NSW Education
GPO Box 33
CITY NSW 2001

Job No. FS539

Attn: Mr Matthew Arnett

23 February 2022

Re: Wee Waa High School – Response to Submissions

Dear Sir,

This letter sets out our response to comments which have been made by Narrabri Shire Council's appointed flood management consultant (**Council's appointed flood management consultant**) in regards the Environmental Impact Statement (**EIS**) for the proposed Wee Waa High School project and the supporting Technical Working Paper titled "Flooding" (**Flooding TWP**).

1. Key Issues

The key issues that were identified by Council's appointed flood management consultant were as follows:

i. Technical details on how the results of the flooding investigation were derived have not been provided. As a result, Council's appointed flood management consultant is not in a position to determine whether the proposed stormwater mitigation measures are technically adequate.

ii. A safety in design assessment of the proposed drainage works has not been provided. In particular, a risk assessment should have been undertaken for the proposed drainage channel and the Charles Street culverts.

The following sections of this letter provide further information which is aimed at addressing the two key issues identified above.

2. Additional Technical Information

2.1 Assessment of present day flooding and drainage patterns

As set out in Section 3.2 of the Flooding TWP, the two-dimensional (in plan) hydraulic model that was used to define flooding and drainage patterns internal to the Town Levee as part of the *Wee Waa Levee Risk Management Study and Plan* (Lyall & Associates, 2019) (**Wee Waa TUFLOW Model**) was updated in order to more accurately define flood behaviour in the vicinity of the proposal. As also stated in Section 3.2, this involved the incorporation of a digital elevation model of the proposal site into the Wee Waa TUFLOW Model that was based on detailed ground survey.

In addition to the above, the cell size of the Wee Waa TUFLOW Model was reduced from 5 m to 2 m, while the Manning's n of buildings was reduced from a value of 10 to 1 due to instability issues which were experienced when running the model using the GPU module in combination with the HPC solver in the TUFLOW software.[1]

Copies of the input and output files relating to the definition of flooding and drainage patterns internal to the Town Levee under present day (i.e. pre-proposal) conditions can be made available to Council's appointed flood management consultant upon request.

2.2 Assessment of operational related impacts

Section 3.4 of the Flooding TWP states that the structure of the Wee Waa TUFLOW Model that was originally developed to define flood behaviour under present day conditions was adjusted to incorporate details of the proposal and flood mitigation works (**FMW**), the key features of which are set out in Section 1.4 of the Flooding TWP. Section 3.4 also states that the results of modelling a range of storm events with AEPs of between 20% and 1%, as well as the PMF, were used to prepare a series of figures showing flooding patterns under operational conditions and afflux diagrams showing the impact the proposal in combination with the FMW would have on flood behaviour.

While Section 3.4 states that details of the concept design arrangements that were incorporated into the Wee Waa TUFLOW Model to define flood behaviour in the vicinity of the proposal are contained in Chapter 6 of the Flooding TWP, we acknowledge that this information was not provided in the final version of the document. Listed below are the modifications that were made to the structure of the updated Wee Waa TUFLOW Model in order that it reflect post-proposal and FMW conditions:

- Design tins were added which reflected changes in finished surface levels across the school site, as well as along the line of the channel which runs from the outlet of the new twin 1350 mm diameter reinforced concrete pipes to the Namoi River.
- The outlet of the existing transverse drainage structures along Mitchell Street were ties into the Low Flow Channel using a series of z lines.
- The Manning's n value of a selected number of cells was increased to a value of 0.2 to represent the proposed fencing on the school site.
- New twin 2700 mm wide by 1200 mm high reinforced concrete box culverts were provided under the access road which links Charles Street with the proposed carpark adjacent to the playing field.
- The inlet of the two existing 600 mm diameter pipes in Charles Street was extended upstream to tie in with the new headwall arrangement associated with new twin 1350 mm diameter reinforced concrete pipes .
- New twin 1350 mm diameter reinforced concrete pipes were provided along Charles Street, extending from the north-west corner of the school site to the northern side of Boundary Street.
- The existing pipes that run through the Town Levee and beneath the adjacent downstream access track were each upgraded to new twin 1350 mm diameter reinforced concrete pipes.

Copies of the input and output files relating to the definition of flooding and drainage patterns internal to the Town Levee under post-proposal and FMW conditions can be made available to Council's appointed flood management consultant upon request.

[1] Note that the Wee Waa TUFLOW Model was run using the Classic 2D solver as part of Lyall & Associates, 2019

3. Safety in Design

It is agreed that the flood risk on the site will increase as a result of the proposal if adequate safety measures are not incorporated into its design. Following a review of the flood risks associated with the proposal, the following safety measures will be incorporated into its design:

i. Minimum 1.5 m high security type fencing and lockable gates will be provided around the perimeter of the High Flow Conveyance / Flood Storage Area, noting that this would also encapsulate the Low Flow Channel.

ii. Perimeter security type fencing and lockable gates would also be provided around the area that will be inundated by local catchment runoff adjacent to the main entrance to the school, thereby enabling staff to prevent access during periods when it is inundated.

iii. Appropriate signage will be fixed to the abovementioned perimeter fencing alerting of the potential for these areas to be subject to flash flooding and for people not to enter the floodwater.

iv. A grated inlet arrangement similar to the one shown in **Annexure A** of this letter will be installed on the inlet of the new twin 1350 mm diameter reinforced concrete pipes which will run north along Charles Street, noting that we do not believe that it is necessary to install a similar grated arrangement on the outlet of the new piped drainage system.

v. In order to reduce the likelihood that the new 1350 mm diameter reinforced concrete pipes will experience a blockage during a flood event, a chain-wire (or similar) debris control device will be provided immediately upstream of the aforementioned grated inlet arrangement. The debris control device will be designed so as to also act as a refuge for anyone who might be caught in the floodwater and find themselves being drawn toward the inlet of the new twin 1350 mm diameter reinforced concrete pipes.

vi. A *Flood Emergency Plan* will be prepared for the high school which will incorporate the following as a minimum:

- a description of the flood threat at Wee Waa and more specifically at the high school;
- a description of the existing severe weather and flood warning systems that are presently in place at Wee Waa;
- details of the flood warning arrangements for the high school, including key trigger levels and contact details;
- details of the flood evacuation arrangements for both students and staff; and
- maps and schematics showing key features such as the indicative extent and depth of inundation at Wee Waa and more specifically in the immediate vicinity of the high school, primary and secondary flood evacuation routes, and refuge areas.

We trust that the additional information that is set out in this letter adequately addresses the key issues that have been raised by Council's appointed flood management consultant under the heading "Flooding". However, please do not hesitate to contact the undersigned should further supporting information/documentation be required.

Yours faithfully
Lyall & Associates Consulting Water Engineers

Scott Button
Principal

ANNEXURE A