30 March 2022 221103 CAAA

CBRE

Level 21, 363 George Street,
Sydney NSW 2000

Attention: Nicholas Lawler

New Liverpool Public School (SSD-10391)

Response to Request for Additional Information

Dear Nicholas,

The following are the Department of Primary Industry and Environment Requests for additional information (28th February 2022) and our responses for your review and response.

Our responses in the following are based on our Master Plan investigation of the New Liverpool Hospital site investigations (6th November 2018) and our review and assessment of;

- *Georges River Floodplain Risk Management Study & Plan, May 2004*
- *Liverpool City Centre Overland Flow Path Mapping, December 2016*
- *FloodMit Flood Emergency Response Plan of March 2022 Revision 4*.
- TTW New Liverpool Public School Flood Impact Review 16th February 2022
-

Yours faithfully,
TTW (NSW) PTY LTD

STEPHEN BRAIN
Technical Director

P:\2022\2211\221103\Letters\220330 TTW comments on RFI for additional information NLPS SSD-10391.docx

Department of Planning and Environment Requests for additional information (28th February 2022)

DPE RFI Query

•The recommendations of the Civil Design Report prepared by Meinhardt-Bonacci (April 2021) includes consideration for an evacuation plan in lieu of the development being located above the probable maximum flood (PMF) level that affects the site.

•However, the submitted evacuation plan is based on the site-specific flooding conditions only, with no consideration for the cumulative impacts of the PMF event from the Georges River on existing and future developments in the locality. Additionally, no consideration is given for demand for evacuation in the surrounding area in addition to the whole of the site and the adequacy of the transport networks to support evacuation within a regional context.

•The flood assessment considers the impact of flood waters within the site within which the proposed building is to be sited. It, however, does not provide an assessment of the ability of the site to be accessed in the future by parents and other care givers during low level flood events such as 1% , when the roads surrounding Liverpool Central Business District (CBD) will be affected by flood waters when the catchment is further developed.

TTW response

Our review of Council's DCP found that the DCP allows development within the PMF zone where the risk is addressed by a site specific assessment, as carried out by FloodMit in their Flood Evacuation Management Plan with a Shelter in Place recommendation.

Based on the proposed development and assessment by Liverpool Council's Development control plan 2008 (1 February 2021 edit – extracts in section 3.1.2 of this review), We believe the proposed New Liverpool Primary School complies with the intent of the limits of development within the extent of the PMF flood.

The flood risk is primarily low for the proposed NLPS development site. The site is not affected by the 100 year event while being within a low velocity portion of the PMF event (greater than 1 in 10,000 year probability).

The opportunity to shelter in place safe and flood free in Level 1 and level 2 of the primary school development, as referenced by the FloodMit Flood Emergency Response Plan of March 2022 Revision 4, is considered significantly safer than escaping to a road network which will be significantly compromised in the probable maximum flood event.

The TTW Flood Impact review attached (16th February 2022) has assessed Council's completed flood studies for the Georges River and the local overland flooding for the Liverpool CBD catchment, respective references; Georges River Floodplain Risk Management Study & Plan, May 2004 and Liverpool City Centre Overland Flow Path Mapping, December 2016.

Council have provided TTW with the Liverpool CBD overland flood study. The flood model has been run to view the flood results in detail and to confirm the flood extent up to the PMF for the public school site. The combined Georges River and localised overland flooding extents for the PMF and 100 year ARI (1% AEP) is as per the following from figure 4 of the TTW flood impact review report (16 February 2022) attached;

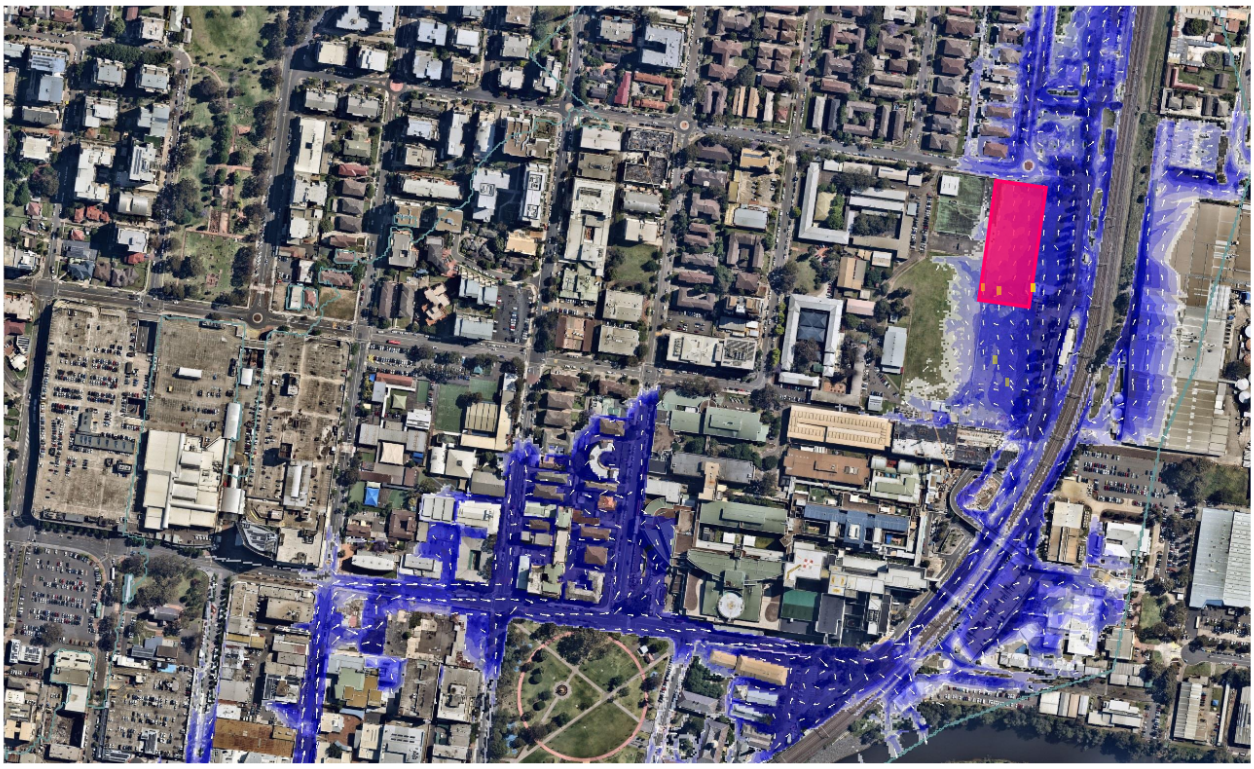


Figure 4: PMF Flood Extent for Mainstream and Overland Flooding with NLPS school location in red (*Georges River Floodplain Risk Management Study & Plan, May 2004* and *Liverpool City Centre Overland Flow Path Mapping, December 2016)*

The Liverpool Boys and Girls High School Site is within the PMF extent of the Georges River. Council have provided flood information which confirms the 1% AEP flood level is 8.80m and the PMF level is 10.80m.

In accordance with Council requirements, the flood planning level for this site is the 1% AEP flood level +500mm freeboard where the Flood Emergency Response Plan (FERP) for the proposed development is applied.

The FloodMit FERP includes recommendations to shelter in place on the first and second floor levels of the Public School with an option to evacuate to the west when a Probable Maximum Flood event occurs.

With the site specific Flood Evacuation Management Plan in place, the proposed building ground floor levels will therefore need to be a minimum of RL 9.30m which is 500mm above the 1% AEP flood level of 8.80m.

During a flood event, the flood evacuation procedure would be to 'shelter on site' above the PMF level of 10.80m. The first floor and second floor of the proposed Primary School will be above this level. The existing western area of the site is also above the PMF level and can provide an area of safe refuge.

This solution is recommended over relying on evacuation via transport networks during a Probable Maximum Flood Event due to travel safety concerns in the regional context.

During a flood event, we recommend the flood evacuation procedure would be to 'shelter on site' above the PMF level of 10.80m in accordance with the recommendations and procedures in the FloodMit Flood Emergency Response Plan of March 2022 Revision 4.

The first floor and second floor of the proposed Primary School will be above this level. The existing western are of the site is also above the PMF level and can provide an area of safe refuge. This solution is recommended over relying on evacuation via transport networks during a Probable Maximum Flood Event due to travel safety concerns in the regional context.

Refer to the FloodMit Flood Emergency Response Plan of March 2022 Revision 4 for guidance on flood monitoring and direction from SES, and coordination with flood level information warning web sites.

DPE RFI Query

•The current evacuation plan submitted as part of the development involves three main response measures including early warnings to close the school; evacuation if flooding occurs when children are on site; and Shelter-in-Place (on-site refuge) if the school is occupied and evacuation cannot occur. However, the evacuation plan prepared by Flood MIT concludes that the Shelter-in-Place is likely to be the most viable option for this site. Notwithstanding, the Department's specialist and EESG's experts have assessed all the possible mitigation measures outlined in the report.

Following the assessment, both the Department's specialist and EESG's experts have raised concerns regarding the reliance on the early warning system for evacuating the site. EESG note that whilst early warning systems may be developed for the catchment and improve in the future to provide greater lead times, it is likely to be many years before this occurs. Consequently, the Department raises concerns regarding the adequacy of warning times and the responsible authority for identifying when the warning parameter has been reached, nothing that this catchment does not have a single flood warning system such as the flood warning system managed by City of Parramatta Council.

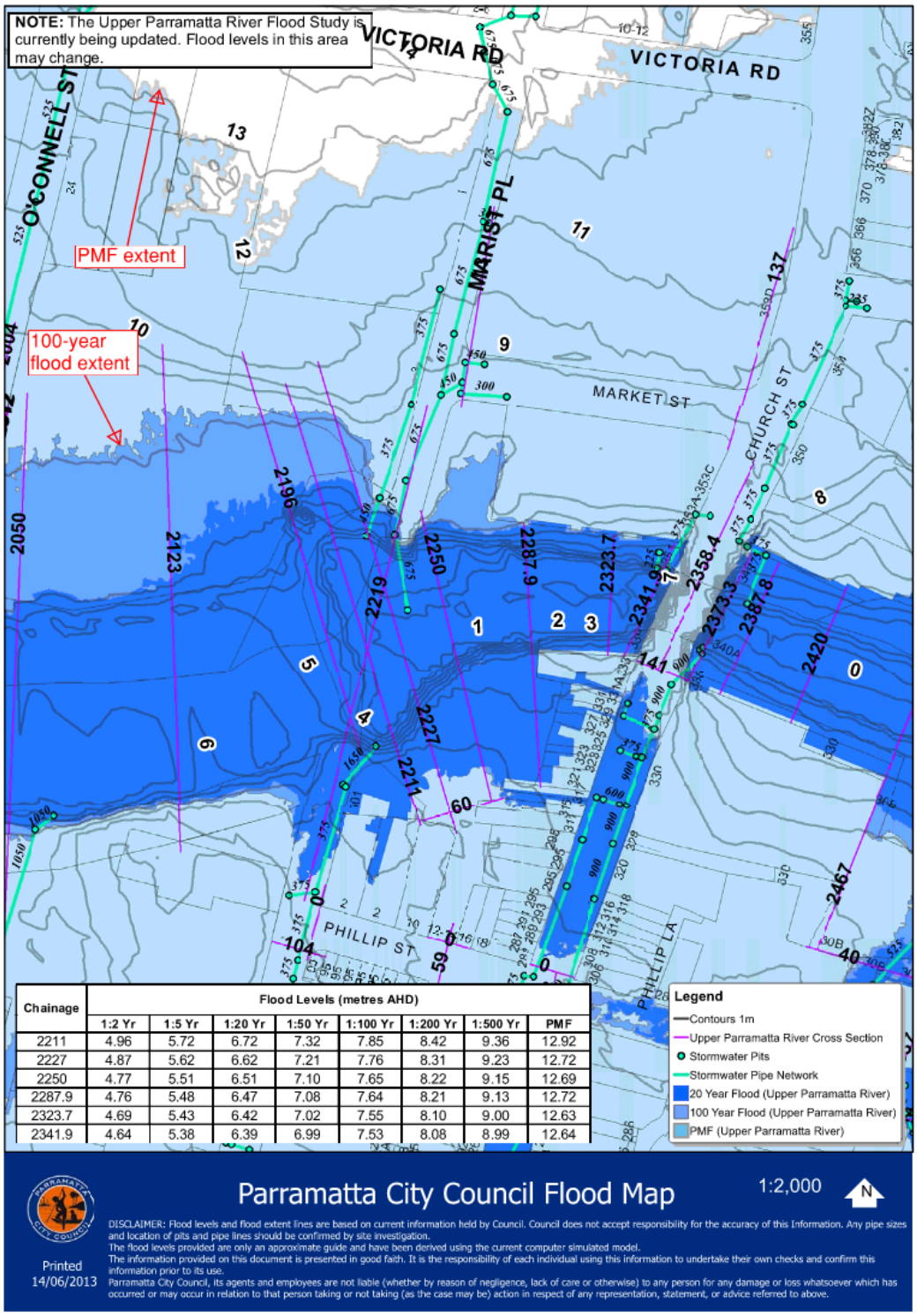
• The evacuation plan includes a comparison between the flood warning times and the time within which the site is expected to be fully flooded based on the rate of rise of floodwater. It concludes that the available warning time would be adequate to evacuate the site. However, it does not consider that some portion of the warning time (i.e. the lag time for accepting an evacuation order and the time taken for parents/care givers to attend the site to evacuate children etc.) would need to be excluded from the evacuation time, that the safety of entering flood waters at less than peak and therefore the actual available time to travel with or without caregivers/parents from the flood impacted area to a flood free zone (or a regional evacuation route) may not be adequate.

Noting that children within this age group cannot self-evacuate, the Department considers that this would pose risk to the school and pre-school children due to inadequate travel time being given for care givers to reach the building before access to the building is affected by flood waters and inadequate time for care givers to take their children to a flood free refuge (which has not been nominated).

With regard to Shelter-in-Place proposal, sufficient evidence has not been provided to identify the necessary period of time for refuge to occur within the site and how quickly flood waters will enter the site and then also recede from the site. Further the time flood waters will recede from all access road servicing the Liverpool CBD. Evidence sighted by the Department indicates that future development modelled to occur within the flood catchment will result in access roads serving Liverpool CBD to be significantly flood affected for events above 1% AEI.

TTW response

The proposed New Primary School site has an evacuation in place capacity above the PMF event level of RL 10.80m AHD. Our assessment Is that a flood warning system is not as critical for the NLPS site as it is for the Parramatta River where parts of the Parramatta CBD and other site sites in Parramatta are inundated in the PMF event.



Chainage	Flood Levels (metres AHD)							
	1:2 Yr	1:5 Yr	1:20 Yr	1:50 Yr	1:100 Yr	1:200 Yr	1:500 Yr	PMF
2211	4.96	5.72	6.72	7.32	7.85	8.42	9.36	12.92
2227	4.87	5.62	6.62	7.21	7.76	8.31	9.23	12.72
2250	4.77	5.51	6.51	7.10	7.65	8.22	9.15	12.69
2287.9	4.76	5.48	6.47	7.08	7.64	8.21	9.13	12.72
2323.7	4.69	5.43	6.42	7.02	7.55	8.10	9.00	12.63
2341.9	4.64	5.38	6.39	6.99	7.53	8.08	8.99	12.64

We believe the recommendations of the FloodMit Flood Emergency Response Plan of March 2022 Revision 4 is appropriate for the level of risk for this site. The flood plain management manual which is the basis of Council's flood policy recommends the following in its forward. We believe the development is consistent with a merit based approach that will allow the NLPS to operate safely and where the Flood Evacuation Management plan is applied. Note that Level 1 and Level 2 are above the PMF level providing safe refuge.

The FERP responds to the requirements of the Council DCP. While the transport and management questions are useful, the primary recommended flood management measure is shelter. We believe this strategy reduces the priority of traffic concerns and we recommend these concerns can be addressed as part of the review process for the FERP with the school management, post the development consent.

Floodplain Development Manual: *the management of flood*

FOREWORD

The primary objective of the NSW Government's Flood Prone Land Policy is to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods. At the same time, the policy recognises the benefits flowing from the use, occupation and development of flood prone land.

The policy promotes the use of a merit approach which balances social, economic, environmental and flood risk parameters to determine whether particular development or use of the floodplain is appropriate and sustainable.

In this way the policy avoids the unnecessary sterilisation of flood prone land. Equally it ensures that flood prone land is not the subject of uncontrolled development inconsistent with its exposure to flooding.

The policy highlights that primary responsibility for floodplain risk management rests with councils, which are provided with financial and technical support by the State Government. The Commonwealth has also historically shown a willingness to be involved by providing financial assistance to local government in partnership with the State Government.

DPE RFI Query

•The evacuation plan has not provided any commentary on flood events below the PMF event. This is particularly important given that much of the surrounding road network is affected by flooding before the PMF event. In this regard, EESG refer to the Flood Risk and the Evacuation Study prepared by Molino Stewart on behalf of Liverpool City Council (currently draft). The above report provides a clear idea of the behaviour of the various roads and areas in the locality during lower level flooding events and the associated constraints for evacuation of the Liverpool CBD.

•The evacuation plan does not consider that parents would be needing to travel along those flooded routes at 1% AEI to pick their children and the cumulative impacts on the overall traffic network of the travelling parents to not just this school but to the existing schools on this site and the risks associated in this scenario.

•The Shelter-in-Place strategy is proposed by you as the final viable option for PMF events. Given the vulnerable nature of the students and pre-school age children associated with the development and the potential overall length of inundation (including ability of parents to travel through flood areas to collect students) Shelter-in-Place may not be a viable option for the development.

Noting the above concerns, the Department requests that an updated flood assessment and a detailed emergency response plan (evacuation plan) be prepared to include:

•information reading the impact of lower level floods on the regional road network (used by parents) to access the Liverpool CBD.

•assessment of the future likelihood of access roads being flood impacted during lower level floods (below the PMF event), children being unable to be reached by parents during these events and the period these roads will be flooded (including how long it will take for these floods to recede) to enable parents to enter the Liverpool CBD to collect children. Please clarify whether this will be a short term or long-term period and what management requirements will be implemented to overcome this situation.

•clarification of how the system of monitoring of flood events would occur in terms of the warning trigger, the authority for measuring and issuing a direction that the trigger has been reached, the intended length of the warning times and the response by DoE following such warnings.

•clarification of who would be responsible for the monitoring and warning, under what scenarios the school would be closed and the frequency of school closures due to flooding events noting that not every warning will result in a PMF event, but the warning should nevertheless be applied.

•further information as to how the warning trigger will be determined and by who, what the warning lead time will be and how that warning time will be adequate to ensure that the school is closed prior to a large flood events occurring in the area in lieu of relying on evacuation given the vulnerability of the students and children. The frequency of that warning trigger occurring must also be identified.

•a holistic approach exploring all possible options to evacuate the site and the associated risk. To progress within this approach, you will need to consult with the NSW State Emergency Services (SES) being the responsible agency for assisting communities in flood affected areas. This consultation must explore options that are otherwise unknown at this stage as well as provide comments on the flood management measures currently proposed . EESG have also advised that some additional consultation be undertaken in this regard.

•consideration for various flood events including the PMF event and the other flood events where the surrounding roads may be affected (thus affecting the overall evacuation plan), while the site remains unaffected. The Flood Risk and the Evacuation Study prepared by Molino Stewart should be utilised to assist in the consideration of various flood events.

•more details of the Shelter-in-Place strategy including how the children would be safely sheltered for extended periods if the shelter in place can't otherwise be demonstrated to be short term. In this case you are requested to explore if the entire site (including the two existing high schools) can be considered for evacuation and/or shelter and whether this sheltering will be short duration or long and if it will be long what arrangements are intended to be made for care of children through that shelter in place particular if that will likely be over night.

•if shelter in place has been modelled to be short term only then evidence confirming confirmation the shelter in place being no more than one or two hours at most – including the time required for caregivers to access the site and their children through flood affected (below PMF) areas within the regional road network.

•The Department requests that prior to submitting the updated flood assessment and/or evacuation plan (flood emergency response plan), consultation on the plan occurs with Council and SES.
The Department also requests that you consider whether limiting the number of students on the site would ensure a safer environment on the site or the maximum number of students that can be safely sheltered within the site and/or evacuated.

TTW Response

In response to the above school management concerns, I believe the revised FloodMit FERP for the development deals effectively with events significantly above the 1% AEP storm event in response to Council's DCP requirement for sensitive uses and facilities in Low Flood risk areas. The detailed application of the FloodMit plan with respect to management of students and access to students is part of the responsibility of the School which will be detailed by the School as part of the application of the FERP.

The FERP provides the School with a flood mitigation response when warnings are received from the SES with respect to the recommended shelter is place strategy place where flood levels are likely to meet or exceed the probable maximum flood level above RL 10.80m AHD.

We recommend, as noted in the FERP, that communication be established with the SES. This detail can be added to the FERP to provide additional procedures and parent/teacher/children communications.

The clarification of the responsibilities under the FERP would be the responsibility of the Principal and staff with reference to SES and Department of Education directives. We believe the additional detail can be addressed as part of the review process for the FERP within the school management, post the development consent.

Yours faithfully,
TTW (NSW) PTY LTD

STEPHEN BRAIN
Technical Director

New Liverpool Primary School

Flood Impact Review

School Infrastructure NSW

16 February 2022

221103

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1 Introduction

TTW have been engaged by Schools Infrastructure NSW to provide flood impact review advice for the proposed New Liverpool Primary School development.

1.1 Site Location

The selected site is occupied by Liverpool Boys High School and Liverpool Girls High School, and is located to the north east of Liverpool CBD, directly opposite Liverpool Hospital. The site is bounded by Lachlan Street to the north, Burnside Drive and the Southern Railway Line to the east, Liverpool Hospital to the south, and Forbes Street to the west, refer to figure 2.

The boys school occupies the northern half of the site, with the girl's school occupying the southern half of the site. The library building is shared between the two schools and provides the main access link between the schools. The external grounds are shared.

Figure 1: Forbes Street site (Liverpool Boys and Girls School)

1.2 Site Topography

The Forbes Street site is also approximately 75,500 sq.m and is approximately square in shape with a north-south dimension of approximately 260m and an east-west dimension of approximately 290m. The site generally falls towards the south east corner at an average grade of 1.25% from Lachlan Street (RL ≈ 13.50m) to Burnside Drive (RL ≈ 9.00m). The north western area of the site is generally more steeply sloping with the south and eastern area of the site being flatter.

The natural topography of the local area generally falls from the south west to the north east with a low point in Goulburn Street outside Liverpool Hospital. Georges River is the main watercourse for the local catchment and is located approximately 320m south of the Forbes Street site, and 200m east of the Bigge Street site. The natural topography produces overland flow paths along the direction shown in figure 4.

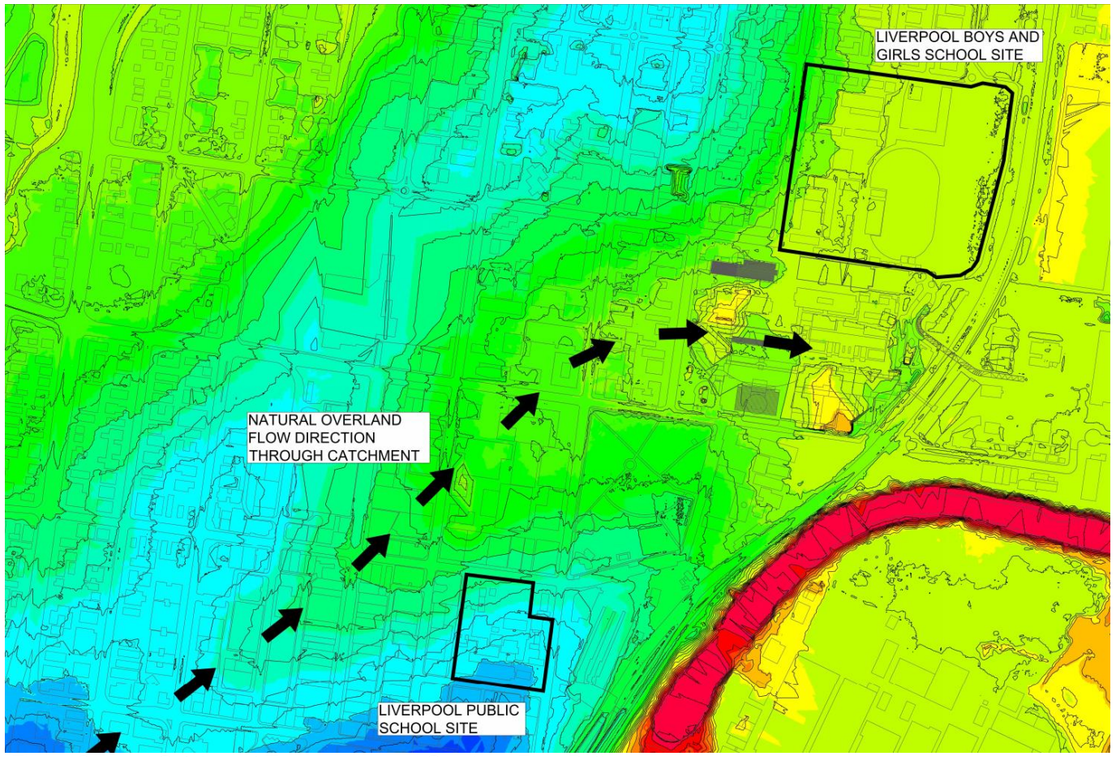

Figure 2: Local Catchment Topography and Overland Flow Path

2 Proposed Development

Figure 1
Architectural Site Plan

Figure 3: Proposed North Liverpool Public School

2.1 Flooding

Council have completed flood studies for the Georges River and the local overland flooding for the Liverpool CBD catchment, respective references; *Georges River Floodplain Risk Management Study & Plan, May 2004 and Liverpool City Centre Overland Flow Path Mapping, December 2016*.

Council have provided TTW with the Liverpool CBD overland flood study. The flood model has been run to view the flood results in detail and to confirm the flood extent up to the PMF for the public school site. The combined Georges River and localised overland flooding extents for the PMF and 100 year ARI (1% AEP) is shown in figure 11.

The Liverpool Boys and Girls High School Site is within the PMF extent of the Georges River. Council have provided flood information which confirms the 1% AEP flood level is 8.80m and the PMF level is 10.80m.

In accordance with Council requirements, the flood planning level for this site is the 1% AEP flood level +500mm freeboard where the Flood Emergency Response Plan for with the proposed development is applied. The FERP includes recommendations to shelter in place on the first and second floor levels of the Public School with an option to evacuate to the west when a Probable Maximum Flood event occurs.

With the site specific Flood Evacuation Management Plan in place, the proposed building ground floor levels will therefore need to be a minimum of RL 9.30m which is 500mm above the 1% AEP flood level of 8.80m.

During a flood event, the flood evacuation procedure would be to ‘shelter on site’ above the PMF level of 10.80m. The first floor and second floor of the proposed Primary School will be above this level. The existing western are of the site is also above the PMF level and can provide an area of safe refuge.

KEY ITEMS:

- **The site is flood affected in the PMF event.**
- **There are acceptable evacuation in place options for the Primary School for this rare event.**
- **As the flooding is above the 100 year Flood event the risk is regarded as low in the Georges River Floodpain Management Study**
- **Flood evacuation management is to shelter on site on the first floor level or above, or to move to the western portion of the site.**
- **Based on the above we recommend the ground floor level to be a minimum of RL 9.30m for the NLPS site which is 500mm higher than the 100 year flood event level.**

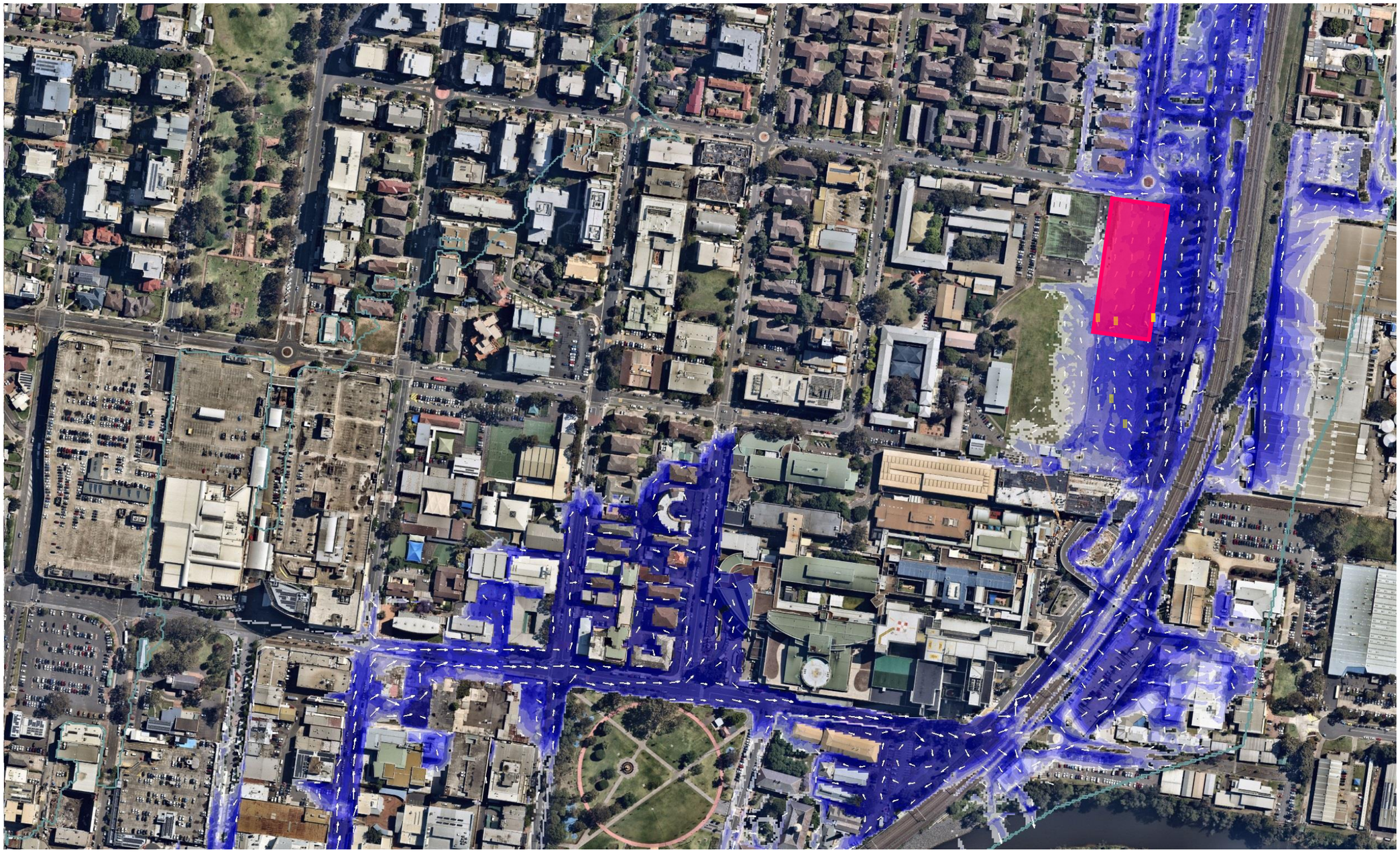

Figure 4: PMF Flood Extent for Mainstream and Overland Flooding with NLPS school location in red (*Georges River Floodplain Risk Management Study & Plan, May 2004* and *Liverpool City Centre Overland Flow Path Mapping, December 2016)*

3 Response to Department of Planning and Environment Comments

3.1.1 DPE comments and TTW review response in red

From: Nahid Mahmud <nahid.mahmud@dpie.nsw.gov.au>
Date: 4 February 2022 at 3:05:53 pm AEDT
To: Alejandra Rojas <Alejandra.Rojas1@det.nsw.edu.au>
Subject: SSD 10391 – New Liverpool Primary School (18 Forbes Street, Liverpool NSW 2170)

[External Email] This email was sent from outside the NSW Department of Education. Be cautious, particularly with links and attachments.

Dear Alejandra

We have discussed with our flood consultant this morning over the phone and he advised that the flood mitigation will not work for this development. He will send his final comments as soon as possible. His initial review and council's email are provided below; Please consult with council also.

Comments from Flood Consultant:

The new Liverpool Primary School is to be located on land that has an elevation above the predicted peak level of the 1 in 100 AEP flood, but which is up to 2.2 m below the predicted peak level of the Probable Maximum Flood (PMF). The proposed level for the ground floor of the new school is 9.3 mAHD which will be at least 1.5 m lower than the predicted peak level of the PMF at the site. The Flood Emergency Response Plan has been prepared because it has been determined that it is not feasible for all new buildings proposed as part of the school development to be constructed with minimum floor levels above the PMF. As a result, the proponent and its consultant is advocating that the risk to life associated with flooding in extreme events be managed by an emergency response plan based on evacuation of all occupants of the school. The Council DCP allows development within the PMF zone where addressed by a site specific assessment and in this case a Flood Evacuation Management Plan with a Shelter in Place recommendation. Refer 3.1.2 below

I have reviewed the proposal and the Flood Emergency Response Plan and make the following comments.

1. There is no commentary within the Flood Emergency Response Plan that seeks to address compliance or otherwise of the development proposal to the requirements of Liverpool Development Control Plan 2008 (LDCP 2008). Development proposals in the Liverpool LGA which are sited on land that has the potential to be flood affected or which falls within the Flood Planning Area (FPA) are determined based on compliance to criteria set out in Liverpool Development Control Plan 2008 (LDCP 2008). LDCP 2008 specifies development controls according to the sensitivity of the proposed land use to flooding, the severity of the flood impact on the site and the specific floodplain in which the development is located. The severity of the flood impact is based on consideration of the site with reference to flood risk mapping that accompanies the DCP. The land use is categorized into 8 Land Use Risk Categories according to the sensitivity of each land use to flooding. The definitions of each land use are based on Liverpool LEP 2008. The Land Use Categories indicate that new school buildings are sensitive uses and facilities. As a consequence, Council's flood policy specifies that the school buildings must have a minimum floor level that is above the Probable Maximum Flood (PMF). Council's policy serves two purposes:
   (a) To ensure that children are not exposed to dangerous conditions as a result of flooding that may be experienced at the site; and,
   (b) School buildings that have no risk of flooding may serve as important evacuation centres for both the school and local community when flooding is experienced in the general area.

Therefore, as the ground floor level of the school development will be up to at least 1.5 m below the predicted peak level of the PMF, and potentially as much as 2.7 m below it if the data from Council's latest Flood Study is applied, it follows that the development as proposed does not comply with Council's Flood Policy and the provisions of LDCP 2008. **Hence, it is not possible to support the proposal if compliance to Council's policy is to be strictly adhered to.** The Council DCP allows development within the PMF zone where addressed by a site specific assessment and in this case a Flood Evacuation Management Plan with a Shelter in Place recommendation. We understand Council have made no specific objection to the North Liverpool Public School development in the proposed location. Refer 3.1.2 below

2. If the issues outlined in Item 1 can be overcome, the focus would then fall on the suitability of the Flood Emergency Response Plan as presented by FloodMit. I have reviewed the Plan and make the following comments.
   (i) The Plan considers and relies on projected flood warning times for evacuation during the onset of floods as rare as the PMF using a rate of rise of floodwaters determined for the 1 in 100 AEP flood. This is considered to be inconsistent and potential over estimates the actual warning time that would be available if the flood that triggered the need for evacuation was rarer than the 1 in 100 AEP event. It is recommended that if a decision is made to support flood risk management for the development based on evacuation of the school occupants, that the warning times be re-evaluated using a rate of rise of floodwaters for the PMF. This is likely to result in shorter flood warning times and therefore should involve a re-assessment of the viability of evacuation as a safe mechanism for flood emergency response.
   (ii) Investigations need to be undertaken to identify, assess and mitigate the potential risks associated with parents of children attending the school seeking to "rescue" their children in a flood emergency. This should involve traffic modelling that accounts for the reduced warning times determined from (i).
   (iii) Given that it is proposed that the school be multi-level and that the upper levels will have floor levels above the predicted peak level of the PMF, it is recommended that if the compliance issue outlined in Item 1 above can be overcome, that shelter-in-place be considered as a viable alternative to evacuation.

The Council DCP allows development within the PMF zone where addressed by a site specific assessment and in this case a Flood Evacuation Management Plan with a Shelter in Place recommendation. We understand Council have made no specific objection to the North Liverpool Public School development in the proposed location. Refer 3.1.2 below

Council's Comments

It is Council's DCP requirement that floor levels of sensitive development such as educational establishment on the floodplain are set no lower than the Probable Maximum Flood. The PMF flood level for the site from Georges River flooding is 10.8m AHD. Proposed floor levels of the new school buildings are set at 9.3m AHD and this not satisfy Council DCP requirement.

The Council DCP allows development within the PMF zone where addressed by a site specific assessment and in this case a Flood Evacuation Management Plan with a Shelter in Place recommendation. We understand Council have made no specific objection to the North Liverpool Public School development in the proposed location. Refer 3.1.2 below

Kind Regards,

Nahid Mahmud
Senior Planning Officer

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3.1.2 Council's DCP Extract

Council's DCP requirements are as per the following requirements highlighted in yellow

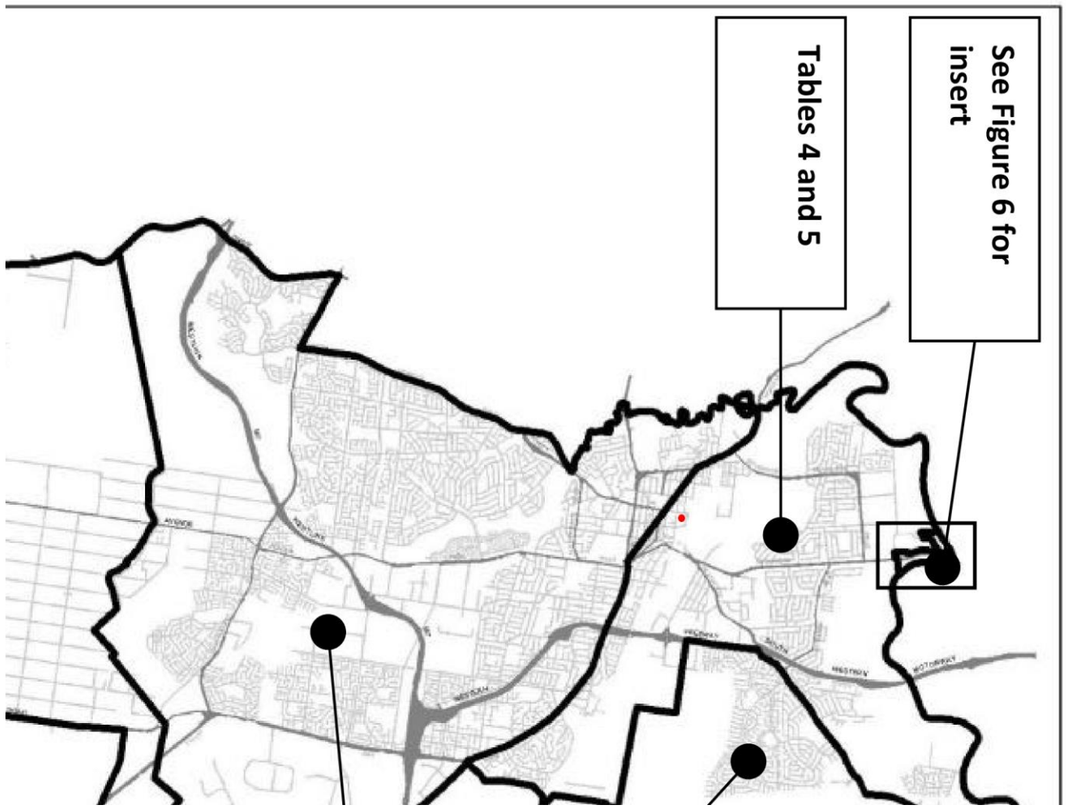

Table 4 Georges River Floodplain (Includes Harris Ck and Williams Ck, lower parts of Anzac Ck, but not Cabramatta Creek)

Flood Risk Category	Land Use Risk Category	Planning Controls: Floor Level	Building Components	Structural Soundness	Flood Effects	Car Parking & Driveway Access	Evacuation	Management & Design	Fencing
Low Flood Risk	Critical Uses & Facilities								
	Sensitive Uses & Facilities	13	4	4	2, 4, 5	2, 3, 6, 7, 8	6, 8, 9	2, 4	
	Subdivision				2, 4, 5			1	
	Residential (++)	2, 6	2	3	2, 4, 5	2, 3, 6, 7, 8	6, 9		
	Commercial & Industrial	4, 8, 15	2	3	2, 4, 5	2, 3, 6, 7, 8	(4 or 9), 6	2, 3, 5	
	Tourist Related Development	2, 6, 15	2	3	2, 4, 5	2, 3, 6, 7, 8	6, 9	2, 3, 5	
	Recreation & Non-Urban	2, 7	2	3	2, 4, 5	1, 5, 7, 8	6, 8	2, 3, 5	
	Concessional Development	14, 15	2	3	2, 4, 5	1, 7, 8, 9	6, 9	2, 3, 5	
Medium Flood Risk	Critical Uses & Facilities								
	Sensitive Uses & Facilities								
	Subdivision				1, 4, 5			1	1, 2, 3
	Residential	2, 6, 15	2	2	2, 4, 5	2, 3, 6, 7, 8	6, 9		1, 2, 3
	Commercial & Industrial	8, 4, 15	2	2	2, 4, 5	2, 3, 6, 7, 8	4, 6	2, 3, 5	1, 2, 3
	Tourist Related Development	2, 6, 15	2	2	2, 4, 5	2, 3, 6, 7, 8	6, 9	2, 3, 5	1, 2, 3
	Recreation & Non-Urban	2, 7	2	2	2, 4, 5	1, 5, 7, 8	6, 8	2, 3, 5	1, 2, 3
	Concessional Development	14, 15	2	2	2, 4, 5	1, 7, 8, 9	8, 9	2, 3, 5	1, 2, 3
High Flood Risk	Critical Uses & Facilities								
	Sensitive Uses & Facilities								
	Subdivision								
	Residential								
	Commercial & Industrial								
	Tourist Related Development								
	Recreation & Non-Urban	2, 7	2	2	1, 4, 5	1, 5, 7, 8	6, 8	2, 3, 5	1, 2, 3
	Concessional Development	14, 15	2	2	1, 4, 5	1, 7, 8, 9	6, 9	2, 3, 5	1, 2, 3

Key:

	Not Relevant
	Unsuitable Land Use
1, 2, 3	Control reference number relevant to the particular planning consideration. (see Table 6)
(++)	Attached dwellings, Dwelling houses, dual occupancies, multi unit dwelling housing, residential flat buildings (not including development for the purpose of group homes or seniors housing), Secondary dwellings and Semi-detached dwellings are exempt from these controls.

The Floodplain management manual requires that Flood planning levels be set

Table 5 Local Overland Flooding

Flood Risk Category	Land Use Risk Category	Planning Controls							
		Floor Level	Building Components	Structural Soundness	Flood Effects	Car Parking & Driveway Access	Evacuation	Management & Design	Fencing
Local Overland Flood Risk	Critical Uses & Facilities	13	4	5	3	4, 7, 8	7	3, 5	2, 4
	Sensitive Uses & Facilities	13	4	5	3	4, 7, 8	7	3, 5	2, 4
	Subdivision				3		5	1	2, 4
	Residential	3, 5	1	6	3	4, 7, 8	5		2, 4
	Commercial & Industrial	10	1	6	3	4, 7, 8	5	3, 5	2, 4
	Tourist Related Development	3, 5	1	6	3	4, 7, 8	5	3, 5	2, 4
	Recreation & Non-Urban	3, 5	1	6	3	4, 7, 8	5	3, 5	2, 4
	Concessional Development	14	1	6	3	4, 7, 8	5	3, 5	2, 4

Key:

	Not Relevant
1, 2, 3	Control reference number relevant to the particular planning consideration.

Table 6 Explanation of Development Controls

Ref No	Controls
Floor level	
1	All floor levels to be as high as practical but not less than the 20% AEP flood level.
2	Non habitable floor levels to be as high as practical but no less than the 5% AEP flood level.
3	Non-habitable floor levels to be not less than the 1% AEP flood.
4	The level of Non-habitable and general Industrial floor areas to be as high as practical but not less than the 2% AEP flood. Where this is impractical for single lot developments within an existing developed area, the floor shall be as high as practical but no less than the 5% AEP flood.
5	Habitable floor levels to be equal to or greater than the 1% AEP flood level plus 300mm freeboard.
6	Habitable floor levels to be equal to or greater than the 1% AEP flood level plus 500mm freeboard.
7	Habitable floor levels to be no lower than the 1% AEP flood plus 500mm freeboard unless justified by site specific assessment.
8	Habitable and general commercial floor levels to be as high as practical but no lower than the 1% AEP flood plus 500mm freeboard unless justified by site specific assessment.
9	The level of habitable floor areas to be equal to or greater than the 1% AEP flood level plus 500mm freeboard. If this level is impractical a lower floor level may be considered provided the floor level is as high as possible but no less than the 5% AEP flood level.
10	All floor levels to be equal to or greater than the 1% AEP flood level plus 300mm freeboard. Freeboard may be reduced if justified by site specific assessment.
11	All floor levels to be no lower than the 1% AEP flood plus 500mm freeboard. Freeboard may be reduced if justified by site specific assessment.
12	All floor levels to be equal to or greater than the PMF level. If this level is impractical a lower floor level may be considered provided the floor level is as high as possible but no less than the 1% AEP flood level plus 500mm freeboard.
13	Floor levels to be no lower than the PMF level unless justified by a site specific assessment.
14	Floor levels to be equal to or greater than the minimum requirements normally applicable to this type of development. Where this is not practical due to compatibility with the height of adjacent buildings, or compatibility with the floor level of existing buildings, or the need for access for persons with disabilities, a lower floor level may be considered. In these circumstances, the floor level is to be as high as practical, and, when undertaking alterations or additions no lower than the existing floor level.
15	A restriction is to be placed on the title of the land, pursuant to S.88B of the *Conveyancing Act*, where the lowest habitable floor area is elevated more than 1.5m above finished ground level, confirming that the undercroft area is not to be enclosed.
Building Components & Method	
1	All structures to have flood compatible building components below the 1% AEP flood level plus 300mm freeboard.
2	All structures to have flood compatible building components below the 1% AEP flood level plus 500mm freeboard.
3	All structures to have flood compatible building components below the 1% AEP flood level plus 500mm freeboard or a PMF if required to satisfy evacuation criteria (see below).
4	All structures to have flood compatible building components below the PMF level.
Structural Soundness	
1	Applicant to demonstrate that the structure can withstand the forces of floodwater, debris and buoyancy up to and including a 1% AEP flood plus 500mm freeboard or a PMF if required to satisfy evacuation criteria (see below). An engineer's report may be required.
2	Engineer's report to certify that the structure can withstand the forces of floodwater, debris and buoyancy up to and including a 1% AEP flood plus 500mm freeboard.
3	Applicant to demonstrate that the structure can withstand the forces of floodwater, debris and buoyancy up to and including a 1% AEP flood plus 500mm freeboard.
4	Applicant to demonstrate that any structure can withstand the forces of floodwater, debris and buoyancy up to and including a PMF. An engineer's report may be required.
5	Applicant to demonstrate that any structure can withstand the forces of floodwater, debris and buoyancy up to and including a PMF.
6	Applicant to demonstrate that the structure can withstand the forces of floodwater, debris and buoyancy up to and including a 1% AEP flood plus 300mm freeboard.
Flood Effects	
1	Engineers report required to certify that the development will not increase flood effects elsewhere, having regard to: (I) loss of flood storage; (ii) changes in flood levels, flows and velocities caused by alterations to flood flows; and (iii) the cumulative impact of multiple similar developments in the floodplain.
2	The flood impact of the development to be considered to ensure that the development will not increase flood effects elsewhere, having regard to: (i) loss of flood storage; (ii) changes in flood levels and velocities caused by alterations to the flood conveyance; and (iii) the cumulative impact of multiple potential developments in the floodplain. An engineer's report may be required.
3	The flood impact of the development to be considered to ensure that the development will not increase flood affectation elsewhere having regard to changes in flood levels and velocities caused by alteration of conveyance of flood waters. An engineer's report may be required if Council considers a significant

4 Conclusion

Based on the proposed development and assessment by Liverpool Council's Development control plan 2008 (1 February 2021 edit – extracts in section 3.1.2 of this review), We believe the proposed New Liverpool Primary School complies with the intent of the limits of development within the extent of the PMF flood.

The flood risk is primarily low risk for the proposed building development as not affected by the 100 year event while being within a low velocity portion of the PMF event (greater than 1 in 10,000 year probability).

The opportunity to shelter in place safe and flood free in Level 1 and level 2 of the primary school development is considered significantly safer than escaping to a road network which will be significantly compromised in the probable maximum flood event.

The time period for staff and pupils to shelter in place while the flood recedes is significantly better that traveling home to residential areas that have less protection from an extreme flood event. As shown by figure 4 there remain large areas of the high school site which are unaffected by the PMF for an auxiliary evacuation location if required.

We believe a finalized version of the Flood Evacuation Management Plan should be conditioned as part of the approval for this development with respect to flood management with a clear procedure and nominated gathering location

Yours faithfully,
TTW (NSW) PTY LTD

STEPHEN BRAIN
Technical Director

Adco Constructions Pty Ltd

New Liverpool Primary School

New Liverpool Primary School at 18 Forbes Street, Liverpool

Flood Emergency Response Plan

March 2022

FloodMit

Adco Constructions Pty Ltd

New Liverpool Primary School

Flood Emergency Response Plan

March 2022

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1 INTRODUCTION

FloodMit Pty Ltd was engaged to prepare a flood emergency response plan for a proposed new primary school to be located within the existing Liverpool Girls High School and Liverpool Boys High School site at 18 Forbes Street, Liverpool.

The site and surrounding land are potentially affected by flooding from the Georges River, Cabramatta Creek, and Brickmakers Creek. The school site itself is above the estimated 100 year average recurrence interval (ARI) flood, but could be inundated in larger, more extreme flood events. Nuisance flooding can also be experienced across the school grounds as a result of local overland stormwater flows.

The purpose of this plan is to provide a summary of the flood risk in the immediate vicinity of the proposed primary school, and the recommended measures to be taken in response to flooding.

2 SITE DESCIPTION AND PROPOSED PRIMARY SCHOOL

Architectural drawings showing the existing site and the location of the new primary school are shown on Figure 1.

Key features from the architectural drawing have been traced and overlaid on an aerial photo of the site at Figure 2. Ground contours at 0.5m intervals are also shown on Figure 2.

The site generally slopes from Forbes Street towards Burnside Drive. The highest ground levels occur in the north-west corner of the site, at RL 13.5m AHD. The lowest ground levels are adjacent to Burnside Drive, at RL 8.6m AHD.

The Liverpool Boys High School occupies the northern portion of the site. Buildings are a mixture of single storey to three storey buildings, with ground floor levels mostly at RL 10.5m AHD or higher.

The Liverpool Girls High School occupies the southern portion of the site. Buildings are similarly a mixture of single storey to three storey buildings, with ground floor levels mostly above RL 10.3m AHD.

There is also a common library and hall between the two high schools, which is shared between both facilities. The library is at RL 10.55m AHD and the hall is at RL 13.63m AHD.

The primary school is proposed to be located on existing playing fields on the eastern part of the site.

There are a total of four main building blocks that have been proposed, as shown on Figures 1 and 2. All buildings are proposed to be three storeys high, except for the school hall, which is single storey.

Proposed floor levels for all buildings are shown as:

i) Ground Floor Level = RL 9.3m AHD;

ii) Level 1 = RL 13.25m AHD; and

iii) Level 2 = RL 17.20m AHD.

The natural ground level in the vicinity of the new buildings range from RL 8.8m to RL 9.3m AHD.

A staff parking area is shown in the south-east corner of the site. The parking area is shown to vary from RL 9.2m to RL 9.6m AHD.


LACHLAN STREET
FORBES STREET
BURNSIDE DRIVE
LIVERPOOL BOYS HIGH SCHOOL
LIVERPOOL GIRLS HIGH SCHOOL
REFER TO LANDSCAPE DRAWINGS FOR INTERNAL COURTYARD DETAILS
SUPPORT UNIT UNENCUMBERED PLAY AREA
FUTURE PRE SCHOOL OUTDOOR PLAY AREA
BIKE RACKS
HARDSTAND
BIN STORE
EXTENT OF REQUIRED 75 UNENCUMBERED PLAY SPACE
PRIMARY SCHOOL UNENCUMBERED PLAY AREA
REFER TO LANDSCAPE DRAWINGS
LIVERPOOL NEW PRIMARY SCHOOL STAFF CAR PARK
SITE BOUNDARY


Lachlan St
Liverpool Boys High School
New Primary School Buildings
Forbes St
Liverpool Railway Line
Burnside Dr
Liverpool Girls High School
New Parking

3 REVIEW OF FLOOD BEHAVIOUR

3.1 SOURCE OF INFORMATION

The following data sources have been used to review flood behaviour at the site, and in the vicinity of the site:

i) Georges River Flood Study (PWD, 1991);

ii) Georges River Floodplain Risk Management Study and Plan (Bewsher, 2004);

iii) Georges River Flood Study (BMT WBM, 2020);

iv) Cabramatta Creek Flood Study and Basin Strategy Review (Bewsher, 2011);

v) Brickmakers Creek Flood Mitigation Option Assessment (GHD, 2007)

The site is not shown to be inundated in floods up to the 100 year ARI event. However, more extreme floods on the Georges River could potentially overtop the Liverpool Railway line and inundate the site.

Flooding from Cabramatta Creek and Brickmakers Creek do not have the potential to inundate the site, but could inundate access roads to and from the school. Local stormwater inundation and overland flow may contribute to nuisance flooding problems in and around the school.

3.2 DESIGN FLOOD LEVELS

Design flood levels from the Georges River that could potentially have an impact on the primary school are summarised in Table 1.

Table 1
Design Flood Levels from the Georges River (18 Forbes Street, Liverpool)

Design Flood (ARI)	Design Flood Level (m AHD) [1]
20 year Flood	7.6
50 year Flood	8.4
100 year Flood	8.6
Probable Maximum Flood (PMF)	10.8

1 Formal flood levels adopted by Liverpool Council (PWD, 1991)

The lowest ground level within the school is RL 8.6m AHD. This is similar to the adopted 100 year ARI flood level for this site. Proposed ground floor levels for the new primary school (at RL 9.3m AHD) are above the 100 year ARI flood level, but would be inundated by 1.5m in the PMF flood. All upper floor levels are above the PMF estimate.

3.3 FLOOD RISK CLASSIFICATION

Liverpool City Council has adopted a flood risk classification that divides the floodplain into three different flood risk classifications (High, Medium and Low). The flood risk classification in the vicinity of the school is shown on **Figure 3**.

The subject site is classified as having a *Low Flood Risk*. This means that the site is above the 100 year flood, but still potentially affected by more extreme flood events.

3.4 FLOOD VELOCITIES

The maximum velocity that applies to the site in the PMF event occurs along the eastern boundary of the site, with a maximum value estimated at 0.4m/s (BMTWBM, 2020). The location of the proposed primary school buildings has a maximum velocity of 0.2 to 0.3m/s. The existing high school buildings experience a maximum velocity of less than 0.1m/s.

Flood velocities are relatively low due to the distance from the river, and the partial shielding of floodwater by the railway embankment.

3.5 RATE OF RISE OF FLOODWATER

An important consideration for the proposed development is the rate of rise of floodwater within the school, as this determines the time in which occupants have to safely leave the area, or to minimise their exposure to potential flooding.

A graph (Illustration 1) showing how flood levels are likely to vary over time for the 100 year ARI flood and the Probable Maximum Flood (PMF) have been extracted from the Georges River Floodplain Risk Management Study and Plan (Bewsher, 2004) for Liverpool Bridge. This is the same location at which the Bureau of Meteorology provides flood warnings for Liverpool during periods of flooding. It is noted that the Bureau provides warning levels as the height above the Liverpool weir, which is different to flood levels provided in this report (which are to Australian Height Datum or AHD). A correction of 2.8m should be added to the Liverpool gauge readings to convert these levels to AHD.

Based on the graph shown at Illustration 1, there could be:

i) of the order of 3.6 hours from a "major flood" level (ie 4.5m on the Liverpool gauge, or RL 7.3m AHD) being experienced within the Georges River to the time that the maximum flood level would be experienced within the school; and

ii) of the order of 1.7 hours or less from the time that the railway embankment overtops near the school until the maximum flood level is experienced within the school site.

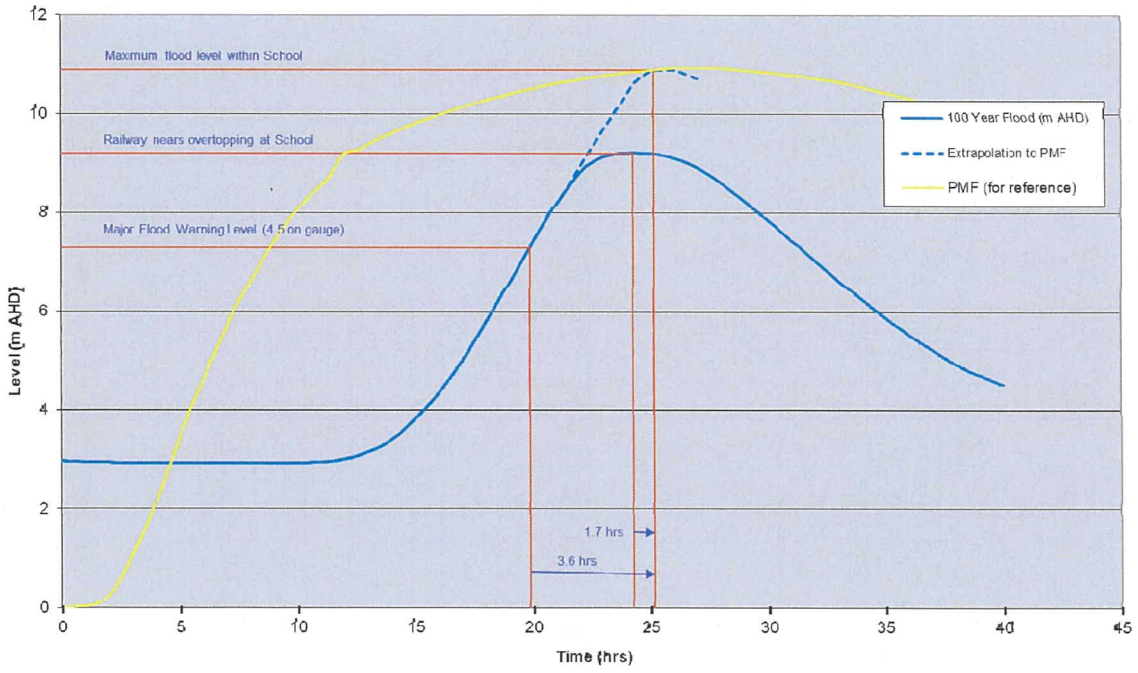


Illustration 1
Rate of Rise of Floodwater at Liverpool


Brickmakers Ck
SITE
Georges River

4 FLOOD WARNING AND EVACUATION CONSIDERATIONS

4.1 FLOOD WARNINGS

The Bureau of Meteorology provides a formal flood warning service for the Georges River.

The scheme monitors rainfall and river gauges in the upper catchment and aims to provide up to 12 hours warning of impending flooding. Warnings are issued to the State Emergency Service (SES) who then has responsibility for evacuation and other emergency response actions.

The main warning is based on the predicted flood height at Liverpool weir, also known as Liverpool Bridge. Predicted flood heights may also be issued for:

i) Scrivener Street;

ii) Irelands Bridge (on Cabramatta Creek);

iii) Cutler Road;

iv) Lansdowne Bridge (on Prospect Creek);

v) Milperra Bridge; and

vi) East Hills

Readings and predicted flood heights at Liverpool weir are based on the gauge height, which is the height above the weir level. This needs to be converted to Australian Height Datum (AHD) when comparing levels to survey plans and contours that have been derived for the proposed primary school site. The conversion factor is to add 2.8m to levels issued for this site to provide the level to AHD. There is also a flood gradient adjustment when comparing flood levels between Liverpool weir and the school site.

Flood Warning Heights, and the relevance to the proposed primary school site, is shown in Table 2.

Table 2
Flood Warning Heights at Liverpool Weir

Description of Warning	Liverpool Weir Flood Height		Impact on School Site
	Gauge Height	RL (m AHD)	
Minor Flood Warning	2.0	4.8	Minor roads closed
Moderate Flood Warning	3.0	5.8	Main traffic routes affected
Major Flood Warning	4.5	7.3	Significant disruption & nearby flooding
100 year Flood at Liverpool	6.4	9.2	School grounds become inundated [1]
Probable Maximum Flood (PMF)	8.1	10.9	Ground floor buildings flooded to 1.5m

1 Corresponds to lowest ground level within the school site at RL 8.6m AHD.
Earlier flooding could be experienced through stormwater and local overland flow inundation

Flood warnings can be monitored at the bureau's web site: www.bom.gov.au under "NSW Weather and Warnings". Flood Heights can also be monitored in real time using the "FloodsNearMe" phone app (search for Liverpool weir).

4.2 ROAD CLOSURES

The ability to safely evacuate the primary school is an important consideration in developing a flood emergency response strategy for the school.

Many of the major traffic routes within Liverpool and surrounding suburbs are likely to be inundated by floodwater from the Georges River, Cabramatta Creek, and/or Brickmakers Creek. Many of these traffic routes will be inundated long before any signs of flooding within the school site are visible.

Major road closures that are anticipated during flood events are shown on Figure 4. It is also anticipated that there will be additional local road closures due to inadequate stormwater drainage. Main road closures, and the depth of flooding in an estimated 100 year flood, include:

i) The Hume Highway, to the north, which could be inundated by over 1.5m near Cabramatta Creek (Irelands Bridge);

ii) Governor Macquarie Drive (to the east) which could be inundated by up to 0.9m near Warwick Farm Racecourse;

iii) Newbridge Road (to the east), which could be inundated by up to 1.5m near Lake Moore.

Higher level evacuation routes are shown on Figure 4, and include:

i) West along Campbell Street, and south on George Street, to Liverpool CBD;

ii) West along Campbell Street, north on the Hume Highway to the Cumberland Highway, and then north towards Cabramatta Road;

iii) West along Campbell Street, south on the Hume Highway to the M5 Motorway.

4.3 SHELTER-IN-PLACE

It is safer to stay within the school grounds rather than attempt to evacuate the school once flooding is encountered. Ground floor levels could be inundated by up to a maximum of 1.5m in an extreme flood event from the Georges River, but all upper floor levels are estimated to have no risk of inundation. It could typically take 12 - 24 hours for the flood risk to subside.

The most appropriate building to seek shelter in is the "Shared Hall" that is located between the Girls' and Boys' High School. This is a preferred location because:

i) The site is readily accessible from the Primary School, and rises steadily in the direction of egress;

ii) The Hall is located over the Library, and is well above the PMF flood level;

iii) It is a common area that could safely accommodate a large number of people;

iv) Only minor inundation (less than 0.4m) occurs between the library/hall and Forbes Street in an extreme flood event;

v) Forbes Street is not inundated in an extreme flood event at this location, providing safe vehicular access to the Liverpool CBD area, where additional supplies of food and water can be sought;

vi) It is understood that neither High School rely on the Hall for flood evacuation purposes.

4.4 RECOMMENDED STRATEGY

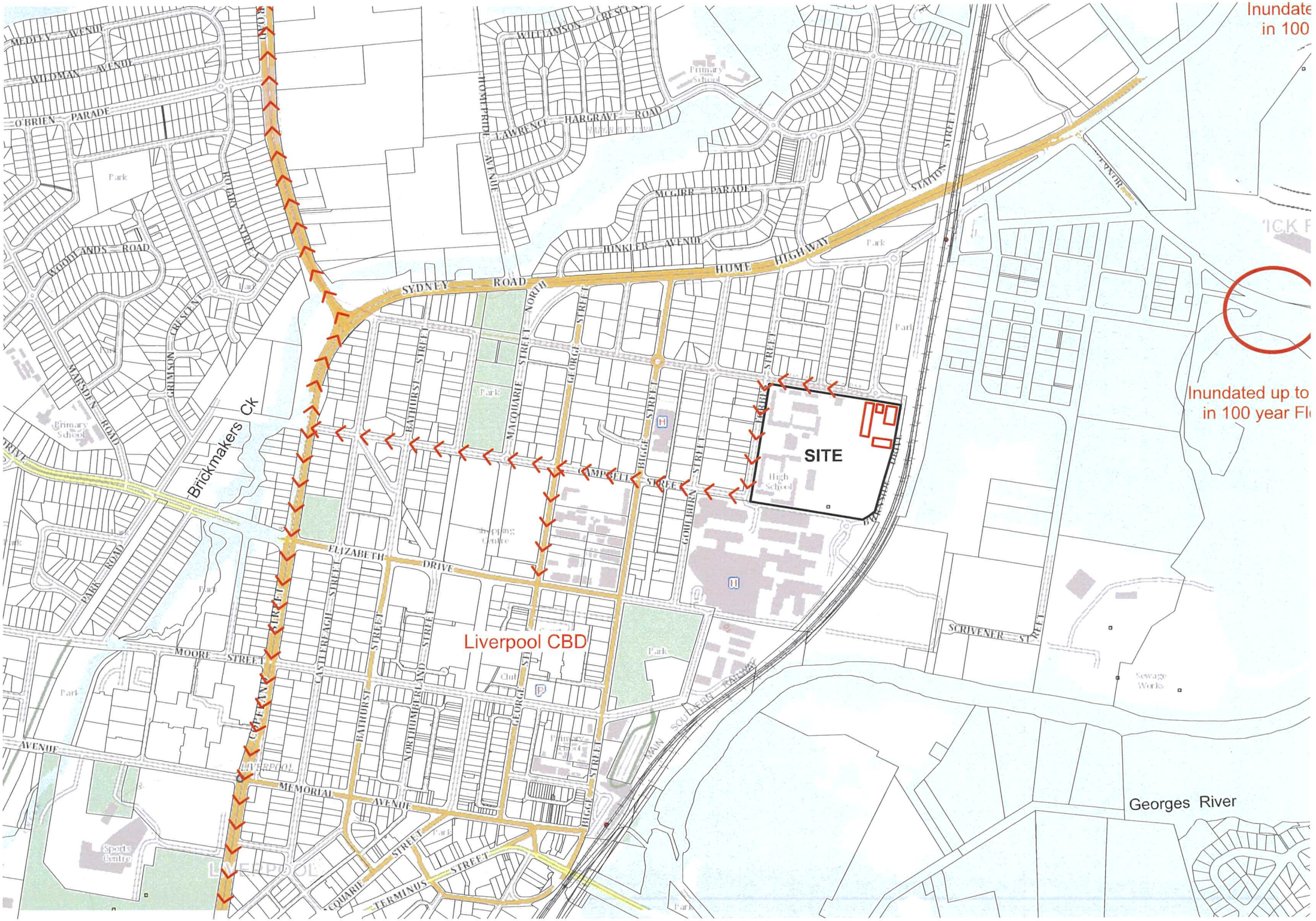
The recommended flood emergency response strategy, in priority order, is to:

i) Close the school (before the start of the day) if the Bureau of Meteorology issues a flood warning for "**Major Flooding**" at Liverpool. The Bureau typically provides 6-12 hours warning of future flooding.

ii) If school is already in progress and "**Major Flooding**" is predicted to occur before the end of the school day, then early closure of the school should be considered. This would include contacting parents to pick up students immediately if it is safe to do so. Remaining students should seek refuge within one of the upper floor levels within the school.

iii) If flooding on site is experienced, then it is too late to evacuate, and all remaining students and staff should seek refuge within one of the upper floor levels within the school. The preferred location to seek shelter is the shared Hall between the Girls' and Boys' High School.

The recommended flood emergency response measures are detailed in Section 5.


Inundate
in 100
Inundated up to
in 100 year Fl
SITE
Liverpool CBD
Brickmakers Ck
Georges River
SYDNEY ROAD
HUME HIGHWAY
CAMPBELL STREET
ELIZABETH DRIVE
MOORE STREET
MEMORIAL AVENUE
SCRIVENER STREET
MACQUARIE STREET
BATHURST STREET
GEORGE STREET
BIGGE STREET
CASTLEREAGH STREET
NORTHUMBERLAND STREET
GOULBURN STREET
HINKLER AVENUE
LAWRENCE HARGRAVE ROAD
WILLIAMSON CRESCENT
MEDLEY AVENUE
WILDMAN AVENUE
O'BRIEN PARADE
WOODLANDS ROAD
MARSDEN ROAD
PARK ROAD
STATION STREET
MAIN SOUTHERN RAILWAY

5 RECOMMENDED RESPONSE MEASURES

5.1 RESPONSIBILITIES

The ***Bureau of Meteorology*** has formal responsibility for monitoring rainfall and river levels within the Georges River catchment, and for providing a formal flood warning service for the Georges River. The Bureau aims to provide at least 6 hours warning of flooding at Liverpool based on actual rainfall within the catchment, and up to 12 hours warning based on predicted rainfall. Predictions provided by the Bureau will include a predicted flood height at Liverpool, and a classification as either "Minor Flooding", "Moderate Flooding", or "Major Flooding".

The ***State Emergency Service*** is responsible for disseminating flood warnings provided by the Bureau of Meteorology; taking action to coordinate and evacuate residents at risk; and attending to other hazards. Further information on preparing for flooding is provided on their web site at www.ses.nsw.gov.au . In a flood emergency phone 132 500.

Local Police provide assistance to the State Emergency Service, and are likely to assist with road closures and coordinating evacuation procedures.

The ***School Principal*** should assume overall responsibility for implementing this flood emergency response plan. This includes nominating a staff member to monitor flood conditions; deciding whether there is early closure of the school; which upper level buildings will be used as refuge areas in times of flood; and when students should be moved to these refuge areas.

A ***Flood Monitor*** should be assigned responsibility for monitoring flood conditions, and advising the principal on the evolving flood situation. This should include monitoring of river levels and flood level predictions provided by the Bureau of Meteorology; any additional advice issued by the State Emergency Service; and any visual signs of flooding in the immediate vicinity of the school grounds.

A ***Parent Liaison Officer*** should be appointed by the Principal to contact parents; advise of the school's position regarding early closure; and the availability of school buildings to act as refuge centres for both students and parents.

Teachers will be responsible for the coordinated movement of students to the refuge rooms when instructed by the Principal or whenever there is visual indication of flooding within the school grounds.

5.2 MONITORING FLOOD CONDITIONS

Flood Warning predictions can be monitored at www.bom.gov.au under "Warnings Current". Real time river conditions at Liverpool Bridge can also be monitored under "Rainfall & River Conditions" on the opening web page.

The Public Works and Advisory phone app: "FloodsNearMe" can also be used to monitor real time river conditions at Liverpool.

Visual monitoring of floodwater in the vicinity of the school should also be regularly made, particularly along the eastern boundary of the school and in the vicinity of the railway embankment.

5.3 KEY TRIGGERS

Key flood warning levels and their impact on the school are provided in Table 2. Key levels include:

Prediction for "***Minor Flooding***" at Liverpool – Liverpool gauge height will exceed 2.0m
Flood Conditions should be closely monitored.

Prediction for "***Moderate Flooding***" at Liverpool – Liverpool gauge height will exceed 3.0m
Main traffic routes are likely to be affected and road closures are likely once this level is reached.

Prediction for "***Major Flooding***" at Liverpool – Liverpool gauge height will exceed 4.5m
The decision to close the school should be made as soon as "Major Flooding" is predicted. Where the school day is in progress and "Moderate Flooding" is currently occurring, it is recommended that students and staff seek shelter within one or more of the upper level school buildings.

"***Major Flooding***" is occurring at Liverpool and the Liverpool gauge height exceeds 6.4m
The school grounds are likely to become inundated once the Liverpool gauge exceeds a level of 6.4m. All students and staff remaining within the school should seek shelter within one or more of the upper level school buildings, or as directed by the Principal.

5.4 SUITABLE REFUGE LOCATIONS WITHIN THE SCHOOL

All buildings within the school grounds that have upper floor levels will provide suitable refuge that is above the level of an extreme flood. However, the most appropriate building is considered to be the common Hall between the Girls' and Boys' High School, for the reasons provided in Section 4.3. The preferred refuge location is shown on illustration 2.

Illustration 2 – Preferred Refuge Location

5.5 ACTION TO TAKE BEFORE A FLOOD OCCURS

The following action should be taken prior to a flood occurring:

i) This Plan should be kept up to date; key staff should be aware of the Plan; and the actions to be taken during an impending flood.

ii) All electrical outlets should be protected by appropriate earth leakage devices to avoid the risk of electrocution.

iii) Emergency kits, including first aid, torch, battery powered radio, spare batteries, etc should be located within each building where refuge may be sought.

5.6 ACTION TO TAKE DURING A FLOOD

The following action should be taken whenever flood conditions arise:

iv) Flood conditions should be carefully monitored once any formal flood warning advice is received from the Bureau of Meteorology for the Georges River, or other advice is received from the State Emergency Service.

v) Where the school day has not yet commenced, and a "major flood" warning has been issued, it is recommended that the school is closed for the day.

vi) Where the school day is in progress, and a "major flood" warning has been issued, it is recommended that early closure of the school is considered. This would include contacting parents to pick up students early from school where it is safe to do so, and prior to the flood level exceeding 3.0m on the Liverpool gauge (ie "moderate flooding").

vii) Preferred access routes to and from the school are shown on Figure 4. Areas likely to be inundated by floodwater once "moderate flooding" occurs includes The Hume Highway (near Cabramatta Creek); Governor Macquarie Drive (near Warwick Farm); and Newbridge Road (near Lake Moore).

viii) Should the grounds of the school become inundated, or floodwater overtops the railway line, then it is recommended that all remaining students and staff seek shelter in the shared Hall above the library between the two High Schools, and wait until the flood risk abates. Any parents in the process of collecting students should be encouraged to remain with their children at this location.

ix) It could typically take 12-24 hours until the flood risk abates. Reasonable access to the Liverpool CBD (and Westfields) is available from the School Hall, along the preferred route shown on Figure 4, where supplies can be obtained for any extended period of sheltering.

5.7 ACTION TO TAKE AFTER A FLOOD

The following action is recommended after a flood occurs:

x) All floors, furniture and any equipment that has been immersed should be thoroughly cleaned and disinfected.

xi) All electrical outlets and electrical equipment should be inspected for signs of immersion, and where evident, a safety check should be carried out by a licensed electrician.

xii) This Plan should be reviewed on a regular basis, and after past flood events to account for experiences and lessons learnt.

6 REFERENCES

Bewsher Consulting (2004), "*Georges River Floodplain Risk Management Study and Plan*", prepared for Liverpool, Fairfield, Bankstown and Sutherland Councils

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