

APPENDIX A: CONSULTATION

Appendix A-1 Media Releases

Appendix A-2 Notification Letters

Appendix A-3 Community Newsletter and Questionnaires

Appendix A-1 Media Releases

Friday 8 March 2013. All applicants will be contacted by 5pm on Friday 8 March. The Public Access Forum policy and application forms are available on Council's website or by phoning (02) 4227 7111.

Independent Hearing and Assessment Panel (IHAP) Meeting

Thursday 14 March at 5pm

Council's Administration Building, Level 9, Function Room

The next IHAP meeting will consider the following development applications:

1. DA-2012/1194
25 Cedar Grove, Keiraville. Residential – alterations and additions to dwelling house.
2. DA-2006/1156/B
14–16 Virginia Street, Wollongong. Demolition of all existing structures/buildings and construction of a multi-unit residential flat building comprised of 22 x 3-bedroom apartments over basement parking. Modification B: increase building height, additional awnings and internal changes.
3. DA-2010/439/A
317–321 Lawrence Hargrave Drive, Clifton (Clifton Hotel). Alterations and additions to existing Imperial Hotel building, continued use as a pub/restaurant, with parking for 24 vehicles, 2 motorcycle spaces, 7 bicycle spaces and landscaping works. Modification to condition 15.
4. DA-2006/1525/C
68 Cliff Road, Wollongong. Demolition of building and construction of 6-storey residential flat building comprising 4 units. Modification C: the consolidation of 5 units into 2 units, internal rearrangement of plans, simplification of elevations, reduction of height and deletion of 3 car parking spaces.

The meeting agenda and business paper will be available on Council's website no less than five days prior to the meeting.

If you wish to speak at the meeting please register with the IHAP Coordinator by close of business Wednesday 13 March 2013 on (02) 4227 7285 or by emailing lwilson@wollongong.nsw.gov.au.

Please note that each speaker will be allocated 3 minutes to speak unless extended time is agreed to by the Panel Chair.

→ HAVE YOUR SAY

Neighbourhood Forums

Neighbourhood Forums are community groups that meet monthly to help solve local problems. To get involved please visit Council's website or contact the Community Engagement Team on (02) 4227 7096.

- **Helensburgh – Area 1**
Wednesday 13 March at 7pm
Helensburgh Community Centre, Walker Street, Helensburgh
- **Coledale – Area 2**
Thursday 14 March at 7pm
Coledale Community Centre, Lawrence Hargrave Drive, Coledale
- **Thirroul – Area 3**
Tuesday 19 March at 7pm
Thirroul Library & Community Centre,
Lawrence Hargrave Drive, Thirroul
- **Wollongong – Area 5**
Wednesday 6 March at 7pm
Wollongong Town Hall, Cnr Crown and Kembla Streets, Wollongong
- **Unanderra – Area 6**
Thursday 14 March at 7pm
Unanderra Community Centre, Princes Highway, Unanderra
- **Berkeley – Area 7**
Tuesday 19 March at 6pm
Illawarra Yacht Club, Northcliffe Drive, Warrawong
- **Dapto – Area 8**
Wednesday 13 March at 7pm
Dapto Ribbonwood Centre, Princes Highway, Dapto

Review of Flood Studies

Council has recently started to review its flood studies for Towradgi Creek, completed in 2003, and Hewitts Creek, completed in 2012. The review will update these studies to account for subsequent changes in the catchment and improvements in flood modelling software. Residents in these study areas will receive a newsletter containing details of the study and a questionnaire. The questionnaire is to help us to collect essential historic flood information. Please take a few minutes to complete the survey and return it in the reply-paid envelope provided by Friday 29 March 2013.

• Towradgi Creek Flood Study

The study area includes the catchments of seven main tributaries (including Towradgi Creek itself) which are in the suburbs of Tarrawanna, Corrimall and Towradgi. For more information visit <http://towradgicreek.bmtwbm.com.au/> or contact Yelia Perera at Council on (02) 4227 7205, or Simon Kovacevic at BMT WBM Pty Ltd on (02) 8987 2900.

• Hewitts Creek Flood Study

The study area includes the catchments of Hewitts, Slacky, Tramway, Woodlands, and Thomas Gibson Creeks which are in the suburbs of Bulli and Thirroul. For more information about this study, please visit <http://hewittscreek.bmtwbm.com.au/> or contact Robert Dinero at Council on (02) 4227 7485, or Simon Kovacevic at BMT WBM Pty Ltd on (02) 8987 2900.

→ WHAT'S ON

Culture

Creative Dialogues Event

Thursday 7 March, 6pm

Wollongong Art Gallery

Join Illawarra film group, Film City, as they present a new initiative to foster projects and skills development for local film and multi-platform practitioners. Award-winning short film, 'Greener Pastures and Cleaner Curls', by Tom Coburn will be screened and director Josh Reid will discuss his feature film '1500 Steps'.

Environment

Chemical Clean Out Day

Saturday 9 March, 9am–3.30pm

Fred Finch Sporting Complex car park, Bedford Street, Berkeley

These days are a collaborative project between Council and the NSW EPA. You can drop off materials including: solvents and household cleaners, fluorescent globes, car batteries, motor oils, fuels and fluids.

Be sure to transport your chemicals carefully so they don't leak or break. For more information call the Environment Line on 131 555.

Wollongong Indian Myna Bird Action Program

This program aims to engage and support the community in reducing breeding and feeding opportunities, undertaking humane trapping and euthanising, and recording bird numbers for research. Residents can get involved in the management of this urban pest by registering with Council's Customer Service team on (02) 4227 7111.

Library

All Wollongong City Libraries will be closed on Wednesday 6 March for staff development. We apologise for any inconvenience.

Learn to Knit

Wednesday 20 March, 9.30–11.30am

Unanderra Library

Join in our free Learn to Knit session for adults. Bookings are a must on (02) 4271 1217, and please bring along your own 4mm knitting needles.

→ WOLLONGONG CITY COUNCIL | WORKING WITH YOU

Address 41 Burelli Street Wollongong • Post Locked Bag 8821 Wollongong DC NSW 2500 • Phone (02) 4227 7111
Emergency after hours contact 1300 557 980 • Fax (02) 4227 7277 • Email council@wollongong.nsw.gov.au
Web www.wollongong.nsw.gov.au ABN 63139525 939 – GST Registered

WOLLONGONG CITY COUNCIL

→ COUNCIL MEETINGS

Council Meeting (now broadcast live)

Monday, 13 October, 6pm

**Administration Building, Level 10, Council Chambers,
41 Burelli Street, Wollongong**

Council meetings are open to the public except for any part of the meeting where items are to be considered in Closed Council. To enhance public access, the meeting will be broadcast live on Council's website and by attending this meeting you consent to the possibility that your image and voice may also be broadcast to the public.

Business Papers are available from Council's website, the Administration Building and Reference Library from 5pm on Tuesday 7 October 2014.

Community members can apply to address Council by submitting a Public Access Forum application by 12 noon on Friday 10 October 2014.

Independent Hearing and Assessment Panel (IHAP) Meetings

Council wishes to advise the next IHAP meeting is scheduled for Wednesday 15 October 2014 in the Function Room on Level 9 of Council's Administration Building at 5pm to consider the following development applications:

1. DA-2014/245
2 Broadridge Street, Wombarra. Subdivision and dwelling-house. Phase 1: 2-lot Torrens title subdivision.
Phase 2: Construction of a dwelling-house.
2. DA-2014/516
Lot 1 Corrie Road, Woonona, 33H Hospital Road, Bulli. Subdivision. Phase 1: 2-lot Torrens title subdivision including boundary adjustment and consolidation.
Phase 2: 2-lot Torrens title subdivision of one of the created lots from Phase 1.
3. DA-2014/589
172-174 Keira Street, Wollongong. Commercial. Ground level and awning refurbishment, BCA compliance works.

The meeting agenda and business paper will be available on Wollongong City Council's website no less than five (5) days prior to the meeting.

If you wish to speak at the meeting please register with the IHAP Coordinator by close of business Tuesday 14 October 2014 on (02) 4227 7285 or email lwilson@wollongong.nsw.gov.au.

Please note that each speaker will be allocated 3 minutes to speak unless extended time is agreed to by the Panel Chair.

→ HAVE YOUR SAY

Neighbourhood forums

Neighbourhood Forums are community groups that meet monthly to help solve local problems. To find out more about Neighbourhood Forums, including the Convenor's contact details, please visit Council's website or contact the Community Engagement Team on (02) 4227 7060.

- **Helensburgh – Area 1**
Wednesday 8 October, 7pm
Helensburgh Community Centre
- **Thirroul – Area 3**
Tuesday 21 October, 7pm
Thirroul Library and Community Centre
- **Berkeley – Area 7**
Tuesday 21 October, 6pm
Illawarra Yacht Club
- **Dapto – Area 8**
Wednesday 8 October, 7pm
Dapto Ribbonwood Centre

Notice of neighbourhood forum Annual General Meeting

Neighbourhood Forum 7 is holding an AGM on 21 October to elect a Convenor. Please contact Convenor for more information.

Proposal for Relocatable Toilet in MacCabe Park

Wollongong City Council is planning to install a re-locatable toilet facility on Burelli Street, adjacent to MacCabe Park. The facility will have disabled access and will house two separate self-cleaning toilets within one unit. We are inviting you to Have Your Say on this proposed public facility by Friday 17 October 2014. Please contact engagement@wollongong.nsw.gov.au or (02) 4227 7111 for further details.

Draft Review of Hewitts Creek Flood Study

Council is undertaking a review of the Hewitts Creek Flood Study (2002).

The study area includes the suburbs of Bulli and Thirroul. The review of the Flood Study is nearing completion and you're invited to view and comment on the draft Flood Study report.

Come along to one of our public information nights at the Bulli Senior Citizens Centre on Friday 24 October 2014 or Friday 31 October 2014, between 7pm-9pm.

Copies of the documents and feedback forms are available on the Have Your Say page of Council's website and at Thirroul and Wollongong Libraries until 10 November 2014.

Written comment via feedback forms are due by Friday 14 November 2014.

For further information, please contact Council's Customer Service on (02) 4227 7111.

→ WHAT'S ON

Botanic Garden

Walk 'n' Talk: Flowering Trees & Shrubs

9 October, 10am-12 noon

Botanic Garden Discovery Centre – Madoline Street entrance

Take a walk with the gardener responsible for our colourful flowering trees and shrubs collection. You'll pick up some great ideas for your own garden. \$10 per person. Bookings essential on (02) 4227 7667 or email botanicgarden@wollongong.nsw.gov.au.

'Plants That Inspired Shakespeare' Tour

Thursday 16 October, 10am-12 noon

Botanic Garden Discovery Centre – Madoline Street entrance

Join William Shakespeare on a stroll through Wollongong Botanic Garden. The famous playwright will point out the plants that have inspired some of his most memorable dramatic lines. \$10 per person.

Bookings essential on (02) 4227 7667 or botanicgarden@wollongong.nsw.gov.au.

Nursery Open Day

Friday 17 October, 7.30am-2.30pm

Botanic Garden Greenplan Nursery – Northfields Avenue entrance

Native trees, shrubs, ground covers and grasses will be on sale at great prices. The Botanic Garden website lists all species available for sale. Remember to bring your rates notice as proof of Wollongong residency; payment is by card (not AMEX) or cheque only.

Environment

Indian Myna Bird Workshop

Come and learn about the Indian Myna bird and find out how you can get involved in our humane backyard trapping and euthanising program.

We will also discuss how you can reduce their breeding and feeding opportunities and how to get involved with our research.

To register your interest in attending a workshop please contact Council's Customer Service on (02) 4227 7111.

Library

Illawarra Remembers Final Scanning Day

Friday 10 October, 10am-4pm

Bring your family documents/stories from 1914-1918 to be scanned by a professional scanning company and added to our Illawarra Remembers database. For more information contact the Reference Library on (02) 4227 7414 or visit the website illawarraremembers.com.

Guest Speakers @ Thirroul Library

Wednesday 15 October, 5-6pm

Author Susan Boyer will discuss her book *Across the Great Divide: True life stories at Sydney Cove*.

Free, bookings not required.

Wednesday 22 October, 5-6pm

John Montagner shares his experiences of walking the Camino Frances and shares anecdotes of the people he met and of the places along this ancient pilgrim walk.

Free, bookings not required.

PUBLIC NOTICES

Seniors Week Committee Nominations

Wollongong City Council is calling for nominations from individuals and local peak organisations for Council's Seniors Week Committee.

The Seniors Week Committee provides community input into the planning, organisation and delivery of a city-wide Seniors Week program that reflects the diversity of our residents, and celebrates the contribution that older people make to the community.

Seniors Week 2015 will be held from 14-22 March. The committee will commence meeting monthly from November.

For a copy of the charter or to express an interest please contact Tracey Needham on (02) 4227 7245 or email seniorsweek@wollongong.nsw.gov.au.

Nominations close: Friday 24 October 2014.



Privacy Notification: The purpose for seeking your submission on advertised matters is to better assist Council in its decision making processes.

The intended recipients of your submission are officers within Council and those persons granted lawful access to the information. Your submission, including your name, address and other contact details, may be exhibited on Council's website and included in publicly accessible registers. If you make an anonymous submission, Council will be unable to contact you further.

If your submission relates to a development proposal or other relevant planning application, Council is required to disclose on its website all relevant details of political donations or gifts made by you.

In limited circumstances, you may apply for suppression of your personal information from a publicly accessible register. Further information is available on Council's website at wollongong.nsw.gov.au/pages/privacy.aspx or by phoning Council on (02) 4227 7111.

→ DEVELOPMENT CONSENTS

From 24/09/2014 to 30/09/2014

The following applications have been approved by Council. Notification under Section 101 Environmental Planning and Assessment Act 1979.

Austinmer

- DA 2014/689 Lot A DP 369644 No. 56-64 Asquith Street. Residential. Dwelling-house.

Balgownie

- DA 2014/574 Lot 1 DP 1133249 No. 16 Napier Street. Residential. Dual occupancy.

Bellambi

- DA 2014/985 Lot 3 DP 38069 No. 70 Cawley Street. Residential. Alterations and additions to existing dwelling, demolition of existing garage and construction of new garage.

Bulli

- DA 2011/653/A Lot 262 DP 791214 No. 30 William Street. Residential. 2-lot Torrens title of a dual occupancy. Modification A – change subdivision type to strata title.
- DA 2006/1376/C Lot 11 DP 285763 No. 13 Weaver Terrace. 2-storey dwelling-house and swimming pool. Modification C – removal of space wall in basement.
- DA 2013/1321/A Lot 1 DP 588060 Lot 1 Point Street & Lot 517 DP 1156416 Lot 517 Sandon Drive. Pathway for pedestrians and cyclists. Modification A – modification to Conditions 3, 11 and 66.
- DA 2014/1096 Lot 1 DP 1184809 No. 4 Westmacott Parade. Residential. Demolition of existing dwelling-house and construction of a dwelling-house and retaining walls.
- DA 2014/1066 Lot 1 DP 1039986 No. 54 Farrell Road. Residential. Alterations and additions.

Corrimal

- DA 2014/1001 Lot 3 DP 210232 No. 6 Hall Street. Residential. Alterations and additions including detached shed and swimming pool.
- DA 2014/322/A Lot D DP 414728 No. 45 Tarrawanna Road. Residential. Secondary dwelling and carport extension. Modification A – change in setback to boundary and minor external modifications.

Appendix A-2 Notification Letters

The Resident
«House» «Street»
«Suburb»

Your Ref

Our Ref

File

Date

I:RD/BL

PJ-10/20

27 February 2013

Dear Sir/Madam

REVIEW OF HEWITTS CREEK FLOOD STUDY

Wollongong City Council has recently commenced a review of the Hewitts Creek Flood Study which was completed in 2002. The review will update the 2002 study to account for subsequent changes in the catchment and improvements in flood modelling software.

The study area includes the catchments of Hewitts, Slacky, Tramway, Woodlands, and Thomas Gibson creeks which are located in the suburbs of Bulli and Thirroul.

You have been sent this letter, a newsletter and questionnaire because you are a resident within the study area. The newsletter contains information on the study, and the questionnaire will help us to collect historic flood information that is important to this study. Please take a few minutes to complete the questionnaire and return it in the reply-paid envelope provided by **Friday, 29 March 2013**.

For more information about the Review of the Hewitts Creek Flood Study, please visit <http://hewittscreek.bmtwbm.com.au/> or contact Robert Dinero at Wollongong City Council on 4227 7485, or Simon Kovacevic at BMT WBM Pty Ltd on 8987 2900.

Thank you for taking part in this study.

This letter is authorised by

Peter Garland
Senior Floodplain Management Engineer
Wollongong City Council
Telephone (02) 4227 7734

↔ΠΑΦΒαρογδε «PAFBSP»

«Owner»

«Owner Address»

Your Ref

Our Ref

File

Date

PJ-10/20

29 September 2014

Dear Sir/Madam

REVIEW OF HEWITTS CREEK FLOOD STUDY - PUBLIC EXHIBITION

Wollongong City Council is undertaking a review of the Hewitts Creek Flood Study which was completed in 2002. The review accounts for improvements in flood modelling software and subsequent changes in the catchment which include the following flood mitigation measures implemented by Council since the completion of the 2002 study:

- Modifications to existing detention basin adjacent to Slacky Creek, Black Diamond Place, Bulli;
- Improvements to creek and existing culvert on Hewitts Creek, Lachlan Street, Thirroul;
- Construction of new overland flow path adjacent to Flanagans Creek, The Esplanade, Thirroul; and
- Voluntary purchase of two properties, Princes Highway, Bulli.

The flood study defines the nature and extent of flooding, and will establish the basis for the subsequent floodplain risk management study and plan.

Council, through its Floodplain Risk Management Committee, has now completed a draft report of the flood study review.

We are writing to you as your property has been identified by the study as potentially being affected by flooding. It should be noted that properties are identified as affected if the land is likely to become inundated in the Probable Maximum Flood (PMF).

Prior to adopting this study, Council seeks your comments on the study findings. The draft report will be placed on public exhibition from 13 October to 10 November 2014 at both the Wollongong Central Library and Thirroul District Library. You are encouraged to view the information, provide comment on the enclosed feedback form and return it in the reply-paid envelope provided by 14 November 2014.

Information sessions have also been organised to assist in clarifying any issues. Refer to the enclosed newsletter for details.

Thank you for taking part in this study.

This letter is authorised by

Peter Garland
Senior Floodplain Risk Management Engineer
Wollongong City Council
Telephone (02) 4227 7111

Appendix A-3 Community Newsletter and Questionnaires

Hewitts Creek Catchment REVIEW OF FLOOD STUDY

Community Questionnaire

Wollongong City Council is undertaking a review of the Hewitts Creek Flood Study (2002) to re-examine flooding problem areas. The study will establish the basis for subsequent floodplain management activities. We are seeking the community's input by collecting information on any flooding or drainage problems that you may have experienced in the past.

Please take a few minutes to read through these questions and provide responses wherever you can. Please mail this questionnaire by 29 March 2013 in the enclosed envelope (no stamp required) or scan and email it to **SydFlood@bmtwbm.com.au**. All information provided is confidential and used only for the purposes of the study.

Contact and Property Details

Name: _____

Address: _____

Phone or email: _____

Can we contact you for more information?

☐ Yes ☐ No

Previous Flooding Experience

Have you experienced flooding at this property?

- ☐ Yes - inside the main dwelling above the floor level
- ☐ Yes - significant flooding within the property grounds but not inside the main dwelling
- ☐ Yes - minor flooding within a small portion of the property grounds only
- ☐ No

Please tick your type of property:

- ☐ Residential property
- ☐ Non residential property

How long have you been at this property?

_____ Years

Have you experienced flooding on your street?

- ☐ Yes - across one or both lanes of traffic
- ☐ Yes - minor along gutters
- ☐ No

If yes, does this occur regularly, i.e. several times a year?

- ☐ Yes ☐ No

If you answered yes to any of the above questions on your previous flooding experience, can you provide further information on this flood event in the table below

Flood event date or year	Are you able to indicate the depth that flood waters reached on your property or elsewhere such as roads? Please attach a sketch where appropriate.

If needed, please provide additional information on your previous flooding experience on additional pages.

Photographs and Video

Do you have any photographs or video of flooding that you are willing to share with Council? ☐ Yes ☐ No

Photographs and video can mailed with this questionnaire or emailed to **SydFlood@bmtwbm.com.au** (all photos and videos will be returned).

→ **WOLLONGONG CITY COUNCIL** ABN 63 139 525 939 - GST Registered

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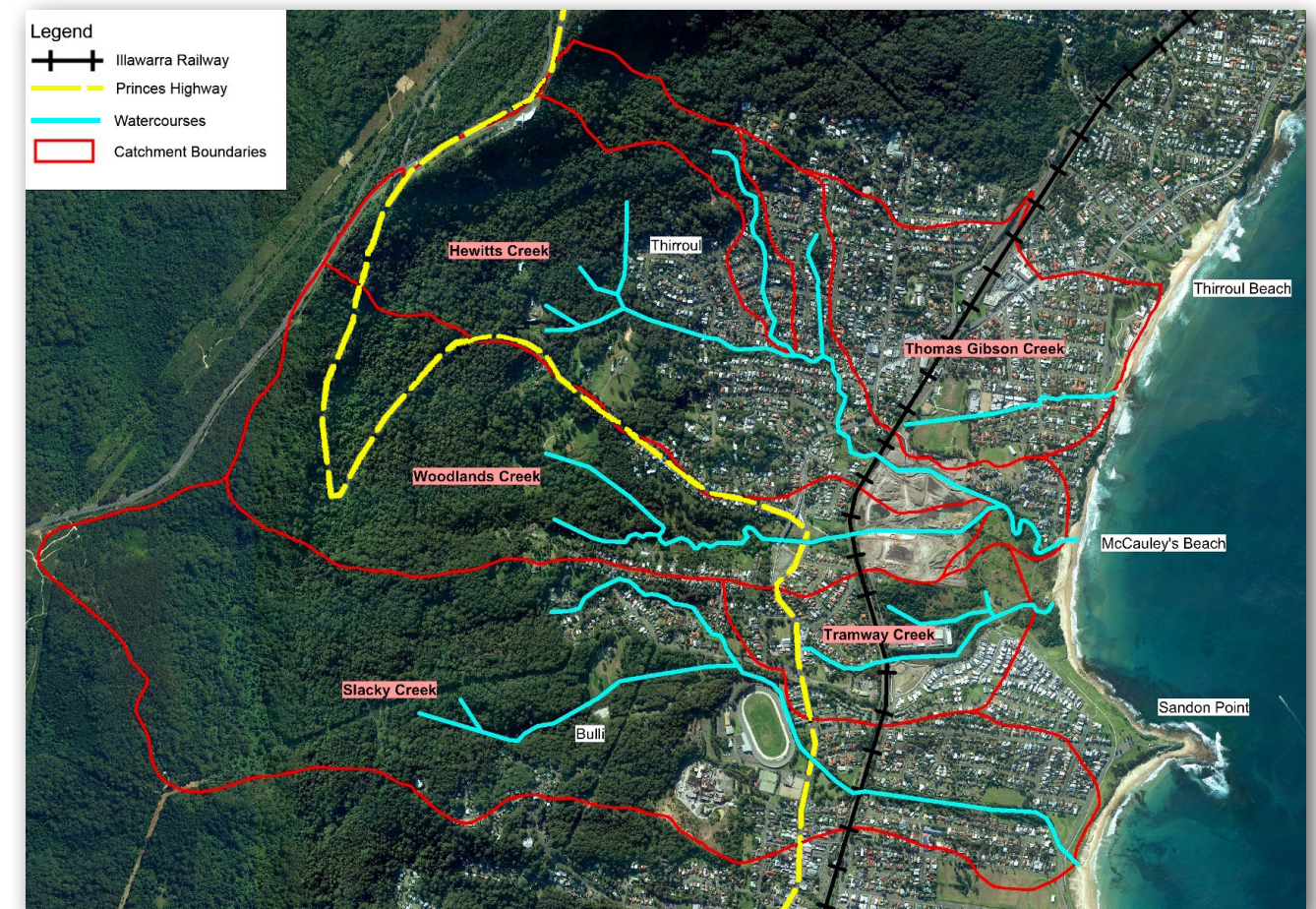
What is the study about?

Wollongong City Council is carrying out a detailed review of the Hewitts Creek Flood Study which was completed in 2002. This review will update the previous study to account for recent changes within the catchment and take advantage of innovations and improvements in computer flood modelling. The flood study will define the nature and extent of flooding, which will establish the basis for the subsequent floodplain risk management study and plan. The flood study is funded under the NSW Government's Floodplain Management Program and is being prepared to meet the objectives of the NSW Government's Flood Prone Land Policy.

The Hewitts Creek Catchment Floodplain Risk Management Committee will oversee the study, providing regular input and feedback on key outcomes. The Committee has a broad representation including Councillors, Council staff, State Government representatives, stakeholder groups and community representatives. The study will be undertaken by BMT WBM, an independent company specialising in flooding and floodplain risk management.

Flood risk in the study area

The study area includes the catchments of Slacky, Tramway, Woodlands, Hewitts and Thomas Gibson Creeks which are located on a narrow coastal strip of land to the north of Wollongong. The western portion of the catchments are dominated by the Illawarra escarpment. Heavy rain on the steep slopes of the escarpment leads to rapid flooding in the creeks, which all drain to the Pacific Ocean. Further information on flooding in the catchment can be found in the Hewitts Creek Flood Study (2002).



Map of the Hewitts Creek Flood Study Area

Hewitts Creek Catchment REVIEW OF FLOOD STUDY

The Floodplain Risk Management Process

This process is overseen by the Floodplain Risk Management Committee which is established by the local Council and includes community groups and state agency specialists.



The orange elements in the flow chart detail the steps being carried out as part of this review of the Hewitts Creek Flood Study.

Study Progress

The review of the flood study is currently at a stage which involves data collection and initial community consultation. Following this, the study will then involve the development of computer models used to simulate the flooding in the study area. The outputs from these models will be processed into a series of flood maps which provide a visual illustration of the flood risk in the study area. A Draft Flood Study Report will be issued in 2014 to document the methodology, analysis and findings of the review. The community will be consulted for their views and feedback on this Draft Report. This feedback will be considered as part of preparing the Final Flood Study Report.

Community Consultation

Community involvement in managing flood risks is essential to improve the decision making process, to identify local concerns and values, and to inform the community about the consequences of flooding and potential management options. The success of the flood planning in the Hewitts Creek study area relies on the community's input. A website has been established to keep the community informed on the study progress <http://hewittscreek.bmtwbm.com.au/>. This site has further information on flooding in the Hewitts Creek Study area and will be updated throughout the study as new information becomes available. Community members can post their views and comments on the website so they can be considered during the course of the study.

A community information session is planned at a later stage to present draft flood study results and provide further opportunity for feedback from the community.

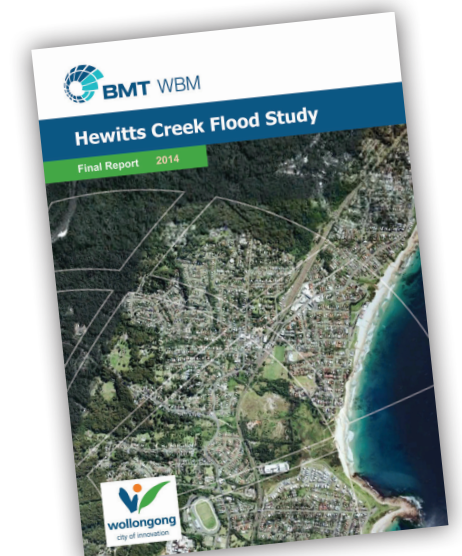
At this stage, we are seeking the community's input by collecting information on any flooding or drainage problems that may have been experienced in the past. A questionnaire is available from Wollongong City Council and any information provided is strictly confidential and will only be used for the study.

Want more information?

For further information about the Hewitts Creek Flood Study please visit <http://hewittscreek.bmtwbm.com.au/> or contact one of our project team members:

Robert Dinaro
Floodplain Management Engineer
Ph 02 4227 7485
rdinaro@wollongong.nsw.gov.au

Simon Kovacevic
Project Manager
Ph 02 8987 2900
SydFlood@bmtwbm.com.au



Community Feedback Form

Wollongong City Council is undertaking the review of the Hewitts Creek Flood Study (2002) to review flood behaviour in the catchment. The study will establish the basis for the subsequent floodplain risk management study and plan. The Flood Study is nearing completion and we are seeking the community's comments on the draft report.

Please take a few minutes to fill out this feedback form and mail it to Council by 14 November 2014 in the enclosed envelope (no stamp required).

Please note that the intention of this feedback form is only for gathering comments on the draft Flood Study report. If you have any queries relating to development within the catchment or maintenance of watercourses and drainage systems, please contact Council's Customer Service section on 42277111.

Contact and Property Details

Name: _____

Address: _____

Phone or email: _____

Can we contact you for more information?

☐ Yes ☐ No

Please tick your type of property:

☐ Residential property

☐ Non residential property

How long have you been at this property?

_____ Years

Comments on draft Flood Study Report

Please provide comments on the draft Flood Study Report in the space provided below and attach additional pages if necessary:

Thank you for your participation in this study

Copies of this feedback form can be obtained from www.wollongong.nsw.gov.au

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WOC61374973.9.14

What is the study about?

Wollongong City Council is carrying out a detailed review of the Hewitts Creek Flood Study which was completed in 2002. We've engaged BMT WBM, an independent company specialising in flooding and floodplain risk management, to undertake this study.

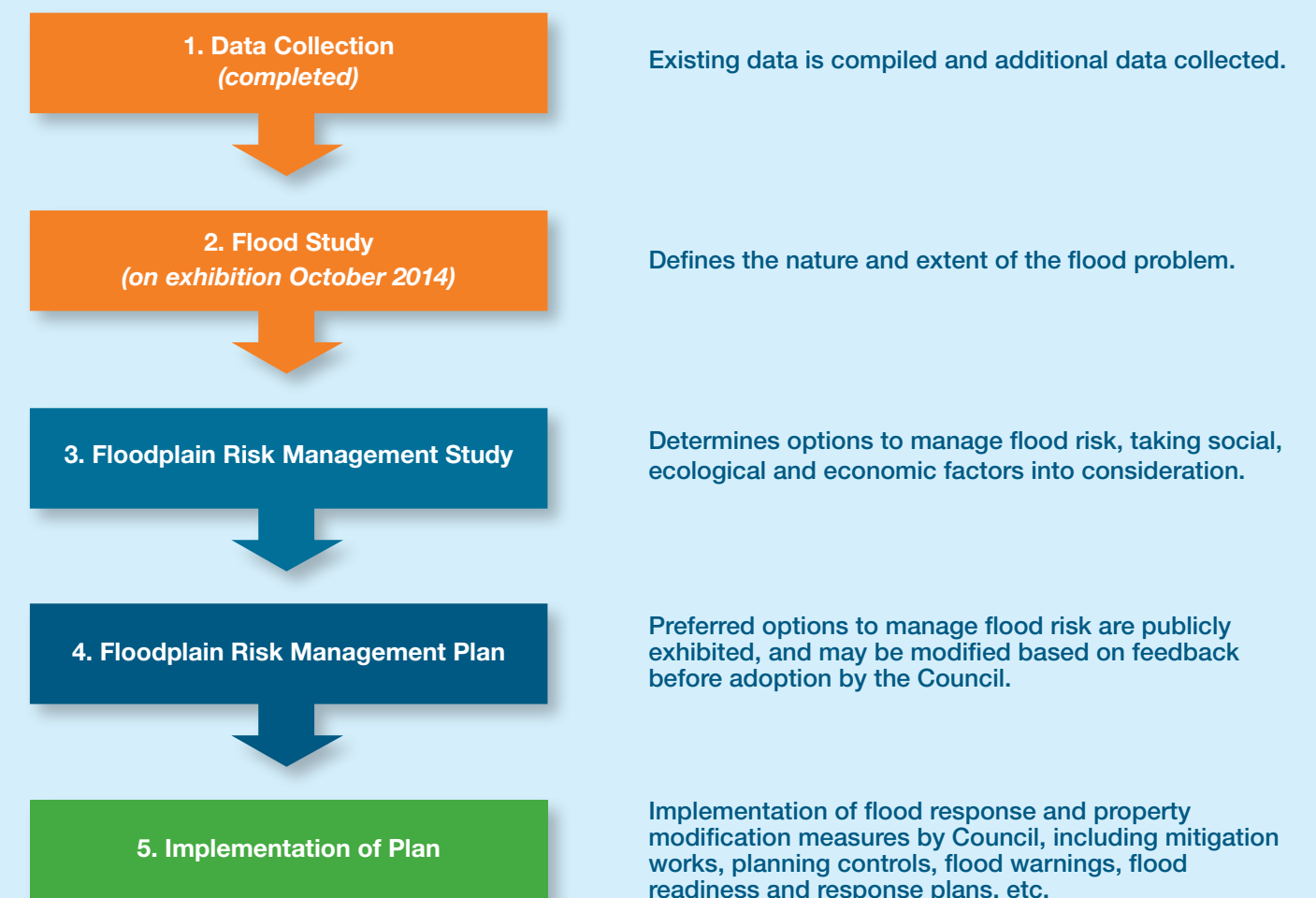
This review accounts for recent changes within the catchment and takes advantage of improvements in computer flood modelling. The flood study defines the nature and extent of flooding to establish the basis for the subsequent floodplain risk management study and plan. The flood study is funded under the NSW Government's Floodplain Management Program and is being prepared to meet the objectives of the NSW Government's Flood Prone Land Policy.

The aim of the NSW Government's Flood Prone Land Policy is to reduce the impact of flooding on individual owners and occupiers of flood prone property, and reduce private and public losses resulting from floods, utilising ecologically sound methods where possible.

Under the Policy, the management of flood liable land is the responsibility of Local Government, with financial and technical support provided by the State Government.

The Floodplain Risk Management Process

The Policy specifies a staged approach to the floodplain management process. This process is overseen by the Floodplain Risk Management Committee which is established by the local Council and includes Councillors, Council Staff, State Government representatives, stakeholder groups and community representatives.



The orange elements in the flow chart detail the steps being carried out as part of this review of the Hewitts Creek Flood Study.

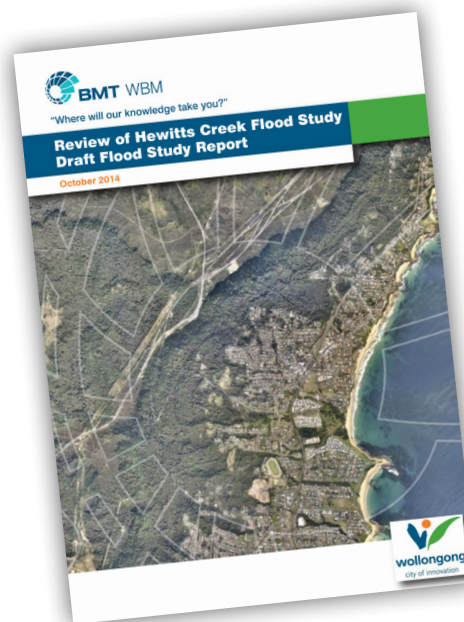
Draft Flood Study Report

A draft Flood Study report has been prepared to document the methodology, analysis and findings of the review of the Hewitts Creek Flood Study.

The study is being undertaken in stages involving data collection, community consultation, the development of computer models to simulate flood conditions in the study area, and the preparation of a Flood Study report.

The key outcomes reported in the draft Flood Study report include information on flood extents, flood depths, flood hazards and flood velocities for a range of flood event magnitudes under existing catchment conditions. This information has been generated from the computer model outputs and processed into a series of flood maps which provide a visual illustration of the flood risk in the study area.

The draft Flood Study is a comprehensive document to communicate flood risks to the community and improve flood awareness. The reported flood risks will help inform the selection and assessment of appropriate floodplain management measures in the next step of the floodplain risk management process. The draft Flood Study report will be placed on public exhibition in October 2014 and the community is invited to provide comment on this draft document.



Community Consultation

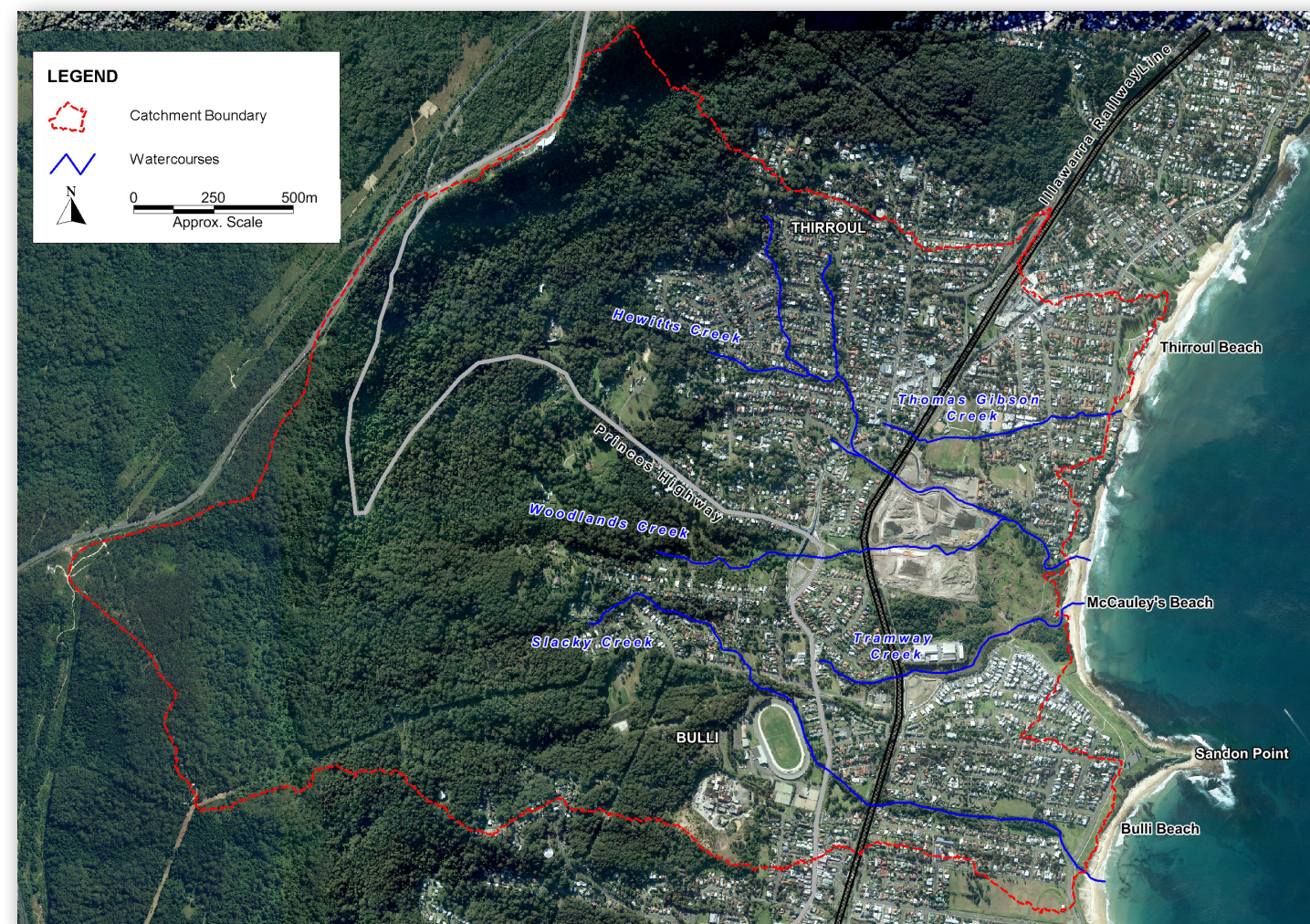
Community involvement in managing flood risks is essential to improve the decision making process, to identify local concerns and values, and to inform the community about the consequences of flooding and potential management options. The success of flood planning in the Hewitts Creek study area relies on the community's input to the Flood Study. A website has been established to keep the community informed on the study progress <http://hewittscreek.bmtwbm.com.au>. This site has further information on flooding in the Hewitts Creek study area.

The draft Flood Study report will be placed on public exhibition from 13 October to 10 November 2014 at both Wollongong and Thirroul Libraries. The community is invited to view and provide comment on the draft Flood Study report. Please submit your response via the feedback form on this newsletter by 14 November 2014.

PUBLIC CONSULTATION

Public information sessions will be held at the **Bulli Senior Citizen's Centre (8 Hospital Road, Bulli)** between 7 pm and 9 pm on **Friday 24th October** and **Friday 31 October 2014**.

The information sessions will present the draft Flood Study results and provide further opportunity for feedback from the community on the draft Flood Study report. Please come along to these information sessions to talk to a member of the project team.



Map of the Hewitts Creek Flood Study Area

What's next?

Following its exhibition, the project team will consider the feedback on the draft Flood Study report. A revised draft Flood Study report will then be prepared for adoption by Council. After the adoption of the Review of Hewitts Creek Flood Study, a Flood Risk Management Study and Plan will be undertaken to identify and prioritise measures to manage flood risk in the Hewitts Creek study area.

Further information?

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41 Burelli Street
Wollongong NSW 2500
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Project Manager
(02) 8987 2900
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www.wollongong.nsw.gov.au/services/sustainability/floodplainmanagement/Pages/hewitts.aspx

APPENDIX B: MODEL CALIBRATION

Appendix B-1 Longitudinal Profile of Peak Flood Levels for the 17 August 1998 Event

**Appendix B-2 Comparison of Observed and Modelled Flood Extents and Mechanisms
for the August 1998 Flood Event**

Appendix B.1 Longitudinal Profiles of Peak Flood Levels for the August 1998 Event



Limit of Aerial Photographs
provided by the Council

LEGEND

- TUFLOW Model Boundary
- Catchment Boundary
- Long Section Profiles

- Observed Flood Mark
- ID Number

Peak Flood Depths (m)	
	0.00 to 0.25
	0.25 to 0.50
	0.50 to 0.75
	0.75 to 1.00
	1.00 to 2.00
	2.00 to 4.00
	> 4.00

Title:
**August 1998 Flood Event
Flood Level Reporting Locations**

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 250 500m
Approx. Scale

Filepath : S:\WATER\PROJECTS\S1290 - Water - Hewitts Ck Flood Study\Drafting\WOR\Figures\FigureB-1_V11.5.wor

Figure:
B-1

Rev:
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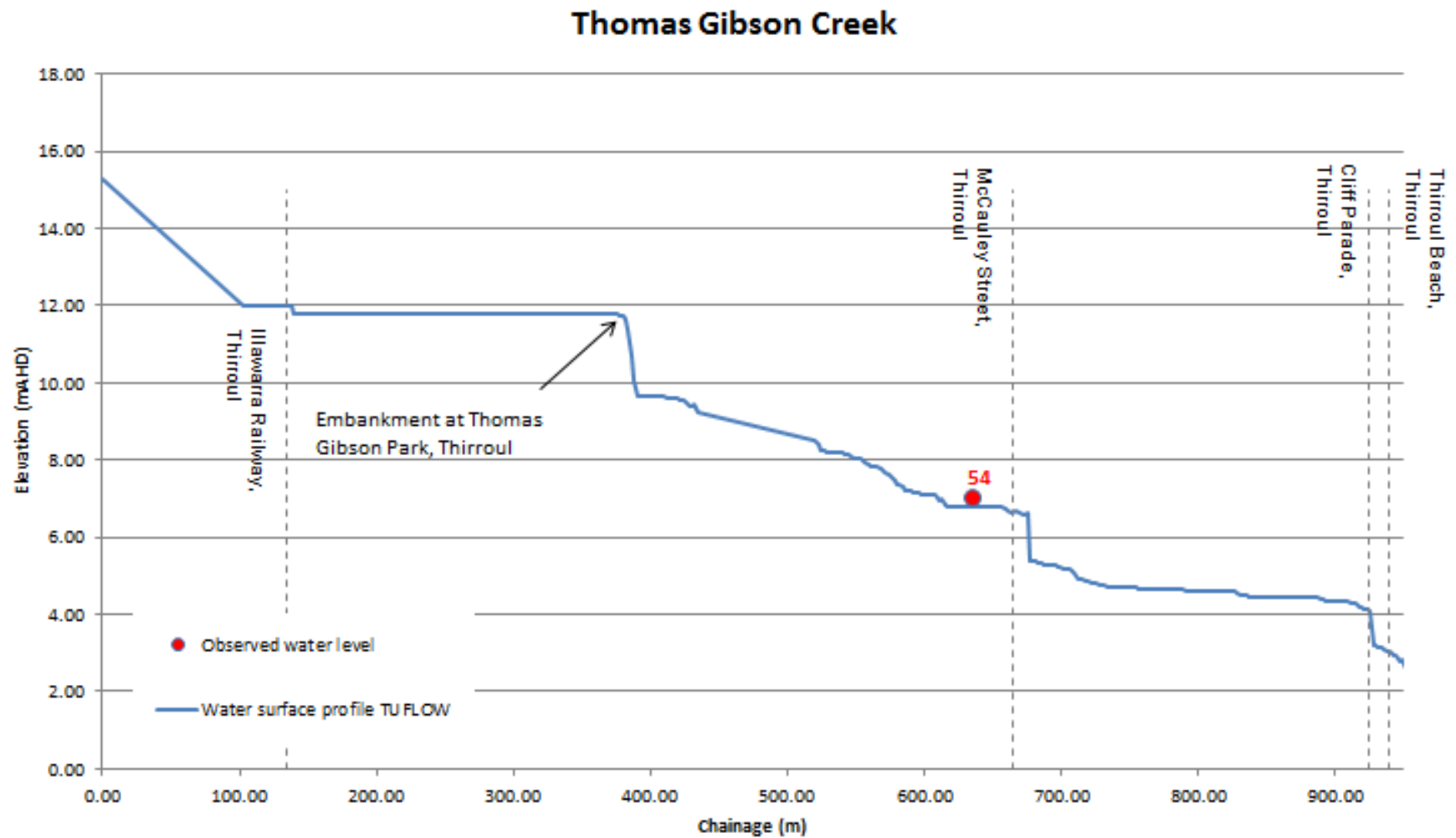


Figure B-2 Thomas Gibson Creek - Longitudinal Profile of Peak Flood Levels - 17 August 1998 Event

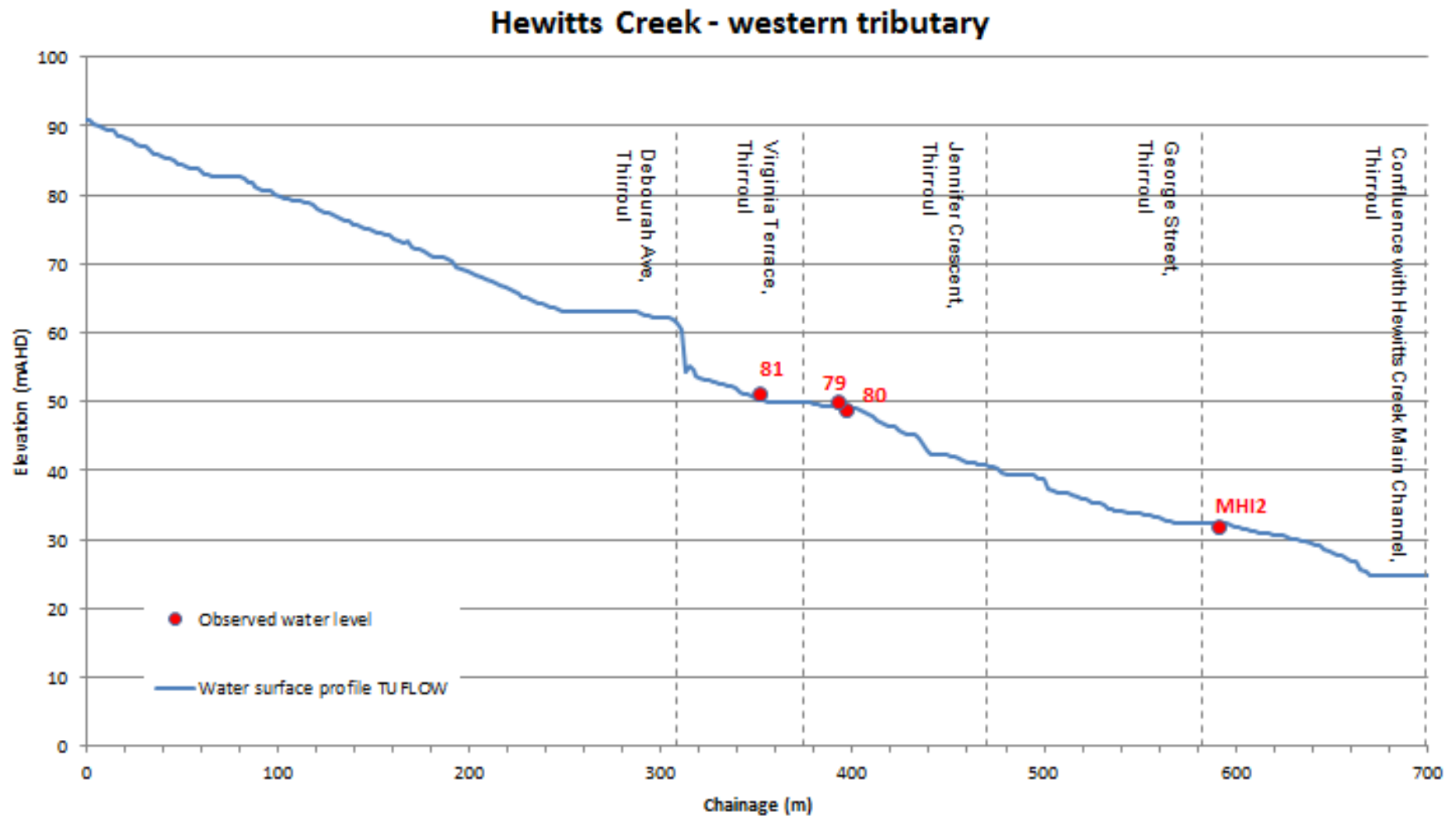


Figure B-3 Hewitts Creek western tributary - Longitudinal Profile of Peak Flood Levels - 17 August 1998 Event

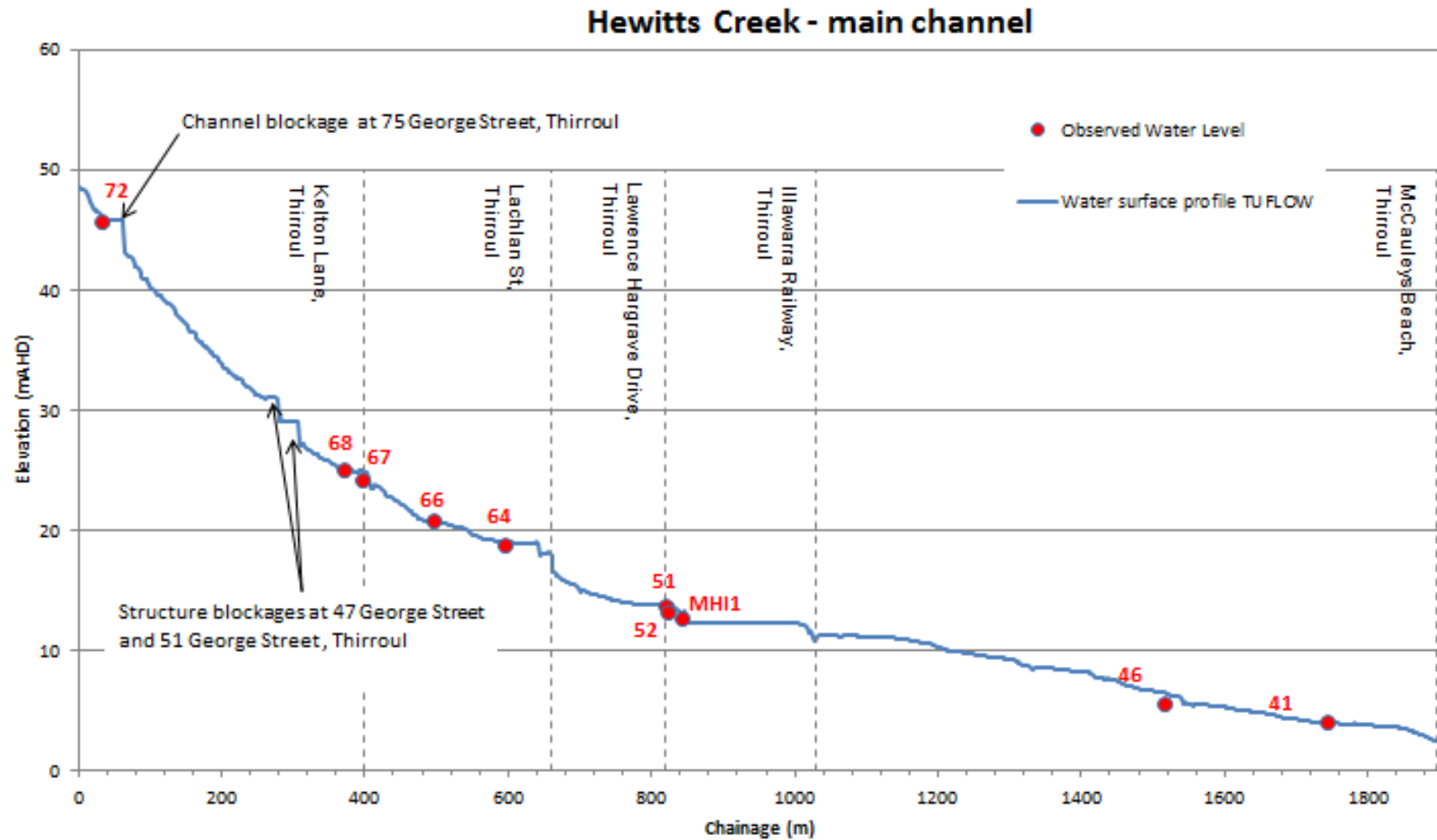


Figure B-4 Hewitts Creek Main Channel - Longitudinal Profile of Peak Flood Levels - 17 August 1998 Event

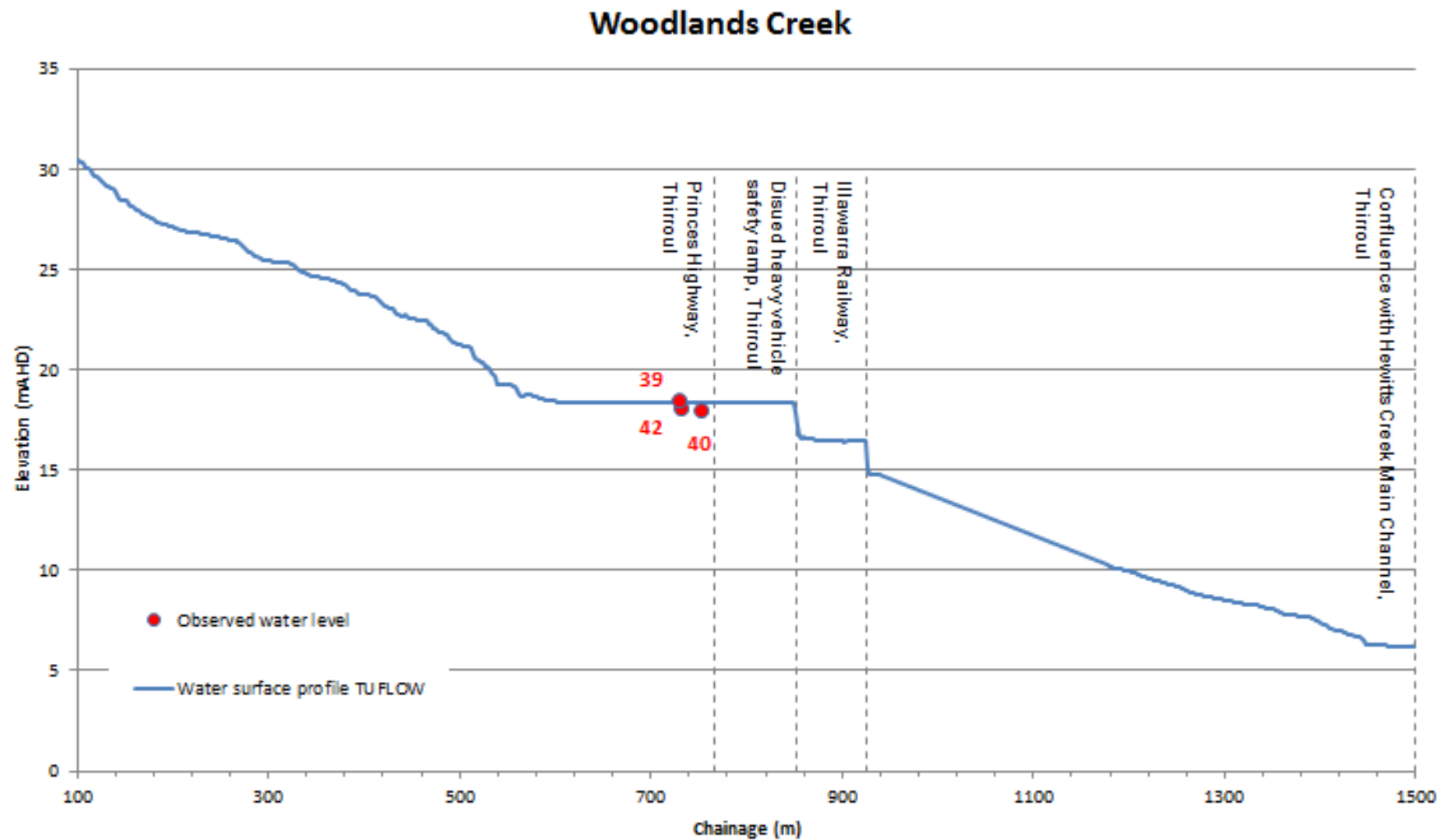


Figure B-5 Woodlands Creek - Longitudinal Profile of Peak Flood Levels - 17 August 1998 Event

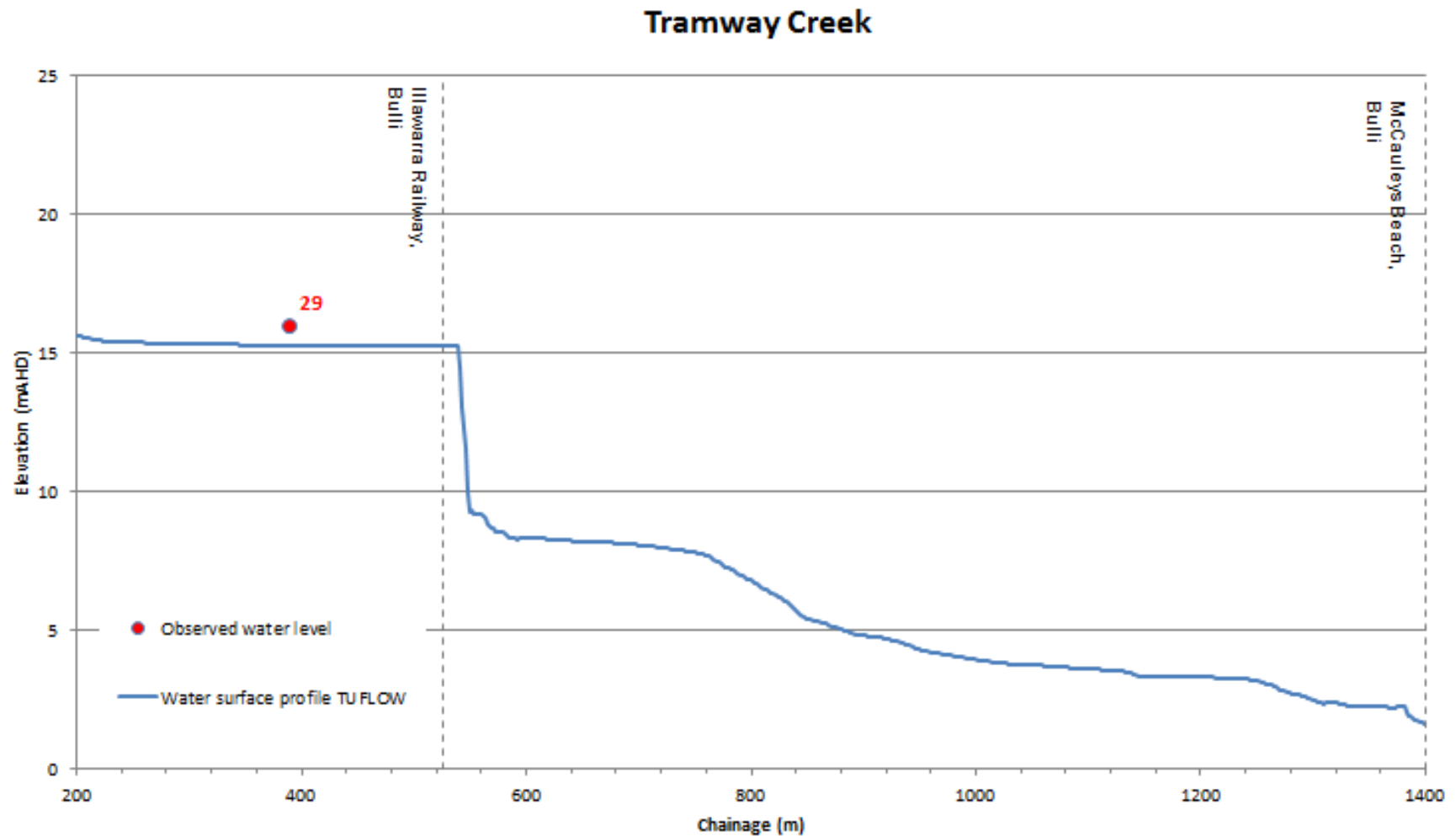


Figure B-6 Tramway Creek - Longitudinal Profile of Peak Flood Levels - 17 August 1998 Event

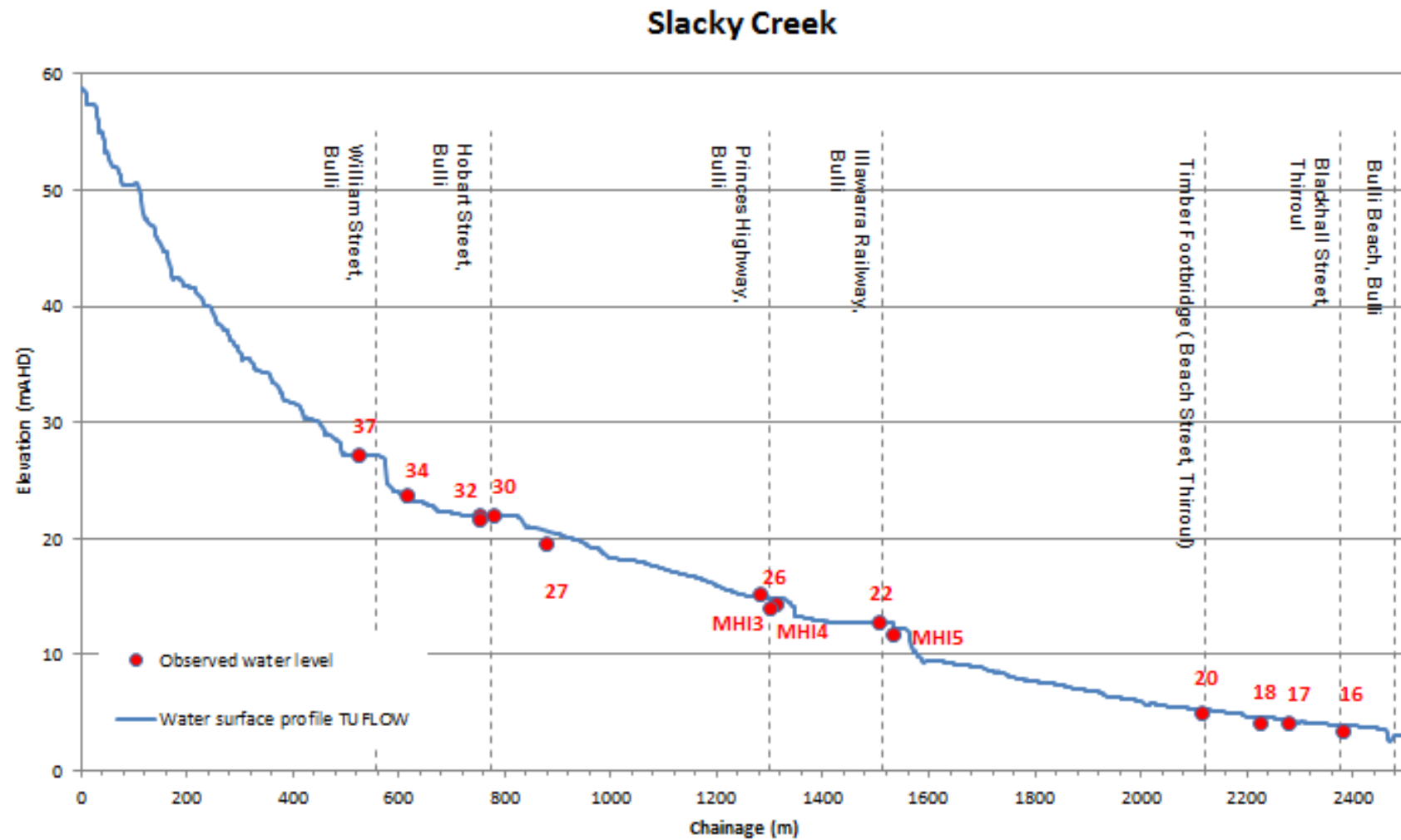
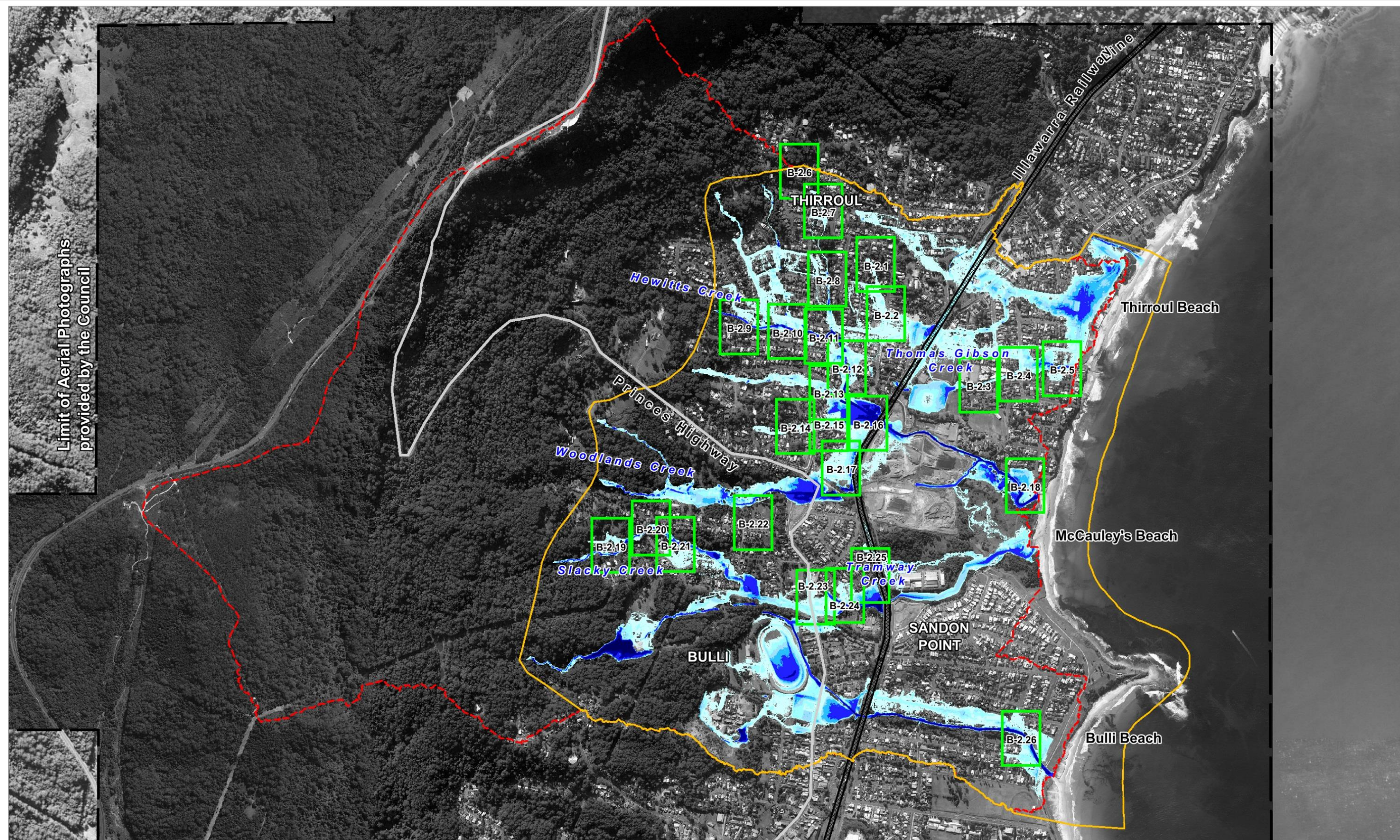


Figure B-7 Slacky Creek - Longitudinal Profile of Peak Flood Levels - 17 August 1998 Event

Figure B-2 to Figure B-7 show longitudinal profiles of observed flood levels and simulated peak flood levels for the August 1998 flood event for the TUFLOW model developed as part of the current study. Observed flood levels are presented on the graphs where flood marks have been recorded either directly along the creeks (i.e. at structures) or adjacent to (i.e. creek banks) the modelled creeks. The ID for the observed flood levels presented in Figure B-2 to Figure B-7 corresponds with the observed flood mark ID in Figures 7-5.1 to Figure 7-5.10 and Figure B-1.

The HEC RAS model results from the Hewitts Creek Flood Study (Forbes Rigby Pty Ltd., 2002a), have not been presented on Figure B-2 to Figure B-7 as a direct comparison with the TUFLOW model results has not been possible. The water surface profiles in Appendix 3.6.0 of the Hewitts Creek Flood Study (Forbes Rigby Pty Ltd., 2002a) are presented using two long section profiles representing 'all clear' and 'all blocked' culvert blockage scenarios for the August 1998 flood event. The long section profiles from the TUFLOW model results represent the blockage scenario that resulted in an acceptable level of agreement between observed and modelled levels and was based on modelling a number of blockage scenarios with reference to observed blockage information where this was available.

**Appendix B-2 Comparison of Observed and Modelled Flood Extents and Mechanisms
for the August 1998 Flood Event**



Limit of Aerial Photographs
provided by the Council

LEGEND

- TUFLOW Model Boundary
- Catchment Boundary
- Map Windows
- Map Window Appendix Reference

Peak Flood Depths (m)

- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 2.00
- 2.00 to 4.00
- > 4.00

Title:

Key Map for Comparison of Observed and Modelled Flooding for the August 1998 Event

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 250 500m
Approx. Scale

Filepath : S:\WATER\PROJECTS\1290 - Water - Hewitts Ck Flood Study\Drafting\WOR\Figures\Fig_B8_V11.5.wor

Figure:

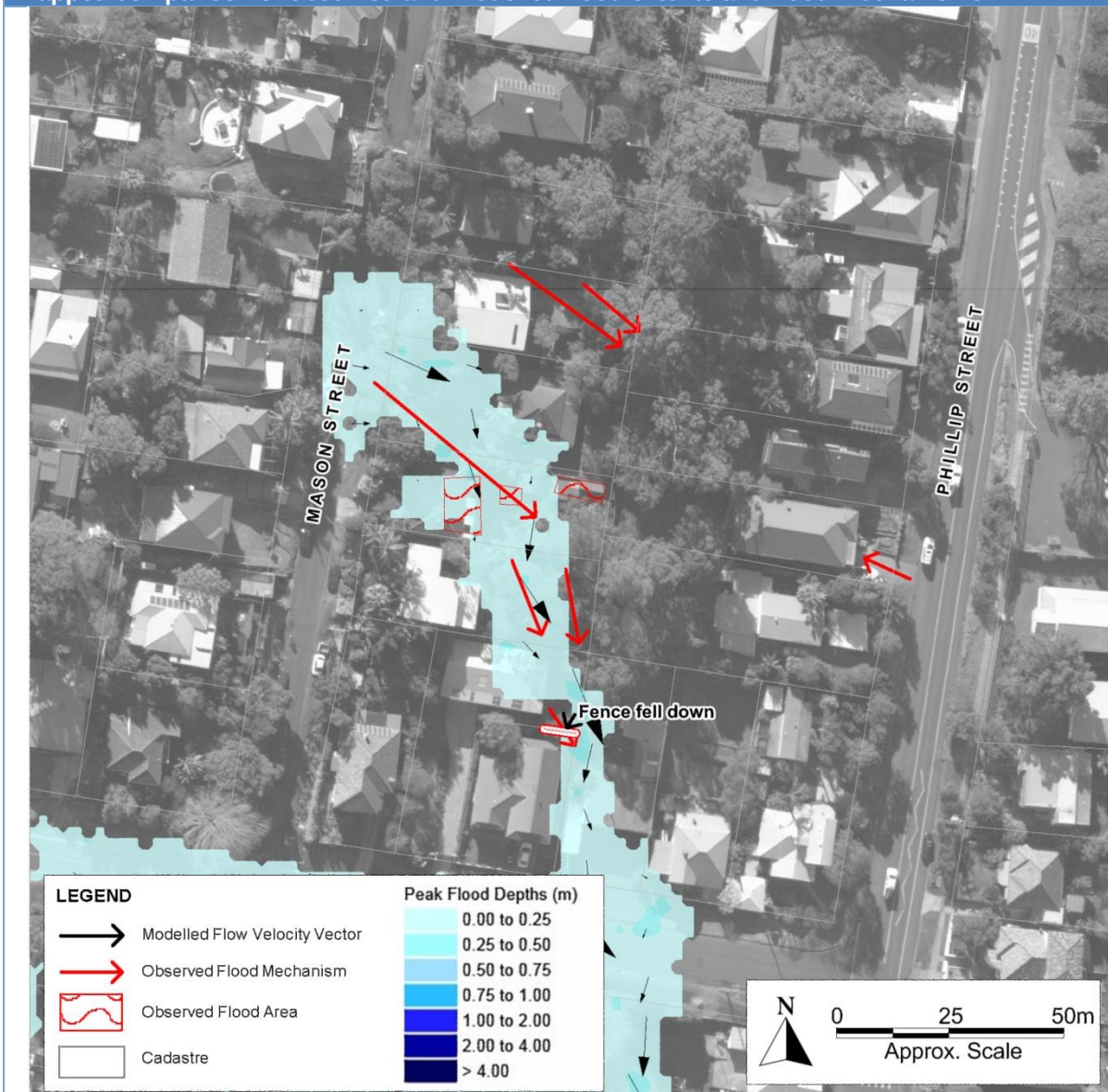
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Appendix	B-2.1
Location	Mason Street and Philip Street, Thirroul
Watercourse	Thomas Gibson Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

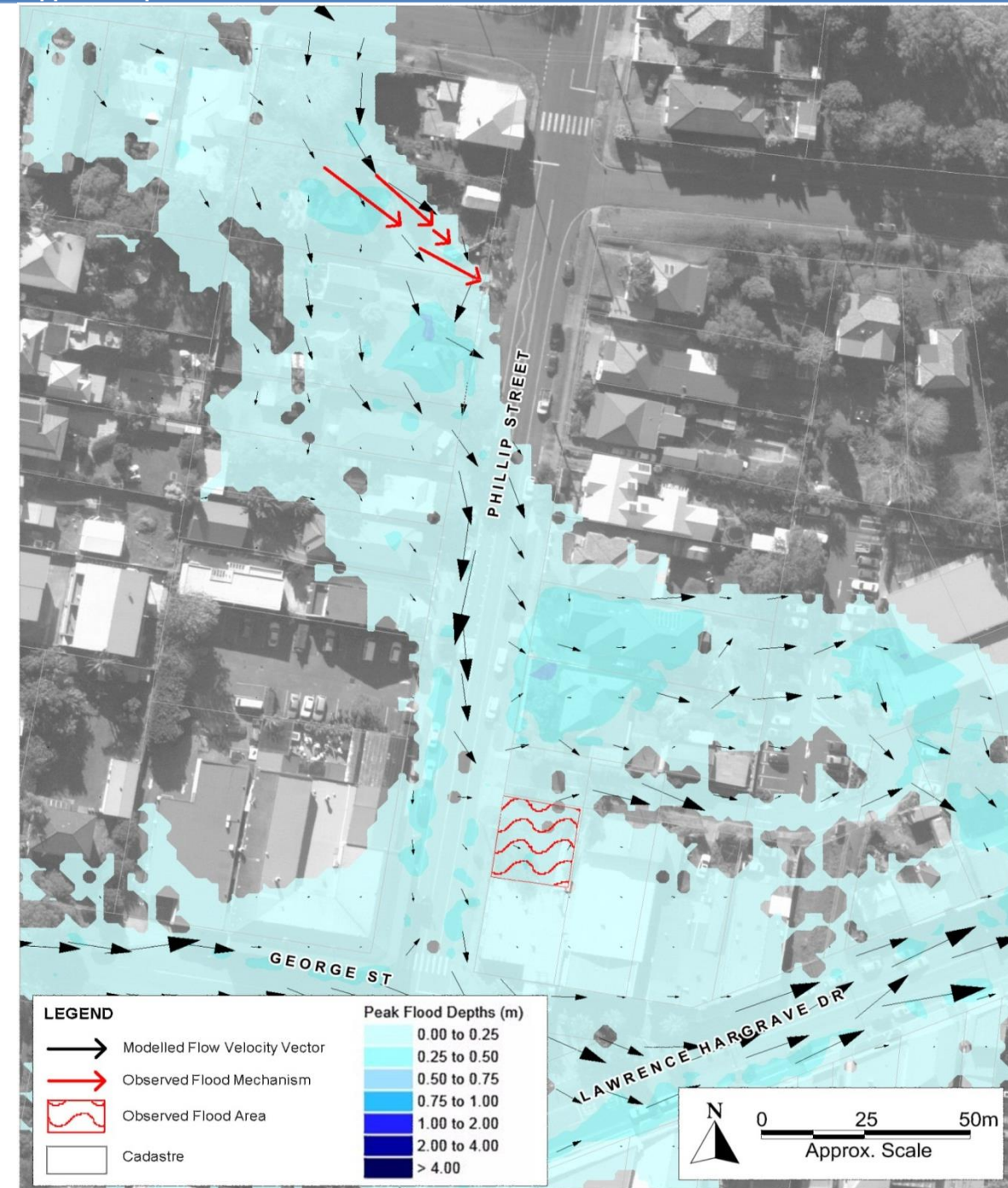


Discussion on comparison of results

Observed flood information indicates that there was flooding at a number of properties in Mason Street, Thirroul. Flood water moved in a south easterly direction from the front of 9 Mason Street and exited the at the back of 15 Mason Street. Flooding caused damage to garden fences and garden sheds. The residents of 13 Mason Street reported flood depths of between 0.1m and 0.25m in the back yard, garden shed and in a room underneath the house. The residents at 118 Phillip Street reported that surface water runoff from Phillip Street, Thirroul spilled under the garage door.

The model results correlate well with the majority of the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood areas. The model does not replicate the full extent of the localised surface water runoff at 9 Mason Street or localised surface water runoff at 118 Phillip Street. The responses to the community survey following the 1998 flood event indicates that the surface water runoff at 118 Phillip Street was relatively localised. It is not possible to replicate all of these localised surface water runoffs within the hydraulic model.

Appendix	B-2.2
Location	Phillip Street and Lawrence Hargrave Drive, Thirroul
Watercourse	Thomas Gibson Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

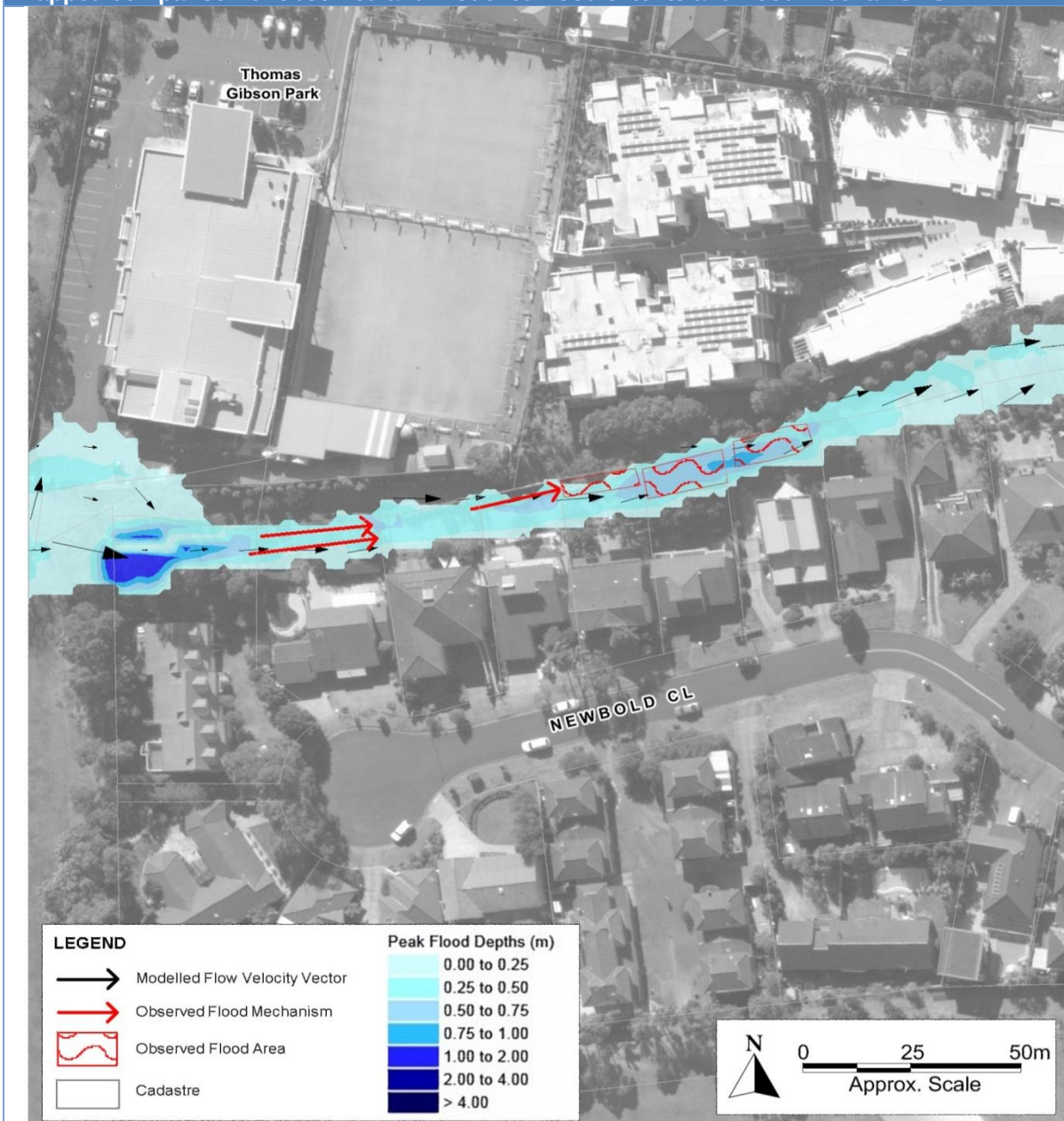


Discussion on comparison of results

Flood flows were observed to cross Virginia Terrace, Thirroul and through the front yard of the property at 126 Phillip Street, Thirroul. At 382-384 Lawrence Hargrave Drive, Thirroul, flooding was observed in the car park of the property. Flood water also reported to have entered through the back door of this property and partially inundated the ground floor.

The model results correlate well with the observed flood mechanisms described at this location and indicates flooding within the observed flood areas.

Appendix	B-2.3
Location	Newbold Close, Thirroul
Watercourse	Thomas Gibson Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

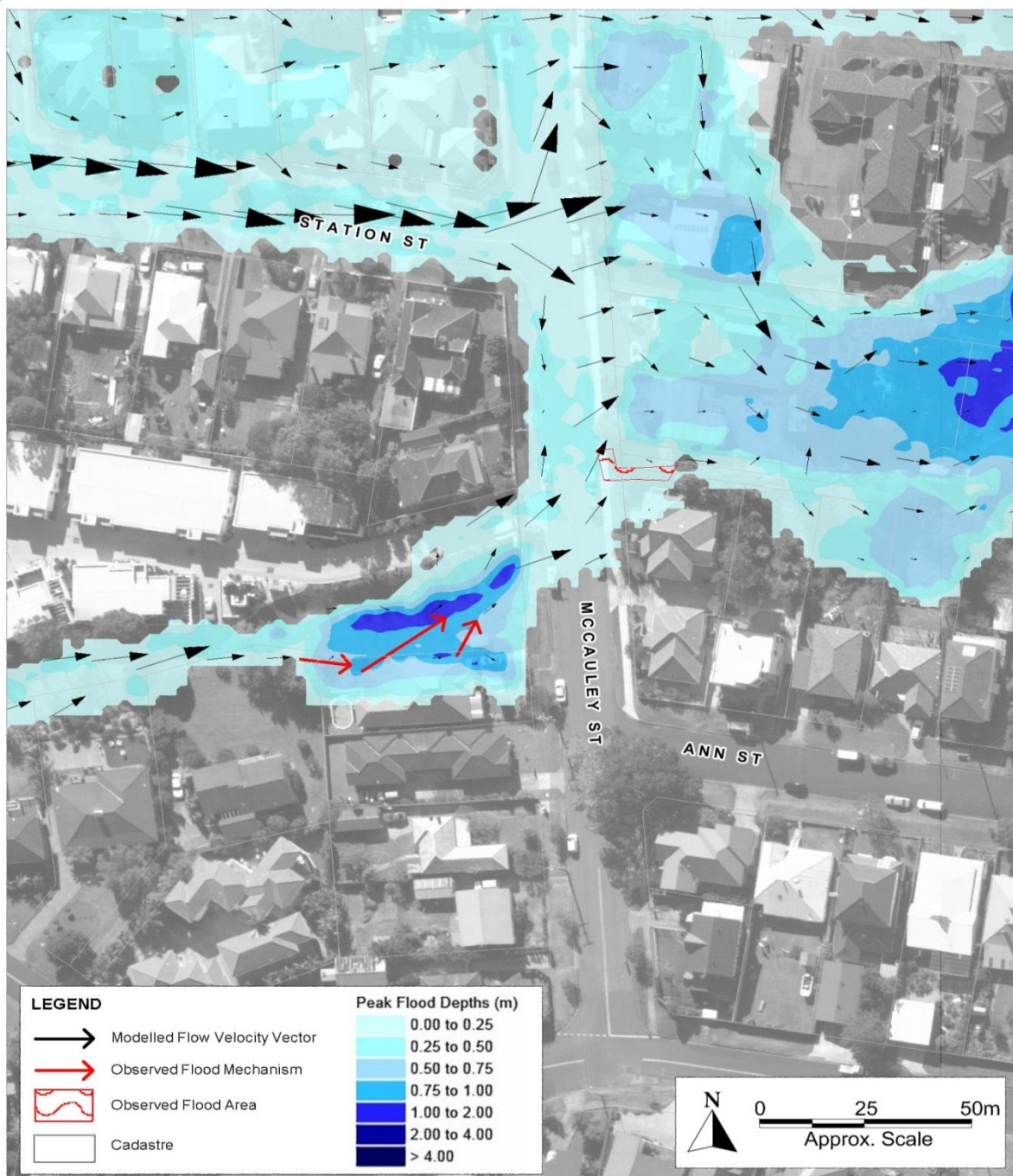


Discussion on comparison of results

At Newbold Close, Thirroul, the creek is formed as an overland floodway through the rear gardens. Flooding along this overland floodway was observed at a multiple properties in Newbold Close. Water entered 24 Newbold Close from the west and flowed east until 14 Newbold Close. The water level rose twice during the evening to a height of approximately 1 meter before subsiding reasonably quickly each time. At 14 Newbold Close a stormwater drain was forcibly thrown open. The stormwater from this drain caused a section of a wall to collapse.

The model results correlate well with the majority of the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood areas. The model does not replicate the localised stormwater drain issue at 14 Newbold Close as the stormwater drainage network has not been modelled as part of this study

Appendix	B-2.4
Location	McCauley Street and Ann Street, Thirroul
Watercourse	Thomas Gibson Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

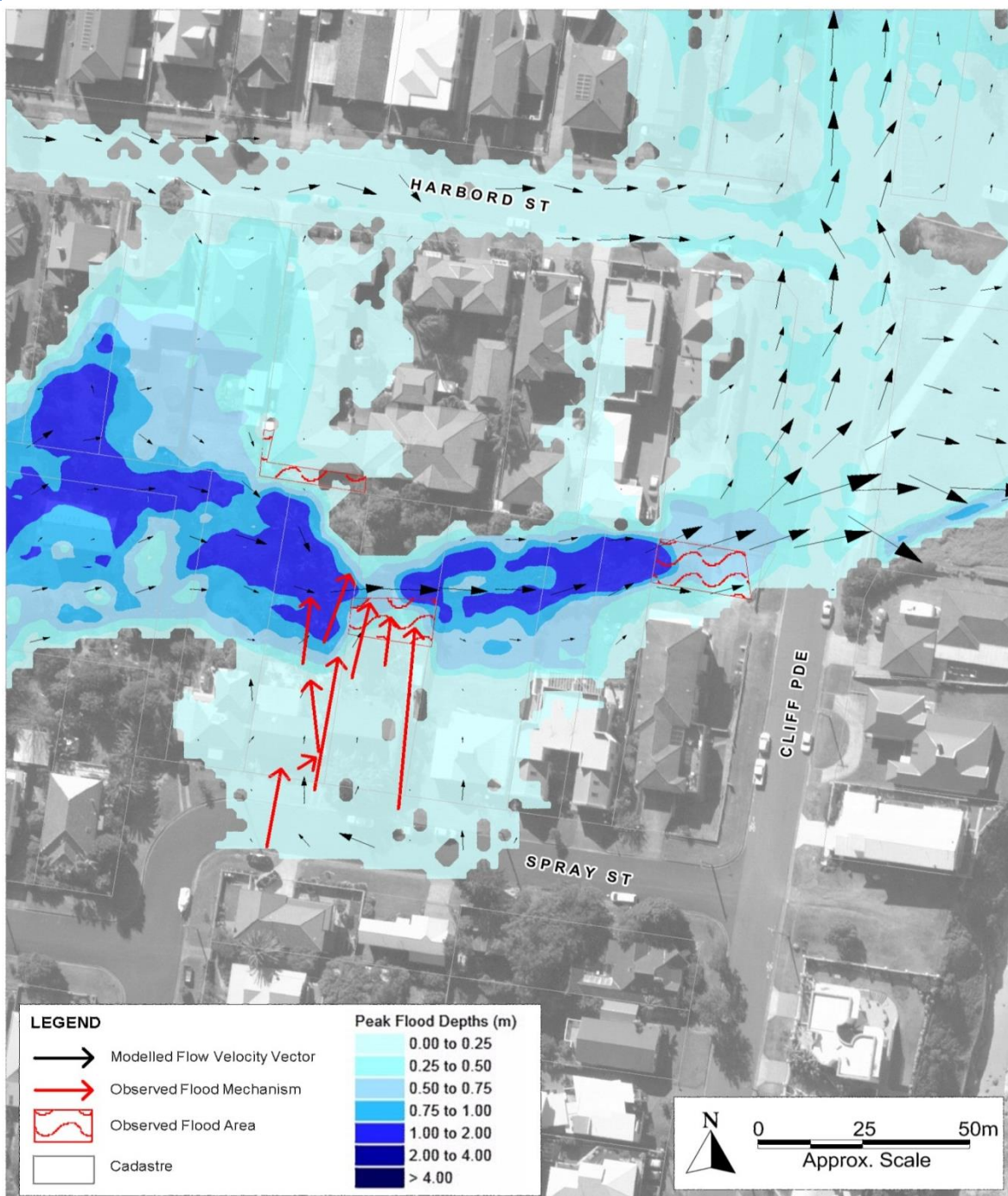


Discussion on comparison of results

At 42 McCauley Street, Thirroul, the resident reported flood water inundation of 0.1m in their garage with water running through the grounds of their property passing from upstream at McCauley Street and existing at the northeast corner of their property. The residents of 1/12 Ann Street, Thirroul reported damage due to stormwater runoff and erosion.

The model results correlate well with the majority of the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood area. The model does not replicate the localised erosion at Ann Street as erosion and subsidence of the creek banks was not assessed as part of this study.

Appendix	B-2.5
Location	Spray Street, Thirroul
Watercourse	Thomas Gibson Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

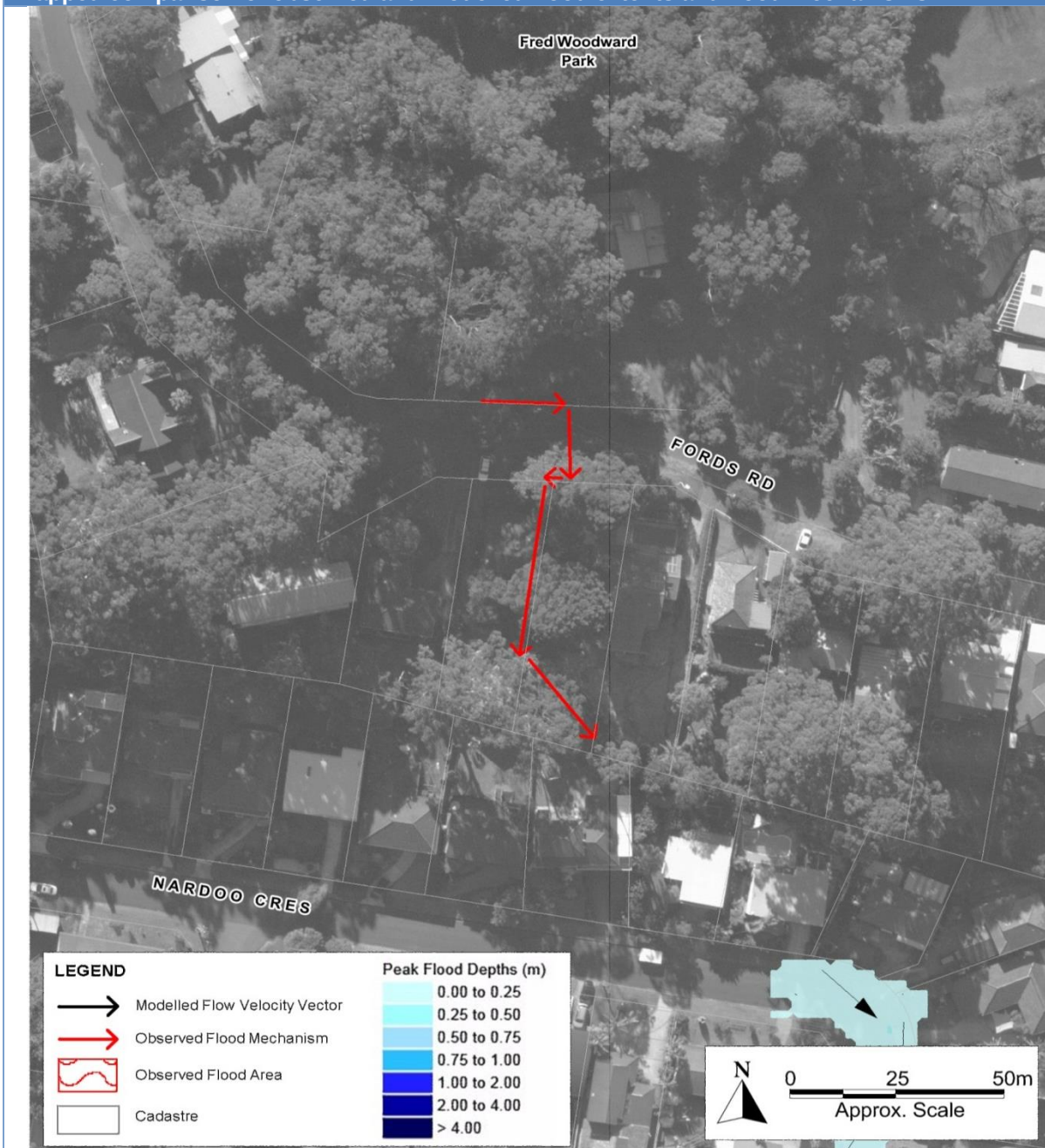


Discussion on comparison of results

Flooding was observed at two properties on Spray Street, Thirroul. At 3 Spray Street, the residents reported that water flowed from the street down the eastern side of their property. The residents at 5 Spray Street also reported overland flows from Spray Street, through their property, and exiting to Thomas Gibson Creek at the rear of their house. The creek rose to the level of the level of the clothes line at 5 Spray Street.

The model results correlate well with the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood areas.

Appendix	B-2.6
Location	Fords Road, Thirroul
Watercourse	Hewitts Creek (eastern tributary)
Mapped comparison of observed and modelled flood extents and flood mechanisms	

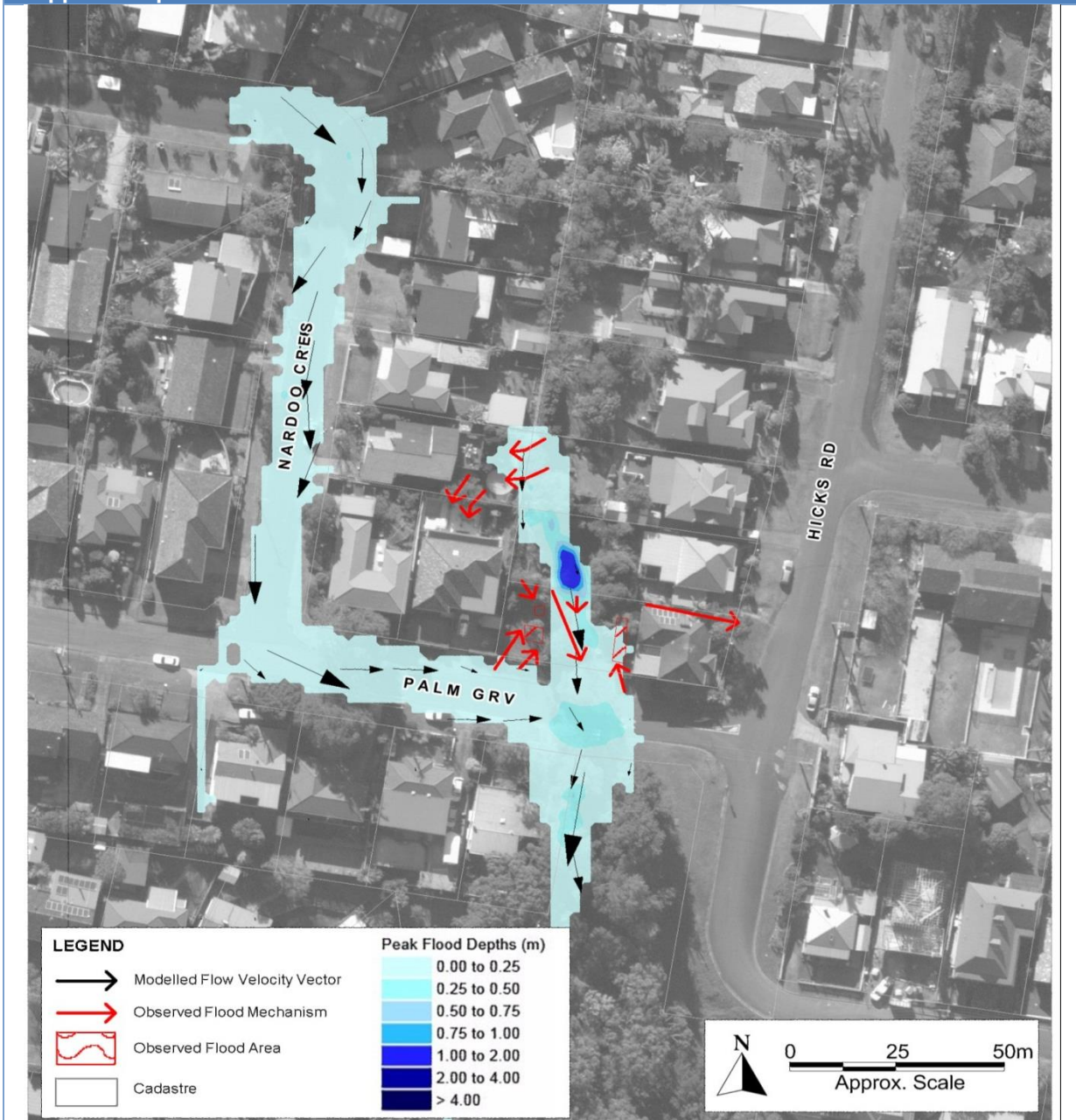


Discussion on comparison of results

At Fords Road, Thirroul, surface water runoff was observed through a number of properties. Water flowed in a south western direction towards Nardoo Crescent, Thirroul.

The model does not replicate the surface water flooding at this location. Fords Road forms the catchment boundary between Hewitts Creek catchment and the adjacent catchment to the north. This catchment boundary defines the limit of the hydrological and hydraulic models. It is likely that the surface water flows at this location, for this event, are from the neighbouring catchment to the north spilling along Sylvan Way, Thirroul and Fords Road. As this is outside the modelled area, this flood mechanism is not replicated in the hydraulic model.

Appendix	B-2.7
Location	Nardoo Crescent, Palm Grove and Hicks Road, Thirroul
Watercourse	Hewitts Creek (eastern tributary)
Mapped comparison of observed and modelled flood extents and flood mechanisms	

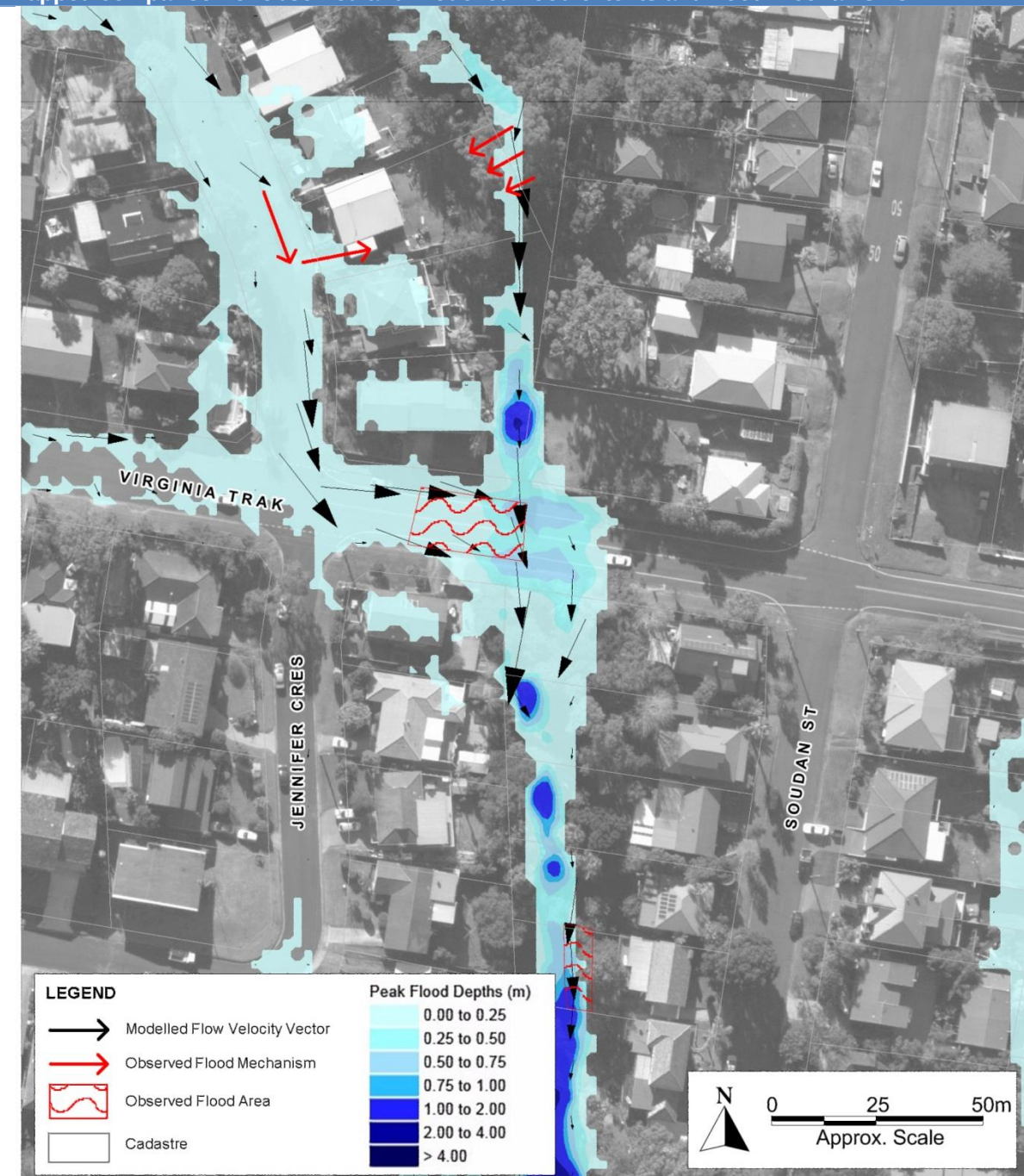


Discussion on comparison of results

Flood water are reported to have inundated the back gardens of properties on Hicks Road, Thirroul and Nardoo Crescent, Thirroul. Water rose to a reported depth of 0.15m in the garden of 2 Hicks Road. The residents of 4 Nardoo Crescent reported significant erosion of their back garden with overland flows passing from north to south across their property. The residents reported a 0.2m depth of flooding in the grounds of their property.

The model results correlate well with the majority of the observed flood mechanisms and depths described at this location. The model does not replicate the localised erosion at 4 Nardoo Crescent as erosion and subsidence of the creek banks was not assessed as part of this study.

Appendix	B-2.8
Location	Jennifer Crescent and Virginia Terrace, Thirroul.
Watercourse	Hewitts Creek (eastern tributary)
Mapped comparison of observed and modelled flood extents and flood mechanisms	

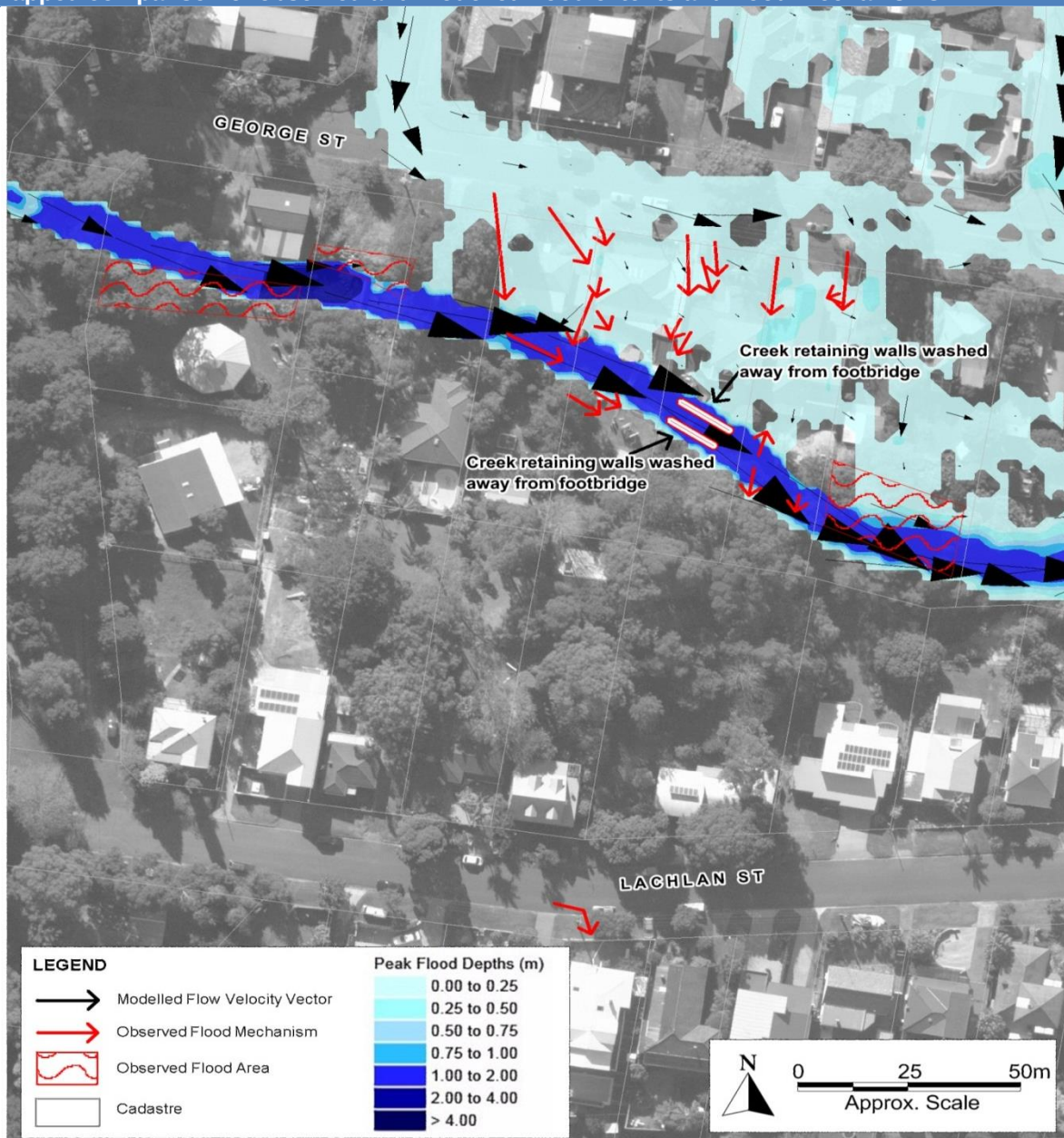


Discussion on comparison of results

Flooding was observed at 31 Arunta Drive, Thirroul, from both surface water flows off Arunta Drive and from out of bank flooding from the creek at the rear of the property. At Virginia Terrace, Thirroul, residents reported that flooding was increased by a blockage that occurred in the stormwater pipe running under the road resulting in flood water spilling over the road. At 34 Soudan Street, Thirroul, the residents observed creek flows inundating the garden to the rear of their property.

The model results correlate well with the observed flood mechanisms described at this location and indicates flooding within the observed flood areas.

Appendix	B-2.9
Location	George Street and Lachlan Street, Thirroul
Watercourse	Hewitts Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

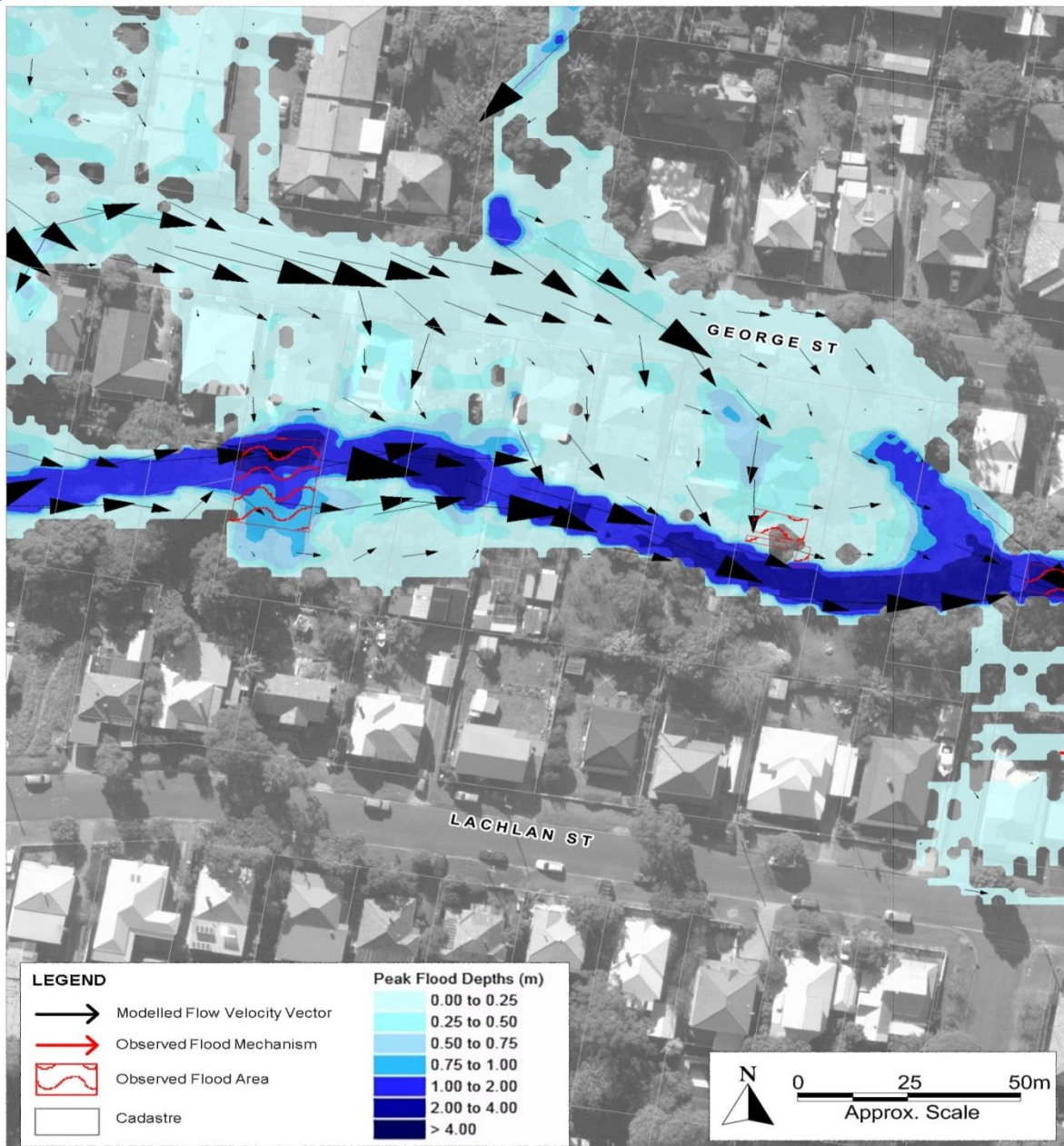


Discussion on comparison of results

Numerous properties were affected by flooding along George Street, Thirroul, from a combination of out of bank flows from the main channel of Hewitts Creek and overland flows from George Street. Flooding was exacerbated by the deposition of debris and the blockage of structures. At 75 George Street, the residents reported that at the height of the storm, the water level in his back yard was in excess of 3m. At 69 George Street, the water was reported to be 0.35m deep in the garage and at 51 George Street, the water was reported to be 1m deep in the garage.

The model results correlate well with the majority of the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood areas. The responses to the community survey following the 1998 flood event indicates that the surface water runoff at 62 Lachlan Street, Thirroul was relatively localised. It is not possible replicate all of these localised surface water runoffs within the hydraulic model.

Appendix	B-2.10
Location	George Street, Thirroul
Watercourse	Hewitts Creek and Hewitts Creek eastern tributary
Mapped comparison of observed and modelled flood extents and flood mechanisms	

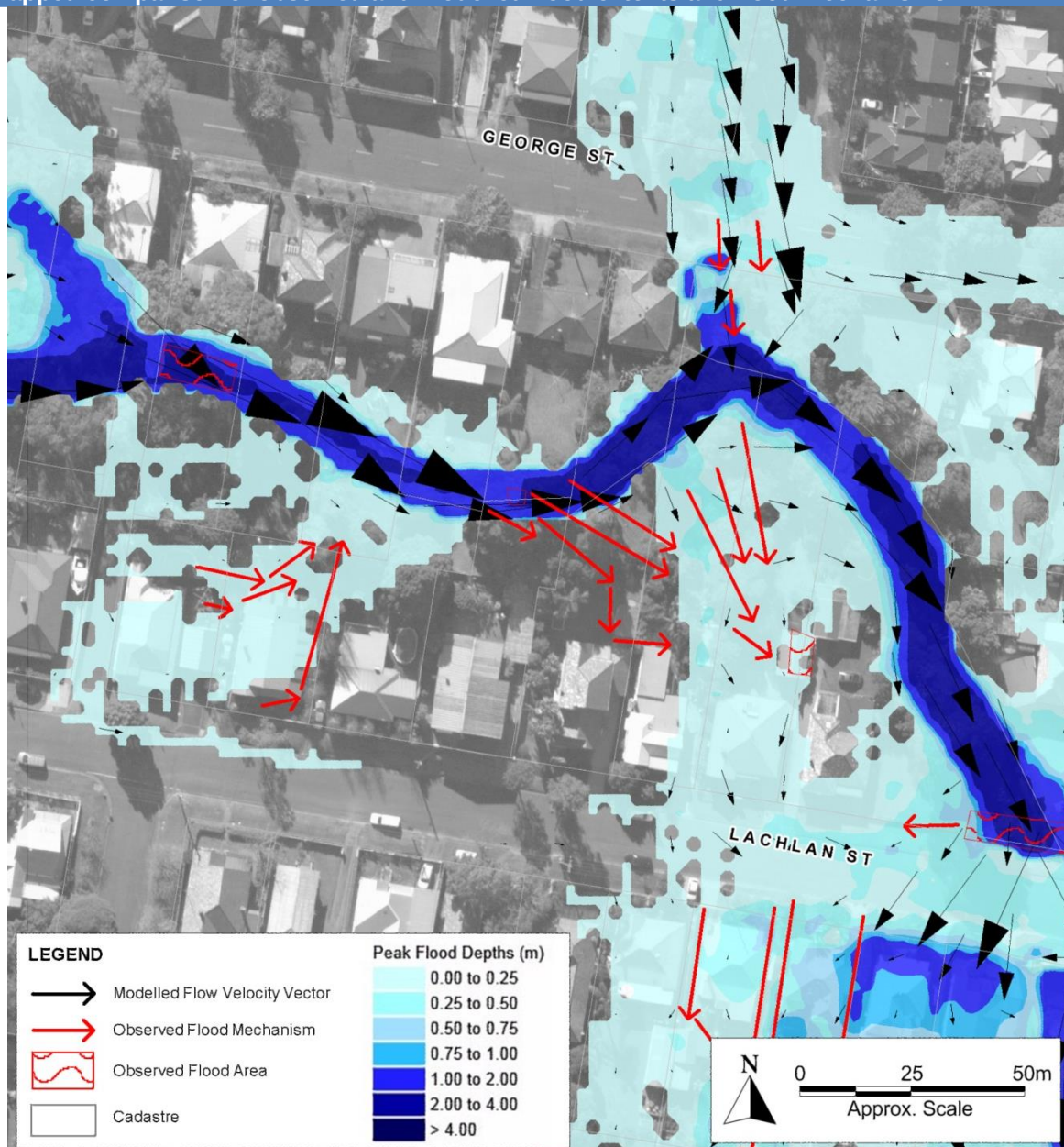


Discussion on comparison of results

On the eastern tributary of Hewitts Creek at George Street, Thirroul, the culvert was observed to be blocked and significant flows were reported to be flowing along George Street. Parked cars and debris were reported to have impeded the flow of water along this street. On Hewitts Creek flooding inundated a number of properties and resulted in damages to properties. Numbers 37-39 George Street sit on a raised platform. The residents reported that their yard was covered by approximately 0.1m of water. It was reported that numerous properties had sections of the creek banks eroded and washed away.

The model results correlate well with the majority of the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood areas. The model does not replicate the observed erosion along this reach as erosion and subsidence of the creek banks was not assessed as part of this study.

Appendix	B-2.11
Location	Lachlan Street, Thirroul
Watercourse	Hewitts Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

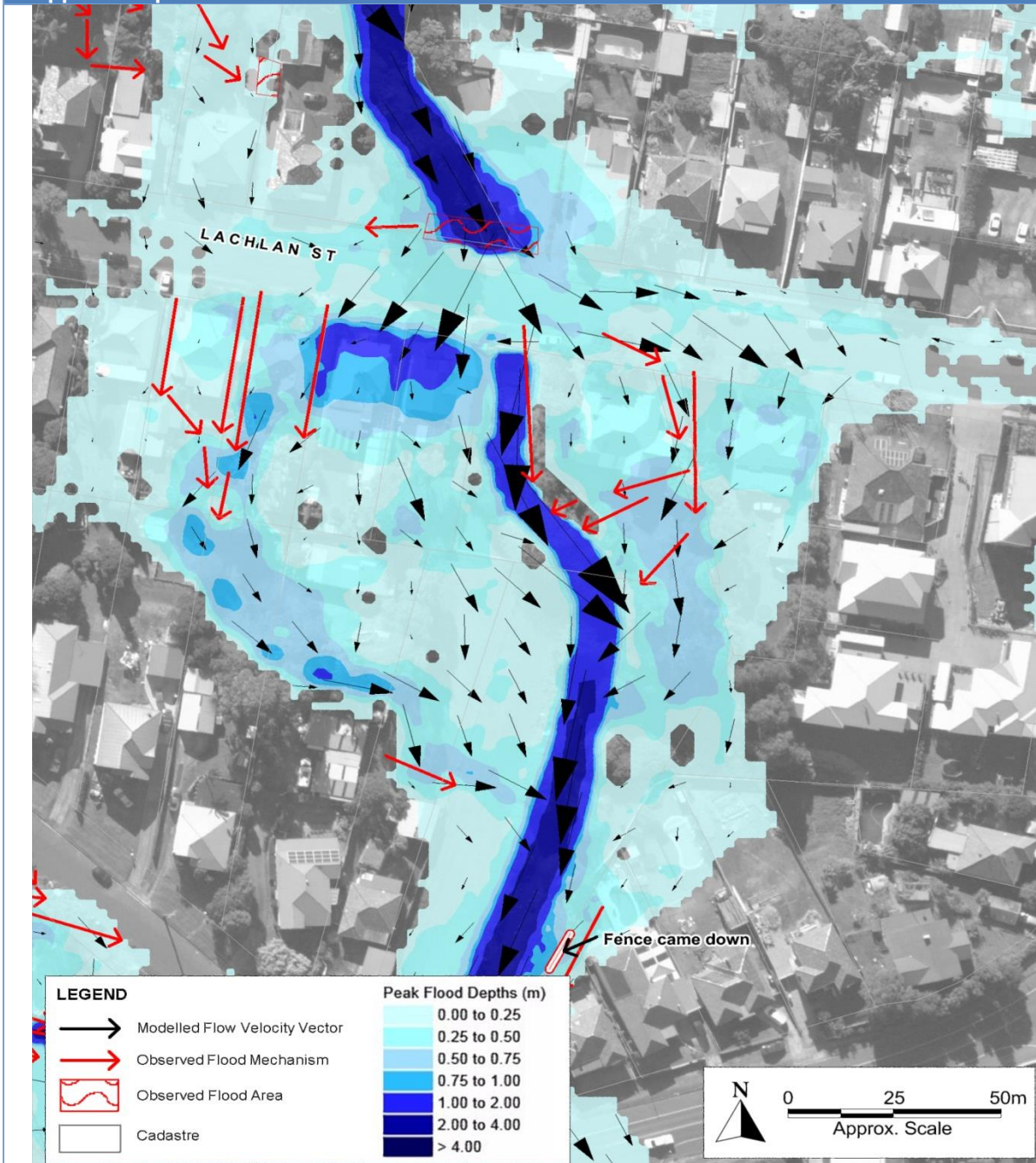


Discussion on comparison of results

At Lachlan Street, Thirroul, residents reported that numerous properties experienced flooding. On the northern side of Lachlan Street, Hewitts Creek runs to the rear of the gardens at a number of properties. During the August 1998 flood event, the creek overflowed its banks and flooded the back yards of numbers 23, 19, 17 and 15 Lachlan Street. At 17 Lachlan Street, the residents reported that flood water travelled through their back yard at a depth of approximately 0.5m. The brick garage of 15 Lachlan Street was knocked down by the force of the flood water and also resulted in damage to the property at 11a Lachlan Street.

The model results correlate well with the majority of the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood areas. The flooding mechanisms resulting from this collapse of property walls at numbers 15 and 11a Lachlan Street are not able to be represented in the model.

Appendix	B-2.12
Location	Lachlan Street and Lawrence Hargrave Drive, Thirroul
Watercourse	Hewitts Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

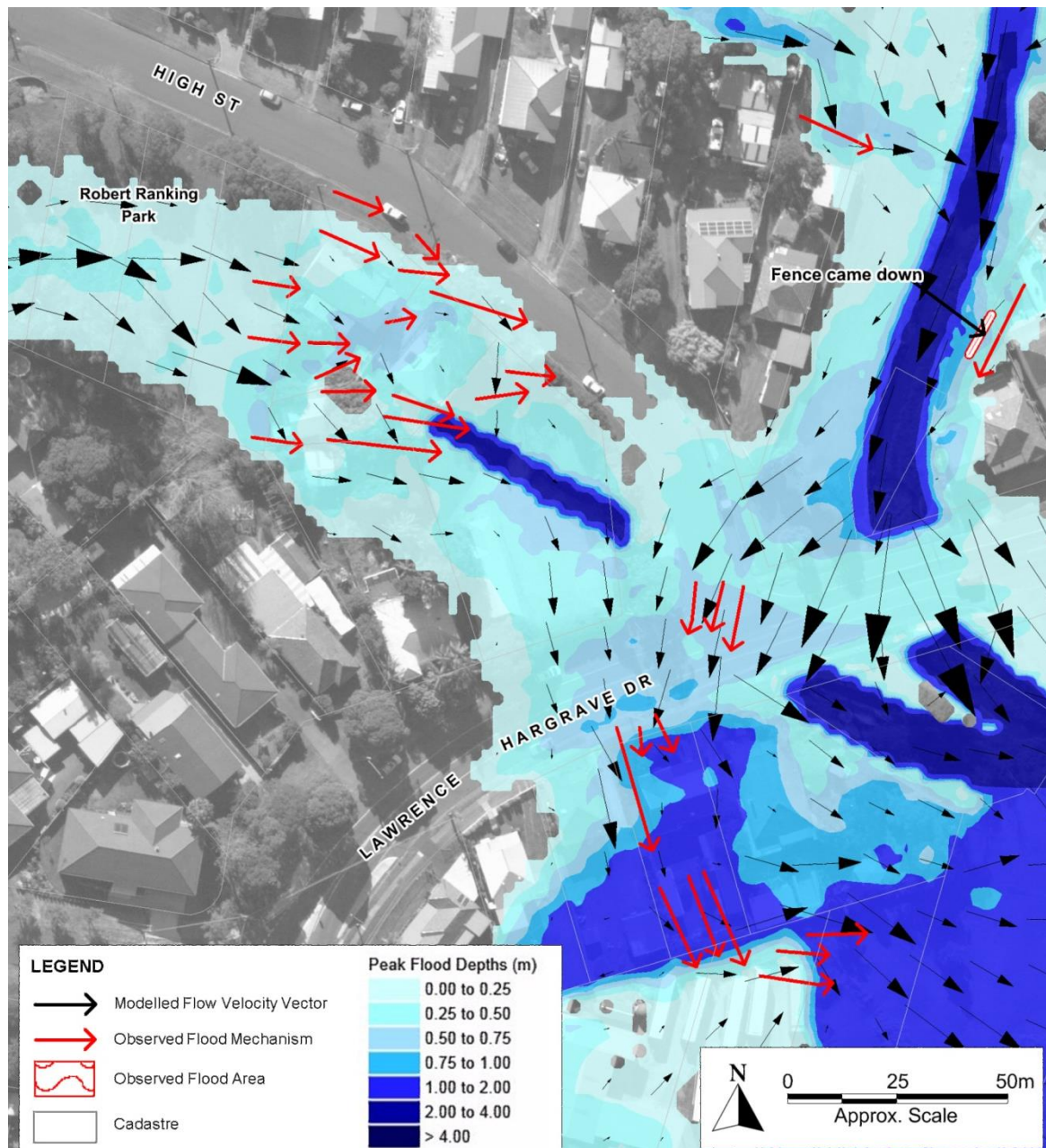


Discussion on comparison of results

On the southern side of Lachlan Street, Thirroul, flooding was observed to enter properties from flows spilling along Lachlan Street. Flood water exited these properties through the southern boundaries before re-joining Hewitts Creek downstream of Lachlan Street. The residents of 6 Lachlan Street reported that 0.3m – 0.5m of water covered the back yard, whilst the residents of 12 Lachlan Street reported between 1m and 1.5m of water at their property. The residents of 416 Lawrence Hargrave Drive, Thirroul reported flooding at the rear of their property with damage to a boundary fence

The model results correlate well with the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood areas

Appendix	B-2.13
Location	Lawrence Hargrave Drive and High Street, Thirroul
Watercourse	Hewitts Creek and un-named overland floodway
Mapped comparison of observed and modelled flood extents and flood mechanisms	

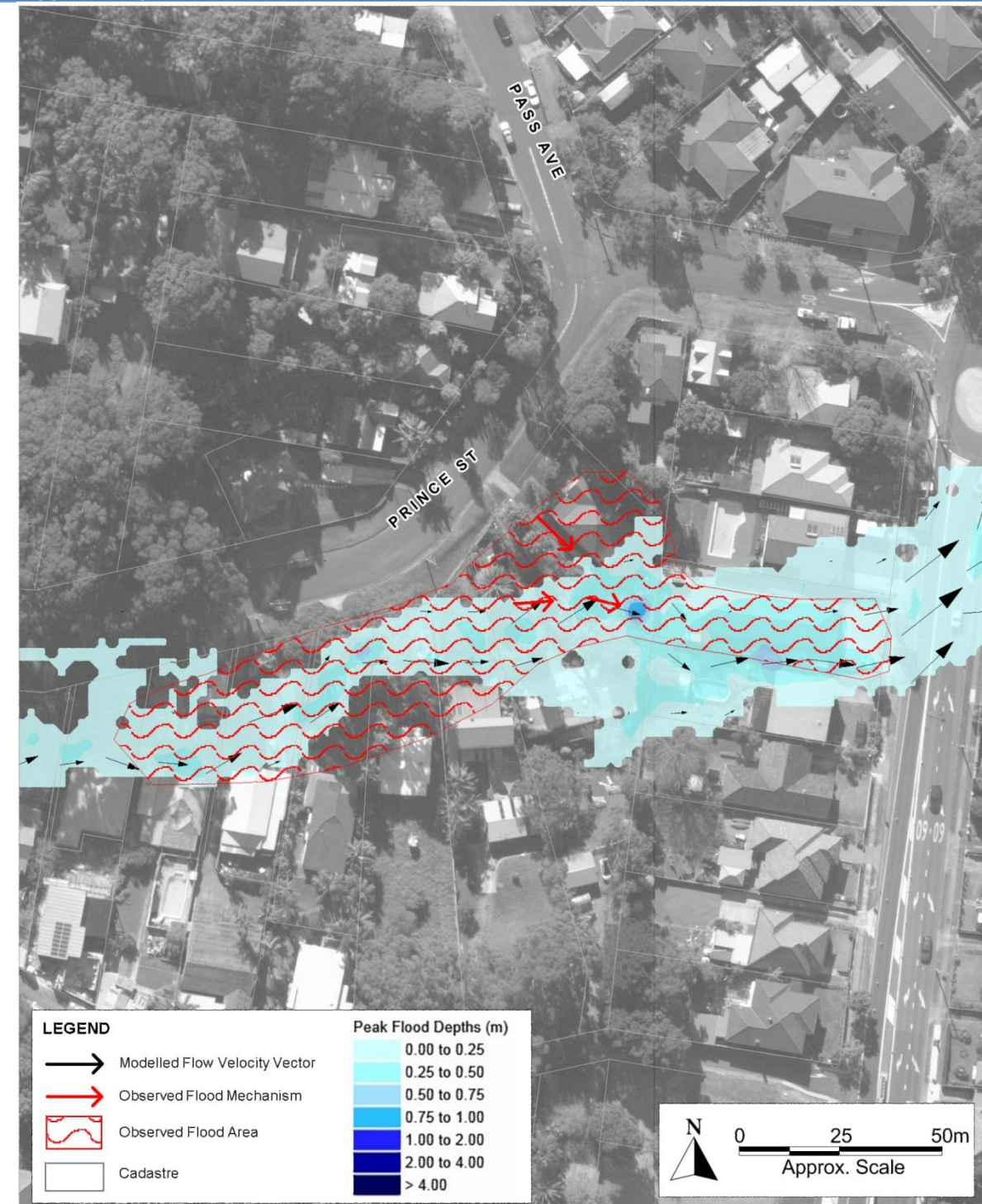


Discussion on comparison of results

Flooding was observed at multiple properties at the intersection of High Street, Thirroul, and Lawrence Hargrave Drive, Thirroul. On High Street, it was reported that flood water entered property numbers 2 and 4 High Street from the west and ran through their properties before exiting onto High Street. This flooding was from an upstream overland floodway. The residents of numbers 421 and 419 Lawrence Hargrave Drive reported flooding overtopping Lawrence Hargrave Drive and spilling through their property before exiting back to the creek at the rear of their property with the flood water was up to 1m deep in the grounds of their property and up to 0.5m through their house.

The model results correlate well with the majority of the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood areas.

Appendix	B-2.14
Location	Pass Avenue, Thirroul
Watercourse	Un-named overland flood way
Mapped comparison of observed and modelled flood extents and flood mechanisms	

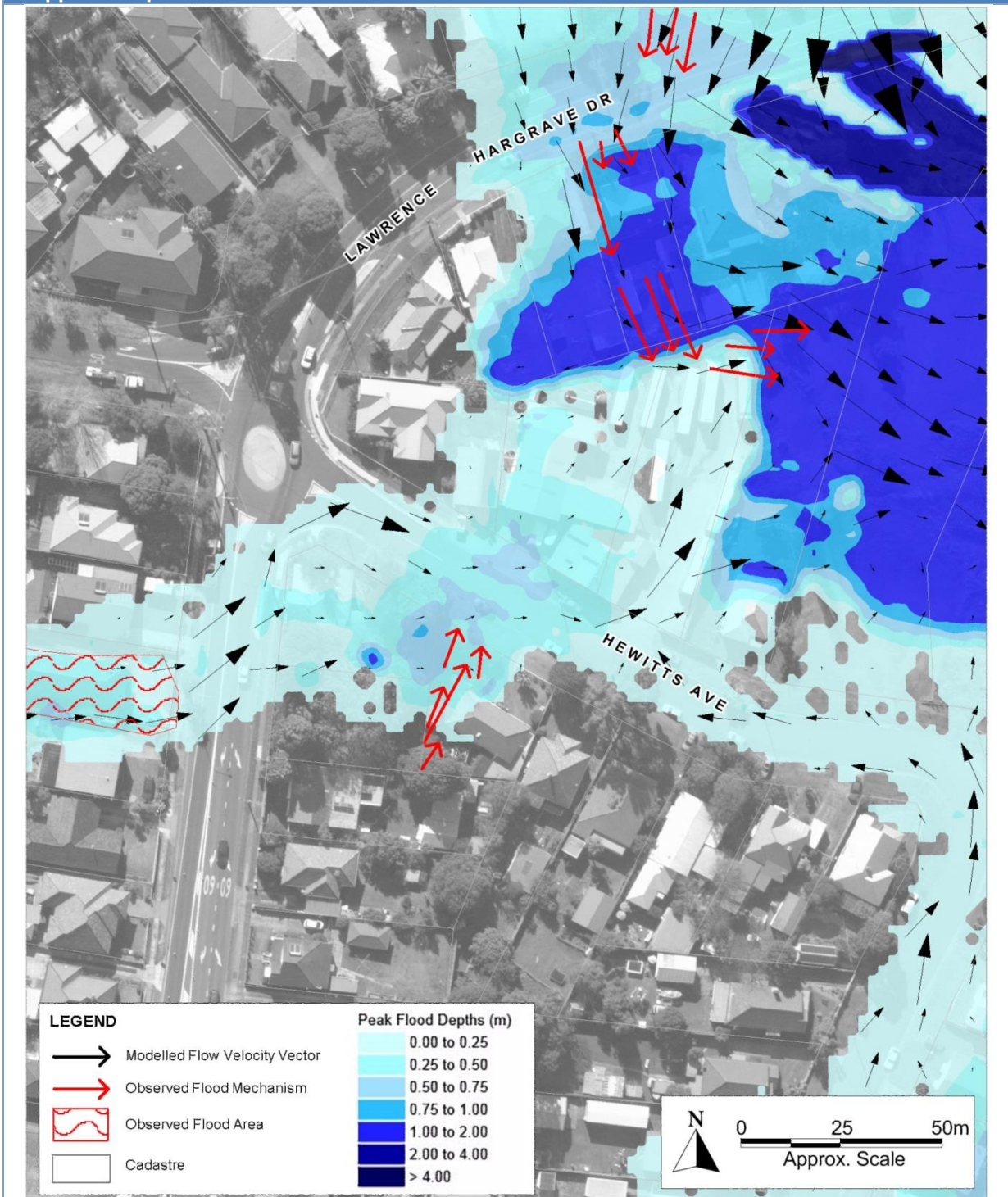


Discussion on comparison of results

The residents of 19 Pass Avenue, Thirroul, reported flooding through the grounds of their property and numerous neighboring properties.

The model results generally correlate well with the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood areas.

Appendix	B-2.15
Location	Hewitts Avenue, Thirroul
Watercourse	Un-named overland flood way
Mapped comparison of observed and modelled flood extents and flood mechanisms	

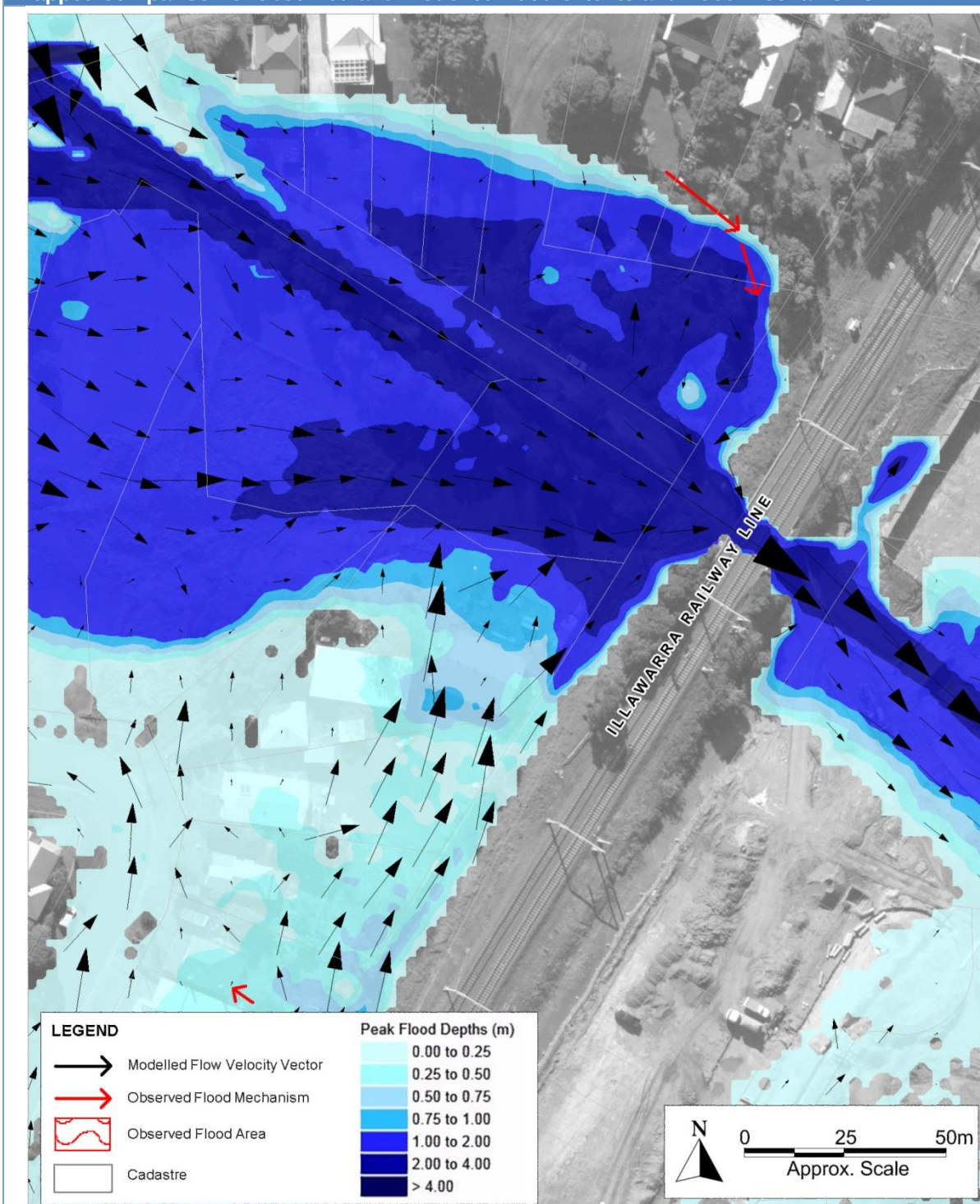


Discussion on comparison of results

At 25 Hewitts Avenue, Thirroul, flood water was observed to enter the property from the southwest boundary and proceeded through the yard and house before exiting to the north onto Hewitts Avenue. The resident reported flood water up to 1m deep.

The model results correlate well with the observed flood mechanisms and depths described at this location.

Appendix	B-2.16
Location	Wrexham Road, Thirroul
Watercourse	Hewitts Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

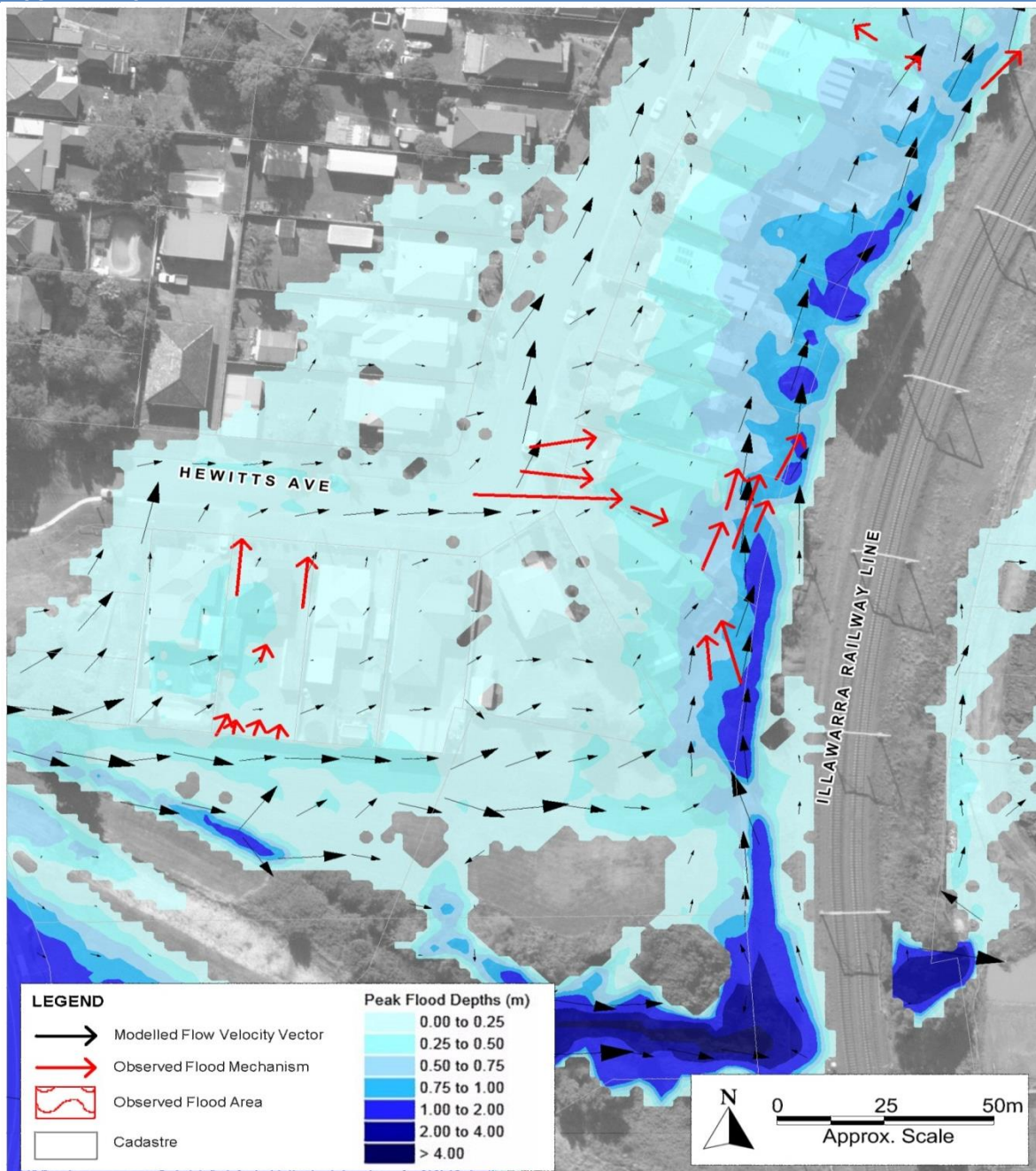


Discussion on comparison of results

The residents of 10 Wrexham Road, Thirroul, indicated that flood water ran through the back corner of their yard at a depth of 1-2m and deposited a large amount of silt and debris.

The model results correlate well with the observed flood mechanisms and depths described at this location.

Appendix	B-2.17
Location	Hewitts Avenue, Thirroul
Watercourse	Woodlands Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

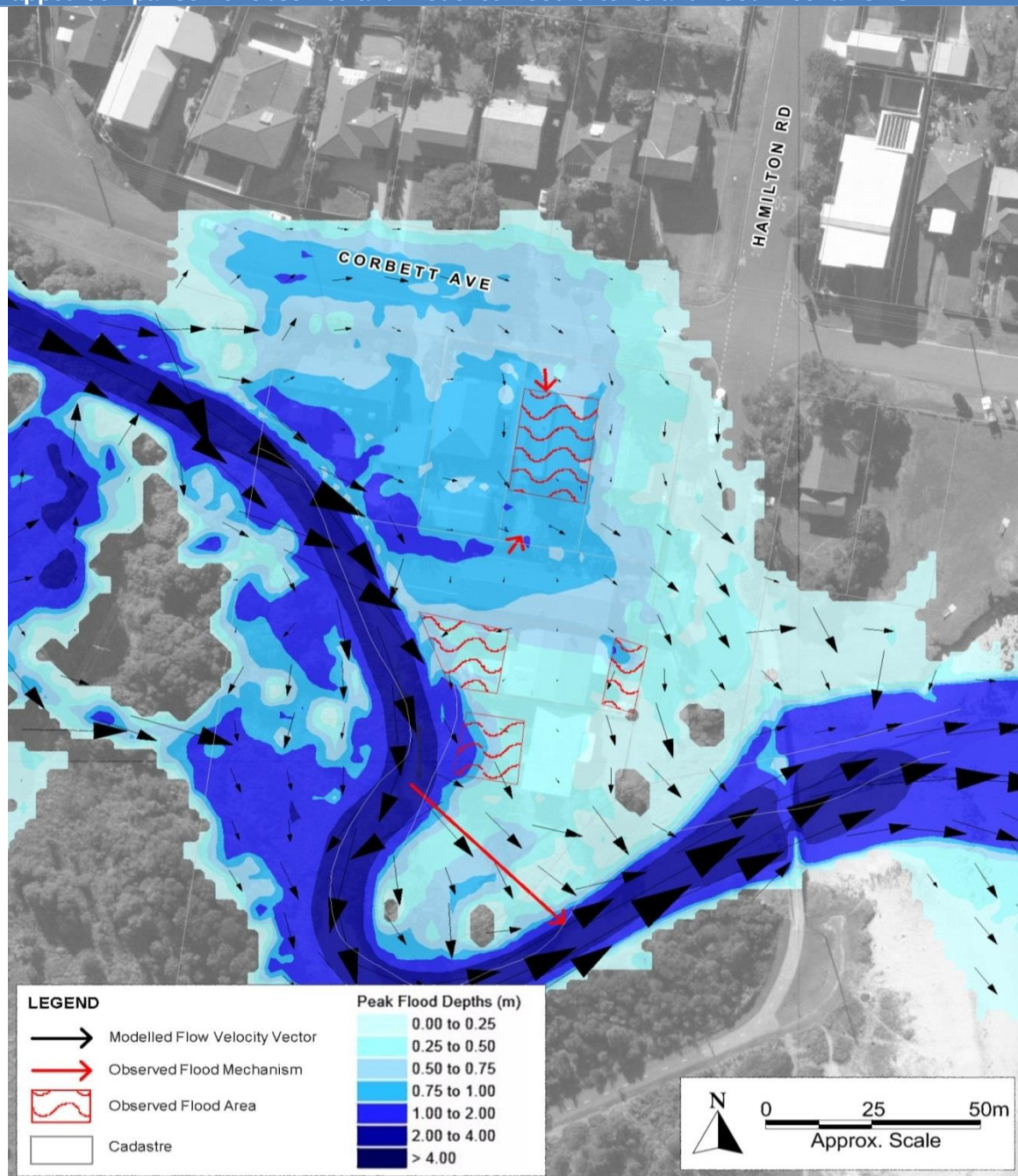


Discussion on comparison of results

The residents of 4 Hewitts Avenue, Thirroul, indicated that flood water moved through their property from the south and exited to the north onto Hewitts Avenue. Flood water up to 1m deep were reported at 12 Hewitts Avenue, with flows cutting across the back of the property and heading north. The residents of 14 Hewitts Avenue reported the same pattern of flooding with water entering their property from 12 Hewitts Avenue to the south and moving through to 14 Hewitts Avenue to the north before exiting into 16 Hewitts Avenue. The residents at 14 Hewitts Avenue indicated that water adjacent to the railway line was approximately 1.5m deep, with depths of 0.8m and 2.3m water near their house and garage.

The model results correlate well with the observed flood mechanisms and depths described at this location.

Appendix	B-2.18
Location	Corbett Avenue, Thirroul
Watercourse	Hewitts Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

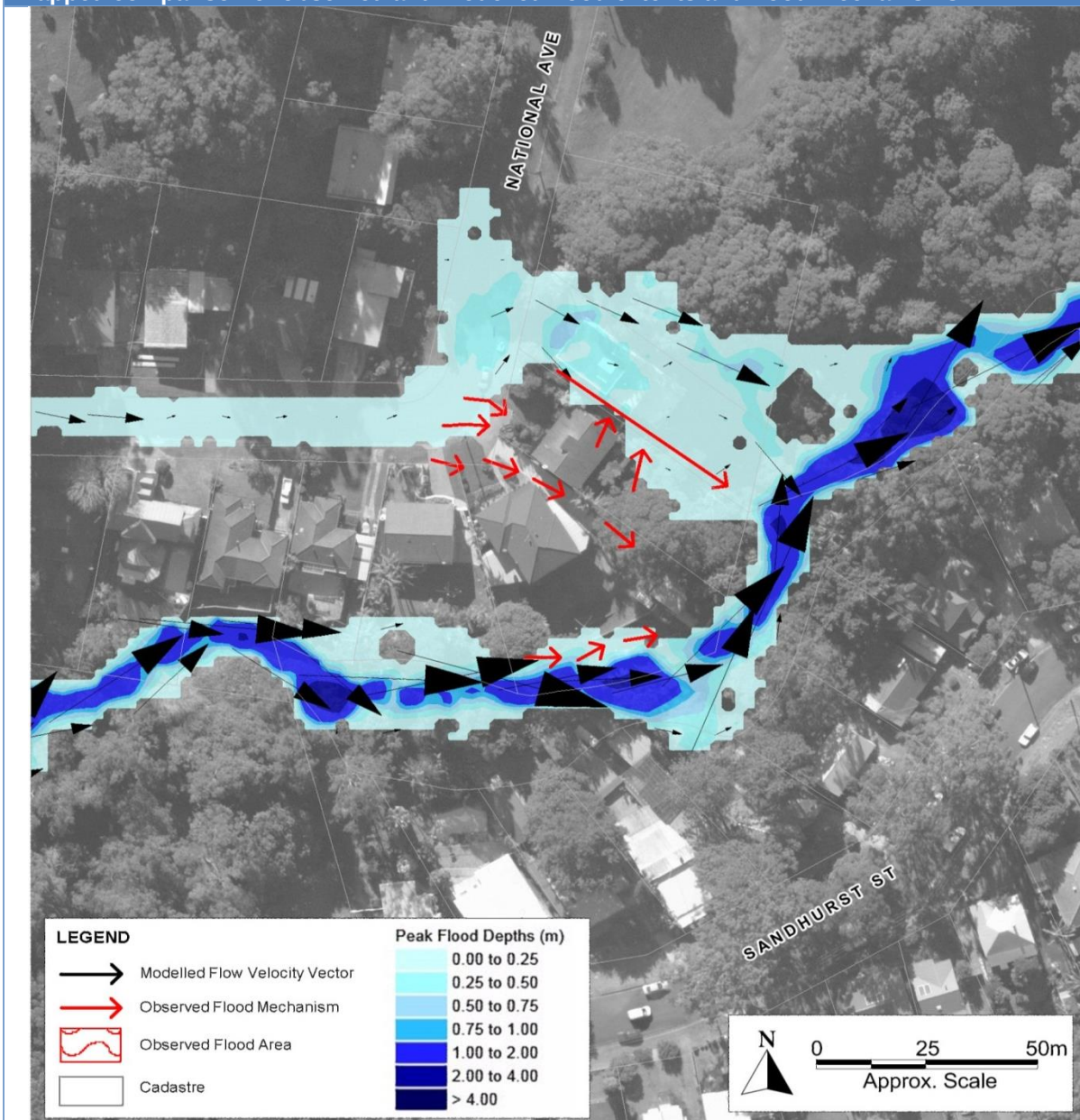


Discussion on comparison of results

Flooding was reported by the residents of 13 Corbett Avenue, Thirroul. They reported flood water entering the front and rear of their property via burst water pipes on the street and flows spilling from the creek. The entire back yard of their property was under approximately 0.4m of water. Numbers 6 and 8 Hamilton Road, Thirroul, also reported flooding. Both houses had water enter their property from Hewitts Creek. The residents at 8 Hamilton Road reported approximately 0.1m of water at the back steps of their house and indicated that the flood water cut across the creek bend and through the corner of their property.

The model results correlate well with the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood areas.

Appendix	B-2.19
Location	National Avenue, Bulli
Watercourse	Slacky Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

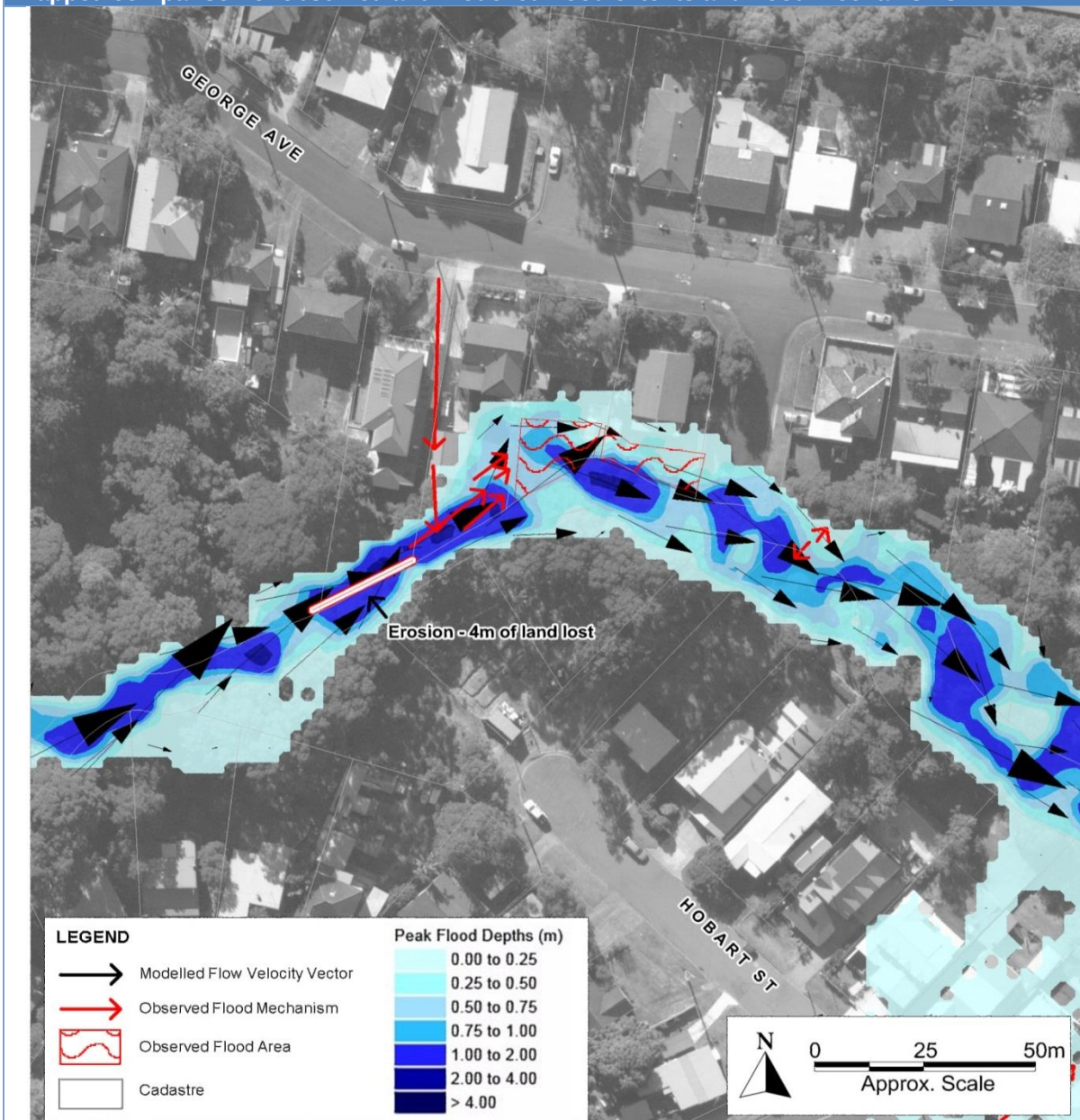


Discussion on comparison of results

The residents at 7 and 9 National Avenue, Bulli, experienced flooding. The residents at 9 National Avenue indicated that water entered from National Avenue and ran through property numbers 9 and 11 to join with flows in Slacky Creek to the rear of these properties. The lower garage at 9 National Avenue was flooded to a depth of approximately 1m. The water running through the grounds of this property was 0.1m – 0.2m deep and very fast moving. The units at 7 National Avenue reported a similar pattern of flooding, with very fast flowing water through their property, sweeping full garbage bins downstream. Flooding in the garages of this property was reported to be approximately 0.75m deep with flood water entering some of the lower ground floor units.

The model results correlate well with the majority of the observed flood mechanisms and depths described at this location. The modelled surface water runoff from National Avenue is not as extensive as the observed runoff.

Appendix	B-2.20
Location	George Avenue, Bulli
Watercourse	Slacky Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

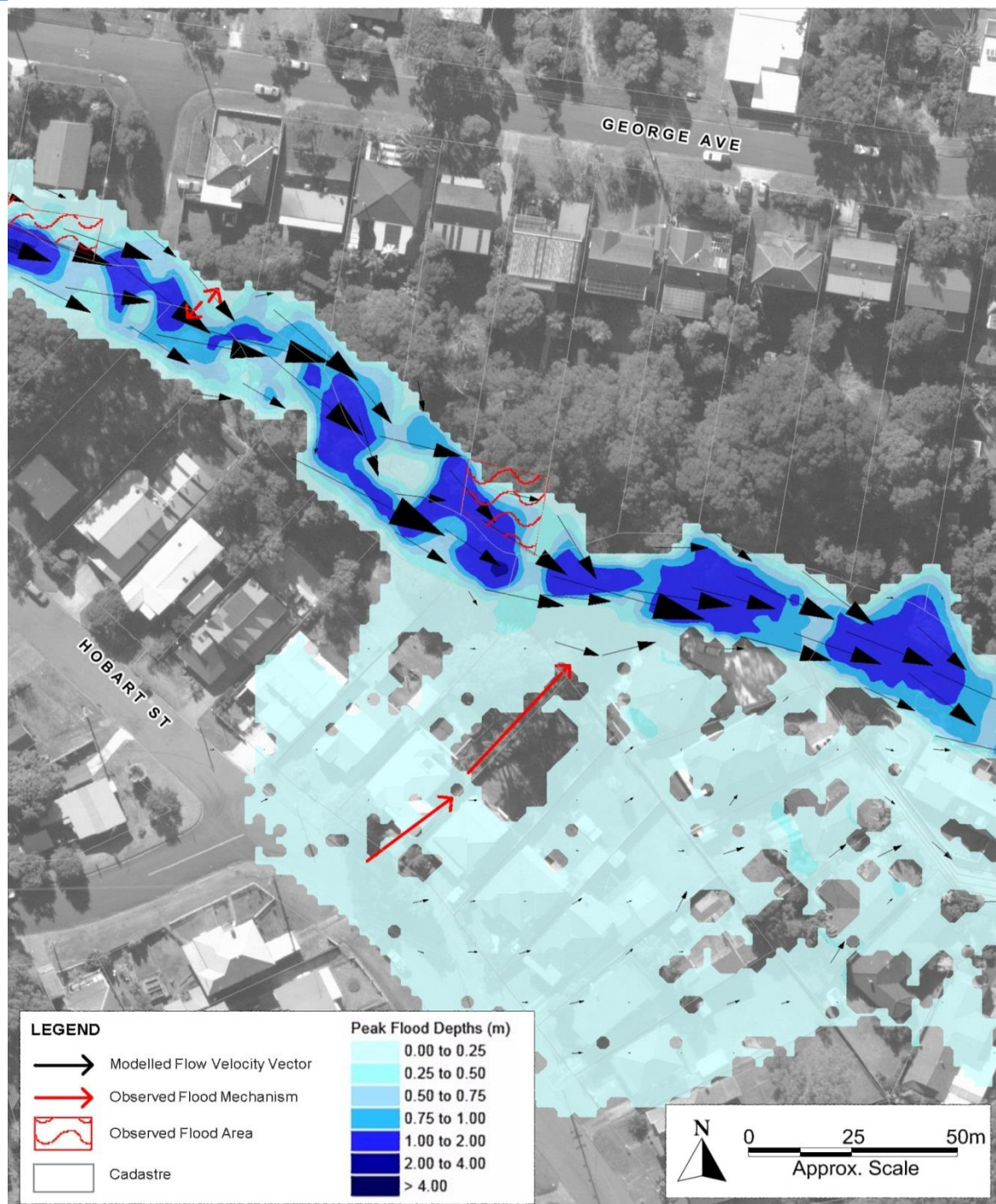


Discussion on comparison of results

A number of properties on George Avenue, Bulli, reported flooding. The residents at 67 George Avenue observed severe erosion all along the creek, with their own property losing approximately 4m of land. The residents at 65 George Avenue reported water flowing rapidly through their back yard from the creek as well as surface water runoff flowing from George Avenue, through their property, to the Creek. At 63 George Avenue, the residents observed the creek breaking its banks which resulted in the destruction of a boundary fence, flood damages to their garage and erosion of their land. The residents of 61 George Avenue reported similar flooding issues with approximately 4m of their property including two sheds and a sewerage line eroded and washed away by the flood water.

The model results correlate well with the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood areas. The model does not replicate the observed erosion along this reach as erosion and subsidence of the creek banks was not assessed as part of this study.

Appendix	B-2.21
Location	Hobart Street, Bulli
Watercourse	Slacky Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

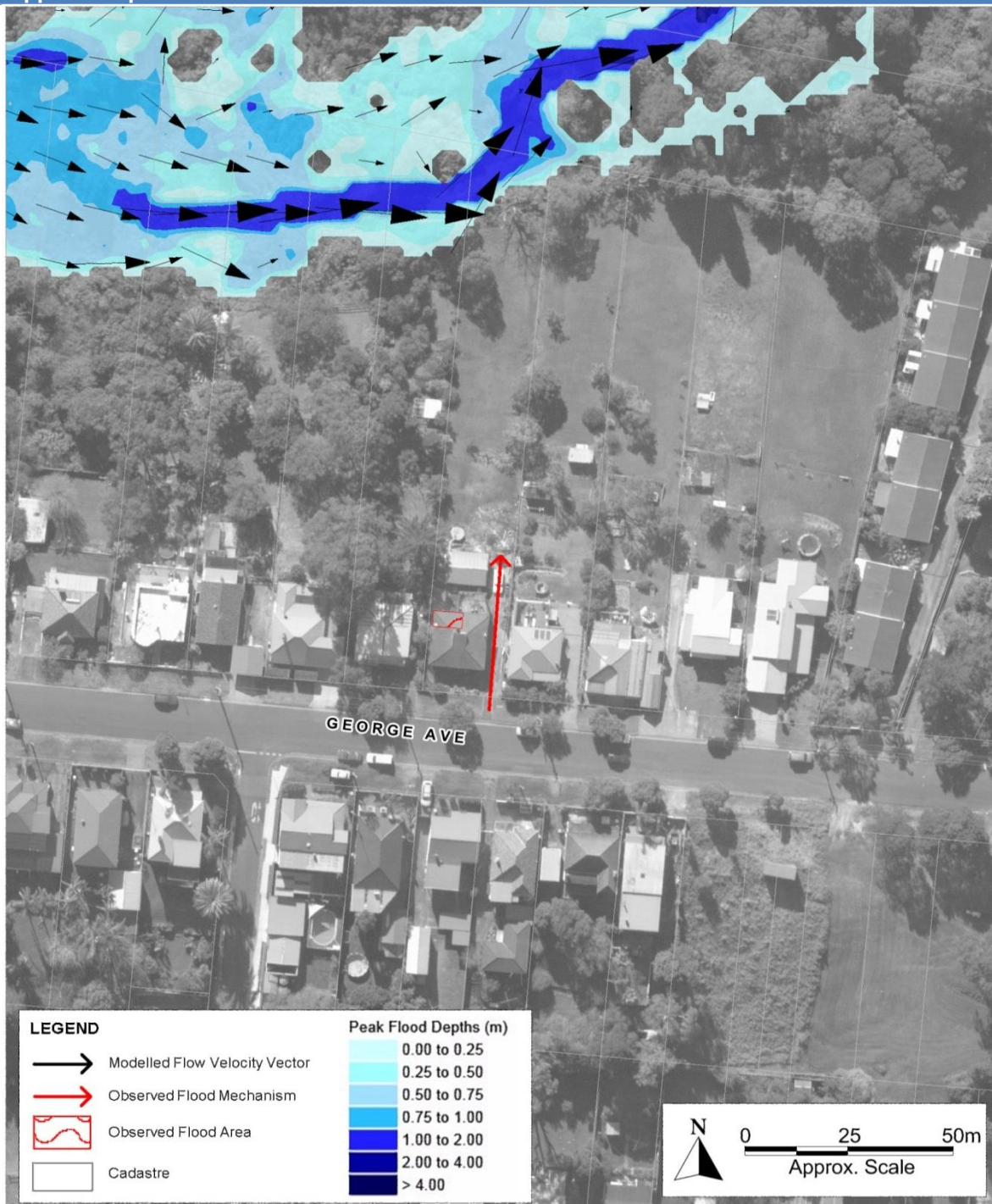


Discussion on comparison of results

Surface water flooding was observed at 42 Hobart Street, Bulli, where the residents reported water flowing from Hobart Street, through their property, and exiting through their back yard to Slacky Creek. The residents at 54 Hobart Street reported water flowing through their back yard from out of bank flooding from Slacky Creek.

The model results correlate well with the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood areas.

Appendix	B-2.22
Location	George Avenue, Bulli
Watercourse	Woodlands Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

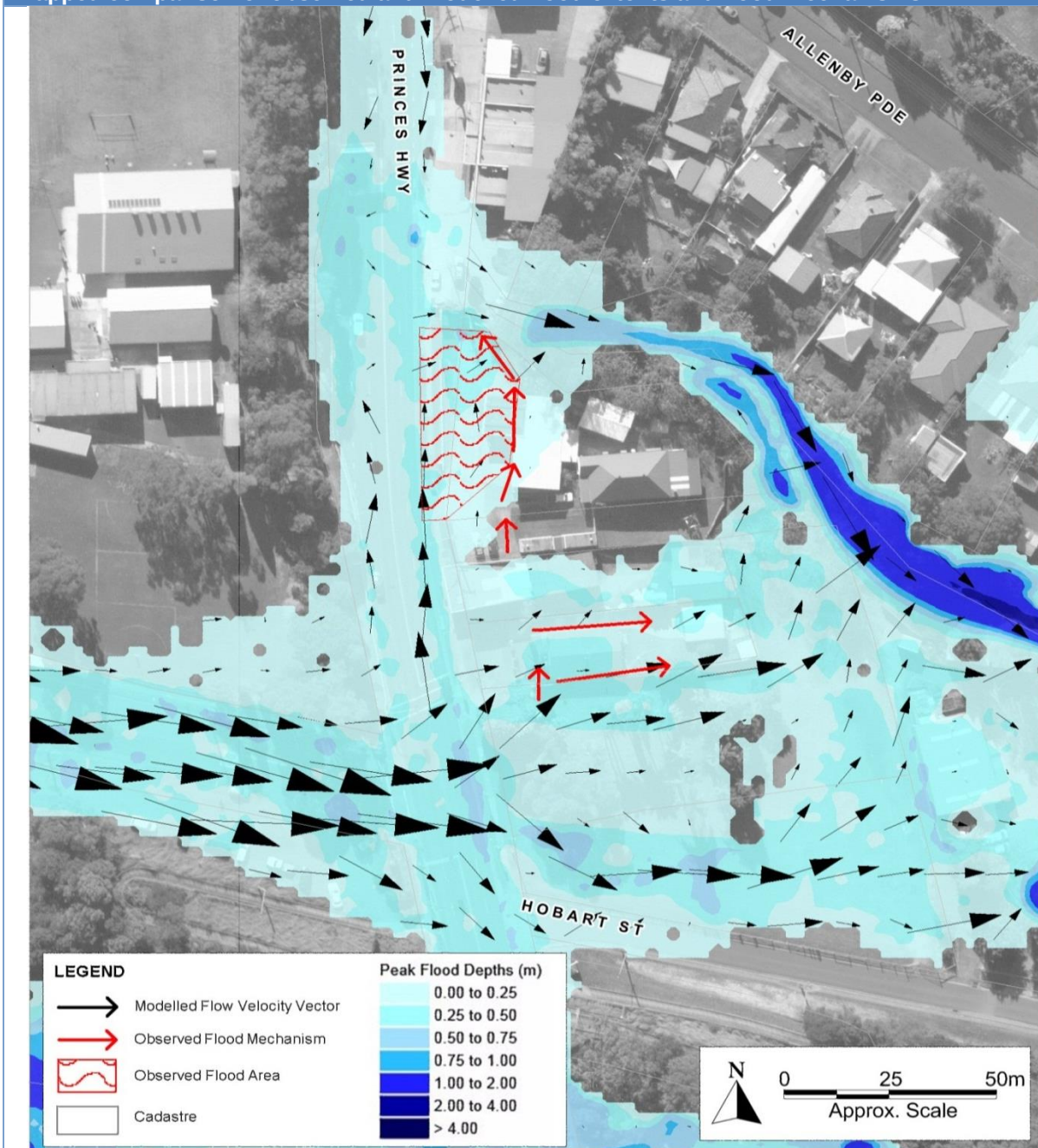


Discussion on comparison of results

The residents at 16 George Avenue, Bulli, reported flows running down their driveway from runoff off George Avenue. Flows exited to the north of their property. Flood damage was reported in one room of their property.

The responses to the community survey following the 1998 flood event indicates that the surface water runoff at this location was relatively localised. It is not possible replicate all of these localised surface water runoffs within the hydraulic model.

Appendix	B-2.23
Location	Princes Highway and Hobart Street, Bulli
Watercourse	Tramway Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

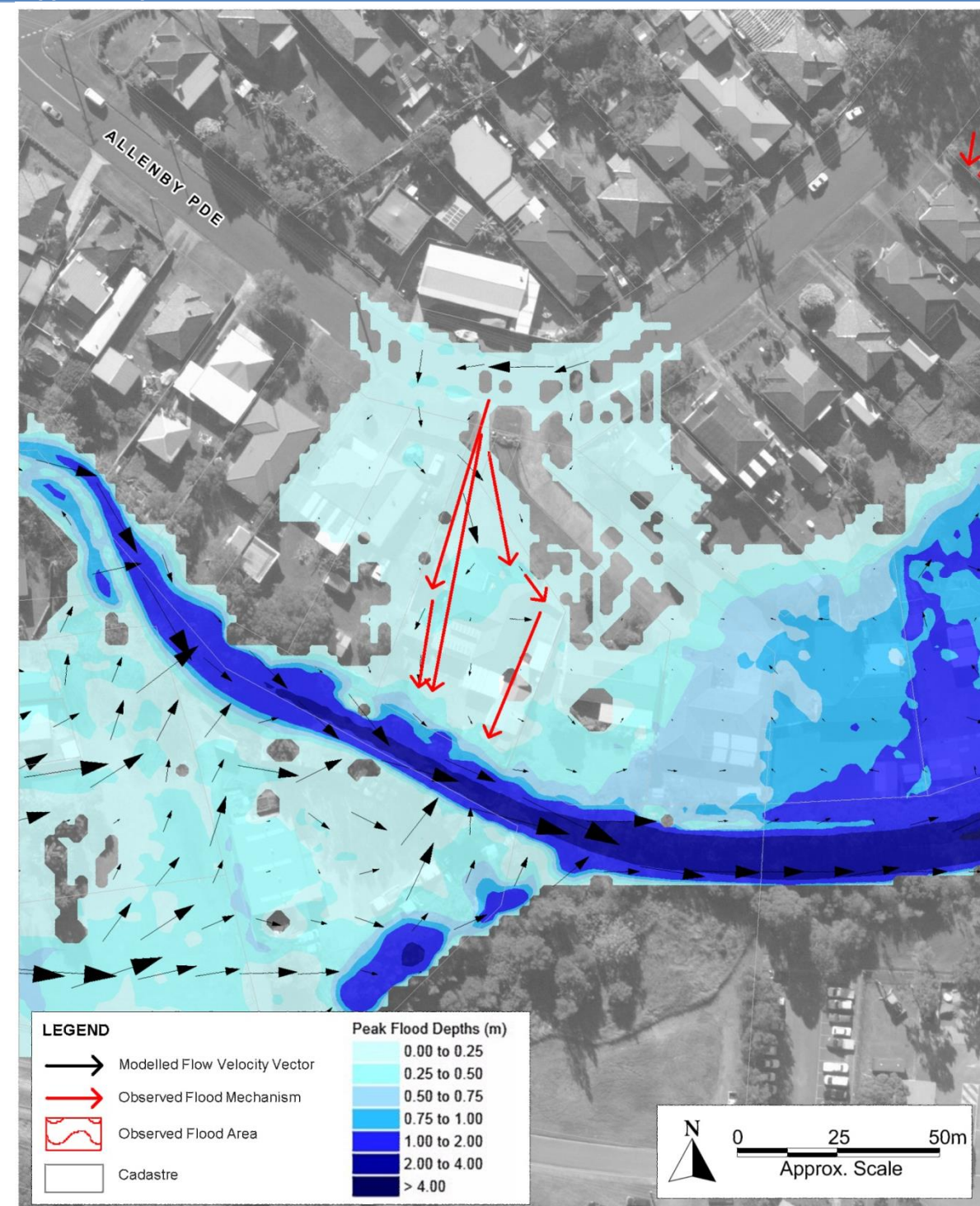


Discussion on comparison of results

Three houses on Princes Highway, Bulli, reported flooding. Numbers 163 and 165 Princes Highway, observed water flowing north from Hobart Street, Bulli, towards Tramway Creek. At 163 Princes Highway, the residents reported that floodwaters covered the driveway to a depth of approximately 0.1m and entered the workshop to the rear of their property. At 169 Princes Highway, the residents reported that floodwater entered the property from the south, near Princes Highway, and ran down the side of the house and exited to the rear of the property. Floodwaters reached a depth of approximately 0.9m at the side of the house.

The model results correlate well with the observed flood mechanisms and depths described at this location and indicates flooding within the observed flood areas.

Appendix	B-2.24
Location	Allenby Parade, Bulli
Watercourse	Tramway Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

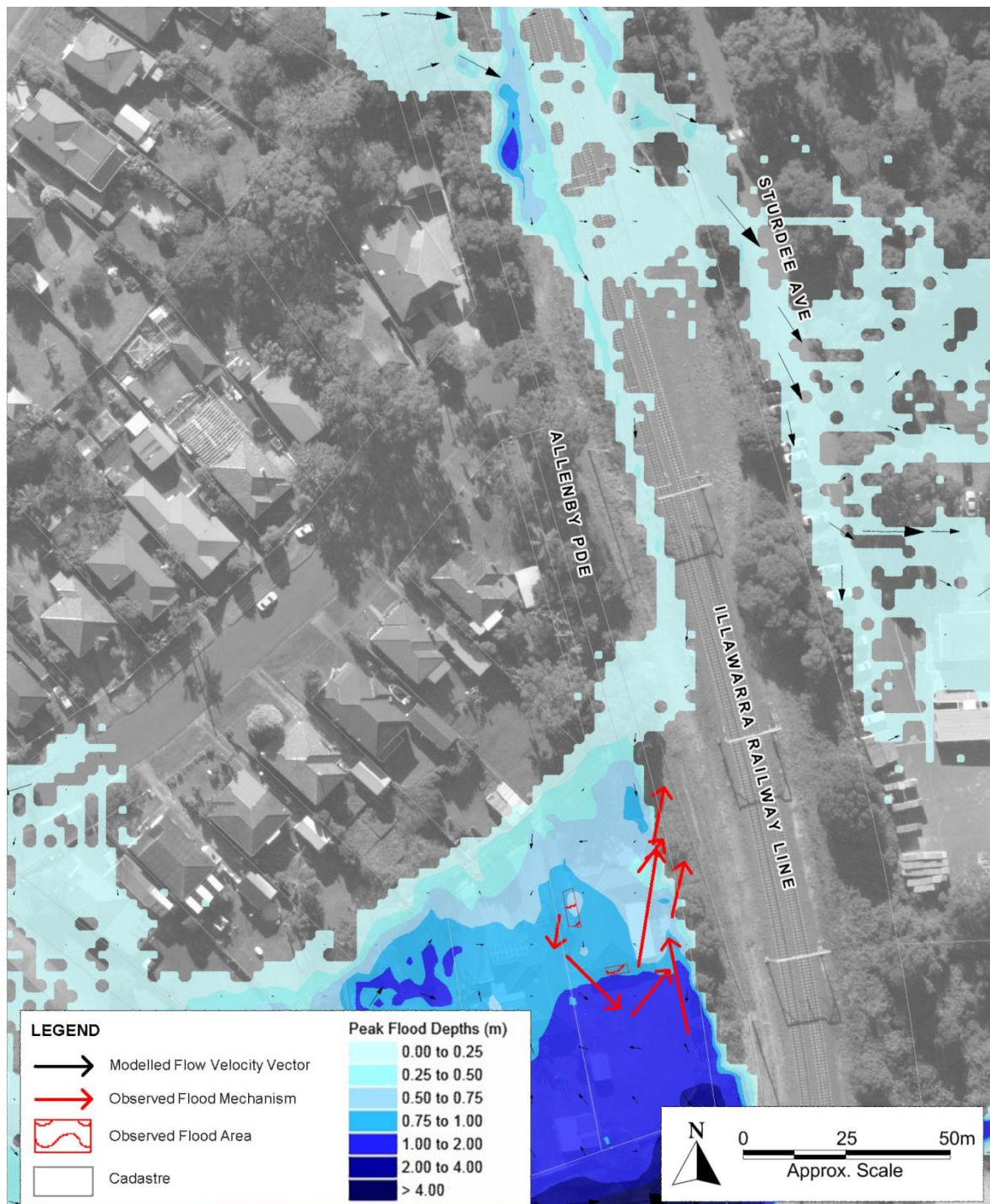


Discussion on comparison of results

The residents at 17a Allenby Parade, Bulli, reported flooding of their property with surface water runoff from Allenby Parade flowing down both sides of their house exiting to the creek at the south of their property.

The model results correlate well with the observed flood mechanisms described at this location .

Appendix	B-2.25
Location	Allenby Parade, Bulli
Watercourse	Tramway Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	

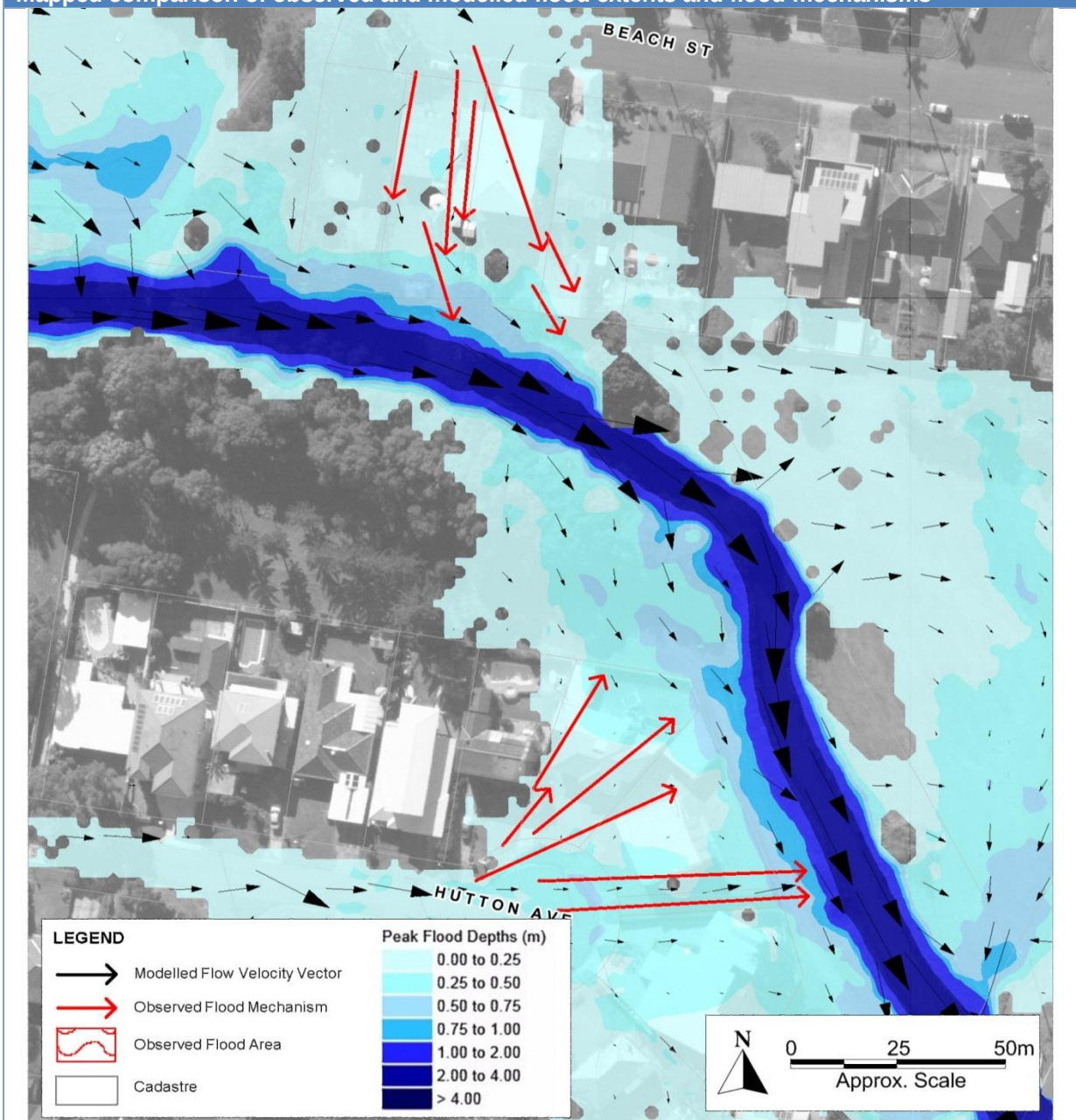


Discussion on comparison of results

The residents at Allenby Parade, Bulli, reported flows from the northwest side of the house which existed the property towards Tramway Creek to the south. Depths of flooding between 0.1 and 0.8m were reported.

The model results correlate well with the observed flood mechanisms and depths described at this location .

Appendix	B-2.26
Location	Beach Street, Bulli
Watercourse	Slacky Creek
Mapped comparison of observed and modelled flood extents and flood mechanisms	



Discussion on comparison of results

The residents of numbers 17 and 19 Beach Street, Bulli, and numbers 2 and 4 Hutton Avenue, Bulli, experienced flooding. Numbers 17 and 19 Beach Street both reported storm water flowing from Beach Street through their properties and exiting the rear of their properties to join Slacky Creek. The residents reported that the drains on Beach Street were unable to cope with the volume of surface water flows. The residents of 17 Beach Street reported 0.1m of water inside their house, 0.05m of water in their garage 0.4m of water in the grounds of their property and against the walls of the house. The residents of numbers 2 and 4 Hutton Avenue both reported surface water flowing through their properties from Hutton Avenue to Slacky Creek at the rear of their properties. The residents of 4 Hutton Avenue reported 0.4m of water in the grounds of their property while the residents of 2 Hutton Avenue reported 0.2m of water in their yard.

The model results correlate well with the observed flood mechanisms described at this location .

APPENDIX C: DESIGN MODEL RESULTS

Appendix C-1 Design Peak Flood Level Longitudinal Profiles

Appendix C-2 Comparison of Results for the 1% AEP Design Flood Event for Pre-existing Conditions

Appendix C-1 Design Peak Flood Level Longitudinal Profiles

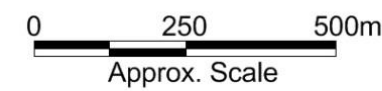


LEGEND

- TUFLOW Model Boundary
- Catchment Boundary
- Long Section Profiles

Title:
Longitudinal Profile Locations

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



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Figure: C-1	Rev: 0
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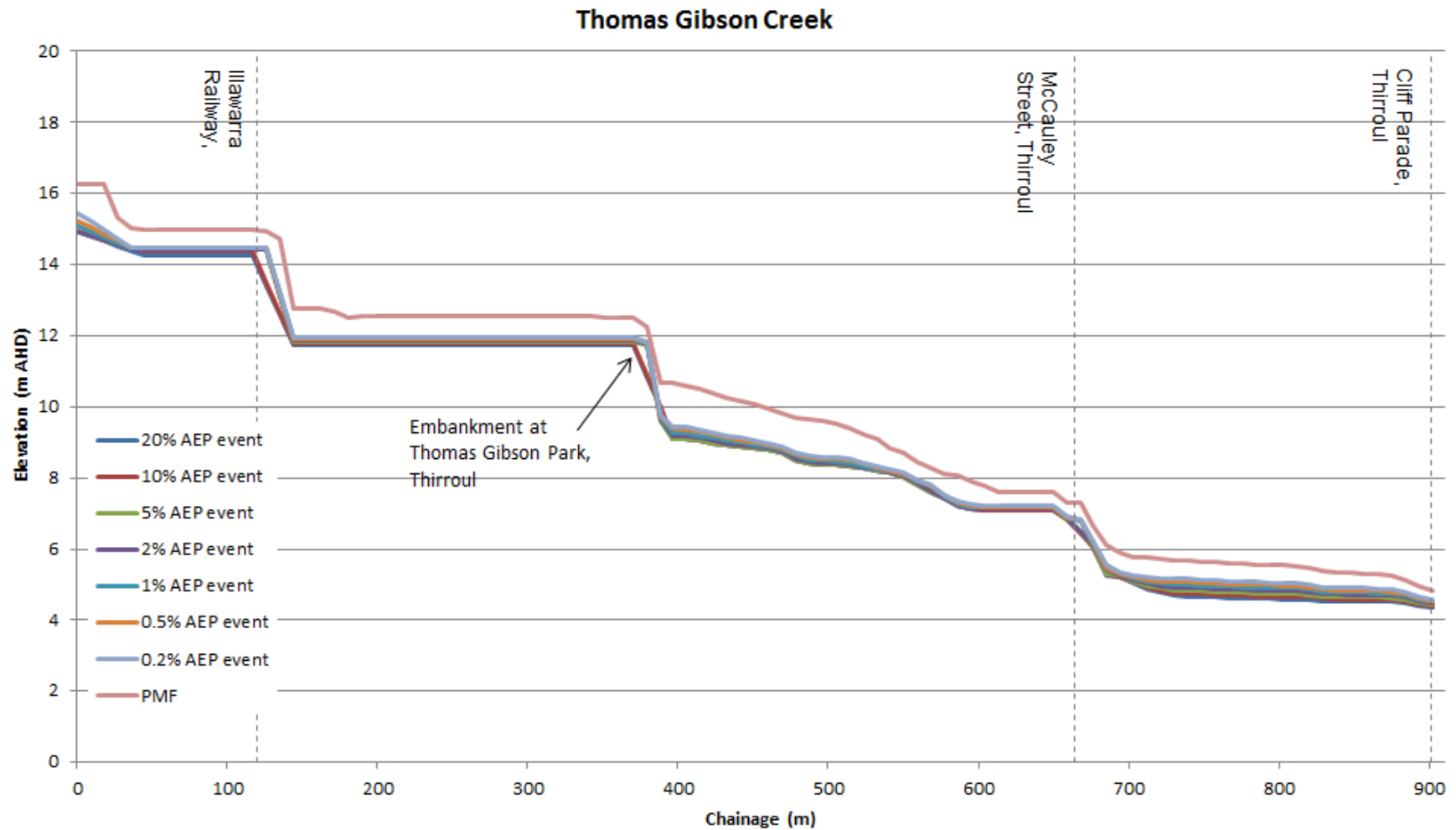


Figure C-2 Thomas Gibson Creek - Longitudinal Profile of Peak Flood Levels - Design Events

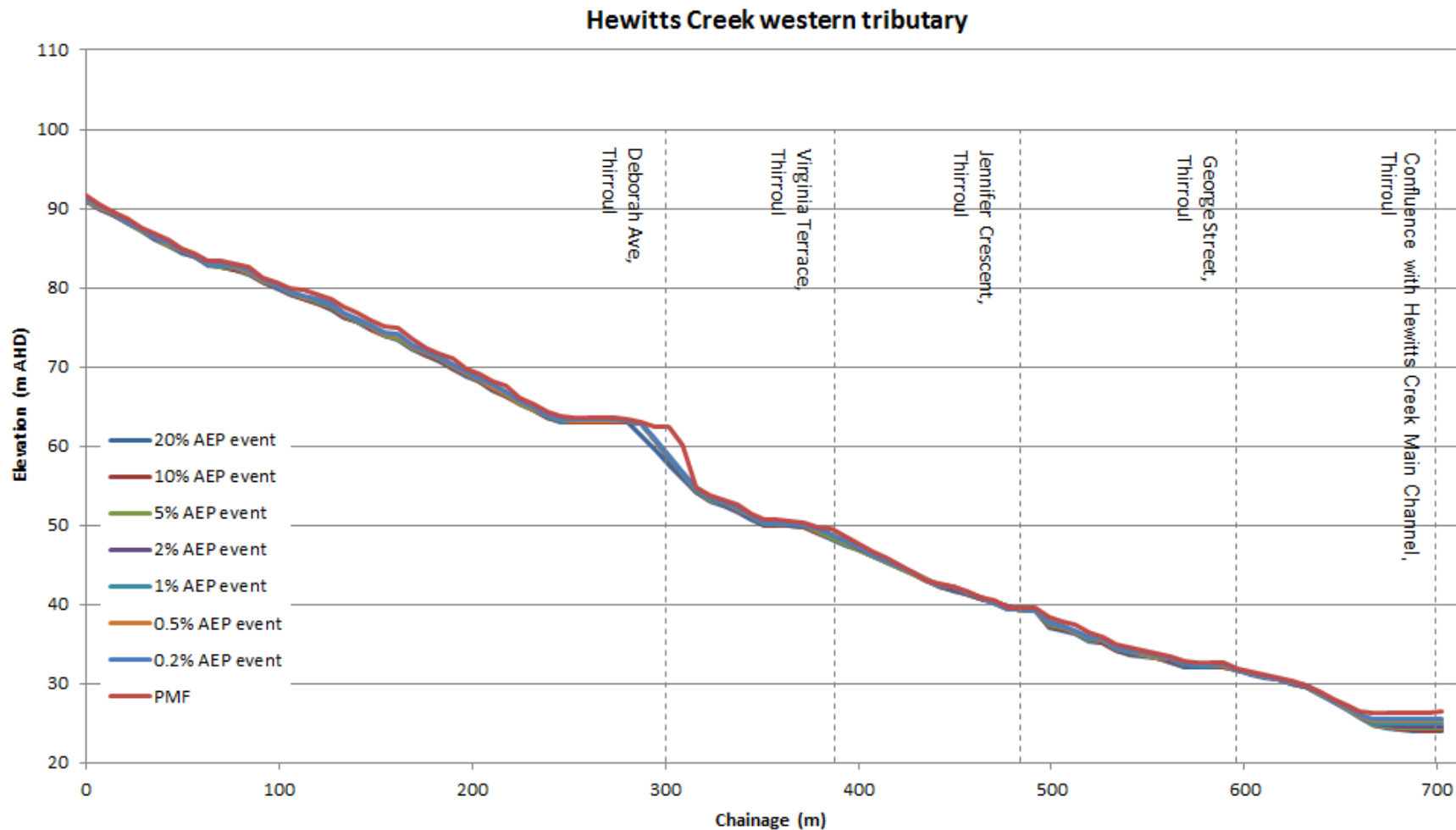


Figure C-3 Hewitts Creek western tributary - Longitudinal Profile of Peak Flood Levels - Design Events

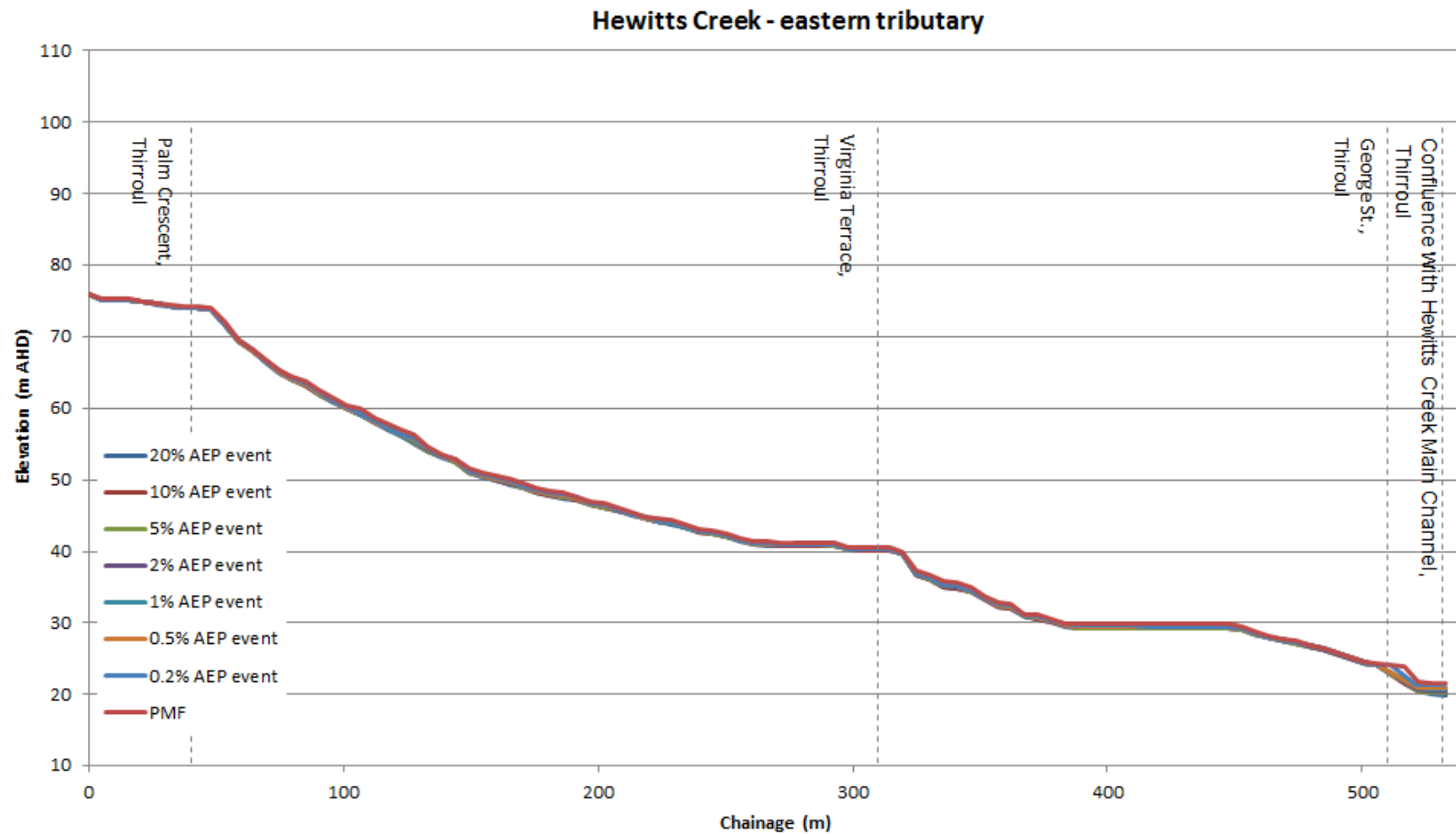


Figure C-4 Hewitts Creek eastern tributary - Longitudinal Profile of Peak Flood Levels - Design Events

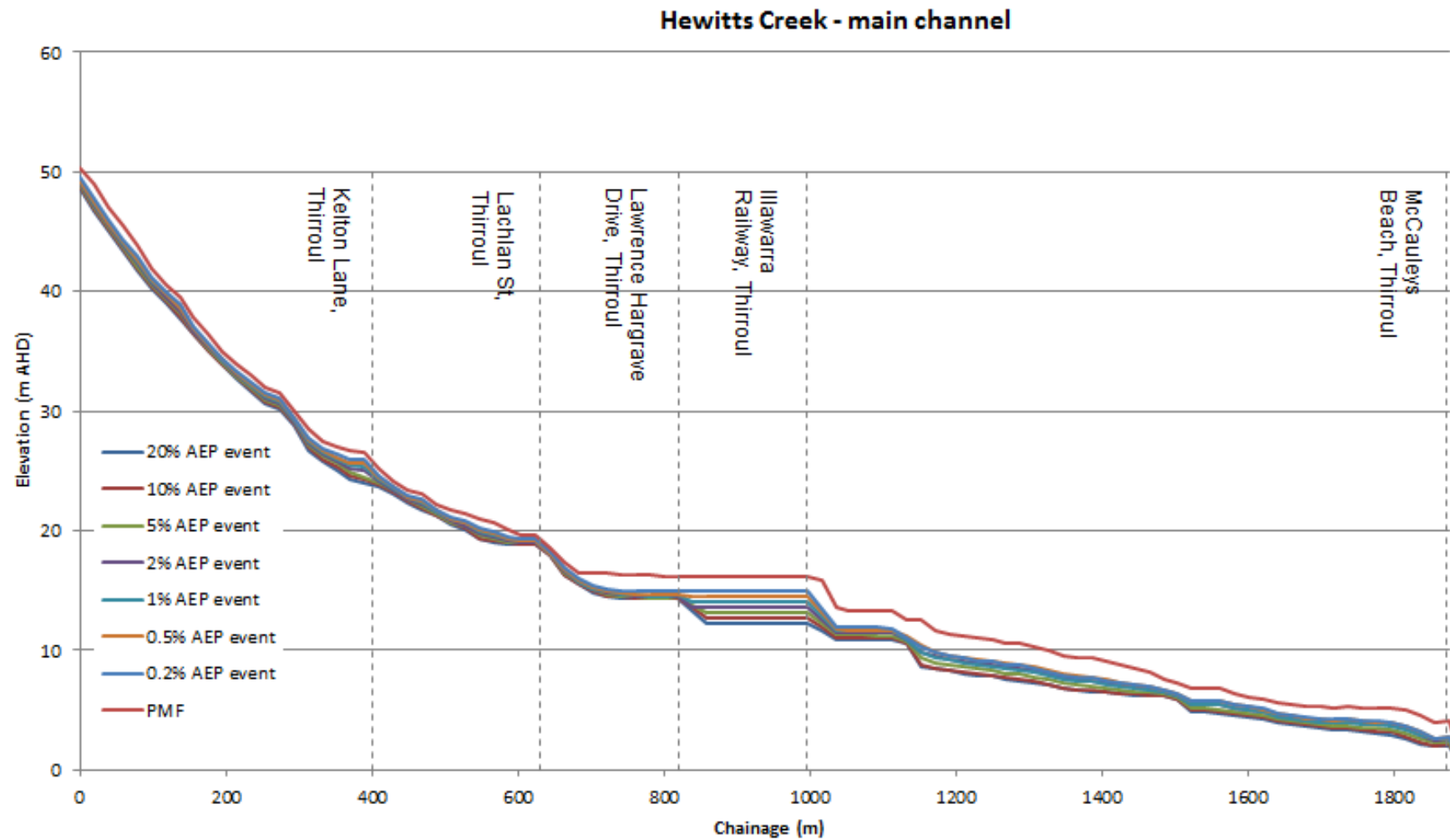


Figure C-5 Hewitts Creek Main Channel - Longitudinal Profile of Peak Flood Levels - Design Events

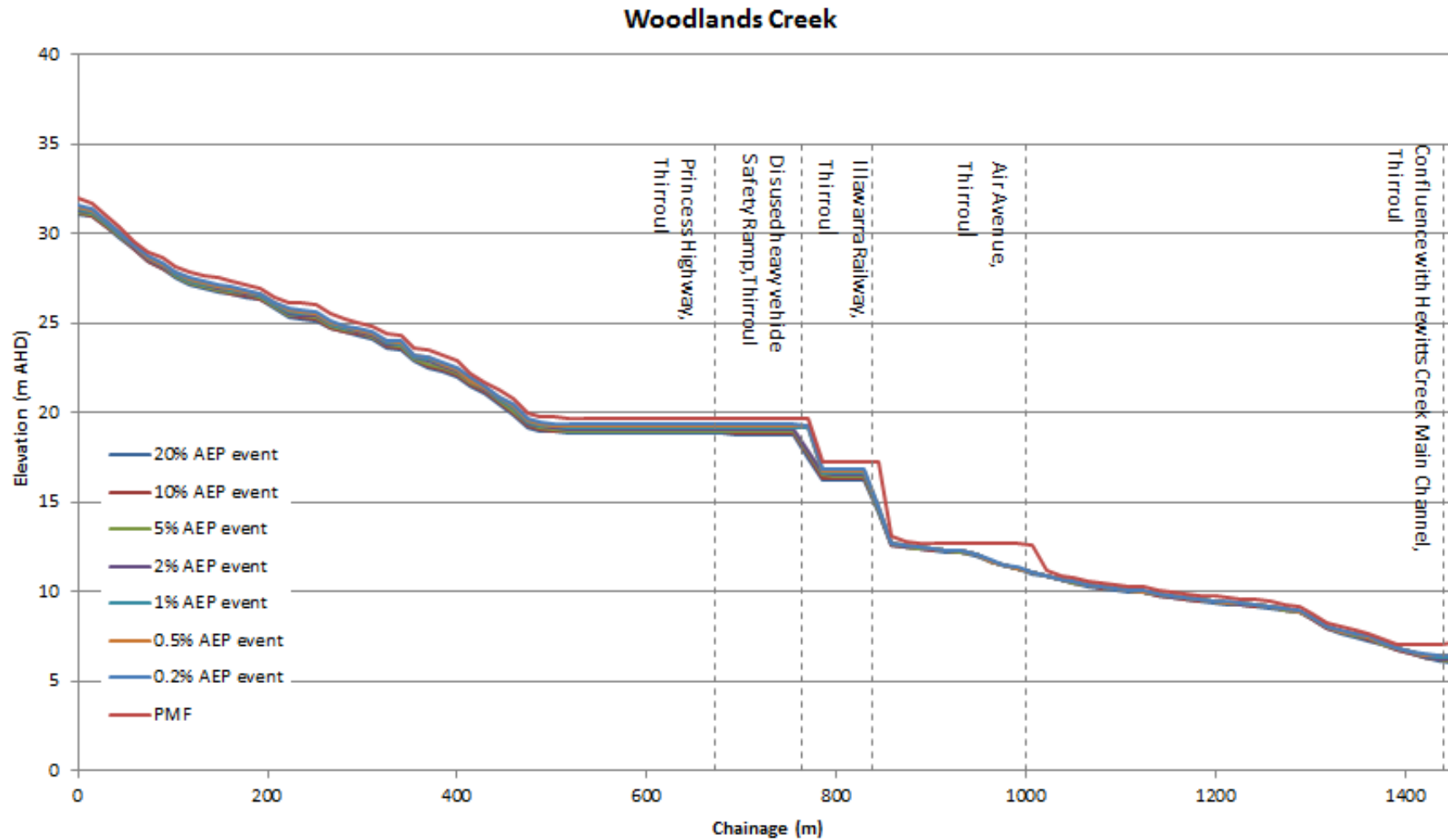


Figure C-6 Woodlands Creek - Longitudinal Profile of Peak Flood Levels - Design Events

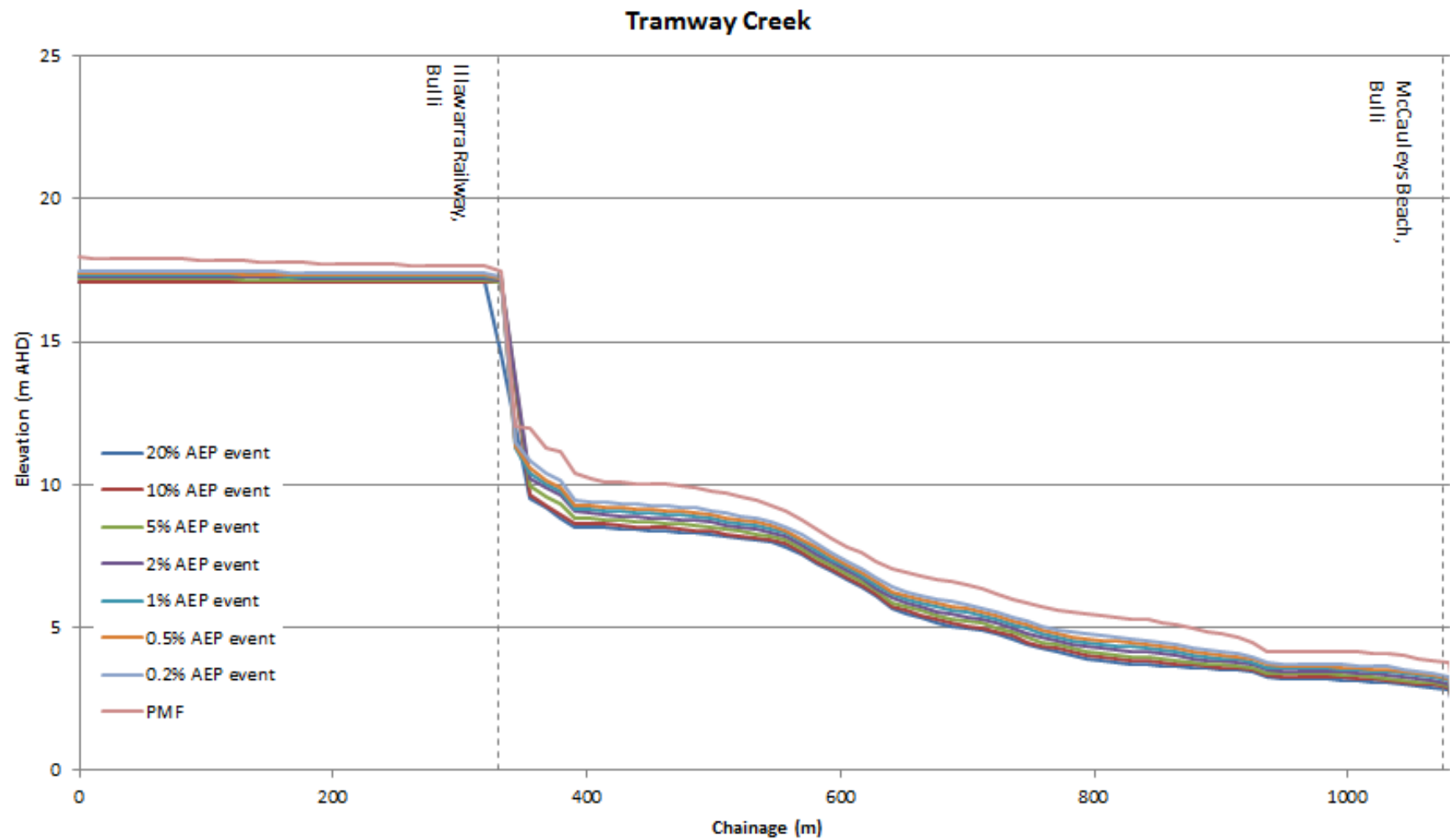


Figure C-7 Tramway Creek - Longitudinal Profile of Peak Flood Levels - Design Events

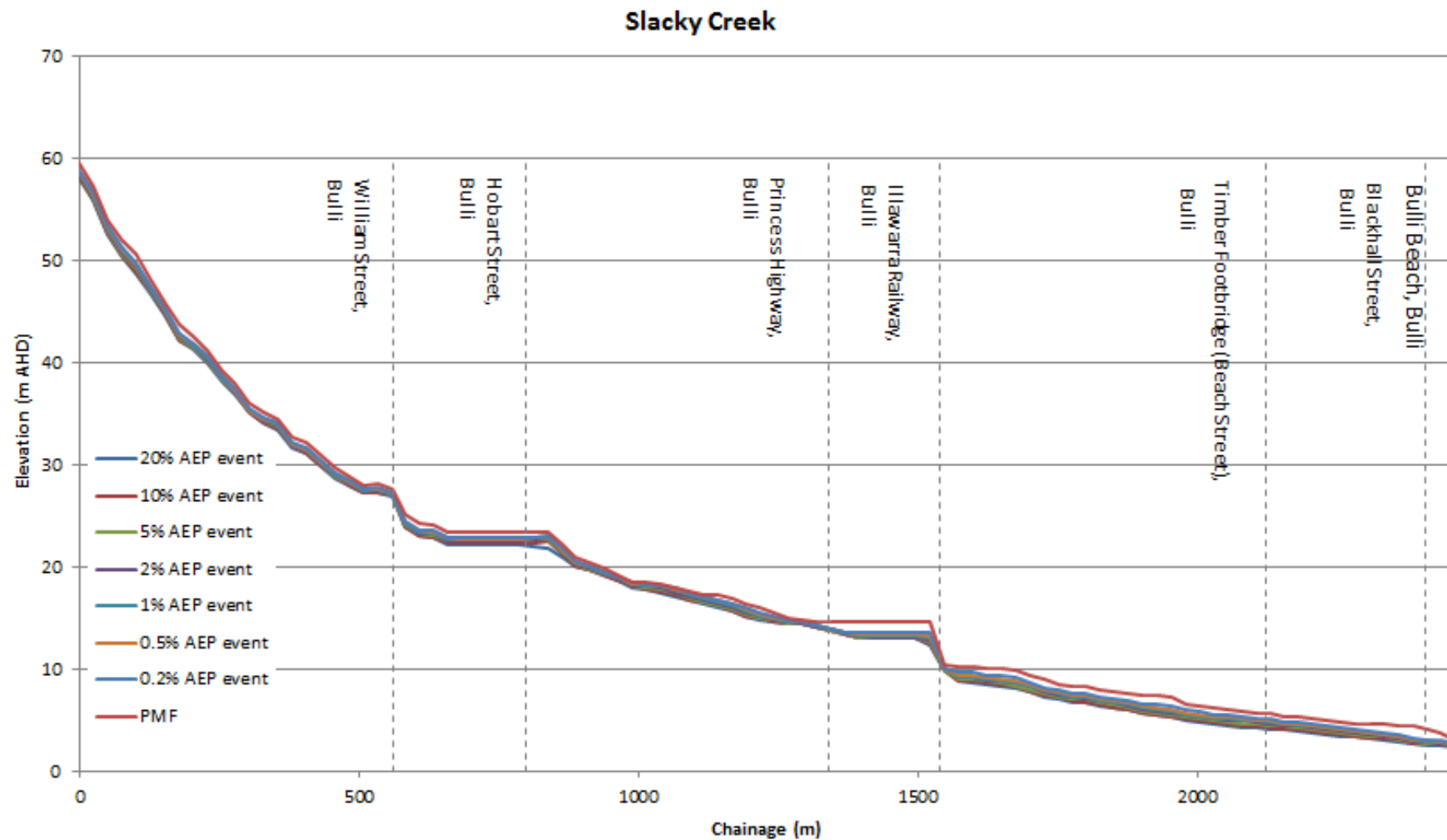


Figure C-8 Slacky Creek - Longitudinal Profile of Peak Flood Levels - Design Events

Appendix C-2 Comparison of Results for the 1% AEP Design Flood Event for Pre-existing Conditions

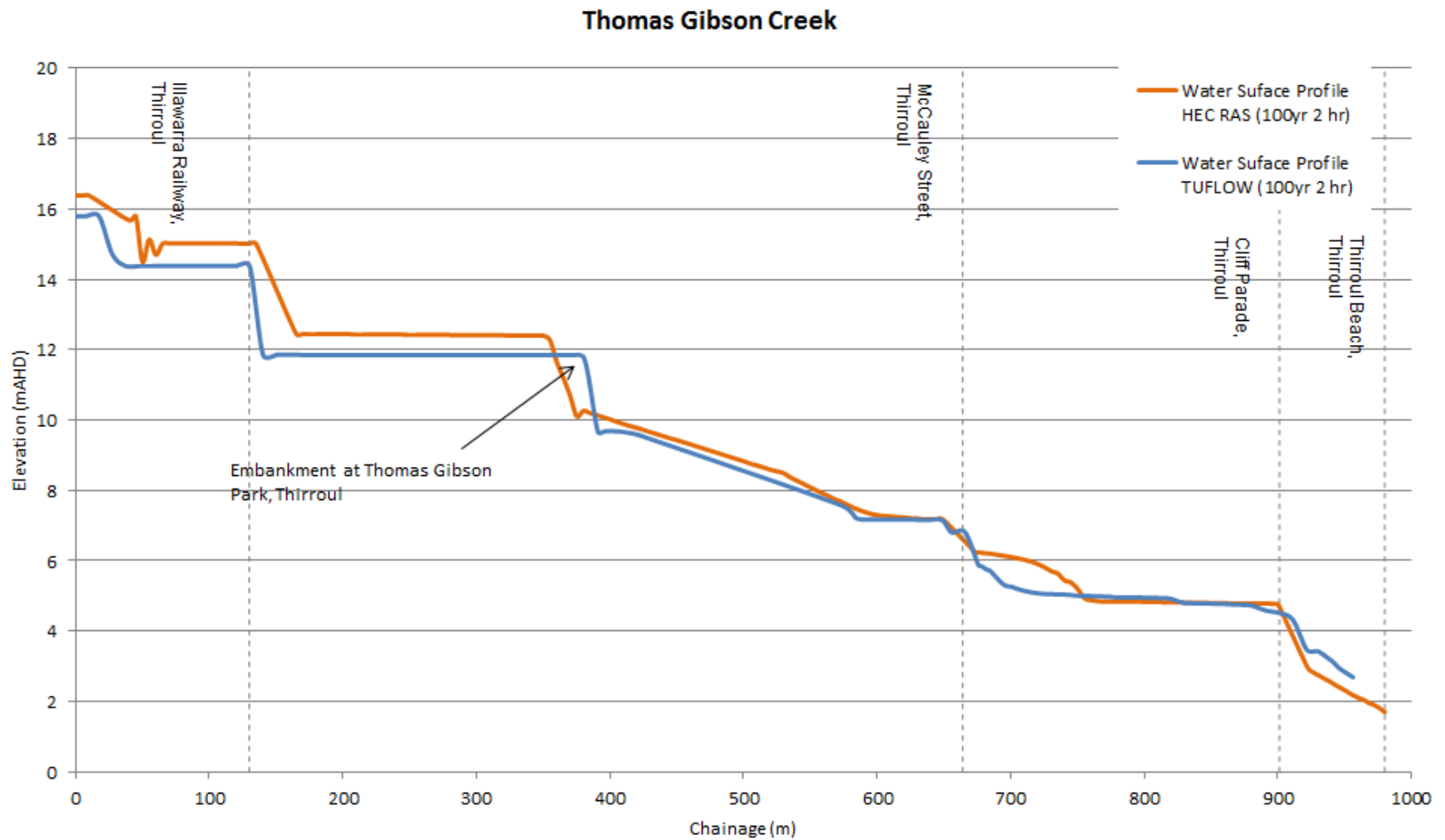


Figure C-9 Thomas Gibson Creek - Longitudinal Profile of Peak Flood Levels - Design Flood Event for Pre-existing Conditions

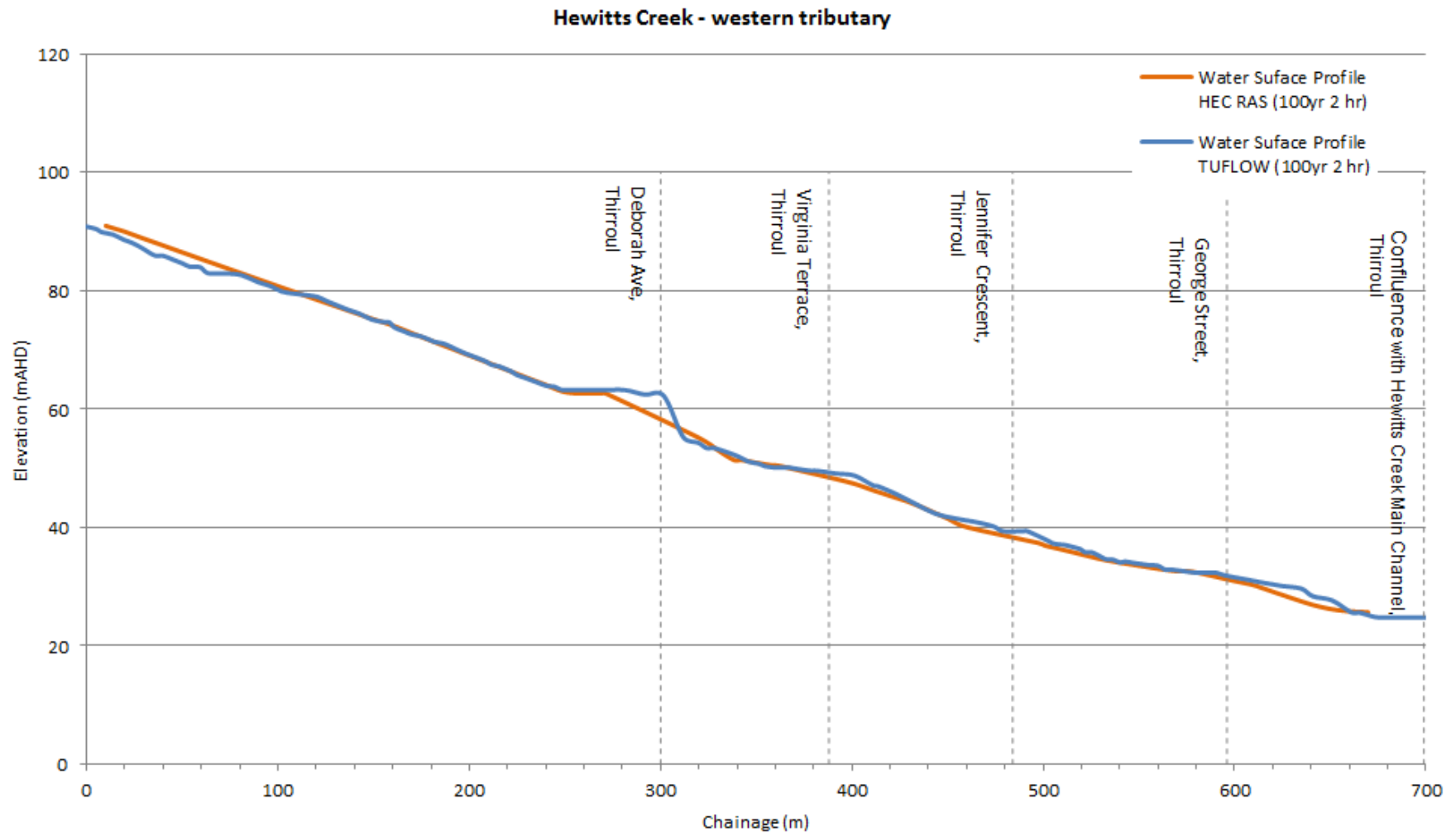


Figure C-10 Hewitts Creek western tributary - Longitudinal Profile of Peak Flood Levels - Design Flood Event for Pre-existing Conditions

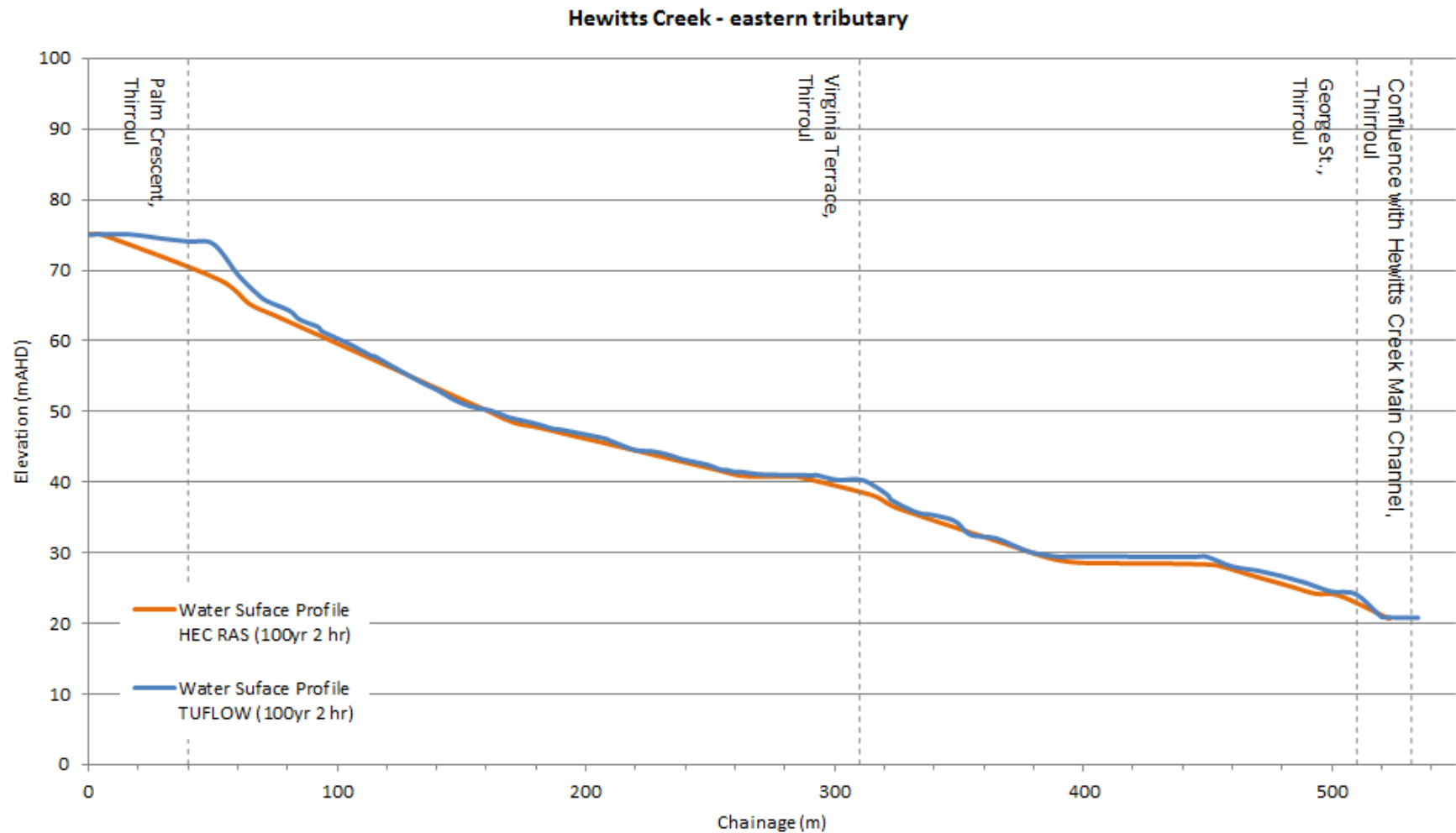


Figure C-11 Hewitts Creek eastern tributary - Longitudinal Profile of Peak Flood Levels - Design Flood Event for Pre-existing Conditions

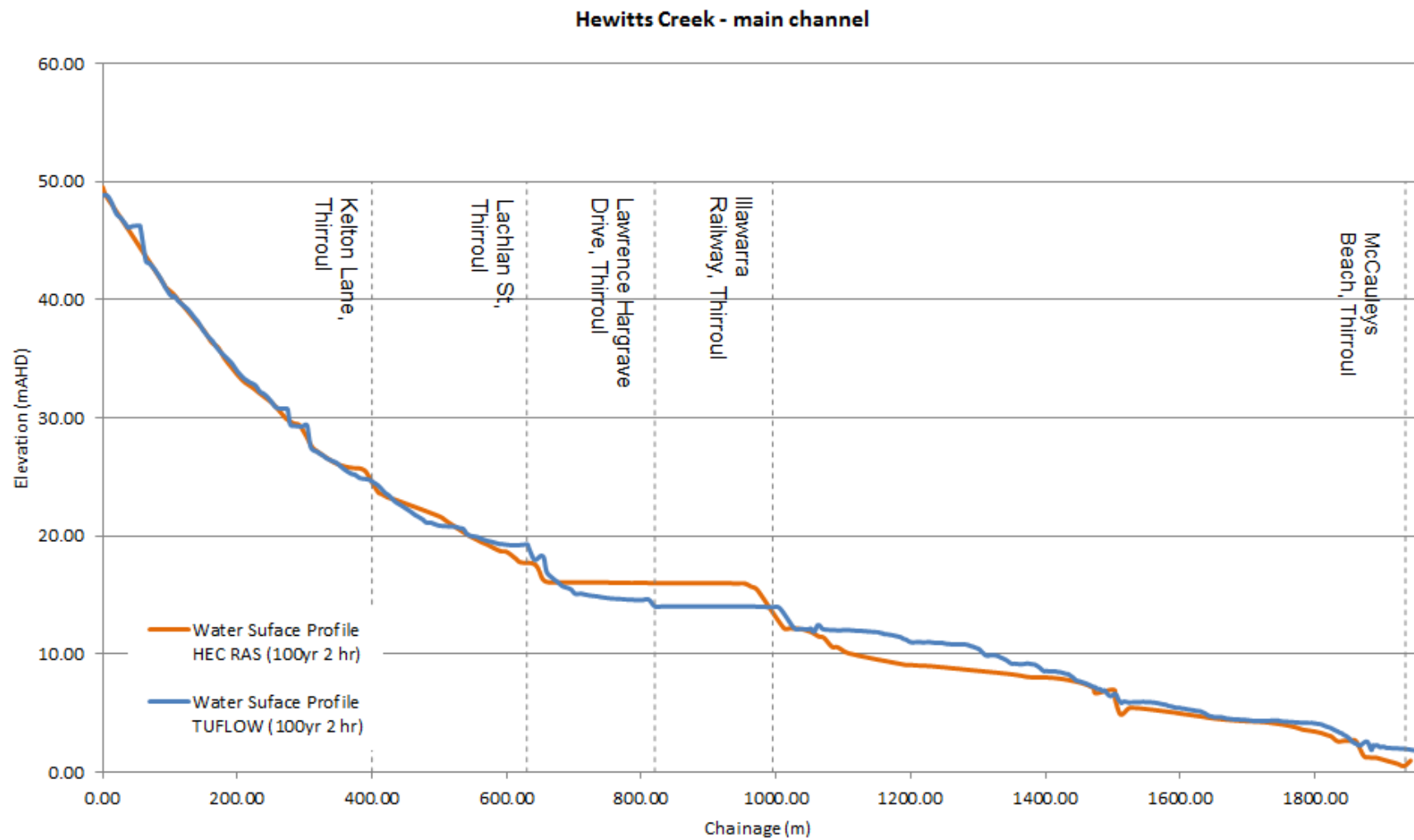


Figure C-12 Hewitts Creek Main Channel - Longitudinal Profile of Peak Flood Levels - Design Flood Event for Pre-existing Conditions

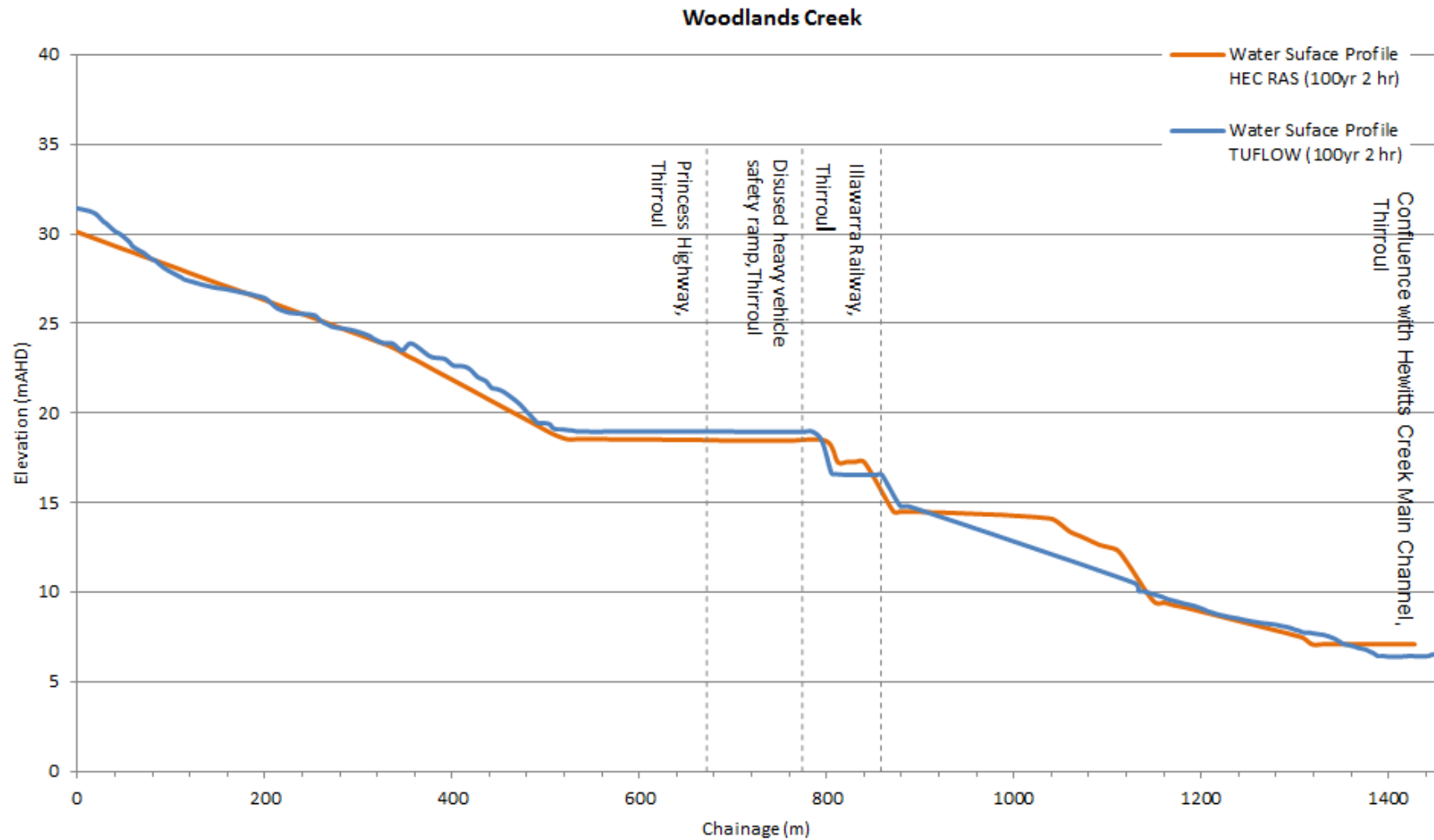


Figure C-13 Woodlands Creek - Longitudinal Profile of Peak Flood Levels - Design Flood Event for Pre-existing Conditions

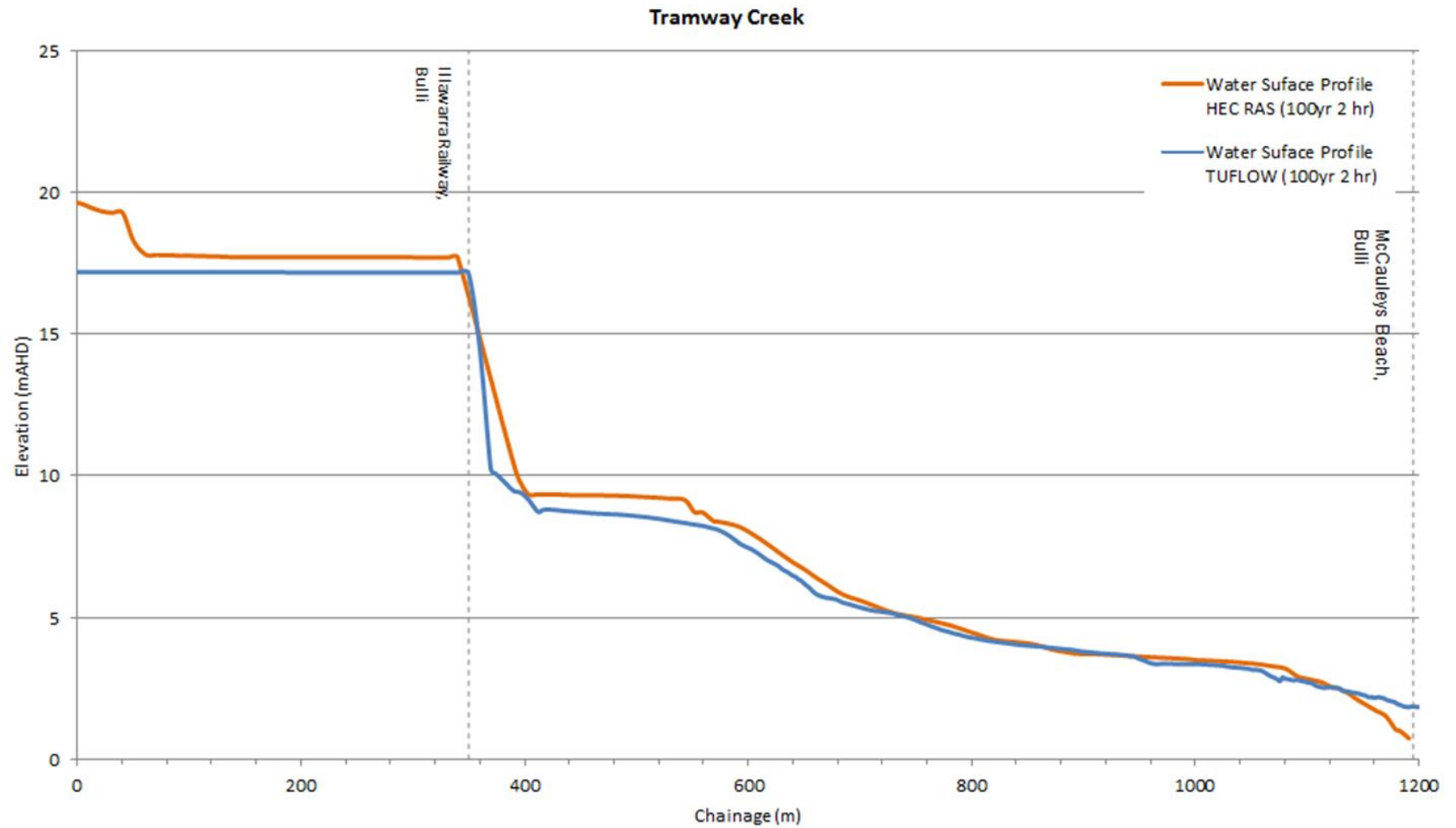


Figure C-14 Tramway Creek - Longitudinal Profile of Peak Flood Levels - Design Flood Event for Pre-existing Conditions

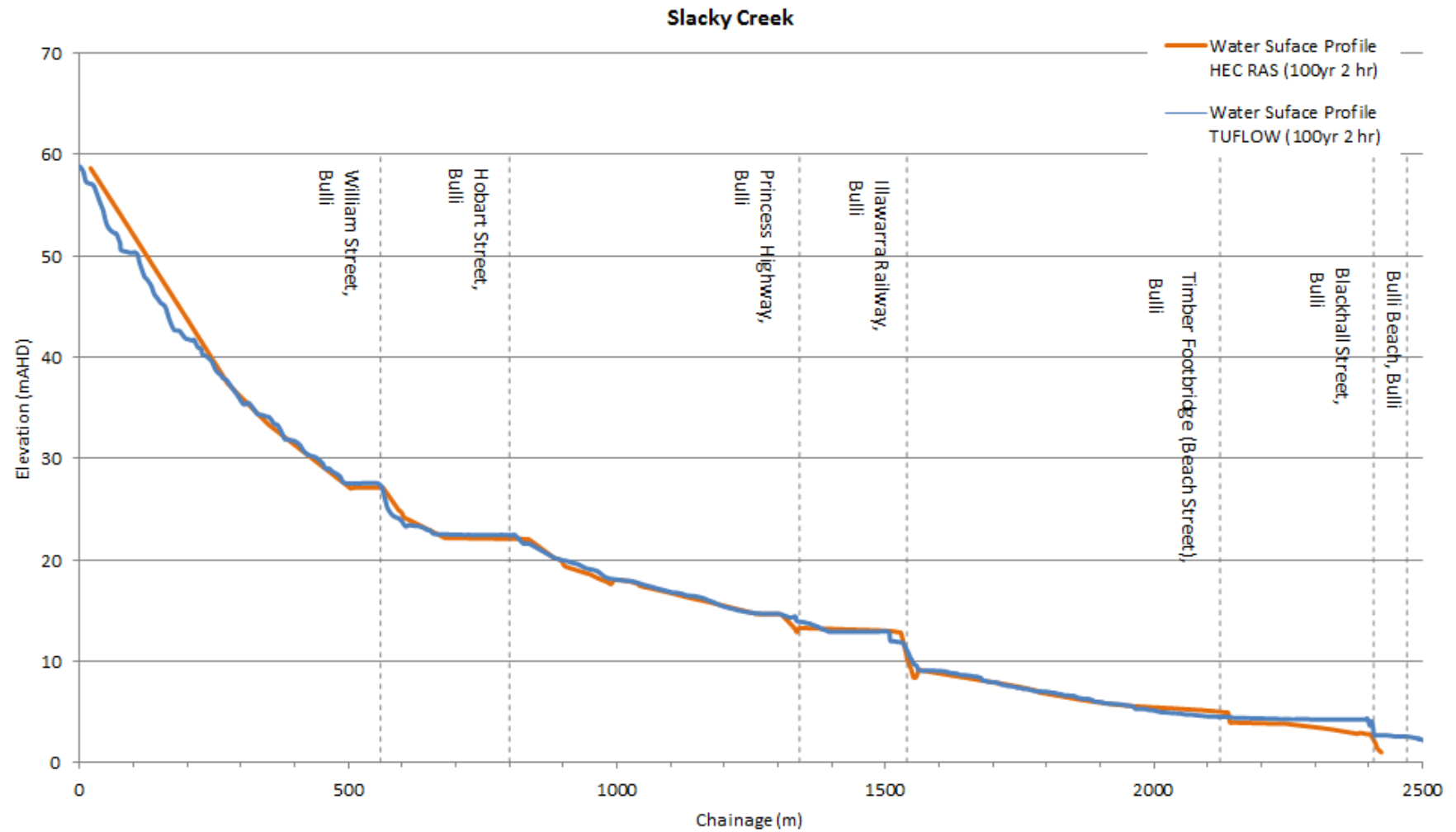


Figure C-15 Slacky Creek - Longitudinal Profile of Peak Flood Levels - Design Flood Event for Pre-existing Conditions

C-2.1 Introduction

The TUFLOW water surface profiles have been generated from peak water surface elevations generated at approximately 2m intervals along the centreline of the watercourses. The peak water surface elevations have been generated from the 'enveloped' results to define the 'worst case' 1% AEP design flood event for pre-existing conditions as discussed in Section 6.2.2. The TUFLOW water surface profile has been generated for both the open channel reaches of the creeks and any overland flow routes along the alignment of the creeks (i.e. the overland flow route on the eastern tributary of Hewitts Creek between Virginia Terrace, Thirroul and Jennifer Crescent, Thirroul).

As a function of the 1D modelling approach adopted for the Hewitts Creek Flood Study (Forbes Rigby Pty Ltd., 2002a), the water surface profile generated from the HEC RAS model results has been produced by joining the peak water surface elevation between adjoining cross sections. The resolution of the water surface profile is therefore dependent on the spacing of the channel cross sections. Given the higher concentration of modelled peak water level points used to generate the water surface profile from the TUFLOW model results, the profile from the TUFLOW model has a higher resolution.

C-2.2 Thomas Gibson Creek

Figure C-9 indicates that there is a reasonable correlation between the TUFLOW model results and the HEC RAS model results. The main difference in the water surface profiles occurs upstream of the Illawarra Railway, Thirroul, within Thomas Gibson Park, Thirroul and directly downstream of McCauley Street, Thirroul.

The difference in levels upstream of the Illawarra Railway, Thirroul and within Thomas Gibson Park, Thirroul, is a function of differences in the peak flows between the TUFLOW model and the HEC RAS model. Section 8.5.5.1.2 provides an explanation for the differences in flows between the two models.

Directly downstream of McCauley Street, Thirroul, the water surface profile generated by the TUFLOW model is lower than the HEC RAS modelled water surface profile. The modelled TUFLOW water surface profile is consistent with the ground surface profile representing the road and creek at this location and is deemed to be accurate. The observed flood mechanisms for the August 1998 flood event also correlate well with the TUFLOW model results at this location (refer to Section 8.5.5.1.2 and Appendix B-2.4).

At the downstream extent of the modelled reach at McCauley Beach, Thirroul, the TUFLOW water surface profile is higher than the HEC RAS water surface profile. The TUFLOW model results are comparable with the peak ocean boundary water level (2.7m AHD - refer to Section 6.2.2) and the TUFLOW results are considered valid.

C-2.3 Hewitts Creek western tributary

Figure C-10 indicates that there is generally a good correlation between the TUFLOW model results and the HEC RAS model results. The main difference in the water surface profiles occurs at the culvert on Deborah Avenue and is a function of differences in the resolution of the HEC RAS model results and TUFLOW model results and the schematisation of the models.

The TUFLOW water surface profile captures the overland flooding on Deborah Avenue, Thirroul which results from overtopping of the culvert inlet and headwall. The HEC RAS water surface profile is generated by joining the peak water surface elevations between creek cross sections upstream and downstream of Deborah Avenue, Thirroul. The overland flooding on Deborah Avenue is not represented in the HEC RAS water surface profile.

C-2.4 Hewitts Creek eastern tributary

Figure C-11 indicates that there is generally a good correlation between the TUFLOW model results and the HEC RAS model results. The main differences in the water surface profile occurs at the culverts on Palm Crescent, Thirroul and Virginia Terrace, Thirroul and is a function of differences in the resolution of the HEC RAS model results and TUFLOW model results and the schematisation of the models.

The TUFLOW water surface profile captures the overland flooding on Palm Crescent, Thirroul, and Virginia Terrace, Thirroul, which results from overtopping of the culvert inlet and headwall. The HEC RAS water surface profile is generated by joining the peak water surface elevations between creek cross sections upstream and downstream of these culverts and the overland flooding on Palm Crescent, Thirroul and Virginia Terrace, Thirroul, is not represented in the HEC RAS water surface profile.

C-2.5 Hewitts Creek main channel

Figure C-12 indicates that there is generally a good correlation between the TUFLOW model results and the HEC RAS model results along the upper reaches of the main channel of Hewitts Creek. From Lachlan Street, Thirroul, to downstream of the Illawarra Railway, Thirroul, there are more significant differences in the water surface profiles which results from differences in the schematisation of the TUFLOW and HEC RAS models as discussed in Section 8.5.5.2.

Upstream of the Illawarra Railway, the largest difference in levels between the HEC RAS and TUFLOW water surface profiles is 1.93m. This difference in levels is primarily as a function of differences in the dimensions of the culvert on Hewitts Creek at the Illawarra Railway, Thirroul, between the TUFLOW and HEC RAS models.

Downstream of the Illawarra Railway, Thirroul, the TUFLOW modelled water surface profile is significantly higher (+1.0m) than the water surface profile from the HEC RAS model. This is primarily as a result of increased flows in the channel downstream of the Illawarra Railway, Thirroul, through a combination of increased conveyance through the Illawarra Railway culvert and overland flows from Woodlands Creek as discussed in Section 8.5.5.1.2. Substantial changes have been made to the channels and floodplain in this area since the completion of the 2002 Flood Study as part of a new residential housing development at McCauley's Beach, Thirroul. These changes to the catchment have altered the flow regime in this area and are reflected in the design model results and flood maps in Appendix D.

At the downstream extent of the modelled reach at McCauley Beach, Thirroul, the TUFLOW water surface profile is higher than the HEC RAS water surface profile. The TUFLOW model results are comparable with the peak ocean boundary water level (2.7m AHD - refer to Section 6.2.2) and the TUFLOW results are considered valid.

C-2.6 Woodlands Creek

Figure C-13 indicates that there is generally a good correlation between the between the TUFLOW model results and the HEC RAS model results. The main differences in the water surface profiles occur at the culvert on the Illawarra Railway, Thirroul and along the channel downstream of the Illawarra Railway, Thirroul. These differences are a function of the resolution of the HEC RAS model results and TUFLOW model results used to generate the water surface profiles and variances in the schematisation of the models.

At the upstream extent of the graphed model results (i.e. chainage "0" in Figure C-13), the TUFLOW water surface profile is approximately 1.5m higher than the HEC RAS water surface profile. The 2D model boundary within the TUFLOW model extends for approximately 0.3km further upstream of the HEC RAS modelled extent (i.e. chainage "0" represents the upstream extent of the HEC RAS model). Based on a review of the complete long section profile data from the TUFLOW model results, the water surface elevations from the TUFLOW model results at chainage "0" are appropriate.

Differences in the water surface profiles directly upstream of the Illawarra Railway, Thirroul, are a function of differences in the schematisation of the models, in particular the representation of the disused heavy vehicle safety ramp, Thirroul. Further discussions on the differences in water levels at this location are discussed in Section 8.5.5.1.2.

Downstream of the Illawarra Railway, Thirroul, the water surface profile generated by the TUFLOW model is lower than the profile generated by the HEC RAS model. This is as a result of differences in the schematisation of the models downstream of the railway. A culvert along Woodlands Creek downstream of the Illawarra Railway, Thirroul, was not included in the HEC RAS model and the water surface profile generated by the HEC RAS model represents the overland flows along the channel. The TUFLOW model includes this culvert and the results indicate that there is no overland flooding directly east of the culvert inlet (refer to Figure 8-9). This is reflected in the TUFLOW water surface profile. Any out of bank flooding upstream of this culvert inlet is diverted overland to Hewitts Creek as discussed in Section C-2.5.

C-2.7 Tramway Creek

Figure C-14 indicates that there is generally a good correlation between the between the TUFLOW model results and the HEC RAS model results. The main differences in the water surface profiles occurs upstream and downstream of the culvert on the Illawarra Railway, Bulli and upstream of the channel at Princes Highway, Bulli. These differences are a function of the resolution of the HEC RAS model results and TUFLOW model results used to generate the water surface profiles

At the upstream extent of the modelled reach, the water surface profile generated by the TUFLOW model is significantly lower than the water surface profile generated by the HEC RAS model. The bed elevation at the upstream limit of the modelled TUFLOW reach is 15m AHD with a peak modelled water level of 17.18m AHD. A review of the LiDAR topography indicates that the ground levels rise sharply from the bed of the creek to Princes Highway, Bulli (15m AHD to 17.25m AHD). The long section profile generated by the HEC RAS model includes the flood levels at Princes Highway, Bulli and explains the difference between the water surface profiles at this location.

Between the Princes Highway, Bulli and the Illawarra Railway, Bulli and for approximately 250m downstream of the Illawarra Railway, Bulli, the TUFLOW modelled water surface profile is lower than the HEC RAS modelled water surface profile. This is as a result of differences in flows between the TUFLOW model and the HEC RAS model as discussed in Section 8.5.5.1.2.

At the downstream extent of the modelled reach at McCauley Beach, Sandon Point, the TUFLOW modelled water surface profile is higher than the HEC RAS water surface profile. The TUFLOW model results are comparable with the peak ocean boundary water level (2.7m AHD - refer to Section 6.2.2) and the TUFLOW results are considered valid.

C-2.8 Slacky Creek

Figure C-15 indicates that there is generally a good correlation between the between the TUFLOW model results and the HEC RAS model results. The main difference in the water surface profiles occurs along the upstream reaches of Slacky Creek, upstream of the Illawarra Railway, Bulli and at Blackhall Street, Bulli. These differences are a function of the resolution of the HEC RAS model results and TUFLOW model results used to generate the water surface profiles

Section 8.5.5.1.2 provides details on the differences in levels upstream of the Illawarra Railway, Bulli and at Blackhall Street, Bulli.

At the downstream extent of the modelled reach, downstream of Blackhall Street, Bulli, the TUFLOW modelled water surface profile is higher than the HEC RAS water surface profile. The TUFLOW model results are comparable with the peak ocean boundary water level (2.7m AHD - refer to Section 6.2.2) and the TUFLOW results are considered valid.