

Our Ref: ID2256
Your Ref:

29th January 2024

Elizabeth Kimbell
Department of Planning, Housing and Infrastructure
Locked Bag 5022
Parramatta NSW 2124

email: elizabeth.kimbell@dpie.nsw.gov.au

Dear Elizabeth,

Planning Proposal for 146 Newbridge Road, Moorebank

Thank you for the opportunity to provide comment on the Planning Proposal which seeks to amend the Liverpool Local Environmental Plan (LEP) for 146 Newbridge Road, Moorebank (the Site).

We understand that the Moorebank East precinct has been subdivided into three main development sites:

- Georges Cove Residences (Site C), which is a previously approved medium density residential development currently being constructed by Mirvac.
- Georges Cove Village (Site A), which is likely to be developed as a commercial and light industrial facility subject to a separate Planning Proposal.
- Georges Cove Marina (Site D), **which is the subject site for this Planning Proposal.**

The Planning Proposal¹ for Georges Cove Marina seeks to:

- Include two additional permitted uses of residential accommodation and restaurants or café's, within the existing RE2 Private Recreation Zone.
- Increase the number of dwellings by 374, the on-site population by between 842-1029 people, and the number of car spaces by 592.
- Increase the density of at-risk population by amending the Maximum Floor Space Ratio from 0.25:1 to 0.4:1.
- Increase the density of at-risk population by amending the Maximum Height of Buildings from 21m to 35m.

We note from the Flood Impact Assessment that *"This Planning Proposal for the Mirvac Georges Cove Marina (site D) adopts the Council approved landform, basement carpark, southern area ground car park and Boatshed from the approved Benedict Georges Cove*

¹ EMM. 2023. Georges Cove Marina: Modified Planning Proposal.

Marina development and provides retail and open space on the ground floor and apartments and terraces on level 1 and above.”²

The NSW State Emergency Service (NSW SES) is the agency responsible for dealing with floods, storms, and tsunamis in NSW. This role includes, planning for, responding to, and coordinating the initial recovery from floods. As such, the NSW SES has an interest in the public safety aspects of the development of flood prone land, particularly the potential for changes to land use to either exacerbate existing flood risk or create new flood risk for communities in NSW.

The consent authority will need to ensure that the planning proposal is considered against the relevant Ministerial Section 9.1 Directions, including 4.1 – Flooding and is consistent with the NSW Flood Prone Land Policy as set out in the Flood Risk Management Manual 2023 (the Manual) and supporting guidelines, including the Support for Emergency Management Planning. Key considerations relating to emergency management are outlined in Attachment A.

In summary, we:

- **Recommend** reconsidering the proposed residential development on the site, as:
 - *“The properties along Newbridge Road in Moorebank, (..) are located on **one of the worst flood ways in NSW**”³*, as noted in the meeting minutes of Liverpool City Council meeting held in March 2022.
 - It is located on a high-risk floodplain as identified in the NSW 2022 Independent Flood Inquiry.
 - The Molino Stewart evacuation report⁴ states *“Development at Moorebank East should be restricted, considering it is estimated that half of the potential evacuation capacity is taken up by the already-approved Site C development.”*, and also states that *“planning proposals for Moorebank East (..) would take up road capacity currently used by Chipping Norton evacuees and thousands would be caught by floodwaters who would otherwise have time to escape”*. Further information on evacuation constraints is detailed in Attachment A.
- **Recommend** that Council’s Georges River Flood Study 2020, although not yet adopted by Council, is used to determine the flood risk on the site, to use the best available information. This study indicates that the entire proposed development site is in a high flood risk precinct.⁵

² Tooker and Associates. 2023. Flood Impact assessment and Flood Emergency Response Plan. Section 3 Site Description, Page 2

³ Liverpool City Council. 2022. Minutes of the Ordinary Meeting held on 30 March 2022. Item No: QWN 02, Page 27

⁴ Molino S. 2022. Georges River Evacuation Modelling – Flood Evacuation Analysis, Final. Pages viii - ix.

⁵ BMT. 2020. Georges River Flood Study - Final Draft Mapping Compendium, Flood Risk Precinct - Figure A-20

- **Recommend** seeking advice from NSW Reconstruction Authority regarding the proposed development
- **Recommend** careful consideration of the site to ensure that the proposed buildings are not subject to high hazard floodwater. The current proposal would be subject to high hazard (H5 and H6) floodwater and potential debris during frequent flood events, which poses a risk to the structural safety of the buildings supported by the supporting piles.
- **Recommend** that any proposed basement carparking is designed to ensure that it is passively protected to the Probable Maximum Flood (PMF) – i.e., that all entrances and openings (vents, etc) are located above the PMF.
- **Recommend** further consideration of safety features for any proposed lifts, to ensure floodwater does not enter the lift and ensure people do not exit into flooded areas.
- **Recommend** ensuring that any proposed plant rooms, service rooms and waste storage are located above the PMF, to minimise disruption to essential services and reduce risks of exposing persons onsite or downstream to polluted floodwater.

You may also find the following Guidelines, originally developed for the Hawkesbury Nepean Valley and available on the NSW SES website useful:

- [Reducing Vulnerability of Buildings to Flood Damage](#)
- [Designing Safer Subdivisions](#)
- [Managing Flood Risk Through Planning Opportunities](#)

Please feel free to contact Peter Cinque via email at rra@ses.nsw.gov.au should you wish to discuss any of the matters raised in this correspondence. The NSW SES would also be interested in receiving future correspondence regarding the outcome of this referral via this email address.

Yours sincerely



Nicole Hogan

Director Emergency Management

NSW State Emergency Service

ATTACHMENT A: Key Emergency Management Considerations Relevant to the Site

Increased Exposure to Flood Risks

The proposal is situated on a high-risk floodplain as identified in the NSW 2022 Independent Flood Inquiry⁶ and highlighted in meeting minutes of Liverpool City Council meeting held in March 2022, which states *“The properties along Newbridge Road in Moorebank, (..) are located on one of the worst flood ways in NSW.”*

Recommendation 22 and 15 of the NSW 2022 Flood Inquiry⁷ advocates for a planned retreat from areas at most risk on the floodplain. The proposed development is essentially an advance into the floodplain. The Inquiry also recommends that essential services and floodplain infrastructure is situated above the Flood Planning Level (Recommendation 28). It would be challenging to ensure the communications, water, power, and sewerage etc. would be above the Flood Planning Level, whether it be the current 1% AEP flood plus 0.5 metres freeboard or revised.

Increased Risk to Life

Decisions on development within the floodplain does not increase risk to life from flooding and should consider the full range of risks to the community. The site is impacted by floods as frequently as 5% AEP events, below the current Flood Planning Level. In a 1% AEP event, the flood depth in part of the site can reach above 5 meters⁸ and the flood hazard level reaches H5 – H6⁹, which is *“unconditionally dangerous and unsuitable for any type of development”* and classified as a high-risk precinct.¹⁰ Further, *“the high flood risk area is where high flood damages, potential risk to life, or evacuation problems are anticipated. Most development should be restricted in this area.”*¹¹

In an **Extreme Flood**, the flood depth on the entire site can reach above 10 meters¹², with a flood hazard level of H6 for the entire site,¹³ with the northern part of the site becoming a **floodway**.¹⁴ Any development on the site is therefore likely to result in changes to flood behaviour and be at risk of failure. We therefore highly recommend consulting DCCEEW regarding the flood impacts on the infrastructure and on surrounding sites.

⁶ NSW Government. 2022. Independent Flood Inquiry.

⁷ NSW Government. 2022. Independent Flood Inquiry.

⁸ BMT. 2020. Georges River Flood Study - Final Draft Mapping Compendium. Figure A-05

⁹ BMT. 2020. Georges River Flood Study - Final Draft Mapping Compendium. Figure A-13

¹⁰ BMT. 2020. Georges River Flood Study - Final Draft Report. Section 7.4 - Flood Hazard. Page 140

¹¹ BMT. 2020. Georges River Flood Study – Final Draft Report. Flood Risk Precincts, Page 142

¹² BMT. 2020. Georges River Flood Study - Final Draft Mapping Compendium. Figure A-8

¹³ BMT. 2020. Georges River Flood Study - Final Draft Mapping Compendium. Figure A-15.

¹⁴ BMT. 2020. Georges River Flood Study - Final Draft Mapping Compendium. Flood Function – Figure A-11

The site is identified as a Low Flood Island, meaning it is isolated prior to becoming inundated. The site access is subject to frequent flooding. Low Flood Islands represent a significant risk factor that would be best avoided for development due to the difficulties in carry out large scale evacuation operations, resulting a large risk of mass rescue, as detailed in subsequent sections.

There are a number of significant secondary risks associated with Low Flood Islands that must be considered. When evaluating potential impact, the risk of isolation, secondary risks and human behaviour should be considered. There is no known safe period of isolation in a flood, though the longer the period of isolation, the greater the risk to occupants. Risk to occupants may be compounded by secondary risks such as fires or medical emergencies. There is also the risk that people will not follow emergency management plans, for example they may refuse to remain isolated from family for an extended duration.

Emergency services are also exposed to greater risks than if flood-free access was available. This unnecessarily exposes emergency service personnel to flood situations which may lead to the injury or death. In recognition of this possibility, emergency services are under an increasing demand to consider the safety of personnel. Each circumstance must be subject to an individual risk assessment at the time. If, after conducting a risk assessment of an incident, a Commander or team leader is unsatisfied with the level of risk involved, the response will be delayed until the risk can be reduced or is no longer present.

The probability of a fire occurring on a site whilst it was isolated and surrounded by floodwaters would be greater due to power surges, electrical faults and the use of ad hoc heating and lighting measures such as candles. The likely delay in response times during floods would greatly exacerbate the chances of a fire spreading from its point of origin, of which increases the risk of injury or death to occupants of the building. This was the case in the 2011 Brisbane floods where a fire broke out inside Suncorp Stadium (Lang Park), which was flooded at the time.

There is limited evidence to indicate that there would be structural stability of the buildings located in the high hazard floodway. The Flood Impact Assessment states *"The building platform will provide a low flood hazard environment"*¹⁵, however, we recommend considering the structural suitability of the placement of the proposed development in high hazard floodwater, considering the forces of the floodwater as well as debris loading on the building structure.

¹⁵ Tooker and Associates. 2023. Mirvac Georges Cover Marina Flood Impact Assessment and Flood Emergency Response Plan v4 010823, Section 8.3, Page 13

The proposed development is stated to include buildings “supported on piles to form more flood storage”¹⁶ and that “flood flows would be designed to pass under the carpark”.¹⁷ These supporting piles are expected to become subject to high hazard floodwater during frequent flood events, which poses a risk to the structural safety of the buildings supported by these piles. When considering the post development landform heights compared to the predicted benchmark pre-development flood levels (Cardno 29 Jan 2013), we understand that the supporting piles are expected to become subjected to high hazard floodwater (H5, and potentially H6, due to flood depths >2m) in events as frequent as a 20 year ARI flood event.¹⁸ This is consistent with the updated flood modelling from 2020, where the location of the proposed development¹⁹ is located on land that is modelled to become inundated by floodwater with depths of 3-4m or greater in a 5% AEP event²⁰. The modelling also shows that high hazard (H5) floodwater would be present on the site of the proposed development in more frequent events such as the 20% AEP flood event.²¹

Furthermore, the proposal includes basement carparking which is impacted as frequently as the 1 in 20 year ARI. Basement car parks have inherent risks to life and property²² and can often restrict safe evacuation of the occupants. This can be managed through building design, such as crest levels and vents above the PMF to prevent water ingress and flooding and protection of lift services to ensure lifts to not put people into floodwater.

We are aware that a previous Land and Environment Court decision (Moorebank Recyclers Pty Ltd v Benedict Industries Pty Ltd and Ors [2018] NSWLEC 1089) refused development at the site due to the potential contamination and impact on water quality. This risk would also impact on the health and safety of any volunteers that would be involved in response operations for the site or people using the site if they entered the floodwaters.

Increased Demand on Emergency Services

The area is an existing flood rescue hotspot for NSW SES, which would be exacerbated by increasing the density of the population at risk. According to the Georges Cove Marina Modified Planning Proposal (2023), “the Social Impact Assessment (SIA) identifies that the proposal to provide 374 new dwellings for the Moorebank East precinct will generate an

¹⁶ Tooker and Associates. 2023. Mirvac Georges Cover Marina PP Flood Impact Assessment and Flood Emergency Response Plan v4 010823, Section 3, Page 3

¹⁷ Tooker and Associates. 2023. Mirvac Georges Cover Marina PP Flood Impact Assessment and Flood Emergency Response Plan v4 010823, Section 3, Page 3

¹⁸ Tooker and Associates. 2023. Mirvac Georges Cover Marina PP Flood Impact Assessment and Flood Emergency Response Plan v4 010823, Sections 3 and 4, Page 3

¹⁹ EMM. 2023. The Georges Cove Marina - Modified Planning Proposal. Section 5.3.7 Social and Economic Effects, Page 12

²⁰ BMT. 2020. Georges River Flood Study - Final Draft Mapping Compendium. Figure A-3, Page 5

²¹ BMT. 2020. Georges River Flood Study - Final Draft Mapping Compendium. Figure A-1, Page 3

²² Collier, L. Phillips, B., and Griffin, M. 2017. Basement Development in the Floodplain. Floodplain Management Australia Conference. Newcastle, 2017.

increase in the Moorebank population by between 842 to 1,029 people, in particular increasing the numbers of families with young children in the precinct.” (pg. 45) ²³

Several flood rescue jobs have historically been responded to by the NSW SES in the area, as recently as 2020, 2021 and 2022. This includes responding to people trapped in their cars and properties by floodwaters and ambulances being unable to reach patients to provide emergency medical assistance.

Elevated structures to achieve compliance with habitable floor levels, although effective for property protection, brings with it the problem that residents will be convinced that it is safe to “sit-out the flood”. Unfortunately, our experience is that people change their mind about this option after they have been surrounded by flood water or when essential services such as water, power and sewer cease to function. Rescue, resupply, and medical responses are difficult and can be dangerous under these conditions. Building stability can also be an issue, particularly in high hazard floods where all buildings are susceptible to structural failure. In summary, **NSW SES resources will be required to rescue and/or resupply occupants due to less than 100% evacuation.**

Consideration of Climate Change

Climate Change has not currently been adequately considered to ensure risks are understood and managed for the future users of the site. Continuing research by the Bureau of Meteorology and the CSIRO predicts more intense, short duration heavy rainfall events. The projected increase in heavy rainfall will increase flood risk in cities, built-up urban areas, and small catchments, where extreme rainfall over hours to a day not only can result in riverine flooding but can also quickly become flash floods and cut roads prior to the onset of riverine flooding.

Risk to Life Treatment Options

Evacuation

Development of the floodplain should have sufficient evacuation capacity and should not impact on the ability of the existing community to safely and effectively respond to a flood.

The existing assessment does not adequately consider the cumulative impacts the development will have on risk to life and the existing and future community and emergency service resources in the future, including the converging evacuation traffic from the existing and proposed adjacent developments along Georges River. The ability of the existing community to effectively respond (including self-evacuating) within the available timeframe on available infrastructure is to be maintained. It is not to be impacted on by the cumulative impact of new development.

²³ EMM. 2023. The Georges Cove Marina - Modified Planning Proposal. Section 5.3.7 Social and Economic Effects, Page 45

The Georges River Evacuation Study (Molino Stewart 2022) highlighted the limitations of the existing road network to accommodate the large number of developments proposed for this area. The assumptions of the NSW SES evacuation model are explained in the Hawkesbury Nepean Flood Evacuation Model Report.

NSW SES is the legislated authority for planning for and coordinating the evacuation of people affected by flooding. To assist in this, NSW SES creates sub-sectors that align to the Flood Emergency Response Classification of Communities. An appropriate emergency response strategy is applied accordingly. For example, properties situated on a low flood island would need to be evacuated before they become isolated to avoid the need for mass rescue. However, neither the NSW SES nor the Bureau of Meteorology can provide special individual flood warning services for each business site. Any proposed Emergency Management strategy for an area should be compatible with the evacuation strategies identified in the Liverpool City Flood Emergency Sub Plan or as advised by NSW SES, where evacuation is the primary Emergency Management Strategy²⁴.

The proposed evacuation route along Brickmakers Drive becomes inundated with flood waters as frequently as a 1% AEP event²⁵ and during a PMF event becomes inundated with flood waters in excess of 1m in depth²⁶. During a PMF event this area is classified as Hazard Level 6 (H6)²⁷ which is classified as not suitable for people, vehicles or buildings²⁸.

The vehicle evacuation route proposed *“will be via the Mirvac Georges Cove Residences (site C) residential area (which is already at a higher than the 100 year ARI flood level) and then onto the existing high level road bridge leading to Brickmakers Drive and then onto Maddecks Avenue and Nuwarra Road. Nuwarra Road is above the Probable Maximum Flood (PMF) level.”*²⁹ Maddecks Avenue is a suburban street which is primarily a single lane in each direction. It includes several intersections, turning lanes and roundabouts, plus surface parking and a speed limit of 50km/h³⁰.

²⁴ Liverpool City Flood Emergency Sub Plan. Endorsed April 2023 Section 5.8, Page 16

²⁵ BMT. 2020. Georges River Flood Study, Final Draft Mapping Compendium, Figure A-5 1% AEP Modelled Peak Flood Depths, Velocities and Water Levels

²⁶ BMT. 2020. Georges River Flood Study, Final Draft Mapping Compendium, Figure A-8 Extreme Modelled Peak Flood Depths, Velocities and Water Levels

²⁷ BMT. 2020. Georges River Flood Study, Final Draft Mapping Compendium, Figure A-15, Extreme Best Practice Flood Hazard

²⁸ Department of Planning and Environment. 2023. Flood Hazard, Flood Risk Management Guideline FB03, Table 1 Combined hazard curves vulnerability thresholds

²⁹ Tooker and Associates. 2023. Flood Impact assessment and Flood Emergency Response Plan. Section 5, Proposed Development, Page 4

³⁰ Google Maps 2023 imagery of Maddecks Road between Brickmakers Drive and Nuwarra Road

This presents a 'pinch point' at the start of the evacuation route which limits traffic flow to a single lane, it is therefore not appropriate to apply "the operational capacity for basic motorway segments"³¹ as traffic flow will be greatly reduced by several factors:

- Design capacity of a single lane, 50km/h road
- Reduction in traffic capacity due to impacts of on-street parking³²
- Reduction in traffic capacity due to roundabouts³³
- Impacts of weather conditions
- Background traffic from surrounding area not inside evacuation zone
- Cumulative impacts of other evacuating traffic noting that Nuwarra Road forms part of a major evacuation route for Chipping Norton and surrounding areas

As stated in the Georges River Evacuation Modelling Report *"Nuwarra Road is an evacuation bottle neck which may prevent the timely evacuation of parts of Chipping Norton. The provision of an additional southbound lane from Brickmakers Road to Heathcote Road and the utilisation of Brickmakers Road and Anzac Road for some of the Chipping Norton evacuation traffic may alleviate this problem"*³⁴. As the proposed evacuation route joins Nuwarra Road, this development would add up to 592 additional vehicles³⁵ (in conjunction with other vehicles from the other sites on the Moorebank East precinct) to this thoroughfare, increasing the risk of life to those already evacuating the Chipping Norton area. This would transfer additional risk to emergency services who will be called upon for rescue of those unable to evacuate.

The report goes on to state that development at Moorebank East should be restricted, considering it is estimated that half of the potential evacuation capacity is taken up by the already-approved Site C development. An additional lane on Nuwarra Road should be investigated to see whether it would provide sufficient additional evacuation capacity to enable further development at Moorebank East without compromising the safe evacuation of existing development in Chipping Norton³⁶. Further, *"the vast majority of the area inundated by the Georges River PMF experiences high hazard flooding (..) for over 24 hours, in many places in excess of 40 hours. Therefore, failing to evacuate or deliberately sheltering in place*

³¹ Tooker and Associates. 2023. Flood Impact assessment and Flood Emergency Response Plan. Attachment E. Risk-e Business Review - Vehicle capacity per lane during evacuation, Page 4

³² Wijayaratna, S. 2015. Impacts of On-Street Parking on Road Capacity. *Australian Transport Research Forum Proceedings, 30 September -2 October 2015, Sydney Australia.*

³³ Austroads. 2020. Guide to Traffic Management Part 3: Transport Study and Analysis Methods. Section 7.2 Roundabouts

³⁴ Molino, S. 2022. Georges River Evacuation Modelling – Key Findings, Existing and Infill Development, Page V

³⁵ Tooker and Associates. 2023. Flood Impact assessment and Flood Emergency Response Plan. Section 6.4 Flood Emergency Response Plan, Page 6

³⁶ Molino, S. 2022. Georges River Evacuation Modelling – Key Findings, Existing and Infill Development, Page viii

in the Georges River floodplain is particularly risky considering buildings can be isolated and inaccessible to emergency services for more than 24 hours.”³⁷

Pedestrian and Rail Evacuation

It is unacceptable to expect people to escape from a flood on foot as identified in the proposal. As identified in section 7.1.5 of the Georges River Evacuation Modelling Report, it is unacceptable to expect people to escape from a flood on foot as identified in the proposal. This is particularly concerning, with the high likelihood of ongoing poor weather conditions and should not be used to justify the development. Pedestrian evacuation is a backup strategy.

Pedestrian evacuation is a rare phenomenon since car ownership became widespread and factors associated with a large-scale pedestrian evacuation are not well-understood. However, research following the 9/11 attack on the World Trade Centre indicates that the pedestrian evacuation that occurred was multi-modal, where many people walked to get a ferry, bus or train. Many complex issues were identified in this event, including the safety challenges of pedestrians and vehicles sharing routes, the large number of officials required to coordinate the evacuation on-ground, pedestrians being exposed to the weather, limited capacity to carry important documents and possessions particularly those requiring medicines or children’s items and with pets.

In the context of the proposed development pedestrian evacuation would be constrained by:

- Distances that evacuees may need to travel - evacuation by foot could exceed a distance greater than 1 km from the site.
- Weather at the time of an evacuation becoming necessary - an evacuation by foot may coincide with heavy rainfall and strong winds which may dissuade people from selecting this strategy.
- Time of day - people may be reluctant to evacuate at night.
- Evacuation of people with special needs who may lack the mobility to evacuate by foot.
- Disruption to onsite and offsite infrastructure resulting in evacuees navigating streets, paths, and bridges in darkness.
- Hazards such as downed powerlines due to strong winds and storm damage.

The pedestrian evacuation route assumes evacuation to the Moorebank Library and Community Centre or beyond to the shopping centre and any nearby public transport. The Moorebank Library and community centre has a capacity of 100 evacuees while the total number of evacuees may be up to 2622 should vehicle evacuation fail or be unavailable³⁸. This would necessarily require evacuees to move on, either to larger evacuation centres or to friends and family.

³⁷ Molino, S. 2022. Georges River Evacuation Modelling – Flood Evacuation Analysis, Final. Page 34

³⁸ Tooker and Associates. 2023. Flood Impact assessment and Flood Emergency Response Plan. Section 6.4

The closest bus stops in the vicinity of the site are on Newbridge Road and are served by bus route M90, which operates from Liverpool Station to Burwood Station via Bankstown.³⁹ Newbridge Road at Brickmakers drive becomes inundated with flood water up to 2m in depth as frequently as a 5% AEP event⁴⁰. This means evacuees would need to travel a greater distance to access public transport which is running out of the area.

Similarly, large scale rail evacuation in Sydney cannot be relied upon as a primary evacuation strategy or where vehicular evacuation fails during flood events. The reliability of the Sydney Rail network can be severely impacted in storms and floods. For example, in April 2015, Sydney Trains estimates nearly 200 significant incidents to Sydney Trains and NSW Trains, and approximately 585 peak and non-peak services were affected during a 3-day period of storms⁴¹. Compounding on this, is the increased complexity in evacuation operations arising from this strategy. For example, it would require significant resources to manage, coordinate and appropriately communicate to the community and provide adequate infrastructure and essential services while evacuees are waiting at the train station, for example toilets. People would also be attempting to carry large amounts of luggage and supplies with them, potentially with children or other vulnerable members of the community.

The private motor vehicle is therefore likely to be the most effective means of evacuation transport. The motor vehicle also provides an important although limited capacity for people to save some of their possessions, most of which will almost certainly be lost in large floods.

Addressing Risk to Life with Site Specific Emergency Planning

The NSW SES is opposed to the imposition of development consent conditions requiring private flood evacuation plans rather than the application of sound land use planning and flood risk management. Section A2.4 of the Support for Emergency Management Planning notes site-specific flood response plans as a development consent condition are not an effective measure for addressing continuing risk nor suitable for addressing the impacts of the development on emergency management risks to the existing community. This is particularly problematic where consent conditions are used to overcome a flood risk that would otherwise be considered unacceptable in the context of the proposed development.

The Flood Risk Management Manual 2023 notes flood risk management plans are 'living documents' which need to be regularly reviewed to ensure they remain appropriate to address the flood risk to the community, can be practically implemented and consider changing information and lessons learnt from any floods since the last review. This ongoing

³⁹ EEM. 2023. Georges Cove Marina Modified Planning Proposal, Section 5.3.4 Traffic, i Existing Traffic and Transport

⁴⁰ BMT. 2020. Georges River Flood Study, Final Draft Mapping Compendium, Figure A-3 5% AEP Modelled Peak Flood Depths, Velocities and Water Levels

⁴¹ TfNSW. 2016. Climate Risk Assessment Guideline

review process is unlikely to be implemented in a private ownership context where there is no external audit or monitoring.

In addition to the above, the proposed site specific plan:

- Assumes that power and/or communications will still be available. There are often outages of such services during major flooding.
- Would still rely on a trigger to evacuate prior to inundation occurring. There is considerable historical evidence that some people, occasionally in large numbers, will not heed the call to evacuate early and will instead wait until they see floodwater in their immediate vicinity. In doing so it is possible that people will not have sufficient time to get off the site before floodwater encroaches around their dwelling or workplace and require resupply or rescue. In addition, if the forecast height does not result, then there is an effect on subsequent evacuation compliance rates due to the “cry wolf” effect.
- Relies on the actions of a flood warden, who is unlikely to be an emergency management expert and places significant burden on the individual to analyse and interpret flood information.
- May cause confusion and provide conflicting information. All warnings issued by the NSW SES are considered official warnings and will be viewed on the SES website and HazardWatch launched by the NSW SES on 30 September 2022 as part of the Australian Warning System. This new site is geared to displaying official NSW SES warnings and in time flash flood warnings and warnings from other emergency services. If the early warning system is pursued, the Australian Warning System terminology will not be able to be adopted unless it is an established warning system within the NSW SES framework.
- Assumes “immediate evacuation”. There has been no consideration of the time required for occupants to validate and process the information (warning acceptance factor) and for them to collect their belongings or children and pets). Furthermore, no matter how many warning technologies are used, door knocking is the only way of ensuring everyone has been warned. Any time advantage is gained by the application of warning technology should be considered as a safety factor, not a potential for increasing the scale of the development and simply wiping out the safety factor with more risk exposure. In some instance, people will not be home and will return to collect their valuable possessions prior to evacuating. In other instances, it may be in the middle of the night.
- Assumes more than 12 hours is available for evacuation. The confident warning timeframe for the Liverpool flood gauge is around 12 hours for above 4 metres with a flood peak forecast criteria (70% +/- 0.3m)⁴².

⁴² Bureau of Meteorology. 2013. Service Level Specification for Flood Forecasting and Warning Services for New South Wales and the Australian Capital Territory

Therefore, such a private evacuation plan is not a sufficient means to mitigate the increase in risk to life, and property, as a consequence of the proposed development.

Managing Residual Risk

The Moorebank area is currently serviced by the NSW SES Liverpool Unit, supported by the Metro Zone. The resources of the Zone cover several high-risk river systems that can flood singly or in combination, along with flash flooding in the numerous creek systems. Managing evacuations is already complex. Adding additional people would further result in increased complexity and reliance on human behaviour.

If the proposed development were to proceed there would be a substantial cumulative increase in residual risk to life. This increase requires even more community engagement and preparedness programs along with stretching resources in an already complex response operations environment.

The NSW SES would require a substantial increase in response capability and resources and additional Community Engagement and Safety programs for the Liverpool LGA, for the life span of the proposed development.

Ongoing community awareness of flooding is critical to assist effective emergency response. The consent authority should consider the cumulative impacts any development will have on risk to life and the existing and future community and emergency service resources in the future. No considerations are outlined in the report as to the organisation of emergency response and how this would achieve little to no additional demand on scarce NSW SES resources.