



Throsby, Styx and Cottage Creek Flood Study

Public Engagement and Submissions Report

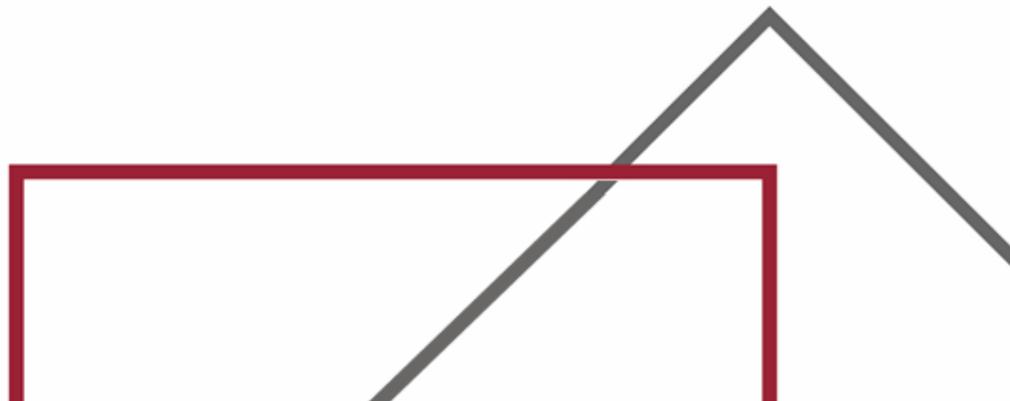


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1 Background

The City of Newcastle (CN) has updated its Flood Study for the Throsby, Styx and Cottage Creek catchments (the Flood Study) using updated methodologies and modelling techniques as outlined in the Australian Rainfall and Runoff 2019 (ARR2019). Newcastle is built on a floodplain and is highly prone to flooding, with the community having already experienced numerous flooding events, resulting in damage to local properties, the risk to life, as well as drainage issues.

In 2021, CN consulted with the community and encouraged the sharing of flooding experiences via an interactive map displayed on their website. The Newcastle area is already highly urbanised and the population within Newcastle is anticipated to increase in the coming decades, which will place pressure on housing in the form of new infill developments. It is important that the community understands the current flood behaviour and risk in the Throsby, Styx and Cottage Creek catchments and are provided with the appropriate resources and educational materials so they can appropriately prepare and respond to future flooding events.

Community engagement occurred as follows during the preparation of the Throsby, Styx and Cottage Creek Flood Study 2023:

Stage 1 – early engagement

- Inform the community about the study and the floodplain risk management process
- Identify community concerns
- Gather flood information from the community by participation

Stage 2 – public exhibition

- Inform the community about the study
- Develop and maintain community confidence and collaboration with the study results
- Inform the community about flood impacts in the area

This report outlines the results of Stage 2 – public exhibition.

2 Engagement plan

The engagement methods utilised before and during the public exhibition period are identified in **Table** below.

Activity	Description	Reach and engagement
Have Your Say webpage	A dedicated project page was created on CN's Have Your Say website to provide information about the draft Flood Study and to collect feedback from the community.	19,870 page views 3,789 individual visitors
Letters	Individually addressed letters were sent to newly flood-affected property owners and no longer flood-affected property owners.	2,404 letters sent to newly flood-affected property owners 786 letters sent to no longer flood-affected property owners
Email notifications	Email notifications sent to residents signed up to CN Flash Flood Alert Network and contributors to the public exhibition of stage 1 of the Flood Study 2023.	1,503 email notifications
Information flyers	Information flyers were delivered to property owners across the study area.	41,300 flyers were letterbox dropped across the study area.
Community drop-in information sessions	Two community information drop-in sessions were held: <ul style="list-style-type: none"> • 12 August 2023 – Adamstown Community Hall • 14 August 2023 –City of Newcastle Digital Library. 	Two drop-in sessions (estimated 56 attendees)
Social media (Facebook)	The public exhibition was promoted via a post on CN's Facebook page. The post aimed to raise awareness of the draft Flood Study and to encourage the community to provide feedback online via the Have Your Say webpage or in person. A paid Facebook campaign was also used to further increase the audience reach.	Facebook Reach: 40,236 accounts saw our ads at least once Facebook engagement: 2,820 engaged directly (sharing, commenting, clicking a link or reacting)
One-on-One sessions	One-on-one sessions were held with newly identified flood-affected property owners (in person and via online video conference sessions).	26 one-on-one sessions
Follow up phone calls	Follow-up phone calls were made to those property owners requesting a telephone conversation based on their online or email submission.	13 phone calls with an expert from Rhelm and the City of Newcastle (not booked one-on-one)

Table 2.1 Communication and engagement methods

3 Consultation outcomes

3.1 Stakeholder engagement

This Flood Study has been developed with input from the Department of Planning and Environment (DPE), the community drop-in sessions as part of the public exhibition and stakeholder meetings. In addition, key stakeholder feedback and advice was sought to ensure the Flood Study had identified key data sources, stakeholder held flood-related knowledge, and any constraints and opportunities to consider prior to finalising the Flood Study.

3.1.1 Stakeholder meetings

Letters were sent to key stakeholders ahead of the public exhibition of the Flood Study, to provide further background on the study, an overview of the flood risk context and the timeframes for future engagement opportunities, and to gather advice and information for review ahead of finalising and adopting the Flood Study. Meetings were held with the following key stakeholders:

- NSW State Emergency Service (SES)
- Hunter Water Corporation (HWC)
- Port of Newcastle

Meetings were held ahead of the public exhibition period.

NSW State Emergency Services

The SES requested that CN include a SES representative in the future Flood Risk Management Committee.

Hunter Water Corporation

HWC wished to confirm the status of 681 Hunter Street in the flood model. Rhelm and CN confirmed that the existing conditions modelling does have this building removed, as it is now a key overland flow path along Cottage Creek. In the June 2007 flood event, this became blocked with debris and flood waters were not able to flow on to Hunter Street.

HWC also wished to confirm the pedestrian bridge over the top of Throsby Creek is represented as a bridge structure and not a culvert. Rhelm were able to confirm this is a bridge structure in the model.

Discussions were held about the growth of mangroves and sediment deposits upstream of the Hannel Street Bridge in Throsby Creek. Rhelm were previously engaged by HWC to quantify the effects of mangrove growth and sedimentation along this stretch of Throsby Creek. Bathymetric surveys were undertaken in both 2000 and 2022. The Draft Flood Study has utilised the 2000 bathymetric survey data. Isolating the effect of the sedimentation, it was determined there was minimal impact (less than 10mm) on the surrounding residential areas between 2000 and 2022. This portion of the creek is tidal and the elevated ocean level in the 1% AEP scenario is 'drowning out' the effects of sedimentation. By isolating the effect of the growth of mangroves islands between 2000 and 2022, it was estimated that there are impacts upstream to an approximate maximum of 50mm in residential areas. However, it is important to note that the flood model results are far more sensitive (in magnitude and extent) compared to other model assumptions including structure blockage, surface roughness, and hydrologic parameters.

Port of Newcastle

The Port of Newcastle was concerned about any additional sediment deposited in the Port of Newcastle from Throsby and Cottage Creeks. It was concluded that any additional sedimentation is insignificant compared to the volume of sediment deposited from the Hunter River.

3.2 Public exhibition

The Flood Study was exhibited from 26 July to 24 August 2023 on CN's website (<https://haveyoursay.newcastle.nsw.gov.au/throsby-styx-and-cottage-creek-flood-study>). A summary of the submissions received is shown below.

3.2.1 Submissions overview

202 total submissions received (via online survey, email or customer service channels)	2 Agency submissions received
164 online survey responses were received from the community.	36 Email submissions
26 One-on-one sessions were held with newly flood affected property owners.	13 Phone calls were made to residents

3.2.2 Online responses by suburb

Members of the community who provided an online response to the Draft Flood Study were asked to indicate which suburb they lived in.

Out of the 164 respondents:

- 154 lived within the study area,
- Seven lived outside of the City of Newcastle LGA,
- Three lived outside of the study area but within the City of Newcastle LGA (Stockton, Fletcher and Wallsend)

Figure 3-1 provides a breakdown of the online responses by suburb of residence. The greatest number of respondents, within the study area, live in New Lambton (22) while the suburb with the fewest respondents (1) was Waratah West. There does not appear to be any obvious correlation between the extent of modelled flooding, flood risk, or historic flooding experiences and the number of respondents for each suburb. For example, Hamilton North, Hamilton South, Hamilton and Broadmeadow are relatively significantly flood-affected but only 11 responses were received for these suburbs. Conversely, for some suburbs with a relatively lower flood risk, a higher number of submissions were received, including Merewether (15) and Mayfield East (13).

There is a loose anecdotal correlation between the number of residents receiving letters indicating their property is newly flood-affected and online responses received. Suburbs with a higher proportion of the notified newly flood-affected properties which also produced a relatively high number of online submissions include New Lambton (22), Merewether (15), Mayfield (13) and Mayfield East (13). However, it is noteworthy that the suburbs of Newcastle, Cooks Hill, Waratah and Adamstown also include many properties which were notified as newly flood-affected but did not generate a similar proportion of online submissions (five to seven respondents each).

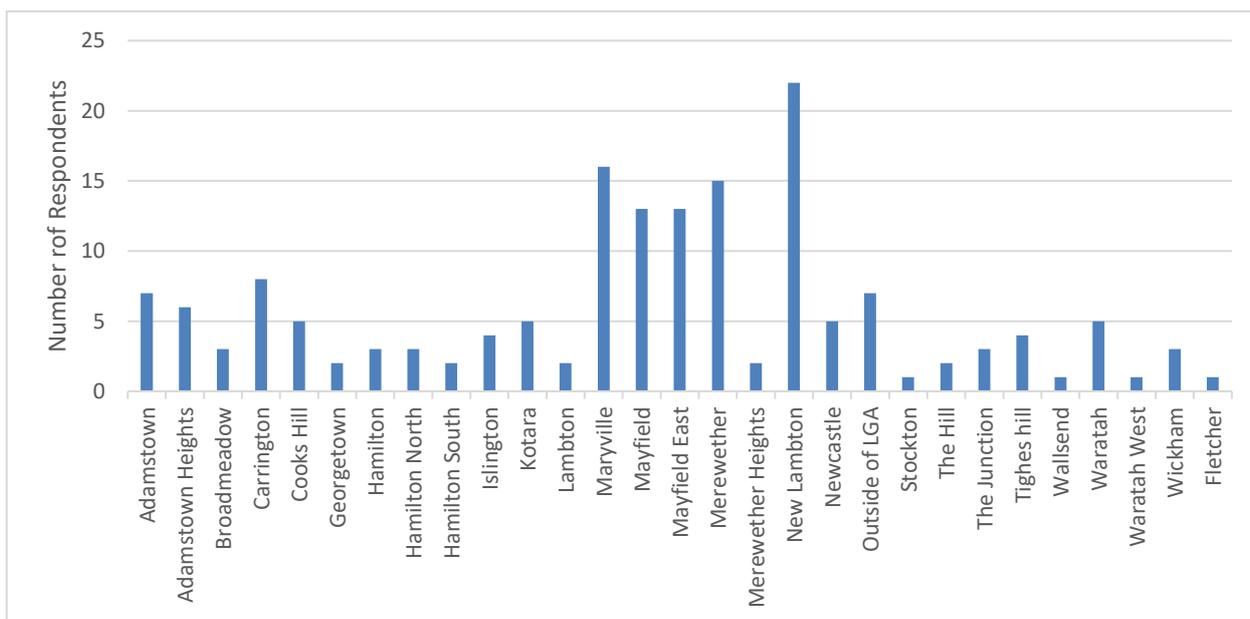


Figure 3-1. Submissions received by suburb

3.2.3 Online responses by age

The spread of respondents by age was skewed towards those residents who were 45 or over. Only 23% of respondents were less than 44 years of age. **Figure 3-2** provides a breakdown of respondents by age group. For comparison, the 2021 Australian Bureau of Statistics Census (<https://abs.gov.au/census/find-census-data/quickstats/2021/LGA15900>) identifies that approximately 43% of people within the Newcastle LGA are between the ages of 15 and 44, and 41% of people are 45 years of age or over.

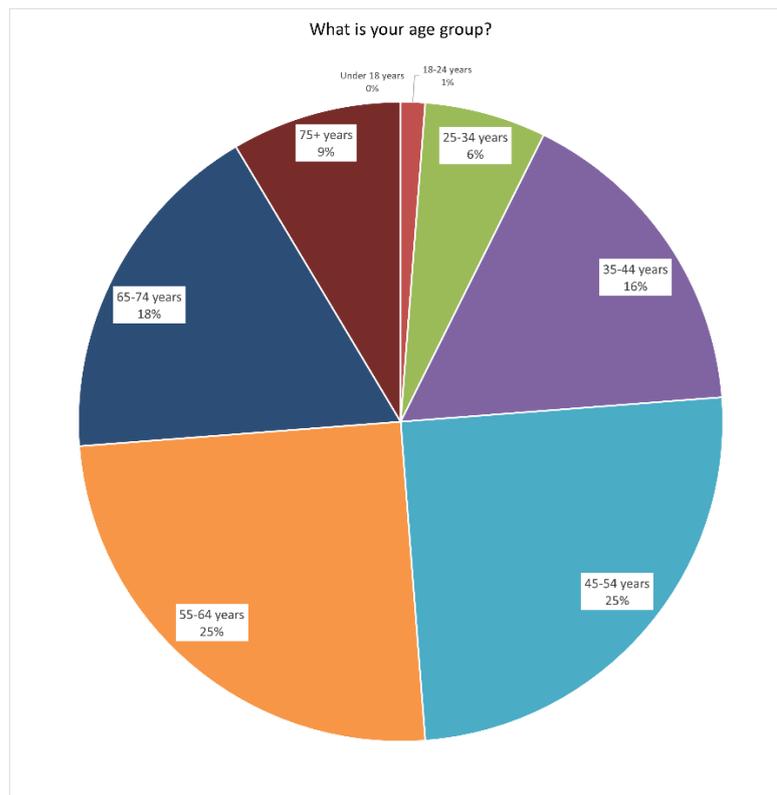


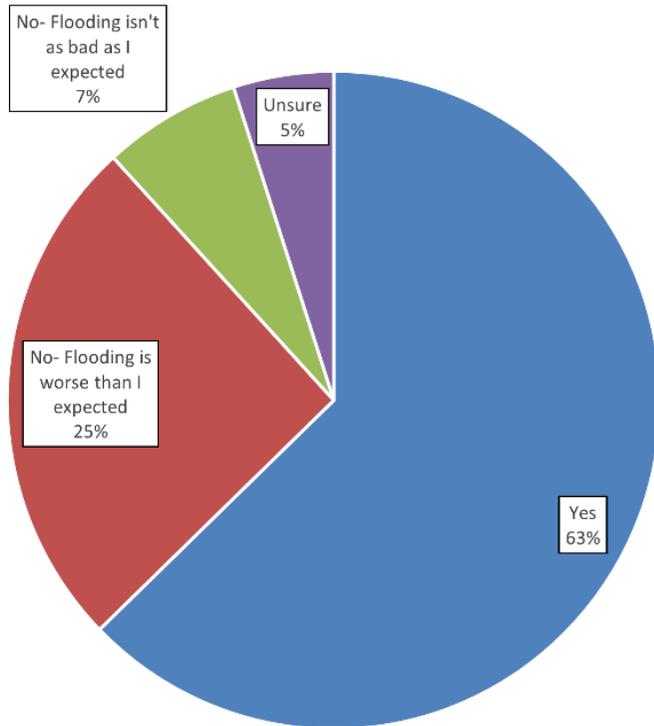
Figure 3-2. Online submissions by age group

3.2.4 Flood awareness

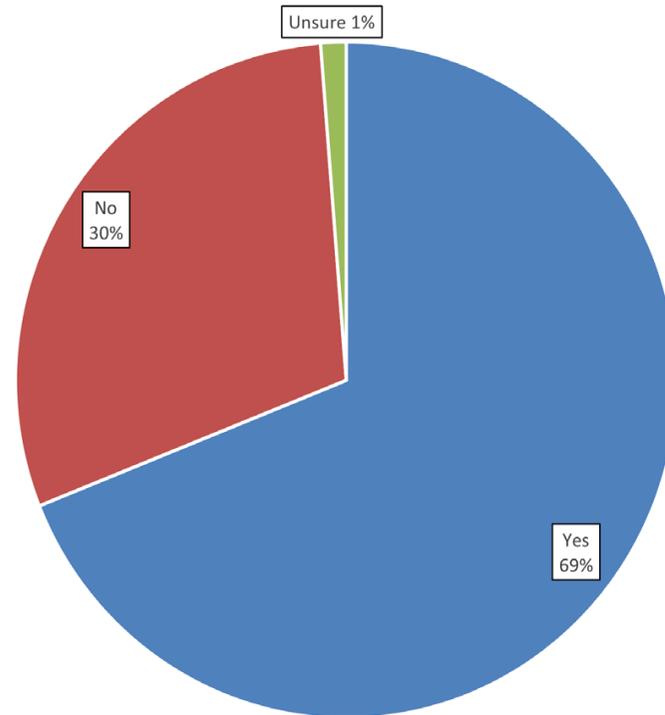
In the online submission form, questions were asked of respondents regarding their awareness of flooding in the LGA. The five pie charts included as **Figure 3-3** provide a brief summary and breakdown of the online responses. In general, the following conclusions can be drawn from the data and the breakdown of respondents by age and suburb:

- Respondents are familiar with the previously modelled extent of flooding from the 2008 Flood Study (WBM BMT, 2008) and flood data provided on CN's website (<https://newcastle.nsw.gov.au/living/environment/flooding>), as well as historic flooding.
- Nearly three quarters (73%) live in or own property that is flood affected and a further 14% were unsure.
- 37% of respondents found out that their property is flood affected through this study.
- 39% of respondents claimed that their insurance premiums have recently increased due to flood risks.
- 30% of responders did not experience the 2007 event and are unlikely to have lived experience of flooding in Newcastle.

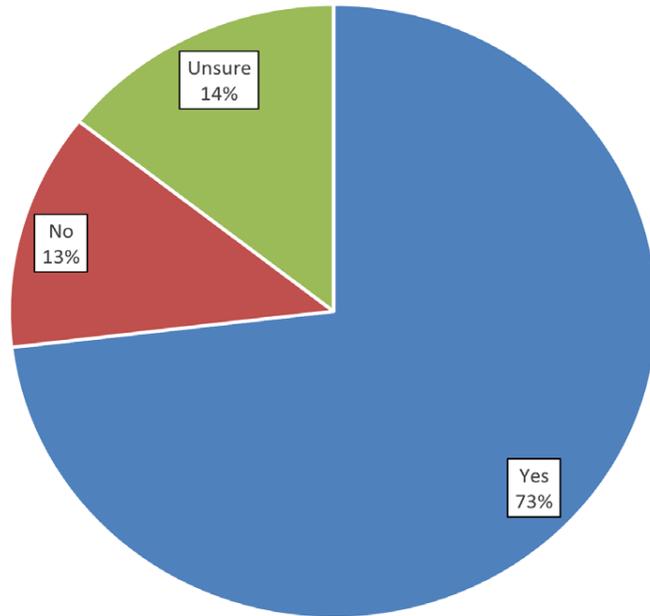
Were you previously aware of the extent of flooding in the Newcastle LGA?



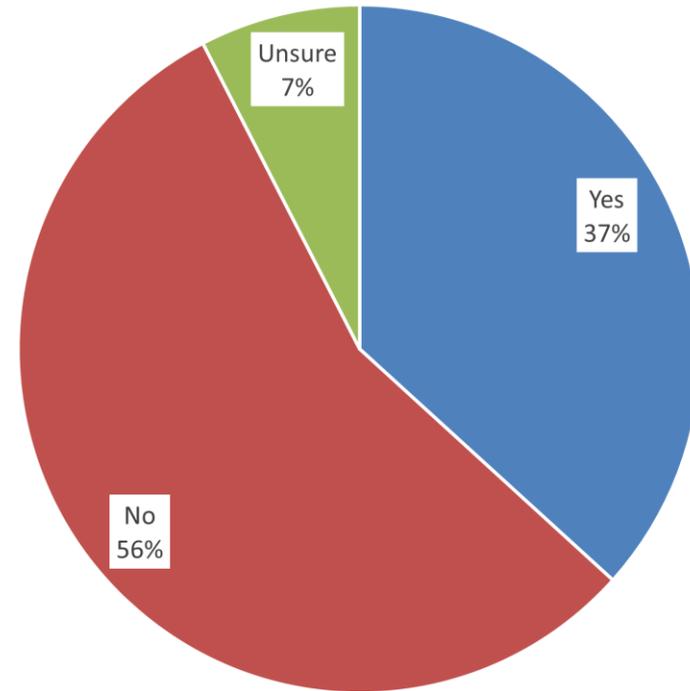
Were you living in Newcastle when the 2007 Pasha Bulka flood occurred?



Has your property been identified as flood affected in the Flood Study?



Did you know your property was flood affected prior to this study being released?



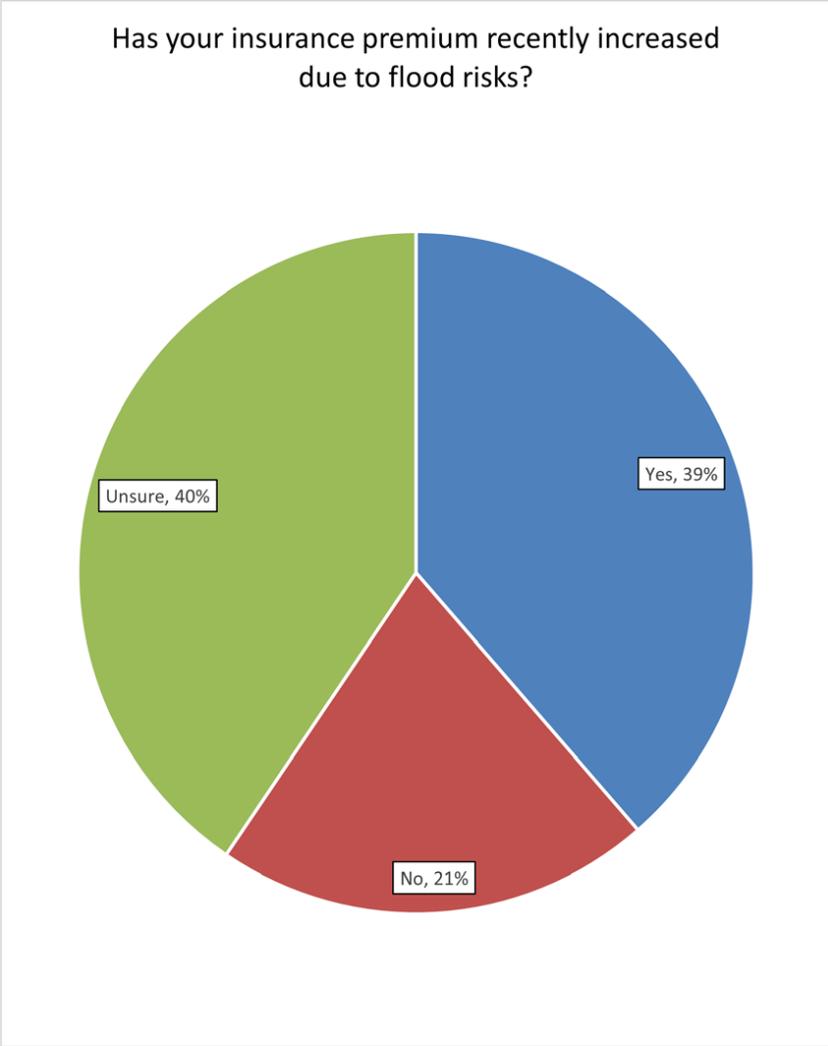


Figure 3-3. Previous awareness of the extent of flooding in the Newcastle LGA

3.2.5 Emergency flood response

Two additional questions were asked in the online submission form regarding community behaviour during a flood emergency event. **Figure 3-4** provides an overview of these questions and responses.

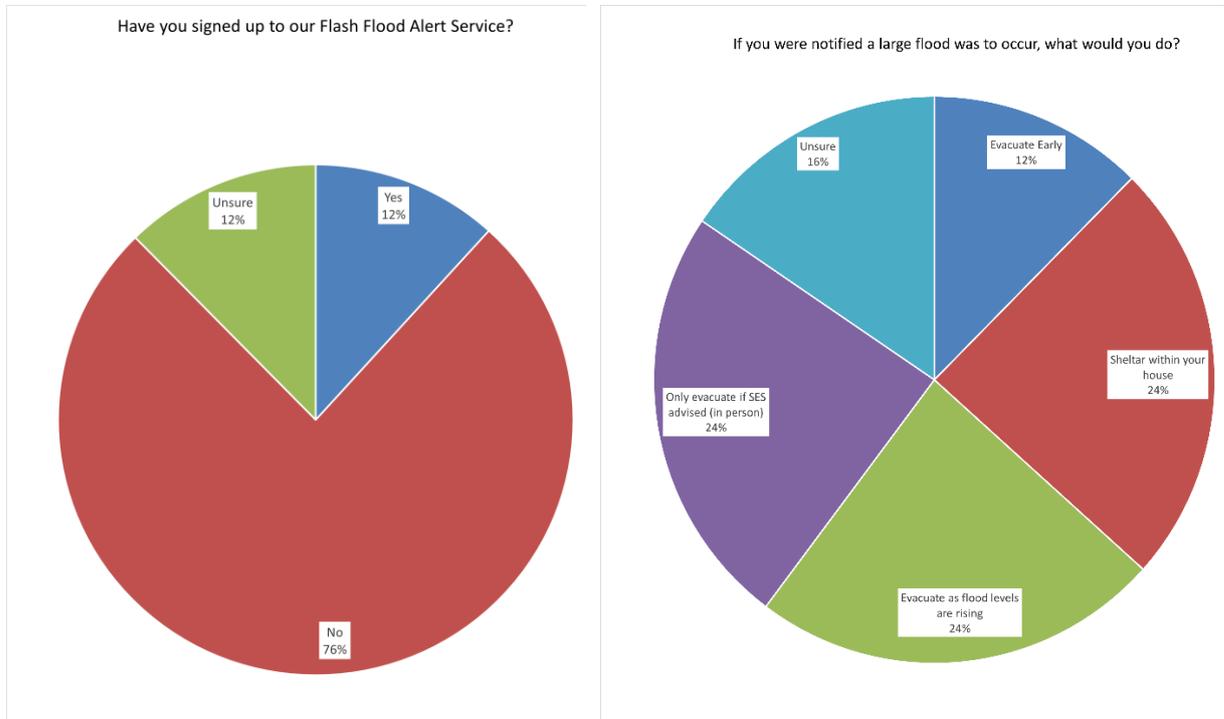


Figure 3-4. Respondent emergency flood preparedness summary

The notable takeaway from this data is that although potentially up to 87% of respondents are within the floodplain (refer to **Figure 3-3**), only 12% are signed up for CN's flash flood alert service. Only 12% of respondents would evacuate early if they received warning that a large flood was imminent, with a further 24% intending to shelter within their home. This leaves 64% of respondents who do not have an appropriate flood response plan, would potentially leave their house at the highest risk to life period during a flood, or are waiting for an SES evacuation door knock that is not likely to occur.

This snapshot of community knowledge of flood risk and response highlights the need for flood risk education, further advocacy to sign up to the flash flood alert service and amplifying the SES's advice to evacuate early when flood warnings are issued for flash flood catchments.

3.2.6 1% AEP in 2050

The online survey asked the question, 'do you have any comments on the use of the 1% AEP in 2050 flood event to inform planning controls for new property developments?'.

A total of 13% online survey respondents supported the use of the 1% AEP in 2050 event to inform planning controls, with 4% unsure and 75% having no or unrelated comments. Only 8% of survey participants did not support the use of the 1% AEP in 2050 event as the planning flood.

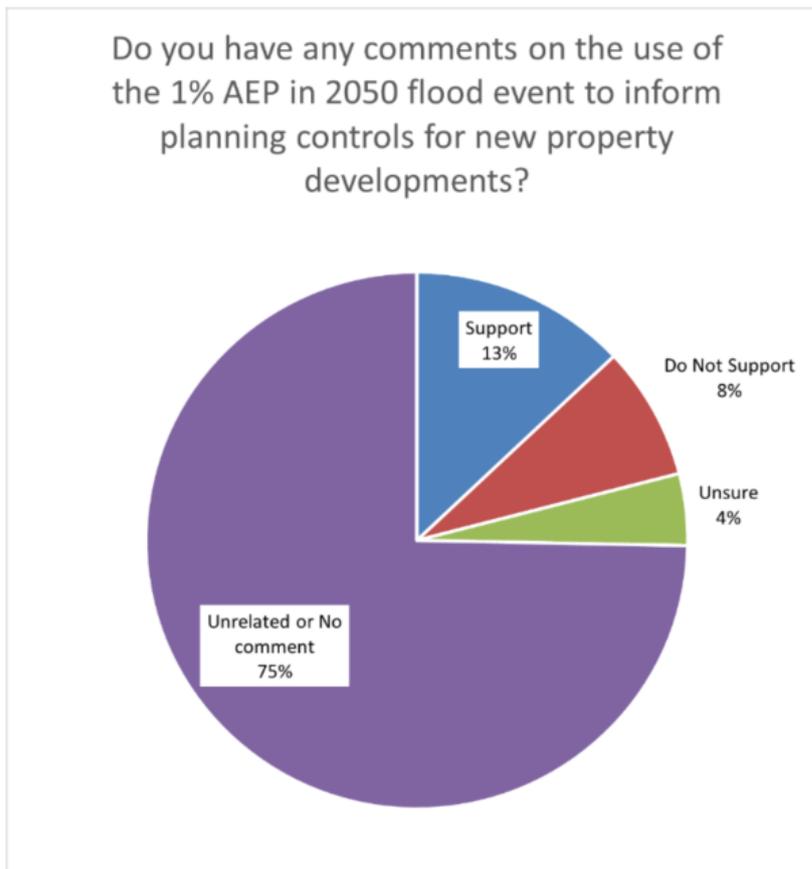


Figure 3-5. Response to use of 1%AEP in 2050 event as planning flood

3.2.7 Community feedback from public exhibition period - key themes

Below are the key themes that emerged from community feedback regarding the Draft Flood Study across all engagement methods (online survey, email, one-on-one sessions and phone calls). CN's response to these concerns are also included.

Theme	Response
Respondents were concerned about increasing flood insurance premiums. Some noted increases prior to the public exhibition period, while others are worried about future increases caused by this study.	<p>It is likely that this flood study will be used by some insurance companies, as it is the most accurate information available and is a highly detailed study, completed using best practice guidelines and modelling techniques. However, insurance companies use multiple tools to determine flood risks and also rely on their own studies and assessments to identify risk and associated premiums for individual properties.</p> <p>CN is encouraging residents to use the mapping from the flood study to have discussions with their insurer to adjust premiums when the flood extent is shown not to impact the dwelling, or if their dwelling is raised above the flood level.</p> <p>If a property owner is concerned that they are being unfairly charged high insurance premiums and their flood risk is minimal (that is, only flooding within their yard or below their raised habitable floor level) data in this Flood Study can be utilised to demonstrate their flood risk is not commensurate with their insurance premiums. Property owners are encouraged to obtain multiple quotations for home and contents insurance to ensure they receive a competitive premium.</p>

Theme	Response
Maps are difficult to read.	Interactive, high-resolution flood maps will be made available on the CN website upon adoption of the Flood Study 2023.
Increased development and introduction of additional impervious surfaces in recent decades have caused an increase in flooding magnitude.	Sensitivity testing has been undertaken in the flood model based on the difference in roof areas and hardstand surfaces defined in LiDAR from 2021 to what was used in the Flood Study 2008. A conservative estimate of a 10% increase in impervious areas was assumed (this may be closer to 5%) and the resulting increase in flood levels was found to be insignificant (less than 10mm) across the study areas for the 1% AEP flood event.
Revised flood modelling and mapping will reduce property values.	This is considered a perception by some respondents who have been notified they are newly flood-affected. Property values are more influenced by market conditions rather than flood affectation. There is no evidence to suggest that property values will decrease for properties now located within flood affected areas. This is especially so given the probable maximum flood is the largest flood that could conceivably be expected to occur at a particular location, and therefore is not typically considered a current risk to potential property buyers.
Council rates will increase.	Council rates will not increase as a direct result of this Flood Study.
Flooding should be managed by better maintenance of street drainage and concrete channels.	<p>CN needs to conduct maintenance of street drainage to improve nuisance flooding from frequent stormwater events, however this maintenance does not significantly influence the impact of larger flooding events.</p> <p>Pits with downstream pipes less than 750 mm in diameter are not within the flood model. ARR 2019 guidelines note smaller pits and culverts (<750mm) are likely to experience blockage during a larger flood event, such as those flood events modelled in this study.</p> <p>Concrete channels are maintained by Hunter Water. Similarly, a degree of blockage is expected at structures crossing the channels during large flood events. CN can raise public awareness regarding maintenance procedures through existing communications channels. This is consistent with the NSW Government Flood Risk Management Manual 2023.</p>
<p>All areas</p> <p>Concerns with flood affected classification</p>	<p>Flood affected land is defined in the NSW Government Flood Risk Management Manual 2023 as land susceptible to flooding by the probable maximum flood (PMF) event. Flood affected land is also known as the floodplain, flood prone land and flood liable land. Hence, land mapped within the PMF extent is deemed 'flood affected.'</p> <p>No change to the methodology for classification of flood affected properties has been proposed, compared to the previous flood modelling adopted in 2008. Flood affected properties are those properties that intersect with the PMF extent. The classification does not consider if a dwelling is raised above the flood level.</p> <p>Whilst some respondents expressed that they had not experienced any flooding at their property, flood affected property classification is based on the PMF, in accordance with the NSW Government Flood Risk Management Manual 2023, and no recorded historic flood event has occurred of this magnitude. The PMF event is used as a planning tool by CN and the NSW SES to understand and manage the risk to human life and property.</p> <p>There is no change required to the flood mapping or flood study.</p>

Theme	Response
Flood model is not accurate at a property level.	The Flood Study 2023 is a high-level study based on Federal and State Government best practice guidelines and has been peer reviewed by the Department of Planning and Environment (DPE) to ensure it is consistent with other studies across NSW. All concerns raised as a result of the public exhibition have been reviewed and no error or inaccuracy is identified that requires the flood model to be re-run.
The flood model should only consider mainstream flooding and overland flow.	Flooding and subsequent flood risk can come from multiple sources, including ocean flooding, mainstream flooding and overland flows. This is consistent with the NSW Flood Risk Management Manual (DPE, 2023). Newcastle is highly prone to flooding, including flash flooding
Climate change and sea level rise should/ should not be considered.	<p>Consideration of climate change to 2050 is consistent with the City of Newcastle 2040 Community Strategic Plan, ARR2019, the NSW Flood Risk Management Manual (DPE, 2023) and is appropriate for this study.</p> <p>Some residents did not believe this should be included while other residents strongly supported the use of this defined flood event (1% AEP in 2050) as a planning tool to make the community more resilient to climate change.</p>
Flooding is shown in areas where there has been no historic evidence of flooding.	<p>Historic flooding extents (for example, the June 2007 Pasha Bulker flood event) is not necessarily indicative of future extreme flood events such as the PMF. For reference, rainfall from the June 2007 event was similar in magnitude at some gauges to the 1% AEP or less.</p> <p>Records of historic flooding have been used in this study for validation and calibration of the flood model to improve its reliability, including the June 2007 Pasha Bulker flood event.</p>
LiDAR is not representative of the actual ground levels across the study area.	<p>LiDAR utilised in the TUFOW hydraulic model was acquired in 2021. Ground levels are accurate to within +/- 0.1m at the 95% confidence interval. Utilising LiDAR is consistent with all council flood studies undertaken in NSW and is consistent with the NSW Flood Risk Management Manual (DPE, 2023). The Flood Study 2023 has been peer reviewed by DPE and confirmed to be consistent with the requirements within the NSW Flood Risk Management Manual (DPE, 2023).</p> <p>It is not feasible to acquire a ground survey for the entire study area.</p>
Council should be doing more (flood mitigation) to reduce flood risk in this Flood Study.	Following the completion of the two flood studies across the Newcastle LGA, CN will re-convene the Flood Risk Management Committee, to advise and prepare the Newcastle Flood Risk Management Study and Plan (FRMSP), that will cover the entire Newcastle LGA. Flood mitigation measures will be explored in the FRSMP stage.
Shared flooding experience	The community submissions included shared experiences of flooding in their local area and the impact on their property, and on private and public assets. This information was considered and will be further explored in the FRMSP stage.

3.2.8 Specific investigations

Feedback that warranted further investigation is outlined below, as well as CN's response to this feedback.

Location and Concern	Response
<p><i>John Pde Merewether</i></p> <ul style="list-style-type: none"> - Flooding is due to public space improvements made by Council - Area not accurately modelled 	<p>The purpose of this Flood Study is to identify current flood risk. It is not about the cause of flooding, such as specific developments or infrastructure.</p> <p>A site inspection was undertaken at this location and the flood model reviewed. No information was identified that indicates that the model inaccurately represents the topography in the area when data was collected, and the study commenced. No additional overland flow paths were identified across the Bathers Way shared path, or along Coane or Watkins St, that may not have been represented in the 2021 LiDAR.</p> <p>It was confirmed that the pillow pedestrian crossings constructed in 2021 are not included in the LiDAR used in the model as their construction occurred after LiDAR collection. The inclusion of these crossings would not have reduced the PMF extent.</p> <p>It should be noted this area was not included in the extent of the 2008 flood model. The previously limited study area in the Flood Study 2008, in conjunction with use of blockage factors (as required by ARR 2019), has resulted in flood extents extending further upstream across the entire study area of the Flood Study 2023 than previously identified. This includes John Parade, Merewether.</p> <p>In the vicinity of John Pde, culverts <750 mm were not identified for inclusion in the flood modelling at the time of data collection for the study.</p> <p>In response to resident concerns and the minimal extent of PMF mapped for properties in this location, it is recommended that flood mapping is identified as 'subject to further investigation' at this location and that appropriate culverts < 750mm are considered for inclusion in a revised model for this location.</p> <p>A note will be included in the Flood Study 2023 as follows: <i>In the vicinity of John Pde, culverts <750 mm were not identified for inclusion in the flood modelling at the time of data collection for the study. Therefore, flood mapping has been identified as 'subject to further investigation' at this location and appropriate culverts < 750mm will be considered for inclusion in a revised model for this location".</i></p>
<p><i>Rail line at Kotara</i></p> <ul style="list-style-type: none"> - Culverts not modelled under rail line at Kotara 	<p>No culverts 750 mm or greater were identified at this location at the time of data collection for the study and hence not included in the flood model at this location.</p> <p>For the flood prone area to the north of the rail line, in the vicinity of the Kotara train station, including Kimbarra Cl, Wallace St and Gregory Pde, flood maps up to and including the 1% AEP in 2050 accurately represent flood behaviour. However, impacts identified for larger events, such as the PMF, need further investigation.</p> <p>It is recommended that PMF mapping is identified as 'subject to further investigation' at this location and that that culverts 750mm are included in a revised model for this location.</p> <p>A note will be included in the Flood Study 2023 as follows: <i>In the vicinity of Kotara train station, no culverts 750 mm and greater were identified under the rail line at the time of data collection for the study and hence included</i></p>

	<i>in the flood modelling. Therefore, flood mapping has been identified as 'subject to further investigation' at this location and culverts 750mm and greater will be included in a revised model for this location".</i>
<i>Lower Throsby Creek</i> - If the current extent (2021) of mangroves and sedimentation within Throsby Ck have been included in the model	Current mangrove establishment was modelled along channel banks, channel bathymetry from 2000 was used, and mangrove islands were not included. Sensitivity testing of the influence of a 2022 HWC bathymetry survey along Thorsby Creek found that the increase in sedimentation and growth of the mangrove islands since 2000 causes increases in 1% AEP in 2050 flood levels in surrounding private properties by 10 mm and 50 mm, respectively. Hunter Water is responsible for maintenance of the Throsby Creek channel. Discussions around appropriate channel maintenance to manage flood impacts will continue with Hunter Water, with the intent to maintain the channel flood conveyance from 2000 as modelled in the Flood Study 2023.
<i>Flood affected properties with 0.01m² or less of PMF extent within boundary should not be classified as flood affected</i> - 47 properties are identified as impacted by the PMF extent from 0.000002 to 0.01m ²	An internal 'minimum area rule' has been applied to Flood Information Certificates (required under Section 10.7 of the <i>Environmental Planning and Assessment Act 1979</i>) to remove flood affected land classification from properties with a PMF area of 0.01m ² or less. There is no change required to the flood mapping or flood study report as a result of this amendment.

3.2.9 Conclusion

Flood modelling for the Flood Study 2023 was undertaken based on current industry guidelines and best practice modelling methodology and assumptions. It has undergone peer review and been overseen by the NSW Department of Planning and Environment to ensure this study is technically consistent with other flood studies completed across NSW.

It is recommended that flood mapping is identified as 'subject to further investigation' at John Parade, Merewether, and Kimbarra Close, Wallace Street and Gregory Parade, Kotara and that the flood modelling is updated at these locations.

It is recommended that 47 properties in the study area with 0.01m² or less of probable maximum flood (PMF) extent within their boundary be not classified as flood affected.

Minor revisions should be made to the Flood Study 2023, in relation to the notation of the Merewether and Kotara further investigations. A section on the public exhibition outcomes should also be added to the Flood Study 2023.

