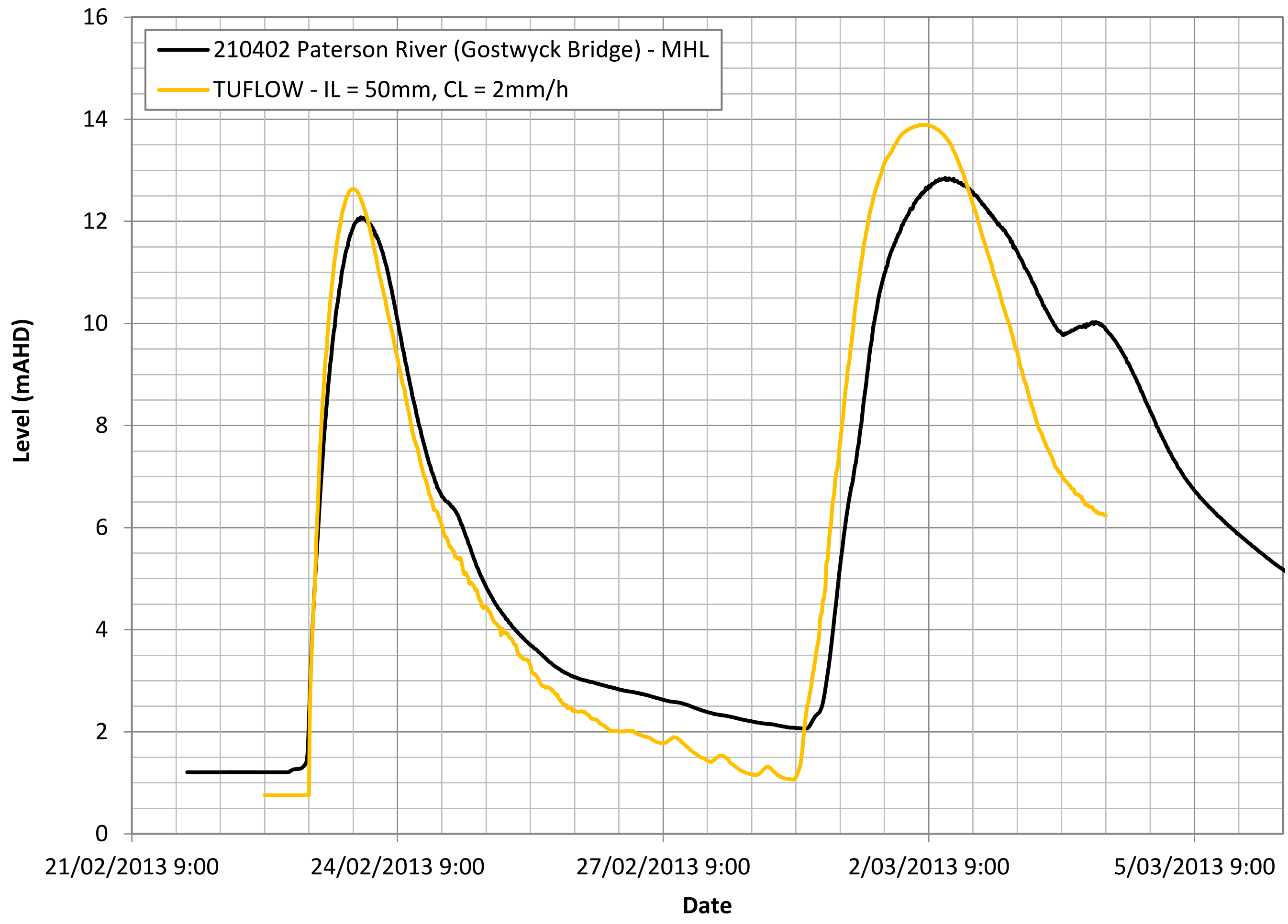

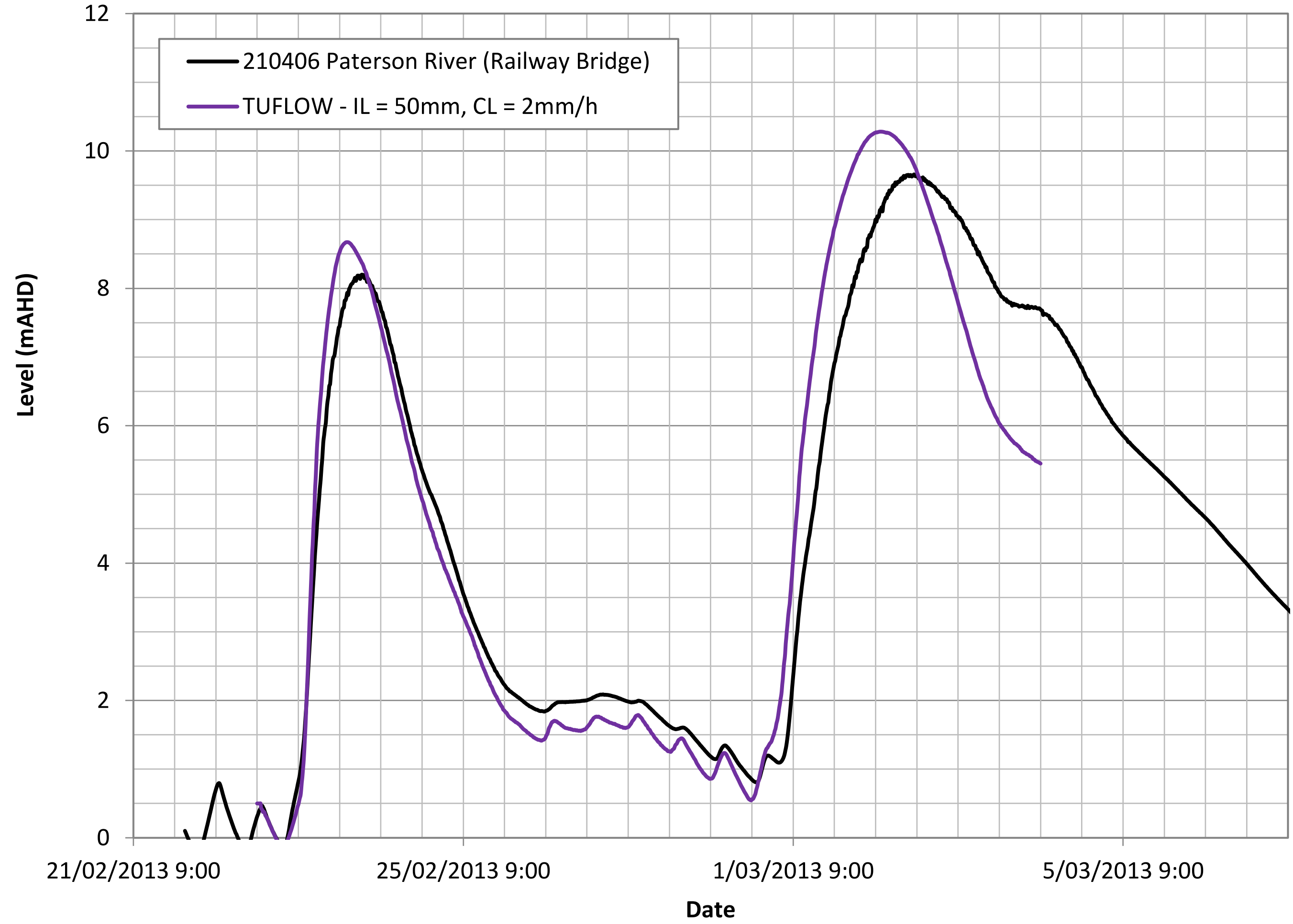

FIGURE B19

HYDRAULIC MODEL CALIBRATION

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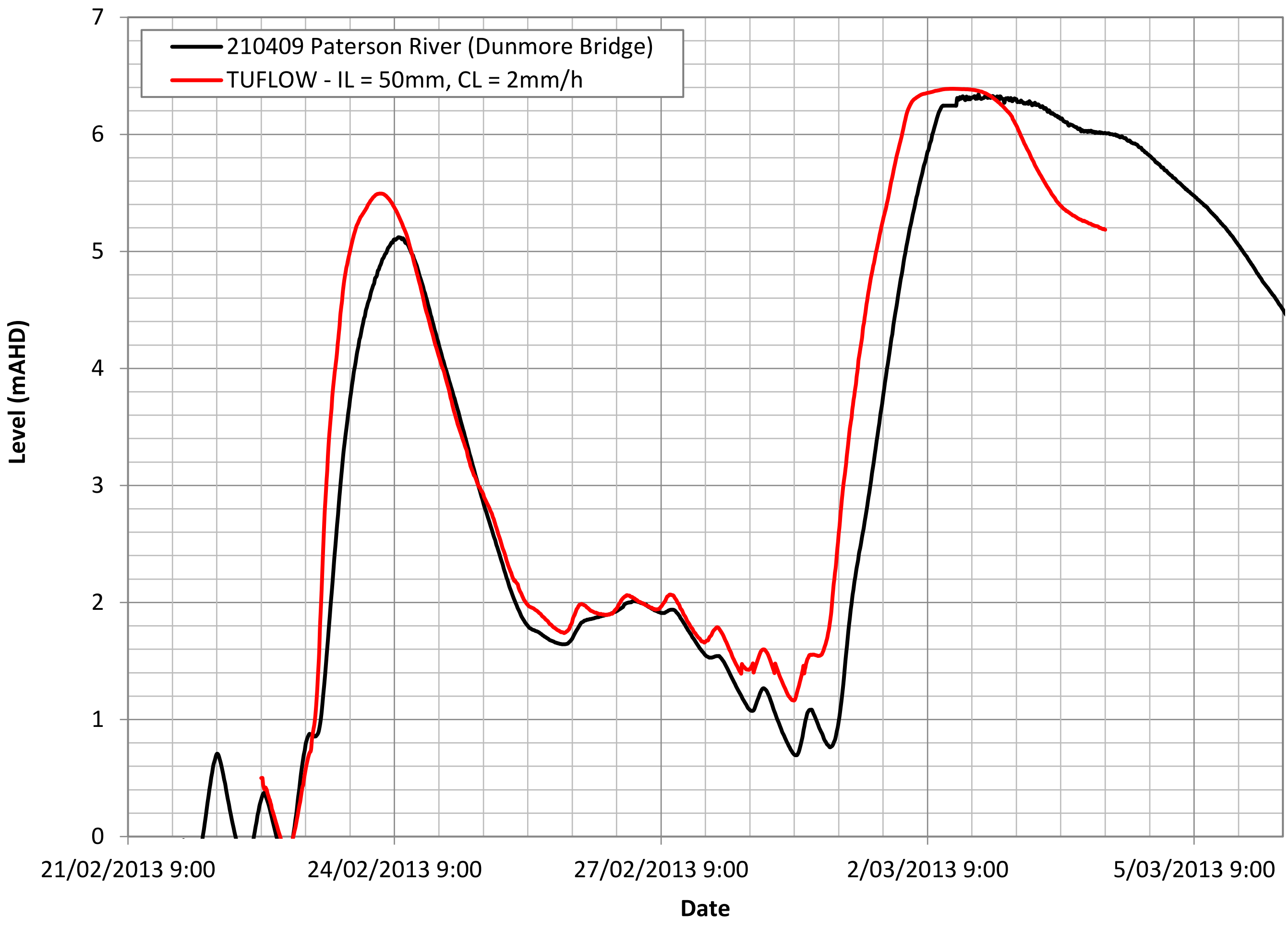


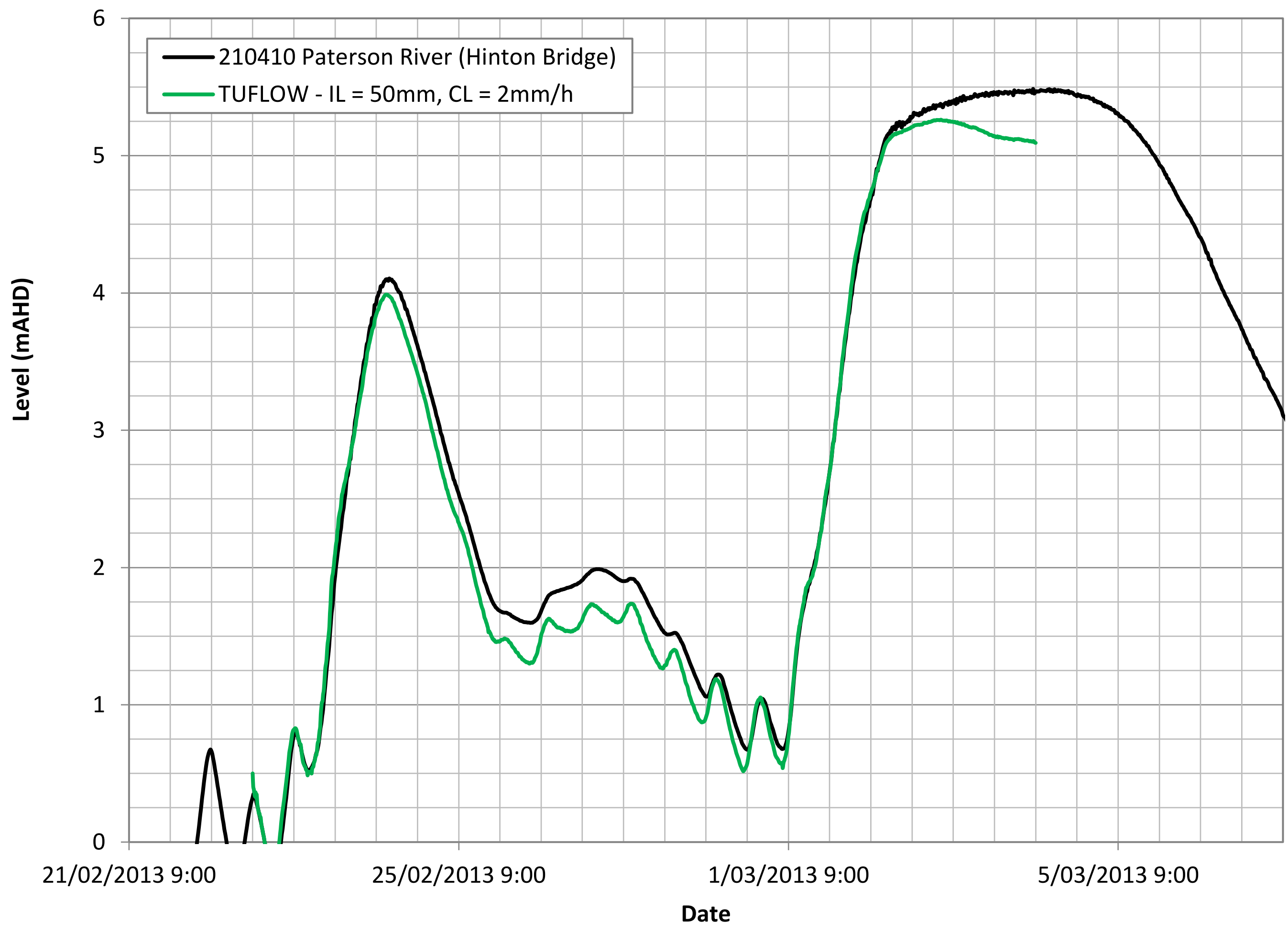
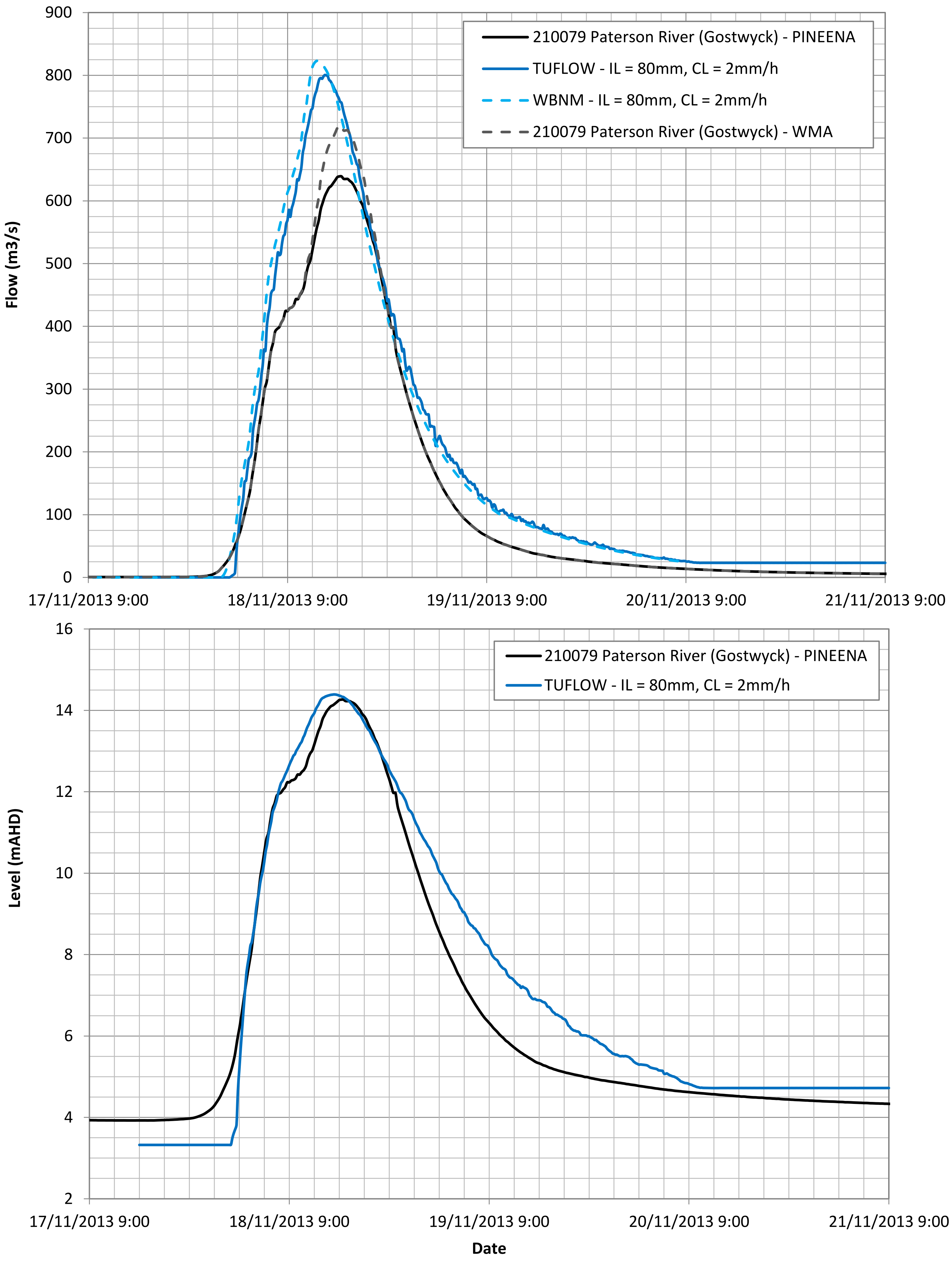


FIGURE B20

HYDRAULIC MODEL CALIBRATION

NOVEMBER 2013 EVENT



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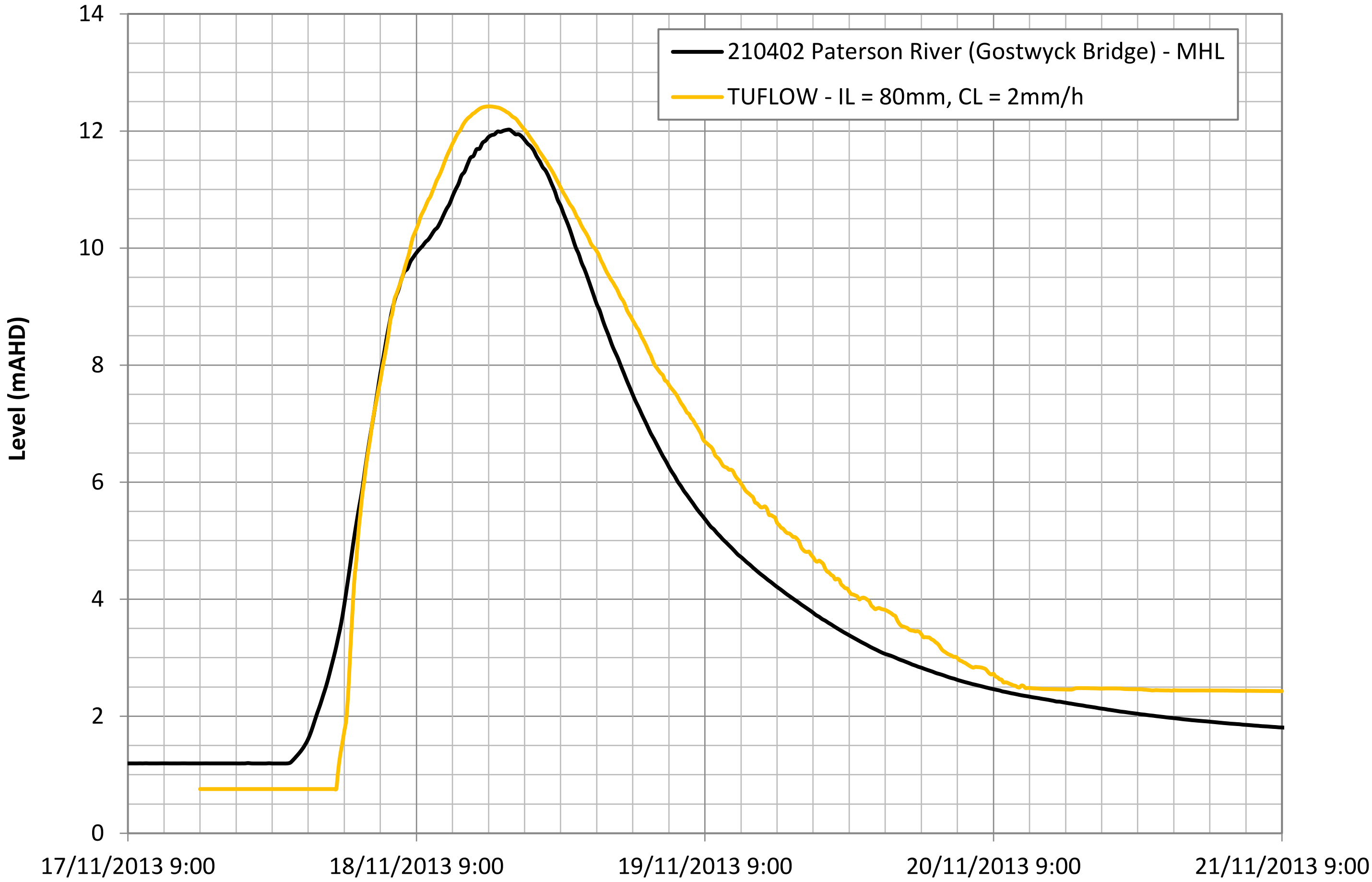

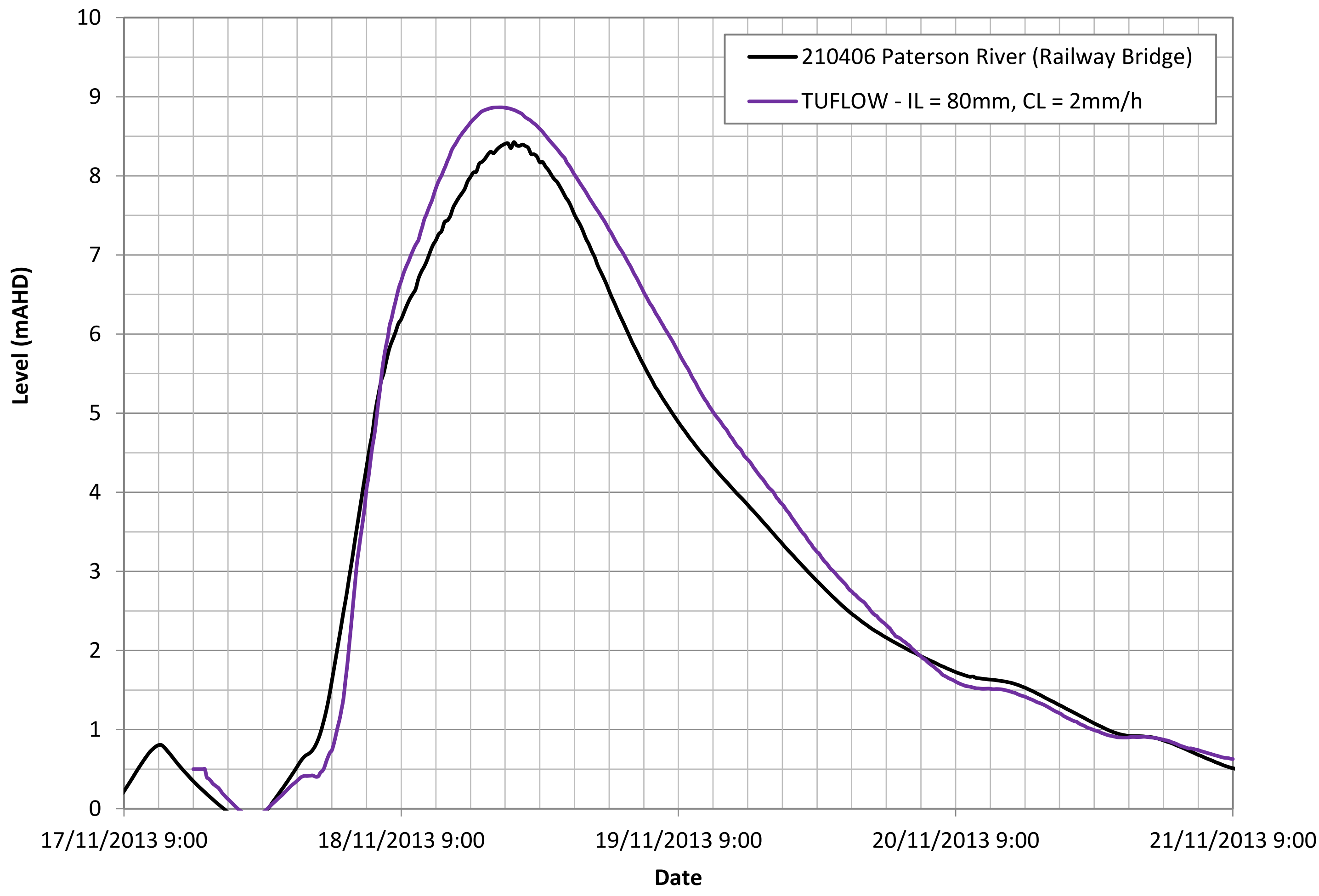

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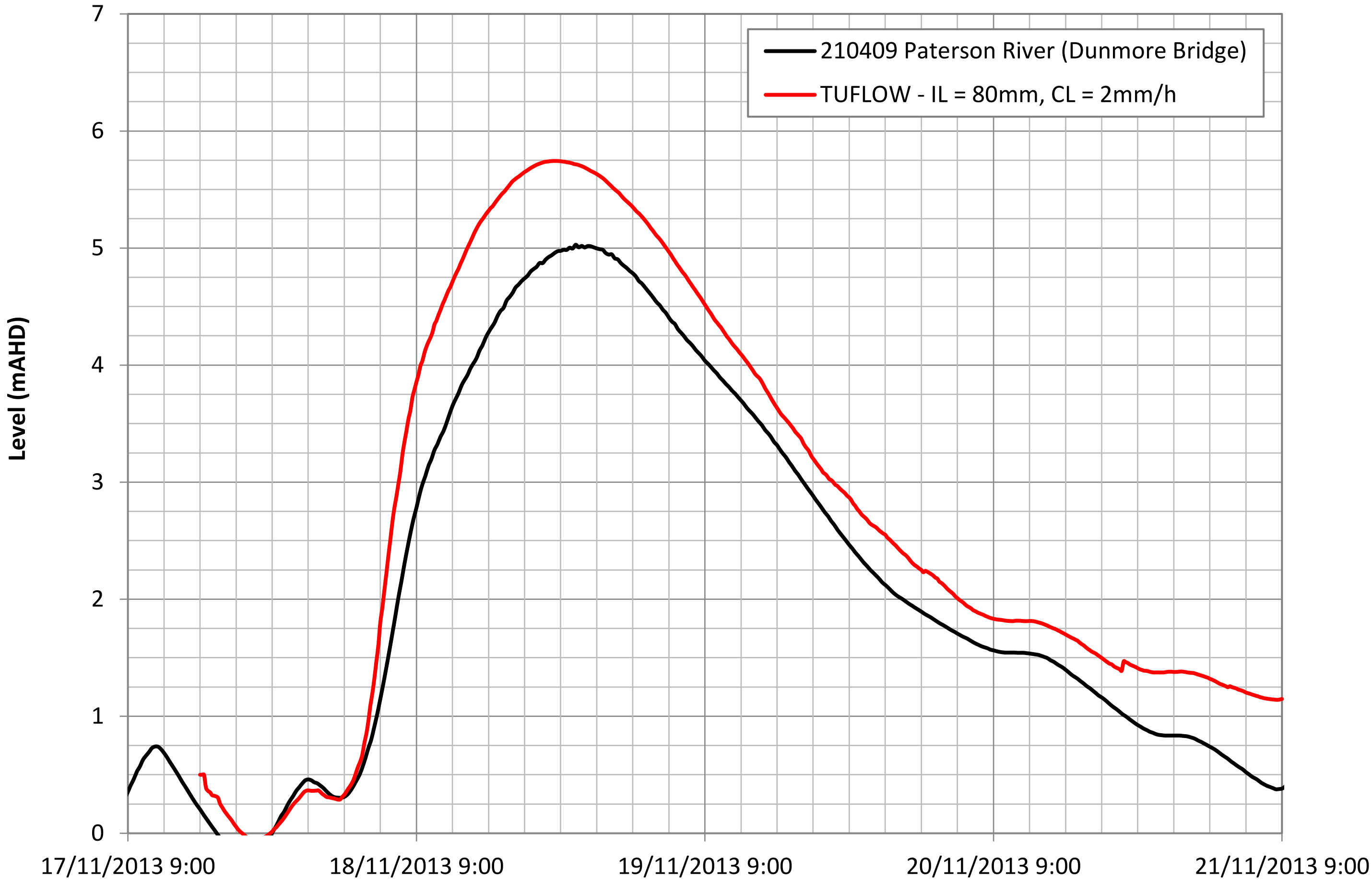

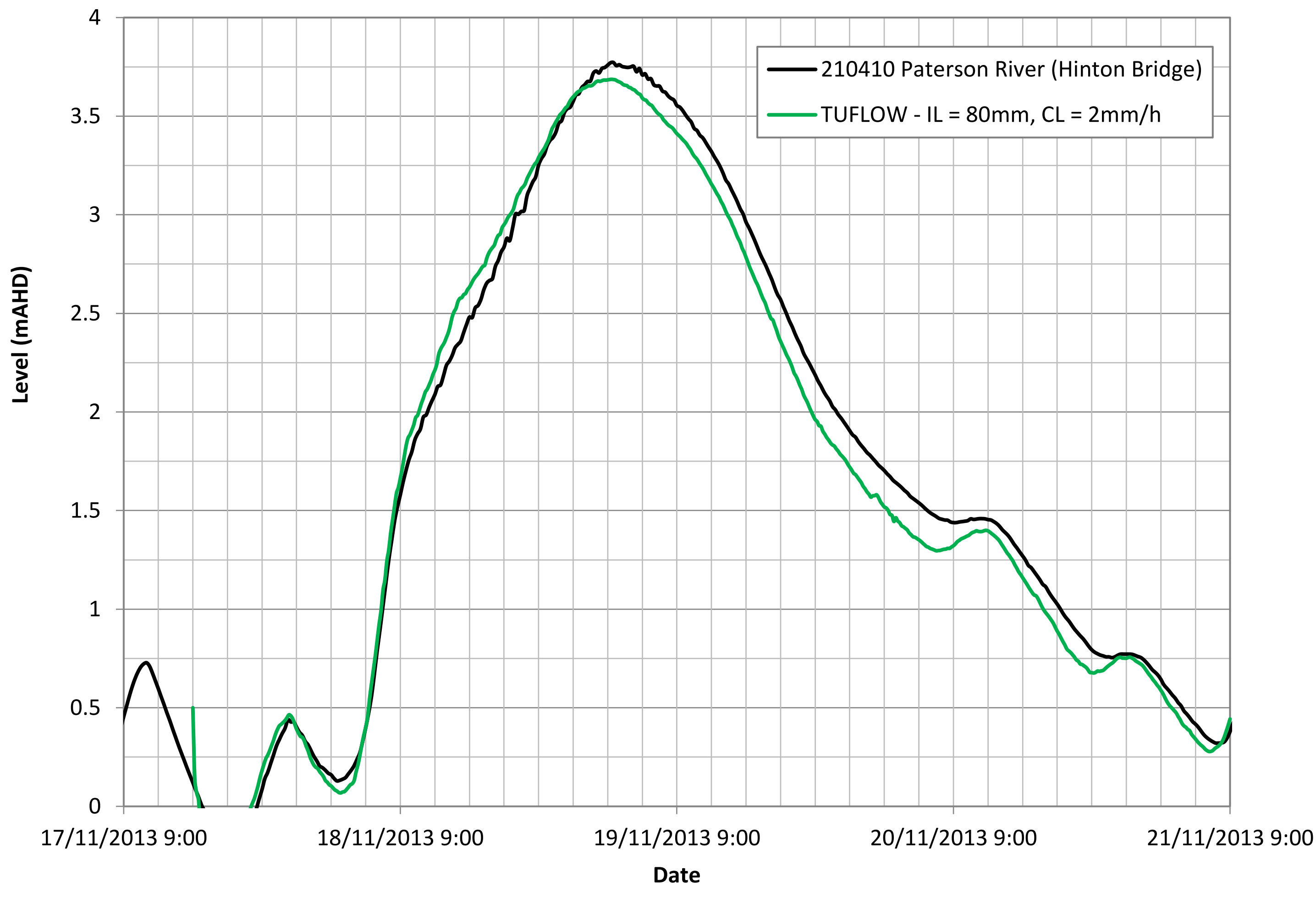

FIGURE B23

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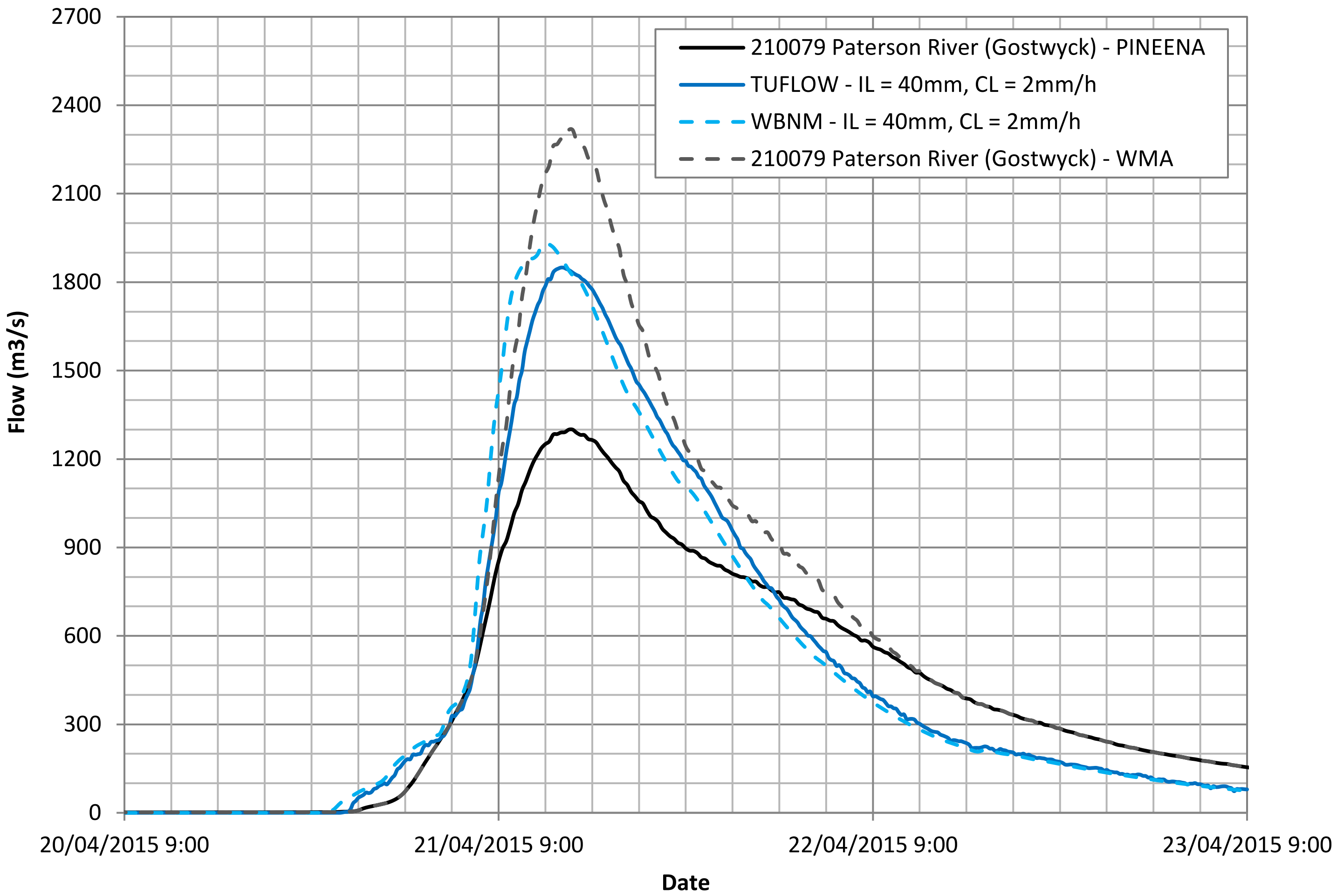
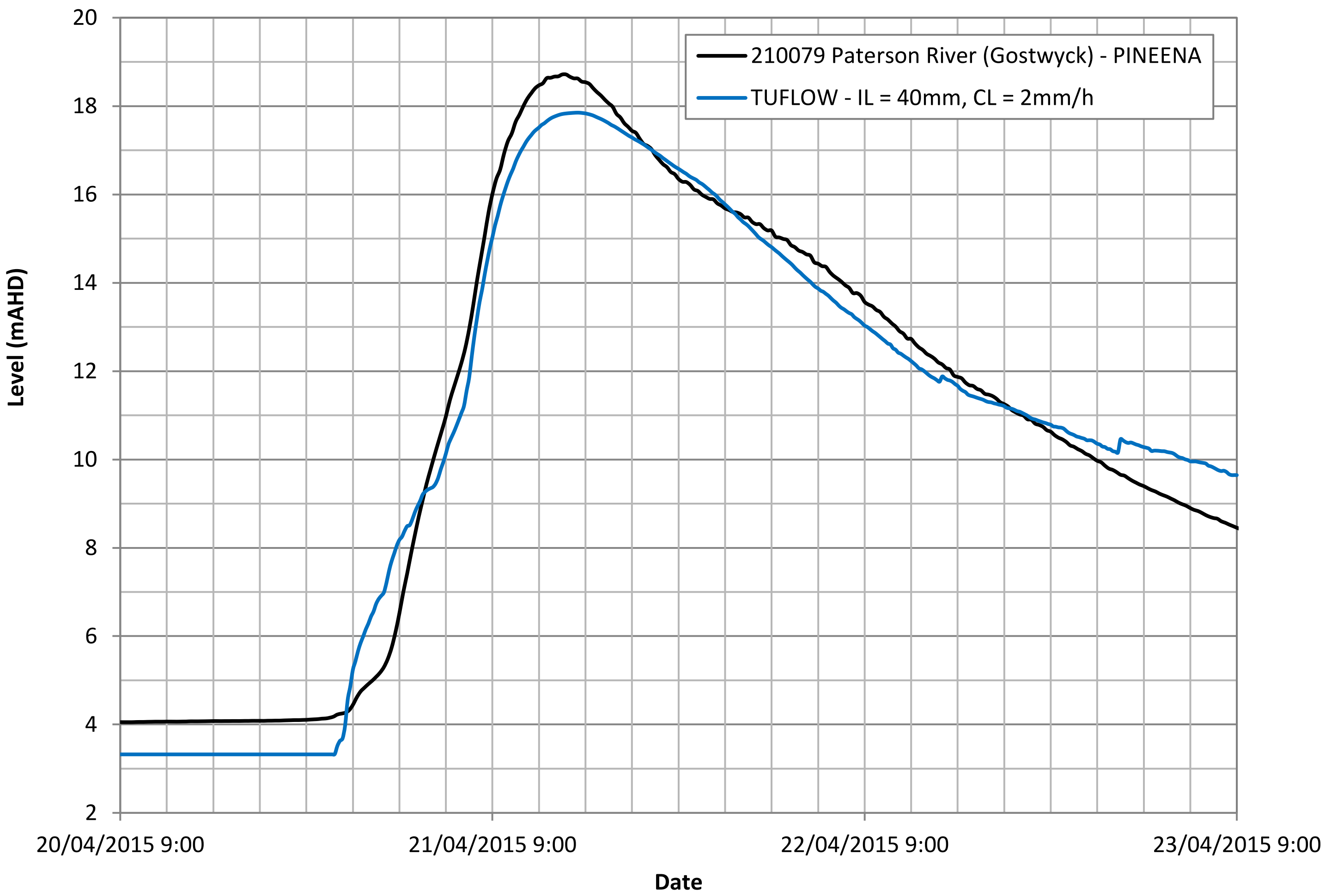
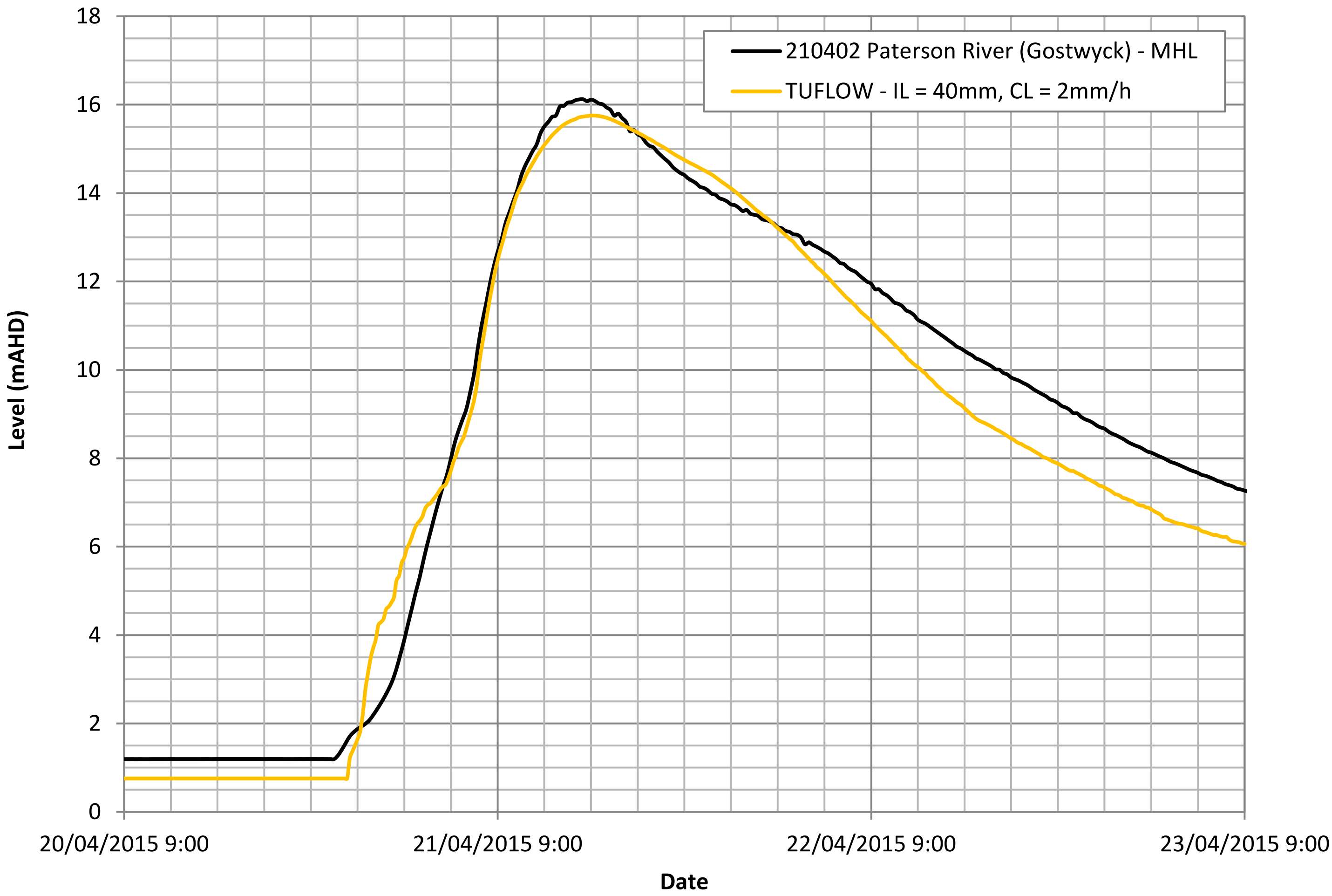
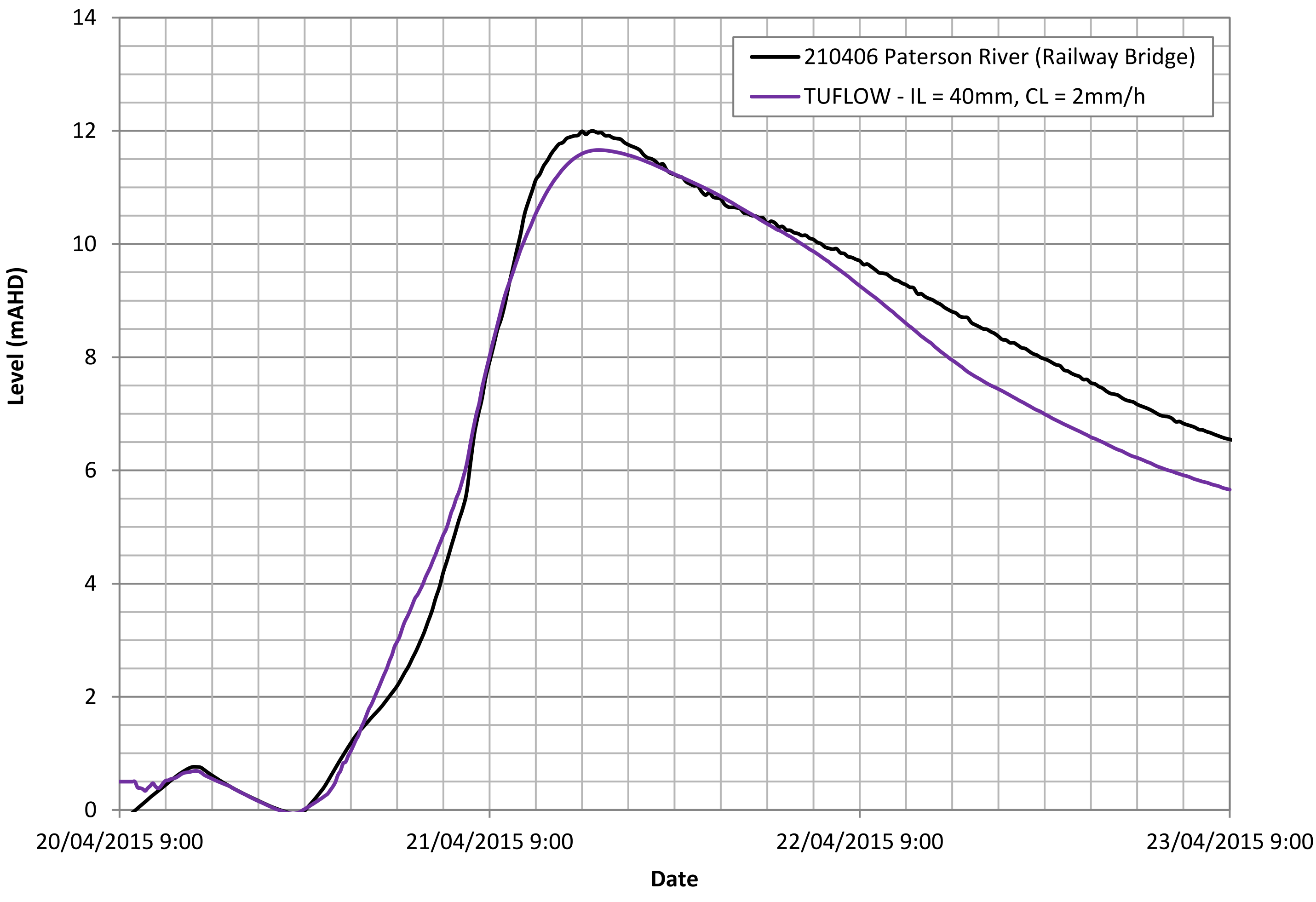




HYDRAULIC MODEL CALIBRATION
APRIL 2015 EVENT





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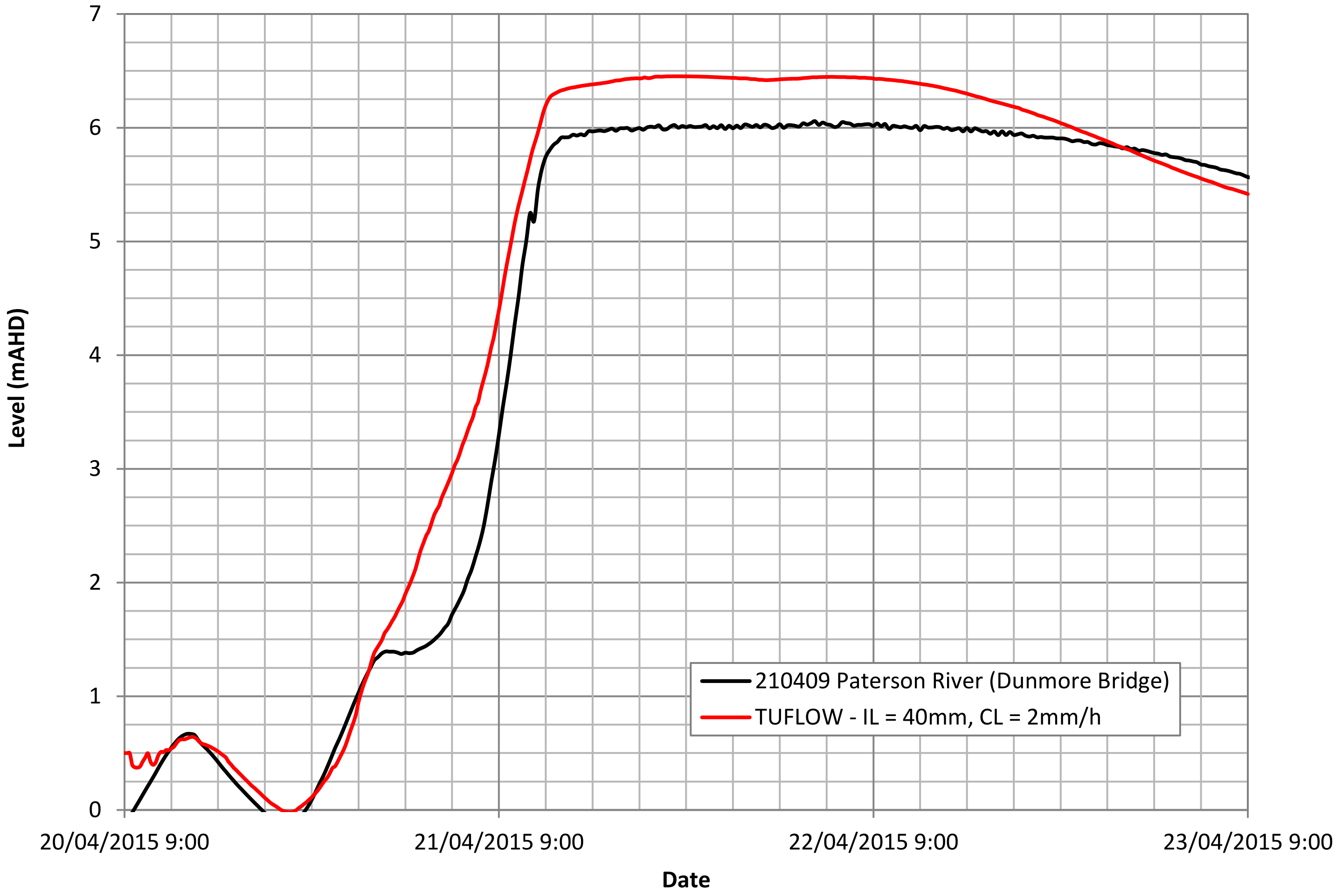

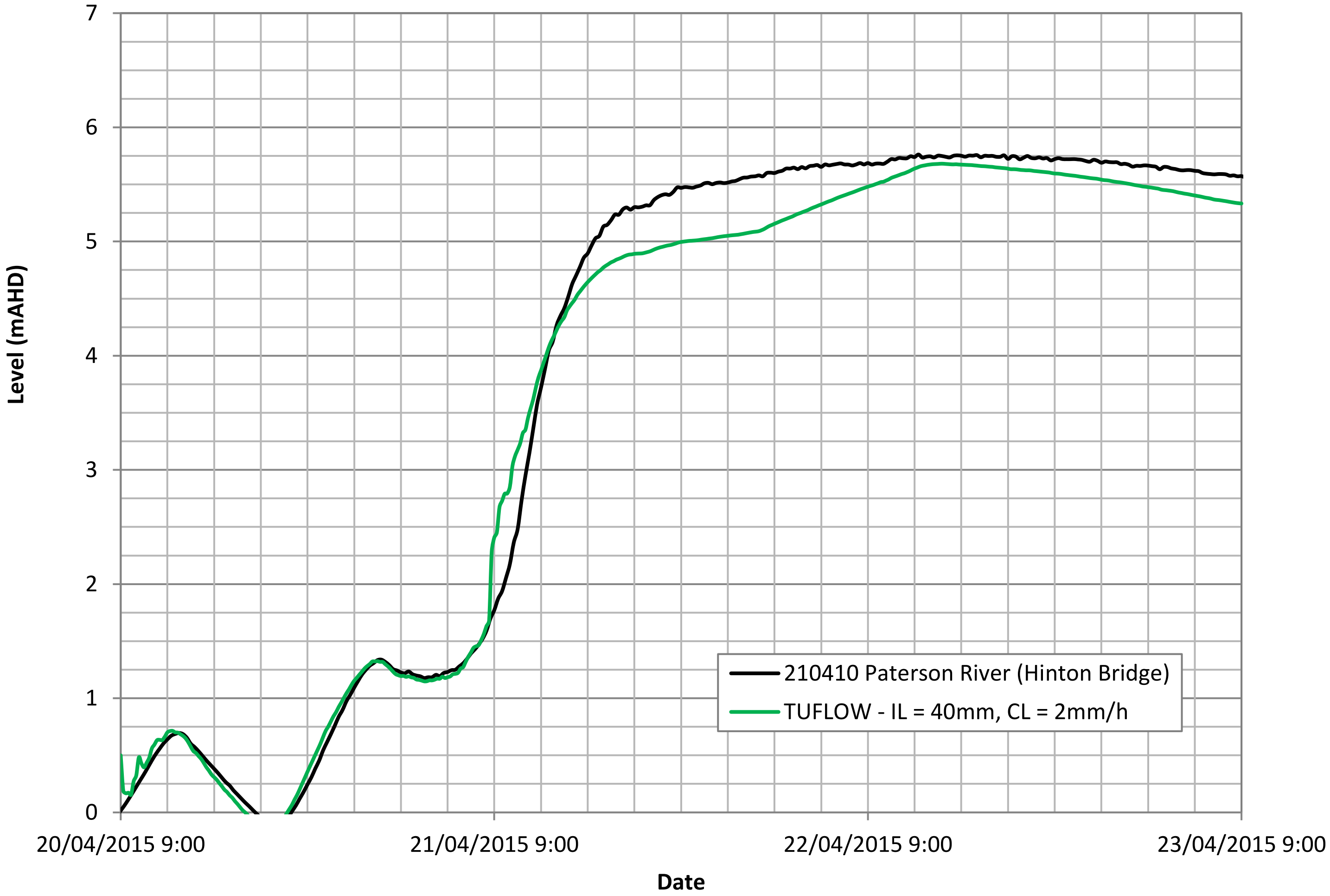

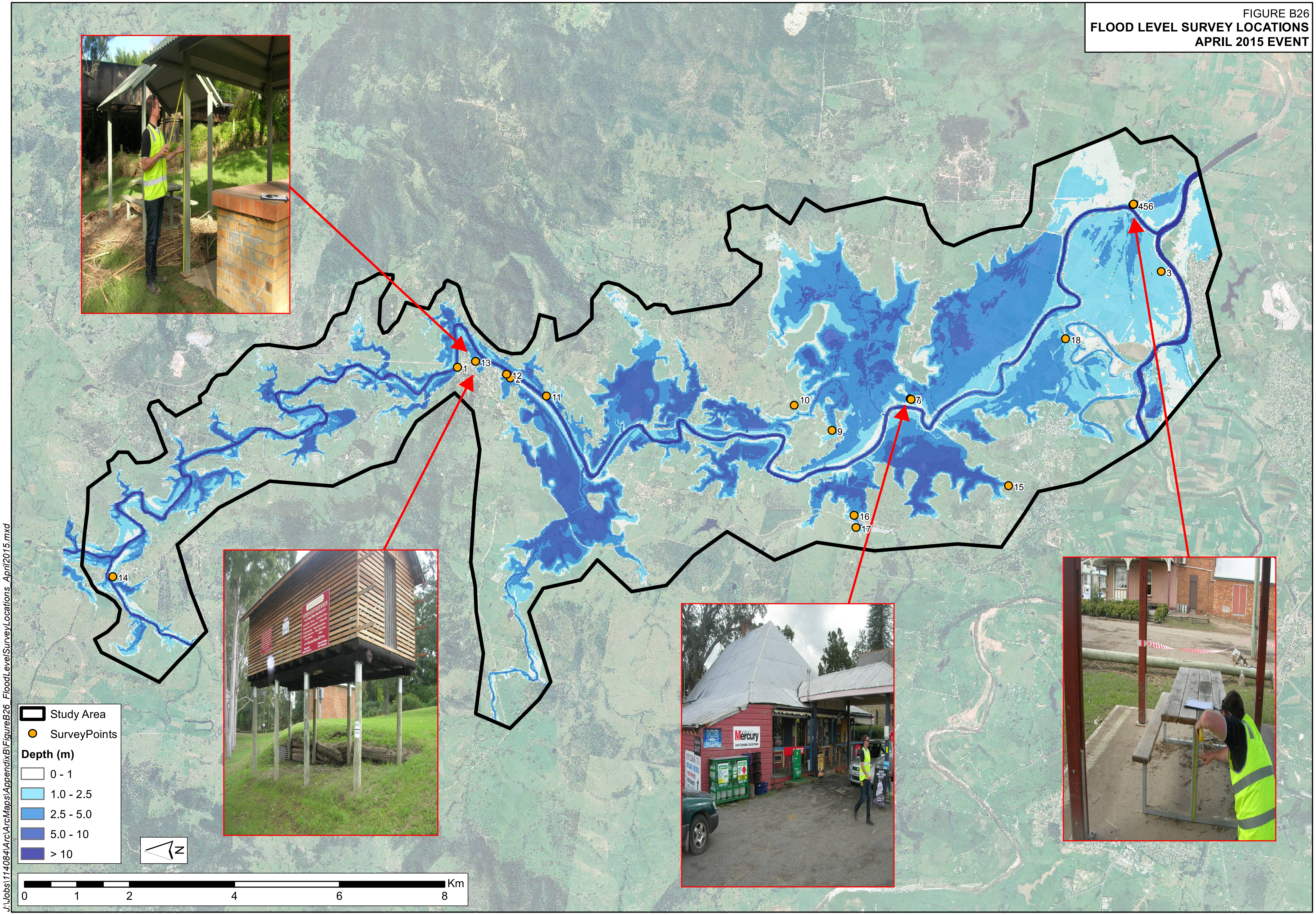

FIGURE B26
FLOOD LEVEL SURVEY LOCATIONS
APRIL 2015 EVENT

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FIGURE B27
BOLWARRA HEIGHTS AND PHONIEX PARK
FLOOD EXTENT MAP
APRIL 2015 EVENT

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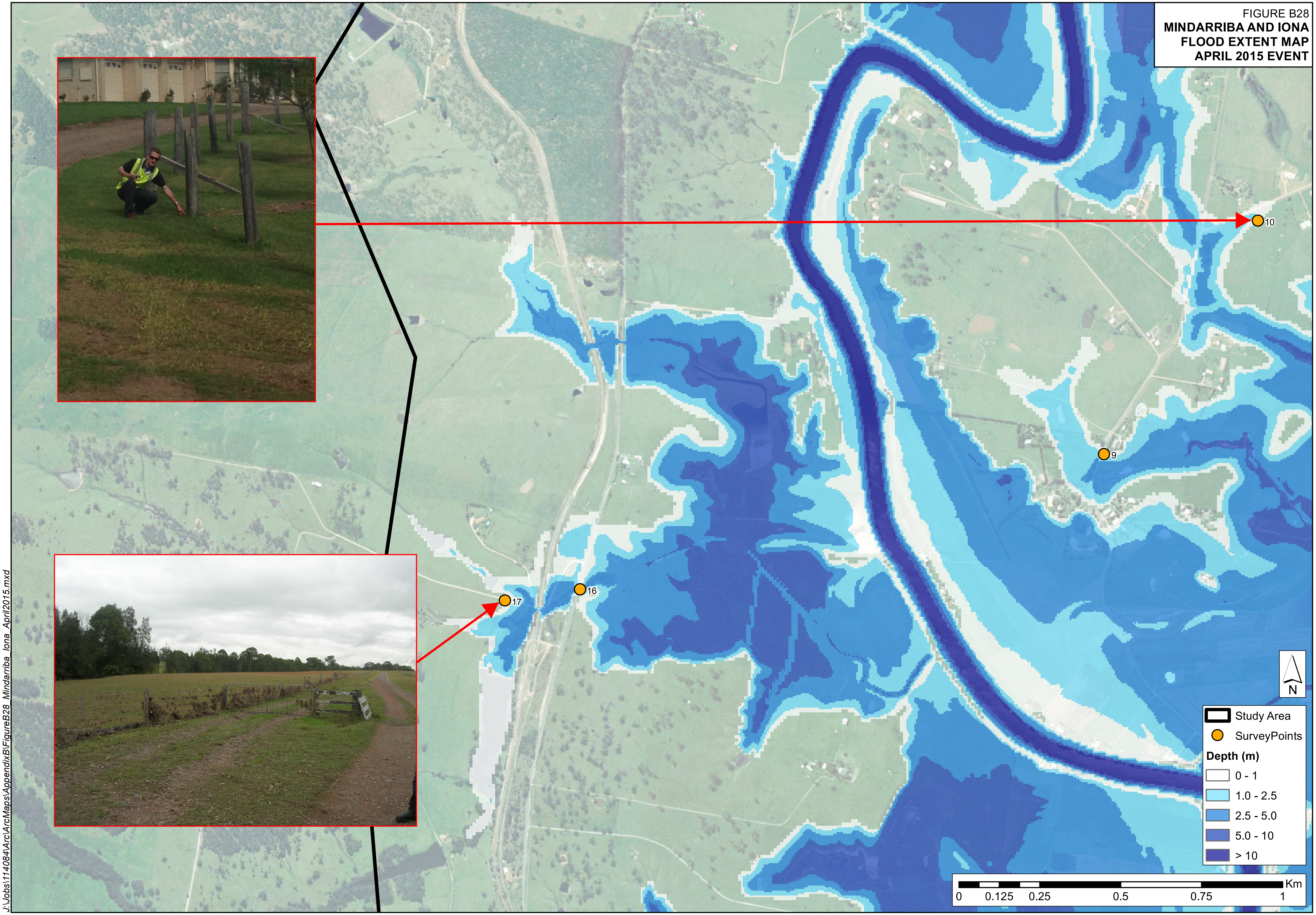

FIGURE B28
MINDARRIBA AND IONA FLOOD EXTENT MAP APRIL 2015 EVENT

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Appendix E

20/10/16.

Paterson River Draft – River Study.
Vacy to Hinton
(closing 21/10/16 at 4pm)

The General Manager.
Maitland Council.

I hereby object to this draft, on the grounds that this will increase flooding to the areas of Phoenix Park, Dunmore Millers Forest and Berry Park areas.

My property is on the banks of the Paterson River.

The levee opposite me, on the Wallalong side has recently been raised – this will now have more flood waters coming to my farm.

I request the levee be put back to what it was.

– Diane Burton
212 Phoenix Park Rd
Phoenix Park (P.O Box 1 Morpeth 2321)
49301477 0429-616-518
email: diane.b212@bigpond.com

20th October, 2016

Exhibition of Draft Paterson River Flood Study Vacy to Hinton.

Draft Study: Reference No. 103/64/4

We refer to the above Draft and have a number of issues:

1. The landholders in Phoenix Park did not receive any survey with regard to this.

2. We would like to know what proposed works that are to be carried out on the levee's and spillways. Has any work been given approval to be commenced prior to any objections, or a draft study being carried out on the Hunter River?

3. We would like to draw your attention to the attached extracts from your draft, stating that both drafts would be required before any work commenced.

4. We therefore object to the work already carried out, which has removed spillways on the Woodville Wallalong side of the Paterson River in the last six months, without any feasibility study in regard to the impact of these works. There was no consultation in regard to this work and when requested to stop we were ignored by the Office of Environment and Heritage, Newcastle. These works in our mind are illegal under the Water Management Act 2000.

We lodge this objection on behalf of the Phoenix Park Landholders.

Raymond Burton
PH: 0418346867

Cyril Suters
Ph: 0249301682

Table 32 – Hunter River Inflows (m^3/s)

Event	Hunter In-bank (m^3/s)	Hunter Left Over-bank (m^3/s)	Hunter Right Over-bank (m^3/s)
50% AEP	713	0	0
20% AEP	1345	0	290
10% AEP	1700	0	631
5% AEP	1781	325	851
2% AEP	1830	1047	1049
1% AEP	1851	1558	1331
0.5% AEP	2060	2653	2845
0.2 % AEP	2100	6274	4533
PMF	2096	9287	7356

Dynamic design tailwater levels for the Hunter River were modelled, based on model results from (Reference 5). The max tailwater levels at the two Hunter River outflow locations are shown in Table 33.

Table 33 – Hunter River Tailwater (mAHD)

Event	Hunter In-bank (mAHD)	Hunter Left Over-bank (mAHD)
50% AEP	3.7	Ground Level
20% AEP	5.0	2.6
10% AEP	5.2	4.3
5% AEP	5.4	4.9
2% AEP	5.7	5.7
1% AEP	5.9	5.9
0.5% AEP	6.3	6.3
0.2 % AEP	7.2	7.3
PMF	8.1	8.2

Note that the results presented below are for Paterson River flooding, in combination with smaller Hunter River flood events as outlined in Table 33. In the lower Paterson River floodplain, the Hunter River design flood levels (from Reference 5) are often the critical level for flood planning and development control purposes. The results from both studies should be considered for floodplain management decision-making.

10.7. Design Flood Modelling Results

The results for the study are presented as:

- Peak flood depth and level contours in Figure C1 to Figure C8
- Peak flood velocities in Figure C9 to Figure C16

10.7.4. Provisional Hydraulic Categorisation

The hydraulic categories, namely floodway, flood storage and flood fringe, are described in the Floodplain Development Manual (Reference 1). However, there is no technical definition of hydraulic categorisation that would be suitable for all catchments, and different approaches are used by different consultants and authorities, based on the specific features of the study catchment in question.

For this study, hydraulic categories were defined by the following criteria, which is similar to the methodology proposed by Howells et. al, 2003 (Reference 14), but modified slightly to be more consistent with other similar studies undertaken in the Port Stephens and Maitland Council areas (e.g. the Williams River and Hunter River flood studies):

- Floodway is defined as areas where:
  - the peak value of velocity multiplied by depth (V x D) > 0.5 m^2/, OR
  - peak velocity > 1.0 m/s AND peak depth > 0.2 m

The remainder of the floodplain is either Flood Storage or Flood Fringe,

- Flood Storage comprises areas outside the floodway where peak depth > 1.0 m; and
- Flood Fringe comprises areas outside the Floodway where peak depth < 1.0 m.

The provisional hydraulic categories mapping is shown on Figure C20 to Figure C22.

Port Stephens Council advised that their development control policies also require consideration of a rainfall intensity increase of 20%, as well as sea level rise. It was established in Reference 5 that projected sea level rise benchmarks through to 2100 do not significantly affect design flood levels in the Hunter and Paterson River upstream of Green Rocks. Additional mapping of hydraulic categories was therefore created for the following scenario:

- 1% AEP Paterson River design storm with 20% increased rainfall intensity.

The provisional hydraulic categories mapping incorporating 20% increase in Paterson River rainfall intensity is shown on Figure D2 (Appendix D).

Note that this mapping does not include consideration of the Hunter River 1% AEP design flood event (Reference 5), which should also be considered for development control planning.

12. RECOMMENDATIONS

It is recommended that following the conclusion and adoption of the Paterson River Flood Study, combined flood level and DCP mapping be developed utilising results from the Paterson River Flood Study and the Hunter River Flood Study (Reference 5). The DCP mapping can be tailored to meet each Council's individual needs or developed after a consultation process with all stakeholders.

For areas downstream of Dunmore Bridge the 1% AEP flood levels from the Hunter River Flood Study (Reference 5) are to be used for developmental purposes.

RECOMMENDATIONS

It is recommended that following the conclusion and adoption of the Paterson River Flood Study, combined flood level and DCP mapping be developed utilising results from the Paterson River Flood Study and the Hunter River Flood Study (Reference 5). The DCP mapping can be tailored to meet each Council's individual needs or developed after a consultation process with all stakeholders.

DESIGN FLOOD ESTIMATION

Two approaches were investigated to determine design flood magnitude. Flood Frequency Analysis and design rainfall modelling were both undertaken with similar results for peak flow at key gauges. The design rainfall approach was adopted as it provides a more holistic result for the entire study area, especially in regard to flood mapping of the Paterson River floodplains and tributaries.

The study included modelling of the 20%, 10%, 5%, 2%, 1%, 0.5%, 0.2% AEP and PMF design flood events, with mapping provided for peak flood depths and levels, peak velocities, hydraulic hazard and hydraulic categories.

KEY OUTCOMES

The study has quantified flood behaviour in the study area and the modelling tools that have been developed will assist Maitland City Council, Port Stephens Council and Dungog Council to undertake flood related planning decisions for future and existing development. A summary of key outcomes is as follows:

- The April 2015 flood event was equivalent to between a 2% and 1% AEP event in the study area;
- Vacy Bridge is above the 1% AEP flood level but overtopped in the 0.5% AEP event;
- Gostwyck Bridge is above the 0.5% AEP level but overtopped in the 0.2% AEP event;
- Paterson Road Bridge is above the 0.5% AEP level but overtopped in the 0.2% AEP event;
- Webbers Creek Bridge is above the 10% AEP level but overtopped in the 5% AEP event;
- Dunmore Bridge is above the 0.2% AEP level;
- The Horns Crossing causeway on the Allyn River is impassable in all events modelled.
- Major roads throughout the catchment are cut in events beginning at the 20% AEP event. This has implications for emergency response planning as well as planning future development in the catchment;
- The primary damages resulting from flooding in the study area are likely to be infrastructure damage to roads, bridges and railway lines, damages to agricultural equipment (farm machinery, structures, fences, etc.), and loss of crops and livestock;
- Existing residential and commercial buildings are generally at a low risk from flooding.
- This flood study will provide planning tools for Council to mitigate flood risk to future development in the catchment.

The outcomes relating to road closures are expected to be mainly of interest to the SES in formulating flood response procedures.

Note that the results presented in this study are for Paterson River flooding, in combination with smaller coincident Hunter River flood events. In the lower Paterson River floodplain, the Hunter River design flood levels (from Reference 5) are often the critical level for flood planning and development control purposes. The results from both studies should be considered for floodplain management decision-making.

Several of the roads in the study area are cut in relatively frequent events such as the 20% AEP. A summary of the frequency of inundation for major roads and bridges is given in Table 40.

Table 40 – Summary of Overtopping Frequency for Major Bridges and Roads

Location ID (Figure 35)	Bridge/Road	Waterway	Overtopping Event
2	Vacy Bridge	Paterson River	Between 1% and 0.5% AEP
R2	Gresford Rd	Floodplain	Between 5% and 2% AEP
3	Horns Crossing	Allyn River	< 20% AEP
5	Gostwyck Bridge	Paterson River	Between 0.5% and 0.2% AEP
R5	Gresford Rd Paterson	Floodplain	Between 10% and 5% AEP
R6	Tocal Rd & Queen St	Floodplain	< 20% AEP
R7	Tocal Rd Paterson	Floodplain	Between 10% and 5% AEP
7	Paterson Rd Bridge	Paterson River	Between 0.5% and 0.2% AEP
R9	Tocal Rd Webbers Creek	Webbers Creek	< 20% AEP
R10	Webbers Creek Bridge	Webbers Creek	Between 10% and 5% AEP
R11	Paterson Rd Dunns Creek	Dunns Creek	Between 10% and 5% AEP
R12	Paterson Rd Iona	Floodplain	Between 20% and 10% AEP
R13	Iona Public School	Floodplain	Between 20% and 10% AEP
R14	Clarence Town Road Woodville	Floodplain	Between 10% and 5% AEP
13	Dunmore Bridge	Paterson River	Between 0.2% AEP and PMF
R16	Phoenix Park Rd - Largs	Floodplain	Between 20% and 10% AEP
R17	Wallalong Rd	Floodplain	Between 2% and 1% AEP
R18	Butterwick Rd	Floodplain	< 20% AEP
R19	High Street (between Hinton and Wallalong)	Floodplain	Between 5% and 2% AEP

10. DESIGN EVENT MODELLING

10.1. Overview

Design flood levels in the study area are a combination of inflows from the Paterson and Allyn Rivers upstream of Vacy, rainfall over the catchment downstream of Vacy and Hunter River inflows upstream of McKimms Corner (Reference 5). The design flows determined from the design rainfall approach were very similar to the flows determined from the FFA. Therefore the design rainfall approach has been used as it provides a more holistic result for the entire study area, especially in regard to flood mapping of the Paterson River floodplains and tributaries. A comparison of the flows at the Gostwyck PINEENA gauge (210079) for the design rainfall and FFA approach are shown in Table 28.

Table 28 – Comparison of Flows (m^3/s) – Design Rainfall vs FFA

Event	Design Rainfall (m^3/s)	FFA (m^3/s)
20% AEP	1000	820
10% AEP	1280	1190
5% AEP	1680	1570
2% AEP	2130	2100
1% AEP	2530	2520
0.5% AEP	2990	2950

10.2. Upstream Inflows

Design peak inflows from the Paterson River and Allyn River are shown in Table 29.

Table 29 – Paterson River and Allyn River Design Peak Inflows

Event	Paterson River (m^3/s)	Allyn River (m^3/s)
20% AEP	566	487
10% AEP	726	610
5% AEP	936	795
2% AEP	1172	1015
1% AEP	1403	1222
0.5% AEP	1647	1439
0.2 % AEP	1979	1736
PMF	4568	3855

A reasonable match is made to all the flood marks except for flood mark 16 which was considered to be of low accuracy due to poor visibility of the actual mark inside the culvert. A good match was made to the flood extent marks shown in Figure B27 at Bolwarra Heights and the levee on Phoenix Park Road. The flood mark recorded on the levee shows the levee did not overtop which was replicated in the model. The break out at Iona is shown Figure B28 with a good match to the flood extent recorded.

Table 23 – Peak Flood Levels April 2015

Gauge	Recorded (mAHD)	Modelled (mAHD)	Difference	Percentage	Calibration
Gostwyck - 210079	18.72	17.85	-0.87	-4.6%	Good
Gostwyck Bridge - 210402	16.12	15.75	-0.37	-2.3%	Good
Paterson RB -210406	11.99	11.66	-0.33	-2.8%	Good
Dunmore - 210409	6.06	6.45	0.39	6.4%	Fair
Hinton Bridge - 210410	5.76	5.68	-0.08	-1.4%	Good