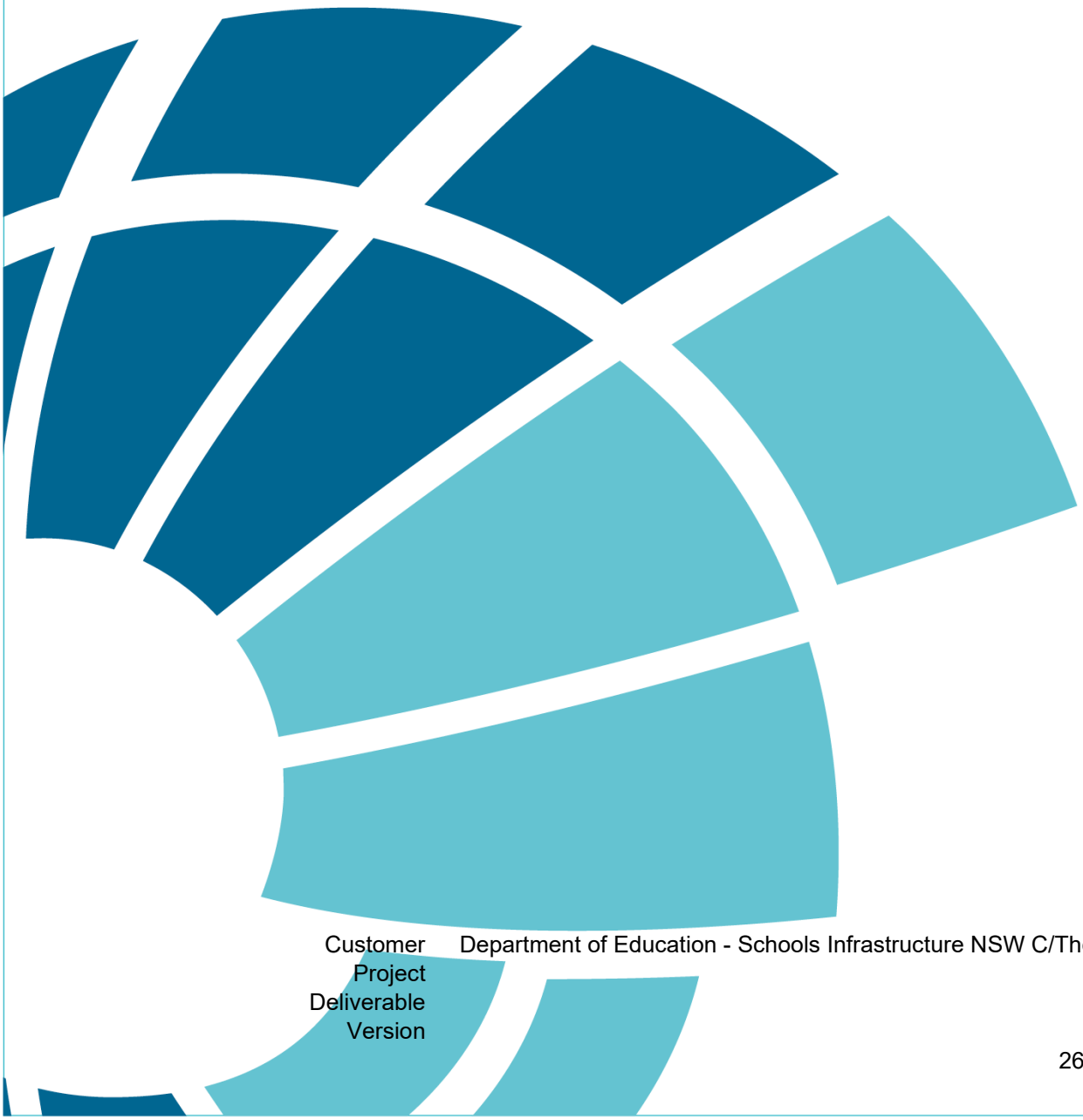
Construction Flood Emergency Management Plan Newcastle Education Campus



Customer	Department of Education - Schools Infrastructure NSW C/The App Group
Project	A12077
Deliverable	002
Version	01
	26 March 2024

Document Control

Document Identification

Title	Construction Flood Emergency Management Plan Newcastle Education Campus
Project No	A12077
Deliverable No	002
Version No	01
Version Date	26 March 2024
Customer	Department of Education - Schools Infrastructure NSW C/The App Group
Customer Contact	Anthony Harrigan
Classification	BMT (OFFICIAL)
Synopsis	Construction Flood Emergency Management Plan to inform the development of the Newcastle Education Campus
Author	Barry Rodgers
Reviewed By	Owen de Jong
Project Manager	Barry Rodgers

Amendment Record

The Amendment Record below records the history and issue status of this document.

Version	Version Date	Distribution	Record
00	14 March 2024	The App Group	Draft Report
01	26 March 2024	The App Group	Final Report

Contents

Figures

1 Introduction

1.1 Background

On 12 January 2024, Development Application SSD-41814831 for staged upgrades to Newcastle Education Campus was approved by the NSW Minister for Planning and Public Spaces. Newcastle Education Campus ("the Site") is located at 25A National Park Street, Newcastle West NSW 2302 (formerly Newcastle Education Precinct, Lot 1 DP794827, Lot 1 DP575171 and Lot 1 DP 150725).

The planning approval is subject to conditions set out within Schedule 2 of the notification of approval. Condition B21 relates to the preparation of a Construction Flood Emergency Management Plan (CFEMP). The full text of condition B21 is provided below and the section reference to this report where each part of the condition has been addressed is shown in bold text.

Construction Flood Emergency Management Plan

Prior to the commencement of each construction stage, a Construction Flood Emergency Management Plan must be prepared by a suitably qualified and experienced person(s) in consultation with NSW State Emergency Services, submitted to the Certifier and a copy to the Planning Secretary for information, including but not limited to:

*(a) Detail on triggers, including rainfall and water level, that require closure of the site; (***Section 2.2***)*
*(b) Detail on how site closure would be communicated to construction workers, before commencement of the work day; (***Section 2.3***)*
*(c) Details of drills, frequency and record management of the drills; (***Section 2.4***)*
*(d) A map showing the flood-free pedestrian route from each construction site to a suitable location free of inundation; (***Section 2.5***)*
*(e) Details of any gauges or warning infrastructure that are to be provided to assist with flood management, including frequency of maintenance, and how these will be monitored; (***Section 2.6***)*
*(f) Identification of suitable locations for evacuation that are free of inundation; (***Section 2.7***) and*
*(g) Flood warning signs around the site to identify areas with Category H3 hazard and higher, in accordance with the Flood Hazard Flood Risk Management Guide FB03, NSW Department of Planning and Environment and are within the overland flow path. (***Section 2.8***)*

The APP Group has engaged BMT to prepare the CFEMP and this is set out within this report. The CFEMP has been prepared by Barry Rodgers of BMT and reviewed by Owen de Jong of BMT. CV's of Barry and Owen are provided in Annex A.

1.2 Supporting Information

The CFEMP draws upon information presented in two reports previously prepared by BMT as part of the planning application for the Site. These reports are as follows:

- Flood Impact Assessment (FIA) which describes the flood behaviour at the Site and assesses the potential for flood impacts as a result of the proposed development. Proposed floor levels are also provided and demonstrate that they are above the flood planning level (reference: R.A12077.001.02_FIA).

- Flood Emergency Response Plan (FERP) which outlines the proposed strategy for flood emergency management of the Site including the nomination of evacuation routes. The report documents available space for sheltering in place, including for four interim stages of construction (reference: R.A12077.001.07_FERP).

The CFEMP contains only summary details from these two reports and reference should be made to those reports for further information if required.

1.3 Consultation with SES

The NSW State Emergency Service (SES) was consulted during preparation of the FERP and was satisfied that its advice was incorporated into the finalised FERP. In summary, the SES states that the preferred emergency strategy for the school is early closure prior to the commencement of flooding and before the start of the school day. People using the site must be informed of the flood risk during and after the works, for example by using signage, induction etc.

Given the significant overlap between the FERP and this CFEMP and that the SES advice received also related to the construction stages of the development, it is considered that the received SES advice remains applicable for the CFEMP. A draft version of the CFEMP was provided to the SES for review and they concurred that their recommendations for the FERP are also reflected in the CFEMP. A copy of the SES response to the CFERP is provided in Annex B.

2 Construction Flood Emergency Management Plan

2.1 Overview

A CFEMP has been prepared to address the requirements of condition B21. A key consideration when preparing the CFEMP is that the majority of the Site remains outside of the flood extent for events up to and including the 0.5% AEP event. As such, the likelihood of the Site flooding, particularly during the relatively short construction period (around 2 years) is low. Notwithstanding this, a precautionary approach is applied whereby early evacuation is undertaken when a significant weather event is forecast.

The CFMEP is structured in accordance with the sub-items of B21 and is set out below.

2.2 Triggers for Site Closure

The Site is located within the Cottage Creek catchment and has the potential to be impacted by runoff from a small 110 hectare upstream area. There are no upstream water level gauges and any triggers based on rain which has fallen at nearby rain gauges may not give sufficient time to evacuate.

It is proposed that the NSW Hazards Near Me app is monitored for warnings of extreme weather. This includes severe weather warnings and severe thunderstorm warnings issued by the Bureau of Meteorology and which may include warnings for possible flash flooding. These warnings are also disseminated via various media outlets and are available of the Bureau of Meteorology website. In the event of a local warning advising of the potential for flash flooding it is recommended that the Site is closed and evacuated.

Whereas much of the Site is located at an elevation above 4mAHD, a small proportion of the Site in the north east corner is at lower elevations typically ranging between 2.1 to 2.5 mAHD. In addition to monitoring for severe weather warnings, it is recommended that the site is evacuated if water within Cottage Creek starts to rise and spread over the majority of this lower part of the Site i.e. a flood level of around 2.5mAHD. A flood depth indicator is proposed in this location which will mark a flood height corresponding to 2.5mAHD (see Section 2.6).

2.3 Communication of Site Closure

In the event of Site closure, a safety bulletin should be sent to all workers. BMT understands this can be delivered through the contractor's safety management software, Hammertech. Each worker associated with the project should then receive an SMS with information relating to Site closure.

For workers on site, a nominated worker should assume the role of chief flood warden. In the event of a Site closure, this worker should ensure that the Site is fully evacuated.

2.4 Flood Evacuation Drills

All site workers should be made aware of the potential flood risk to the site during Site induction. This should include awareness of evacuation routes and areas of the Site where floodwater can potentially pose the greatest hazard, namely the eastern corner near the proposed multi-purpose facility. The induction should also make workers aware of suitable buildings where shelter in place can occur in the unlikely event that evacuation is not possible (see Section 2.5).

It is recommended that a flood evacuation drill for site workers is undertaken on an annual basis. The drill should assume that a severe weather warning has indicated the potential for flash flooding and that the water level in Cottage Creek is rising rapidly. An evacuation to nominated shelter in place locations should be undertaken as part of the drill using nominated routes.

The school will still be operating during the construction stages. It is assumed the requirement for a flood evacuation drill in the CFEMP relates only to construction activities and workers. The students and teachers of the school would not be expected to take part in these drills as they have their own flood emergency management plan.

2.5 Flood Free Pedestrian Evacuation Routes

Evacuation routes to shelter in place locations are presented in the FERP. Annex C of this report presents figures showing flood free pedestrian routes to an area north of Building A for all key stages of construction. If floodwater continues to rise and shelter in place is required then Figure 2.1 shows flood free evacuation routes to shelter in place locations within Building A. Building A is the nominated shelter in place location for workers during all stages of construction as it retains sufficient floor area above the PMF flood level for all construction stages. It is recommended that use of Building A for potential shelter in place for workers is discussed and agreed with the school.

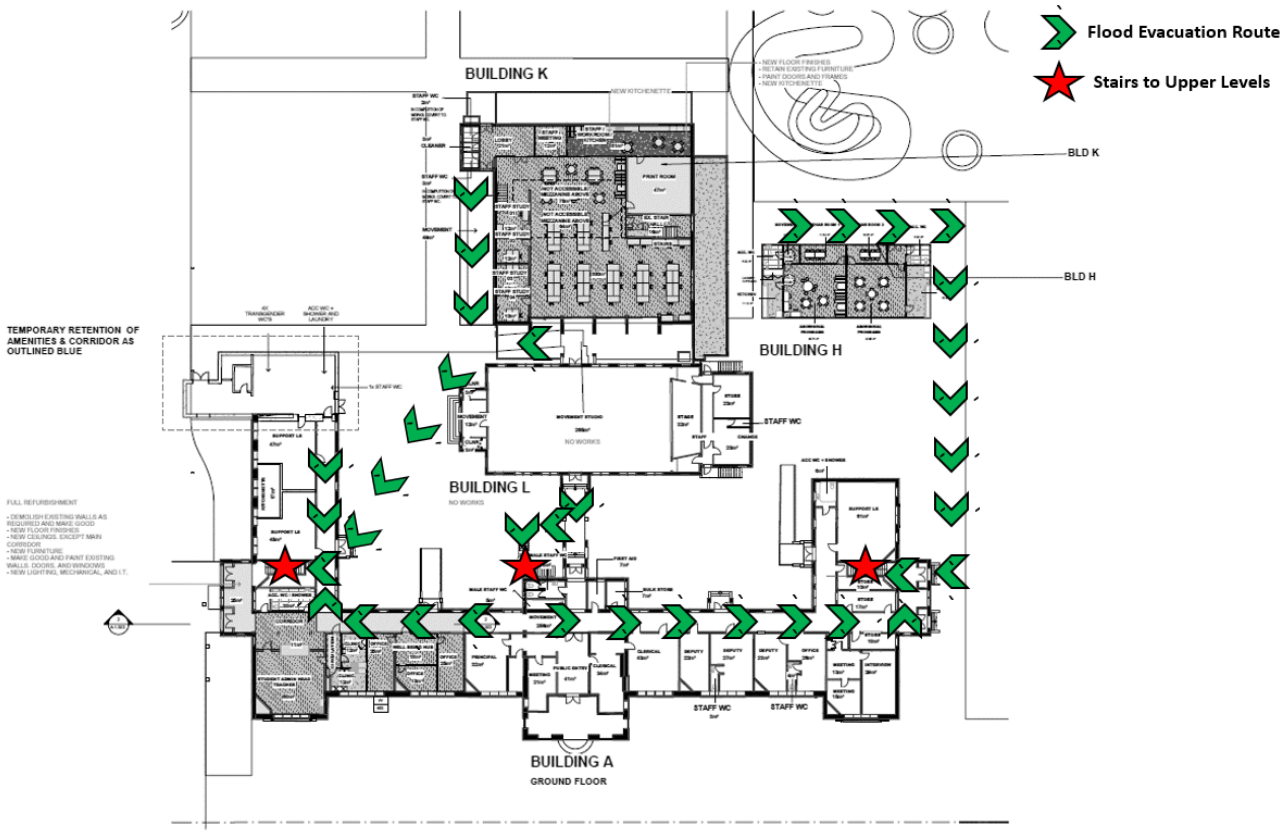


Figure 2.1 Evacuation routes to shelter in place in Building A

2.6 Gauges and Flood Warning Infrastructure

Given the nature of the flooding that has the potential to affect the site is flash flooding, there is limited potential to provide advance warning from installation of gauges within the catchment. A recommendation of the FERP was to install a flood depth indicator in the area north of the proposed multipurpose facility building with indicators for the 5% AEP flood level (2.48mAHD) and the 1% AEP flood level (2.94mAHD). This gauge can be used to monitor the rate of rise of floodwater at the site and can be used to set key triggers as part of an evacuation response.

It is assumed that the gauge would be a manually read gauge with clear markers identifying flood depths and key thresholds. Maintenance of the gauge is expected to be relatively minimal but it should be checked and cleaned after any period of floodwater inundation and retained free of debris.

An example flood depth marker is shown in Figure 2.2. Elevations of the 5% AEP (2.48mAHD) and 1% AEP (2.94mAHD) design floods would need to be determined as a height on the board and indicated with alternative marking.

Figure 2.2
Example Flood Depth Indicator Board

2.7 Suitable locations for Evacuation

The majority of the Site is free from inundation in all modelled events up to and including the 0.5% AEP flood. In the PMF event the entire Site and much of the surrounding area is inundated and so suitable locations for evacuation are limited to internal floor areas of buildings which have floor levels above the PMF level. The FERP identifies these floor areas during each key construction stage and this information is replicated in Figure 2.3 below. The analysis conservatively assumed that the school is at capacity with students and teachers and that these are factored into the calculations. As stated in Section 2.5, it is recommended that Building A is the nominated shelter in place location for workers during all stages of construction as it retains sufficient floor area above the PMF flood level for all construction stages. The newly constructed buildings (New Learning Hub and Multipurpose Facility) will also have floor levels above the PMF level at the end of Stages 2 and 3 and these buildings will be finished during Stages 4 and 5.

STAGE 1	
-Move Building H to new location	
- Services Infrastructure Upgrades	
- Demolition of Building B and existing Sport Courts	
- Remove trees, other planting	
Site Occupants	1242 ppl
Building A - Level 1	969 m²
Building B - Level 1	60 m² (maintained after demolition)
Building C - Level 1	673 m²
Building C - Level 2	687 m²
Building D - Level 1	377 m²
Building D - Level 2	371 m²
Total Available area	**3137 m²**
Per-capita available space (ppl/m²)	**2.53**

STAGES 2 and 3 (occurring concurrently)	
- Construction of new Learning Hub (Building R)	
- Landscaping walkway and external works	
-New Support drop off zone	
- Construction of newMultipurpose Facility (Building S)	
- Landscaping and external works	
- Demolish Building P	
Site Occupants	1242 ppl
Building A - Level 1	969 m²
Building B - Level 1	60 m² (maintained after demolition)
Building C - Level 1	673 m²
Building C - Level 2	687 m²
Building D - Level 1	377 m²
Building D - Level 2	371 m²
Building R - Level 1	0 m² (construction in progress)
Building R - Level 2	0 m² (construction in progress)
Building S - Level 1	0 m² (construction in progress)
Total Available area	**3137 m²**
Per-capita available space (ppl/m²)	**2.53**

STAGE 4	
- Refurbish Building A & K	
- Demolish Building J & existing walkways to Building K	
- Landscaping , site works	
Site Occupants	1242 ppl
Building A - Level 1	969 m²
Building B - Level 1	60 m² (maintained after demolition)
Building C - Level 1	673 m²
Building C - Level 2	687 m²
Building D - Level 1	377 m²
Building D - Level 2	371 m²
Building R - Level 1	2069 m²
Building R - Level 2	1975 m²
Building S - Level 1	900 m²
Total Available area	**8081 m²**
Per-capita available space (ppl/m²)	**6.51**

STAGE 5 and Project Completion	
- Demolish Buildings D, E & I	
- Construct new Sports Courts	
- Landscaping , site works	
- Campus Green & remaining landscapes, walkways	
Site Occupants	1530 ppl
Building A - Level 1	969 m²
Building B - Level 1	60 m² (maintained after demolition)
Building C - Level 1	673 m²
Building C - Level 2	687 m²
Building D - Level 1	0 m² (demolition in progress)
Building D - Level 2	0 m² (demolition in progress)
Building R - Level 1	2069 m²
Building R - Level 2	1975 m²
Building S - Level 1	900 m²
Total Available area	**7333 m²**
Per-capita available space (ppl/m²)	**4.79**

Figure 2.3 Available area for sheltering in place during a PMF event in project construction stages

2.8 Signage for High Hazard Areas

Pre-construction condition B21 (g) requests that flood hazard is identified for hazard category H3 and above using the Flood Hazard Flod Risk Management Guideline FB03 and that flood warning signs are placed around the Site to identify such areas which also correspond to overland flow paths.

The FIA identified and categorised flood hazard in accordance with Newcastle City Council's DCP. This consisted of five categories of hazard termed 'hydraulic behaviour thresholds'. Guideline FB03 uses a different categorisation consisting of six categories of increasing hazard as shown in Figure 2.4.

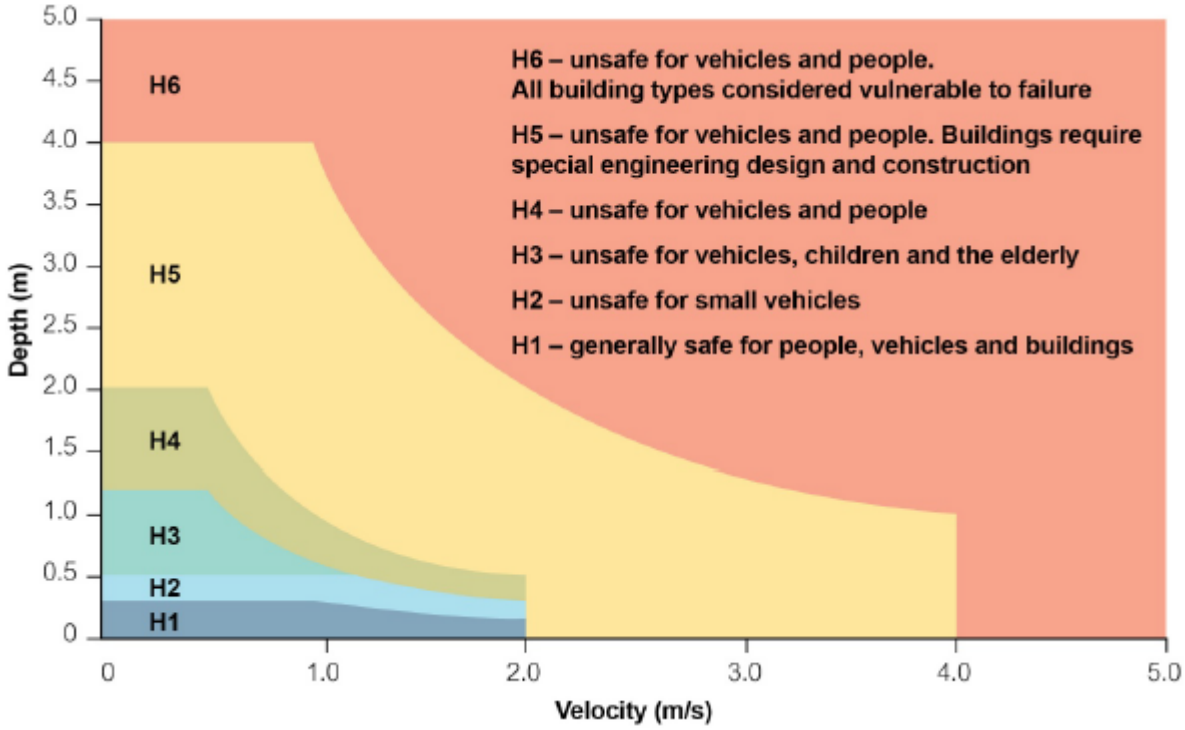


Figure 2.4 General Flood Hazard Vulnerability Curves specified in FB03

The FB03 hazard categories are based on combinations of flood depth and flood velocity. Hazard category 3 and above includes all areas with a depth above 0.5m. If the velocity exceeds 1m/s then the depth threshold for Hazard Category 3 or more is reduced.

Figure 2.5 shows the hazard categories H3 and above mapped across the Site for a PMF. All areas of the Site, apart from existing buildings, are subject to category H3 and above. The pattern of inundation during the PMF event is caused by water rising from Cottage Creek and backing up into the Site. As such the inundation has relatively low velocity and there are no areas that are considered overland flow paths where water flows through the Site. An extract from the peak flood velocity mapping for the PMF event is shown in Figure 2.6 for both the pre- and post- developed cases. It can be seen that velocities within the Site are relatively low and no overland flow paths are apparent.

The condition requests that signage is placed in areas both where it is subject to hazard H3 and above and it is within an overland flow path. No parts of the Site meet the conditions needed for this requirement. Notwithstanding this, it is recognised that the eastern corner of the Site has the potential for high flood hazard (up to H5) due to the potential for significant flood depths during a PMF event, and lower flood depths during more frequent events. It is therefore recommended that signage be included alongside the proposed flood depth indicator to indicate the potential for inundation. A location for the recommended sign is included in Figure 2.6 and an example sign is shown in Figure 2.7.

Figure 2.5 Flood Hazard Categories H3 or greater shown across the Site

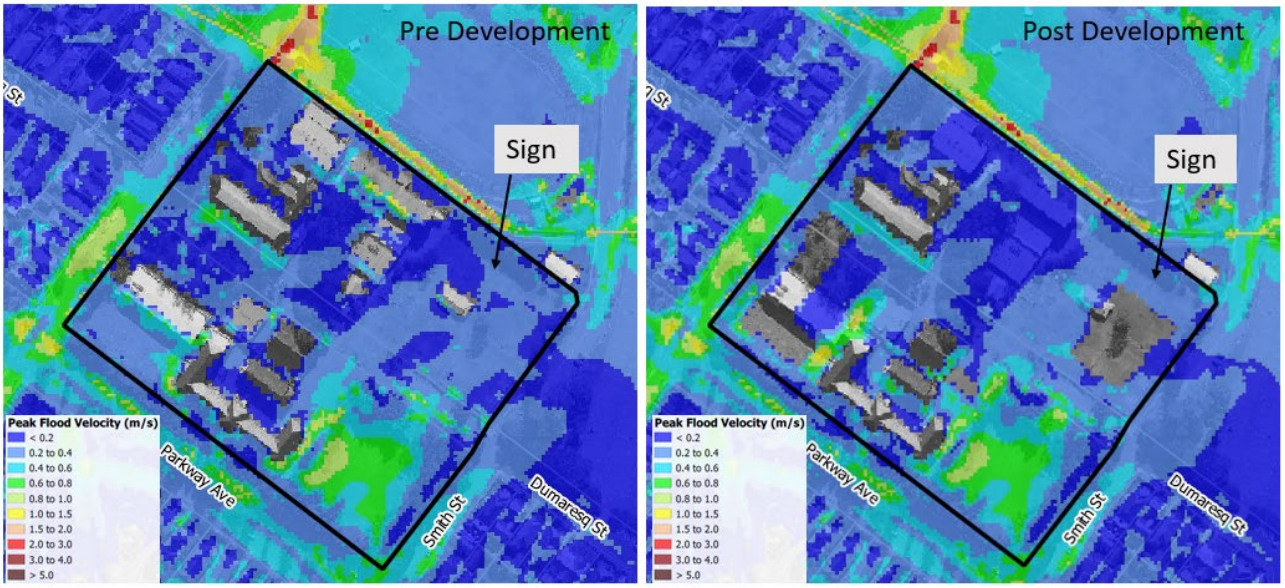


Figure 2.6 Peak PMF Velocity and recommended location for flood hazard signage

Figure 2.7 Example Signage for Eastern Part of Site

3 Conclusions

A Construction Flood Emergency Management Plan (CFEMP) is presented for the proposed Newcastle Education Campus upgrades. The CFEMP addresses the requirements of pre-construction condition B21 and is informed from analyses undertaken in the supporting flood impact assessment and flood emergency response plan. The SES was provided with a draft copy of the CFEMP and noted that it's previous recommendations are reflected in the CFEMP.

The preferred strategy during an extreme weather event is early Site closure based on monitoring for flash flood warnings and water levels in lower parts of the Site. Should a sudden and severe rainfall event happen while workers are already on the Site then a shelter in place strategy is advised using Building A.

The CFEMP presented in this report is based on construction staging details available at the time of reporting and use of simulated design floods. In reality, flood events can have characteristics different from those simulated and therefore the flood behaviour presented in this report should be considered indicative only of what can occur.

It is recommended that the CFEMP is reviewed on an annual basis.

Annex A CVs

Barry Rodgers

CAREER OVERVIEW

Barry joined the BMT flood team in Brisbane in January 2011. He has a Master's degree in hydrology and over 19 years of consultancy experience in Australia and overseas specialising in hydrologic and hydraulic modelling.

He was the lead hydraulic modeller in developing a 2D hydraulic model of the Brisbane River Catchment; one of the largest and most comprehensive studies of its kind in Australia and one that won and Engineers Australia award for technical excellence. He was also the technical lead on a number of other high profile studies including the Swan River Flood Study, the Maroochy River Flood Study Update, the Richmond River Flood Study and the Ipswich Rivers Flood Study update, the latter being one of the first in the country to apply Australian Rainfall and Runoff 2019 techniques at the catchment scale. Barry regularly undertakes technical peer reviews of modelling studies for internal and external clients.

POSITION

Principal Scientist

YEARS OF EXPERIENCE

20

ACADEMIC QUALIFICATIONS

MSc in Hydrology and Water Quality from Lancaster University UK (2004)

BSc in Environmental Science from University of Southampton UK (2001)

EMPLOYMENT HISTORY

2011 to date **Principal Scientist, BMT**

2007 to 2011 **Consultant, Senior Consultant, Entec UK Ltd, Bristol UK**

2004 to 2007 **Assistant Analyst, Analyst, JBA Consulting, Warrington UK**

PROFESSIONAL AFFILIATIONS

- Chartered Institute of Water and Environmental Management, Member (MCIWEM)
- Chartered Scientist (CSci)

FLAGSHIP PROJECT

Brisbane River Flood Study Hydraulic Assessment – Barry was the lead flood modeller in developing a 2D model of the lower Brisbane River. The model was calibrated to a range of flood events and resulted in some key findings in relation to use of supplementary energy losses that were since presented to the industry. The study subsequently won the Engineers Australia RJ Hawkin Award for Engineering Excellence.

AREAS OF EXPERTISE

- Hydrologic Modelling
- Hydraulic Modelling
- Project Management
- Peer Reviews

SPECIFIC PROJECTS

Strategic/Catchment Scale Flood Studies

- Maroochy Flood Mitigation, Sunshine Coast Regional Council (2023-ongoing)
- Clarence Valley Flood Mitigation, Department of Planning and Environment (2023 - ongoing)
- Lower Clarence Flood Model Update, Clarence Valley Council (2021-2023)
- Richmond Valley Flood Study, Richmond Valley Council (2021-2023)
- Lower Clarence River Structural Flood Mitigation Works Investigation, Clarence Valley Council (2020-2022)
- Kapiti Coast District Council, New Zealand - Hydraulic Model Peer Reviews (2020-2022)
- City of Canterbury-Bankstown Urban Drainage Assessments (Various) (2013-2020)
- Insurance Australia Group – Flood Investigations (2013-2020)
- Pioneer River Flood Study Peer Review - Mackay Regional Council (2019)
- New Grafton Bridge Flood Modelling and Mitigation (2015-2019)
- Levee Regulation Framework Scoping Study and Review (2018)
- Ipswich Rivers Flood Study Update (2017-2018)
- Swan and Helena Rivers Flood Study (2016-2017)
- Brisbane River Catchment Flood Study (2014-2017)
- Evans River Flood Study, Richmond River County Council (2014)
- Grafton Bridge – Additional Crossing of the Clarence River at Grafton – Hydraulic Impact Assessment, Roads and Maritime Services (2014)
- Bankstown LGA Wide Piped Network Constraints Analysis, Bankstown City Council (2014)
- Black Snake Creek Flood Investigations, Ipswich City Council (2014)
- Bankstown Stormwater Modelling and Mapping, Bankstown City Council (2013)
- Western Downs Flood Risk Management Study, Western Downs Regional Council (2013)
- Western Downs Flood Study – Peer Review, Western Downs Regional Council (2012)
- CopperString Transmission Line, Leighton Contractors (2011)

Site Specific Assessments

- Singleton Bypass Subject Matter Expert - Flooding, Transport for NSW (2022-ongoing)
- Department of Transport and Main Roads, Butterfield St. Bus Layover Business Case Assessment (2020)
- Transport for NSW, Lismore Road Upgrade Flood Modelling Investigation (2020)
- Glencore Hunter Valley Operations, Peer Review of Flood Modelling (2020)
- West Yamba Flood Impact Assessment (Various) (2014-2019)
- Bennett Street Drain Options Assessment, Bankstown City Council (2015)
- Norman Creek Bikeway Crossing, Brisbane City Council (2014)
- Summerland Way Flood Impact Assessment, Roads and Maritime Services (2014)
- Wryallah Road Flood Impact Assessment, Lismore City Council (2014)

KEY PAPERS/PRESENTATIONS

Richmond Valley Flood Study - An Overview, presented at the Queensland Water Symposium 2023.

A Multi-Criteria Investigation of Structural Flood Mitigation Assets in the Clarence Valley Floodplain, presented at the Floodplain Management Australia 2022 National Conference, Toowoomba, May 2022.

Ipswich Rivers Flood Study Update – Implementing ARR2016 at the catchment scale, presented at Engineers Australia Evening Event, Brisbane, June 2018.

Swan River: A Pragmatic Assessment of the Interaction of Riverine and Coastal Flooding, presented at the Floodplain Management Australia 2018 Conference, Gold Coast, May 2018.

'Brisbane River Catchment Flood Study – Hydraulic Modelling Overview' presented at the Queensland Water Panel Special Event, Engineers Australia, Brisbane, September 2017.

'Brisbane River Catchment Flood Study – Calibration of Hydraulic Models' presented at 13th Hydraulics in Water Engineering Conference, Sydney, November 2017.

Owen de Jong

CAREER OVERVIEW

Owen is an Environmental Engineer and Scientist (CPEng / RPEQ) with 18 years of experience in water engineering and infrastructure across local government, state government and private sectors. Surface water management has been a particular focus, with specific areas of expertise encompassing catchment wide flood studies, floodplain risk management plans, concept and detailed designs, hydrology and flooding for major road and rail infrastructure, dam break assessments, stormwater quality, drainage, stormwater harvesting, water balance, erosion and sediment control, climate change assessments, riparian assessments and policy review.

Other experience includes authoring and presenting papers relating to water engineering, university lecturing, hosting of technical tours and community consultation.

POSITION

Principal Engineer

EMPLOYMENT HISTORY

2022 to date **Principal Engineer, BMT**

2020 to 2022 **Various, Contract Roles**

- Principal Engineer, AECOM
- Flooding+Stormwater Unit Leader (Acting), Wollongong City Council
- Dams Engineer, Wollongong City Council
- Technical Specialist, Transport for NSW

2016 to 2019 **Senior Natural Resources Officer (Floodplain Management), NSW Department of Planning, Industry & Environment**

2010 to 2016 **Manager (Water), Cardno**

2007 to 2010 **Water Engineer, Parsons Brinckerhoff**

2007 to 2007 **Graduate Water Engineer, Brown Consulting**

2005 to 2007 **Undergraduate Water Engineer, Redland Water & Waste**

ACADEMIC QUALIFICATIONS

B.Eng (Hons1) in Environmental Engineering from Griffith University (2006)

B.Sc from Griffith University (2006)

YEARS OF EXPERIENCE

19

PROFESSIONAL AFFILIATIONS

- Member, Institution of Engineers Australia (MIEAust)
- Chartered Practicing Engineer (CPEng)
- Registered Professional Engineer of Queensland (RPEQ)

AREAS OF EXPERTISE

- Catchment hydrology
- Floodplain risk management
- Dams safety management
- Transport infrastructure
- Drainage & water quality
- Erosion & sediment control

AWARDS

Certificate of Appreciation for Contributions to Teaching and Learning at the University of Wollongong, 2018 & 2019.

Best for Project, Albion Park Rail Bypass (Hydrology & Flooding Lead), 2014.

SPECIFIC PROJECTS

Floodplain Management

- Rockhampton Floodplain Risk Management Study (2023-2024)
- NSW Floodplain Management Program, Flood and Risk Management Studies - Technical Assistance for 19 Catchment Wide Studies and Plans (2016-2019)
- NSW Floodplain Management Program, Flood Mitigation Works - Technical Assistance for Investigation & Design of 11 Flood Mitigation Projects. (2016-2019)
- Nowra & Browns Creeks Floodplain Risk Management Study & Plan (2012-2014)

Dams Safety Management

- Review of Logan City Council LGIP Stormwater Basins (2023)
- Wollongong City Council Dams Safety Management System (2021)
- Shell Cove Estate Detention Basin 1 DBA, DSEP and OMM (2015)
- Shellharbour City Centre Basin DBA, DSEP and OMM (2012-2014)

Erosion & Sediment Control

- Veolia Water Soil & Water Management Plan (2014)
- Dargues Gold Mine Pollution Production Program (2013)
- Wongawilli No.2 Ventilation Shaft Project (2011)
- Anglo American Metallurgical Coal (2010)

Flood Impacts & Mitigation

- Northern Silica Project (2023-2024)
- Gladstone Solar Farms (2023-2024)
- Damascus Barracks Zone B (2022)
- Corrimal Schools (2012-2016)
- Innovation Campus (2011-2016)
- University of Wollongong Stormwater & Flooding Rectification Works (2015)
- BlueScope CRM (2014-2014)
- Elderslie Release Area (2013-2014)
- Kembla Grange Employment Lands Flood Study (2014)
- Wollongong Debris Control Structures (2014)

Policy

- NSW Floodplain Management Program, Input for Various Local and State Government Policies (2016-2019)
- Shellharbour Floodplain Risk Management DCP Review (2011-2013)

Expert & Insurance

- ANU (2023)
- Capricorn Copper (2023)
- Ernest Henry Mine (2023)
- United Cinemas (2023)
- Cleanaway New Chum (2023)
- Blackbutt (2013)
- Warilla (2011)

Transport Infrastructure

- Swan Hill Bridge Replacement (2023)
- Gold Coast Light Rail Stage 3 (2022)
- Pacify Motorway Upgrade, Palm Beach to Tugun (2022)
- Inland Freight Route Link (2022)
- Albion Park Rail Bypass (2014-2021)
- Berry to Bomaderry Upgrade (2015-2016)
- Fowlers Road to Fairwater Drive (2014-2016)
- Cleveland Road Upgrade (2016)

Water Cycle Management

- Bunnings Bellambi (2015-2016)
- University of Wollongong (2013-2014)
- McPhails Urban Development (2011-2014)
- Wongawilli Urban Development (2010-2014)

Water Quality

- Inland Rail (2022)
- Shellharbour Regional GPT Designs (2013-2016)
- Shell Cove Wetlands (2011-2013)
- Port Kembla Coal Terminal (PKCT) (2012)
- Hanrahan Refuse Site (2012)

ARTICLES, PAPERS, PRESENTATIONS

Dams Safety Management System Workshop for Wollongong City Council. Authored and presented by Owen de Jong.

Ghetti, I, de Jong, O, Garratt, O & Nunn, P, 2019, 'Cooking up ARR16 Storms in Wollongong – the Importance of Using Local Ingredients'. Presented by Isabelle Ghetti at FMA 2019 Conference, Canberra, ACT.

Guest lecturer at University of Wollongong for Water

ARTICLES, PAPERS, PRESENTATIONS, CONTINUED...

Sensitive Urban Design (WSUD), host of WSUD technical tours and water quality modelling tutorials (2014 to 2019).

Host of World Wetlands Day 2018 at Shell Cove Wetlands (featured on WIN News).

de Jong, O, 2011, ‘Major Flood of March 2011: 1 in 100 year Wipeout for Warilla’. Presented by Owen de Jong at SIA NSW 2011 Conference, Hunter Valley, NSW.

Annex B SES Response to CFEMP

Our Ref: ID2354
Your Ref: SSD-41814831

22 March 2024

Soane Puliuvea
The App Group
Level 2, 426 King Street
Newcastle West NSW 2302

email: Soane.Puliuvea@app.com.au
CC: lisa.ignatavicius1@ses.nsw.gov.au

Dear Soane,

Construction Flood Emergency Response Plan for Newcastle Education Campus Site

Thank you for the opportunity to provide comment on the Construction Flood Emergency Response Plan (CFERP) for the proposed development at Newcastle Education Campus. It is understood that this project, a state significant development (SSD-41814831), includes the construction of a new three-story learning hub, a multipurpose hall, and the demolition of certain existing structures.

We refer to our previous correspondences dated 1 March 2023 (FERP), 2 August 2023 (EIS), 20 November 2023 (RtS) and appreciated that BMT have incorporated the NSW SES recommendations in the Flood Emergency Response Plan (FERP) accordingly. These recommendations are also reflected in the CFERP.

The NSW SES has reviewed the CFERP and the flood risk information (e.g. Newcastle Local Flood Plan; Newcastle City Wide Floodplain Management Study and Plan 2012; Council's Flood Certificate; Thorsby, Cottage and CBD Flood Study 2008; Honeysuckle Redevelopment Area Flood Study 2018; the Flood Impact Assessment provided) available to the NSW SES, noting the proposed development is at risk of flooding and the adjacent roads may be cut by floodwaters.

We would like to emphasise:

- It is the preference of NSW SES that all schools follow the application of sound land use planning and flood risk management in accordance with the Flood Prone Land Policy, the Flood Risk Management Manual 2023 (the Manual) and supporting guidelines.
- NSW SES does not have the authority to endorse or approve the private CFERP.
- The CFERP must be regularly exercised, reviewed, and updated to ensure workers are aware of the procedure and that it remains current and relevant and ensure

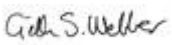
consistency with the contemporary emergency management arrangements relevant to the area, for example the Newcastle City Local Flood Emergency Sub Plan.
- It is the preferred emergency strategy for the school site is early closure prior to the commencement of flooding and before the start of the school day.

In 2023 the NSW SES implemented the Hazards Near Me app, to warn communities about floods, severe weather, and tsunami. Making warnings easier to access during weather events enables the school community to make safer decisions, which is part of our mission to create safer communities. In addition, we recommend the CFERP also:

- Integrate the Hazards Near Me NSW App into the CFERP and FERP for emergency information. School closure will need to be proactive and not rely on receipt of any warnings provided by NSW SES.
- Educate occupants about the Australian Warning System Warning Level (Emergency Warning, Watch and Act, Advice) definition and the implications for the Flood Emergency Response Plan.

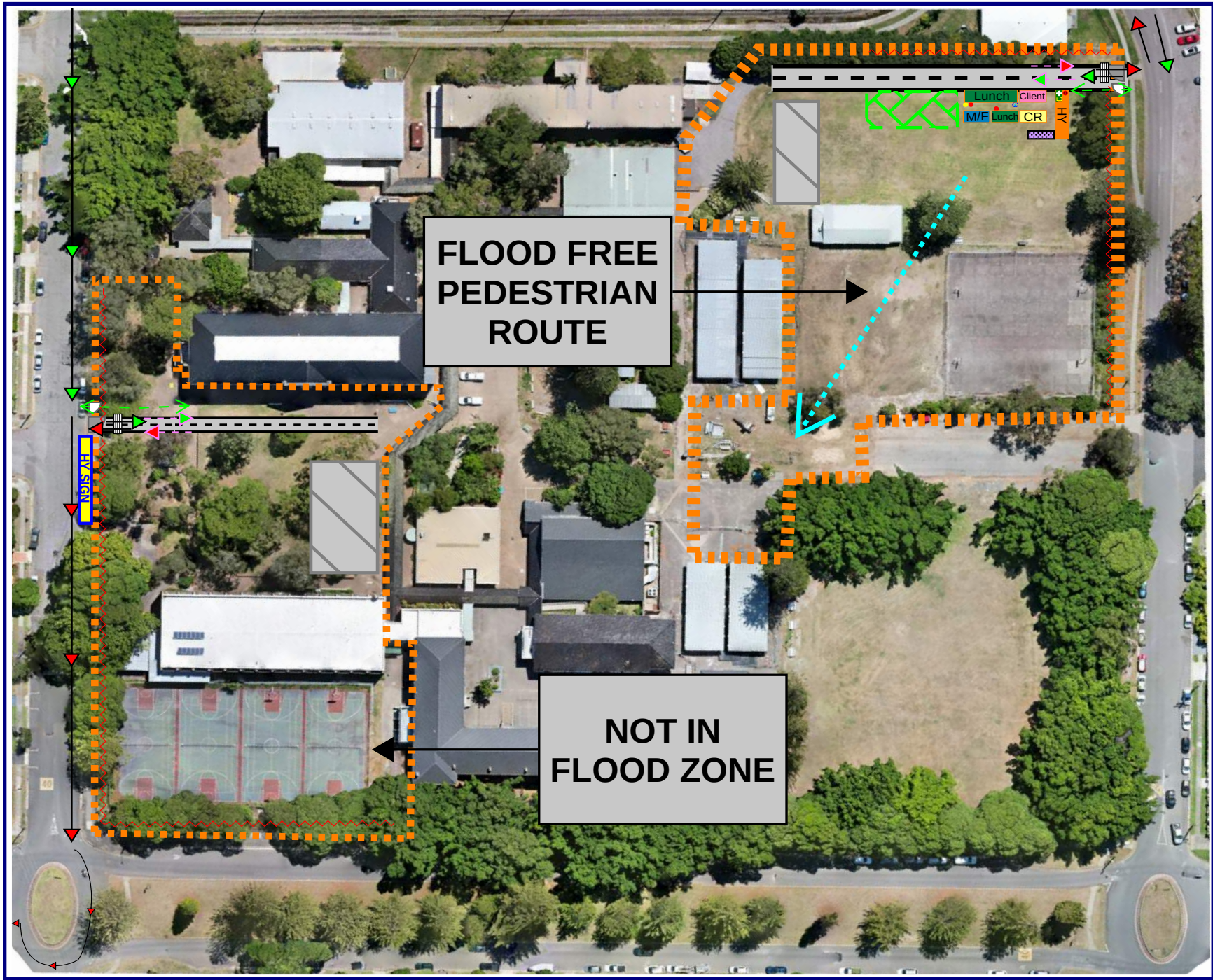
Please feel free to contact Gillian Webber via email at rra@ses.nsw.gov.au should you wish to discuss any of the matters raised in this correspondence. The NSW SES would also be interested in receiving future correspondence regarding the outcome of this referral via this email address.

Yours sincerely



Gillian Webber
Coordinator Emergency Risk Management Regional
NSW State Emergency Service

Annex C Nominated Flood Free Evacuation Routes



Legend of Symbols

- External Perimeter Site Boundary (Type A Fencing)
- Vehicle Gate
- Pedestrian P/A Gate
- HY Statutory Project Site Signage Board
- Laydown Zone
- Site Emergency Evacuation Muster Point
- Internal Site Vehicle Main Path / Road
- Vehicle Access into Project Site
- Vehicle Egress out of Project Site
- Emergency Services Vehicle main Access to / Egress from Project Site
- OH&S First Aid Room with Defrib
- T(m/f) Site Toilets (m=male. f=female)
- L Site Lunchrooms
- HY Site Offices Hansen Yuncken
- CR Site Offices Hansen Yuncken
- Site Container
- Fire Fighting Equipment
- Water Point (non potable)
- Spill Kit
- Evacuation Siren Location
- Main Site Bins / resource recovery
- Site Personnel Entry / Exit / Travel Routes
- Sediment Control Fencing
- Cattle Grate

HY SITE MANAGEMENT & OHS&W PLANNING

Stage 1 Site Layout

North

Revision: 1
Rev Date: 12/02/24

160/200 Parkway Avenue, Hamilton South, NSW 2303

NEWCASTLE HIGH SCHOOL REDEVELOPMENT

HANSENYUNCKEN

Legend of Symbols

- External Perimeter Site Boundary (Type A Fencing)
- Vehicle Gate
- Pedestrian P/A Gate
- HY SIGN — HY Statutory Project Site Signage Board
- Laydown Zone
- Site Emergency Evacuation Muster Point
- Internal Site Vehicle Main Path / Road
- Vehicle Access into Project Site
- Vehicle Egress out of Project Site
- Emergency Services Vehicle main Access to / Egress from Project Site
- OH&S First Aid Room with Defrib
- T(m/f) — Site Toilets (m=male. f=female)
- L — Site Lunchrooms
- HY — Site Offices Hansen Yuncken
- CR — Site Offices Hansen Yuncken
- Site Container
- Fire Fighting Equipment
- Water Point (non potable)
- Spill Kit
- Evacuation Siren Location
- Main Site Bins / resource recovery
- Site Personnel Entry / Exit / Travel Routes
- Sediment Control Fencing
- Cattle Grate

HY SITE MANAGEMENT & OHS&W PLANNING

Stage 2 & 3 Site Layout

North

Revision: 1
Rev Date: 12/02/24

160/200 Parkway Avenue, Hamilton South, NSW 2303

NEWCASTLE HIGH SCHOOL REDEVELOPMENT

HANSENYUNCKEN

Legend of Symbols

- External Perimeter Site Boundary (Type A Fencing)
- Vehicle Gate
- Pedestrian P/A Gate
- HY Statutory Project Site Signage Board
- Laydown Zone
- Site Emergency Evacuation Muster Point
- Internal Site Vehicle Main Path / Road
- Vehicle Access into Project Site
- Vehicle Egress out of Project Site
- Emergency Services Vehicle main Access to / Egress from Project Site
- OH&S First Aid Room with Defrib
- T(m/f) Site Toilets (m=male. f=female)
- L Site Lunchrooms
- HY Site Offices Hansen Yuncken
- CR Site Offices Hansen Yuncken
- Site Container
- Fire Fighting Equipment
- Water Point (non potable)
- Spill Kit
- Evacuation Siren Location
- Main Site Bins / resource recovery
- Site Personnel Entry / Exit / Travel Routes
- Sediment Control Fencing
- Cattle Grate

HY SITE MANAGEMENT & OHS&W PLANNING

Stage 4 & 5 Site Layout

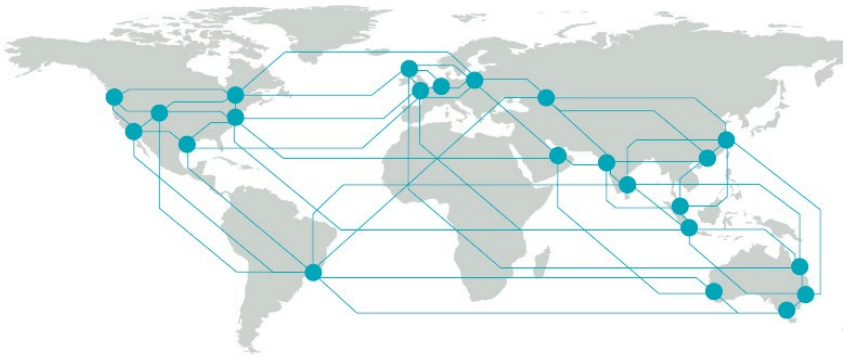
North

Revision: 1
Rev Date: 12/02/24

160/200 Parkway Avenue, Hamilton South, NSW 2303

NEWCASTLE HIGH SCHOOL REDEVELOPMENT

HANSENYUNCKEN



BMT is a leading design, engineering, science and management consultancy with a reputation for engineering excellence. We are driven by a belief that things can always be better, safer, faster and more efficient. BMT is an independent organisation held in trust for its employees.

Level 4
4-14 Foster Street
Surry Hills
NSW 2010
Australia
+61 2 8960 7755

Registered in Australia
Registered no. 010 830 421
Registered office
Level 5, 348 Edward Street,
Brisbane QLD 4000 Australia

For your local BMT office visit www.bmt.org

Contact us

enquiries@bmtglobal.com

www.bmt.org

Follow us

www.bmt.org/linkedin

www.bmt.org/youtube

www.bmt.org/twitter

www.bmt.org/facebook