Our Ref: ID 2369
Your Ref: SSD-16858710

22 April 2024

Stephen Earp
EPM Projects Pty Ltd
PO Box 1449
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email: kclydsdale@epmprojects.com.au
CC: lisa.ignatavicius1@ses.nsw.gov.au

Dear Stephen,

Revised Development Application for Pacific Brook Christian School Muswellbrook

Thank you for the opportunity to review and provide advice on the additional information prepared for the Revised Development Application for Pacific Brook Christian School. It is understood that the proposed development seeks to develop the site at 72-74 Maitland Street, Muswellbrook to build a new school, the Pacific Brook Christian School, to accommodate 330 students in addition to staff, with Stage 1 works element comprising 130 students plus additional staff.

The NSW State Emergency Service (NSW SES) is the agency responsible for dealing with floods, storms and tsunami 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 NSW SES recommends that consideration of flooding issues is undertaken in accordance with the requirements of NSW Government's 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 and relevant planning directions under the *Environmental Planning and Assessment Act, 1979*.

We refer to our previous correspondence dated 13 June and 21 August 2023 and confirm our advice provided therein (attached). The NSW SES still recommends careful consideration of the proposal for development on this flood prone site, with the associated flood risks, particularly as the future occupants are unlikely to be able to evacuate within the available time. Even with the reduced yield the proposed development will result in an increase in the complexity of flood operations for the Muswellbrook LGA, and directly transfer the risk to NSW SES for evacuation, resupply and potentially rescue.

In summary, we recommend:

- The risk assessment considers the full range of flooding, including events up to the Probable Maximum Flood (PMF). This should also include flood hazards and depths up to and including the PMF and not focus only on the 1% AEP flood[1].
- The risk assessment considers flood warning and evacuation demand on existing and future access/egress routes.
- The risk assessment considers the cumulative impacts that the development will have on risk to life, the existing and future community and emergency service resources.
- Development strategies that do not rely on sheltering in buildings surrounded by flood water, as they are not equivalent, in risk management terms, to evacuation.
- Development strategies that do not rely on an assumption that mass rescue is possible where evacuation either fails or is not implemented.
- Buildings are made as safe as possible to occupy during flood events, for example designed for potential flood and debris loadings of the PMF so that structural failure is avoided during a flood.
- Considering conditions to limit future intensification of use of the site, and reduce the potential risk to life and property.

As one of NSW SES legislated functions includes the establishment of flood warning systems (*SES Act, 1979 s8 (a)),* NSW SES has been involved with the scoping of a proposed council owned and operated Muscle Creek Flood Warning System. Given the short timeframe available prior to the onset of flooding in this catchment, it is unclear if this warning system would provide the school sufficient notice to evacuate safely before the access/egress roads were cut. Regardless, NSW SES does not support use of private flood evacuation plans rather than the application of sound land use planning and flood risk management.

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

- Reducing Vulnerability of Buildings to Flood Damage

Please feel free to contact Gillian Webber 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

Peter Cinque
Senior Manager Emergency Risk Management
NSW State Emergency Service

[1] Royal Haskoning DHV (2023) - Flood Evacuation Management Plan (FEMP) Pacific Brook Christian School page 20 and page 22

Our Ref: ID 1984
Your Ref: PAE-58876209

13 June 2023

via email: Planning Portal
cc: adam.flynn@dpie.nsw.gov.au; lisa.ignatavicius1@ses.nsw.gov.au

Dear Adam

State Significant Development Application (SSDA) for the proposed development of a new school at 72-74 Maitland Street, Muswellbrook

Thank you for the opportunity to provide advice on the Pacific Brook Christian School, Muswellbrook. It is understood the project seeks to:

- Develop the site at 72-74 Maitland Street, Muswellbrook to build a new school, the Pacific Brook Christian School, with staged construction over the next 20 years.
- Accommodate 656 students and 65 full time equivalent (FTE) staff.
- Provide vehicle access via Maitland Street with 67 car parking spaces and 72 bicycle spaces.

The NSW State Emergency Service (NSW SES) is the agency responsible for dealing with floods, storms and tsunami 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.

It is noted that the Secretary's State Significant Site Study Requirements include 'demonstrated consistency with the NSW Floodplain Development Manual, 2005 (the Manual)' in relation to flooding. In this regard, attention is drawn to the following principals outlined in the Manual, which are of importance to the NSW SES role as described above:

- **Development should not result in an intolerable increase in risk to life, health or property of people living on the floodplain.**

  The site at 72-74 Maitland Street Muswellbrook is affected by 1% Annual Exceedance Probability (AEP) in the north-western portion. In the 0.2% AEP flood event the site is affected by shallow (less than 0.5m deep) overland flow as water breaks the banks of Muscle Creek. The entire site is fully inundated by more than 2m depth floodwater during a Probably Maximum Flood (PMF)[1]. In addition, south Muswellbrook becomes isolated from the city centre to the north, between a few hours up to approximately 24 hours in as little as the 5% AEP[2].

[1] RHDHV Flood Impact Assessment 2022 page 15
[2] Draft NSW SES Muswellbrook Local Flood Plan 2021 Volume 3 page 2

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In a flood emergency, the school community of 656 students and 65 staff, the important educational facility would be placed at risk and may require evacuation. Locating developments whose users are particularly vulnerable during flooding including in evacuation, such as children, in an area that needs to be evacuated within the available warning time results in a higher increase in risk of fatalities and demand on limited emergency management resources than if it were located in an area where it could be easily evacuated in the time available or where evacuation is not required.

- **Risk assessment should consider the full range of flooding, including events up to the Probable Maximum Flood (PMF) and not focus only on the 1% AEP flood.**

  The NSW SES note that the full range of flooding was modelled for the Flood Impact Assessment Report including climate change[3]. For land use planning, NSW SES particularly note that the 0.2% AEP peak Muscle Creek discharge (flow) was 37% higher than the 1% AEP peak discharge. Given that it is estimated that climate change may increase design rainfall depths in the order of 30%, the 0.2% AEP event gives an indication of what a future 1% AEP event may look like if rainfall depths increase by 37%[4].

  Modelling has been provided for the proposed flood mitigation option MC2 (Muswellbrook Golf Course Flood Bund). Figure Dev2 100yrCC indicates that most of the site becomes inundated and surrounded by flood water to a depth of 0.5m in a 1% AEP flood[5]. The flood area of impact is extended. Flood duration and hazard category with the proposed MC2 should also be provided.

  The impact the proposed development would have on flood behaviour, including vegetation removal etc. should also be considered.

- **Risk assessment should have regard to flood warning and evacuation demand on existing and future access/egress routes. Consideration should also be given to the impacts of localised flooding on evacuation routes. In the context of future development, self-evacuation of the community should be achievable in a manner which is consistent with the NSW SES's principles for evacuation. Future development must not conflict with the NSW SES's flood response and evacuation strategy for the existing community. Evacuation must not require people to drive or walk, through flood water**.

  A flood risk assessment for the proposed development should therefore assess flood evacuation, noting that the proposed demographic is largely unable to self-evacuate and would require additional time for caregivers to collect children.

  Muscle Creek provides the greatest source of flood risk in Muswellbrook due to the hazardous flow conditions that can rapidly occur between Bell and Wilder Streets.

[3] RHDHV Muswellbrook FRMS&P 2019
[4] RHDHV Flood Impact Assessment 2022 page 15
[5] RHDHV Flood Impact Assessment 2022 Appendix B

Muscle Creek flooding in as little as the 5% AEP event can inundate the only two roads connecting the northern and southern parts of Muswellbrook creating a potential issue for emergency services. There are three bridge crossings across the creek on Bell Street, Wilkinson Avenue and Bridge Street. Wilkinson Avenue only provides access to the sporting facilities on the north side of Muscle Creek but does not provide a link to the northern part of Muswellbrook[6].

Muscle Creek drains 92 km2 of catchment upstream of Muswellbrook bringing flows centrally through the township of Muswellbrook before joining the Hunter River. Due to the moderate size of the catchment, while longer (36 hour) rainfall events are required to cause critical flood levels, shorter duration events 2-12 hours may also produce flash flooding along the Muscle Creek flow path during intense rain events[7].

The proposed evacuation centre for the site is Muswellbrook South Public School on Maitland Road[8]. This school is not a designated LEMC Evacuation Centre, has approximately 250 students and 45 staff and is also partially inundated in a PMF[9]. Therefore, we consider that the site may not be suitable as an evacuation centre.

The NSW SES understand that the Muswellbrook Shire Council is proposing a Muscle Creek Flood Warning System, a project to monitor and alert residents of potential flooding from Muscle Creek, which can cause road closures and inundation[10]. This would provide additional information and awareness about local flood conditions for Muswellbrook and recognises the flooding and duration of Muscle Creek will depend on whether flooding occurs in conjunction with a Hunter River flood event. NSW SES should continue to be involved in the development of the warning system.

- **Development strategies relying on deliberate isolation or sheltering in buildings surrounded by flood water are not equivalent, in risk management terms, to evacuation.**

  Although this development proposal has not currently proposed 'Shelter in place', this strategy is not endorsed for flood management by the NSW SES for future development. Such an approach is only considered suitable to allow existing dwellings that are currently at risk to reduce their risk, without increasing the number of people subject to such risk. The flood evacuation constraints in an area should not be used as a reason to justify new development by requiring the new development to have a suitable refuge above the PMF. Allowing such development will increase the number of people exposed to the effects of flooding. Other secondary emergencies such as fires and medical emergencies may occur in buildings isolated by floodwater.

  During flooding it is likely that there will be a reduced capacity for the relevant emergency service agencies to respond in these times. Even relatively brief periods of

[6] Draft NSW SES Muswellbrook Local Flood Plan 2021 Volume 3 page 2
[7] RHDHV Flood Evacuation Management Plan Pacific Brook Christian School 2022 page 13
[8] RHDHV Flood Evacuation Management Plan Pacific Brook Christian School 2022 page 11
[9] Draft NSW SES Muswellbrook Local Flood Plan 2021 Volume 3 page 4
[10] RHDHV Muswellbrook FRMS&P 2019 page 25

isolation, in the order of a few hours, can lead to personal medical emergencies that have to be responded to.

- **Development strategies relying on an assumption that mass rescue may be possible where evacuation either fails or is not implemented are not acceptable to the NSW SES.**

  Rescue may be required for the proposed development if sewerage, power, medical or other emergencies occur during flooding. The NSW SES note that the closest emergency services (including NSW SES) are in Muswellbrook, which may be cut off by flooded roads. Within the Hunter River floodplain, key roads where access will be compromised by flooding including the New England Highway.

  The use of flood boats and helicopters may not always be feasible due to weather, resource availability or risks, which can result in large number of people trapped on the floodplain.

  There are significant risks associated with mass rescue, including:
  - Insufficient number of flood rescue boats for the number of people remaining on low flood islands.
  - Insufficient air lift capacity
  - Severe weather which makes rescue by boat or air more difficult e.g. wind fetch caused waves
  - Potential exposure to sewage, contaminants, disease, poisons, hidden snags, dead animals and debris etc.
  - Drowning or injuries related to floodwater hazards.

- **NSW SES is opposed to development strategies that transfer residual risk, in terms of emergency response activities, to NSW SES and/or increase capability requirements of the NSW SES.**

  The proposed development would further increase the complexity of flood operations for the Muswellbrook LGA, and directly transfer the risk to NSW SES for evacuation, resupply and potentially mass rescue.

  The NSW 2022 Flood Inquiry Recommendation 28 highlights that sensitive uses are known to have a higher risk to life and warrant the consideration of the impacts of even rarer flood events than the 1% AEP flood extent. The Inquiry recommends sensitive uses, including schools, are situated on land outside the probable maximum flood (PMF) extent and essential services infrastructure is situated above the flood planning level to minimise disruption.

- **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.**

- **Consent authorities 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.**

  The NSW SES understand the Australian Disaster Resilience Index for the statistical area of Muswellbrook is low (0.4277)[11]. Communities in areas of low disaster resilience may be limited in their capacity to use available resources to cope with adverse events and are limited in their capacity to adjust to change through learning, adaptation and transformation. Limitations to disaster resilience may be contributed by entrenched social and economic disadvantage, less access to or provision of resources and services, lower community cohesion and limited opportunities for adaptive learning and problem solving.

  The NSW SES note that environmental assets (i.e. green infrastructure) act as natural sinks for floodwaters, such as wetlands and riparian corridors. Understanding flood behaviour helps to build more flood-resilient communities. Siting development in areas least susceptible to flood impacts can make settlements more resilient to the impacts of flood. It is not clear from the Flood Impact Assessment whether the proposed changes to the site from forestry plantation, are likely to have a significant impact on flood behaviour, or if they have the potential to increase the flood affectation of neighbouring properties.

  Continuing research by the Bureau of Meteorology and the CSIRO are predicting more intense, short duration heavy rainfall events which cause flash flooding. The projected increase in heavy rainfall and coastal low weather systems over the NSW coast will increase flood risk in catchments including the Hunter Valley catchment, where extreme rainfall over hours to a day can cause river rises.

The Secretary of the Department of Planning and Environment will need to be satisfied that these considerations are adequately addressed as part of the assessment process. Due entirely to the need to meet priorities dictated by legislated responsibilities, the NSW SES is not able to assess any detailed development proposal or to work with developer's consultants in preparing any such proposal. However, if requested the NSW SES may be able to provide further advice to the Minister to assists in this determination.

Please feel free to contact Gillian Webber via email at should you wish to discuss any of the matters raised in this correspondence.

Yours sincerely,

Elspeth O'Shannessy
A/Hawkesbury Nepean Advisor and Future Risk Team Leader, Emergency Risk Management
NSW State Emergency Service

[11] Australian Disaster Resilience Index - Natural Hazards Research Australia report produced 20230609

Our Ref: ID 2069
Your Ref: SSD-16858710

21 August 2023

Adam Flynn
Team Leader, School Infrastructure Assessments
Department of Planning & Environment
Via Major Portal

email: adam.flynn@dpie.nsw.gov.au
CC: lisa.ignatavicius1@ses.nsw.gov.au; nhz.ops@ses.nsw.gov.au

Dear Mr Flynn,

State Significant Development Application (SSD-16858710) for the proposed development of a new school at 72-74 Maitland Street, Muswellbrook

Thank you for the opportunity to review and provide advice on the additional information prepared for the State Significant Development Application for Pacific Brook Christian School. It is understood that the proposed development seeks to develop the site at 72-74 Maitland Street, Muswellbrook to build a new school, the Pacific Brook Christian School, to accommodate 656 students and 65 full time equivalent (FTE) staff. Additional advice provided includes;

- Revision 2 - Pacific Brook Christian School (PBCS) Flood Evacuation and Management Plan, dated 4 August 2023
- Revision 2 - Pacific Brook Christian School (PBCS) Flood Evacuation and Management Plan Appendix A & B, dated 4 August 2023
- PBCS RFI Response to BCD and SES Response to Submission, dated 4 August 2023
- DFP planning consultants Response to Request for Additional Information, dated 4 August 2023

The NSW State Emergency Service (NSW SES) is the agency responsible for dealing with floods, storms and tsunami 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.

We refer to our previous correspondence dated 13 June 2023. In summary, NSW SES recommends that consideration of flooding issues is undertaken in accordance with the requirements of NSW Government's 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 and relevant planning directions under the *Environmental*

Planning and Assessment Act, 1979. The floodplain risk management issues which are of concern to the NSW SES are addressed in the Manual. Principles which are of importance to the NSW SES role as described above are further detailed in Attachment A. This includes schools following the application of sound land use planning and flood risk management.

Please feel free to contact Gillian Webber 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

Elspeth O'Shannessy
A/ Manager Emergency Risk Assessment, Emergency Risk Management
NSW State Emergency Service

ATTACHMENT A: Principles Outlined in the Support for Emergency Management Planning Guideline[1]

Principle 1 Any proposed Emergency Management strategy should be compatible with any existing community Emergency Management strategy.

Any proposed Emergency Management strategy for an area should be compatible with the evacuation strategies identified in the relevant local or state flood plan or by the NSW SES.

The flood evacuation constraints in an area should not be used as a reason to justify new development by requiring the new development to have a suitable refuge above the PMF. Allowing such development will increase the number of people exposed to the effects of flooding. Note that the NSW SES has no statutory authority nor capacity as the flood combat agency to review, assess or approve requests by applicants to review these plans.

The NSW SES does not consider requiring a site-specific response plan as a consideration of consent. Plans developed in this context are not considered to be an effective measure for addressing continuing risk to users of new development, nor suitable for addressing the impacts the development may have on the EM risks to the existing community[2]. The NSW SES does not support '*the use of appropriate flood evacuation triggers means that any risk to life is appropriately managed through response actions of school staff and reduced to an acceptable level*'[3], as this relies heavily on human behaviour, including staff, students and parents.

The NSW SES acknowledge that the FEMP recommends that the school, which is at known risk of flooding or isolation, should be closed prior to flooding commencing and when there is an indication that flooding is likely[4].

It is unacceptable, as the primary evacuation strategy, to expect people to escape from a flood on foot (also referred to as overland escape/overland access), especially with the high likelihood of ongoing poor weather conditions. Pedestrian evacuation is a backup strategy. The location of sensitive developments, whose populations are vulnerable in evacuation, needs to consider the consequences of these people being unable to evacuate for both the community and emergency services[5]. The NSW SES recommends careful consideration of the proposal to locate a new school development on the flood prone site, with the associated flood risks.

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[1] Department of Planning and Environment 2023 – Support for emergency management planning Flood risk management guideline EM01
[2] Department of Planning and Environment (2022) - Support for emergency management planning Flood risk management guideline EM01 A2.4.2 p. 6
[3] Royal Haskoning DHV (2023) PBCS RFI Response to BCD and SES Response to Submission p. 3
[4] Royal Haskoning DHV (2023) Pacific Brook Christian School FEMP p. 39
[5] Department of Planning and Environment 2023 – Support for emergency management planning Flood risk management guideline EM01 p. 9

All new primary and secondary school facilities should be located in areas of the floodplain that can be readily evacuated within the available time and resources[6]. Where possible, school classrooms should also be located above the PMF level. However, at a minimum there should be access to adequate space above the PMF within the school buildings for school students, staff and visitors as a contingency. We recommend that the Department requests clarification on the total available space for sheltering in place above the PMF as well as the hydraulic hazard that the buildings are exposed to.

The NSW SES acknowledge that 'Shelter in place' strategy is not recommended[7] in the FEMP and should only be considered if no alternative scenarios are available or it is unsafe to evacuate the site. 'Shelter in place' strategy is not endorsed for flood management by the NSW SES for *future development*. Such an approach is only considered suitable to allow existing dwellings that are currently at risk to reduce their risk, without increasing the number of people subject to such risk. During flooding it is likely that there will be a reduced capacity for the relevant emergency service agencies to respond in these times. Even relatively brief periods of isolation, in the order of a few hours, can lead to personal medical emergencies that have to be responded to.

We recommend the removal or correction of the following statement, as it implies there is a causation-correlation without sufficient evidence and used to justify placing additional people at risk: *'Given that there have been no recent flood related fatalities associated with educational facilities it indicates that effective flood evacuation management policies appear to have been effective in reducing risk to life for education facilities potentially impacted by PMF flood conditions."*[8]

Principle 2 Decisions should be informed by understanding the full range of risks to the community.

Decisions relating to future development should be risk-based and ensure Emergency Management risks to the community of the full range of floods are effectively understood and managed.

Principle 3 Development of the floodplain does not impact on the ability of the existing community to safely and effectively respond to a flood.

The proposed development would further increase the complexity of flood operations for the Muswellbrook LGA, and directly transfer the risk to NSW SES for evacuation, resupply and potentially rescue.

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[6] Department of Planning and Environment 2023 – Support for emergency management planning Flood risk management guideline EM01 p. 63
[7] Royal Haskoning DHV 2023 Pacific Brook Christian School FEMP p. 39
[8] Royal Haskoning DHV 2023 Pacific Brook Christian School FEMP p. 13

Rescue may be required for the proposed development if sewerage, power, medical or other emergencies occur during flooding. The NSW SES note that the closest emergency services (including NSW SES) are in Muswellbrook, which may be cut off by flooded roads. It is unclear what the consequences associated with failed evacuation of the school with vulnerable occupants (e.g. children or those with disability or impaired mobility). Vulnerability of the school community needs to be considered and inform suitability of land use and permissible development types to minimise the emergency management risks to students and staff.

Within the Hunter River floodplain, key roads where access will be compromised by flooding including Maitland Street which forms part of the A15 New England Highway part of Australia's National Highway System forming the inland route between Brisbane and Sydney. Flooding in as little as the 5% AEP (20yr ARI) event can inundate the only two roads connecting the northern and southern parts of Muswellbrook, creating a potential issue for emergency services. Multiple road closure points along Maitland Street are identified in the FEMP[9]. Shorter duration events 2-12 hours may also produce flash flooding with limited warning time during intense rain events.

Consideration should also be given to the impacts of localised flooding on evacuation routes. The evacuation route may be cut by localised flooding, which could see evacuation not completed in time. The problem of localised closure of roads due to inadequate stormwater capacity can be critical where the available warning and evacuation time is short.

Principle 4 Decisions on redevelopment within the floodplain does not increase risk to life from flooding.

Locating developments whose users are particularly vulnerable during flooding including in evacuation, such as children, in an area that needs to be evacuated within the available warning time results in a higher increase in risk of fatalities and demand on limited emergency management resources than if it were located in an area where it could be easily evacuated in the time available or where evacuation is not required.

Principle 5 Risks faced by the itinerant population need to be managed.

Principle 6 Recognise the need for effective flood warning and associated limitations.

It is important to note that there is currently no formal flood warning system available for the proposed area, which is subject to flash flooding. Therefore, there are challenges associated with flood planning, warning, evacuation, and response timing for any future development. Even with a local warning system, the more specific the warning requirement for individuals and sites becomes, in this case a school community of 656 children, the more difficult it is for the NSW SES to deliver warnings in the short time frames that may apply.

[9] Royal Haskoning DHV 2023 Pacific Brook Christian School FEMP p. 21

Principle 7 Ongoing community awareness of flooding is critical to assist effective emergency response.