pitt&sherry

UTAS Inveresk Development

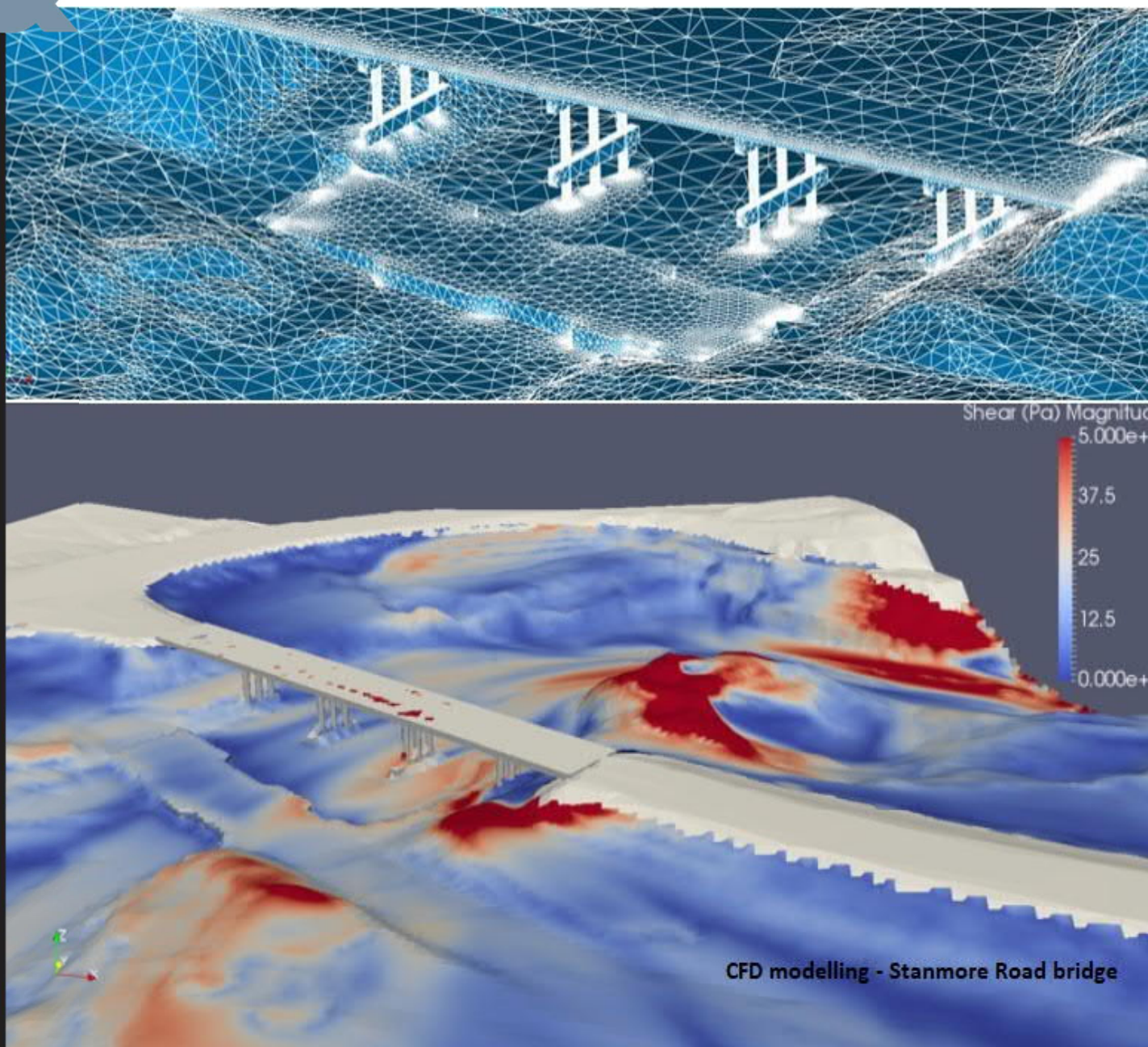
Building 3 Flood Emergency Management Plan

Prepared for
Ireneinc Pty Ltd

Client representative
Irene Duckett

Date
27 June 2019

Rev 01



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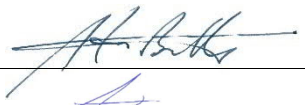
Prepared by — Haydn Betts		**Date —** 27 June 2019
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Authorised by — Haydn Betts		**Date —** 27 June 2019

Revision History

Rev No.	Description	Prepared by	Reviewed by	Authorised by	Date
00	Report	H. Betts	J. Coates	H Betts	30/05/2019
01	Update to align with UTAS EMP	H. Betts	A. Turner	H. Betts	27/06/2119

1. Overview

1.1 Purpose and Scope

This draft Flood Emergency Management Plan (FEMP) has been prepared to support a development application to the City of Launceston (CoL) for a building known as Building 3 to be constructed on the University of Tasmania's (UTAS) transformation site at Inveresk on land depicted with a red outline on Figure 1. This FEMP relies on the information contained in the Building 3 Flood Study Report (pitt&sherry June 2019).

Ireneinc Planning has commissioned pitt&sherry to prepare a flood study report that addresses the requirements of the Inveresk/Invermay Flood Inundation Area Code of the City of Launceston's Interim Planning Scheme 2015 (LIPS) within which the Code provisions are set out in Section E16.7.2 Flood Impact Performance Criteria P3. This Criterion requires the preparation of an FEMP.

This FEMP is aligned to Australian Standard AS3745-2010 (including Amendments 1 and 2) and is predicated on the assumption that is will form part of UTAS Emergency Management Plan (EMP) that is also developed in accordance with AS37345-2010. UTAS reviewed the Rev 00 version of this report and provided additional information to ensure this FEMP aligns with UTAS overall Facilities EMP.

1.2 Flood Emergency Management Plan Requirements

The site is subject to the requirements of the Inveresk/Invermay Flood Inundation Area Code of the City of Launceston's Interim Planning Scheme 2015 (LIPS).

The Code provisions are set out in Section E16.7.2 Flood Impact Performance Criteria P3:

> *Buildings not in the Residential use class must be sited and designed in accordance with a hydrological report and an emergency management plan prepared by a suitably qualified engineer. The report and plan must:*
>
> *(a) detail*
> - *(i) the risks to life*
> - *(ii) the likely impact on the use or development; and*
> - *(iii) how the use or development will manage the risk to tolerable levels*
>
> *during either an overtopping of the levee or a levee breach at the closest point in the levee during a 5% AEP, 2% AEP or a 1% AEP flood event; and*
>
> *(b) consider the following*
> - *(i) the likely velocity and depth of flood waters*
> - *(ii) the need to locate electrical equipment and other fittings above the 1% AEP flood level*
> - *(iii) the likely effect of the use or development on flood characteristics*
> - *(iv) the development and incorporation of evacuation plans into emergency management procedures for the precinct; and*
> - *(v) the ability of the use or development to withstand flood inundation and debris damage and the necessity for the incorporation of any flood proofing measures in the development.*

This Plan will be incorporated into the overall UTAS Site Emergency Management Plan.

1.3 Building 3

Building 3 is to be located as indicated by the red polygon in Figure 1 and is currently the site of an asphalt carpark between two exiting building clusters.

Figure 1: Building 3 development site, Inveresk

It is understood Building 3 will be a three-story building and will hold a Library and Student Services and have a gross floor area of 3,360m^2. It will contain the following spaces:

- Student study spaces
- Library book collection
- Staff office spaces
- Student services spaces
- Plant/ back of house etc.; and
- Retail tenancy most likely food and beverage.

Potential building populations are

- 450 students and staff in the library and student services areas; and
- 30 – 50 patrons in the food and beverage areas.

1.4 Risk Context

The focus of this FEMP is flooding which can be influenced by the occurrence of a conjunctive hazard, earthquake, that may affect the ability of a flood levee to withstand hydraulic loads from a flood, that occur before or after an earthquake.

1.4.1 Flooding

Launceston is located at the confluence of the North and South Esk Rivers where it forms the River Tamar. The Tamar Estuary catchment makes up approximately 15% of Tasmania's land area at approximately 10,000 square kilometres. The South Esk catchment accounts for approximately 9,000 square kilometres of the Tamar catchment and flood behaviour on the Launceston floodplain is dominated by the South Esk River due to its dominant catchment size. Flooding can be exacerbated by high tide levels and storm surge in the River Tamar.

Flood records have been collated since European settlement and significant flooding on the South Esk has been recorded in Launceston in 1828, July and August 1852, 1863, 1929, 1969 (Tasmania, 2000) and most recently in 2016. Whilst the 1852 and 1863 floods are reported to have been greater in magnitude than the 1929 flood, the consequence of flooding was greater in 1929 due to the increase in floodplain development between the 1800's and 1929. One thousand homes and buildings were damaged in Invermay in 1929, prompting the development of the Launceston Flood Protection Scheme (LFPS).

The LFPS was designed to protect Invermay and low-lying areas of Launceston City from riverine flooding equal in magnitude to that experienced in 1929 and construction of the LFPS began in the 1960's. The 1960 iteration of the LFPS was deemed not fit-for-purpose in 2005 due to the structural degradation of the formed levee system.

Recent flood modelling

Recent flood modelling has been undertaken for Council (described in BMT 2019 and discussed in pitt&sherry 2019a) to determine the likely impact of flooding due to flood levee failure. The levee failure mode examined was a simulated instantaneous removal of a 40m long section of flood levee. Flood levee failures under the (updated) 5%, 2% and 1% AEP events were modelled at six breach locations, selected to represent worst case levee failure points (based on proximity to development) near the proposed UTAS sites, a breach at a single location being modelled at any one time.

The flood hazard associated with flood levee failure can be classified using the *Australian Institute for Disaster Resilience Guideline 7-3: Technical flood risk management guideline (Australia 2017b): Flood hazard*. Flood hazard is quantified as a relationship between flood velocity and depth, *i.e.* generally speaking, the deeper the flood waters and the faster the waters are travelling, the more hazardous the classification of the flood waters. Table 1 summarises flood hazard classifications.

Table 1: Hazard classifications

Hazard Vulnerability Classification	Description
H1	Generally safe for vehicles, people and buildings *
H2	Unsafe for small vehicles
H3	Unsafe for vehicles, children and the elderly
H4	Unsafe for people and vehicles
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure

* Some small vehicles have been observed to float at a depth of 150mm.

Observation points were scattered through and beyond the UTAS site to record simulated depths and velocities that resulted from the levee failures.

As indicted in Figure 2, the results of the modelled levee failure events relevant to the UTAS site (Inveresk and Willis Street) indicate that in the event of a levee failure, a hazard classification of H3 is noted in the UTAS Inveresk area in the immediate vicinity of the levee in a 5% AEP event. As expected, as the distance increases away from the levee breach, the hazard class reduces in severity to between H2 and H1. The number to the lower right of the report point dot is the equivalent flood depth.

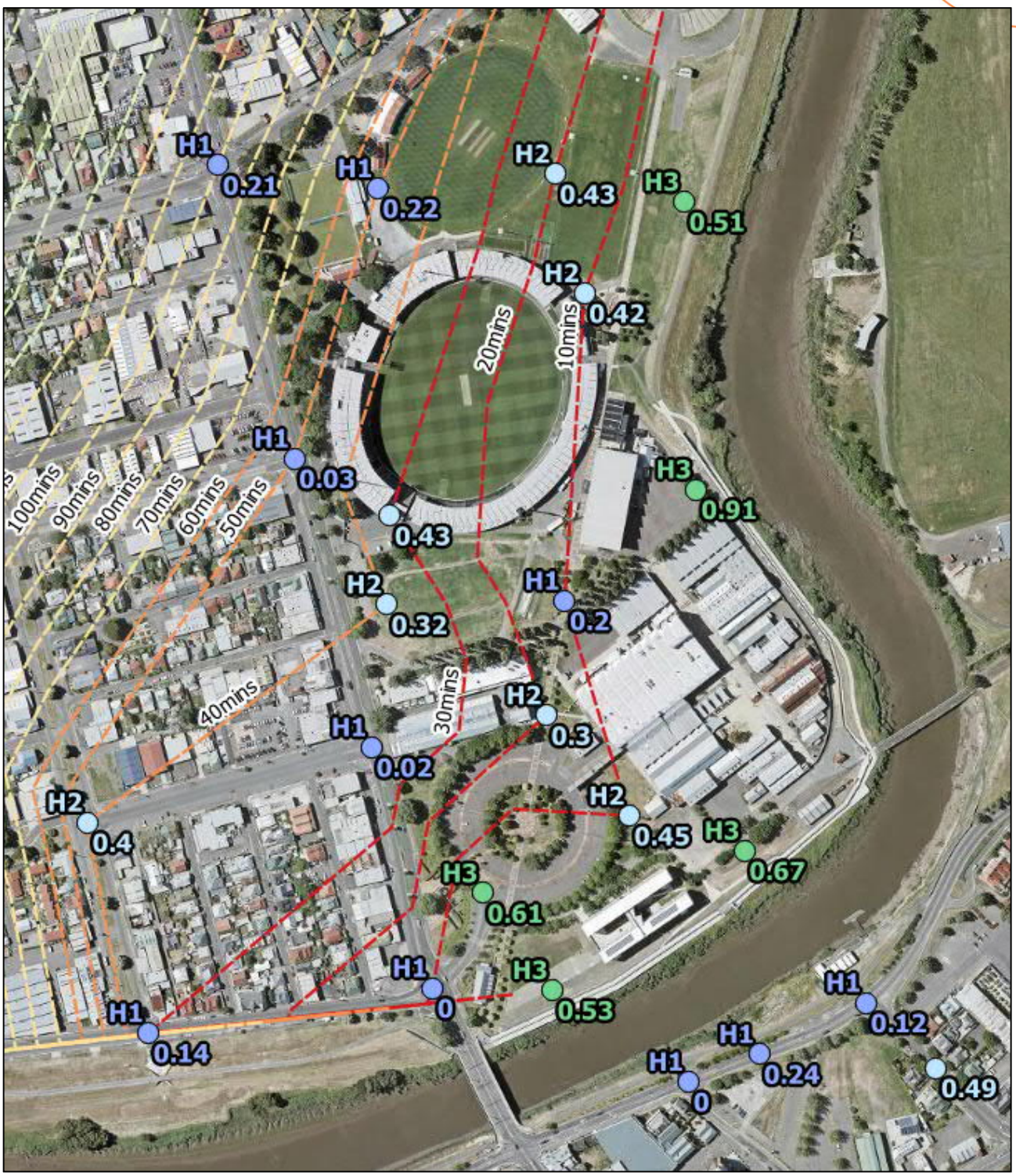

Figure 2: Hazard classification 5% AEP event levee failure

Figure 2 also displays the time to inundation (as isochrones) of the land because of the simulated levee failures. Most of the UTAS Inveresk Precinct in general will be completely inundated within 30 minutes.

The modelled hazard classifications for both modelled flood events greater in magnitude than the 5% AEP (2% and 1% AEP flood events) show that the resultant simulated flood behaviour generally corresponds to a hazard classification of H4 across the UTAS relocation site.

1.4.2 Geotechnical Hazards

Geotechnical factors that might induce failure of levees can be classified as being initiated by:

- Hydraulic slumps of the river bank sufficient to undermine the levees
- Piping failures where hydrostatic forces along weaknesses beneath the levees can create subsurface flow paths into the area protected by the levees (generally counteracted by cut-off walls built into the design); and
- Seismic events (earthquakes) that can initiate ruptures within the levee, that cause or exacerbate hydraulic slumps or piping mechanisms.

Hydraulic slumps can occur at any time but are more likely after high water levels and at low tide. Regular inspections and specific inspections prior to the onset of heavy rain should identify any potential weaknesses.

The probability of a seismic event occurring during a flood event, having sufficient flow to cause rapid flooding within the SAP Concept area, is 1:1000 AEP. This combined probability reflects the occurrence of two statistically independent events where a severe earthquake occurs at the same time as a severe flood. The combined probability of an earthquake occurring during a flood having the impact depicted in Figure 2 (a 5% AEP levee breach) is probably closer to (1:500 x 1:20) = 1: 10,000 AEP

1.4.3 Persons at Risk

The expected maximum population of Building 3 is 500 persons and that is more than likely to be during daylight hours or in evenings.

It should be noted that occupation of the UTAS Inveresk site and Building 3, is controlled by Tasmania Police acting upon advice from the State Emergency Service (SES) and CoL. These are referred to as 'authorised officials' in the FEMP.

Access to the site will be prevent should a flood above a nominated threshold occur or forecast to occur. Occupants of the site and Building 3 will be instructed to evacuate should it be considered a flood levee is at risk of failure. These protocols and thresholds are described below.

A risk can arise after a flood when clean up and re-establishment operations are occurring. If UTAS ever installs a PV solar generating system and the Aurora electrical reticulation system is lost during a flood, a PV array will still be generating electricity in which case an isolation switch should be provided at a height above the 1:200 AEP flood level.

1.4.4 Evacuation Risk

Evacuation of the site due to flooding is only likely if a rainstorm greater than a 1% AEP rainfall event (assessed with climate change impacts to year 2090) falls within the polder area, or when the building is occupied, and flood flow rates are forecast to reach a certain threshold.

Another circumstance might arise from a levee failure when riverine flooding has a magnitude equivalent to a 5% AEP flood event.

1.4.5 Financial risk

Typically, flood risk is categorised in terms of environmental, economic and social implications and its governance. The prime criterion is the safety of people and, if people are not exposed to flood risk, there should be no impediment to development. The next criterion is, as far as it is practicable or reasonable to do so, to ensure the structure and fabric of buildings constructed in flood prone areas are flood resilient. Exceptions might be where the design life of the building is comparatively short in which case exposure to floodwaters should not cause collapse and/or disintegration with resulting debris worsening flood damage to proximate development. Further decisions on infrastructure should consider whether activities can be relocated, and materials, equipment and furniture are readily relocatable to as to minimise financial losses.

UTAS is a semi-government, autonomous body that can access flood insurance in the same manner as a private business in which case we understand the economic consequences associated with flooding will be borne by UTAS and/or its insurers, not by the community in the event of flooding. Providing UTAS is prepared to accept the costs of flooding and the implications on its operations, there only remains the issues associated with the safety of people.

The current CoL flood management strategy intends the levee system provide its design level of protection in perpetuity, not only in the context of the UTAS campus relocation but for all residents and businesses located within the LFPS polders. The CoL (draft) Strategic Asset Management Plan 2018 - 2038 states "The whole of life sustainability analysis via the Strategic Asset Management Plan (SAMP) and the Long Term Financial Plan (LTFP) shows we (CoL) have the financial capacity to achieve very acceptable renewal ratios".

The SAMP indicates the LFPS is funded to its horizon of 2038. Recognising the criticality of the LFPS in the protection it provides to not just the Inveresk and Willis Street sites but the whole of the Invermay/Inveresk and Launceston City floodplains, it is not possible to foresee a future Launceston without some iteration of the LFPS.

1.4.6 Additional Risk Factors

There are additional risk factors that need to be considered when planning for evacuation:

- Loss of electricity and phone lines in a flood emergency: authorises persons within Building 3 can advise people to evacuate by voice/personal contact
- Possible traffic jams on evacuation routes: traffic on Invermay Road in the event of a levee failure could be chaotic and the most efficient evacuation by foot along Invermay Road to Tamar Street
- Floodwaters rising faster than expected: give the Bureau's flood warning capacity, number of hydromet stations and catchment lag, this is unlikely and evacuation for the whole of Invermay and Inveresk can be achieved within 50% of the flood warning time under river rise conditions; and
- People not evacuating: this is unlikely given Building 3 is a workplace/study facility.

1.5 Structure of the Flood Emergency Management Plan

This FEMP is structured as follows:

Section 2 provides background to the development

Section 3 discusses forecasts and warnings

Section 4 outlines property flood emergency response strategy; and

Section 5 presents management strategies for managing the flood risk.

2. Background to the development

2.1 UTAS Aspirations

The University of Tasmania's (UTAS) Northern Transformation Program development sites in Launceston include: the recreational area north of the former Inveresk Railyards; the Inveresk railyards, the Willis Street car park; and a proposed pedestrian and bicycle bridge across the North Esk River. The northern part of the Inveresk area includes the UTAS Stadium, the Bowling Club, Mowbray Cricket Club and Launceston Show Society.

A major commitment identified within the Launceston City Deal (Commonwealth of Australia 2017) is the $260 million relocation and redevelopment of University of Tasmania's main Launceston campus to Inveresk. The new campus is projected to increase economic output in the local community by around $362 million per annum over 10 years with an estimated direct and indirect economic impact of $965 million during the construction phase.

The Launceston City Deal is an agreement made between the Commonwealth of Australia (Commonwealth Government), the State of Tasmania (Tasmanian Government) and the CoL to deliver integrated investment and practical actions that build on Launceston's strengths and tackle key challenges.

The City Deal recognises and endorses the merits of this strategic direction. UTAS seeks to achieve:

- Modern, fit-for-purpose teaching and learning spaces a short walk to the Central Business District
- High-tech research facilities that focus on distinctive fields of academic endeavor, driving better education and economic outcomes in northern Tasmania
- An inviting and accessible environment that is attractive to the community, including new, exciting spaces for cultural and community events; and
- A precinct that acknowledges the previous and current history of the site including Aboriginal and industrial heritage.

Existing uses within the area include:

- Esk Market
- Glebe Farm
- Launceston Show Grounds/parking
- UTAS Stadium
- Invermay Bowls and Community Club Mowbray Cricket Club/Invermay Park
- School of Fine Furniture
- School of Architecture
- Tramway Museum and Tramshed Function Centre, ISEE Church
- Big Picture School
- Youth Futures
- Blue Café
- Queen Victoria Museum and Art Gallery
- School of Visual and Performing Arts
- Annex Theatre
- UTAS student Accommodation blocks located in Inveresk within the Inveresk Precinct; and
- Open space areas within Invermay/Inveresk.

At the time of writing, the following are likely but may change as the Masterplan evolves:

- Multi-use community space within the Inveresk Precinct
- Plaza
- Public Square
- University Square
- Library and support services building; and
- Teaching and learning hub.

2.2 Reference Materials

The following documents were prepared in response to the overall scope of the UTAS development at Inveresk and Willis Street, Launceston.

2.2.1 Flood Response Plan (2014)

A Flood Response Plan [1]for the UTAS Accommodation building at Inveresk was prepared by pitt&sherry 8 August 2015. Since that document was prepared, there have been several changes that provide the impetus for the NRAS Plan to be reviewed:

- There have been improvements and physical changes to the LFPS levee system that were tested (successfully) by the June 2016 North Esk flood event
- Release of the UTAS Master Plan (2018) and receipt of comments
- Construction of the residential block adjacent to the levee; and
- UTAS precinct extension adjacent to the UTAS stadium (formerly York Park) and Invermay Park and land adjacent to Willis Street.

Infrastructure of state significance (Aurora Stadium; University of Tasmania; Queen Victoria Museum and Art Gallery) is also located in the area. Water and sewage infrastructure in the area is combined. During an invasive flood storm water will be contaminated with raw sewage posing a significant health risk. Mitigation of this risk requires consideration during all phases of evacuation.

During the preparation of the Plan, discussions were held with and input was obtained from the Regional Manager, Northern Region SES. Should there be a need to evacuate the facility the Regional Manager will be ultimately responsible for the safe and efficient evacuation process.

2.2.2 Australian Standard AS3745-2010 'Planning for Emergencies in Facilities"

The objective of this Standard is to enhance the safety of people in facilities, by providing a framework for emergency planning, utilizing the built facilities as appropriate.

The key to sound emergency planning is to provide a greater distinction between emergency plans and emergency/evacuation procedures. Clearly the distinction comes through defined roles and responsibilities around development of emergency plans; duties of emergency planning committee; provisions relevant to all sectors of the community 9including those with special needs); education and training and communication.

[1] LN14279L001 rep 31P Rev00/IA/as

The Standard provides guidance for managing emergency situations – it is however targeted at emergency planning committees and emergency control organisations' procedures, covering emergency situations up until the appropriate Emergency Service arrives to manage the situation.

To that end the Emergency Plan attached to this report has been formulated with the Standard in mind.

2.2.3 Australian Disaster Resilience Handbook 4: Evacuation Planning, 2013[2]

This handbook provides guidelines to assist the development of evacuation plans guidelines to assist in the development of evacuation plans and to ensure the principles and concepts of evacuation planning remain consistent nationally. It is designed to assist agencies in developing and revising community evacuation plans.

The handbook aligns many key messages used emergency management, which are:

- Disasters will happen
- Disaster resilience is your business
- Connected communities are resilient communities
- Know your risk
- Get ready – then act; and
- Learn from experience.

These key messages underpin each of the five stages of evacuation planning: from the decision to evacuate, through to the warning, withdrawal, shelter and return. Evacuation is a complex process and careful planning will aid community engagement and minimise risks associated with the evacuation process.

The principles expressed in the handbook have been used to develop the Emergency Management Plan attached to this report.

2.2.4 Flood Study Report BMT 2018[3]

The CoL CoL engaged consulting hydrologists and hydraulic engineers BMT in 2017 to update the North Esk, South Esk Rivers and River Tamar flood model and produce new flood mapping outputs. The subject site/s of the UTAS campus relocation is contained within flood prone land included in this flood model.

The key updates for this model and mapping update are:

- An updated flood frequency analysis which estimates the 1% AEP flood event flow rate(s)
- A joint probability analysis in accordance with Australian Rainfall and Runoff 2016 (Ball et al) which considers the interaction between North Esk and South Esk Rivers flooding, and tidal influences, storm surge and climate change consequences
- New hazard mapping in accordance with the Australian Institute of Disaster Resilience Handbook 7 (Australia 2017a).

The flood frequency analysis was revised through the examination of the history of flood data of the South Esk River at Trevallyn and estimation of the likely magnitudes of events of a given return period, commonly expressed as Annual Exceedance Probability (AEP).

[2] Australian Disaster Resilience Handbook 4: Evacuation Planning, 2013, Australian Institute for Disaster Resilience CC BY-NC
[3] BMT (2018), *North and South Esk Rivers Flood Modelling and Mapping Update –Final Report,* November 2018.

3. Forecasts and Warnings

Under Australia's Meteorology Act 1955, the Bureau of Meteorology is the only organisation permitted to issue flood warnings. However, it does provide access to competent local authorities to its flood warning gauges through its ENVIROMON hydromet data gathering and database system.

3.1 Bureau of Meteorology

In the event of flood producing rain, the Bureau of Meteorology issues a series of flood warnings. These warnings are based on the information provided from a significant hydro-meteorological warning system that utilizes automatic rain gauges in the catchments, automatic water level recorders along the rivers and meteorological modelling. The Bureau enters into agreements with local authorities and provides a Service Level Specification for Flood Forecasting and Warning Services for Tasmania Version 2 that is published on the Bureau's website. Refer http://www.bom.gov.au/water/floods/index.shtml.

This agreement provides for a warning time of 12 hours for Launceston for a North Esk River flood event and 24 hours for a South Esk River flood event, considered as generating the more severe flood. In practice, heavy rain forecasts are now possible for several days before rain begins to fall and generates sufficient runoff for by the Bureau of Meteorology to issue Flood Watch, Minor, Major and Severe flood. The respective catchments are sufficiently large there is ample time to enact the City of Launceston Municipal Emergency Management Plan (MEMP) that identifies various hazards and how they are managed.

3.2 Flood Warning Gauges

These comprise two types: water level and rainfall. Within the northern rivers' catchments there are 38 water level gauges and more than 30 rainfall stations, together with gauges owned by others that report to the Bureau.

3.3 Launceston Emergency Management Plan

The *Launceston Flood Evacuation Plan – Issue 2 2011* sets out the roles and responsibilities for flood evacuation in Launceston.

The circumstances under which evacuation would normally occur are:

- The trigger point for placing Invermay residents on evacuation standby is when flooding in the South Esk River is expected to reach 2000 m^3/s, (corresponding to an approximate flood level of RL 3.0m)
- If rising flood waters in the South Esk River are expected to breach the Launceston levee system causing significant inundation to the Invermay and Inveresk areas (a flood approaching 2330 m^3/s and corresponding to an approximate flood level of RL 3.3m)
- If the combined discharge values in the South and North Esk Rivers approach a 2330 m^3/s flood; and
- Or at any other time deemed appropriate by the Police Regional Commander North.

4. Flood Emergency Response

4.1 Approach

This FEMP recognises the protection of life is paramount. The comfort of occupants is second and the protection of property including motor vehicles is third.

Within these priorities those who are less able or who have disabilities shall be afforded every assistance to evacuate first. This assistance should be directed to removal from site, or permission to stay at home should a flood event be imminent.

A critical part of the development is to ensure both physical infrastructure is resilient, management systems can enact the FEMP, and the FEMP is successfully integrated into the UTAS emergency management plan.

4.2 Responsibilities

4.2.1 UTAS Administration

UTAS ensures this FEMP becomes the responsibility of the precinct emergency management committee appointed by UTAS as recommended in Australian Standard AS3745-2010 (including Amendments 1 and 2).

UTAS incorporates this draft FEMP into its Inveresk Emergency Management Plan, modifying where needed to accord with its nomenclature and operational requirements.

It shall appoint a person (nominally the Associate Director, Facilities Management) to oversee the enactment of this FEMP and undertake the suggested duties below.

- Appoint a Campus Emergency Coordinator and a Building Emergency Control Organisation (Chief Warden & Emergency Wardens)
- Ensure all flood management measures are consistent with this report
- Ensure annual audits are undertaken of measures and resources needed to implement this FEMP
- Assist in communicating messages before, during and after as required by Tasmanian Police, State Emergency Service and City of Launceston and the Building Manger
- Ensure this site specific FEMP is reviewed and modifies as appropriate annually and following a significant flood so that it reflects emergency prevention, preparedness, mitigation, response, coordination and recovery operations including agreed roles and responsibilities; and
- Nominate a validity period for this and successor plans and ensure their periodic review (suggested after each additional facility is approved for development, and then before the new facility is occupied.

4.2.2 Campus Emergency Coordinator (CEC)

The CEC should:

- Ensure the FEMP is developed and maintained for Building 3
- Ensure that the building's flood management measures are maintained and functional
- Test the flood emergency response procedures annually
- Ensure weather and flood warnings are being monitored in accordance with this FERP
- Initiate operational procedures when required; and
- If any Solar PV array(s) are installed, turn off isolation switches to the off position.

4.2.3 Chief Warden

The Chief Warden shall:

- Ensure one-page emergency action plans (indicating the warning mechanism, evacuation route and renewal date) are displayed as required by the emergency management committee
- Communicate flood management procedures to staff, residents and visitors
- Maintain a register of contact details for all staff and residents
- Appoint sufficient emergency wardens so that there are at least three wardens on site should an evacuation be required
- Record the roles of emergency wardens and review with them regularly
- Maintain a record of personal evacuation plans (PEEPs) for people with disabilities and advise emergency Wardens of these are kept
- Ensure copies of the evacuation action plan are positioned around the building and near egress points; and
- Initiate site evacuation when required.

4.2.4 Emergency Wardens

Wardens shall:

- Assist the Chief Warden as required; and
- Undertake training to take over from the Chief Warden if he/she is absent from site.

4.2.5 Staff, Students and Visitors

- Provide the University with most up to date contact details
- Follow the advice of the Chief Warden and Wardens; and
- Report any concerns to the Chief Warden or Wardens.

4.3 Development Features

The following design features are to be incorporated into Building 3:

- The ground flood level will be constructed 300mm above the expected stormwater level from that would occur from direct rainfall for a 1 %AEP event anticipated for the year 2090
- The building will be constructed to resist expected hydraulic forces resulting from the failure of the LFPS levees under 1% AEP flood conditions plus 5000mm freeboard expected at 2050
- The building will be constructed of flood resistant materials to a level that is 500mm higher than the 1% AEP flood expected at 2050
- An internal PA system will be installed within the building
- Electrical switchboards will be located at or above the first floor; and
- Archival materials and computer information databases will be located on the second floor.

Consideration should be given to the provision of elevated wheel chairs having large diameter wheels to assist disable persons evacuate through shallow floodwaters.

4.4 Evacuation Triggers

This FEMP contemplates evacuation might occur under the following flooding scenarios:

- When flood levees are considered unsafe during a flood emergency
- When a sudden rupture of a levee occurs
- When flood flows in the South Esk and North Esk Rivers reach levels that are considered unsafe by the authorised officials; and
- For any other reason given by the authorities or UTAS.

4.4.1 Evacuation Alert

An evacuation alert will be issued to occupants of the Building

- when advised to do so by the authorities (generally when flood flow in the South Esk River is forecast to rise 2000 m^3/s or when flood levels at Charles Street bridge at forecast to rise above 3.0mAHD); and
- if an earthquake occurs when the North Esk River is in flood.

4.4.2 Evacuation and Closure of Building

Evacuation will be triggered when

- When flood flow in the South Esk River is forecast to rise 2000 m^3/s or when flood levels at Charles Street bridge at forecast to rise above 3.0mAHD for people with disabilities
- When flood flow in the South Esk River is forecast to rise 2,330 m^3/s or when flood levels at Charles Street bridge at forecast to rise above 3.3mAHD; and
- if an earthquake occurs when the North Esk River is in flood (the ALERT may be sounded at the instruction of the Building Manager of his designate).

5. Management Actions

5.1 Before a Flood Event

It is contemplated UTAS and its emergency management committee will develop detailed emergency management procedures based on the advice of the flood planning report, this FEMP, and CoL and consider any additional risk factors that become evident during the detail of the design. The procedures should include clear responsibilities, as outlined in Section 4 above, for the Campus Emergency Coordinator and Wardens in the event of a flood.

Copies of the Building 3 and other hazard emergency management plans for UTAS Inveresk development shall be made available and clear directions on their location are included on evacuation route notices and public spaces. All permanent building occupants are to be made aware of the possibility of flooding and the procedures to be adopted when a flood is expected.

The Campus Emergency Coordinator will maintain an emergency contacts list of building occupants and a support list that includes responsible UTAS personnel in nearby UTAS facilities. The Campus Emergency Coordinator will ensure all flood management measures are maintained and functional.

The person responsible for monitoring warnings from the Bureau of Meteorology and/or authorised officials, will notify the Campus Emergency Coordinator or authorised delegate, and continue to advise the Campus Emergency Coordinator when Building Operations should be shut down.

The Campus Emergency Coordinator will advise building occupants that a flood is expected and they should be prepared to evacuate when required. This may include offsite arrangements. The Campus Emergency Coordinator or delegate should erect signs at the Invermay entrances that advise people not to enter the Precinct.

5.2 Pre-flood Actions

At the onset of a flood, the person responsible for monitoring warnings from the Bureau of Meteorology and/or authorised officials, will notify the Campus Emergency Coordinator or authorised delegate, and continue to advise the Campus Emergency Coordinator when Building Operations should be shut down.

The Campus Emergency Coordinator will advise building occupants that a flood is expected and they should be prepared to evacuate when required. This may include offsite arrangements.

Table 2: Pre-flood actions

Item No	Action	Responsible Party
1.	Each school with a presence at Inveresk campus to develop a business continuity plan detailing arrangements for the continuation of operations in the event that flooding prevents access to the Inveresk campus for an extended period. Such planning may include: • relocation of teaching • extension of semester time fames • alternate methods of course delivery • cancellation of semester courses; and • permanent relocation of some specialist subjects. Plans to be submitted to the University Executive Team (UET) for endorsement and reviewed annually.	School of Creative Arts (CALE) School of Architecture and Design (CoS)
2.	Newnham campus colleges and organisational units to develop business continuity plans to ensure continuation of operations for a period of up to three weeks in the event that Newnham campus is used as an emergency evacuation centre. Plans to be submitted to the UET for endorsement and reviewed annually.	All colleges, schools and organisational units, Newnham campus
3.	Following receipt of business continuity plans from the colleges/schools, ISD to prepare options for the preparation of alternate venues for the continuation of teaching classes.	ISD
4.	Review campus grounds and buildings to determine optimal flood mitigation options (such as bunding, landscaping, waterproofing) and the feasibility of implementing mitigation works.	ISD
5.	Compile list of all critical plant/equipment that would require replacement following a flood event, and the estimated time required for replacement of each item.	Colleges/schools in association with ISD
6.	Review present location of all critical infrastructure likely to be impacted in the event of flooding; identify alternate locations for key elements; and develop cost estimate for relocation.	ISD ITS
7.	ISD and Information Technology Services (ITS) to undertake works to relocate essential services out of areas subject to flood damage and to identify potential alternate sites for key activities as advised by the colleges and University management.	ISD
8.	Review server locations and back-up processes to ensure that critical data is retained and remains accessible in the event of flood.	ITS
9.	Dedicated funds to be made available for essential infrastructure relocation and flood mitigation measures at Inveresk campus.	UET
10.	Execute any remediation, relocation and other pre-flood preparation works approved and funded by UET.	ISD
11.	All future infrastructure/building works at the Inveresk campus to be situated above recorded flood levels wherever possible and/or to include flood mitigation measures.	ISD
12.	School of Creative Arts and Academy Gallery to review on-site art collection and prepare prioritised list of artworks/critical items to be evacuated in the event of flood. List to be accompanied by a map with the location of each item clearly marked and updated monthly.	School of Creative Arts

Item No	Action	Responsible Party
13.	School of Creative Arts and Academy Gallery to arrange for off-site storage of non-display artworks and artefacts.	School of Creative Arts
14.	Schools and Academy Gallery to review archived material, administrative files and student records, and arrange for storage off-site.	Schools
15.	ISD to compile list of local removalists for distribution to schools. List to include out-of-hours contact details to be used in the event that evacuation is required outside business hours.	ISD (Security)
16.	Schools to prepare and maintain a chemicals register for each relevant building, to be maintained and updated at least monthly.	Schools
17.	All chemicals to be stored out of the reach of flood waters. Bulk chemicals to be stored on upper building levels. A small, working stock of chemicals may be kept on the ground floor for operational reasons, but must be shelved above floor level, or stored in such a way that they may easily be placed on shelves or benches in the event of flooding.	Schools
18.	Each school at Inveresk campus to nominate and train appropriate staff as flood evacuation officers. (These can be the same people as building and floor wardens.)	Schools
19.	Inveresk and Newnham campuses to develop a flood volunteer list containing contact details of personnel who would be available to assist in the event of flooding at Inveresk.	Schools
20.	Schools to provide training annually, at a minimum, for staff in disaster management response activities.	Schools (with assistance from ISD)
21.	Schools to retain, and maintain in good condition, a stock of plastic sheeting, sandbags, duct tape and packing materials for emergency use.	Schools
22.	A designated back-up person to be nominated for each Critical Incident Team member.	Critical Incident Team
23.	A lockable and fully equipped emergency trailer to be purchased and kept at the Newnham or Inveresk campus. Equipment should include a stock of high visibility vest and torches for distribution to volunteers. Annual allocation to be provided (in addition to regular funding) for emergency-related contingencies, such as removalist fees, etc.	✦ISD ✦UET
24.	10–12 short-distance 2-way radios to be purchased for use by volunteers during an emergency and kept on charge in the Security Office.	✦ ISD (Security)
25.	Media Office staff to consult with campus emergency coordinators (CECs) to develop a detailed flood event communications plan. The plan should take account of the established emergency communication chain: State Emergency Service (SES) to University Security to school contact staff.	✦ Media Office in consultation with CECs
26.	Dedicated telephone link to be established to facilitate contact among all relevant personnel in the event of emergency.	✦ ITS

Item No	Action	Responsible Party
27.	Printed flood evacuation/management information to be developed for distribution to Inveresk campus students and staff as part of orientation and induction packages. Information to include: ✦ evacuation instructions, including what to take and where to go ✦ contact numbers for updates during emergency ✦ emergency radio frequencies ✦ assistance required from students in the event of evacuation ✦ a map showing areas likely to be impacted by flooding ✦ possible impacts on courses and likely alternative teaching venues.	✦ Schools ✦ HR
28.	Discussions to be conducted web service providers to ensure that all flood-event information despatched by email is delivered in a timely manner.	✦ ITS
29.	Investigate and implement SMS messaging system so that flood event information can be despatched direct to student and staff mobile telephones. Inveresk staff and students to be prioritised for testing and delivery of system.	✦ ITS
30.	Arrangements to be made to establish: ✦ Newnham Oval as initial evacuee reception point, as it is easy to locate and has ample parking and lighting ✦ new Newnham campus gymnasium building as Evacuation Centre.[4]	✦ ISD
31.	Ensure that the emergency evacuation reception point and evacuation centre venue provide access for the disabled.	✦ ISD
32.	Ensure that the Launceston City Council (LCC) is able to provide sufficient signage and traffic control equipment (barriers or witches' hats) to cover the entire Newnham campus in the event of flooding requiring use of the campus as an emergency evacuation centre.	✦ ISD
33.	Establish an Inveresk emergency planning committee that includes the LCC, Queen Victoria Museum and Art Gallery, York Park, the Tasmanian Polytechnic and other occupants of the Inveresk Precinct, to: ✦ cooperate on flood emergency planning for the site ✦ ensure that any plan is tested at least annually ✦ coordinate the implementation of the plan in the event of a flood.	✦ ISD

[4] Note - Temporary accommodation, meals and facilities will be arranged and managed by SES and aid organisations. Pets may be brought to the evacuation centre, but will sheltered under arrangements made by DPIPWE.

5.3 Actions upon Receipt of Order to Evacuate[5]

Launceston's flood emergency arrangements contemplate that access to Invermay and Inveresk will be prohibited once flood levels reach nominated thresholds, and but prior to that point a general evacuation advice will be issues to all residents and occupants. Evacuation will only be necessary if there are people in the building who enter Invermay and Inveresk prior to road closures.

The Campus Emergency Coordinator or Chief Warden will issue an evacuation order over the complex's PA system and Staff and Emergency Wardens will door knock all closed spaces to ensure the order has been received and understood. The Campus Emergency Coordinator will arrange transport by other occupants for those occupants who do not have their own vehicle unless a levee breach has occurred in which case all people will evacuate by foot as marked on Figure 2.

Figure 3: Building 3 evacuation route

The Chief Warden and Wardens will sweep the complex to ensure everyone has left.

[5] NOTE: precedence to be given to any directions issued by TasPol and/or SES

Table 3: Actions upon receipt of order to evacuate

Item No	Action	Responsible Officer
1.	University Security to alert University emergency response contact staff and school contact officers.	ISD (Security)
2.	CEC to issue instruction to schools to commence evacuation of the campus.	CEC
3.	School contact officers implement flood evacuation plan, including notification of emergency volunteers.	Schools
4.	Buildings to be prepared for flooding: • electrical items to be switched off, disconnected and, where possible, relocated to upper building level • refrigerators and freezers to be emptied of food and switched off • books, files, furniture and other portable items to be moved to a higher building level • students to remove their project work wherever possible; and • internal doors to be closed and, where possible, sealed with plastic sheeting and duct tape to minimise water entry to rooms.	Schools
5.	Removalists to be contacted and essential artworks to be prepared for removal and off-site storage.	Director, Academy Gallery
6.	Sandbags to be filled and placed in sinks, troughs and toilets, over floor drains and on top of manhole covers to prevent backflow of sewage.	Schools ISD
7.	Inveresk campus electricity, gas and water supply be turned off.	ISD
8.	Newnham campus staff to be advised that the campus will become an emergency evacuation centre.	ISD (Security) CEC
9.	Clear and robust signage to be erected to direct evacuees to emergency evacuation centre.	ISD (Security) CoL
10.	On-site volunteers to be supplied with short-distance 2-way radios, high visibility vests and torches.	CEC
11.	CEC to provide hourly briefings to emergency team personnel, heads of schools and Media Office staff.	CEC

5.4 Actions during Flood Evacuation Period[6]

Table 4: Actions during flood evacuation period

Item No	Action	Responsible Officer
1.	Campus Emergency Coordinator to liaise with SES/TasPol and Launceston Flood Authority to monitor situation.	CEC
2.	Schools at Inveresk campus (and Newnham, where affected by evacuation centre provisions) to advise students of alternate teaching arrangements.	Schools
3.	Classes to be conducted in alternate venues in accordance with schools' business continuity plans.	Schools
4.	Counselling to be made available for staff and students affected by the flood incident.	Support and Equity Unit
5.	Regular updates on flood situation and planning for re-occupation to be provided to students and staff.	Media Office
6.	Media Officer to ensure that the SES website and radio station 91.7 are provided with regular situation updates and that these are broadcast in a timely fashion.	Media Office

[6] NOTE: precedence to be given to any directions issued by TASPOL and/or SES

5.5 Actions on the Reoccupation of the Site[7]

No personnel will be allowed to return until the emergency authorities have given UTAS permission to enter,

A hazard assessment shall be made for the clean-up, safe work methods and statements will be prepared, and personal protective equipment supplied consistent with known hazards that are associate with floods. Contaminated material shall be disposed of in consultation with CoL.

Table 5: Actions on reoccupation of the site

Item No	Action	Responsible Officer
1.	Inspection of Inveresk campus to be undertaken to determine works required for reoccupation. Inspection to be conducted in consultation with emergency services staff and local authorities (CoL, Aurora Energy Pty Ltd, Taswater) and to consider: structural integrity of built infrastructure condition of essential services; and cleaning requirements.	ISD
2.	Campus emergency coordinator to advise heads of schools when area is available for reoccupation.	CEC
3.	School staff to assist in re-establishing site including cleaning and testing of specialist equipment.	Schools
4.	ISD to provide blower dryers, if available, to assist in drying.	ISD
5.	Refrigerators and freezers to be cleaned professionally prior to re-use.	ISD
6.	Bottled water to be supplied for drinking and washing upon reoccupation.	Schools
7.	Repair works to be executed	ISD
8.	Post-emergency debrief to be conducted.	ISD CECs Heads of schools Student representatives

[7] NOTE – Reoccupation to occur only when TasPol/SES have advised that the area is safe.

pitt&sherry

UTAS Inveresk Development

Building 3 Daft Flood Emergency Management Plan

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