

Great River NSW Pty Ltd

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4/12/23

RE: Penrith Lakes Employment Lands Subdivision Construction Phase Flood Emergency Response Sub-Plan

Dear Jane,

We refer to the Nepean Business Park site at 14-96 Old Castlereagh Rd, Penrith, and provide the revised Penrith Lakes Employment Lands Subdivision Construction Phase Flood Emergency Response Sub-Plan updated as per comments received from the Department of Planning and Environment on 1st November 2023. Please see summary of our responses enclosed.

In relation to the new Hawkesbury-Nepean River Flood Study (2023) we are unable to update our sub-plan to include this as access to the flood model results of this study are not yet available. However we have added commentary in the document to address this.

Should you have any further queries please contact the undersigned.

Yours sincerely,

Catherine Turnbull

Great River NSW Pty Ltd

Nepean Business Park

23 November 2023

Catherine Turnbull
Precinct Capital
Level 1, 2 Barrack Street
Sydney NSW 2000

Dear Mark,

Our ref: 23050087_R01_v05_Penrith_Lakes_Employment_Land_Construction_Second_Stage_FERSP_Update_DPE_Revisions23050087_R01_v04_Penrith_Lakes_Employment_Land_Construction_Second_Stage_FERSP_Update_DPE_Revisions

Penrith Lakes Employment Lands Subdivision Construction Phase Flood Emergency Response Sub-Plan

This document comprises the revised Penrith Lakes Employment Lands Subdivision Construction Phase Flood Emergency Response Sub-Plan, updated as per comments received from the Department of Planning and Environment on 8-September1 November 2023, ~~which includes submissions from the NSW Reconstruction Authority and the State Emergency Service~~ as described in Table a below.

Table a: Response to Agency Comments

Comment	Change	Page #
NSW Department of Planning and Environment – 8 September 2023		
Please include an explanatory cover letter; and a table, which identifies where, and how, the agencies' comments have been addressed.	Cover letter and 'Table a' included.	i-vii
Please include a track version of the sub-plan.	Track changes have been added to this version of the document.	This document
Please ensure the revised sub-plan includes a document control table with date and revision number.	See "Document Control Table"	viii
Please ensure that the revised sub-plan is consistent with the department's, <i>Environmental Management Plan Guideline</i> (April 2020), and <i>Post Approval Documents General Requirements</i> .	This document incorporates these requirements such as the addition of the Table of Contents and Table b: Response to Conditions of Consent.	vii , viii, ix
NSW Department of Planning and Environment – 1 November 2023		
<u>The forecast increase in the frequency of flooding at the site, as detailed in the draft Hawkesbury-Nepean River Flood Study (NSW Reconstruction Authority, October 2023) (please see overview document attached, for your information).</u>	<u>The sub-plan cannot yet be updated with the increase in the frequency of flooding forecast by the 2D Hawkesbury-Nepean River Flood Study (2023) as access to the flood model results of this study is not yet available. The overview document does not provide data specific to the site and is therefore insufficient for</u>	<u>3</u>

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	<p><u>the purpose of updating the sub-plan.</u></p> <p><u>Once the revised flood probabilities and flood levels for the site have been made available, the sub-plan can be updated to reflect the increased frequency of flooding. However, we note that the evacuation trigger is set to a specific gauge level and is not tied to a flood probability. Even if specific Annual Exceedance Probability (AEP) flood levels are revised and increased in the updated modelling, this evacuation trigger would still provide enough time to evacuate based on the available Bureau of Meteorology quantitative flood warning. However, we note that increased AEP flood levels would result in the evacuation trigger level being reached more frequently than it currently is.</u></p> <p><u>Text has been added to “Flood Levels” section to acknowledge that flood frequency information will need to be updated once the results of the 2023 Flood Study become available.</u></p>	
<p><u>The site is located on a high-risk, low flood island. It becomes isolated during moderately frequent flooding (between 1:50 and 1:100 AEP), prior to the site itself becoming inundated in floods in the order of 1 in 1000 AEP events with hydraulic hazards up to H6.</u></p>	<p><u>Text added to “Flood Levels” section to explicitly acknowledge that the site is a low flood island. This does not impact the flood emergency response strategy or procedures outline in the sub-plan as these have already been designed to address the flood risk of a low flood island.</u></p>	<u>4</u>
<p><u>The 2D Hawkesbury Nepean Regional Flood Study currently being undertaken, and which is expected to result in an increase in depth for flood heights.</u></p>	<p><u>Text added to “Flood Levels” section to acknowledge that flood behaviour information will need to be updated once the results of the 2023 Flood Study become available.</u></p>	<u>3</u>
<p><u>Include provisions for the sub-plan to be regularly implemented, evaluated, reviewed and updated, to ensure consistency with contemporary, emergency management arrangements, because the risk may change. That process should ensure that the sub-plan continues to align with current emergency</u></p>	<p><u>Text added to “Updating this FERSP” section.</u></p>	<u>8</u>

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<p><u>management arrangements across the Hawkesbury Nepean Valley, as updates are made to the Hawkesbury Nepean Flood Plan, and associated local flood plans.</u></p>		
<p>NSW Reconstruction Authority – 8 September 2023</p>		
<p><i>The flood monitoring and response largely follows the FERP attached to the DA. However, management of flood risk during subdivision construction does pose particular challenges that need to be addressed. The include:</i></p> <ul style="list-style-type: none"> <i>• The subdivision construction site should be managed by a central contractor or project manager, and they must be responsible for managing flood risk for all contractors and subcontractors on the site. This includes ensuring that the induction of all workers and visitors addresses flood risk issues and response.</i> <i>• The site manager must ensure that all workers log into and out of the site, and all workers have active telecommunications with the site manager.</i> <i>• Unsealed roads during earthworks can become untrafficable during rainfall events. The site manager should ensure that all workers have access to vehicular exit from the site at all times [sic], and do not need evacuate from the site on foot.</i> 	<p>Text added to “Responsibilities and Training” and “Flood Emergency Response Operations” sections.</p>	<p>5, 8</p>
<p><i>The NSWRA notes that the FERSP risk has utilised flood levels from the Penrith City Council Nepean River flood study. The NSWRA is completing an updated Hawkesbury-Nepean Flood Study, and the NSWRA will be consulting with the community on the results of this study in the third quarter of 2023. This study, which includes assessment of recent flood events, indicates that flood levels have risen in the Penrith floodplain, and are projected to increase even further with climate change. The results have been provided to the Department of Planning and Environment and Penrith City Council.</i></p>	<p>As per the Nepean Business Park Flood Emergency Response Plan draft 6.2 (Molino Stewart, March 2022), this FERSP incorporates flood levels from the 2019 WMAWater flood model results (Hawkesbury Nepean Valley Regional Flood Study Final Report by WMAwater, 2019), not the Nepean River Flood Study. This has been clarified in the text. It is noted that updated flood data incorporating recent floods will be available later in 2023, however was not available at the time of this FERSP’s production. However, we note that the evacuation trigger is set to a specific gauge level and is not tied to a flood probability (which will be revised by more recent flood modelling). Even if specific Annual</p>	<p>3</p>

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	Exceedance Probability (AEP) flood levels are revised and increased in updated modelling, this evacuation trigger would still provide enough time to evacuate based on the available Bureau of Meteorology quantitative flood warning. However, we note that increased AEP flood levels would result in the evacuation trigger level being reached more frequently than it currently is.	
<i>In terms of regional flood evacuation risk, the development significantly adds to the considerable evacuation traffic generated from the Castlereagh area, which is to increase with the construction of other developments in the area. The development would need evacuation for events greater than 1 in 20 chance per year, and vehicles would have a number of road low points before rising above PMF. This means the evacuation risk to life is relatively low, but people in vehicles should be aware that they may have problems getting onto The Northern Road due to both day-to-day traffic and evacuation and diverted traffic from other parts of the floodplain during flood events.</i>	Noted; text has been added regarding expected traffic.	7
<i>The Directorate also made submissions to DPE on impact on regional Hawkesbury Nepean of the full development of Penrith Lakes. The approval of Nepean Business Park by the Court has taken most of the available evacuation capacity for Penrith Lakes, and will make the flood emergency evacuation of any further significant development difficult to achieve. This capacity is also expected to decrease when the regional flood evacuation risk is remodelled with the flood levels from the new Hawkesbury-Nepean flood study late this year.</i>	This is noted, however does not require specific changes to this FERSP, which only pertains to the construction phase.	N/A
<i>During flood emergencies the directions from the SES and other emergency response agencies must prevail over the measures outlined in the FERSP.</i>	Text added to explicitly state this.	5
NSW SES – 8 September 2023		
<i>Andrews Road should be the primary evacuation route for the site construction staff and Coreen Avenue can be used as</i>	This has been clarified by adding text and updating Figure 2.	7, 10

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<p><i>secondary evacuation route. For evacuation traffic management purposes when exiting Lugard Street it is preferable to turn left on to Castlereagh Road towards the roundabout rather than turning right heading south towards flooding on Boundary Creek.</i></p>		
<p><i>The following comments apply to the eventual site configuration, noting that the DA was approved after the relevant Land and Environment court decision.</i></p>		
<p><i>Principle 1. Any proposed Emergency Management strategy for an area should be compatible with the evacuation strategies identified in the relevant local or state flood plan or by the NSW SES.</i></p>	<p>The FERSP has been designed to be consistent with the NSW SES evacuation strategy and the Hawkesbury-Nepean Valley Flood Emergency Plan 2020. This has been clarified in the text.</p>	<p>2</p>
<p><i>Principle 1. It is unclear what the triggers would be for people on site to decide whether to evacuate by vehicle or on foot. Pedestrian Evacuation should not be a primary evacuation strategy for proposed development. It is unacceptable, as the primary evacuation strategy, to expect people to escape from a flood on foot (also referred to as overland escape/overland access), especially with the high likelihood of ongoing poor weather conditions and should not be used to justify the development. Pedestrian evacuation is a backup strategy.</i></p>	<p>Pedestrian evacuation is only to be undertaken should vehicular evacuation fail (e.g., due to motor vehicle inoperability or unsafe roads/driving conditions). This has been clarified in the text.</p>	<p>6, 7</p>
<p><i>Principle 2. The flood risk assessment is currently based on flood model outputs from 2022, however, NSW SES recommends that the flood risk assessment should also consider the 2D Hawkesbury Nepean Regional Flood Study currently being undertaken, which is expected to result in an increase in depth for flood heights. In addition, the risk assessment should consider climate change. As a result, the risk for the proposed site may increase from the levels shown in this report and may require earlier evacuation triggers in order to enable complete evacuation of the site.</i></p>	<p>The initial evacuation trigger has been set as a predicted flood level of 8.9 m at the Penrith gauge, for which the BoM will provide 6 hours of flood warning (i.e. more time than is required to evacuate). Even if specific AEP flood levels are revised and increased due to updated modelling and climate change projections, this level would likely remain the evacuation trigger based on the available BoM flood warning. However, we note that increased AEP flood levels would result in the evacuation trigger level being reached more frequently than it currently is. While updated flood data will be available later in 2023, this data is not available at the time of this FERSP's production, and is unlikely to change the site's flood</p>	<p>N/A</p>

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	evacuation strategy for the construction phase.	
<i>Principle 3. NSW SES is the legislated combat agency for flooding, which includes evacuation of people at-risk of flooding. It must be clear in the FERSP, that if NSW SES issue a warning advising to evacuate, that this will override any localised arrangements for the site</i>	Agreed; text added stating this.	5
<i>Principle 4. In order for NSW SES to understand the overall context for flood risk for this site and surrounding area, we would like to view the Master plan for the broader proposed development. We note that the site, once the construction phase is complete, is expected to take up most of the evacuation capacity for the area.</i>	It is noted, however the current FERSP only covers the construction phase.	N/A
<i>Principle 5. There is likely to be a high proportion of itinerant population on the proposed site, both during and following the construction phase of the proposed development. Monitoring of persons on site during the construction phase is likely to be coordinated through the head contractor, however, for evacuation purposes it is essential that a system exists to ensure that all personnel on site will be accounted for.</i>	This has been specified in the Emergency Response Operations and Responsibilities sections.	5, 8
<i>Principle 6. If the occupants are unable to evacuate in time, or they intentionally shelter in place, rescue may be required for the proposed development. The likelihood of this increases if sewerage, power, medical or other emergencies occur during flooding and floodwater continues to overwhelm the building, or the building is subject to structural damage and/or failure.</i>	The FERSP has been set out so that site occupants evacuate in their vehicles in time, or by foot as a last resort, so that there will be no reliance on SES rescue. As this is a managed construction site (as opposed to residences), it is very unlikely any site occupants would intentionally shelter in place.	N/A
<i>Principle 7. In order to ensure emergency plans remain effective and up-to-date, any emergency plan must be exercised, evaluated and reviewed regularly. This includes ensuring Flood Wardens are fully aware of procedures and trigger levels, ensuring all contact lists are up to date, and ensuring any alarms are working and current. When the construction works are completed and the site starts to be occupied then the warning trigger times will be reviewed as part of NSW SES emergency planning processes. Ongoing community awareness should also include</i>	Section 8 has been added pertaining to updating the FERSP. Text has also been added to explicitly state that directions from the NSW SES and other emergency response agencies must prevail over the measures outlined in this FERSP, and for this to be communicated to staff.	5, 8

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<p><i>awareness of any changes to risk levels or procedures. For example, if updated flood modelling indicates that an earlier trigger height is required for safe evacuation, this should be incorporated into emergency plans, messaging, and practice exercises. As stated earlier, it must be clear in the FERSP, that if NSW SES issue a warning advising to evacuate, that it overrides any localised arrangements for the site. This messaging must be clearly communicated to the community on site, to ensure safe and timely evacuation and assist effective emergency response.</i></p>		
<p><i>We recommend removing and updating any references to “Evacuation Order” and “All Clear”. NSW SES use the Australian Warning System (AWS), launched on 30 September 2022, which uses three categories of hazard warnings: Advice, Watch and Act, and Emergency Warning. The AWS does not have an All Clear level, however, the NSW SES may issue a hazard warning stating “Advice - Return With Caution”.</i></p>	<p>Updated accordingly.</p>	<p>4, 6</p>

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Document Control Table

Version	Date issued
1.0 Final Plan for Site Filling Works (First Construction Phase)	4 October 2019
2.0 Draft Plan for Site Subdivision (Second Construction Phase)	29 June 2023
3.0 Plan for Site Subdivision, Submitted to Department of Planning and Environment	21 July 2023
4.0 Plan for Site Subdivision, Incorporating Department of Planning and Environment Comments	3 October 2023
4.1 Plan for Site Subdivision, Incorporating Precinct Capital Comments	5 October 2023
<u>5.0 Plan for Site Subdivision, Incorporating Department of Planning and Environment Comments</u>	<u>21 November 2023</u>

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This Flood Emergency Response Sub-Plan fulfills the relevant conditions of consent as per Table b.

Table b: Response to Conditions of Consent

Condition	Response
<i>C18. The Flood Emergency Response Sub-Plan (FERSP) must be submitted to the Planning Secretary for approval and must address, but not be limited to, the following:</i>	
<i>(a) be prepared by a suitably qualified and experienced person(s);</i>	See page 2: This FERSP has been prepared by Steven Molino, a Director at Water Technology and a Registered Professional Engineer NPER 3 Civil and Environmental, with over 30 years of experience working on flood emergency management in the Hawkesbury Nepean floodplain including for State Government and local Councils.
<i>(b) considers and adequately addresses the FERP prepared under Condition A1, as approved by the Planning Secretary;</i>	See page 2: This FERSP has been prepared in accordance with the Flood Emergency Response Plan Version 6.2 prepared by Molino Stewart Pty Ltd dated March 2022 and the Flood Evacuation Report (Draft) prepared by Molino Stewart Pty Ltd dated 5 November 2021.
<i>I address the provisions of the Floodplain Risk Management Guidelines (EESG);</i>	See page 2: This FERSP is prepared in line with Floodplain Risk Management Guidelines published by the NSW Department of Planning and Environment. Specifically, as per the Support for emergency management planning: Flood risk management guideline EM01 (Department of Planning and Environment, 30 June 2023) this plans describes the flood warning time available and lays out the site's self-evacuation procedures compatible with the existing NSW SES flood evacuation strategy (as per the document's Figure 21: Considering emergency management in redevelopment or infill development compatible with existing zoning).
<i>(d) include details of:</i>	
<i>(i) the flood emergency responses for construction phases of the development;</i>	See pages 5- 7 <u>6</u> : Flood Emergency Response Operations
<i>(ii) predicted flood levels;</i>	See page 3- 4 : Flood Levels
<i>(iii) flood warning time and flood notification;</i>	See page 4- 5 : Flood Warnings
<i>(iv) assembly points and evacuation routes;</i>	See pages 6 - 7 : Evacuation Route and page <u>109</u> : Figure 2
<i>(v) evacuation and refuge protocols; and</i>	See pages 5-7: Flood Emergency Response Operations and Evacuation Route
<i>(vi) awareness training for employees and contractors, and students.</i>	See page 7: Responsibilities and Training

Penrith Lakes Employment Lands Subdivision Construction Phase Flood Emergency Response Sub-Plan

1 BACKGROUND

Great River NSW Pty Ltd lodged a Development Application (DA) for proposed subdivision and construction of the Penrith Lakes Employment Lands, located south of Old Castlereagh Road and West of Leland Street in the North Penrith Industrial Area. The site is adjacent to the Nepean River and has the potential to flood during extreme events.

The subdivision stage of construction will include the subdivision of the site, construction of roads and drainage, and the installation of services. The current scope of works under DA 9876 comprises:

- Subdivision of the site into 93 Community title lots and one community association lot;
- thirteen (13) development stages;
- earthworks to achieve the final site levels;
- construction of internal roads, including a slip lane to Old Castlereagh Road, footpaths and shared pathways and infrastructure to be dedicated to Council; and
- landscaping works including removal of 36 trees and certain vegetation and planting of new trees and vegetation.

A separate Flood Emergency Response Plan incorporating a flood evacuation plan and procedures for early warnings has been approved for the occupation and operation of the industrial subdivision. Works not specific to the subdivision construction do not fall under this FERSP.

This Flood Emergency Response Sub-Plan sets out procedures for early warnings and flood evacuation during the subdivision stage of the project. The Condition from the Determination of Development Application by Grant of Consent (dated 31 March 2022) relevant to this subplan is:

C18. The Flood Emergency Response Sub-Plan (FERSP) must be submitted to the Planning Secretary for approval and must address, but not be limited to, the following:

- (a) be prepared by a suitably qualified and experienced person(s);*
- (b) considers and adequately addresses the FERP prepared under Condition A1, as approved by the Planning Secretary;*
- (c) address the provisions of the Floodplain Risk Management Guidelines (EESG);*
- (d) include details of:*
 - (i) the flood emergency responses for construction phases of the development;*
 - (ii) predicted flood levels;*
 - (iii) flood warning time and flood notification;*
 - (iv) assembly points and evacuation routes;*
 - (v) evacuation and refuge protocols; and*
 - (vi) awareness training for employees and contractors, and students.*

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As per condition C18a, this FERSP has been prepared by Steven Molino, a Director at Water Technology and a Registered Professional Engineer NPER 3 Civil and Environmental, with over 30 years of experience working on flood emergency management in the Hawkesbury Nepean floodplain including for State Government and local Councils.

As per condition C18b, this FERSP has been prepared in accordance with the Flood Emergency Response Plan Version 6.2 prepared by Molino Stewart Pty Ltd dated March 2022 and the Flood Evacuation Report (Draft) prepared by Molino Stewart Pty Ltd dated 5 November 2021.

Regarding condition C18c, this FERSP is prepared in line with Floodplain Risk Management Guidelines published by the NSW Department of Planning and Environment. Specifically, as per the *Support for emergency management planning: Flood risk management guideline EM01* (Department of Planning and Environment, 30 June 2023) this plans describes the flood warning time available and lays out the site's self-evacuation procedures compatible with the existing NSW SES flood evacuation strategy (as per the document's Figure 21: Considering emergency management in redevelopment or infill development compatible with existing zoning).

This FERSP has been prepared in line with the Hawkesbury-Nepean Valley Flood Emergency Plan 2020.

2 CONSTRUCTION OVERVIEW

Construction will involve the subdivision of three lots into 93 Community title lots and one community association lot. Construction includes the earthworks to achieve final site levels, landscaping works, services, and the construction of internal roads, footpaths and shared pathways.

During the entire construction period there will be a relocatable building or buildings on site which will be used as a site office and staff amenities. These will be in the site compound which will also include storage containers, materials storage areas, a plant and equipment parking area and a staff vehicle parking area. This will be close to either the Lugard Street or Old Castlereagh Road entry. All workers, contractors and any other site occupants will sign in upon arrival at the site.

The plant and equipment used during the bulk earthworks phase of the subdivision construction will principally be large earthmoving plant such as trucks, scrapers, dozers and backhoes. The trucks and other plant will be parked on site. There will be stockpiles of imported or excavated inert fill at various locations around the site as development progresses.

During the subdivision servicing stage when roads, drainage and utilities will be installed, there will be smaller earth moving equipment such as drilling rigs, backhoes, cranes, excavators and trucks. There may be small stockpiles of sand, gravel, large stones, steel reinforcing, precast concrete drainage items, cables, conduits and steel light poles at various times. Small, temporary stockpiles of excavated material may be created from time to time.

The construction phase will involve the following:

- An anticipated maximum of 80 people and 50 vehicles on site at any time
- Vehicular and pedestrian access to the site via Lugard Street or Old Castlereagh Road entries

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- A duration of 6 to 7 years to complete construction of the subdivision works subject to market demand
- Operating hours during construction of Monday – Saturday 07:00 – 18:00

3 FLOOD LEVELS

This analysis is based on flood model outputs provided by WMAWater (from Nepean Business Park Flood Emergency Response Plan, prepared by Molino Stewart, March 2022 based on 2019 flood model outputs from WMAWater). However, the draft 2D Hawkesbury-Nepean River Flood Study has more recently been prepared by NSW Reconstruction Authority October 2023 and may differ from the WMAWater data with regard to flood depth and frequency. This sub-plan should therefore be updated with the flood model results of the 2023 Flood Study once they become available.

The Employment Lands are on the outside of a bend in the Nepean River at a level of around 26 m AHD compared to the normal river level which is at about 12 m AHD. Filling of the site will raise the ground level of the sites to a minimum of 26.7 m AHD and a maximum level of 30.5 m AHD.

Error! Reference source not found. Table 1 shows the predicted levels on site for the full range of flood levels which could affect the site (as per DA condition C18.(d)(ii)).

Table 1: Flood levels for the site based on flood model outputs provided by WMAWater (from Nepean Business Park Flood Emergency Response Plan, prepared by Molino Stewart, March 2022 based on 2019 flood model outputs from WMAWater)

Chance per year	Peak flood level in river at the Precinct (m AHD)
1 in 5	18.1
1 in 10	20.0
1 in 20	22.2
1 in 50	23.9
1 in 100	25.0
1 in 200	25.7
1 in 500	26.5
1 in 1,000	26.9
1 in 2,000	27.8
1 in 5,000	29.0
PMF	32.6

Access to the site can be cut at much lower levels than would flood the site. Castlereagh Road to the southeast of the site would be cut when the river reaches 24.2 m AHD. From this point onwards access to flood free land would only be possible via Andrews Road. At 24.5 m AHD, Lugard Street would be cut, and Old Castlereagh Road would be cut shortly thereafter. These roads would be cut in floods smaller than a flood with a 1 in 100 chance of occurring per year.

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A flood would have to exceed the 1 in 1,000 chance per year level of 26.9 m AHD at the site and reach 27.0 m AHD before the lowest parts of the site began to flood through water backing up into the internal drainage system and onto the lowest parts of roads.

The site is located on a low flood island. It would be partially inundated in events slightly larger than a flood with a 1 in 1,000 chance of occurring per year and would be entirely inundated in the PMF. The lower parts of the site would be subject to floodwaters with a hydraulic hazard of H6 in the PMF and potentially more frequently. In addition, access to and from the site would be cut before the site flooded, with site isolation occurring in events with a less than a 1 in 50 chance of occurring per year.

4 FLOOD WARNINGS

Monitoring the weather forecasts and warnings will be an integral step in managing the flood risk of the Penrith Lakes Employment Precinct. This will be critical to being able to evacuate the site before flooding cuts evacuation routes. The following information is relevant for flood risk management at Penrith Lake (as per DA condition C18.(d)(iii)).

- **A Flood Watch for the Nepean River** – this is a notification that flood producing rainfall is forecast within the catchment and flooding may eventuate.
- **A General Flood Warning for the Nepean River** – this is a warning that minor, moderate or major flooding is expected on the Nepean River, but it is too early to forecast specific levels.
- **A Quantified Flood Warning for the Nepean River at Penrith**— this will include a forecast flood height and the time at which that height is expected to be reached. It may also include information on whether further flood rises are expected, whether that forecast is expected to peak or whether the river level is falling. The Bureau of Meteorology has a target warning lead time of six hours in advance of a flood reaching over 8.9 m AHD at the Penrith flood gauge, which is about 1.5 km upstream of the site and has considerably higher flood levels than the site.
- **NSW SES Evacuation Advice/ Watch and Act/ Emergency Warnings** — these would be issued by the NSW SES, as per the Australian Warning System, if it believes areas are at risk of isolation or inundation
- **Forecast Rainfall Maps**— these can be used to estimate the amount of rain expected to fall over the next eight and four days, as well as the next 24 hours. This information is available at: <http://www.bom.gov.au/jsp/watl/rainfall/pme.jsp>.
- **NSW Weather Warnings**—these are issued by the Bureau of Meteorology and can be found at the following link: <http://www.bom.gov.au/nsw/warnings/>.
- **Bureau of Meteorology Rainfall and River Gauges**—these show the amount of rainfall that has fallen in the previous 24 hour period and stream gauges which indicate water heights. These can be monitored at: <http://www.bom.gov.au/australia/flood/index.shtml?ref=hdr>.
- **Bureau of Meteorology Rainfall Radar**— this also shows current rainfall location and intensities. The radar station to be used for the site would be the Sydney radar at: <http://www.bom.gov.au/products/IDR713.loop.shtml>.

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The most relevant data for the site will be from the Penrith gauge at Victoria Bridge and flood response actions for the site should principally be determined by forecasts related to this gauge.

Note that the gauge zero at Penrith is 14.1 m AHD. The trigger levels in this plan are gauge levels not metres above sea level (m AHD).

Gauge readings at Warragamba Dam, Camden Weir and Wallacia Weir will be indicative of flood behaviour upstream of Penrith and may give information on expected flood behaviour at Penrith some hours later. The data on the website is updated every hour or so.

It also needs to be remembered that it is the forecast level at the Penrith gauge, not the observed level at the gauge, which needs to be used to trigger evacuation of the Precinct because it is the time it takes to reach the forecast level which is needed to effect evacuation.

5 FLOOD EMERGENCY RESPONSE OPERATIONS

It is highly unlikely that the site would be flooded directly in the time that it is being developed. It is more likely that it would be isolated by flooding but even that has a very low probability. Nevertheless, a plan is needed should a flood occur.

The protection of all lives is the first priority, and the protection of property is second.

While this document sets out flood emergency response procedures, it is stressed that during flood emergencies, the directions from the NSW SES and other emergency response agencies must prevail over the measures outlined in this FERSP. If NSW SES issue a warning advising to evacuate, that will override any localised arrangements for the site.

Figure 1 is a flow diagram showing the flood emergency response procedures before, during and after a flood for the construction phase of the development (as per DA condition C18.(d)(i)). There are four phases:

1. Ready
 - This is the base stage all throughout construction, where site occupants are aware of and prepared for the possibility of flooding.
 - The site supervisor or delegate will monitor flood warnings and forecasts daily.
 - The site supervisor and at least one other supervisor on site will subscribe to a service which sends alerts to the supervisor's mobile phone and computer.
 - The site supervisor ensures that all personnel check-in when they arrive on site, and a system is in place to account for all occupants in the event of an evacuation.
2. Alert
 - If a **Flood Watch** or **any type of Flood Warning** is issued for the Nepean River, the FERSP will escalate to the Alert Phase.
 - The site supervisor will monitor flood warnings and forecasts every eight hours.
3. Respond
 - If the BoM **forecasts** that flooding will reach **8.9 m at the Penrith Gauge** the Respond Phase is triggered.
 - Site evacuation commences which includes:

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- Advise staff, contractors and any other site occupants (i.e. students) who are not required to move plant and equipment to leave the site immediately until further notice.
- The site supervisor is to contact all staff and contractors who are not on site, and not required to move materials, to not come to the site until further notice.
- Organise transport of mobile plant to the highest part of the site or out of the floodplain.
- Remove hazardous materials and valuables from storage containers and site sheds.
- Flood forecasts and the Penrith gauge level must be monitored every hour.
- If the Penrith flood gauge is **observed to reach 8.9 m** (gauge level) then evacuation routes could be cut within two hours and everyone on site must leave immediately on the evacuation routes in Figure 2 and leave on site any plant, equipment or valuables not already loaded for transport.
- If during the Response Phase the NSW State Emergency Service issues an emergency warning to “evacuate now” then everyone on site must leave immediately on the evacuation routes in Figure 2 and leave on site any plant, equipment or valuables not already loaded for transport.
- Pedestrian evacuation is only to occur should vehicular evacuation not be possible for whatever reason (e.g., due to motor vehicle inoperability or unsafe roads/driving conditions).
- If anyone gets trapped on site and needs rescue contact the NSW SES on 132 500.
- Once the site is fully evacuated, the site supervisor is to monitor BoM warnings and forecasts and NSW SES warnings at least every 8 hours. Only when the BoM indicates that the flood peak has passed and the NSW SES gives the all clear does the Recovery Phase begin.

4. Recover

- The site may only be accessed once the NSW SES issues a hazard warning stating “Advice - Return With Caution”.
- If the site has not flooded then in the Recovery Phase a debrief should be immediately undertaken and any adjustments made to this FERSP in response to learnings from the flood response.
- If the site has flooded:
 - a hazard assessment must be undertaken taking into account as a minimum:
 - slips, trips and falls caused by mud and debris
 - injuries from sharp debris
 - contamination and infection risks from contaminated water and sediments
 - bites from venomous animals taking refuge in debris or buildings
 - safe work methods statements must be prepared for site clean up and restoration

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- site clean up and restoration takes place
- a debrief should be undertaken and any adjustments made to this FERSP in response to learnings from the flood response and recovery
- Following every flood or event where the FERSP has been used, a debrief and review of the FERSP should be undertaken.
- Once back on site, Ready Phase monitoring should continue.

While this plan is focused on the protection of all lives, the following is noted:

- The amenities buildings are too difficult to move but any items of value which can be removed from them will be during the Response Phase if safe to do so.
- There may be small quantities of hazardous materials stored in the storage facilities on site (fuels, oils etc). Any items of these and items of value (e.g. tools) which can be removed from them will be during the Response Phase if safe to do so.
- Vehicles and large items of mobile plant will be moved to the highest point of the site or removed from site during the Response Phase if safe to do so. This may require the order of transport vehicles to float tracked equipment.

6 EVACUATION ROUTE

Because the precinct is a low flood island it is imperative that it is evacuated before its evacuation routes are cut by flooding. This section sets out the evacuation route as per DA condition C18.(d)(iv) and (v)). As per NSW SES advice, the primary evacuation route from the site is to turn left from Lugard Street onto Castlereagh Road towards the roundabout, then travel east on Andrews Road. Andrews Road may remain open for a few hours longer than Castlereagh Road heading south. Andrews Road provides the shortest vehicular route to flood free land. The secondary evacuation route (if the primary route is not available for any reason) is to turn right on Castlereagh Road from Lugard Street and then travel east on Coreen Avenue. It is noted that this route could be impacted by floodwaters from Boundary Creek.

Andrews Road is recommended as the pedestrian evacuation route as it provides the shortest route from the precinct to flood free land and will remain open the longest. Pedestrian evacuation is only to occur should vehicular evacuation not be possible. It is about 2.5 km from most locations in the precinct to the section of Andrews Road which is above the reach of the PMF. This would take about 30 minutes to walk at a brisk walking pace or about one hour at a strolling pace.

Figure 2 shows the site's evacuation route to The Northern Road. It is noted that evacuees can anticipate there being traffic on The Northern Road due to both day-to-day traffic and evacuation and diverted traffic from other parts of the floodplain during floods.

All site occupants including workers, contractors and visitors to inform the site supervisor or other delegated Flood Warden in charge that they are evacuating and follow site sign-out procedures. It is the responsibility of the site supervisor and/or Flood Warden on duty to have an accurate register of exactly who is on site at all times and to ensure all site occupants are accounted for during an evacuation.

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7 RESPONSIBILITIES AND TRAINING

As per DA condition C18.(d)(vi), it is essential that employees, contractors and any individual present on site are aware of the procedures to be followed in the event of a flood. The site supervisor will be familiar with the flood emergency response and act as the Chief Flood Warden for the site. They will appoint a deputy Flood Warden so that there is always a Flood Warden on site at all times that the site is occupied who is aware of this FERSP and the procedures to follow in the event of a flood.

The site will ensure that all workers, contractors, and temporary employees on site will be made aware of the possibility of flooding and the emergency procedures to be followed if a flood were to occur. This will be done by including flood procedures during staff inductions. Training will involve going over this FERSP and the evacuation route. All staff are to be made aware of how to monitor for flood risk as described in this document. All people on site are also to be reminded that if the NSW SES were to issue a warning advising to evacuate, they should abide by the NSW SES instructions, which overrides any local arrangements for the site as per this FERSP.

The subdivision construction site is to be managed by a central contractor or project manager/site supervisor, and they must be responsible for managing flood risk for all contractors and subcontractors on the site. The site supervisor is to ensure that:

- the induction of all workers and visitors addresses flood risk issues and response;
- all workers log into and out of the site;
- all workers have active telecommunications with the site supervisor;
- all workers have access to vehicular exit from the site at all times, and do not need evacuate from the site on foot;
- a system exists to ensure that all personnel on site will be accounted for in the event of a flood evacuation.

A hard copy of this FERSP must be kept on site at all times and electronic versions stored with the site's OHS documents.

8 UPDATING THIS FERSP

The site supervisor/ Flood Warden is to ensure that this FERSP is to be kept up-to-date and reviewed/ updated annually or following any event in which it is activated. This includes integrating updated flood information, if available. The evaluation/ review/ update process must include a review of whether the sub-plan continues to align with the current emergency management arrangements across the Hawkesbury Nepean Valley, including the latest NSW SES Hawkesbury-Nepean Valley Flood Emergency Plan and other local flood plans.

The FERSP applies to the construction phase only, and the flood emergency response procedures will again be updated when the site is occupied.

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9 FIGURES

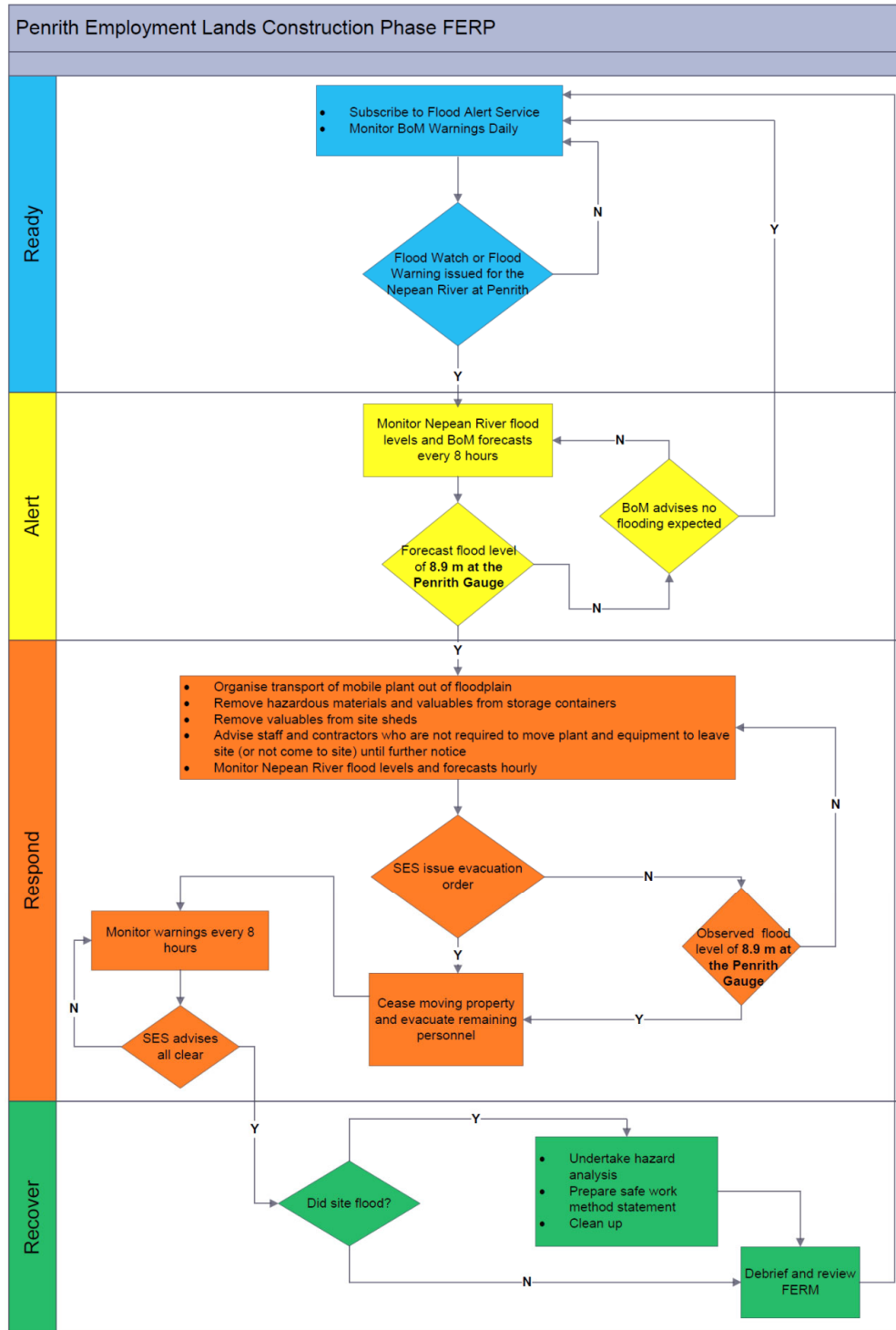


Figure 1: Flood Emergency Response Phases and Actions

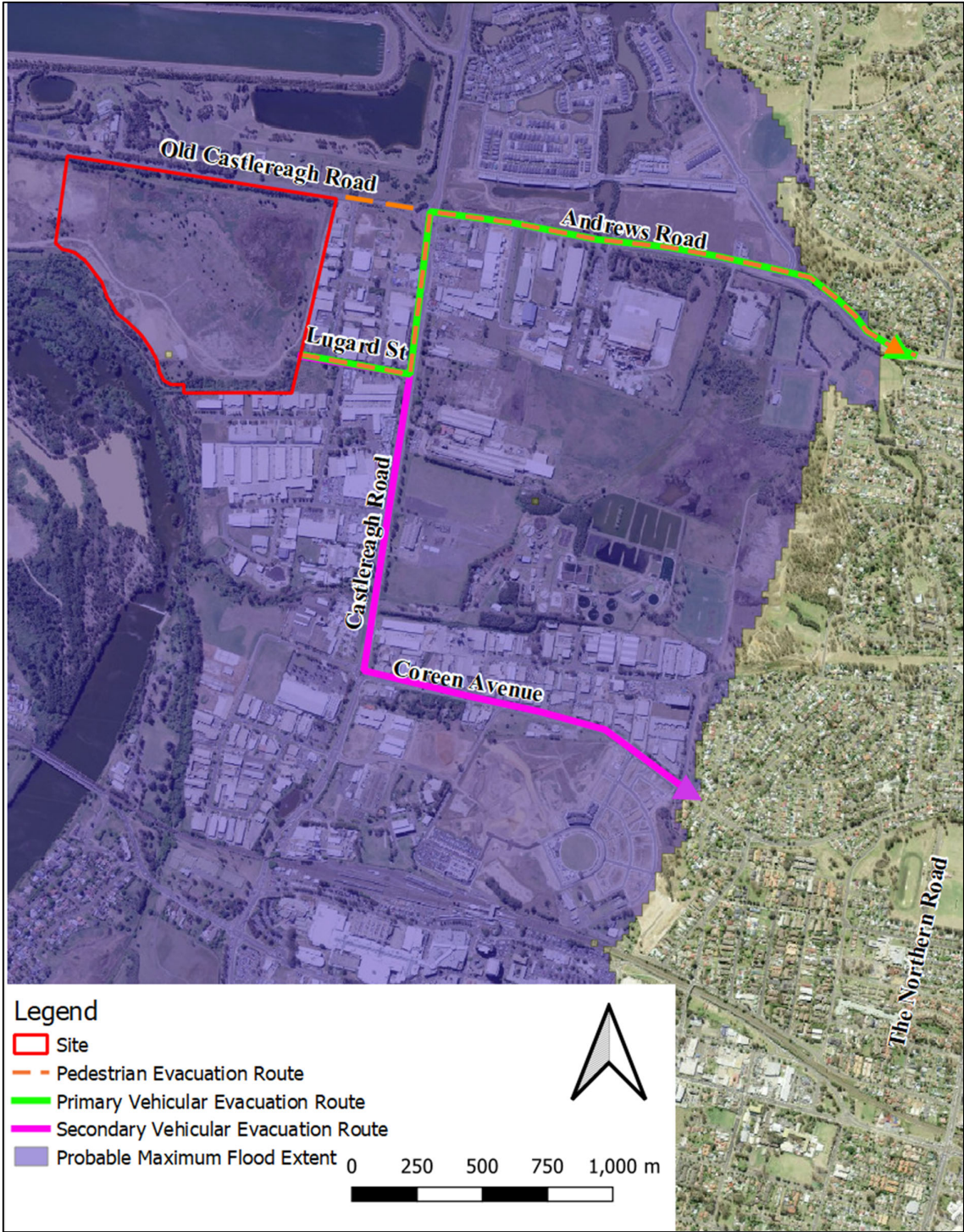


Figure 2: Flood Evacuation Routes