

Department of Planning and Environment

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# Riverstone Town Centre

Flood Planning Advice Report

David Gainsford (Chair)

Juliet Grant

Prof Richard Mackay, AM

3 May 2023



# Acknowledgement of Country

The Department of Planning and Environment acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

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Riverstone Town Centre

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# Contents

- Defined terms..... 4**
- 1 Introduction..... 5**
  - 1.1 Advice request..... 5
  - 1.2 Material considered by the panel..... 6
  - 1.3 The Panel’s meetings..... 6
- 2 Planning Proposal ..... 6**
  - 2.1 Site and locality..... 6
  - 2.2 Background..... 8
  - 2.3 Planning proposal..... 8
- 3 The Panel’s consideration ..... 11**
  - 3.1 Key Issues ..... 11
- 4 Panel Advice..... 19**
- Appendix A – Material Considered by the Panel ..... 21**

# Defined terms

Term	Definition
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
BLEP	Blacktown Local Environment Plan 2015
Council	Blacktown City Council
Department	Department of Planning and Environment
FEM	Hawkesbury-Nepean Valley Flood Evacuation Model Report, July 2022
Flood Inquiry	NSW Flood Inquiry (July 2022)
INSW	Infrastructure NSW
m	Metre
NWGA	North West Growth Area
Panel	Flood Advisory Panel
PLUS	Department's Planning and Land Use Strategy division
PLUS Request	The request for advice from PLUS to the Panel, dated 10 January 2023 – see Section 1.1.
Planning Proposal	The Riverstone Town Centre Planning Proposal – PP-2020-3064
PMF	Probable Maximum Flood
RTC	Riverstone Town Centre
SES	NSW State Emergency Service
Site	The area of the Riverstone Town Centre Planning Proposal (as shown outlined in green in Figure 1)
TAG	Flood Technical Advisory Group
TAR	Flood Technical Advisory Report provided by the TAG
TfNSW	Transport for NSW

# 1 Introduction

1. The Department of Planning and Environment (**Department**) has established Flood Advisory Panels (**Panel**) to provide advice regarding the flood risk associated with certain 'high risk' planning proposals and other planning-related matters, in light of the recommendations of the NSW Flood Inquiry 2022 (**Flood Inquiry**). The Panel review process for these matters is intended as an interim measure pending the establishment of a NSW Reconstruction Authority, in accordance with the Flood Inquiry recommendations.
2. A Technical Advisory Group (**TAG**) was also established by the Department to deliver expert technical advice to Panels in accordance with the TAG terms of reference (dated 12 December 2022) and at the direction of Panels. The advice of the TAG is not binding on the Panels nor on the Department's Planning and Land Use Strategy (**PLUS**) division, which remains the delegated decision maker for the planning proposals referred to the Panels.
3. On 3 February 2022, Blacktown City Council (**Council**) lodged the post-exhibition Planning Proposal, PP-2020-3064 (**Planning Proposal**), to the Department seeking finalisation. The Planning Proposal seeks to amend Blacktown Local Environment Plan 2015 (**BLEP**) to progress a proposed rezoning of the Riverstone Town Centre (**RTC**) and implement the strategies and recommendations contained within the Riverstone Town Centre Masterplan. For the purpose of this Planning Proposal, Council are the proponent.
4. On 10 January 2023 the Panel received a request for advice from PLUS (**PLUS Request**) in relation to the Planning Proposal, which is detailed in Section 1.1 below.
5. On 21 March 2023 PLUS provided the revised Planning Proposal boundary (as indicated in Figure 1 and described at Section 2). The TAG and Panel advice provided relates to this revised layout.
6. The Department's Deputy Secretary David Gainsford (Chair), and independent members Juliet Grant and Prof Richard Mackay, AM were appointed to constitute the Panel with respect to this request.

## 1.1 Advice request

7. The PLUS Request to the Panel is to provide advice and recommendations on how to proceed with the Planning Proposal, considering the flood and evacuation matters, with possible options being:
  - a. Proceed to finalisation with the proposal in its current format.
  - b. Proceed to finalisation, under certain circumstances or flood-related conditions to be suggested by the Panel.
  - c. Refuse the Planning Proposal.
8. In addition, PLUS has requested the Panel consider the following matters specifically in forming their recommendations on how to proceed with the Planning Proposal:
  - a. Adequacy of the regional road network for evacuation purposes, in particular Garfield Road and its intersection with Riverstone Parade.
  - b. Concerns of the Department's then Environment Energy and Science group (now Environment and Heritage Group) and the NSW State Emergency Service (**SES**) regarding the flood impact assessment, flood affectation evacuation capacity.
  - c. The potential timing of funding and delivery of the necessary regional road upgrades.

## 1.2 Material considered by the panel

9. In this review, the Panel considered a range of material (**Material**) detailed in Appendix A.
10. The Panel requested the TAG provide technical advice on specific flood-related risks of the Planning Proposal, having regard to the Flood Inquiry and its recommendations as accepted by government (either absolutely or in principle). The TAG was requested to advise whether the Planning Proposal adopts a tolerable, risk-based flood planning level considering the documentation as listed in Appendix A.
11. The TAG's advice is summarised in the Technical Advice Report (**TAR**) dated 5 April 2023. The TAG advice is a compilation from the SES, Infrastructure NSW (**INSW**), Transport for NSW (**TfNSW**) and several independent experts.

## 1.3 The Panel's meetings

12. As part of its advice, the Panel met with various stakeholders as set out in **Error! Reference source not found..**

Table 2 – Panel's Meetings

Meeting	Date
PLUS	14 February 2023
Council	14 February 2023
Site Inspections	1 and 4 February 2023

# 2 Planning Proposal

## 2.1 Site and locality

13. The extent of the RTC proposal currently under consideration by the Department can be seen outlined in green in Figure 1 (the **Site**). The extent of the Planning Proposal shown in Figure 1 is approximately 19 hectares, adjacent to Riverstone train station to the west and Garfield Road East, Piccadilly Street, and King Street. The Site is approximately 10 kilometres from the Blacktown central business district.
14. RTC contains a mix of residential land (R2 – Low Density Residential), businesses (B2 – General Commercial Zone), and public spaces (RE1 – Public Recreation). There are several landholders across the Site, with a large section of commercial centre owned by Council.
15. The current height restriction for buildings across the Site in the BLEP is 9 metres (m), excluding areas zoned RE1 (Public Recreation).
16. The existing area comprises a small-town centre and high street along Riverstone Parade and Garfield Road. The surrounding residential development nearer Piccadilly Street and King Street is largely characterised by low density single dwelling housing.
17. Eastern Creek, which forms part of the Hawkesbury-Nepean Catchment, is situated approximately 500 m to the west of RTC.





Figure 1. Riverstone Town Centre Planning Proposal Boundary (PLUS – March 2023)

## 2.2 Background

18. Table 3 below provides a brief history of the Planning Proposal to date.

Table 3. Timeline of Riverstone Town Centre Planning Proposal

Date	Proposal Stage	Comment
Early-2018	Planning Proposal Submitted	The original planning proposal for RTC was submitted to PLUS for consideration in early-2018 following Council endorsement on 28 February 2018. The original proposal included additional areas of Design Excellence controls between Church Street and King Street and proposed approximately 4000 dwellings
6 August 2018	Gateway Determination Issued	Primarily required Council to prepare a flood study to ensure the suitability of the proposed zoning in relation to section 9.1 Direction 4.3 Flood Prone Land
August 2019	Revised Planning Proposal Submitted	Revised planning proposal was re-submitted responding to gateway determination, including the provision of a flood study
13 December 2019	Gateway Alteration Issued	Primarily required the removal of land south of Garfield Road from the planning proposal due to unresolved land reservations for Garfield Road and possible related land acquisitions
15 January – 21 February 2020	Exhibition	Exhibited proposal is reduced to the land between Church Street, Garfield Road, Riverstone Parade, and Piccadilly Street, excluding Mill Street Park and small lots adjacent to Mill Street and Pitt Street. The dwelling yield was subsequently reduced to between 3200-3565 dwellings (depending on the uptake of development incentive provisions)
3 November 2021	Council – Post Exhibition	Open space on the corner of Riverstone Parade and Mill Street retained due to flood affectation. The dwelling yield was subsequently reduced to between 2945-3310 dwellings (depending on the uptake of development incentive provisions). See red outline in Figure 1
Current	Department – Post Exhibition	Council amended the proposal boundary in response to stakeholder and agency concerns. Northern street blocks between Mill and Church Street are removed from the planning proposal. See the green outline in Figure 1

## 2.3 Planning proposal

19. The Planning Proposal is seeking to amend the BLEP as follows:
- Up zone the R2 (Low Density Residential) to R4 High Density Residential and B4 Mixed Use, see Figures 2 and 3;
  - Increase the building heights in all areas, except areas zoned RE1 (Public Recreation). A height limit of 32 m is proposed for land southwest of George Street, while all remaining land is proposed to be 20 m high, see Figure 4. Additional incentive provisions for design excellence could increase the height limit to 50 m in the B2 zone adjacent to the railway station along Riverstone Parade, see Figure 5;
  - Change the Lot size map to align with the proposed zoning changes; and
  - Identify land to be acquired by Council for community use.

The Planning Proposal could yield approximately 2640 dwellings.



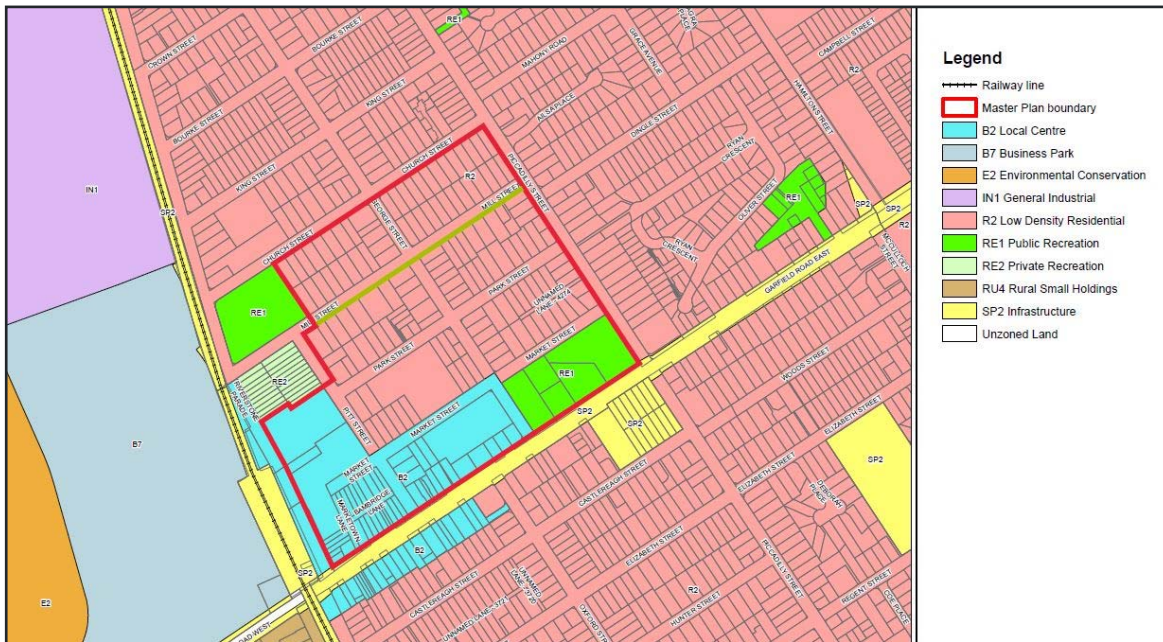


Figure 2. Current zoning within proposal area

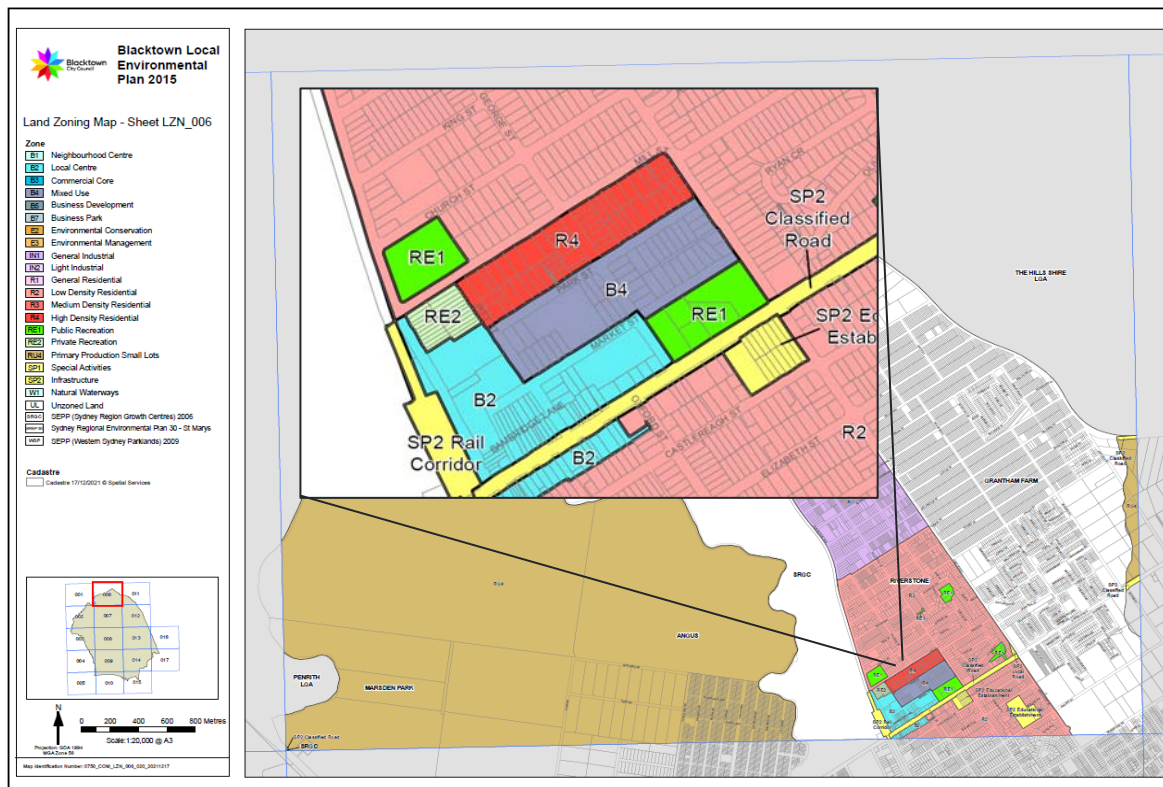
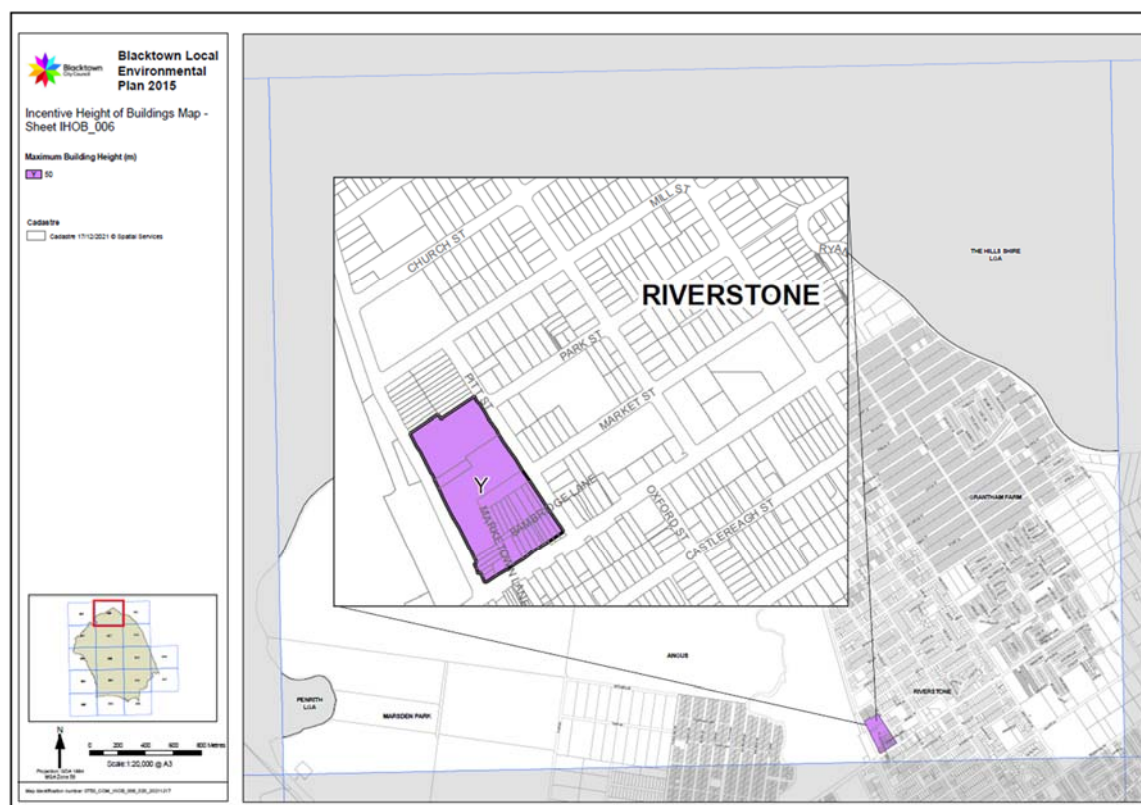
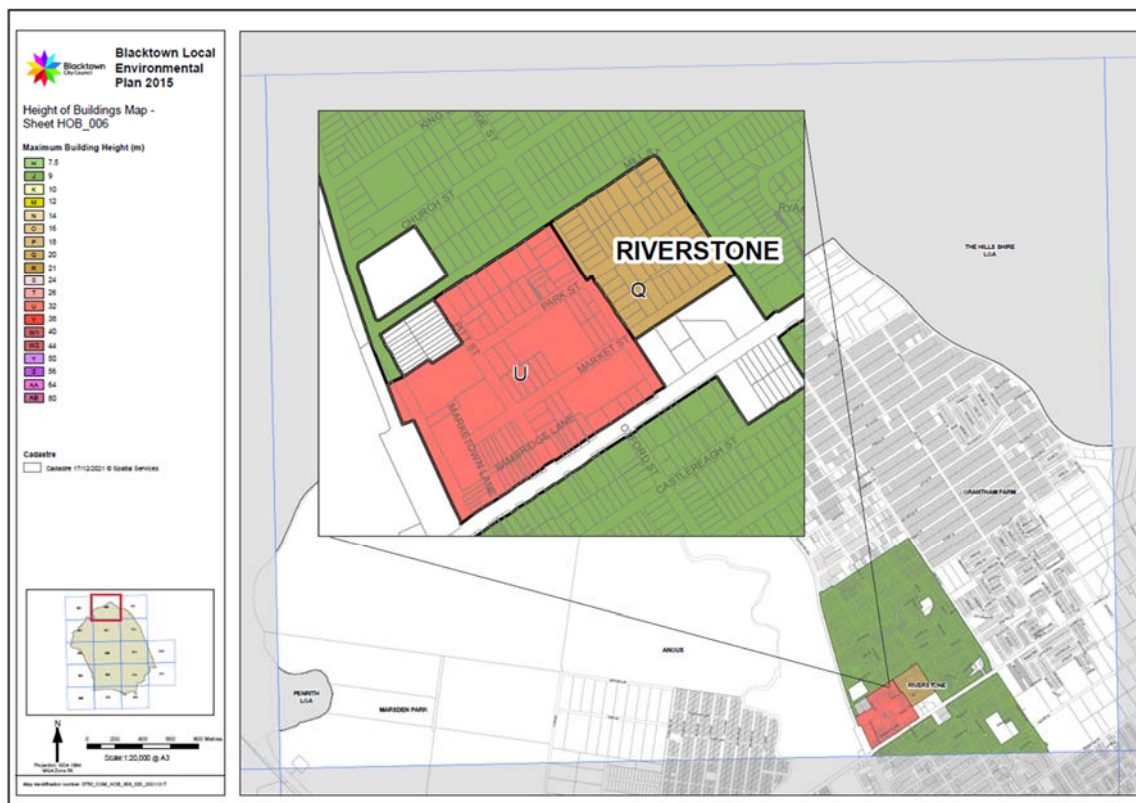


Figure 3. Proposed zoning within proposal area



# 3 The Panel's consideration

## 3.1 Key Issues

20. The following section provides a summary of the key issues identified and considered by the Panel in response to the PLUS request.

### 3.1.1 Flood Modelling

#### Council reports and comments

21. As part of the Planning Proposal, Council commissioned the following documents regarding flood risk:
- Riverstone Town Centre Flood Impact Assessment* (prepared by Cardno, dated 13 September 2021) (**Flood Impact Assessment**).
  - Riverstone Town Centre Hazard Mapping* (prepared by CSS, dated November 2018) (**RTC Hazard Mapping**).
22. The Flood Impact Assessment and RTC Hazard Mapping provide the following modelling of a range of flood events and their impacts regarding existing conditions:
- 5% Annual Exceedance Probability (AEP):**  
There would be some minor inundation of low-lying areas through the centre of the Site, however, “*most of the area would be safe for buildings and people*” (RTC Hazard Mapping, p2).  
**1% AEP:**  
Backwater flooding from Eastern Creek and the Hawkesbury River becomes more influential. Areas adjoining the railway line to the southwest of the Site would be inundated to levels unsafe for people and vehicles. Buildings within this area would need to be built to withstand floodwater forces (RTC Hazard Mapping, p2). Flood levels would be expected to peak at Windsor bridge at 17.3 m Australian height datum (**AHD**) (Flood Impact Assessment, p15).
  - 0.2% AEP:**  
The area adjoining the railway would be exposed to the highest risk level (H6) with buildings in the area would potentially fail (RTC Hazard Mapping, p2). Flood levels would be expected to peak at Windsor bridge at 20.2 m AHD (Flood Impact Assessment, p15).
  - Probable Maximum Flood (PMF):**  
Backwater flooding from the Hawkesbury River dominates leading to most of RTC being inundated and exposed to the highest risk level (H6), considered unsafe for people or vehicles, all buildings vulnerable (RTC Hazard Mapping, p2). Flood levels would be expected to peak at Windsor bridge at 26.4 m AHD (Flood Impact Assessment, p15).
- It is important to note that the Flood Impact Assessment was undertaken in relation to the original extent of the Planning Proposal as submitted early 2018 (see Table 3).
23. The Flood Impact Assessment also includes modelling of fill in certain locations to the 1% AEP. An appendix in the report includes mapping for flood scenarios with assumed fill for building pads on flood affected lots within the RTC area of 17.3 m AHD, which is equivalent to the 1% AEP Hawkesbury-Nepean flood level.



24. The Flood Impact Assessment models the displacement of floodwaters onto adjacent areas arising from the proposed balanced cut and fill approach. The displacement of Eastern Creek floodwaters during a 1% AEP event is summarised as:
- a. Areas adjacent to the Site will generally experience increases in floodwaters of less than 0.01 m.
  - b. Peak flood levels on Market Street will decrease by approximately 0.3 m.
  - c. Peak flood levels will increase by up to 0.05 m along Park Street, Pitt Street, and at Riverstone Police Station.
25. In their meeting with the Panel on 14 February 2023, Council officers noted the following:
- a. The Planning Proposal for RTC has addressed the 1% AEP flood planning level, as currently required by Council's flood planning policies.
  - b. Any change from the 1% AEP flood planning level as a standard design practice should be led by the State Government and applied consistently across the state.
26. Council's response dated 27 March 2023 noted any change to the long-established flood planning level of 1% AEP plus freeboard will need to be very clearly and carefully communicated to the broader community.

### PLUS Comments

27. In its meeting with the Panel on 14 February 2023, PLUS noted:
- a. Existing flood levels, including the PMF flood level, may change should updated modelling be undertaken that considers climate change. This would likely increase the number of dwellings needing to evacuate the precinct.
  - b. Existing flood planning levels may also be altered as a result of the Flood Inquiry.
  - c. Ministerial Direction 4.1 Flooding, the Planning Proposal requires careful consideration of any increased dwelling density below the PMF.

### TAG Advice

28. *Flood Impact Assessment:*
- a. The TAG members noted the Flood Impact Assessment Report had undertaken a reasonably thorough examination of future flood heights. However, the TAG note, the report did not meet the specific requirements for Flood Inquiry Recommendation 18 in relation to the modelling of the 0.02% AEP event, despite it plausibly occurring during the typical development design life.
  - b. The TAG agreed cumulative hydraulic, and evacuation impacts from the development proposals have not been quantified by the Council, particularly in relation to the potential balanced cut and fill, and regarding a range of flood events.
29. *Climate Change:*
- a. The TAG noted the flood modelling did not adequately consider the effects of climate change and as a result the analysis provided is likely to have underestimated the flood risk to the Site.
  - b. Specifically, the TAG noted the Flood Impact Assessment does not appropriately identify the impacts of climate change on the levels of Hawkesbury-Nepean tailwaters affecting the Site during major flood events.
  - c. There was further consensus among the TAG members that impacts of climate change would exacerbate the flood-susceptibility of the Site. The *Climate Change and Flooding Effects on the Hawkesbury-Nepean 2021* (INSW, Sept 2021) indicates changes to flood levels associated with climate change in the order of 0.75-1.5 m for the adopted climate change scenarios within the Hawkesbury – Nepean.



30. *Flood Hazard and Behaviour:*
- a. The TAG agreed the tolerance for 'risk to life' should be low, and 'developments must not result in increased risk to life'.
  - b. The TAG was clear that 'risk to life' does exist for this Planning Proposal due to increased numbers of people living and working in the floodplain. The TAG members came to a consensus that the extent of 'risk to life' had not been adequately quantified by the Planning Proposal.
  - c. The TAG agreed the western section of the Site is affected by a high flood hazard.
31. *Cumulative Hydraulic Impacts:*
- a. Overall, there was consensus from TAG members that the cumulative hydraulic impacts had not been sufficiently assessed by Council. This includes modelling that is consistent with the draft *Hawkesbury-Nepean River Flood Study, 2022* (INSW) and to ensure the modelling accounts for the proposed developments and climate change.

#### **Panel consideration of flood impact assessment**

32. The Panel shares the TAG's concern that the Flood Impact Assessment is not sufficiently comprehensive as it has not covered the range of flooding scenarios recommended by the Flood Inquiry such as the 0.02% AEP and it is likely unrepresentative of future flooding scenarios and, consequently, the flooding risk could be higher.
33. In particular, the Panel is concerned about the lack of consideration of climate change on the flood level within the Hawkesbury River. The Panel notes members of the TAG have estimated that the depths could be up to 1.5 m higher within the Hawkesbury River under potential future climate change scenarios. Given the flooding of the proposal is largely dominated by backwater flows, on site run-off is unable to leave and flood water from Eastern Creek encroaches into the RTC. This may lead to an underestimation of the flooding depths within the proposal area during future climate change scenarios.
34. The Panel agrees with the TAG advice and considers it critical that the Flood Impact Assessment is updated to appropriately detail the:
- a. 0.02% AEP event;
  - b. impact of climate change from both onsite rainfall and receiving water depths, for all the relevant flooding scenarios;
  - c. flood water velocities;
  - d. cumulative flooding impacts within the catchment, informed by an appropriate consideration of climate change.
35. The Panel considers there is development potential within parts of the Site and in the wider Riverstone Town Centre precinct. However, it is critical to update Flood Impact Assessment to appropriately identify a representative risk-based flood planning level. Once the level is known it is likely an amended configuration of the Planning Proposal would be required to avoid the most flood prone areas. The Panel considers that the Riverstone railway station, being located on low land should not be regarded as a strategic anchor for a future town centre.

### **3.1.2 Evacuation**

#### **Council comments**

36. The Flood Impact Assessment shows that evacuation is possible under most flood events via routes of rising egress to the north-east towards Hamilton Street, then Garfield Road towards Windsor Road.

37. In its meeting with the Panel on 14 February 2023, Council officers noted:
- a. the unique evacuation challenges associated with the development of a 'brownfield site' as compared to the 'Greenfield sites' adjacent;
  - b. there are existing infrastructure issues with the road network adjacent to the precinct and that Garfield Road likely requires upgrade;
  - c. the development in the North West Growth Area (**NWGA**) continues to occur prior to the necessary road upgrades. According to Council, some release areas are developing above expected densities, however, the surrounding road infrastructure is not being developed in coordination to support the increased levels of development.
38. Council's additional comments to the Panel on 27 March 2023 noted:
- a. There is a lack of mass transport options servicing the NWGA Precincts which forces residents to rely on private vehicles, adding congestion to flood evacuation routes;
  - b. There is a lack of clarity regarding the location and timing of the delivery of new and upgraded flood evacuation routes for the region, including:
    - o Castlereagh Connection between the M7 Motorway and South Creek,
    - o Outer Sydney Orbital,
    - o Garfield Road and Bandon Road upgrades,
  - c. The Site is minimally affected by the current flood planning level 1% AEP plus freeboard. For most sites it would be a matter of walking a short distance to move from an area within the flood planning area to an area outside the flood planning area.

#### PLUS Comments

39. In its referral letter dated 10 January 2023, PLUS noted:
- a. The relevant road upgrades supporting growth in RTC are unfunded and will be subject to future budget consideration, these include:
    - o Various upgrades to Richmond Road and Townson Road (Stage 1),
    - o Garfield Road Central and West upgrades,
    - o Garfield Road East upgrade.
40. In its meeting with the Panel on 14 February 2023, PLUS noted:
- a. RTC was different to many surrounding precincts in the NWGA being on the flood fringe and because of the surrounding infrastructure and existing evacuation routes. These include roads with rising grade which lead to the north-east towards Garfield Road and Windsor Road respectively, which may be adequate to serve RTC, if considered in isolation from regional evacuation requirements.
  - b. The *Hawkesbury-Nepean Valley Flood Evacuation Model Report, July 2022 (FEM)* suggests there is existing evacuation capacity to accommodate for the RTC Planning Proposal.
  - c. There is likely sufficient time to evacuate RTC before a 1% AEP flood event reaches its peak within the Hawkesbury-Nepean Valley.
41. In additional information provided to the Panel on 21 March 2023, PLUS noted the following:
- a. The Planning Proposal would yield an estimated 2,640 dwellings within the Site.
  - b. Approximately 450 proposed dwellings within the Site would be affected by the current 1% AEP flood event, assuming no fill material is brought in to increase the height of land above the 1% AEP.
  - c. A further estimated 2,030 proposed dwellings would be affected by a PMF flood event.
  - d. The Planning Proposal includes 160 dwellings above the PMF.

## **TAG Advice**

### **42.     *Evacuation Modelling:***

- a. The TAG concludes there is insufficient information to demonstrate appropriate evacuation capacity is available to support the Planning Proposal in its current form. This is because:
  - o Site specific evacuation modelling has not been undertaken by Council;
  - o Traffic modelling of evacuation has not been undertaken to determine appropriate traffic capacity to allow safe evacuation by vehicle.
- b. In the absence of specific modelling, the TAG members referenced the FEM to assist its consideration of evacuation. The FEM indicates the Planning Proposal has limited impact on the regional Hawkesbury-Nepean flood evacuation. However, this assumes there are no internal congestion issues resulting from the proposed development.
- c. The TAG acknowledged the proposed flood evacuation route has a short and rising egress, reducing risk for evacuation.
- d. The TAG also agreed there would be insufficient evacuation capacity for the proposed development if all other proposed development on the Hawkesbury-Nepean floodplain were to be approved.

### **43.     *Site-specific emergency evacuation plans:***

- a. The use of site-specific emergency evacuation plans is not supported as an appropriate tool to address 'risk to life'. The TAG noted these plans rely on complex administrative arrangements that rely on human behaviour in emergency situations and would be highly prone to failure. Further they add complexity for emergencies services into an already complex regional flooding emergency.

## **Panel consideration of flood evacuation**

44. The Panel notes that PLUS, Council, and the TAG consider that the current road network has existing evacuation capacity constraints and key upgrades to sections of Richmond, Townson and Garfield Roads (East, Central and West) are likely to be required. This is to account for the evacuation of existing residents as well as existing approved yet unbuilt development within the area.
45. The Panel notes the TAG advice regarding preliminary regional flood evacuation modelling indicates that the proposal has limited impact on the Hawkesbury Nepean flood evacuation. However, this advice cautions that this assumes no local congestion issues and considers that proposal specific evacuation modelling is required.
46. The Panel considers the ability to evacuate occupants effectively from the Site is unknown and concurs with the TAG advice that appropriate evacuation modelling which considers the preliminary regional flood evacuation modelling (FEM) is required before a decision is made. Further, this modelling needs to include appropriate consideration of cumulative scenarios.
47. The Panel acknowledges that evacuation by foot to the immediate adjacent high ground would be possible. However, the Panel notes this evacuation type does not align with the SES position requiring mass evacuation by motor vehicle to the nearest evacuation centre or destination of choice.
48. The Panel considers that the use of site-specific emergency plans is not appropriate and agrees with the TAG advice that such an approach would not effectively address 'risk to life' across the proposed development.

49. The Panel considers the likely evacuation constraints do not prohibit the development potential of the Site entirely. However, the Planning Proposal in its current configuration with a focus on densification of flood prone land creates evacuation risk which has not been suitably assessed or mitigated by the proposal.

### 3.1.3 Mitigation Measures

#### Council comments

50. Council's Flood Impact Assessment finds that a potential balanced cut and fill strategy is feasible within the floodplain to enable key sites to support development.
51. Council have noted in the Planning Proposal and Flood Impact Assessment that flood risks can be reduced by introducing fill to raise the ground level above the 1% AEP flood event level. This equates to 17.3 m AHD, and would require some lower lying portions of the Site to be filled up to 3 m. The proposed balanced cut and fill strategy identifies several options for cut sites, including the creation of detention basins on a Council park and a former depot site within the RTC.
52. The cut and fill strategy and evacuation measures would be supported by a new part of the *Blacktown Development Control Plan 2015* to assist with the safety of occupants in the event of a flood.
53. In its meeting with the Panel on 14 February 2023, Council officers noted:
- a. the high-density development has been excluded in areas impacted by the 1% AEP and open space has been located in areas most affected by overland flow.
54. On 27 March 2023 in response to questions on notice on, Council noted:
- a. The Planning Proposal includes the following flood risk mitigation measures:
    - o Raising development sites to the flood planning level (1% AEP) in accordance with a balanced cut and fill strategy;
    - o Compliance at the development application (DA) stage with the *NSW Flood Prone Land Policy* and the *Blacktown Development Control Plan 2015 Part A* (Section 9 – Development on flood prone land, and Section 10 – Local overland flooding);
    - o Drafting additional Development Control Plan requirements specific to the RTC for consideration of overland flow to local roads, Flood Emergency Response Plans for certain DAs, and controls for the minimum entry level to all basement car parks.
  - b. With regard to the notion of relocating the Planning Proposal, considerable support from the NSW Government would be required to ensure the community understands the justification for new planning levels, implications for the Town Centre, implications for the existing Riverstone railway station, implications on land value, what support is available from the NSW Government, and what are the relevant timeframes.

#### PLUS Comments

55. In its referral letter to the Panel dated 10 January 2023, PLUS confirmed:
- a. The proposed balanced cut and fill approach, raising flood affected lots up to the 1% AEP Hawkesbury-Nepean flood level assumed in the Flood Assessment Report, is a feasible approach.
56. In its meeting with the Panel on 14 February 2023, PLUS noted:



- a. The proposed balanced cut and fill approach assumed in the Flood Impact Assessment may not remain appropriate if new flood planning levels were to be established, in light of the Flood Inquiry.

## **TAG Advice**

### **57. Mitigation Measures:**

- a. The Council's approach to risk mitigation includes a combination of excluding low lying areas from development as well as a balanced cut and fill programme to raise areas above the 1% AEP flood level plus freeboard.
- b. Some TAG members supported some of the existing mitigating controls recommended in the Flood Impact Assessment, such as no underground car parks.
- c. TAG members identified that there may be other mitigation measures potentially available to the Council such as relocation of the high-density development further away (approximately 100 m) from flood prone land near the Riverstone railway station.

### **58. Balanced Cut and Fill:**

- a. There is consensus amongst TAG members that the cut and fill mitigation measures proposed by the Council are not sufficient to satisfy the requirements of Recommendations 18, 19 and 20 of the Flood Inquiry.
- b. The TAG found that the proposed balanced cut and fill strategy conflicts with the principles of the *Western Sydney District Plan* for a resilient city as they apply to the Hawkesbury-Nepean Valley, which suggest avoiding alterations to flood storage capacity of the floodplain and flood behaviour through filling and excavation or other earthworks.

### **59. Site-specific emergency evacuation plans:**

- a. The TAG does not support the use of site-specific emergency planning as an appropriate tool to address 'risk to life'. The TAG considers these are based on assumptions of human behaviour and compliance that are prone to failure.

## **Panel consideration of mitigation measures**

### **60. The Panel considers the proposed cut and fill strategy is problematic for the following reasons:**

- a. Uncertainty around the need for a compensatory cut outside the proposal boundary and insufficient detail in relation to implementation of the cut or fill locations.
- b. Inconsistency with recommendations 18, 19 and 20 of the Flood Inquiry and *Western Sydney District Plan*.
- c. Fill requirements may need to be greater than discussed in the proposal documentation given the limitations with the current Flood Impact Assessment (see paragraphs 33-35).
- d. Evacuation from the land near the railway station would not be resolved, noting surrounding roads may become inundated.

### **61. The Panel considers the use of site-specific emergency plans is not appropriate (see paragraph 48).**

### **62. The Panel considers avoidance of additional yield on flood prone land and moving the focus of the proposal to the adjacent high ground as a potential solution. This would minimise the need for the cut and fill, evacuation of residents or the rescue of trapped residents.**

### 3.1.4 Economic Impacts

#### Council comments

- 63. An Economic and Feasibility Analysis was undertaken by AEC Group to inform the Riverstone Town Centre Masterplan. Analysis by AEC Group did not directly consider the financial impacts of flood events on RTC.
- 64. Council did not provide any specific comments on the economic impacts of flooding.

#### PLUS Comments

- 65. PLUS did not have any specific comments with regard to the economic impacts of flood events.

#### TAG Comments

- 66. *Economic Impacts Modelling:*
  - a. TAG members agree there has been inadequate consideration of the economic impacts from potential flooding on future developments or infrastructure within the Planning Proposal. This includes a lack of consideration regarding the distributions of costs and economic burden of floods events on future owners, occupants and Government.
  - b. The TAG found there was no information provided on the liability of any public or private property. Rather, the proposal would likely transfer the risk of rescue, clean up and potential future infrastructure upgrades to the NSW Government and Council.
  - c. The TAG was of the view that the Council's documentation did not consider how a range of flood events, including a PMF event, would impose on business owners, insurers, and Government.
  - d. TAG members agree damage to property could be severe, despite the potential use of fill to raise habitable areas of development above a 1% AEP event.

#### Panel consideration of economic impacts

- 67. The Panel considers the potential economic damage from flooding impacts and the potential transfer of the economic burden to public authorities has not been adequately assessed.
- 68. The Panel considers an appropriate flood planning level needs to be determined through updated flood modelling (see paragraphs 34 - 35) and the proposal suitably amended to minimise economic impacts from flooding and potential transfer of risk to future owners and government.

## 4 Panel Advice

70. The Panel has undertaken a review of the Proposal as requested by PLUS (see paragraph 4). In doing so, the Panel has considered the Material listed in Appendix A (see Section 1.2 above) including submissions by Council and PLUS as well as the advice provided by the TAG.
71. The Panel acknowledges the strategic context of the Riverstone Town Centre Planning Proposal and understands the renewal of the town centre has been identified in Council's strategic planning documents since at least 2012. The Planning Proposal is located in the NWGA and has been under consideration since early 2018.
72. Given the Site's location near Eastern Creek, the Panel is mindful that flooding is not a new matter and is a risk that has been factored into deliberations, strategic planning and decision making to this point. However, the Panel further recognises there are significant challenges to be resolved in the Planning Proposal in response to greater awareness of flood risks and complex issues identified by the Flood Inquiry.
73. The Flood Inquiry advocates risk-based assessments be undertaken and that *"flood risk management goes hand-in-hand with the economic and social aspirations of the community, particularly the provision of more affordable housing located close to good facilities such as railway stations, schools and medical centres"* (Flood Inquiry, Executive Summary, p4).
74. In this regard, the Panel has formed the view that the Riverstone Town Centre precinct has potential to contribute to the strategic context identified by both the NSW Government and Council. However, the Planning Proposal should not proceed in its existing form.
75. In conclusion, the Panel provides the following advice:
- a. **The Flood Impact Assessment should be updated.** This should include:
    - o modelling of the 0.02% AEP flood event;
    - o remodelling of the flooding scenarios to include the impacts of climate change to the water levels within the Hawkesbury-Nepean catchment, with consideration of:
      - increased rainfall intensity and duration;
      - the *Hawkesbury-Nepean Valley Regional Flood Study 2019*, with regards to flood risk and the impacts of the Hawkesbury River tailwater levels and the impact of this to the Site;
      - the findings of the *draft Hawkesbury-Nepean River Flood Study* (interim results - April 2022), which highlights potential increases to flood levels for this proposal;
      - flood water velocities for all the flooding scenarios, including impacts of climate change discussed above; and
    - o greater analysis of cumulative impacts for the cut and fill in all flooding scenarios, clearly defining what cumulative scenarios have been considered.
  - b. **The Planning Proposal should be reconsidered** in response to the updated Flooding Impact Assessment to avoid the most flood prone areas and therefore minimise as far as practical the need for evacuation. Riverstone railway station, being on lower ground, should not be regarded as a strategic anchor to the town centre.
  - c. **Mitigation measures**, should be updated to:
    - o Reduce the reliance on Emergency Evacuation Plans, as this form of risk management and community protection is not suitable for a town centre with large residential and commercial towers, and would add complexity into an already complex regional evacuation scenario;

- Avoid or minimise the use of fill material and the subsequent compensatory cut;
  - Consider opportunities to avoid additional development on flood prone land and moving the focus of the proposal to the adjacent high ground. This would minimise the need to for emergency plans, cut and fill and the evacuation of residents.
- d. Further assessment should be undertaken **in relation to the economic impacts** from flooding.



David Gainsford  
(Chair)  
Department  
Executive Panel  
Member



Juliet Grant  
Panel Member



Prof Richard  
Mackay, AM  
Panel Member



# Appendix A – Material Considered by the Panel

Attachment ID / Date	Name	Author
06.08.2018	Signed Gateway Determination	PLUS
13.08.2018	Altered Gateway Determination – October 2019	PLUS
13.12.2019	Altered Gateway Determination – December 2019	PLUS
13.10.2019	Letter to Blacktown City Council regarding altered Gateway determination	PLUS
A	Planning Proposal – Riverstone Town Centre Post Exhibition Planning Proposal – Nov 2021	Blacktown City Council
NILL	AEC Economic and Feasibility Analysis Report	AEC Group
Attachment H	Council submission report	Blacktown City Council
Attachment Maps	Post Exhibition Mapping	Blacktown City Council
B	Council Report Riverstone Town Centre - Nov 2021	Blacktown City Council
C	Transport advice received from the DPE Chief Engineer	Department's PLUS grp
NILL	Cover Letter – Riverstone Town Centre	Blacktown City Council
D	Riverstone Town Centre Flood Impact Assessment Report	Cardno
DOC18 193643	ARUP Transport Impact Assessment Report - Jan 2018	ARUP
DOC18 193662	Group GSA Urban Design Analysis Report – June 2016	Group GSA
DOC18 193668	Riverstone Town Centre Master Plan	Elton
DOC18 326974 22.05.2018	Updated Planning Proposal – Riverstone Town Centre – May 2018	Blacktown City Council
DOC18 326975 22.05.2018	Updated Proposal – Riverstone Town Centre – Updated cover letter	Blacktown City Council
NILL	Flood Levels Map	PLUS
NILL	Gateway Determination Report	PLUS
IRD22 36891	Panel Letter – Riverstone Town Centre	PLUS
Attachment Letter		
NILL	Planning Proposal – Riverstone Town Centre – Mar 2018	Blacktown City Council
NILL	Riverstone Town Centre Hazard Mapping	CSS & Council
NILL	Updated ARUP Transport Impact Assessment Report - 2020	Blacktown City Council
PLUS IN (02.15.2023)	Attachment – Transport advice received from the DPE Chief Engineer	PLUS
PLUS IN (15.02.2023)	Attachment – Council report 3 Nov 2021 RTC	Council
PLUS IN (15.02.2023)	FAP – Extract Assessment report RTC 14022023	PLUS
PLUS IN (15.02.2023)	FAP Cover Letter – Riverstone TC – IB markup 14022023	PLUS
PLUS IN (21.03.2023)	RIVERSTONE TOWN CENTRE PP – supplementary info to Panel	Department's PLUS grp
Council IN (27.03.2023)	Flood Advisory Panel - Riverstone town c_ - Attachment 2 - BCC Commercial and Community land in town centre - 2023_03_27	Council
Council IN (27.03.2023)	Flood Advisory Panel - Riverstone Town Centre - Attachment 1 - Key Owners 2023_03_27	Council
Council IN (27.03.2023)	Response - Flood Advisory Panel - Riverstone Town Centre - Questions on Notice	Council
TAR (5 April 2023)	Technical Advisory Group – Advice Report, Riverstone Town Centre	TAG