Our ref: DOC21/1030084-52
Your ref: SSD-13895306

Stephen Dobbs

Senior Planning Officer
Infrastructure Assessments
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Dear Stephen

Request for Advice – Newcastle Grammar School – Park Campus – Newcastle LGA

I refer to your request for advice on the Major Projects Portal, dated 19 November 2021in which the Planning and Assessment Division (P&A) of the Department of Planning, Industry and Environment (the Department) invited Biodiversity and Conservation Division (BCD) to provide advice in relation to the Newcastle Grammar School – Park Campus Environmental Impact Statement (EIS) (SSD-13895306).

BCD has significant concerns with the adequacy of the Flood Emergency Response Plan (FERP) and the current flood preparedness of the site. The updated FERP provided with this request does not provide for the safety of students or staff attending the site in the event of a flood emergency. This current proposal is likely to significantly increase the number of vulnerable people occupying a flood prone site and would greatly increase the risk to life.

BCD acknowledges that the proposed development is consistent with that detailed in the Biodiversity Development Assessment Report (BDAR) Waiver Request and has no comments with respect to biodiversity.

BCD's recommendations are provided in **Attachment A** and detailed comments are provided in **Attachment B**. If you require any further information regarding this matter, please contact Neil Kelleher, on 02 4320 4206 or via email at huntercentralcoast@environment.nsw.gov.au

Yours sincerely

PAULINE DUNNE
A/Director Hunter Central Coast Branch
Biodiversity and Conservation Division

Date: 21/12/2021

Enclosure: Attachments A and B

Attachment A

BCD's recommendations

Newcastle Grammar School – Park Campus

1. BCD recommends that the proponent provides hydrographs for the 1%, 0.5%, 0.2% and the Probable Maximum Flood (PMF) events.

2. BCD requests that the proponent provide evidence as to the measures taken to date to implement flood safety provisions in their existing Flood Emergency Response Plan (FERP), including:

    - revision history of the 1988 FERP
    - how often the 1988 FERP has been enacted
    - history of flood evacuations drills
    - which of the 1988 FERP recommendations have been implemented.

3. BCD advises that the proposal will significantly increase the risk to life by intensifying the vulnerable population occupying the site.

    BCD advises that the proponent has not adequately mitigated risk to life.

    Prior to further consideration of this proposal, BCD recommends that the Flood Emergency Response Plan is updated to:

    - require that the induction of new staff members is to introduce the FERP
    - require that the FERP is regularly reviewed
    - list the provisions for shelter-in-place refuge
    - provide clear roles and responsibilities for emergency flood management
    - provide clear emergency management triggers and responses
    - provide clear messaging and communication protocols
    - recognise that the NSW SES is the lead combat agency for floods and state that any flood response directive issued by the SES must be followed
    - encourage students and staff to remain home and offer online learning in the event of severe weather warnings.

    And that the proposal is updated such that:

    - The Stage 1 building is to be certified by a structural engineer to withstand the hydraulic forces of the PMF conditions, i.e. a flood depth of 2.2 m, flood velocity of 1.8 m/s and velocity depth product of 1.4.
    - The minimum FFL for shelter-in-place refuge is the level of the PMF (4.8 m AHD)
    - A flood warning alarm system activated by a float valve is installed on site.

- The proponent demonstrate that the school has sufficient flood refuge for the number of people reasonably expected to be occupying the site during a flood event. Sufficient capacity is defined as floor space of 1 m2 per person for short duration (less than 6 hours), and 2 m2 per person for long duration (greater than 6 hours).

- The proposed raised walkway:

    - has a minimum elevation of 3.2m AHD

    - has minimum width of 1.5m

    - is connected to all classrooms by pathways with a minimum elevation of 3.2m AHD

    - is certified by a structural engineer to withstand the hydraulic forces of the PMF conditions.

4. BCD recommends that The Union Street building ground floor facilities require flood proofing and The Union Street building must comply with Building Code of Australia requirements, with external components rated appropriately for storm, wind, and moisture.

Attachment B

BCD's detailed comments

Newcastle Grammar School – Park Campus

Flooding and flood risk

1. The Flood Impact Assessment does not include sufficient information to determine the time available to complete a flood evacuation

The Flood Impact Assessment prepared by Torrent Consulting does not provide adequate information to determine the time available to evacuate (or seek onsite refuge). Pre-incident planning needs to include a realistic assessment of the time required to evacuate. This requires hydrographs for the 1%, 0.5%, 0.2% and the PMF events to determine:

- available warning time
- time available to evacuate after evacuation triggers are reached
- length of time Cottage Creek stays at its peak
- duration of isolation for people sheltering in place.

Recommendation 1

BCD recommends that the proponent provides hydrographs for the 1%, 0.5%, 0.2% and the PMF events.

2. The proponent should demonstrate compliance with flood safety provisions in their existing Flood Emergency Response Plan

The effectiveness of any FERP will require the school to commit to maintaining the plan in perpetuity.

The proponent's existing FERP was prepared by Patterson Britton 1988, to support the development application DA 98/048. The key recommendations of the 1988 FERP, include:

- constructing a pathway from the Sandi Warren Performance Centre to Corlette Street with an elevation no lower than the footpath on Corlette Street (3.2m ADD)
- displaying the evacuation procedures in the Sandi Warren Performance Centre and the Administration building
- installing a flood marker on the side of the library
- locating a rechargeable torch in the Sandi Warren Performance Centre
- conducting flood emergency drills

The proponent should provide evidence as to the measures taken to date to implement flood safety provisions in their existing FERP that was prepared in 1988.

Recommendation 2

BCD requests that the proponent provide evidence as to the measures taken to date to implement flood safety provisions in their existing FERP, including:

- revision history of the 1988 FERP
- how often the 1988 FERP has been enacted
- history of flood evacuations drills
- which of the 1988 FERP recommendations have been implemented.

3. Flood safety provisions in the updated Flood Emergency Response Plan are considered to be inadequate to manage the site flood risk

The Flood Emergency Response Plan has not demonstrated that there will be sufficient time available to complete an evacuation. The flood impact assessment prepared by Torrent Consulting, found that the critical duration of the Probable Maximum Flood (PMF) was 90-minutes. The nominated flood evacuation trigger is when flood waters in the school playground rise from 2.2m to 2.5m within 15 minutes or water levels reaching 2.8m. At this time the proposed evacuation route will already be inundated by H1 hazard flood waters. Given that the highest point in the school is 3.2m and the expected rate of rise of flood waters will be in the order of 50mm a minute, it is likely that the time available to complete the evacuation of the school will be less than 20min. BCD considers that this will not be a sufficient amount of time to complete the evacuation of 450 students and staff and to lockdown the site.

The evacuation route proposed in the FERP will be cut off early. The FERP incorrectly states that the evacuation route is upwards and away from rising floodwaters. The Tooke Street evacuation route is cut off at a local depression at the Bruce Street intersection, approximately 150m from the site by backwater flooding from runoff from the Strzlecki ridge and Nesca Park area. Given the very fast rate of runoff off the Strzlecki ridge, the school cannot rely on the evacuation route being trafficable, even if they confirmed it was flood free at the start of the evacuation. BCD considers that the evacuation plan must provide a gradually rising evacuation route that can be negotiated without the need to cross floodwaters that increase in depth.

The FERP has not considered non-flood hazards. During an extreme storm event, it is likely that the evacuation route may be blocked by fallen trees, downed power lines, and slippery conditions. Photo 1 shows the potential impact of fallen trees on an evacuation route. This photo was taken in close proximity to the proposed evacuation route.

Photo 1 Fallen Trees in Cooks Hill during the April 2015 storm

The FERP has not recognised the role of the NSW SES. The FERP must recognise that the NSW SES is the lead combat agency for floods and state that any flood response directive issued by the SES must be followed. This includes any order to evacuate the site or not evacuate the site, irrespective of what decisions have been made by school staff in accordance with the plan. The FERP must also include contact information for the SES.

The FERP has not considered if the proposed evacuation centres will be available. The FERP states that Genesis Health and Fitness centre or St John's Church will be used for flood refuge. However, the school cannot rely on these facilities being open during an extreme storm event.

The FERP relies on a visual assessment of the depth and timing of flooding by the administration staff. To assist staff to determine if evacuation triggers are reached, the FERP recommends installation of a new flood marker with markings between 2.5m and 3.0m at 0.1m intervals that is visible from the classrooms. Potential issues with relying on a visual flood marker are that:

- evacuation time could be lost if the flood marker is not continually monitored.
- staff could inaccurately estimate the rate of rise unless they are continually monitoring the flood marker.
- it may be difficult to read the flood marker during intense rainfall.

BCD considers that an automatic flood warning alarm system activated by a float valve would provide a more fail-safe evacuation trigger. Technology for depth gauges with SMS telemetry and siren facilities are now inexpensive and provide information quickly and easily.

The FERP does not include a communication plan. The Newcastle City-wide Floodplain Risk Management Study and Plan (FRMS&P) contains information on the significant risk to life posed during a large flood event. BCD considers that the FERP should contain protocols for communicating information and managing parents attempting to collect children in the event of a large flood.

The FERP proposes to evacuate all students and staff on foot. The justification provided is that it is likely that there will be insufficient time to source a bus and the potential for traffic congestion. BCD considers that evacuation by foot should be a last resort.

The FERP fails to provide clear emergency management triggers and responses. The FERP requires staff to decide to evacuate or shelter in place based on their assessment of time available to marshal students and staff prior to evacuating. However, a flood event that poses a risk to life will be rare and management of an evacuation by untrained or uninitiated staff will be challenging. The FERP must have clear, unambiguous triggers and directions to reduce confusion.

The FERP has not considered measures to reduce the number of people placed at risk. The most effective way to reduce the risk to life is to reduce the number of students in the school at the time of a major flash flood event. Accordingly, in the event of severe weather warnings, flood watches and weather forecasts of heavy rain that may lead to flash flooding, the school should consider proactively encouraging students and staff to not attend the site.

The FERP fails to clearly assign responsibility for the role of monitoring and managing flood emergency response in the school. The FERP relies on administrative staff to collectively monitor flood progress and institute the evacuation procedures. It is BCD's opinion that during a risk to life rainfall event, appropriately trained personnel and/or staff should be managing the flood emergency response for the school.

The FERP does not address the requirements for on-site refuge. Remaining in buildings surrounded by high hazard flooding is not low risk and the FERP will need to identify any provisions required to reduce the vulnerability of the refugees. These measures may include – but not be limited to: provisions of water, emergency lighting, backup power, first aid kits, special food, firefighting equipment, student records (documenting food allergies, medical needs and contact information for parents) etc. These and any additional resources must be identified, planned, and prepared in advance.

The FERP does not specify requirements for reviewing the plan. The FERP must state when the policy will be reviewed and who will be responsible for this. It is BCD's opinion that the school should review the FERP after:

- each annual evacuation drill
- a major flood event

- any revision of a flood study in the Cottage Creek area.

The annual review should document:

- date of the review
- date of the last evacuation drill
- issues identified and proposed refinements
- state of on-site refuge requirements e.g. backup power and first aid.
- up-to-date contact information.

The FERP should consider whether shelter-in-place is preferable to evacuation. It is acknowledged by BCD that the NSW SES considers evacuation as the primary response strategy during flooding. However, the evacuation of 450 children and staff on foot is unlikely to be logistically feasible given the short warning time and the vulnerability of the evacuation route to floodwaters and other hazards.

The FERP does not document how staff will be informed of their roles and responsibilities in managing a flood emergency. BCD recommends that the FERP is incorporated into all staff inductions.

The FERP relies on an elevated walkway for the evacuation route to the on-site refuge. However, no information is provided on the required height of the walkway or requirements for the walkway to be able to withstand PMF flood forces. BCD recommends that:

- the walkway is to have a minimum elevation of 3.2m (AHD) so that it provides rising access to the flood refuge.
- the walkway is to have a minimum width of 1.5m for the walkway, to allow two evacuees to walk side by side.
- All classrooms are to be connected to the raised walkway by pathways with a minimum elevation of 3.2m (AHD).

Recommendation 3

BCD advises that the proposal will significantly increase the risk to life by intensifying the vulnerable population occupying the site.

BCD advises that the proponent has not adequately mitigated risk to life.

Prior to further consideration of this proposal, BCD recommends that the Flood Emergency Response Plan is updated to:

- require that the induction of new staff members is to introduce the FERP
- require that the FERP is regularly reviewed
- list the provisions for shelter-in-place refuge
- provide clear roles and responsibilities for emergency flood management
- provide clear emergency management triggers and responses
- provide clear messaging and communication protocols
- recognise that the NSW SES is the lead combat agency for floods and state that any flood response directive issued by the SES must be followed

- encourage students and staff to remain home and offer online learning in the event of severe weather warnings

And that the proposal is updated such that:

- The Stage 1 building is to be certified by a structural engineer to withstand the hydraulic forces of the PMF conditions, i.e. a flood depth of 2.2 m, flood velocity of 1.8 m/s and velocity depth product of 1.4.
- The minimum Finished Floor Level (FFL) for shelter-in-place refuge is the level of the PMF (4.8 m AHD)
- A flood warning alarm system activated by a float valve is installed on site.
- The proponent demonstrate that the school has sufficient flood refuge for the number of people reasonably expected to be occupying the site during a flood event. Sufficient capacity is defined as floor space of 1 m2 per person for short duration (less than 6 hours), and 2 m2 per person for long duration (greater than 6 hours).
- The proposed raised walkway:
    - has a minimum elevation of 3.2m AHD
    - has minimum width of 1.5m
    - is connected to all classrooms by pathways with a minimum elevation of 3.2m AHD
    - is certified by a structural engineer to withstand the hydraulic forces of the PMF conditions.

4. The Union Street building ground floor facilities require flood proofing

The Flood Impact Analysis (FIA) states that the ground floor level of the proposed Stage 1 building on Union Street requires appropriate flood proofing to manage the risk to life and property and minimise damages in the event of a flood. This level is below the Flood Planning Level (FPL) and has facilities that require protecting, including WC facilities, a lift and PE storage area.

Recommendation 4

BCD recommends that The Union Street building ground floor facilities require flood proofing and The Union Street building must comply with Building Code of Australia requirements, with external components rated appropriately for storm, wind, and moisture.