



14 April 2025

241198 CFAA

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Sydney NSW 2000

Attention: Luke Brady

THE GABLES NEW PRIMARY SCHOOL

Response to Agency Comments

A Flood Impact and Risk Assessment (FIRA) and Flood Emergency Response Plan (FERP) was prepared by TTW (NSW) Pty Ltd on behalf of the NSW Department of Education (the Applicant) to assess the potential environmental impacts that could arise from the development of The Gables New Primary School at Lot 301 DP 1287967 on Fontana Drive, Gables (the site).

Following the public exhibition phase, The Hills Shire Council and NSW SES provided comments for consideration. This letter responds to the comments contained within these reviews.

The Hills Shire Council

The flood related comments contained within Council's review (dated 24th March 2025) are shown below in Figure 1.

<p><u>Stormwater</u></p> <ul style="list-style-type: none">• The development must comply with the requirements of Council flood control DCP Part C section 6.• Flood modelling to be submitted to Council's Waterways team for review and comments.
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Figure 1 – The Hills Shire Council flood related comments, 24th March 2025

The development must comply with the requirements of Council flood control DCP Part C section 6.

Section 6.1 of the FIRA report details the flood planning controls laid out in Council's DCP and how the site must comply with these provisions. The report notes that as a sensitive facility, the Gables proposed new primary school must be protected to the Probable Maximum Flood level in accordance with Council's DCP (Part C, Section 6).

Flood modelling to be submitted to Council's Waterways team for review and comments.

J. Wyndham Prince completed the Water Cycle and Flood Management Strategy report in July 2013 for the then Box Hill North Precinct and produced a TUFLOW model as part of this assessment. This was later updated for their Flood Impact Assessment of the Gables precinct (April 2015).

Northrop Consulting Engineers obtained this model and updated it for their Dam Break Assessment in 2019, making this the latest and most up-to-date flood model available for the Gables site.

TTW contacted The Hills Shire Council in May 2024 to query obtaining a TUFLOW model for the site and were advised by Council (officer Anisul Huq) to obtain this model directly from Stockland (the developer) or Northrop to carry out the flood assessment for the Gables New Primary School proposal.

Section 4.1 of the FIRA report details the modelling methodology used by Northrop in their assessment, and the scenario that was subsequently adopted by TTW in this study. Section 4.2 outlines all updates and refinements that were made to the model by TTW for the Gables New Primary School proposal. TTW can provide this model to Council's Waterways team if this is required (subject to approval from Stockland).

NSW State Emergency Services

A direct response to flood planning matters that were raised by NSW SES in their submission (dated 24th March 2025) has been provided within Table 1. Where relevant, reference has been made to sections within the updated FIRA and FERP prepared by TTW.

Table 1 - Response to NSW SES Flood-Related Requests for Additional Information

Item	NSW SES Comment/Submission – 20 th May 2024	TTW Response
1.1	We note the site is affected by short duration flash flooding “with the school only cutoff from access roads for approximately 20-30 minutes in the critical PMF event”. Adjacent road sag points are inundated as frequently as the 20% Annual Exceedance Probability (AEP) event with the school campus itself affected by small areas of flooding around the building perimeters in events larger than the 1% AEP event reaching up to 1.5 meters in depth.	<p>This is correct.</p> <p>There is notable ponding of flows around the proposed school buildings in both the 1% AEP and PMF events. This is due to a combination of the coarse model resolution adopted and the proposed cut around the building perimeters. This is resulting in increased flood levels around the proposed buildings. However, these areas of ponding around the school are considered a stormwater management issue (which will be addressed as part of detailed civil and stormwater design) and are not considered flooding.</p>
1.2	We support the strategy of closing the school as the primary response to flooding where possible and note that the buildings are proposed to be designed to be safe alternatives if there is insufficient warning time. Consideration should be given to the criteria identified in the NSW Shelter in Place Guideline for Flash flooding.	<p>This is noted and this advice has been retained in the updated FERP.</p> <p>The new NSW Shelter in Place Guideline for flash flood environments has been considered in Table 4 of the updated FERP.</p>
1.3	We recommend pursuing site design and stormwater management that reduces the impact of flooding and minimises any risk to the community. We note the Concept Stormwater Management Report proposes reductions in flood levels can be achieved through these measures.	TTW agree with this recommendation, as noted in Section 5.2.3 ‘Stormwater Management’ of the FIRA, and in the mitigation measures table in Section 9.0.
1.4	We recommend considering the impacts of climate change. It is estimated that the actual probability of a 1 in 100 AEP for this catchment area is approximately a 1 in 58 AEP event for the current 2024 scenario. For the proposed development site, this could result in more frequent inundation and/or isolation than what	<p>The impacts of climate change have been assessed in Section 5.3 of the FIRA.</p> <p>A sensitivity analysis has been carried out to determine the impact of climate change on local flood conditions using the ARR2019 Interim Climate Change Factor for the site in the 2090</p>

	is currently expected based on previous modelling.	<p>RCP8.5 scenario, which equates to a 19.7% increase in rainfall intensity.</p> <p>The Probable Maximum Flood (PMF) event is still shown to simulate the highest flood levels and depths and has been used as an indicator for setting the Finished Floor Levels (FFLs) of the site.</p>
ATTACHMENT A: Principles Outlined in the Support for Emergency Management Planning Guideline		
Principle 1: Any proposed Emergency Management strategy should be compatible with any existing community Emergency Management strategy.		
1.5	Any proposed Emergency Management strategy for an area should be compatible with the evacuation strategies identified in the NSW State Flood Plan and The Hills Shire Flood Emergency Sub Plan, where evacuation is the preferred emergency management strategy for people impacted by flooding.	<p>The Hills Shire Council Flood Emergency Sub Plan (2023) notes that evacuation is the NSW SES' primary response strategy for managing the population at risk and lists pre-emptive evacuation as a potential flood emergency strategy in The Hills.</p> <p>Pre-emptive closure of the school is the preferred flood emergency strategy for the school site in the event of a Hawkesbury-Nepean Valley flood event, or where advanced warning of a major storm event is forecast.</p> <p>However, shelter-in-place (SIP) guidance published by the NSW Department of Planning and Environment (DPE) in January 2025 states that SIP is an appropriate emergency management response when the flood warning time and flood duration are both less than six hours. With less than 10 minutes from the onset of the critical PMF storm until inundation of the adjoining roads for the proposed school site, it is recommended that the school is prepared for a shelter-in-place strategy.</p>
Principle 2: Decisions should be informed by understanding the full range of risks to the community.		
1.6	<p>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.</p> <p>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. Climate change should also be considered.</p>	<p>Section 4.0 of the FIRA outlines the existing and post-development flood conditions for the 1% AEP event and the PMF event. Flood conditions at the site in the 20% and 0.5% AEP events for both scenarios are also presented in Appendix A.</p> <p>The potential impacts of climate change are discussed in Section 5.3 of the FIRA.</p>
1.7	It is noted that the site in its developed condition is affected by flash flooding at the sag point on Pennant Way as frequently as the 20% AEP flood event.	<p>This summary of the FIRA is correct.</p> <p>TTW acknowledge that model results indicate low flood immunity along the sag point at Pennant Way. Northrop's modelling methodology was retained in this assessment, in which underground stormwater</p>

	<p>During the 1% AEP and larger events the school itself is shown to have “pooling of floodwaters is evident along the perimeter of the buildings in the 1% AEP event due to the proposed cut along the perimeter of the proposed school buildings (Figure 22). Depths around the buildings generally range between 0.2 – 0.9m, peaking at around 1.05m at the western perimeter of the northwest building currently designated as administration space.” Flood hazard adjacent to the proposed buildings during this event reaches up to Hazard Level 4 (H4), this level of hazard is unsuitable for all people and vehicles, especially young children.</p> <p>During the PMF event flood conditions throughout the school grounds reach depths of up to 1.5 metres, with “Flood hazard in the PMF has increased from the 1% AEP event, with hazard ranging from H2-H5 along the building perimeters (Figure 27), reaching H6 at the northeastern building.” At this level of hazard all buildings are considered vulnerable to failure. During the PMF event roads to the east and west of the south also become inundated with Fontana Drive and Pennant Way reaching H5 which is unsafe for all vehicles. The PMF flood event modelled for the site is of short duration with “less than 10 minutes from the onset of the critical PMF storm until inundation of the adjoining roads for the proposed school site” and “cutoff from access roads for approximately 20-30 minutes in the critical PMF event”.</p>	<p>systems are excluded in the modelling. Therefore, there should be improved flood immunity in actuality.</p> <p>There is notable ponding of flows around the proposed school buildings in both the 1% AEP and PMF events.</p> <p>This is due to a combination of the coarse model resolution adopted and the proposed cut around the building perimeters. This is resulting in increased flood levels around the proposed buildings.</p> <p>However, these areas of ponding around the school are considered a stormwater management issue (which will be addressed as part of detailed civil and stormwater design) and are not considered flooding. With appropriate stormwater management design, reduction in hazard category can be achieved around these proposed school buildings.</p>
<p>1.8</p>	<p>As noted in the FIRA the school campus itself contains some areas in which the flood hazard during the 1% AEP and larger events “rises to H2-H3 around the perimeter of the buildings, reaching H4 at the communal hall (Figure 24). It should be noted that this pooling is considered a site stormwater management issue that must be addressed as part of the site civil design as opposed to flooding”.</p> <p>The Concept Stormwater Management Report further notes “there is a low resolution of TTW’s flood models, hence, it is unable to pick-up small drainage systems on the flood models. To mitigate the issues, we suggest installing localized spoon drains along the boundary on Fontana Drive to mitigate overland flow during 1% AEP and PMF events.” We support this recommendation along with pursuing any site design and stormwater management that reduces the impact of flooding and minimises any risk to the community, in both these areas</p>	<p>TTW agree with this recommendation, as noted in Section 5.2.3 ‘Stormwater Management’ of the FIRA, and in the mitigation measures table in Section 9.0. It is believed that the high hazards around the proposed school buildings can be reduced with provision of appropriate stormwater management design. This will need to be assessed and confirmed in the subsequent detailed design phase of the project.</p>

	and across the wider school site. Any improvements that can be made to reduce flood risk will benefit the community.	
Principle 3: Development of the floodplain does not impact on the ability of the existing community to safely and effectively respond to a flood.		
1.9	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.	<p>The existing community outside of the subject precinct will not be impacted upon.</p> <p>Pre-emptive closure is the preferred strategy which will not impact upon evacuation procedures. In a flash flood event without advanced warning, the site will maintain a SIP strategy. The site will be self-sustaining for the very short inundation time (i.e. cut-off period).</p>
1.10	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. Evacuation must not require people to drive or walk through flood water.	<p>Section 2.3 'Time to Inundation' of the FERP assesses warning times for the site in a flash flood event, while Section 3.2.2 notes that there is unlikely to be enough warning time for an evacuation strategy to be a feasible flood emergency response strategy for the site in a flash flood event. The FERP acknowledges that evacuation must not require people to drive or walk through flood water, and subsequently SIP is recommended where there is no advanced warning.</p> <p>Where there is advanced warning, the preferred strategy is pre-emptive closure of the school, which will not increase demand on egress routes.</p>
1.11	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.	<p>The proposed site does not rely upon mass rescue.</p> <p>Pre-emptive closure is the preferred response where there is advanced warning of a flood event. Where this is not possible, the site is suitable for shelter in place.</p> <p>The short critical duration for the catchment indicates that the site will not be isolated for an extended period of time in a flash flood event (see Section 2.3), and the necessitation for a mass rescue unnecessary.</p>
Principle 4: Decisions on development within the floodplain does not increase risk to life from flooding.		
1.12	<p>Managing flood risks requires careful consideration of development type, likely users, and their ability respond to minimise their risks. This includes consideration of:</p> <ul style="list-style-type: none"> Isolation – There is no known safe period of isolation in a flood, the longer the period 	<p>The following risks have been considered by TTW in the FERP:</p> <p>Isolation: A longer duration PMF event was simulated to assess the longest potential isolation time. In the critical (15 minute) PMF event, all roads returned to a trafficable condition 30 minutes after the onset of the storm. In the longer (6 hour) PMF</p>

	<p>of isolation the greater the risk to occupants who are isolated.</p> <ul style="list-style-type: none"> • Secondary risks – This includes fire and medical emergencies that can impact on the safety of people isolated by floodwater. The potential risk to occupants needs to be considered and managed in decision-making. • Consideration of human behaviour – The behaviour of individuals such as choosing not to remain isolated from their family or social network in a building on a floor above the PMF for an extended flood duration or attempting to return to a building during a flood, needs to be considered. 	<p>event, all roads remained trafficable for the whole duration of the storm, while flows onsite dissipated after 3 hours.</p> <p>Secondary risks: The least hazardous vehicle evacuation route has been provided in the FERP in the event of a medical or fire emergency (refer Section 3.2.3).</p> <p>Human behaviour: The FERP considers that site users may choose to go against advice and attempt to leave the building during a flood event. The FERP notes that communication (Section 6.1) to all site users during a flood event is important to ensure all site users are aware of the risks associated with flooding and the procedures that are to be followed.</p> <p>The site will also be fitted with a PA system to direct site users on what to do in the event of significant flooding, and regular users of the site will have regular flood drills to ensure they are prepared for an actual event should it occur.</p>
1.13	<p>It is the preference of NSW SES that all facilities follow the application of sound land use planning and flood risk management. 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, and not at significant flood risk. Assessment should be supported by an evacuation capability assessment, where identified by the consent authority or NSW SES.</p> <p>Additionally all new childcare facilities should be located in areas of the floodplain that are lower risk and can be readily evacuated within the available time and with the available resources.</p>	<p>The site is not considered to be at significant flood risk. While it is located adjacent to a riparian zone, it is not impacted by mainstream flooding, and it lies outside of the Hawkesbury-Nepean River Valley PMF extent.</p> <p>While the site is impacted in flash flood events, this is of a short duration and the site is safe for SIP. If evacuation is necessary, a route has been indicated in Section 3.2.3.</p>
1.14	<p>Current evidence suggests that flood events will become more frequent due to climate change. A Climate Change Calculator has been developed to address the updated ARR climate change guidelines (Wasko et al, 2024), recommending the adjustment of the BoM 2016 IFDs to account for the warming that has occurred since the mid-point of the data used for their development (1961-1990). This results in a significant increase in existing conditions flood levels.</p> <p>The change in flood probabilities with climate change for this catchment area results in the new probability of the 1 in 100 AEP to be</p>	<p>The impacts of climate change have been assessed in Section 5.3 of the FIRA.</p> <p>A sensitivity analysis has been carried out to determine the impact of climate change on local flood conditions using the ARR2019 Interim Climate Change Factor for the site in the 2090 RCP8.5 scenario, which equates to a 19.7% increase in rainfall intensity.</p> <p>While the impact of climate change in the current scenario has not been assessed, the PMF event has been assessed. This event is still shown to simulate the highest flood levels and depths and has been used for setting the FFLs of the site, and</p>

	<p>approximately 1 in 58 AEP event for the current 2024 scenario, becoming even more frequent in the future.</p> <p>For the proposed development site, this could result in more frequent inundation and/or isolation than what is currently expected based on previous modelling.</p>	<p>has also been used to assess the flood emergency response strategies for the site.</p>
Principle 5: Risks faced by the itinerant population need to be managed.		
1.15	<p>Any Emergency Management strategy needs to consider people visiting the area or using a development.</p>	<p>Section 6.1 highlights the need to make all visitors and site users aware of flood risk and the flood protocols and procedures. Section 3.2.1 notes that any expected visitors of the site should be informed via SMS if there is a risk of flooding in order to minimise the risk of people entering flood water.</p> <p>Section 7.0 of the FERP advises that any visitors of the proposed site are to be directed to communal areas within the school.</p>
Principle 6: Recognise the need for effective flood warning and associated limitations.		
1.16	<p>An effective flood warning strategy with clear and concise messaging understood by the community is key to providing the community an opportunity to respond to a flood threat in an appropriate and timely manner.</p> <p>As the site is affected by flash flooding with “less than 10 minutes from the onset of the critical PMF storm until inundation of the adjoining roads for the proposed school site” little to no warning time is likely to be available.</p>	<p>Section 4.0 of the FERP outlines the various sources of flood warnings and notifications, including from the Bureau of Meteorology and the Australian Warning System.</p> <p>Section 4.3 of the FERP acknowledges that the flashy nature of flooding at the site (and the inherently limited warning time associated with this type of flooding) limits the capacity of NSW SES to issue flood notifications and action statements with sufficient lead time. The FERP recommends using the HazardWatch website, the Hazards Near Me app, and the Bureau of Meteorology website for severe weather warnings.</p>
Principle 7: Ongoing community awareness of flooding is critical to assist effective emergency response.		
1.17	<p>The flood risk at the site and actions taken to reduce risk to life should be communicated to all site users (includes increasing risk awareness, community connections, preparedness actions, appropriate signage and emergency drills) during and after the construction phase. However, it is important to note that 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.</p> <p>Development in a floodplain will increase the need for NSW SES to undertake continuous</p>	<p>Section 6.1 highlights the need to make all visitors and site users aware of flood risk and the flood protocols and procedures. Section 3.2.1 notes that any expected visitors of the site should be informed via SMS if there is a risk of flooding in order to minimise the risk of people entering flood water.</p> <p>Section 4.3 of the FERP recommends using the HazardWatch website, the Hazards Near Me app, and the Bureau of Meteorology website for severe weather warnings.</p> <p>Residents and users of the site will be educated and prepared for a significant event and will not be reliant on the NSW SES to assist them. As outlined</p>

community awareness, preparedness, and response requirements. Residents and users of the proposed development should be made aware of their flood risk, the Hazards Near Me app (a tool to receive severe weather and flood warnings as part of the Australian Warning System) and the NSW SES website which contains comprehensive information for the general community about what to do before, during and after floods as well as in-language resources and HazardWatch (NSW SES interactive information and warnings site).	<p>in the FERP, site wardens will manage the SIP strategy proposed, including when it is safe to leave the building again.</p> <p>It is also worth noting that the school site is located outside any mainstream flood extent and is only estimated to be impacted mainly by overland flow flooding. Hence, the school site is not located within a floodplain.</p>
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Should you require anything further please contact the undersigned.

Yours faithfully,
TTW (NSW) PTY LTD



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