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20 August 2019

John Ayers
Technical Director Planning
GHD Pty Ltd
Assessing Consultant for City of Launceston
18-28 St John Street
LAUNCESTON, TASMANIA 7250

Re: Development Application for Inveresk Pedestrian Bridge DA0312/2019 – Request for further information

I refer to the preliminary request for additional information dated 2 August 2019. The matters raised in your request are addressed separately below.

1. Construction Methodology - CEMP - E16.0 Invermay/Inveresk Flood Inundation Area Code; E8.0 Biodiversity Code

The request asked that pitt&sherry *"provide a construction methodology that enables the piers to be constructed and the bridge deck installed in accordance with the design criteria highlighted above. The methodology must identify the areas of the riverbank that will be impacted by the construction and the nature of these impacts".*

Specifically, information was sought as to how the construction would be achieved in consideration of the constraints identified in the planning report, namely:

- No load is allowed on the levee at any location during construction, including vehicle movements or storage of materials, and:
- No damage to existing vegetation on the levee is allowed

The low bridge heights either side of the bridge location and the presence of levees on either bank were also raised.

Response:

The construction of this project will be procured as a design and construct contract, which is a common approach for infrastructure works such as bridges. As a result, the details of the final design of the bridge are not clear until tender submissions from the contractor are received.

The Tender brief currently being prepared provides many parameters and guidelines for the bridge that the final design is required to meet, this includes the information provided in the Development Application, concept design drawings, technical parameters etc. This approach helps to ensure UTAS and Council get a bridge that functions as intended, but still provides room for the contractor to pursue innovative designs that ensure value for money.

Because the final design is not clear, the construction methodology is also not yet clear, and tenderers will be required to provide full details of their methodology at tender time. Having said this, pitt & sherry has investigated whether there are feasible methods available to the contractor to construct the bridge, given the access constraints, and we believe the contractor would adopt one or more of the following approaches:

- It is considered likely that a low height barge will be able to be launched at the mouth of the North Esk River and pass below Seaport, Charles St and Tamar St bridges at low tide to access the site.

- Many materials and equipment could be craned over the southern levee to the contractor's working area to the west of the Scotch Oakburn rowing sheds, or onto a barge.

- The existing access to the Scotch Oakburn rowing sheds could be used subject to approval. While this access does not provide direct access to the bridge location, it is another option to enable plant and equipment to reach the river side of the levee. Discussions with Scotch Oakburn have confirmed that construction works, including piling, have been undertaken at their rowing facility in recent years, suggesting construction equipment is able to access the area.

- For erection of the bridge deck, there is room to launch spans from the northern side of the bridge subject to approval.

- The design of the structure will be developed to accommodate the difficult access, using lighter components that can be disassembled and transported by crane or barge more easily.

With respect to the river bank impacts, this will also depend on the final construction methodology submitted during tender. However we have produced a Site Plan (dwg LN18249-P111 attached to this response). This site plan identifies the river banks (pink shaded areas), and requires the contractor not to disturb these areas except by driving of piles.

We trust this answers your query as best we are able at this time.

Also It is unclear why E8.0 Biodiversity Code is included in the heading for this point? If there is something else we have missed relating to Biodiversity please advise.

2. Unexpected Finds Protocol - CEMP

The request stated that "*This protocol should be prepared and included in the CEMP so that the management of the construction process can be fully assessed*".

Also regarding Boland St: *…Boland Street is a heavily trafficked road and forms part of the night time heavy vehicle route serving Toll Transport and the delivery route to Boags Brewery. Any work that requires the shutdown of part, or all, of Boland Street will need significant traffic management and appropriate public consultation.*

Response:

A protocol has been prepared and is attached to the revised planning report attached to this response.

Regarding Boland Street, there are no plans to close Boland Street, and this is clarified in Site Plan dwg LN18249-P111 attached to this response.

3. Flora Fauna Assessment - E8.0 Biodiversity Code

It was requested that pitt&sherry "*review the Flora and Fauna Assessment Report and provide clarification as to the identification of this threatened species and the associated permit requirements*".

Council's Environmental Scientist has stated that the plant shown in the Flora and Fauna Assessment Report is likely to be *Calystegia Sepium*. If so, this will require a "permit to take" under the Threatened Species Protection Act 1995

Response:

The ecologist who undertook the survey has reviewed photographs taken at the time of survey and is confident the plant is the introduced *Calystegia sylvatica*. The photograph below taken at the time of survey identifies large bracts on the flower which distinguishes this species from the native *C. sepium* which has acute bracteoles. A recent inspection of the site found none of this plant to be present (possibly due to weed spraying). The exact species can be confirmed when the plant is present and in flower and if necessary a Permit to take will be applied for. This cannot be done, however, until after the DA is approved and site specific impacts can be determined (based on approved plans) and the number of plants (or area of growth) is calculated.

4. Flood related matters - Launceston Flood Authority - E16.0 Invermay/Inveresk Flood Inundation Area Code

The following information has been requested to address matters raised by the Launceston Flood Authority.

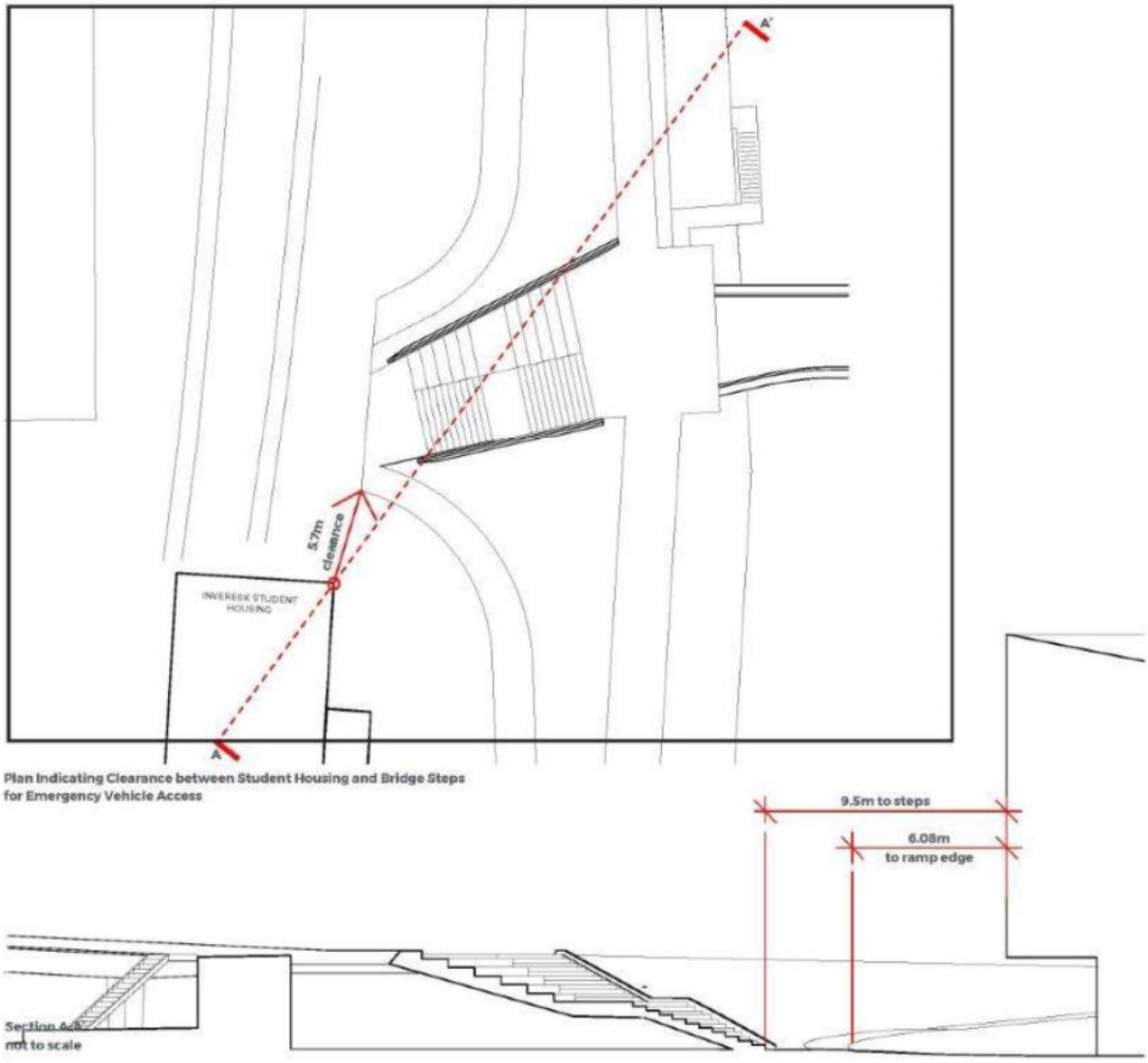
1. Northern steps - Inveresk Flood Levee

The LFA require explanation as to why this alignment alteration to the west has been chosen where from a flood levee maintenance perspective, an alignment to the east or straight off the bridge would be more appropriate. The applicant be asked to provide a cross section through the building and the steps at its minimum clearance alignment

Response:

The alignment alteration of the northern steps slightly to the west is to connect directly to the future pedestrian spine into the heart of the campus. This will form an important component of the overall Northern Transformation Project Masterplan.

See below a plan and cross section showing available clearance for emergency vehicles:



SECTION A-A

Figure 1 Northern steps clearance diagrams

2. Interface between rigid bridge platforms and moveable earth levees

2a. The LFA require explanation as to:

- *Why apparent high-speed radii curves have been shown to the southern side ramp and steps in the application; and*

Response:

The access to the shared-use ramp should facilitate the continuous flow of a cyclists from the levee to the ramp. The proposed COL diagram shows a right angled link slab which would prevent this and create possible points of collision between cyclists and pedestrians.

The 'high-speed radii', operate on a similar principle. A right angled interface with the main bridge structure would create a zone of possible collision, or enforce a dismount which would require added safety barriers. The

Austroads guide to speed limiting treatments does not recommend these approaches as noted is the table below. The proposed curve creates a comfortable point of convergence where cyclists and pedestrians can occupy the same space safely.

Appendix B Speed Limiting Treatments

The use of speed limiting treatments on paths, either a bicycle path or a shared path, should follow the same principles as used when speed reducing treatments are placed on roads. The devices must provide a clear unambiguous direction to the path user, must not add a hazard and must be supported by necessary regulatory signage and linemarking.

Table B 1 sets out speed limiting treatments for bicycle path and shared path terminations.

Table B 1: Suggested path speed limiting treatments

Treatment	Use	Comments
Speed humps	Appropriate	Can destabilise riders and increase hazards if poorly sited or inadequately marked. Warning signs and linemarking similar to road humps.
Path narrowing	Appropriate	Minimum one-way width of 1.4 m. Warning signage and linemarking required.
Path deflection	Appropriate	Maximum deflection angle 10° for high-speed path and 20° for low-speed path.
Warning signs	Appropriate	Used to warn of an approaching hazard and to advise of a need to reduce speed. Used in conjunction with other methods.
Alternative paving	Appropriate	Use different materials and colours.
Path terminal deflection rails	Not appropriate	Can destabilise cyclists and increase hazards if used as a speed limiting treatment. Used only to prevent unauthorised vehicle entry when other methods have not succeeded.
Holding rails	Not appropriate	Only used at intersections to provide a temporary support for a cyclist.
Bollards	Not appropriate	Not considered an appropriate speed control treatment.

Source: Adapted from Roads and Traffic Authority (2005) and Queensland Department of Transport and Main Roads (2015a).

Having said this, we understand CoL's point of view, and suggest a reduction of the proposed angle is the preferred solution from a user experience perspective. See the revised engineering drawings which show the proposed arrangement.

2b. *Why the design cannot be amended to only require minimum interface lengths and minimum load transfer to the top of the levee through the use of short span link slabs. Such link slabs to incorporate design features that allows the link slab to rotate as the earth levee moves, and able to be temporarily removed if the levee needs to be reconstructed. This may avoid the need to have a "revised extent of levee" shown on Drg LN18249-P100.*

Response:

Steps

UTAS are happy to amend the steps to the southern levee as per CoL's diagram to include the small link slab. See updated drawings LN18249-P100 and P102.

Ramp

UTAS have also provided a link slab to the end of the ramp, however we propose a link slab that is not at 90 degrees, but provides a comprise position to maintain the flow of cyclists as discussed above. See updated drawings LN18249-P100 and P102.

This proposed link slab reduces the span length to 3.9m, which significantly reduces the span length, and allows for future settlement and/or raising of the levee.

To enable the link slab to be shortened to 3.9m long, a part of a disused gravel access road needs to be removed from the levee to better define the levee toe and enable a ramp support to be constructed as shown on the drawings.

3. Under bridge scour protection

3a. The LFA are concerned about the ability to maintain grassed surfaces on the river sides of the levees under the bridge structure and around bridge or substructure supports. Without such protection the earth levees are exposed to excessive scour.

The LFA require explanation as to how and where the proponents intend to treat these levee / bridge interfaces to prevent excessive scour

Response:

As this will be a design and construct project, the likely nature of scour protection is unknown. However, overbank velocities at the river edge and on the levee batter beneath the bridge were typically in the 0.2m/s to 0.6m/s range. The attached Pitt & Sherry Hydraulic report estimates of scour and depth for the structural design condition.

Scour protection is recommended around the southern pier, the ramp supports (outside the existing concrete slab), the northern abutment and under the link slab to the stairs and ramp, where vegetation is unlikely to establish. The additional loads imposed by the scour protection measure that might affect river bank stability should be considered in the bridge design.

This information will be included in the tender documents.

Refer pitt&sherry Hydraulic Report (REF) Sections 6.3 and 7 attached to this response.

3b. Furthermore, the bridge foundations are in, and around the remains of the North Esk Rowing Club (NERC) slab and footings. It is not clear whether the applicant intends to remove the existing slab or punch through it to obtain the bridge and ramp foundations. Whilst the slab may guard against scour it would be a different outcome if it was prone to being lifted and relocated during a flood event.

Response:

The intent with respect to the existing NERC slab and footings is to locally saw cut holes in the slab to allow construction of the new ramp supports. These holes shall be cut with a clearance around the finished support, to ensure the support is independent of the existing slab. The gap between new and existing shall be backfilled upon completion so as not to create a new entry point for flood water to erode below the slab at that point. We will ask the designer to assess the risk of future movement of the existing slab during the detailed design, and allow for this in the tender design if necessary.

4. Afflux and flood levels

4a. The LFA require explanation as to:

What the depth of the girder is for the ramp, particularly where the ramp meets the City Levee, and what level

will that be;

Response:

As stated previously, it is now proposed to reduce the span of the link slab to 3.9m, which will significantly reduce the depth of the beams than are landing on the top of the levee. A limit of 500mm total depth from top of deck to underside of beams has been placed on this link slab (refer note on Dwg P102), to minimise the impact on the levee.

The level at top of levee at the match in point is approximately RL5.1, and the link slab deck would match into this level.

Regarding the comment about using a truss structure to reduce the structural depth below deck level, this was an option that was considered, but not preferred by UTAS and their architects.

Refer pitt&sherry Hydraulic Report (attached) Section 6.1.

4b. Comment on the extended horizontal load this will impose on the bridge due to the extended elevation profile of the sloping ramp; and

Response:

It is assumed this question relates to the load the ramp will impart on the bridge? As stated in your query, the bridge soffit will be maintained above RL5.05 to limit the flooding loads on the main bridge superstructure (spans 1 to 3), however at the ramp it is not possible to do maintain the soffit above RL5.05.

The link slab soffit at the western end of the ramp will be at minimum RL4.55, however the adjacent span is longer and so the soffit RL of this span may reduce below RL4.55 depending on the final design. This will mean there are flood loads exerted on the ramp superstructure at the western end, and these loads will need to be taken into account in the detailed design.

Fortunately, the orientation of the ramp at the western end is largely parallel with the flood flow, which will help to reduce these forces. Furthermore, the ramp supports will be designed to take these flood forces, which will reduce any horizontal load exerted on the main bridge span.

4c. Estimate what the possible afflux will be upstream of the bridge due to the main river piers and due to the extended ramp profile, when the river has reached the same level as the height of the levees, but before overtopping. It is not enough that the applicant has noted that "Afflux of the bridge is to be minimised" (Ref Dwg LN 18249-8P101).

Response:

Peak afflux will occur when velocities in the North Esk River are high. Afflux will occur when the peak water level at RL4.0m AHD is below the top of the levee (and less than the 1% AEP design flood level determined by BMT (RL4.6m AHD). Consequently afflux at this level will have no material impact upstream of the bridge.

Under the structural design flood event (1:2000 AEP) the afflux is determined at 10mm to 20mm and will be downstream of the bridge due to the flow reversal caused by the South Esk River dominance. As this is a year 2050 climate scenario, it is expected CoL will have raised the levees sot the afflux will again be benign.

Refer executive summary and section 6.1 of the Pitt & Sherry Hydraulic Report attached.

If you require any further information please contact me on 0498 844 347.

Yours sincerely

Leigh Knight
Principal Environmental and Land Use Planner

Encl.

Engineering Drawings LN18249-P100, P101, P102, P110, P111

Unexpected Finds Protocol CEMP

Pitt & Sherry Hydraulic Report Rev A dated 14 August 2019