APPENDIX 18

Flood Evacuation Assessment (JWP, April 2017)

J. WYNDHAM PRINCE CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS

ABN 67 002 318 621

Our Ref: 110251-02-Ltr_INSW_Flood_Evacuation_Response.docx

DC:fl

21 April 2017

C/- CABE
Atlas Norwest, Suite 502, Level 5
2-8 Brookhollow Avenue
Baulkham Hills NSW 2153

Attn: **Joe Bevacqua**

Subject: **ESQ1818 Development – Panthers North Precinct**
Response to iNSW Flood Evacuation Concerns

Dear Joe,

As part of the Gateway Approval process for the Local Environment Plan (LEP) amendment for the Panthers site which will support the approval of the ESQ1818 development. Infrastructure NSW raised some concerns regarding the flood evacuation of the development in their letter of 5 December 2016.

Infrastructure NSW (iNSW) have further clarified that the requirements for a Flood Evacuation Assessment and in short, the assessment is to show, using the flood hydrograph information available, that evacuation to Mulgoa Road is achievable in the available timeframes.

Email correspondence 4 April 2017, (provided in Appendix A), provided a series of flood hydrographs for use in the assessment for various points within the Panthers site.

1. REGIONAL FLOOD EVACUATION ROUTES

The Hawkesbury Nepean Flood Plan[1] identifies local and regional flood evacuation routes for the Penrith Sector. A copy of these routes is provided in Appendix B.

Regional Flood Evacuation routes for the Penrith Sector are:

- Eastbound on the M4 Motorway;
- East on The Great Western Highway; and
- South along The Northern Road to the M4 Motorway.

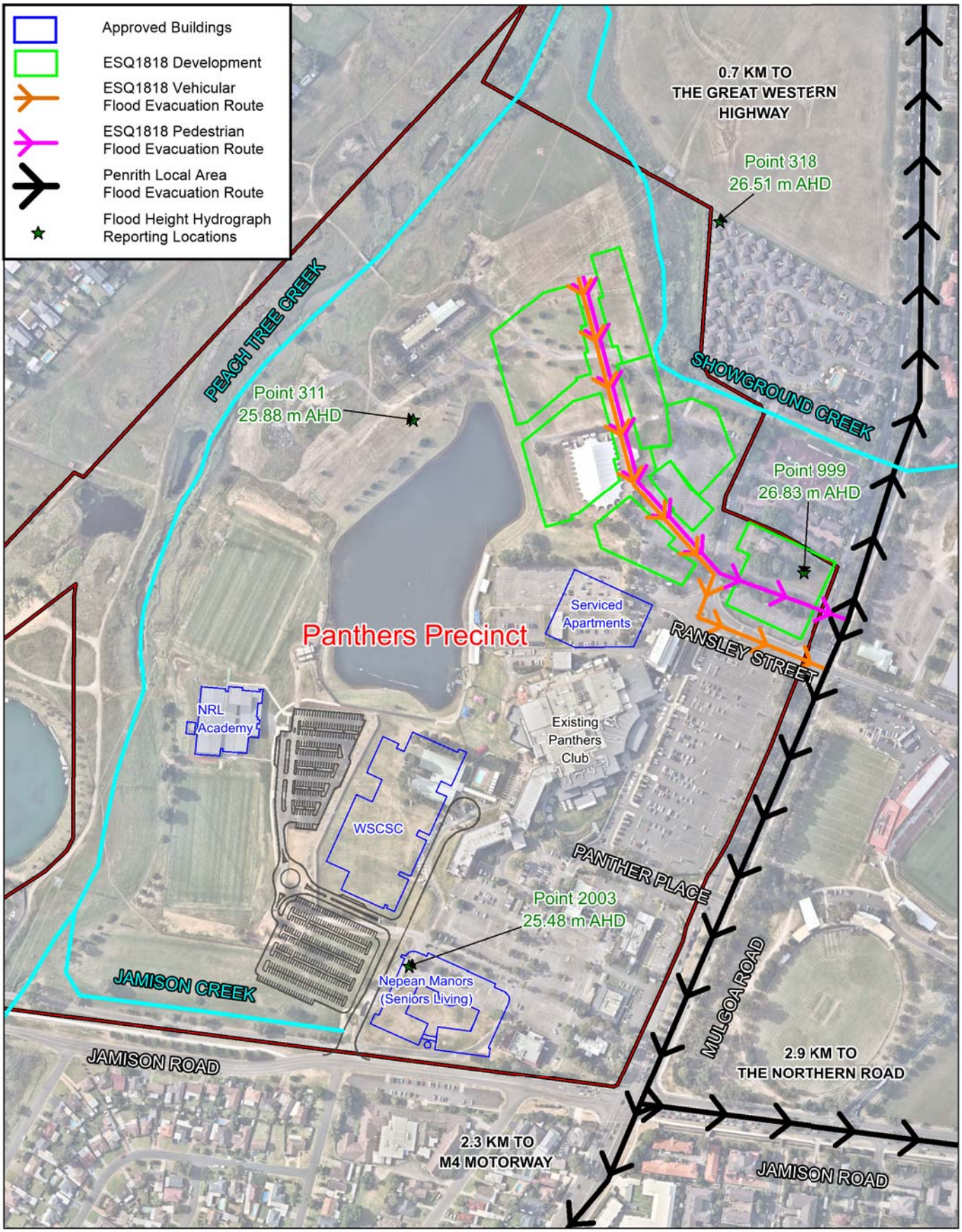
The local evacuation routes from the Panthers precinct are:

- South along Mulgoa Road to the M4 Motorway;
- North along Mulgoa Road to the Great Western Highway; and
- East along Jamison Road to The Northern Road.

Within the Panthers site, vehicles from the proposed residential towers in the northern part of the site will evacuate via the internal road network to Ransley Street, which intersects with Mulgoa Road. However, as Ransley Street grades down toward Mulgoa Road, a continuous rising grade for pedestrians to Mulgoa Road will be achieved via the podium of the eastern-most ESQ1818 building which fronts Mulgoa Road. This podium is located at 26.6 m AHD above the regional 1% AEP flood level of 26.1m AHD.

The internal Panthers Precinct evacuation routes for the ESQ1818 development to Mulgoa Road and the connecting Penrith Local Flood Evacuation Routes are shown on Plate 1.

[1] Hawkesbury Nepean Flood Plan – (Chapter 4 Volume 3) Hawkesbury-Nepean Valley: NSW SES Flood Evacuation Routes, Traffic and Transport Arrangements, NSW Government, September 2015.



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Title: **Plate 1**

Panthers Precinct
ESQ1818 Flood Evacuation Route

Note: Distances to the M4 Motorway, Jamison Road, and The Great Western Highway are measured from the intersection of Ransley Street and Mulgoa Road.

N W E S

100 0 100 m

Scale 1: 5,000 @ A4

File Name: 110251_EvacLtr_Plate_1_Approved_Dev

2. ASSESSMENT - FLOOD EVACUATION TIMING TO MULGOA ROAD

Architectural drawings DA-110-117 (Rev D. 8/2/2016) and DA-110-117 (Rev. C 8/2/2016) indicate that there are 1,237 car spaces proposed as part of the ESQ1818 development. Assuming that every car space is occupied and using a maximum lane capacity of 600 vehicles/ lane/ hour, it is estimated that all vehicles could be evacuated from the ESQ1818 development under 2.1 hours.

iNSW have provided a series of 46 flood hydrographs of regional riverine flood events, for four (4) locations within the Panthers Precinct. These reporting locations are shown on Plate 1.

All 46 Hydrographs have been graphed for the four (4) locations to determine the shortest time occupants have to evacuate before flood water reaches each reporting location. These are provided in Appendix C. Two (2) of the reporting locations fall within the ESQ1818 development area.

A review of the hydrographs indicate the shortest time for riverine floodwater to reach each of the four (4) reporting locations varies between 262 minutes (4.3 hours) at Point 999 to 268 minutes (4.47 hours) at Point 318.

Assuming the SES are already mobilised based on the predicted rainfall and that it will take one (1) hour for people to accept the warning after door knocking and a further hour to prepare to evacuate [3]. The following surplus times are available:

ESQ1818 Evacuation	Total Evacuation Time (Hr)	Evacuation Time (Hr)	Delayed Evacuation	Surplus Time to Evacuation (Hr)
Total Car Spaces to be evacuated (1237)	**2.1**	**4.3**	**2**	**0.2**

Two (2) trafficable lanes are available from the ESQ1818 development to Mulgoa Road. Thus if both lanes were to be used in an evacuation, the evacuation time for the ESQ1818 would be reduced to only 1.05 hours. This increases the available surplus time to evacuate the ESQ1818 to 1.25 hours or 75 minutes spare time.

The configuration of the ESQ1818 development is such that a series of podiums will form part of the development and as suggested in iNSW 5 December 2016 advice, high level refuges will be available for the residents at ESQ1818 for use in flash flooding situations. Appropriate signage will form part of the development.

The location of the ESQ1818 development in the Panthers Precinct is also seen as an advantage to the local residents. Whilst Panthers Leagues Club is not an official evacuation centre, the use of this facility for an alternative “safe haven” should provide iNSW and Department of Planning with confidence that a suitable evacuation strategy is available to support the LEP amendment.

3. LOCAL FLOODING

Both the 5% AEP Local + 1% AEP regional and the 1% AEP Local + 5% AEP regional flood events were assessed and presented on Figure 8-9 and Figure 8-10 respectively in the Panthers Precinct Master Plan Flood Assessment Report[2]. These figures demonstrate that there is ample dry ground within the ESQ1818 development, together with elevated podium areas where residents can take refuge during these localised flood events.

[2] Panthers Precinct Master Plan – Flood Assessment Report, Revision H, J. Wyndham Prince September 2016.

[3] Marsden Park Precinct Flood Evacuation Strategy, Molino Stewart June 2012.

4. CONCLUSION

As part of the Gateway Approval process for the ESQ1818 development within Panthers Precinct, iNSW requested an assessment of the evacuation of the ESQ1818 development to Mulgoa Road. Based on a series of 46 hydrographs provided by iNSW, it has been determined that between 0.2 – 1.05 hour surplus time is available for vehicle evacuation.

There are also a number of short terms "safe havens" both within the ESQ1818 (podium level) and within 200 m for the development where residents would be able to shelter during these major flood events.

We hope the assessment enables iNSW to have confidence that the residents of ESQ1818 development will have a manageable and safe flood evacuation strategy and the amendment of the LEP can be supported.

Should there be any queries regarding this matter please do not hesitate to contact David Crompton on 4720 3340 or dcrompton@jwprince.com.au

Yours faithfully
J. WYNDHAM PRINCE



DAVID CROMPTON
Manager – Stormwater and Environment Group

APPENDIX A – EMAIL CORRESPONDENCE

From: Joel Carson ↑ Next ↓ Previous
Sent: Tuesday, 4 April 2017 3:24 PM
To: 'Joe Bevacqua' <joeb@cabe.com.au>
Cc: Abdul Cheema <Abdul.Cheema@penrith.city>; Kate Speare <kate.speare@penrith.city>; Adam Wilkinson <Adam.Wilkinson@penrith.city>
Subject: RE: [110251-02] Infrastructure NSW response to questions on flood hydrograph information for Penrith Panthers site

Hi Joe,

Thanks for your email. I have spoken with Paul Fuller at iNSW. I outlined to him JW Prince's question below regarding the need to access the iNSW traffic model.

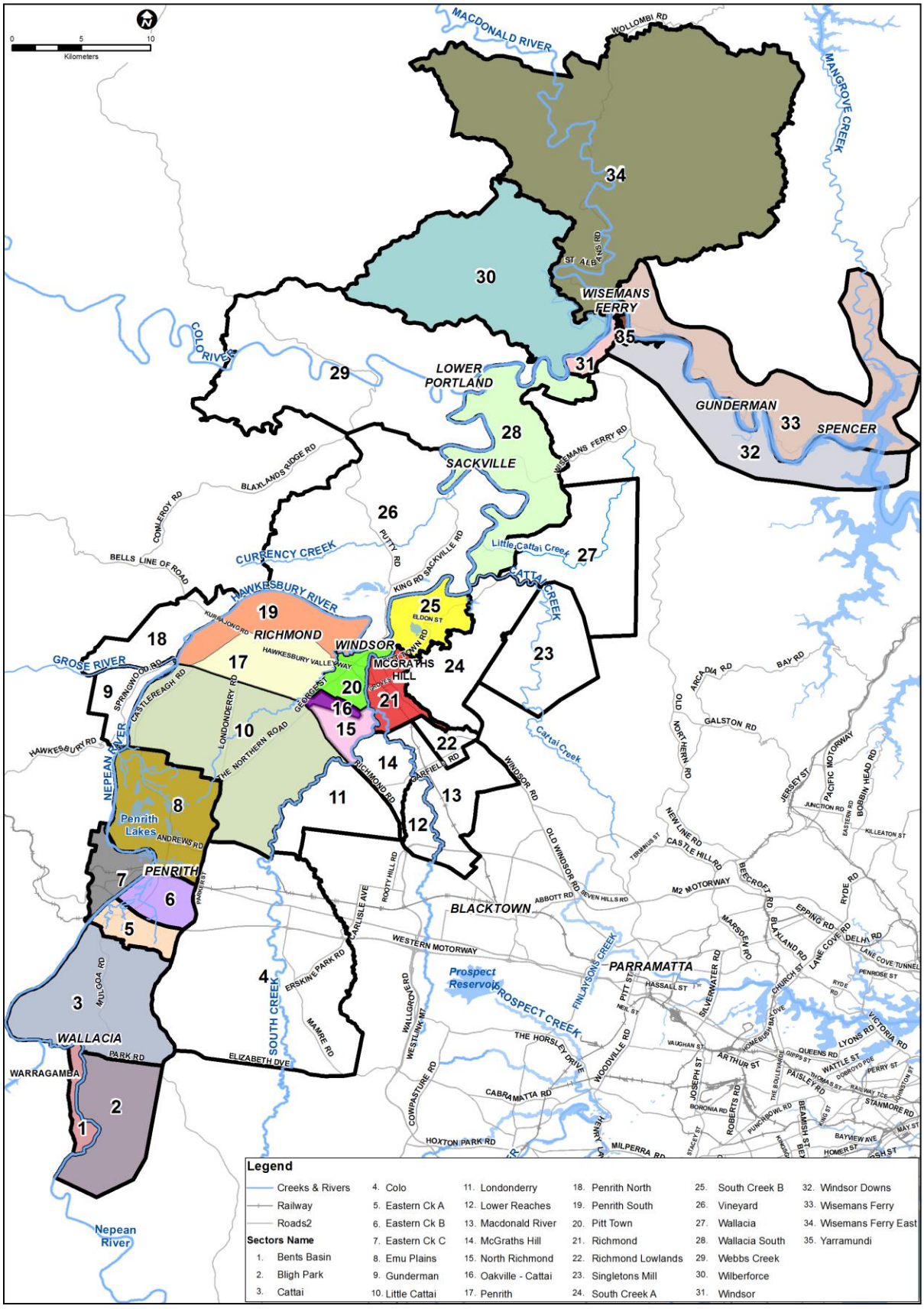
Paul clarified that the task for the applicant is to look at how the evacuation will work to get from the development to Mulgoa Road. The hydrograph information previously provided should be adequate to allow the analysis of the sub-sector to occur. Paul clarified that it is not necessary to access the regional traffic model for this analysis.

Paul also indicated that an iNSW response confirming the process and timing for resolving the matter of emergency evacuation will soon be provided to Council via the Terry Doran at the Department of Planning and Environment.

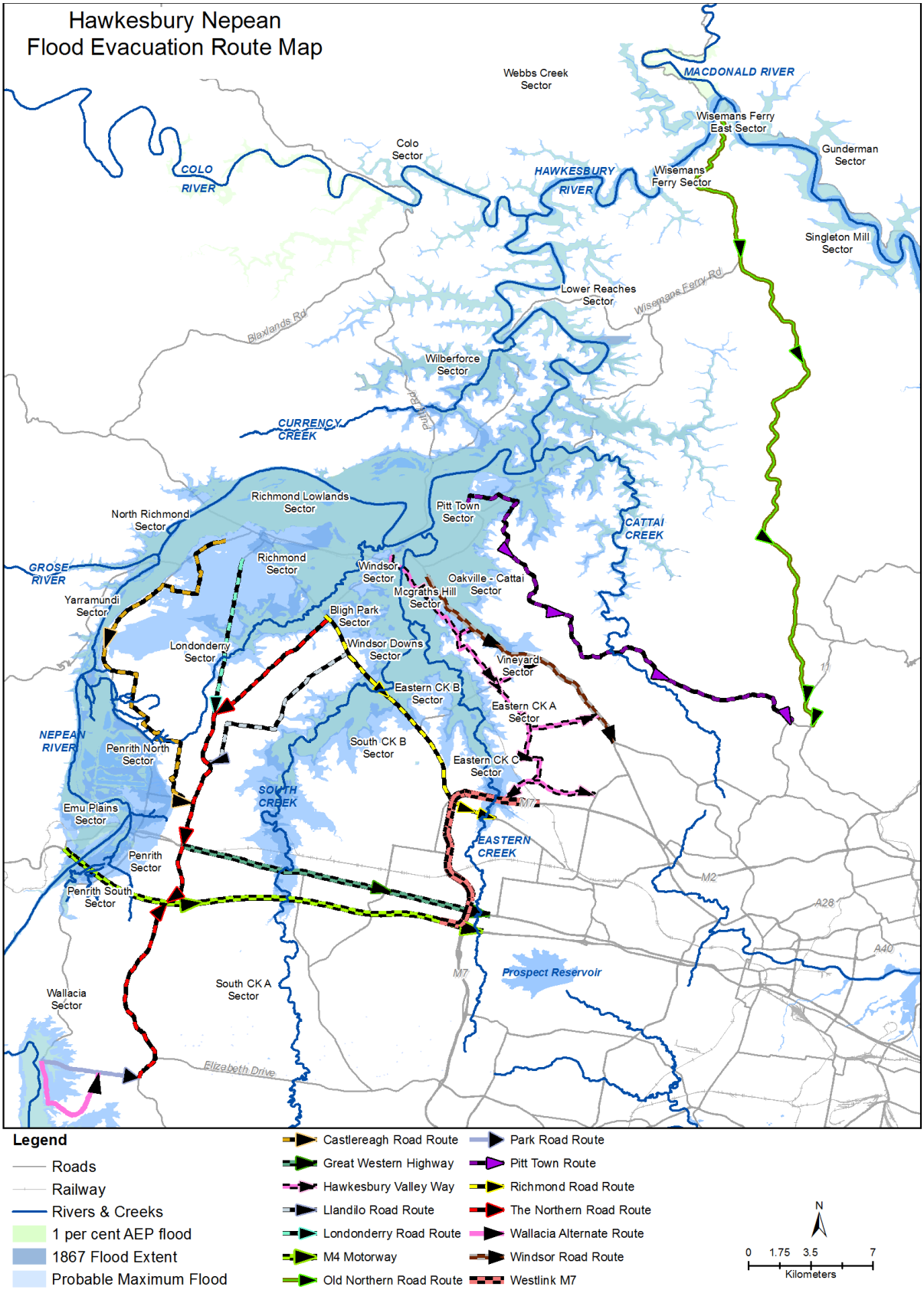
Thank you,

Joel Carson
Senior Planner

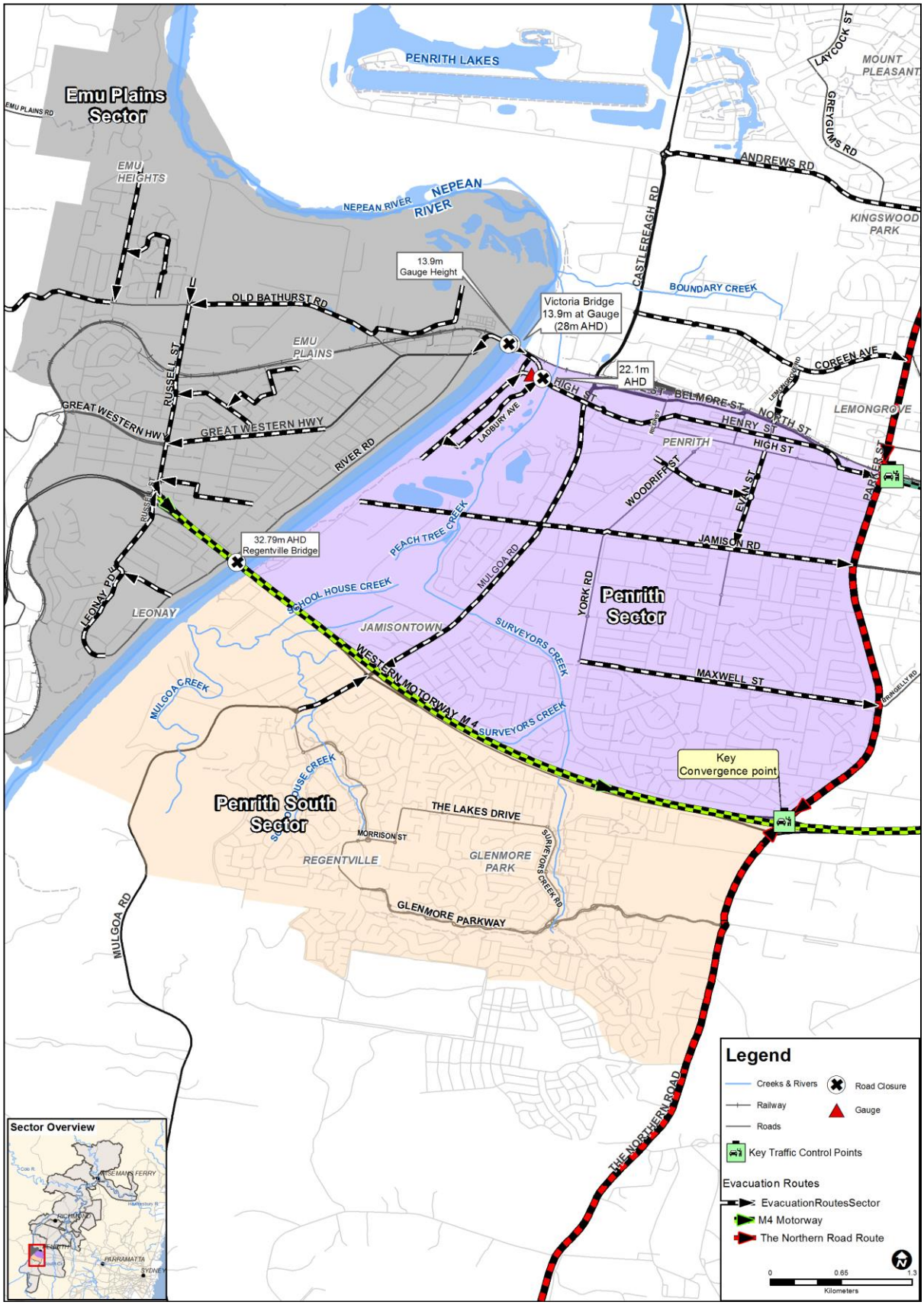
APPENDIX B – HAWKESBURY NEPEAN FLOOD EVACUATION ROUTES



Map 2: Hawkesbury-Nepean Valley Emergency Management Sector Map



Map 1: Regional Evacuation Routes within the Hawkesbury-Nepean Valley



Map 10: Emu Plains and Penrith - Evacuation Routes

APPENDIX C – FLOOD EVACUATION HYDROGRAPHS

Point 311 - 25.88 m AHD
Flood Evacuation Hydrographs

Height (m AHD)

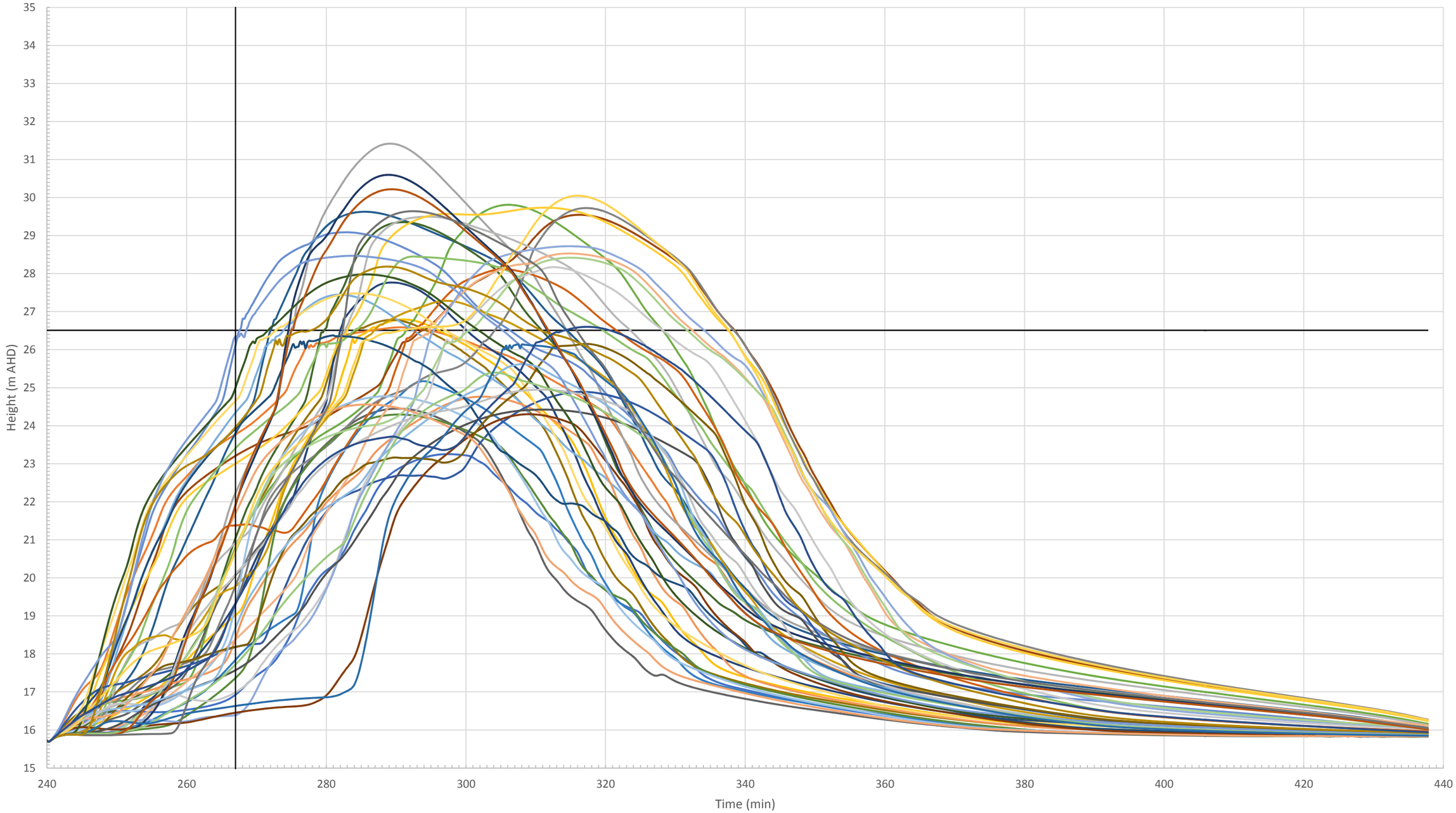
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340
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420
440

Time (min)

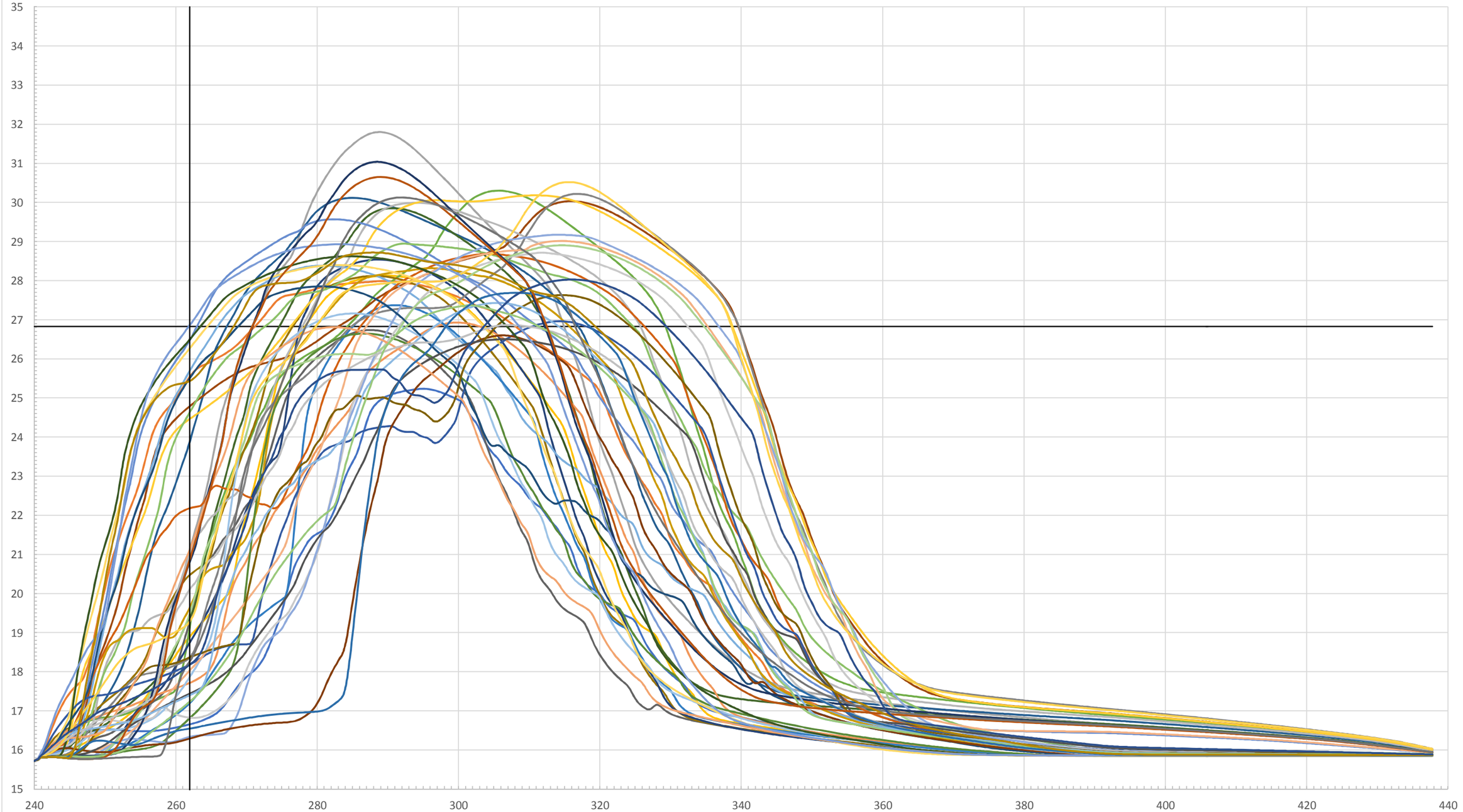
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d06601_H_TS d06483_H_TS d06391_H_TS d06105_H_TS d05981_H_TS d05915_H_TS d05717_H_TS d05677_H_TS d05557_H_TS d04917_H_TS d04750_H_TS d04711_H_TS
d04292_H_TS d04047_H_TS d03859_H_TS d03562_H_TS d03548_H_TS d02996_H_TS d02602_H_TS d02126_H_TS d02077_H_TS d01889_H_TS d01731_H_TS d01664_H_TS
d01630_H_TS d01329_H_TS d00938_H_TS d00732_H_TS d00655_H_TS d00502_H_TS d00285_H_TS d00229_H_TS d00206_H_TS d00045_H14

Point 318 - 26.51 m AHD
Flood Evacuation Hydrographs



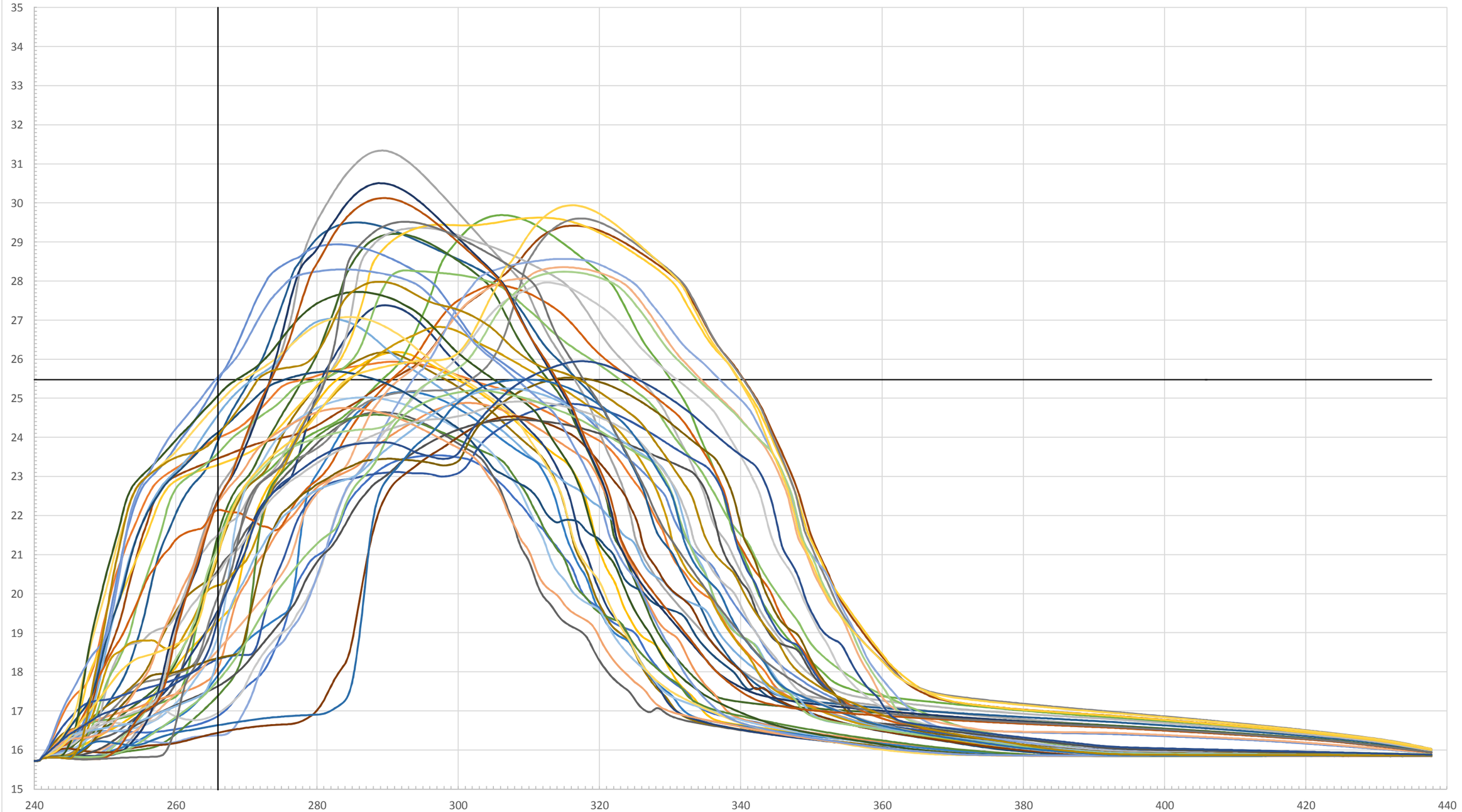
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d06601_H_TS d06483_H_TS d06391_H_TS d06105_H_TS d05981_H_TS d05915_H_TS d05717_H_TS d05677_H_TS d05557_H_TS d04917_H_TS d04750_H_TS d04711_H_TS
d04292_H_TS d04047_H_TS d03859_H_TS d03562_H_TS d03548_H_TS d02996_H_TS d02602_H_TS d02126_H_TS d02077_H_TS d01889_H_TS d01731_H_TS d01664_H_TS
d01630_H_TS d01329_H_TS d00938_H_TS d00732_H_TS d00655_H_TS d00502_H_TS d00285_H_TS d00229_H_TS d00206_H_TS d00045_H14

Point 999 - 26.83 m AHD
Flood Evacuation Hydrographs



Point 999 AHD
d09693_H_TS
d09644_H_TS
d09313_H_TS
d08993_H_TS
d08337_H_TS
d08303_H_TS
d08292_H_TS
d08270_H_TS
d08063_H_TS
d07919_H_TS
d07304_H_TS
d06634_H_TS
d06601_H_TS
d06483_H_TS
d06391_H_TS
d06105_H_TS
d05981_H_TS
d05915_H_TS
d05717_H_TS
d05677_H_TS
d05557_H_TS
d04917_H_TS
d04750_H_TS
d04711_H_TS
d04292_H_TS
d04047_H_TS
d03859_H_TS
d03562_H_TS
d03548_H_TS
d02996_H_TS
d02602_H_TS
d02126_H_TS
d02077_H_TS
d01889_H_TS
d01731_H_TS
d01664_H_TS
d01630_H_TS
d01329_H_TS
d00938_H_TS
d00732_H_TS
d00655_H_TS
d00502_H_TS
d00285_H_TS
d00229_H_TS
d00206_H_TS
d00045_H14

Point 2003 - 25.48 m AHD
Flood Evacuation Hydrographs



d09693_H_TS d09644_H_TS d09313_H_TS d08993_H_TS d08337_H_TS d08303_H_TS d08292_H_TS d08270_H_TS d08063_H_TS d07919_H_TS d07304_H_TS d06634_H_TS
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