

Griffith Main Drain J and Mirrool Creek Yenda Flood Mapping Update

R.T2088.001.03



June 2021

Final Report

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Title: Griffith Main Drain J and Mirrool Creek – Yenda Flood Mapping Update
Project Manager: Dan Williams
Author: Dan Williams
Client: Griffith City Council
Client Contact: Durgananda Chaudhary
Prepared: Verified:

Daniel Williams

Synopsis

Update of modelling and mapping for the Griffith Main Drain J and Mirrool Creek Flood Study and Floodplain Risk Management Study following flood mitigation works to protect the township of Yenda.

Revision History

Revision	Description	Date
01	Draft	19/01/2021
02	Final	5/05/2021
03	June 2021	1/06/2021

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Executive Summary

Torrent Consulting was engaged by Griffith City Council to undertake a flood mapping update for Yenda, following recent works to mitigate flooding within the township.

This assessment has included development of a TUFLOW model originally developed by BMT for the EBP at the MI Main Canal EMR. The model development included:

- an updated flood gate representation at the EMR
- incorporating survey data of the recent MI NBC widening project
- design details of the recently constructed Thorne Road upgrade
- a representation of the Shiraz Drive residential development earthworks.

The updated TUFLOW model was simulated for the full range of design flood events. Mapping has been produced showing the modelled peak flood depths and levels for the 10% AEP, 5% AEP, 2% AEP, 1% AEP, 0.5% AEP, 0.2% AEP and the Extreme Flood event. Flood hazard and flood function mapping has also been produced for the 1% AEP event.

FPA mapping has been based on the extent of the Extreme Flood, except in Myall Park and Collina, where the extent of the 1% AEP + 0.5 m level has been adopted. The FPA mapping excludes the Griffith CBD and Yenda, as they are not subject to mainstream flooding at the 1% AEP event. For appropriate flood planning controls, users should refer to the Griffith Major Overland Flow Floodplain Risk Management Study and Plan for CBD Catchments (WMA Water, 2013) and the latest version of Council's Buildings Floor Heights Policy, accordingly.

An updated design flood mapping series is presented within the accompanying Flood Mapping Compendium (M.T2088.001.03).

The impacts of the flood mitigation works that have been implemented show a significant reduction in flooding at Yenda and the surrounding area. The exception is within the Mirrool Creek floodplain downstream of the Main Canal, where increased peak flood levels of 0.1-0.2 m are typical downstream to Drew Road. Between Drew Road and the Barren Box Storage and Wetland this is reduced to 0.0-0.1 m.

The study was placed on public exhibition from 5 March 2021 to 9 April 2021, with a community consultation forum held by Council at Yenda Diggers Club on 18 March 2021.

A total of eight submissions were received from the community as part of this consultation process. Responses to these submissions are provided in Appendix A.

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1 Introduction

Torrent Consulting was engaged by Griffith City Council to undertake a flood mapping update for Yenda, following recent works to mitigate flooding within the township. More broadly, this required updating of the TUFLOW model developed for the Griffith Main Drain J Flood Study, Floodplain Risk Management Study (FRMS) and Emergency Breaching Protocols (EBP) at the East Mirrool Regulator (EMR). A complete update of the flood mapping product for the Griffith Main Drain J catchment has also been undertaken.

This report summarises the updates that have been made to the TUFLOW model and subsequent flood mapping process.

2 Model Development

For this assessment, the TUFLOW model developed by BMT for the EBP at the MI Main Canal EMR was provided to Torrent Consulting by Griffith City Council. This formed the baseline from which the required model updates were implemented. The model updates are summarised below:

- the TUFLOW version was updated to the 2020-01-AB release, from the 2018-03-AA with which it was previously simulated
- WAE (work as executed) details of the recently constructed floodgate structures at the EMR were provided by Council ("ES-2-96 (DWGS 001 - 011 and 910)_RevA_.pdf") and used to update the existing structure in the TUFLOW model
- survey data of the Northern Branch Canal (NBC) embankment crest levels following the recent MI NBC widening project were provided by Council and were used to update the embankment crest levels in the TUFLOW model
- design details of the recently constructed Thorne Road upgrade were provided by Council ("861 SOUTHERN INDUSTRIAL LINK STAGE 2A.pdf", "861 SOUTHERN INDUSTRIAL LINK, STAGE 2b ROUNDABOUT - APPROVED DESIGN.pdf" and "Thorne Rd Drainage Improvements.pdf") and were used to update road crest levels and cross-drainage infrastructure in the TUFLOW model
- details of the Shiraz Drive residential development were estimated from the 2014 LPI LiDAR data and recent Google aerial imagery and were used to update the local TUFLOW model topography
- assumptions regarding the implementation of the EMR EBP were retained, with the flood gates being opened for events of a 5% AEP and rarer and breaching of the canal bank occurring for events of a 2% AEP and rarer
- the hydrological inputs for the local Main Drain J catchment runoff (excluding Mirrool Creek) in the EMR EBP model were found to be inconsistent with the adopted design conditions in the Flood Study and FRMS and so the model was updated to revert back to the adopted design flood conditions.

3 Flood Mapping

The updated TUFLOW model was simulated for the full range of design flood events and a similar flood mapping series has been produced, consistent with those of the Griffith Main Drain J FRMS and the EMR Emergency Breaching Protocols. Each set of maps in the mapping series comprises seven map views – one giving an overview of the study area and six providing improved detail for the locations of Yenda, North Yenda, Beelbangera, Yoogali, Hanwood and Warburn.

Mapping has been produced showing the modelled peak flood depths and levels for the 10% AEP, 5% AEP, 2% AEP, 1% AEP, 0.5% AEP, 0.2% AEP and the Extreme Flood event. The Extreme Flood has previously been referenced as the PMF, which is technically not correct, being based on a simple 3x flow increase of the 1% AEP event. However, for flood planning, the PMF and Extreme Event serve a similar purpose.

Flood hazard and flood function mapping has also been produced for the 1% AEP event. The flood hazard is based on the definition in the NSW Floodplain Development Manual and is consistent with the previous studies. Flood function (or hydraulic categorisation) mapping is also consistent with the approach used in the previous studies, i.e. a VxD product of > 0.1 has been used to identify areas of floodway, with flood storage areas representing peak flood depths > 0.5 m. The existing floodway definition for the Mirrool Creek floodplain upstream of the Main Canal has also been retained, including the use of the Main Canal between Dalton's Runner and the EMR.

For most of the study area the Extreme Flood event is no more than 0.5 m higher than the level of the 1% AEP event. Therefore, the extent of the Extreme Flood has been used to define the Flood Planning Area (FPA). There are a few exceptions to this:

- within Myall Park the Extreme Flood level is over 1.0 m higher than the 1% AEP event, therefore, the FPA has instead been defined by projection of the 1% AEP + 0.5 m level onto the underlying ground surface LiDAR DEM
- for the Extreme Flood event the flood extent connects Myall Park through to Collina but at the 1% AEP event the flood extent is limited to Collina only. The FPA at Collina has therefore been defined by projection of the 1% AEP + 0.5 m level onto the underlying ground surface LiDAR DEM
- within the Griffith CBD (north of the Main Canal) the local flood conditions are better represented within the Griffith CBD Catchment Overland Flow Flood Study (WMA Water, 2012). For appropriate flood planning controls, users should refer to the Griffith Major Overland Flow Floodplain Risk Management Study and Plan for CBD Catchments (WMA Water, 2013)
- within Yenda the potential inundation at the 1% AEP event is effectively limited to local catchment runoff and drainage, rather than mainstream flooding. For appropriate flood planning controls, users should refer to the latest version of Council's Buildings Floor Heights Policy.

The updated design flood mapping series is presented within the accompanying Flood Mapping Compendium (M.T2088.001.03).

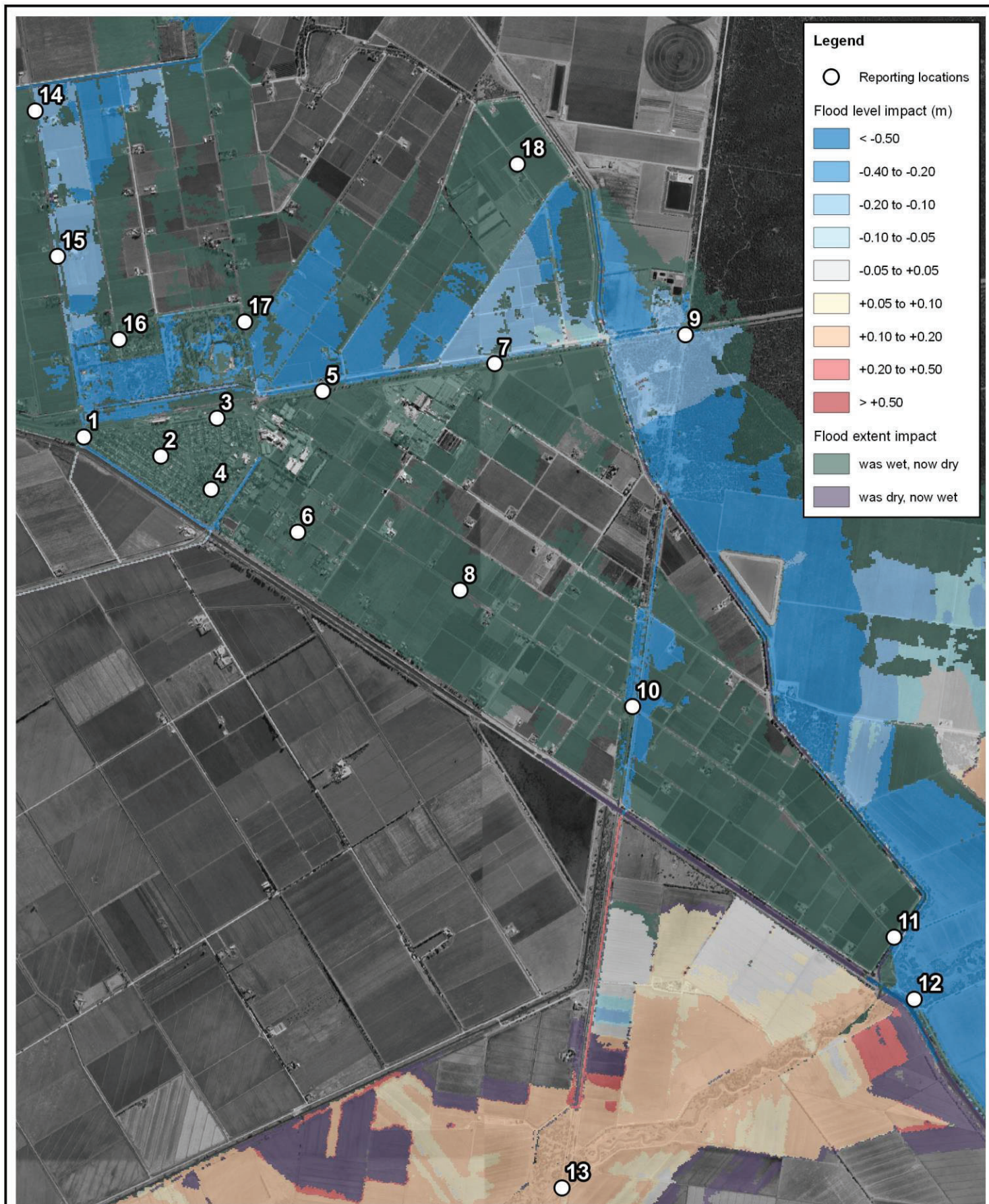
4 Flood Mitigation Impacts

The impacts of the flood mitigation works that have been implemented at Yenda can be discerned through comparison of the modelled results presented in the Flood Mapping Compendium with those of the Griffith Main Drain J and Mirrool Creek Flood Study and FRMS. However, for ease of interpretation a direct comparison of the 1% AEP and 0.5% AEP events is presented at selected locations in Table 4-1. Impact mapping at Yenda for these events is also provided in Figure 4-1 and Figure 4-2.

Overall, the impact of the flood mitigation works show a significant reduction in flooding at Yenda and the surrounding area. The exception is within the Mirrool Creek floodplain downstream of the Main Canal, where increased peak flood levels of 0.1-0.2 m are typical downstream to Drew Road. Between Drew Road and the Barren Box Storage and Wetland this is reduced to 0.0-0.1 m.

Table 4-1 Modelled Impact of Yenda Flood Mitigation Works

ID	Location	1% AEP Level (m AHD)			0.5% AEP Level (m AHD)		
		Previous	Revised	Impact	Previous	Revised	Impact
1	Dredge St	130.76	Dry	Dry	130.87	130.60	-0.27
2	Henry St – Allen St	130.90	Dry	Dry	131.02	130.69	-0.33
3	Railway Pde – North St	130.98	Dry	Dry	131.11	130.90	-0.21
4	Henry St – Bingar St	131.00	Dry	Dry	131.13	130.79	-0.34
5	BG Way – Wood Rd	131.58	Dry	Dry	131.65	131.57	-0.08
6	Curran Rd	131.48	Dry	Dry	131.59	131.30	-0.29
7	BG Way – Wakley Rd	132.30	Dry	Dry	132.40	132.29	-0.11
8	Barracks Rd	131.71	Dry	Dry	131.78	Dry	Dry
9	BG Way – WSR Rd	133.65	133.46	-0.19	133.72	133.59	-0.13
10	WSR Rd – Barracks Rd	132.91	Dry	Dry	132.98	Dry	Dry
11	NBC Rd – Pomroy Rd	133.83	Dry	Dry	133.90	Dry	Dry
12	Halse Rd	134.48	134.19	-0.29	134.56	134.34	-0.22
13	WSR Rd – Mirrool Ck	131.91	132.05	+0.14	131.95	132.13	+0.18
14	Myall Park Rd N	129.99	Dry	Dry	130.03	129.92	-0.11
15	Myall Park Rd S	130.19	130.01	-0.18	130.27	130.12	-0.15
16	Colombana Rd	130.56	Dry	Dry	130.64	130.41	-0.23
17	Twigg Rd	131.18	Dry	Dry	131.22	131.07	-0.15
18	Simpson Rd	131.19	Dry	Dry	132.26	132.02	-0.24



Title:

Modelled 1% AEP Peak Flood Level Impact

0 1 2 km



approx. scale

Figure:

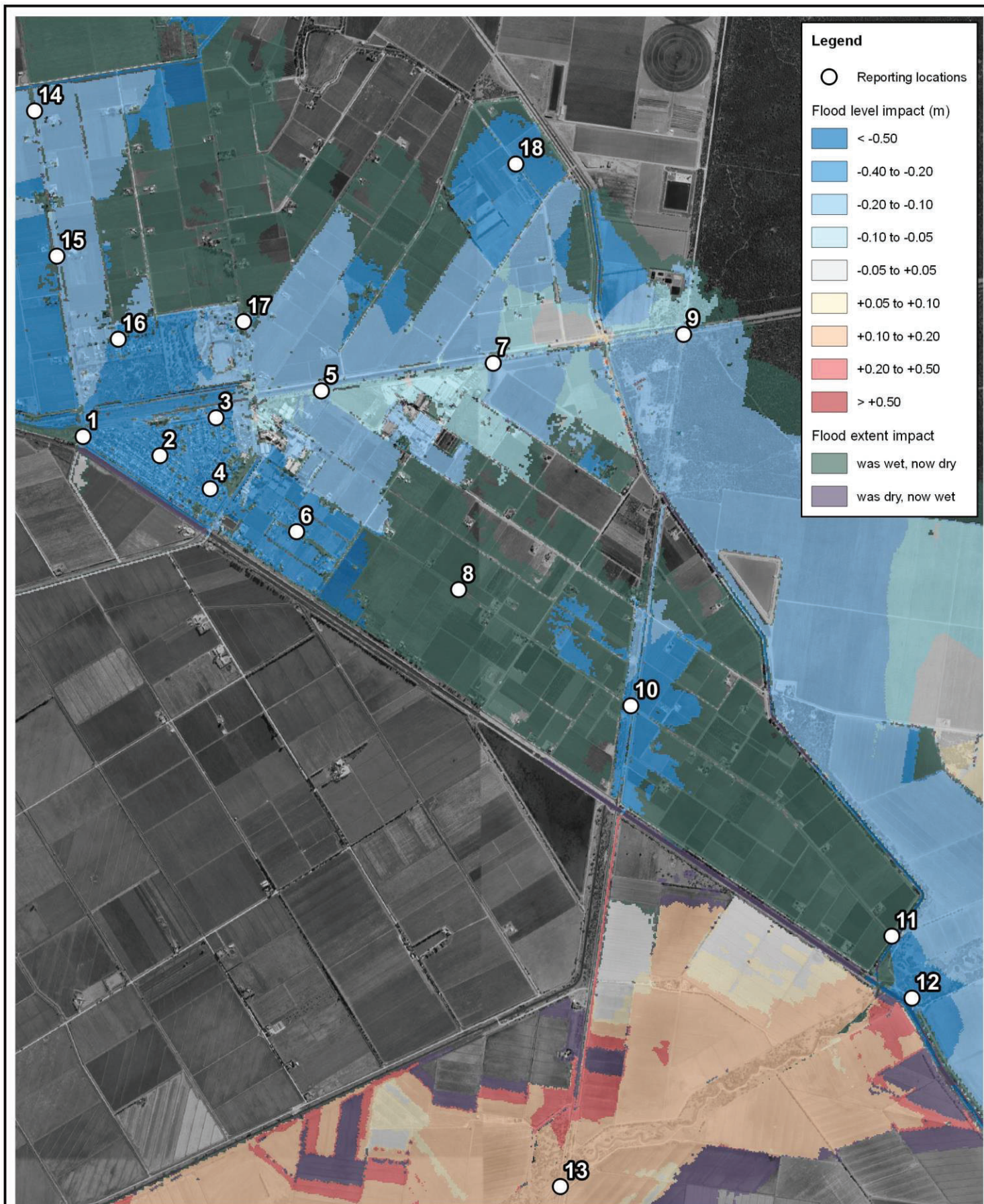
4-1

Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.

Revision:

A





Title:

Modelled 0.5% AEP Peak Flood Level Impact

0 1 2 km



approx. scale

Figure:

4-2

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Revision:

A

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5 Community Consultation

The study was placed on public exhibition from 5 March 2021 to 9 April 2021, with a community consultation forum held by Council at Yenda Diggers Club on 18 March 2021.

A total of eight submissions were received from the community as part of this consultation process. Responses to these submissions are provided in Appendix A.

6 Conclusion

Torrent Consulting was engaged by Griffith City Council to undertake a flood mapping update for Yenda, following recent works to mitigate flooding within the township.

This assessment has included development of a TUFLOW model originally developed by BMT for the EBP at the MI Main Canal EMR. The model development included:

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A total of eight submissions were received from the community as part of this consultation process. Responses to these submissions are provided in Appendix A.

7 References

BMT WBM (2015) *Griffith Main Drain J and Mirrool Creek Flood Study*

BMT WBM (2015) *Griffith Main Drain J and Mirrool Creek Floodplain Risk Management Study and Plan*

BMT (2018) *EMR Emergency Breaching Protocols and Decision Support Framework*

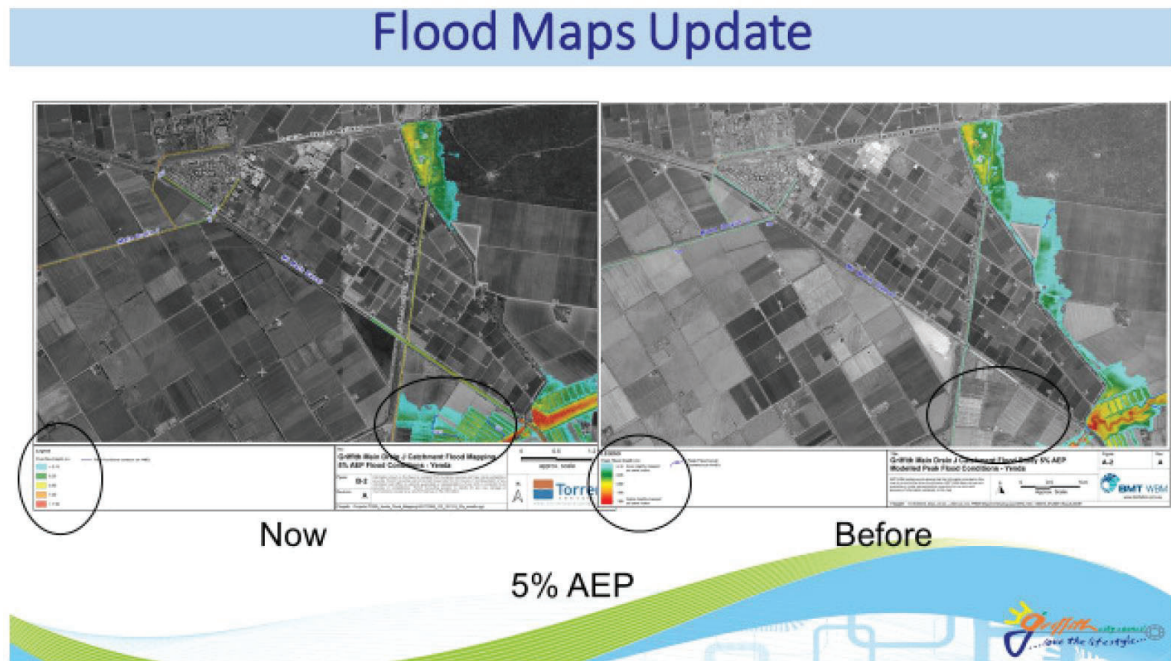
NSW Government (2005) *Floodplain Development Manual*

WMA Water (2012) *Griffith CBD Catchment Overland Flow Flood Study*

WMA Water (2013) *Griffith Major Overland Flow Floodplain Risk Management Study and Plan for CBD Catchments*

Appendix A Response to Public Exhibition Submissions

Flood Map Discrepancy



A discrepancy in the flood mapping, between the originally adopted flood mapping series and that of the Flood Mapping Update, has been highlighted on the right floodplain immediately downstream of the EMR.

This difference in mapping output is an intended change. Significant additional model development was undertaken following the original mapping as part of the modelling to support the EBP for the Main Canal at the EMR. The model development included improvements in the representation of the Main Canal, the upstream approach flows to the EMR siphon and the Mirrool Creek floodplain between the Main Canal and the Barren Box Storage and Wetland (BBSW). The change in mapping at this location is a function of the many improvements that have been made to the TUFLOW model in the intervening period.



Draft Economic Development Strategy

Paperform to: Admin Griffith/Griffith City Council <Admin@griffith.nsw.gov.au>, naomi.brugger@griffith.nsw.gov.au, oumi.karenga@griffith.nsw.gov.au

<oumi.karenga@griffith.nsw.gov.au> 13/03/2021 08:15 AM

Sent by: "bounce+4aa21c.58518c-admin=griffith.nsw.gov.au@mg.paperform.co
<bounce+4aa21c.58518c-admin=griffith.nsw.gov.au

Submission - Flood Mapping Update for Yenda

Submitted At

2021-03-13 08:15:42

Name

Mr. Parisotto

Residential Address

Farm XXXX, Yenda, New South Wales, 2681, Australia

Your email?

xxxxxxx@bigpond.com

Would you like your details withheld from the Business Paper?

Yes

Please provide your feedback on the Flood Mapping Update for Yenda

Can you please explain how GCC say that these flood mapping for Yenda are correct, when nothing has been or is being done about levees along mirrool creek, which changes the flood flow and height since the 2015 flood study. Especially when this is clearly a requirement for levees to remain as they were pre 2012 as per council flood committee meeting minutes dated 14 Dec 2017, 27 Feb 2018, 23 Aug 2018 & so on.

Submission ID

604bd9fe71b34e7415674ae6

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**Flood Mapping for Yenda**

Paperform to: Admin Griffith/Griffith City Council <Admin@griffith.nsw.gov.au>, Graham Gordon/Griffith City Council, naomi.brugger@griffith.nsw.gov.au

<naomi.brugger@griffith.nsw.gov.au> 25/03/2021 09:08 PM

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<bounce+4aa21c.58518c-admin=griffith.nsw.gov.au

Submission - Flood Mapping Update for Yenda

Submitted At

2021-03-25 21:08:48

Name

Ms. Poscoliero

Residential Address

xxxxx Street, Yenda, New South Wales, 2681, Australia

Your email?

xxxxxxxxxxxxx@outlook.com

Would you like your details withheld from the Business Paper?

Yes

Please provide your feedback on the Flood Mapping Update for Yenda

Purchased house in August 2018 and draining has not improved (to date) after rainfall. It takes a long time to drain away and potentially just evaporates. Attached images are of 15 Park Street curb and across the road.

If desired, you can upload a file to support your feedback

- [15 park street curb still not drained.jpg](#)
- [15 park street curb still not drained rubbish not over grid .jpg](#)
- [across the road still not drained, channel full.jpg](#)
- [across the road 2.PNG](#)
- [across the road 1.PNG](#)

Submission ID

605c6130b7b8f83834172882

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Griffith Main Drain J floor mapping

Mr. Budd to: Durgananda.Chaudhary, 'Graham Gordon' 10/02/2021 01:16 PM

History:

This message has been forwarded.

Hello DN,

Not anything that is an issue that is to go before Council but just a couple of queries regarding the mapping.

- In figure E-2 the 0.5% AEO Flood Conditions for Yenda; is the water in Yenda just the localized rainfall not being able to get under the siphons at the main canal as opposed to any flooding caused by breaches of the Northern Branch canal? I assume it is only localized rainwater.
- The Myall Park flooding area; is this purely caused by localized rainfall from the catchment to the north of this area. I ask this as in 2012 flood event MI opened up drain outlets from the Northern Branch canal that contributed to the water in this locality. I assume they did this because of losing control of the Northern Branch canal due to floodwater at the EMR.
- Finally in J-1 the Flood Planning Area which AEP event is this taken from as there are areas for example Yenda and the bottom of Collina that are not included in the Flood Planning Area despite showing flooding in the 0.5% AEP and significant flooding in the 0.2% AEP and greater than significant flooding in the Extreme Flood conditions. I don't understand the exclusion of these areas.

Regards,

Mr. Budd

Architect (reg no: 5331)
Budd & Partners Architects
43 Carrathool Street
Griffith NSW 2680

Phone: 02 69641459
Email: architect@budd.net.au

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Mr. Parisotto

The submission from Mr. Parisotto does not relate to the work that has been undertaken for the Flood Mapping Update and is a broader Council issue regarding development control and approval.

Ms. Poscoliero

The submission from Ms. Poscoliero does not relate to the work that has been undertaken for the Flood Mapping Update and is a broader Council issue regarding the provision and maintenance of local stormwater drainage infrastructure.

Mr. Budd

The submission from Mr. Budd raises three concerns in relation to the Flood Mapping Update. The first concern relates to the 0.5% AEP flooding for Yenda presented in Figure E-2 of the Flood Mapping Compendium and whether the source of flooding is local rainfall or Mirrool Creek flood waters. Whilst there would be a contribution from local rainfall, most of this flood water is likely from Mirrool Creek. The implemented floodplain risk management measures prevent Mirrool Creek flood waters from inundating Yenda at the 1% AEP event, but not the 0.5% AEP event. As discussed previously, the most readily identifiable way to prevent Mirrool Creek flood waters from entering North Yenda (or Yenda at the 0.5% AEP event) would be the construction of a 1 km long and 1.0-1.5 m high levee connecting the right bank of the NBC through to higher ground in Binya Forest. This is a future floodplain risk management option that could be considered by Council, but it was not a recommendation of the FRMS.

The second concern relates to the flooding within the Myall Park area and whether this is from local catchment rainfall or from Mirrool Creek. The flooding in Myall Park is dominated by local catchment rainfall-runoff. However, in the 1% AEP and 0.5% AEP flood events there will be a level of contribution from Mirrool Creek, via any flood waters that reach DC 'T' alongside Fowler Road. It is likely that flood waters were released by MI from the NBC into Myall Park during the 2012 flood event, once the NBC was compromised by Mirrool Creek flood waters. This water would likely have spilt from the NBC into Myall Park if not released but releasing it in that way helps to protect the irrigation infrastructure. Again, options to reduce this input from Mirrool Creek could be investigated as a future floodplain risk management option (the same one that would impact Yenda and North Yenda), but it was not a recommendation of the FRMS.

The third and final concern relates to the exclusion of certain areas from the Flood Planning Area (FPA) map in Figure J-1, namely Collina and Yenda. The area at south Collina that is inundated at the 1% AEP has been added to the FPA mapping, as discussed in Section 3. It was initially removed on the basis that it would be covered more accurately in the Griffith Major Overland Flow Floodplain Risk Management Study and Plan for CBD Catchments (WMA Water, 2013). However, this location is not covered within the CBD Catchments study and so the FPA mapping needs to be provided. The area covered by the CBD Catchments mapping has been highlighted within the FPA mapping series within the Mapping Compendium.

In the case of Yenda the FPA has not been mapped because it is based on the 1% AEP flood event and Yenda is now effectively free from mainstream flood inundation at the 1% AEP. However, Council's Buildings Floor Heights Policy will still apply and provides suitable finished floor level guidance for flood planning purposes. This has been added to Section 3 of this report and highlighted within the FPA mapping series within the Mapping Compendium.

YENDA PROGRESS ASSOCIATION INC. SUBMISSION

'proudly serving Yenda and District since 1921'

YENDA FLOOD MAPPING UPDATE

TORRENT REPORT 2021

2nd April 2021

The General Manager

GRIFFITH CITY COUNCIL

PO Box 485, GRIFFITH NSW 2680

Yenda Progress Association and the Yenda community wish to thank Council for this Torrent Report flood mapping public exhibition period.

At a meeting of Yenda Progress Association held last Wednesday 17/3/2021 additional information was added for this submission.

Yenda Progress Association appreciate the opportunity to pass on our experiences and observations both during the 2012 Yenda Flood and working with Council staff, Graham Gordon, Dr Durgananda Chaudhary, BMT staff, Daniel Lyons and Daniel Williams and committee members too many to mention here, except the chairman Bill Lancaster who showed great patience and Yenda Representatives Louie Forner, Sally Jones , Paul Rossetto and Peter Ryrie from Myall Park during the compilation of the Griffith Main Drain J and Mirrool Creek 2015 Study.

YPA appreciate the hard work that went into the Torrent report by Daniel Williams and while not criticising its detail wish to add local knowledge to it during this public consultation and public exhibition period via our submissions, thereby improving the Yenda flood mitigation efforts.

Ms. Pellizzer

President, Yenda Progress Association

THE TORRENT REPORT

Background page 1

c) Emergency Breaching Protocols

“Council has completed these flood mitigation works.”

No Council has not. Page 28 of The Emergency Breaching Protocol document: Chapter 6 entitled Recommendations dot point 3 says:-

- **“Major floods on Mirrool Creek at the EMR will result in flood waters flowing along the eastern side of the Northern Branch Canal towards Myall Park, which could present a residual flood risk to Yenda.”**

N.B. the recommendations says “residual flood risk to Yenda” not North Yenda.

If North Yenda becomes inundated as modelled 1% AEP Figure 4-1 to a depth of .2m -.5m its impossible to keep flood waters out of residential Yenda given the northern catchment of Main Drain J will exceed the under main canal siphon at Dredge St. and open culverts under the railway at Myall Park Road, Twig Road and Pleasant Valley Road.

The recommendation dot point 3 then says

“Options to Improve the management of these floodwaters should be investigated; particularly the area around the Burley Griffin Way, and Griffith – Temora railway line crossings of the NBC.”

The Burley Griffin Way:

Approximately 50 metres west of the intersection of Burley Griffin Way and Whitton Stock Route there is a low laying section of the highway. I have confirmed this low laying section of Burley Griffin way by closely checking the AHD levels of the Burley Griffin Way on Google Earth Pro and my ute GPS navigation system, also closely looking at yellow to red colour shading crossing the Burley Griffin Way Figure A-2 contour map in the 2015 BMT Main Drain J & Mirrool Creek report

The Torrent Report Modelled 1% Figure 4-1 flood heights map on page 14 does not show the low laying section on Burley Griffin Way as clearly. In fact Location 9 is on the intersection of Burley Griffin way and Whitton Stock Route and misses the low spot by approximately 50 metres.

N.B. Lifting the Burley Griffin Way to the same height as Location 9, ie 133.65 AHD would significantly slow flood waters crossing Burley Griffin Way, protect the railway tracks and prevent 1% flooding in North Yenda and residual flood risk to residential Yenda.

Griffith – Temora railway line crossings of the NBC.”

Approximately 30 years ago Murrumbidgee Irrigation Ltd replaced an open canal and high grassy banks with 2 x 6ft pipes levelling the site to fill in the canal. Unfortunately, MI left some concrete structures in place and there was an accident with a small truck slamming into one of the concrete structures. So MI removed the concrete structures levelling the site even better. Recently, approximately 4 years ago MI installed 2 metre pipe levelling the site again. Over time with settling of soil the site has become quite low acting like a huge table drain for the Burley Griffin Way allowing floodwaters to flow rapidly towards Yenda. Historically the high grassy canal banks would have slowed if not stopped flood water streaming towards Yenda.

YPA believes the site needs a bank of dirt to be rebuilt across the table drains of Burley Griffin way and Cemetery Road to desperately slow the flow of water towards Yenda.

Wood Road MI bridge and MI irrigation outlets

The bridge over the Northern Branch canal and adjacent MI outlets at the end of Wood Road are very low and a potential site for flood water over topping them and entering the NBC flooding downstream similar to 2012 if not over topping the bridge and flowing down Wood Road towards Yenda.

The bridge and MI outlets need building up to the peak flood level indicated on page 14 Torrent Report same as Pomroy Road location 11 AHD 133.9metres.

CLOSING REMARKS

Thank you again to Council for the Torrent Report Update to Yenda mapping and this opportunity to submit our experiences and observations and we hope our input will assist Council in mitigating flood events affecting all of Yenda in the future.

Mr. Rossetto Secretary,

Yenda Progress Association Inc.

‘proudly serving Yenda and District since 1921’

Yenda Progress Association (2 April 2021)

The submission from the Yenda Progress Association (YPA) of 2 April 2021 raises several concerns, the first of which relates to the third recommendation in Chapter 6 of the Emergency Breaching Protocols (EBP) report (BMT, 2018). This recommendation was included because of potential low points in the banks of the Northern Branch Canal (NBC). However, the recent works by Murrumbidgee Irrigation (MI) to widen the NBC has resulted in changes to the NBC banks. The resultant bank crest levels have been surveyed and incorporated into the TUFLOW model, as per the third dot point of Chapter 2 in the Yenda Flood Mapping Update report (Torrent Consulting, 2021). As such, the recommendation within the EBP report has been satisfied.

The second concern relates to the modelled 1% AEP inundation in North Yenda and the ability for Yenda to remain flood-free under such conditions. The modelled 1% AEP flood depths for Yenda are provided in Figure D-2 of the Yenda Flood Mapping Update Flood Mapping Compendium, not in Figure 4-1 (as suggested by YPA) which shows flood impacts resulting from the implementation of the floodplain risk management measures. From Figure D-2 the 1% AEP flood depths are around 0.1-0.3 m (not the 0.2-0.5 m suggested by YPA). The TUFLOW model includes the structures on Main Drain J that enable flood waters to pass from North Yenda into Yenda and beyond. As such, this suggests that the drainage capacity is sufficient to convey the modelled flood flows from North Yenda through Yenda, without resulting in flood inundation within Yenda itself.

The TUFLOW model does not include the minor local cross-drainage structures at Myall Park Road or Twigg Road, as these are beyond the scale of mechanism that the model was developed to simulate, i.e., it is a mainstream regional flood model, not a local drainage study for Yenda. It is acknowledged that a small amount of flood waters would likely flow through these structures into Yenda during a 1% AEP regional flood event. However, this is expected to be relatively small in relation to the available drainage capacity within Yenda and is unlikely to result in significant flooding.

The third concern again relates to the third recommendation in Chapter 6 of the EBP report. Whilst options to improve the management of flood waters flowing north along the eastern side of the NBC have not specifically been investigated, the recent widening works by MI and subsequent survey of the NBC banks has served to address the original recommendation within the EBP report. As previously discussed, the NBC works have been included in the TUFLOW model and the simulated results do not indicate a compromising of Yenda's flood immunity at the 1% AEP event.

The fourth concern relates to inundation of Burley Griffin Way to the west of the Whitton Stock Route. As discussed previously, the modelled 1% AEP flood depths for Yenda are provided in Figure D-2 of the Yenda Flood Mapping Update Flood Mapping Compendium, not in Figure 4-1 (as suggested by YPA). The 1% AEP flood depth mapping clearly shows this low-lying section of the highway, consistent with that produced in the Flood Study. Also, lifting the Burley Griffin Way to a level of 133.65 m AHD would not result in the outcomes suggested by YPA. Whilst slowing of waters crossing the highway and railway might result from this, the available survey data indicates that increased flood waters would spill across the NBC and present an increased flood risk to Yenda.

The fifth concern relates to the Griffith – Temora railway line crossings of the NBC. It is not understood specifically what the concern is, so no comment can be provided in response. However, it does not appear to be related to the work of the Flood Mapping Update.

The sixth and final concern relates to the Wood Road crossing of the NBC. Localised low points within the NBC banks are a legitimate concern, because they do present the potential for flood waters

to spill into Yenda during a rare flood event such as the 1% AEP. The survey of the NBC channel banks identifies the Wood Road crossing as a localised low point. However, the survey data provides an elevation of this low point as being 133.89 m AHD, compared to a peak 1% AEP flood level of 133.83 m AHD within the floodplain to the east. As such, there is nothing within the available survey data to suggest a low point within the bank that locally compromises the flood protection afforded to Yenda. However, raising the road level at this location would provide a greater level of freeboard.

YENDA PROGRESS ASSOCIATION INC.

“proudly serving the needs of Yenda & District since 1921”

11th April 2021.

The general manager

Griffith City Council

1 Neville Place, Griffith NSW 2680

RE: FOR COUNCILLOR DISTRIBUTION

Dear Sir,

The Yenda Progress Association thanks Cr Cristine Stead for her question below and disagrees with the mayors assessment of the meeting.

4

BUSINESS ARISING

Business Arising –C105 Flood Mapping Update for Yenda

Councillor Christine Stead requested an update on the public consultation that was held on 18 March 2021 in Yenda. Mayor John Dal Broi stated the consultation was successful and commended the General Manager Brett Stonestee, Director Graham Gordon and Water & Wastewater Manager Durgananda Chaudhary on the presentation. The updated flood maps are on public exhibition and will be presented to Council with any submissions received.

How can the mayor say the public consultation meeting was successful?

- a) If numbers attending (less than 20) are an indication of success it was disappointing. Failure in Council advertising the meeting.
- b) If questions from the floor (5 people 25 mins) versus time spent listening to Council staff (1 ½ hours) it was filibustering at its best.
- c) If adhering to a request before the meeting for time for General Business to bring to Councils' attention several important road safety matters, including a semi-trailer roll over on Barracks Road, it was a failure in the Chair.
- d) If the subject matter 'The Torrent Report' showing North Yenda still flooding even after Emergency Canal Breaching protocol is enacted is any indication of Council's Flood planning ability it's a failure. The Torrent Report is an inditement of Council's failure to adhere to its own 2015 BMT Flood study recommendation d) Upgrade Flood Gates & levee raising & NSW Flood Plain Development Manual 1% AEP flood mitigation standards.

Mr. Rossetto secretary, Yenda Progress Association Inc.

Yenda Progress Association (11 April 2021)

The submission from the YPA of 11 April 2021 only includes one comment relating to flooding, which is item d). The comment highlights that North Yenda is still flooding, despite the adoption of the EBP, upgraded flood gates and raising of the NBC bank.

The remnant flooding in North Yenda is not considered a failure of Council (as the YPA has suggested) to adhere to the Flood Study recommendations or requirements of the NSW Floodplain Development Manual. The specific protection of North Yenda was not considered as part of the Flood Study or Floodplain Risk Management Study (FRMS), the focus of which was preventing flood waters breaching the NBC and entering the main community of Yenda.

The Flood Mapping Update for Yenda has identified that the floodplain risk management measures that have been implemented result in a reduction of peak flood levels at the 1% AEP event of around 0.2-0.4 m through North Yenda, with a reduction of around 0.1-0.2 m at the 0.5% AEP event. Whilst not flood-free, the community of North Yenda still benefits from the implemented floodplain risk management measures.

Whilst some of the flooding in North Yenda is a result of local catchment runoff, there is still a flood flow contribution from Mirrool Creek. The most readily identifiable way to prevent Mirrool Creek flood waters from entering North Yenda (or Yenda at the 0.5% AEP event) would be the construction of a 1 km long and 1.0-1.5 m high levee connecting the right bank of the NBC through to higher ground in Binya Forest. This is a future floodplain risk management option that could be considered by Council, but it was not a recommendation of the FRMS. It is important to note that any such mitigation option could potentially redirect increased flood waters across the NBC and into Yenda. Any potential future floodplain risk management options should of course be considered through the proper due process.

YENDA FLOOD VICTIMS' ASSOCIATION INCORPORATED

SUBMISSION TO GRIFFITH CITY COUNCIL

TORRENT REPORT 2/4/21

The General Manager
GRIFITH CITY COUNCIL
PO BOX 485 GRIFFITH NSW 2680

YENDA FLOODS 2012

Background:

Yenda Floods March 2012 caused the devastation of 450 homes, a dozen businesses, including a winery, a primary school, pre-school, police station, a church and hotel. The Yenda Police station residence was not renovated and has not been used since.

Terrel Winery closed and never re-opened.

The Financial cost to the Yenda Community was estimated to be approximately \$90 Million dollars. Council spent \$1Million dollars on cleaning up the town and a further \$350,000 on stage 1a & 1b town drainage system.

The emotional toll on families and marriages was immeasurable, with approximately 90 families being refused access to insurance funds through no fault of their own but a recent change to the way insurance companies defined overland flooding. (Et al 2010 Brisbane floods) a lot of families sold their homes and moved away. The Yenda State school saw a drop in numbers of approximately 40%.

The Yenda Flood Victims Association Inc. was formed in 2012 to lobby Council and State Government to rectify the problem causing Yenda to flood.

YFVA commissioned HydroStorm Consulting to investigate the likely cause of the Yenda flooding -The blocked EMR decommissioned flood gates.

The three main organisations; Griffith City Council, Murrumbidgee Irrigation Ltd, SES responsible for flood planning, flood mitigation and flood rescue all let the people of Yenda down badly.

-Griffith City Council by not being aware of the decommissioned status of the EMR flood gates and not acting with enough authority to mitigate flood damage to Yenda when Council was made aware 7 days in advance of the decommissioned status of the flood gates at the EMR.

-Murrumbidgee Irrigation Ltd by decommissioning the EMR flood gates and not replacing them and secondly, not notifying Griffith City Council about the decommissioning of the EMR flood gates.

-SES by evacuating Yenda people from their homes prematurely on Monday 5th March not allowing Yenda people to save personal possessions, photos, lift furniture etc. Flood waters did not enter Yenda residential area until early Tuesday morning approximately at 6.am. Yenda People could have had all day Monday to pack their personal possessions before evacuating Monday afternoon.

The Yenda March 2012 Flood was never a Level 1 Flood emergency requiring immediate evacuation. The breach was small and the height of flood waters were still contained by the eastern embankment of the NBC. The SES have admitted and apologised for hasty evacuation adding to Yenda people pain and disappointment. It was a level 3 flood, Level 2 at best taking 24 hours to enter Yenda from the first over topping of the NBC approximately . 10.30 am Monday 5th March 2012.

The NSW 2005 Flood Plain Development Manual provides for a 1% AEP flood risk standard to be applied to new floodplain management mitigation plans.

The 2021 Torrent Report Figure 4-1 1% modelled AEP very clearly shows floodwaters reaching North Yenda to a depth of .1m to .5m. This is after Main Canal Breaching protocol has been enacted. Council would be failing North Yenda and by extension Yenda residents if further measures are not undertaken to slow or stop this inundation from flood water.

Griffith Main Drain J and Mirrool Creek Floodplain Risk Management Study and Plan says on page 58 underneath Table 7-3

“ultimately the key indicator of performance of each option is in the reduction in flooding in Yenda as represented by the ‘flow through Yenda and Leaver Street flood depth in the Table above”

Column 4 Upgrade Gates & Levee is the only column that provides full protection 0 m² flow through Yenda and 0 metres depth of water in Leaver Street.

“The upgraded flood gate option (approximate duplication in flow capacity at the EMR flood relief structures) provides for almost a 1% AEP discharge capacity with a reduced flow through Yenda as shown in Table 7-3. The peak water level U/S of the EMR structure is just over the critical threshold value of 134.3M AHD. Under the greater flood magnitude of the 0.5% AEP event, this capacity would be insufficient to protect Yenda from significant inundation. A further increase of in structure capacity of 20M/sec – 30M/sec however would be sufficient to provide the higher immunity”.

1. Emergency Breaching Protocol

Is a failure waiting to happen and definitely a safety hazard to operators asked to breach the canal in the event of a 1% flood event or rarer and what excuse Council makes up for its failure.

We notice there are no excavator contractors signed up to the protocol document. Unless MI is prepared to use their own excavators Council could be in a situation where there are no available private excavators available for Council to hire.

Griffith City Council Main Canal Emergency Breaching protocol document page 1 entitled 'Background'

c) Emergency Breaching Protocol

Dot point 3 states

- **Major floods on Mirrool Creek at the EMR will result in flood waters flowing along the eastern side of the Northern Branch Canal towards Myall Park, which could present a residual flood risk to Yenda. Options to improve the management of these flood waters should be investigated, particularly the area around the Burley Griffin Way, and Griffith – Temora railway line crossing of the NBC.**

Please see attached page 13 Torrent Report

2. Burley Griffin Way

At the co-ordinates 34° 14'30.12"S 146°14'05.52"E there is a low spot at approximately 132metres AHD. Its not very wide approximately 70 metres but allows a lot of floodwater to cross the Burley Griffin Way. In fact so much flood water crossed the Burley Griffin way on the night of 5th March 2012 that it blew out the railway tracks in 2 places.

The Turflow flood mapping software used by the Torrents Report looking at peak flood heights has not allowed for the extra flood water flowing across the Burley Griffin Way at these coordinates because the software looks at peak flood heights not topography. Location 9 at AHD 133 is approximately 70 metres to the east of the co-ordinates and almost a metre higher. If Council is serious about mitigating flood waters entering Yenda via the Burley Griffin Way low laying section Council needs to apply for some funding to build up this 70 metre section of Burley Griffin Way.

3. Griffith – Temora railway line crossing of the NBC.

Historically there was an open irrigation canal crossing under the Burley Griffin Way, Railway tracks and Cemetery Road.

App. 30 years ago Murrumbidgee Irrigation installed 2 x 6ft pipes and filled in the open canal and cleared the high grassy banks. In 2017 MI installed another large 2 metre pipe and cleared the site even further. In time the site has settled and become a fast conduit for potential flood water rushing towards Yenda.

If Council is serious about mitigating flood waters entering Yenda via North Yenda Council needs to rebuild the high bank across the northern Burley Griffin Way table drain, railway graded vehicle access tracks and Cemetery Road table drains. Some building up of Cemetery Road may be required as well.

4. Wood Road bridge and MI outlets

This bridge is quite low and will need a load of gravel to prevent flood waters over topping it. Also there are some quite low MI irrigation outlets adjacent that need a bundy bank preventing flood waters entering the NBC at volume similar to 2012.

5. Upstream Levees

Upstream of the EMR there has been lots of levee construction potentially altering the speed and height of arriving flood waters. Councils need to continue communicating our concerns with upstream Councils. At one point a Rural Floodplain management committee was touted.

6. Emergency Canal Breaching protocol document

YFVA has received a complaint regarding Councils Emergency Canal Breaching protocol document not taking into consideration the affects of a breach washing out his property and causing significant damage to his farmland requiring extensive and expensive land forming taking up to two years to settle the soil and grow a successful rice crop again.

Council should consider the placement of some large boulders deflecting water away from his property and towards Mirrool Creek not because Council has to, but because it is 'the right thing to do'.

7. Main Canal bank erosion

If the Main Canal is breached during a 1% or rarer flood event and upwards of 60m² or 5400ML to potentially 120m² or 10400ML how does Council plan to limit the bank erosion and thereby control the escape of flood waters?

We predict massive bank erosion will occur and the majority of flood waters will escape here the same as happened in 2012 at Parisotto farm near his house.

Council clearly has a lot more work to do before Yenda all of Yenda enjoys the NSW Floodplain Development Manual 1% AEP flood mitigation standard.

Thank You.

Mr. Rossetto, President Yenda Flood Victims' Association Inc.



4 Flood Mitigation Impacts

The impacts of the flood mitigation works that have been implemented at Yenda can be discerned through comparison of the modelled results presented in the Flood Mapping Compendium with those of the Griffith Main Drain J and Mirrool Creek Flood Study and FRMS. However, for ease of interpretation a direct comparison of the 1% AEP and 0.5% AEP events is presented at selected locations in Table 4-1. Impact mapping at Yenda for these events is also provided in Figure 4-1 and Figure 4-2.

Overall, the impact of the flood mitigation works show a significant reduction in flooding at Yenda and the surrounding area. The exception is within the Mirrool Creek floodplain downstream of the Main Canal, where increased peak flood levels of 0.1-0.2 m are typical downstream to Drew Road. Between Drew Road and the Barren Box Storage and Welland this is reduced to 0.0-0.1 m.

Table 4-1 Modelled Impact of Yenda Flood Mitigation Works

ID	Location	1% AEP Level (m AHD)			0.5% AEP Level (m AHD)		
		Previous	Revised	Impact	Previous	Revised	Impact
1	Dredge St	130.76	Dry	Dry	130.87	130.60	-0.27
2	Henry St – Allen St	130.90	Dry	Dry	131.02	130.69	-0.33
3	Railway Pde – North St	130.98	Dry	Dry	131.11	130.90	-0.21
4	Henry St – Bingar St	131.00	Dry	Dry	131.13	130.79	-0.34
5	BG Way – Wood Rd	131.58	Dry	Dry	131.65	131.57	-0.08
6	Curran Rd	131.48	Dry	Dry	131.59	131.30	-0.29
7	BG Way – Wakley Rd	132.30	Dry	Dry	132.40	132.29	-0.11
8	Barracks Rd	131.71	Dry	Dry	131.78	Dry	Dry
9	BG Way – WSR Rd	133.65	133.46	-0.19	133.72	133.59	-0.13
10	WSR Rd – Barracks Rd	132.91	Dry	Dry	132.98	Dry	Dry
11	NBC Rd – Pomroy Rd	133.83	Dry	Dry	133.90	Dry	Dry
12	Halse Rd	134.48	134.19	-0.29	134.56	134.34	-0.22
13	WSR Rd – Mirrool Ck	131.91	132.05	+0.14	131.95	132.13	+0.18
14	Myall Park Rd N	129.99	Dry	Dry	130.03	129.92	-0.11
15	Myall Park Rd S	130.19	130.01	-0.18	130.27	130.12	-0.15
16	Colombana Rd	130.56	Dry	Dry	130.64	130.41	-0.23
17	Twigg Rd	131.18	Dry	Dry	131.22	131.07	-0.15
18	Simpson Rd	131.19	Dry	Dry	132.26	132.02	-0.24

Recommendations**6 Recommendations**

It is recommended that the Emergency Breaching Protocols and supporting decision support framework be implemented for the management of flood risk at Yenda. However, there are a few additional recommendations that could also be undertaken to further improve flood risk management of Mirrool Creek:

- the recent flood events of 2012 and 2016 have demonstrated that upstream floodplain waters breaching the Main Canal embankment between Burnt Hill and the EMR can compromise the ability to effectively manage the flood risk. The state of the right bank of the Mill Main Canal should be assessed and regular maintenance and repair work carried out to raise low spots and maintain the integrity of the embankment
- options for the improved management of local flood waters from Colirroobie runoff and floodplain flows around the south of Merribee Hill should be investigated. The objective of this investigation should be to identify a flood risk management option that both reduces the impact to irrigation supply operations and improves the reliability of Halse Road access for the deployment of emergency breaching excavators
- major floods on Mirrool Creek at the EMR will result in flood waters flowing along the eastern side of the Northern Branch Canal towards Myall Park, which could present a residual flood risk to Yenda. Options to improve the management of these flood waters should be investigated, particularly in the area around the Burley Griffin Way and Griffith – Temora Railway crossings of the NBC.



Introduction

side. When the capacity of these structures is exceeded then flood waters can spill over the Northern Branch Canal and proceed to the township of Yenda.

Flood waters spilling into Yenda from Mirrool Creek will build up behind the railway before overtopping and progressing into the Myall Park floodplain storage area. The Myall Park storage area is a natural topographic depression that collects runoff from the western slopes of the Cocoparra Range, in what would have historically been a terminal ephemeral wetland. However, the area is now drained by the irrigation infrastructure and is conveyed along Main Drain J and into Mirrool Creek upstream of Barren Box Storage and Wetland (BBSW).

Flooding within the Main Drain J catchment is essentially driven by local runoff from the land situated to the west of Yenda, between the Main Canal and Mirrool Creek. The runoff from the western Cocoparra and flood flows from Mirrool Creek via Yenda are contained within Myall Park and well regulated by the Main Canal and associated siphon structures.

Discharge across the Main Canal at the EMR is supplemented by runoff from the Little Mirrool Creek and Main Drain J catchments and discharges to BBSW. It takes some three days or so for the flood wave to travel from the EMR to BBSW.

1.3 Mirrool Creek Flood Warning System

The Mirrool Creek Flood Warning System was established concurrently with this study. It includes the installation of two telemetered gauges within the catchment:

- a combined rainfall and stream level gauge on Mirrool Creek at Barrellan (site 41000282)
- a stream level gauge on Mirrool Creek at the EMR (site 41000283).

The Flood Warning System is used by the Australian Bureau of Meteorology (BoM) to monitor the conditions in the Mirrool Creek catchment and to issue Flood Warnings, as required. Flood Warnings are specific to Yenda and will inform the community as to the expected flood conditions at the EMR. BoM uses a three-tiered classification scheme to define the expected flooding as minor, moderate or major. The classification at the EMR is presented in Table 1-1, where flood levels relate to the height above gauge zero (131.68 m AHD).

Table 1-1 Flood Warning Classification at the EMR

Flood Classification	Gauge Height (m)	Expected Response
Minor	0.9 (132.58 m AHD)	Potential operation of Dalton's Runner
Moderate	1.9 (133.58 m AHD)	Likely operation of EMR Flood Gates
Major	2.3 (133.98 m AHD)	Likely implementation of EMR Emergency Breaching Protocols

The Flood Warnings issued by BoM align with the recommendations presented within the Emergency Breaching Protocols and supporting decision support framework. However, the use of peak flow estimation techniques is also provided in Section 2.3. This enables an expected response in terms of flood management at the EMR to be planned for in advance of specific triggers being reached at the flood warning gauges.



Yenda Flood Victims Association

The submission from the Yenda Flood Victims Association (YFVA) raises several concerns, which are addressed below. The first concern is included within the background section of the submission, while the others are numbered one through seven.

The concern raised towards the end of the background section relates to the modelled 1% AEP inundation in North Yenda and the ability for Yenda to remain flood-free under such conditions. The modelled 1% AEP flood depths for Yenda are provided in Figure D-2 of the Yenda Flood Mapping Update Flood Mapping Compendium, not in Figure 4-1 (as suggested by YFVA) which shows flood impacts resulting from the implementation of the floodplain risk management measures. From Figure D-2 the 1% AEP flood depths are around 0.1-0.3 m (not the 0.2-0.5 m suggested by YFVA). The TUFLOW model includes the structures on Main Drain J that enable flood waters to pass from North Yenda into Yenda and beyond. As such, this suggests that the drainage capacity is sufficient to convey the modelled flood flows from North Yenda through Yenda, without resulting in flood inundation within Yenda itself.

The numbered concerns item 1 does not relate to the work that has been undertaken for the Flood Mapping Update and is a broader issue regarding the logistics of implementing the Emergency Breaching Protocols.

The numbered concerns item 2 relates to inundation of Burley Griffin Way to the west of the Whitton Stock Route. As discussed previously, the modelled 1% AEP flood depths for Yenda are provided in Figure D-2 of the Yenda Flood Mapping Update Flood Mapping Compendium, not in Figure 4-1 (as suggested by YFVA). It is an incorrect statement that the TUFLOW software is not based on topographic data. The 1% AEP flood depth mapping clearly shows this low-lying section of the highway, consistent with that produced in the Flood Study. Also, building up the Burley Griffin Way at this location would present an increased flood risk for Yenda, as the available survey data indicates that increased flood waters would spill across the NBC.

The numbered concerns item 3 relates to the Griffith – Temora railway line crossings of the NBC. It is not understood specifically what the concern is, so no comment can be provided in response. However, it does not appear to be related to the work of the Flood Mapping Update.

The numbered concerns item 4 relates to the Wood Road crossing of the NBC. Localised low points within the NBC banks are a legitimate concern, because they do present the potential for flood waters to spill into Yenda during a rare flood event such as the 1% AEP. The survey of the NBC channel banks identifies the Wood Road crossing as a localised low point. However, the survey data provides an elevation of this low point as being 133.89 m AHD, compared to a peak 1% AEP flood level of 133.83 m AHD within the floodplain to the east. As such, there is nothing within the available survey data to suggest a low point within the bank that locally compromises the flood protection afforded to Yenda. However, raising the road level at this location would provide a greater level of freeboard.

The numbered concerns item 5 does not relate to the work that has been undertaken for the Flood Mapping Update and is a broader issue regarding floodplain management within the upstream catchment.

The numbered concerns item 6 does not relate to the work that has been undertaken for the Flood Mapping Update and is a broader issue regarding the potential for localised impacts when enacting the Emergency Breaching Protocols.

The numbered concerns item 7 does not relate to the work that has been undertaken for the Flood Mapping Update and is a broader issue regarding the logistics of implementing the Emergency Breaching Protocols.

SUBMISSION

Flood Mapping Update for Yenda

2nd April 2021

The General Manager,
Griffith City Council
PO Box 485 GRIFFITH NSW 2680

Re: Burley Griffin Way, Griffith – Temora railway line crossings of NBC

Dear Councillors,

The Torrent Report p 14 Figure 4-1 Modelled 1% AEP Peak Flood Level Impact is disappointing for four reasons.

1. Council has not taken into consideration floodwaters by passing the EMR when it is at peak level and diverting towards the Whitton Stock Route in the Binya State Forest.

An excerpt from July 2014 Griffith Main Drain J & Mirrool creek Flood Study p43
"Flood flows from Binya Creek generally flow towards the EMR but there is also the potential for flood waters to be diverted towards the Whitton Stock Route in Binya State Forest (by passing the EMR) particularly when Mirrool Creek is in flood."

Following is a personal account as I have lived, worked and driven this part of Yenda for 43 years.

FYI I reported the following info to the NSW SES hydrologist immediately after the 2012 flood.

"Midnight of Monday 5th of March after spending the day at my farm 1495 Simpson Road Yenda, lifting furniture and moving machinery to higher ground, eg channel banks I decided to go for a drive to see where the floodwaters were up to.

When I crossed the railway line at Whitton Stock route there was a lot of water on the southern side of the railway line. I was attempting to drive south on the Whitton stock route adjacent to the Binya State Forest between the old Defender factory and the Terrel Winery when I had to stop because of the depth of flood waters over topping the bulbar on my Toyota Hilux 4wd ute. The bulbar stands 1.1m above the ground so allowing for a bow wave the flood water in that area would have been approximately 1 metre high coming out of

the Binya state forest traversing the Whitton stock route in a westerly direction. The road is 134m AHD at its lowest point, so that puts floodwaters at 135m AHD.

I decided to head into Yenda and report to the SES what I had seen.

I reversed out of Whitton stock route and tried to head towards Yenda on the Burley Griffin Way. I only went a short distance, maybe 50 metres as the flood waters appeared to be deeper on the Burley Griffin Way. This time the floodwaters were running quickly in a northerly direction across the Burley Griffin Way. Again I reversed, out of Burley Griffin Way and took Cemetery Road into Yenda. At that time of night, app. 12.30 am the railway tracks had not blown out. (There appears to be a low section of Burley Griffin Way, approximately 70 metres at 133 AHD. The remainder of Burley Griffin Way is higher at app. 135 AHD)

The following day, Tuesday 6th March the only thing I could see when I looked out from my farm at the corner of Simpson Road and Cemetery road to the west was the railway tracks sticking out of 2 rivers of water, one river of water on the Burley Griffin Way and the other river of water on Cemetery Road, flowing towards Yenda.

To the east of the NBC the railway tracks had blown out in 2 places, one approximately 50 metres in length near Toscan's house (previous owner) and the other place a bit further east was a 20 metre blow out".

I acknowledge how difficult it is for Councillors to understand the depths and flows of floodwater coming out of the Binya State Forest and traversing the Whitton Stock Route at Terrel Winery and then traversing the Burley Griffin Way at the Riverina Wineries tourist sign and blowing out the Griffith Temora railway line in 2 places on the night of 5th March 2012 without having seen it with their own eyes.

Upon further reading and investigation I offer the following discovery. (different words , same problem)

Page 26 entitled Recommendations of the EMR Emergency Breaching protocol document dot point three says.

"major floods on Mirrool Creek at the EMR will result in floodwaters flowing along the eastern side of the Northern Branch Canal towards Myall Park, which could present a residual flood risk to Yenda. Options to improve the management of these floodwaters should be investigated; particularly in the area around the Burley Griffin Way, and Griffith – Temora railway line crossings of the NBC."

1. When dot point 3 talks about the Burley Griffin Way, I believe it is referring to the low 70 metre section I saw flood waters traversing in a northerly direction at speed on the night of 5th March 2012.

2. When dot point 3 talks about the Griffith – Temora railway line NBC crossings, I believe it's referring to site where MI 30 years ago replaced an open NBC canal and high canal banks with 2 underground 6ft pipes and levelled the site to fill in the canal. In 2017 MI installed a 2 metre pipe levelling the site again. Unfortunately, with settling of the soil over time the site has become a huge Burley Griffin Way table drain directing flood water towards Yenda.

a) Burley Griffin Way

It wouldn't take much to survey the Burley Griffin Way with a view to lifting the 70 metres of low road surface to 135 AHD similar to the NBC eastern bank south of Burley Griffin Way. This would prevent future floodwaters gaining access to the deep Burley Griffin Way table drains and railway graded tracks channelling flood water into Yenda and also protecting the Griffith -Temora Railway line from blowing out again.

b) The Griffith Temora railway line and NBC.

It would not cost very much to rebuild a bank across the northern table drain of the Burley Griffin Way and both sides of Cemetery Road similar to the height of the old open NBC banks 30 years ago. This would stop the table drains turning into rivers of water heading towards Yenda.

2. a) because for an important document it is difficult to comprehend the differences the author is trying to portray. Its clarity of colours is very poor. Questions remain around green areas on the map – wet areas in 2012 which should be dry now but are colour grey in the scale.

b) Farms that were dry in 2012 are now going to be wet.

c) Flood water in 2012 that was shallow less than 0.3m is now 0.5m deep.

d) Farms and houses that were badly flooded by NBC overflowing its length are now dry. (If the NBC doesn't flood again) In summary not the easiest maps to understand.

3. the Torrents report is disturbing because it still has flood waters entering North Yenda and by leakage residential Yenda via open railway culverts at Pleasant Valley Road, Twigg Road and Myall Park Road and the MI drainage canal on Myall Park Road flood waters will enter Yenda residential area.

4. This means there is not enough capacity at the EMR. Council has under designed escape capacity of the escape structures. Due to political expediency.

EMR Flood Gate Upgrade

The BMT WBM option d) written on page 57 entitled 7.3.4. EMR Flood Gate Upgrade of its 2015 Griffith Main Drain J and Mirrool Creek Floodplain and Risk Management Study.

The upgraded flood gate option (approximate duplication in flow capacity at the EMR flood relief structures) provides for an almost 1% AEP discharge capacity with a reduced flow through Yenda as shown in Table 7-3 The peak water level U/S of EMR structure is just over the critical threshold value of 134.3m AHD

Conclusion

- a) The Torrent Report is an indictment of Council's failure to design flood mitigation works to the 2005 NSW Flood development Manual 1%AEP standard for all of Yenda.
- b) Council has missed a perfect opportunity to renew the 100 year old siphon. In 2011 it was pumped dry and deemed to have concrete cancer. Following the 2012 floods the siphon has not been checked for integrity. It could begin to fail at any time. Does MI have a contingency plan if it does fail apart from blocking both ends of it with dirt to allow irrigation to continue. Again there will be a situation where a decommissioned structure is deemed unsafe and blocked with dirt not allowing flood waters across the Main Canal.
- c) It would be prudent of Council to begin planning for its replacement. Council may say it is Murrumbidgee Irrigations' property but it is Councils responsibility to ensure effective flood planning and mitigation is carried out.

Yours Faithfully

Mr. Rossetto

Local farmer

As flood flows are attenuated through the Barellan floodplain the flood peak is typically reduced and occurs a day later than the flows entering the floodplain.

Flood flows around the north of Merribee Hill proceed to the East Mirrool Regulator along the alignment of Mirrool Creek. Flows around the south of Merribee Hill are impeded by the Main Canal and are pushed north to the EMR. As flood waters build up behind the canal there is the risk of local breaching, as occurred during the March 2012 flood event.

Flood waters arriving at the EMR from the Barellan floodplain are further supplemented by runoff from the Binya Creek catchment. The size of the broader Binya Creek catchment is actually almost twice that of Mirrool Creek. It therefore has the potential to generate much more substantial flood flows than those of Mirrool Creek. However, there is an extensive flat, sandy area to the north of Barellan in which catchment runoff is infiltrated into the soil.

The relatively large catchments of Narriah Creek to the north and Sandy Creek to the east generate significant flood overland flow paths. These then soak away when traversing the sandy infiltration zone. This was observed during the March 2012 flood event and is evident within the associated satellite imagery. Therefore, runoff from the Binya Creek catchment is predominantly driven by local runoff from the southern Cocoparra Range. Binya Creek runoff would typically reach the EMR within a day of the rainfall.

Flood flows from Mirrool Creek will reach the Main Canal at the East Mirrool Regulator. Flood flows around the south of Merribee Hill will spread out behind the Main Canal in the vicinity of Burnt Hill, where they are further attenuated. The flood waters will then progress in a northerly direction towards the East Mirrool Regulator. This interface between the flood wave and the Main Canal presents the possibility of flow transfer across the canal prior to reaching the EMR. There is a siphon structure that feeds the top end of Little Mirrool Creek but this is relatively small. Localised breaching of the canal may also occur such as at Briens Road and Parizotto's during the March 2012 event. Flood flows from Binya Creek will generally be conveyed towards the EMR but there is also the potential for flood waters to be diverted towards the Whitton Stock Route in Binya Forest (bypassing the EMR), particularly when Mirrool Creek is in flood.

Flood waters arrive at the EMR firstly from Binya Creek, followed by runoff from the Colinroobie area and finally from Mirrool Creek, as the flood level begins to rise behind the Main Canal. Flood waters are conveyed to the downstream Mirrool Creek floodplain through the siphon structures and the operation of flood gates to allow flood flows into the canal and then out again through the downstream side. When the capacity of these structures is exceeded then flood waters can spill over the Northern Branch Canal and proceed to the township of Yenda.

Flood waters spilling into Yenda from Mirrool Creek will build up behind the railway before overtopping and progressing into the Myall Park floodplain storage area. The Myall Park storage area is a natural topographic depression that collects runoff from the western slopes of the Cocoparra Range, in what would have historically been a terminal ephemeral wetland. However, the area is now drained by the irrigation infrastructure and is conveyed along Main Drain J and into Mirrool Creek upstream of Barren Box Swamp.

Flooding within the Main Drain J catchment is essentially driven by local runoff from the land situated to west of Yenda, between the Main Canal and Mirrool Creek. The runoff from the western

6 Recommendations

It is recommended that the Emergency Breaching Protocols and supporting decision support framework be implemented for the management of flood risk at Yenda. However, there are a few additional recommendations that could also be undertaken to further improve flood risk management of Mirrool Creek:

- the recent flood events of 2012 and 2016 have demonstrated that upstream floodplain waters breaching the Main Canal embankment between Burnt Hill and the EMR can compromise the ability to effectively manage the flood risk. The state of the right bank of the MI Main Canal should be assessed and regular maintenance and repair work carried out to raise low spots and maintain the integrity of the embankment
- options for the improved management of local flood waters from Colimroobie runoff and floodplain flows around the south of Meribee Hill should be investigated. The objective of this investigation should be to identify a flood risk management option that both reduces the impact to irrigation supply operations and improves the reliability of Halse Road access for the deployment of emergency breaching excavators
- • major floods on Mirrool Creek at the EMR will result in flood waters flowing along the eastern side of the Northern Branch Canal towards Myall Park, which could present a residual flood risk to Yenda. Options to improve the management of these flood waters should be investigated, particularly in the area around the Burley Griffin Way and Griffith – Temora Railway crossings of the NBC.

Potential Floodplain Management Measures

- Gate arrangements – refurbishment requires work on both flood escape structures, including gate modifications to provide the function of transferring Mirrool Creek floodwaters across the Canal and not close under headwater pressure from the upstream side.
- Siphon operation – part of the function of the existing northern bank structure is to provide maintenance flows to scour the siphons and remove siltation that may impact on siphon capacity. This function will need to be retained in any flood gate refurbishment.

7.3.4 EMR Flood Gate Upgrade

It is not the intention of the current study to determine the preferred configuration for providing the recommended capacity upgrades to the EMR flood relief structures. The solution involves major engineering design with potentially a number of design solutions. For example, this may incorporate a major upgrade to the existing structure through expansion of current flood gates, or alternative solutions such as siphoning Main Canal flows underneath the Mirrool Creek floodplain (similar to the Lawson Siphon at Deniliquin).

Various upgrade options to the existing flood relief structures were simulated using the existing flood models. Iterations were undertaken gradually increasing design capacity of the flood relief structures.

Some key indicators were identified to assess the relative performance of the upgrades options:

- Peak discharge through the EMR flood relief structures – this considered the combined discharge of the siphons and existing or upgraded gate structures.
- Peak water level U/S of the EMR flood relief structures – a critical level of approximately ~134.3m AHD has been identified as the initiation of significant overtopping of the NBC.
- Peak flow through Yenda – this is obviously the key indicator of effective performance of the management option
- Yenda flood depth – a reference location in Leaver Street, Yenda, was selected representing a location potentially subject to significant inundation.
- Myall Park flows – these represent combined flows moving through to Myall Park via Yenda and North Yenda.

The relative performance of a combination of upgrades to the EMR flood relief structures and a NBC levee is summarised in Table 7-3. The options represent:

- a) Reinstatement of the decommissioned flood gates - this option provides for no major augmentation but a return to full function of the existing configuration.
- b) Upgrade of the flood gates – this option provides for an approximate duplication of the capacity of the existing flood gates.
- c) Reinstatement of the decommissioned flood gates plus construction of a NBC levee.
- d) Upgrade of the flood gate plus construction of a NBC levee – as per above in provision of approximate duplication of existing flood gate capacity.

Results are provided in Table 7-3 for the 1% AEP and 0.5% AEP design flood events. Whilst the 1% AEP event would typically be considered an appropriate design flood standard for flood

best option.

mitigation options, the 0.5% AEP is more representative of the conditions experienced in the March 2012 flood event.

Table 7-3 Peak Flow and Water Level for Yenda Mitigation Works

Reference Location	Reinstate Flood Gates	Upgrade Flood Gates	Reinstate Gates & Levee	Upgrade Gates & Levee
1% AEP Event				
Flow through EMR Flood Structures (m ³ /s)	84	114	92	114
Peak Level U/S Flood Structure (m AHD)	134.43	134.32	134.51	134.32
Flow through Yenda (m ³ /s)	32	7	0	0
Leaver Street Yenda Flood Depth (m)	0.6	0.5	0.1	0
Myall Park Flow (m ³ /s)	30	26	58	38
0.5% AEP Event				
Flow through EMR Flood Structures (m ³ /s)	92	132	99	135
Peak Level U/S Flood Structure (m AHD)	134.49	134.43	134.64	134.45
Flow through Yenda (m ³ /s)	60	24	1	1
Leaver Street Yenda Flood Depth (m)	0.7	0.6	0.3	0.1
Myall Park Flow (m ³ /s)	44	41	103	74

NB-

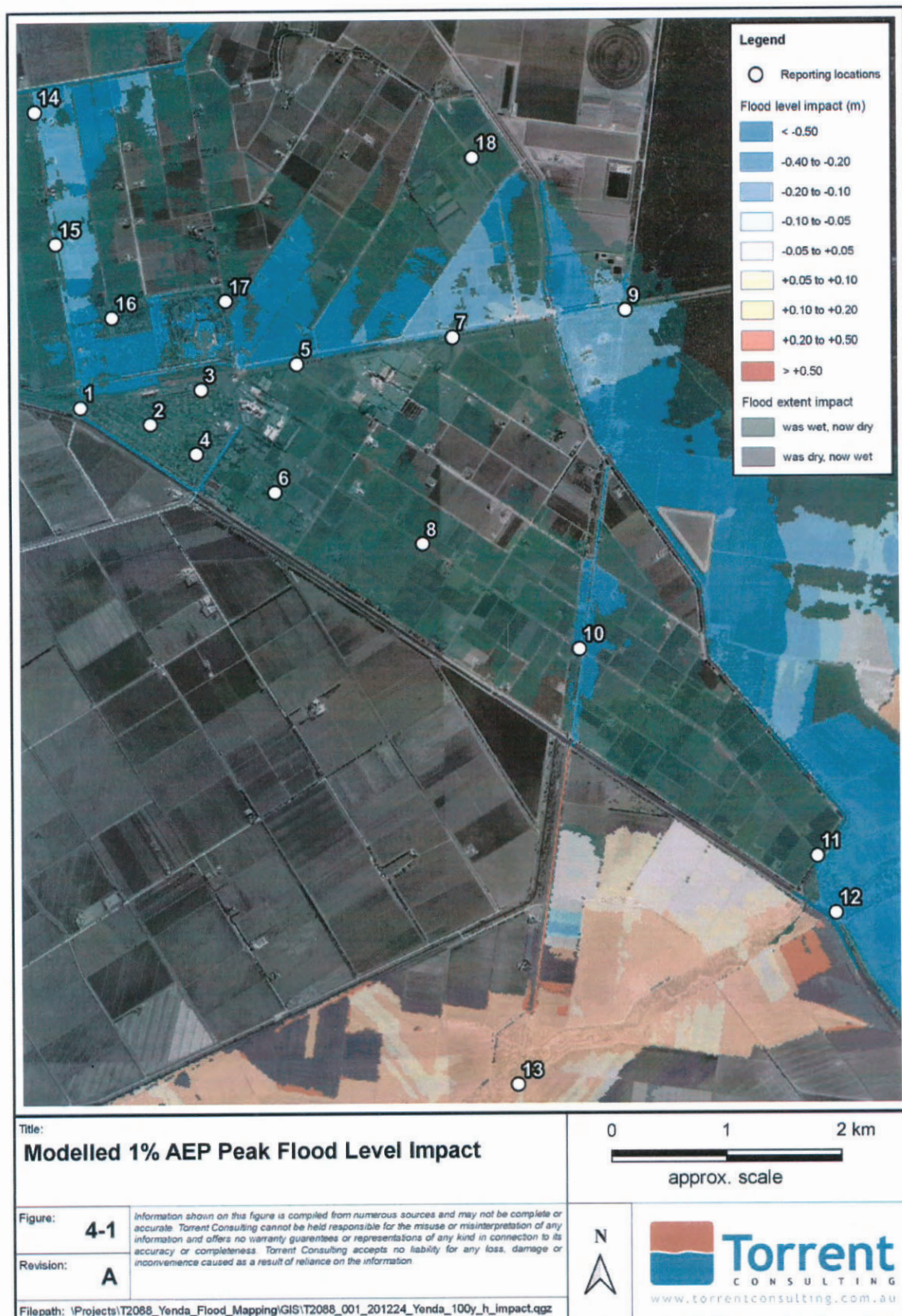
Ultimately the key indicator of performance of each option is in the reduction in flooding in Yenda as represented by the "Flow through Yenda" and "Leaver Street flood depth" in the above table.

Although increasing the flood protection to Yenda, the reinstatement of the flood gates does not provide sufficient capacity to manage events of the order of the 1% AEP. Significant discharges of the order of 30m³/s and 60m³/s for the 1% AEP and 0.5% AEP events respectively would spill through to Yenda providing for significant inundation in the township, similar to conditions experienced in March 2012.

In conjunction with a NBC levee, reinstatement of the flood gates would provide suitable flood protection to Yenda. However, this protection is at the detriment to North Yenda properties in that the flow exceeding the EMR flood gate capacity is pushed north around the levee to North Yenda and through to Myall Park as indicated by the increased flows in the table.

The upgraded flood gate option (approximate duplication in flow capacity at the EMR flood relief structures) provides for almost a 1% AEP discharge capacity with a reduced flow through Yenda as shown in Table 7-3. The peak water level U/S of the EMR structure is just over the critical threshold value of 134.3m AHD. Under the greater flood magnitude of the 0.5% AEP event, this capacity would be insufficient to protect Yenda from significant inundation. A further increase in structure capacity of 20-30m³/s however would appear sufficient to provide the higher flood immunity.

The combination of the flood gate upgrades and NBC levee effectively provide a 0.5% AEP flood immunity standard to Yenda. There is some increase flows through North Yenda to Myall Park as the levee pushes to the north the flow that would have previously inundated Yenda township.



Mr. Rossetto

The submission from Mr. Rossetto raises several concerns, which are addressed below. These are generally arranged within numbered items one through four, with additional points a), b) and c) within the concluding remarks.

The numbered concerns item 1 relates to flood flows from Mirrool Creek and local catchment runoff that flow in a northerly direction parallel to the NBC and then overtop Burley Griffin Way and the railway. The observation of this flood behaviour during the 2012 event is consistent with the TUFLOW modelling that was undertaken by BMT for the development of the Flood Study, Floodplain Risk Management Study and Emergency Breaching Protocols. That same TUFLOW modelling has been updated for the undertaking of this flood mapping update. The 1% AEP flood depth mapping (refer Figure D-2 of the Mapping Compendium) clearly shows this low-lying section of the highway, consistent with that produced in the Flood Study. Also, building up the Burley Griffin Way at this location would present an increased flood risk for Yenda, as the available survey data indicates that increased flood waters would spill across the NBC.

The numbered concerns item 2 relates to the interpretation of flood impact mapping presented within the Flood Mapping Update report, i.e. Figure 4-1. Flood impact mapping is provided to demonstrate the difference in the mapped flood conditions between the original Flood Study / FRMS and those of the Flood Mapping Update. It is acknowledged that the flood impact mapping might be difficult to interpret for people not used to working with such maps. However, this is the format typically adopted within the floodplain risk management industry for presenting such assessments.

The results being mapped are an impact (i.e. change or difference) between two scenarios (the original and updated mapping, the latter of which includes the implemented NBC and EMR flood mitigation measures) and do not show absolute flood depths, as is being misinterpreted. Orange-red colours show areas in which the mapped flood depths are increased from the originally adopted maps and blue colours show areas in which the mapped flood depths have decreased. Changes in flood extent are mapped as purple or green for increased inundation and reduced inundation, respectively.

Figure 4-1 and Figure 4-2 of the Flood Mapping Update show extensive areas of green throughout Yenda and North Yenda where the implemented flood mitigation measures have now protected these areas from flooding. There is still a flood flow path around the east of Yenda and through North Yenda but the flood depths are significantly reduced, typically by around 0.1 m to 0.3 m. Conversely, the flood mitigation measures (that provide an increased flood flow capacity across the Main Canal) result in increased flood depths in the Mirrool Creek floodplain downstream of the Main Canal, by around 0.1 m to 0.2 m. These impacts are described in the Flood Mapping Update report, including the tabulation of flood levels in Table 4-1, which together should enable correct interpretation. Mr. Rossetto has incorrectly interpreted areas of decreased flooding as being areas of increased flooding by comparing a map of reductions in flood depth to one showing absolute flood depths.

The numbered concerns items 3 and 4 relate to the residual flood risk of Yenda and North Yenda following the implementation of the flood mitigation works. The Flood Mapping Update shows that the 1% AEP flood is not inundating Yenda with the reinstatement of the flood gates at the EMR and the operation of the Emergency Breaching Protocols, which was the expected outcome of the recommendation for these works in the Floodplain Risk Management Study. As such, the Flood Mapping Update is consistent with the FRMS and the EBP.

The specific protection of North Yenda was not considered as part of the Flood Study or Floodplain Risk Management Study, the focus of which was preventing flood waters breaching the NBC and entering the main community of Yenda. However, as demonstrated within the updated flood mapping and the flood impact mapping, North Yenda has also inherently benefitted from the implementation of the flood mitigation measures recommended in the FRMS.

The point a) of the concluding remarks is incorrect, as the Flood Mapping Update supports the outcome that the implementation of the flood mitigation measures recommended in the FRMS helps protect Yenda from the 1% AEP flood inundation. As discussed previously, the specific protection of North Yenda was not considered as part of the Flood Study or Floodplain Risk Management Study, but it has also inherently benefitted from the implementation of the flood mitigation measures recommended in the FRMS.

The points b) and c) of the concluding remarks do not relate to the work that has been undertaken for the Flood Mapping Update and is a broader issue regarding the ongoing maintenance strategy for Murrumbidgee Irrigation assets.