# EVALUATIVE REVIEW
## OF THE
# UNIVERSITY OF TASMANIA INVERESK PRECINCT REDEVELOPMENT PROJECT


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# EVALUATIVE REVIEW OF THE UTas INVERESK PRECINCT REDEVELOPMENT: Part of THE NORTHERN TRANSFORMATION PROGRAM TRANSFORMING LIVES, TRANSFORMING CITIES – Version 3, March 2019 The Education-Driven Economic Revitalisation of Northern Tasmania (EDERNT)

**Purpose of the Review**: in considering the University of Tasmania's (UTas) EDERNT project, to produce an informative and accessible evaluative `study' that is supported /referenced by relevant documentation, and that can be used for a range of needs in assessing the project and discussing its strengths and weaknesses.

**Author's Note**

I first read the project proposal, prepared by the University of Tasmania on behalf of the project partners, in the months after its release in March 2016. Its alluring subtitle was `The Education-Driven Economic Revitalisation of Northern Tasmania' - a name I use herein and abbreviate to EDERNT. My main reaction then was that it was an unusual, if not an inadequate document to be used as a business case in seeking federal government funding of $150M. However during 2016, I was busy with other things and did not consider the proposal further. As the project developed during 2017, with associated media reports, it seemed to me that the location of the proposed move featured little in the limited level of available project information and public debate. So I undertook a closer and more analytical reading of the proposal, which revealed a range of perceived shortcomings, especially for a funding document/business case. This prompted me to delve into available background information and relevant literature, which led to the larger undertaking of the major review. As my knowledge grew I found both the content and the process of the proposal intriguing if not poorly advised for a business case. I am retired and spent a part of my working life in academia, so I am familiar with evaluative reviews. I live in Launceston and I initially approached my review from a relatively neutral, independent standpoint. However the people I met, and the information I assembled and reviewed, led me to the conclusion that the proposed UTas move to Inveresk raises several significant issues that have been inadequately addressed, and that may ultimately impact safety and human life. To me, the move is problematic, and creates unwarranted and avoidable risk, especially when there is a sensible available alternative based around the current Newnham campus.

Although I consider the fundamental business needs case (ie Tasmanian business/industry requirements for qualified staff) is without the required quantitative assessment, I accept the case for the provision of a range of Associate Degrees, and I fully support what I consider is the primary intent of the project for Northern Tasmania – namely, to maintain and grow existing tertiary provision, to provide new tertiary courses at Associate Degree level, and to facilitate increased tertiary student enrolment However all the information I have examined indicates the complete campus move to Inveresk is a significant long-term public issue, is fraught with potential problems, and that the process, in conjunction with the City of Launceston, has been inadequate, lacking transparency and perhaps with insider influence/involvement.

Discussions with several local politicians indicated they were faced with a difficult dilemma: the choice between having a significant UTas presence in Launceston at Inveresk, or having a greatly diminished or **no** UTas presence in Launceston, if the move to Inveresk was not made due to the clear UTas stated position about the low ongoing financial viability of the Newnham campus, and its problematic future. The maintenance of a strong UTas presence in Launceston is the political priority, and it appeared to me that a fear of losing this continuance strongly influenced the positive local political support of the project.

In relation to my original writing plans, this document is currently incomplete as I had to curtail my writing time. The latter sections (social, economic and ethical) are simply in point form without elaborative text or references, which I have however sourced and are available. Towards the end of my writing I became much more aware of the potentially important role of Infrastructure Australia (IA) in the project, and the important and critical section about IA, the Launceston City Deal (LCD) and associated politics, was written

after other sections. So when I examined the IA advice and templates for project assessment, I was gratified that my review of the project design process and the EDERNT document was supported by the IA expectations about a submission for a project of this size and expense.

I completed the first version of this review in October 2018, and put it aside. Between then and late February 2019, there have been a number of relevant happenings, as The UTas Inveresk Precinct Redevelopment is still in the design and planning approval stage. It worthwhile incorporating the new information into this review and the current document is version 3 (after an early February 2019 version 2) which now includes consideration of:

- The Updated Flood Modelling and Mapping reports from BMT consultants – Nov 2018;
- The `reported' revisions of key UTas Inveresk Precinct Redevelopment projections – Nov 2018;
- The discovered removal of the UTas EDERNT project/funding proposal public document from its website, and the release, by the new UTas V-C Professor Black, of the November 2018 UTas Strategic Direction paper;
- The submission on January 31 of the UTas Northern Transformation Program detailed business case to Infrastructure Australia;
- An additional floodplain management reference – Bewsher and Maddocks 2003;
- Incorporation of the estimated potential residential and commercial direct tangible costs for Invermay in the event of a 1 in 200 AEP event;
- Other aspects related to legal liability in the context of climate change;
- An introductory section of `Findings' from the review, which can act as an executive summary.

In view of the range and nature of the information available, my opinion is that the project warrants an adjournment, while an independent review is undertaken, in which all the evidence relating to the issues and alternatives is fully, openly and quantitatively considered. This view has only been reinforced by my understanding of the additional material now included.

# EVALUATIVE REVIEW OF THE UTAS DEVELOPMENT PROJECT: TRANSFORMING LIVES. TRANSFORMING CITIES.

## An Education-Driven Economic Revitalisation of Northern Tasmania (EDERNT)

## Contents

# FINDINGS (Review Summary)

The data, information and references to support statements made in these findings can be found in the main document, together with fuller descriptions and explanations. Broadly, the evaluative review includes: (i) political/approval aspects and associated process; (ii) a detailed analysis of the Northern Transformation Program proposal on the basis of which funding was committed; (iii) environmental considerations for the Inveresk Precinct Redevelopment (IPR); and (iv) social, economic and ethical considerations, which are simply listed in tabular format (without text etc, due to time constraints).

## Process

- The Northern Transformation Program (NTP) proposal document – the Education Driven Economic Revitalisation of Northern Tasmania (EDERNT, March 2016)) was not a business case, as purported, but a marketing document for a program then estimated to cost $300m (now revised to at least $400m). Of the partners, the University of Tasmania (UTas) committed $75m, the Tasmanian Government (TasG) $75m, and $150m was sought from the Australian Government (AG).
- The NTP appears to have been a top down exercise driven by the then UTas Vice Chancellor (VC) Rathjen and the then City of Launceston (CoL) General Manager Dobrysinski, with support from the TasG ministers. Its expression through the EDERNT had a major focus on predicted economic outcomes, and a lesser focus on tertiary education.
- In the politics of the months prior to the July 2016 Federal Election, the Labor Party first agreed to Federally fully fund the NTP ($150m), followed two months later by agreement from the LNP, with neither party referring the NTP proposal to Infrastructure Australia (IA) for initial assessment. The EDERNT thus proved successful as a marketing document, and was the sole proposal by which funding was committed. Of the $150m AG funding, $130m was directed to the Launceston Inveresk Precinct Redevelopment (IPR) and became the major component of the Launceston City Deal (LCD) a tripartite agreement between CoL, the TasG, and the AG.
- That the NTP funding commitment was purely political expediency is evidenced by its timing and uncritical acceptance, by a later Senate Estimates hearing, and by MHR Mr Ross Hart's maiden parliamentary speech after winning the seat of Bass for the Labor Party in the July 2016 Federal election.
- By regulation/law, all projects that may potentially receive more than $100m in Federal funding, must be assessed and approved by IA through a 4-stage process – stage 1 involves problem identification and prioritisation, and stage 2 is initiative identification and options development. These two stages are effectively hurdles/screening exercises to ensure the initiative is rational/sensible and all options have been considered and assessed before proceeding to develop a business case for the preferred option. If approved, the Initiative becomes classified as a project for which a full business case is prepared (stage 3) and evaluated by IA (stage 4), and if positive the project may proceed. The NTP, after commitment of funds and a long hiatus, proceeded directly to stage 3.
- The main project partners – UTas, TasG, CoL- were all aware of IA and its processes, as they had previously submitted other initiatives that had become projects with business cases. In this instance, they knowingly and willingly chose not to engage with IA (as normal) in the developmental stages of the proposal, preferring to proceed by making the EDERNT marketing document publically available. Their reasons can only be surmised, but may possibly include an awareness that building on a greenfield, problematic, tidal floodplain would be a poorly regarded and expensive option (especially by IA) if better options were available eg using the current Newnham campus.
- In the lead-up to the election, neither political party referred the NTP to IA for screening stages 1 and 2 before making the funding commitment, so both political parties were negligent in this respect.

- Thus the NTP was not subject to due process nor due diligence, both serious omissions, at the time and in retrospect.
- Nevertheless, the LNP federal politicians involved with the NTP during the process of establishing the LCD, publicly reminded UTas (on several occasions) that a full business case must be submitted for approval to IA before funding was provided. However this did not occur, and eventually the LCD was signed and funds released by the AG (Jan 2018), on the basis of a `strategic-level business plan' that was not made public and was not acknowledged in any way by IA on its website (as normal).
- UTas was directed to submit a full business case to IA by 31 January 2019, and was advised that, during the months prior to submission, it would receive feedback, support and some direction from IA in completing the required documentation. The business case was submitted on Jan 31, and is now listed on the IA website as a valid project with a business case that is undergoing evaluation. However there were no stages 1 and 2, so IA had no opportunity to assess the fundamental steps at the necessary and correct time, ie as screening prior to proceeding to a business case.
- As IA has been closely involved in assisting UTas in the preparation of its business case consequent to political funding commitments, it is not feasible that IA can act as an independent evaluator of the business case. Despite its professed independence from government, it is likely that IA will simply proceed with a bureaucratic `tick-the-box' exercise that will comply with political needs, and enable the NTP to proceed. The following findings refer mainly to the Launceston IPR.
- It has been informally reported, and not denied, that in late 2018, UTas revised two important foundational projections for the IPR that were in the 2016 EDERNT. The causes of these revisions are likely to have been student enrolments from 2015-18, possibly more accurate analyses of industry needs (as part of the business case for IA), and architectural advice based on detailed site analyses and needs. The original and revised projections are:

| | March 2016 EDERNT Document | **November 2018 Report to CoL** |
|---|---|---|
| Total Cost of IPR | $260m | **$400m** |
| Additional IPR Student Enrolments | 10,000 | **≈2,000** |

- These revisions are very large, and the 2018 numbers are very different (both negatively) from the originals, that were the basis on which funding was committed and the LCD established. Such significant changes could possibly be used to challenge the status and validity of the $130m IPR funding made available by the AG through the LCD.
- The CoL Council has facilitated the proposed IPR by effectively rescinding a previous flood deed (TasG-CoL) that prevented further development at Inveresk, gifting Inveresk land to UTas, and granting approvals, in the floodplain, for a local developer to relocate a community museum and so provide the freed site to UTas.

## The Original EDERNT Proposal Document

- Although the EDERNT included descriptions of a `business case', the document could not be considered as such. A business case generally uses a design framework which reflects normal professional practice and provides a foundation for analyses. The relevant design phases are: (i) Clarify the Problems/Needs/Opportunities; (ii) Note any fundamental Design Considerations/Criteria and Constraints; (iii) Consider/analyse the Options or Alternative Possible Solutions; (iv) Select, with justifiable reasons, the Optimal Option/Solution. These may now be part of the NTP business case to IA, (submitted 31 Jan 2019), which UTas may consider supersedes the EDERNT; nevertheless the EDERNT critique below is still relevant.
- In terms of Needs Analyses the EDERNT:
    - Presented some educational, demographic and economic productivity data that showed Tasmania is behind most other states and suggested that new tertiary educational provision would contribute to improving the situation;

- Stated industry areas of perceived need, made only general `motherhood' statements about industry needs, and failed to properly examine and analyse industry needs in a deep, quantitative, or useful manner;
- Did not undertake any rational consultation/analysis to provide details of the types of jobs requiring trained staff, or the possible future demand for them (ie their future numbers);
- Thus did not establish a rational, useful foundation on which to plan future tertiary course offerings and associated infrastructure needs.

- In terms of Design Considerations, the EDERNT contains many statements that can be regarded as IPR objectives or associated design criteria/considerations:
  - 20 such design criteria were drawn from the text of the EDERNT, only two of which were specific to Inveresk. The others were location neutral and could be fulfilled as easily at Newnham as at Inveresk.
- In terms of Analysis of Options:
  - Did not consider any other educational options apart from the provision of two-year Associate Degrees;
  - Did not provide any analysis of the condition and functionality of the existing Newnham buildings although UTas had undertaken such a review and written a report for 2015-19;
  - Did not provide any comparative infrastructure and financial analyses of possible campus options eg minor modifications at Newnham; major redevelopment at Newnham; complete move to Inveresk.
- In terms of Selection of an Optimal Option:
  - From the outset, the EDERNT did not considered any possible options. It simply presented the two fold solution - (i) provision of Associate Degrees, and (ii) complete campus relocation to Inveresk (apart from Australian Maritime College - AMC).

These findings will progress on the basis of accepting the proposed educational provision (as this is the prerogative of UTas), but will further report on the proposed infrastructure provision -the relocation of all UTas infrastructure, (except the AMC), to Inveresk, as this is a public matter with serious implications.

## Environmental Considerations

The environmental aspects are reviewed under appropriate headings (see below).

- Since the 1990s, the CoL has commissioned a range of expert professional reports about a range of environmental factors that can affect Launceston and particularly Invermay/Inveresk. Much of the detail in this section is drawn from these reports, which in its recent planning decisions the CoL has chosen to ignore. ie the CoL is aware of environmental risks but has apparently regarded them as insignificant in comparison to perceived commercial gains.
- There are no substantive environmental/sustainability comparisons between Newnham redevelopment options and the IPR.

### *Sites and geology*

- The Newnham site is approximately 50ha at 15-23m elevation (AHD);
  - It is not susceptible to river or estuarine flooding, and is above the 1 in 2000 year projected flood zone;
  - It consists of generally consolidated and stable fairly recent sediments (half to 5 million years old), with variable but adequate subsurface drainage;
  - It is a brownfield (existing) site with the full range of established and reliable services, and a valid history of use.
- The Inveresk site is in the order of 20ha, but UTas only owns a part of that. It is generally 1.7-2.5m AHD with some areas 1.5m:

- It is often below high (spring) tide level and is part of the low-lying floodplain (originally a wetland/swamp) at the confluence of the North and South Esk rivers;
- It consists of very recent (in the last 12,000yrs) unconsolidated and unstable/fluid riverine/estuarine/swamp sediments, whose depth can vary from 5 to 30+ m, and which have a high water table, high potential for settlement, and for landslip in embankments;
- Some areas have surface fill (sand clay, ash, ballast) which has been added over the years;
- The underlying solid dolerite bedrock can be quite deep – 5- 30m+, and specific site foundation investigations are required;
- It is protected by levees whose top level was reconstructed (2010-13) at 5.2m AHD;
- It is effectively a greenfield site with some adjacent existing services. The local soil/substrata characteristics create susceptibility to damage of in-ground services (water, sewage, drainage).

### *Seismic factors*

- There are two recognised fault lines (at $90^0$ to each other) close to Inveresk, and although they are regarded as stable, they have never been monitored to establish this. Inveresk is within the zone of influence of the faults which are considered to have been active in the early tertiary period, but may be sites of further displacement in a future possible earthquake. The probability, although low, should not be ignored.
- The N-S fault line is some distance west of the Newnham campus which is likely to be less susceptible than Inveresk to fault displacement.
- Launceston has experienced five earthquakes since 1884, the most recent being in 1946.The epicentres (with Richter magnitudes of 5.6-6.9) were in the west Tasman Sea, 140-240 km distant from Launceston. The recorded damage around the city centre was not extensive or serious, but in some instances had the potential for human injury or fatality.
- The reported past earthquake damage in Launceston is considered to be largely the result of the amplification of earthquake waves by the recent unconsolidated sediments, ie if the structures concerned were situated on sedimentary deposits such as those at Inveresk; (also eg Newcastle, 1989 and Christchurch NZ 2011).
- As a result of microtremor recordings and studies across Invermay (with 5 sites at Inveresk), earthquake power amplifications by factors of 2.3 - 3 (compared to solid dolerite) are expected at Inveresk due to the nature of the underlying sedimentary material.
- A second factor that can influence levels of building damage is earthquake resonance effects depending on building height. At Inveresk, buildings of 4 storeys are expected to be subject to resonance effects (in addition to sediment amplifications); and for the Willis St site, buildings of 1-3 storeys.
- For minor to serious structural damage to buildings on sediments, (a low magnitude earthquake) the combined probability is 1 in 880 in any year.

### *Climate change*

- There have been several substantial high quality studies undertaken to enable a range of valid environmental projections about the influence of climate change on Tasmania as the 21st century progresses. The most significant group of these is the Climate Futures for Tasmania (CFT 2010-12);
- Average temperatures, sea surface temperatures and mean sea level are all projected to rise, and through their climatic effects will impact Inveresk.
- The North Esk catchment and much of the South Esk catchment are in the north-eastern/eastern ranges, areas predicted to have more frequent intense rainfall events, and consequently increased run off and potential flooding.
- The projected increases in annual rainfall are the result of significantly increased east coast summer and autumn rainfalls, and a slight reduction in winter and spring rainfalls.

- Projected changes in the Blocking Index (slow moving low pressure systems in the Tasman Sea) are strongly consistent with the increases in rainfall in the east during summer and autumn.
- Increased intensity of extreme rainfall events is projected, with high confidence.
- The 2018 BMT updated flood modelling study uses, for 2050 and 2090, an increase in catchment rainfall intensity of 7.2% and 16.1% respectively.

### *Flooding, levees, and the 2018 flood modelling report*

- The 2018 BMT study shows that the Newnham site will not be affected by a 1 in 2,000 year flood event;
- Water and flooding constitute the most probable and serious risk for Inveresk, which will be severely impacted by a 1 in 200 year event (0.5% AEP).
- The levees were renewed during 2010-14 based on 2008 modelling, which indicated that a levee height of 5.2m (AHD) would protect from a 1 in 200 year flood with 50-60 cm of freeboard.
- Due to the instability of the underlying strata, the weight of the earth levees causes them to sink slowly, and in considering these factors, the levees are now at their maximum height. Adding earth to increase height will create further instability and pressure to sink. Additionally, the new concrete levee walls cannot be raised, so overall it will prove difficult to increase protection by raising levee heights.
- The earth levees are also susceptible to slumping/landslip, in the main due to the characteristics of the underlying strata.
- The main local factors (ie excluding rainfall, catchments etc) that contribute to flood heights are:
    - Peak flow discharges from each of the rivers;
    - The relative timing of the peak flow discharges for each of the rivers (ie at similar or very different times);
    - The timing of estuarine tides (especially high tides) and their levels, in relation to river discharges and their timing;
    - Storm surges in the estuary;
    - Levels of sediment in the lower reaches of the rivers and the estuary, as they will affect river heights, ie the bathymetry of the rivers and estuary;
    - The height and condition of the levees.
- The most recent flood modelling and mapping report for the North and South Esk rivers (BMT 2018), used data from the 2016 floods and relevant historical data not previously included, and employed improved modelling techniques. The reports also took into account, probabilities of peak flows, relative timings of peak flows, tidal effects, and current bathymetry. Using climate change data, the report also made projections for 20150 and 2090.
- The revised peak flows and AEPs in the 2018 report clearly demonstrate that AEPs (ARIs) and associated flood heights are not calculated once and fixed indefinitely, but that their calculated values are based on data suites that can change over time and that can be used in more accurate and comprehensive computer models as these are developed. This is why the Launceston levees are now predicted to be seriously overtopped by a 1 in 200 (0.5%) AEP flood, whereas they were constructed to contain this level flood (with 50-60 cm freeboard) based on earlier less data rich and comprehensive modelling.
- The 2018 modelling indicates that if there was a 1 in 200 year flood now or in the next few years, the Inveresk Precinct would suffer a **hazard class 5** event - **Unsafe for vehicles and people; all buildings vulnerable to structural damage**; **some less robust buildings subject to failure.** ie the levees although designed in 2008 for a (then) 1 in 200 year flood are expected to be well overtopped. Future scenarios are similarly bleak, as the table below shows:

| | 1% AEP – 1 in 100 ARI | | | | 0.5% AEP – 1 in 200 ARI | | | |
|---|---|---|---|---|---|---|---|---|
| Year | Flood? | Depth Metres | Willis St? | Hazard Class | Flood? | Depth Metres | Willis St? | Hazard Class |
| 2018 | No | - | No | - | Yes | 2-5 | Yes | **5** |
| 2050 | Yes | 0 – 0.5 | Yes | 1 | Yes | 2-5 | Yes | **5** |
| 2090 | Yes | 2-5 | Yes | **5** | Yes | 2-5 | Yes | **5** |

- There are several important assumptions, implicit but not stated, in the BMT reports:
    - That the levee system retains its top level at 5.2m AHD – ie that there is no subsidence or slumping, both of which have occurred since the new levees were completed;
    - That the CoL continues to maintain the integrity and height of the levees and associated structures (eg gates) and retains the capacity/capability to do so in the foreseeable future;
    - That the climate change projections (higher at RCP 8.5) used in the modelling are reasonable and are not likely to be superseded by more severe predictions or actual climate developments;
    - That the recent Bathymetry undertaken for the modelling will not change – ie there will be no further fluvial or estuarine sediment accumulation that changes profiles.

  If in a flood event, one or more of these assumptions are invalid, then it is likely that the projected hazard levels will increase.
- The IPR is a classic example of what is well known as the `Flood Protection Paradox' which can have two stands both of which are evident for Invermay/Inveresk after the levee renewal completion:

  (i) levees encourage more development behind them based on the perceived protection, and when they are overtopped in flood, there is pressure to raise them to protect the increased asset value in the next flood – so potential flood losses rise in tandem with spending on levees;

  (ii) one way of justifying the cost of high levels of levee protection is to allow development behind them.
- The proposed UTas Inveresk development is an example of a perverse consequence of the flood protection paradox: the revised cost estimate for the IPR of $400m will add greatly to the value of the assets protected by levees, and the latest flood modelling report of 2018 indicates that a 1 in 200 AEP flood would overtop the levees and seriously impact Inveresk. So there will be pressure to undertake works to increase levee height; however the levees are at their maximum height in terms of the local geotechnical conditions.

### *Professional environmental advice re Inveresk*

As the CoL does not currently employ relevant professional engineering staff, it is justifiable to argue that the expert opinions expressed in the documents and reports (some of which were commissioned by the CoL/TasG) should be those considered and followed by the CoL. If such expert opinion is not accepted and used, then it understandably becomes the responsibility of the CoL (and UTas) to publically justify any development/use decisions that ignore such professional advice.

- "Future planning approvals should be cognisant of the undesirable nature of allowing highly concentrated populations (eg in public halls) on or near fault lines, even though the risk may seem extremely low numerically."
- "The possible interruption of some services should be considered for their community impact. Particular attention should be directed to bridges, main access roads, power lines and water/sewage reticulation lines where they cross active faults or landslip areas."
- "Care should be taken in planning any building development on the anomalous soils of the old railway yard." (Inveresk).

- In the Launceston Flood Risk Management Act of (Tasmania 2015) Inveresk is clearly included in the map of flood risk areas - after the renewal of the levees.
- "Site Selection for New Construction: Proper site selection is the best solution for avoiding the effects of flooding. Selecting the correct site is far less difficult than designing a facility located in a flood zone to resist the effects of flooding …..
    - Select a site that is not in an area protected by a levee or other man-made flood control works.
    - Select a location where the entire site and all access routes (highway, marine, railroad, etc.) are outside 0.2% annual exceedance (500-year) floodzones (by both elevation and footprint). ….. and a building site that includes 0.3 to 0.6 m of freeboard, ….. and is at least 152 m from direct wave impacts and or high flood-flow velocities."
- "Detailed flood risk management is required in the suburb of Invermay as a result of the following concerns:
    - Risk of flooding and the consequent danger to people and property;
    - Difficulties of providing and maintaining infrastructure in the soft base material, including the combined stormwater and sewerage pipe system, the discharge of sewage into the river in heavy rain and the lack of a drainage system for private property;
    - Difficulties of erecting and maintaining structures on unstable ground; and
    - Potential liabilities faced by the Council and Government arising from a major flood."
- The action/response hierarchy generally used in floodplain management is:
    1. Prevent – do not use sites with risk, especially if an alternative is available - eschewed by UTas;
    2. Avoid - use of technical/planning solutions etc – eg. UTas Inveresk - subject to human frailty;
    3. Respond - safety plans, education etc –eg. UTas Inveresk- subject to human frailty.
- "To assist Council with land use planning activities, a flood planning constraint map has been developed for 2050 climate conditions. Guideline 7-5: Flood Information to Support Land-use Planning of the Australian Disaster Resilience Handbook Collection (AIDR 2017) identifies four flood planning constraint categories (FPCCs) across a floodplain. Invermay/Inveresk is in FPCC 2 - Areas of flood hazard class 5 in the DFE or of flood hazard class 6 in the 1 in 2000 AEP event." Flood hazard class 5 is: **Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.**
- "Technical understanding of climate change and the quality of predictions about future temperature and weather patterns are improving. Recognizing that adaptation efforts have not kept pace with these improvements, litigants are bringing claims that seek to assign responsibility where failures to adapt result in foreseeable, material harms."
- Climate change litigation is becoming more common and can substantially disrupt business activities. Key risks may include exposure to damages claims, financial and reputational costs, disruption to operations and enforcement of financial disclosure requirements.

### *Social, Economic and Ethical Considerations*

In sections 4, 5 and 6 of the report, these considerations are presented in tabular point format and cannot be simplified. Please refer to these tables .

# 1. OVERVIEW

*"The Education-Driven Economic Revitalisation of Northern Tasmania project will expand and extend the University of Tasmania's reach in the North and North-West of Tasmania and position these regions to realise economic change through education."*

Quoted from page 4 of `Transforming lives. Transformng cities. A partnership proposal to deliver an *Education-Driven (Economic) Revitalisation of Northern Tasmania',* (UTas, 2016). This document was a UTas partnership proposal to the Commonwealth Government, published by the University of Tasmania in March 2016. It is abbreviated herein to EDERNT, and as the first and main published proposal document it provides most of the fundamental public information about the project. The project overview in this section draws from it, and page references refer to it unless otherwise named. The overall developments (planning and proposed actions) for the *Education-Driven Economic Revitalisation of Northern Tasmania* are referred to as the `project'. The University of Tasmania is the sole university in the State of Tasmania, and is a significant contributor to the Tasmanian economy. The EDERNT was available on the UTas website but can no longer be accessed from that website, as it was apparently removed during 2018, possibly because (i) its projections were considered over optimistic (more modest ones were communicated to the City of Launceston by UTas in Nov 2018) , and (ii) it purported to be a business case which it clearly was not, as UTas were obliged to submit a detailed business case to Infrastructure Australia, which they did on January 31 2019, the latest date possible before they would have missed an agreed deadline. The overall undertaking is currently referred to as the Northern Transformation Program, and available information is at: http://www.utas.edu.au/northern-transformation

## 1.1 Main Project Elements

### *1.1.1 Project Partners*

The project partners for the project/proposal (EDERNT p 6) are:

- The University of Tasmania (UTas) as the lead proponent
- The Tasmanian State Government (TasG)
- The City of Launceston Council (CoL)
- The Burnie City Council
- TasTAFE
- The Cradle Coast Authority

The partners have successfully sought a financial commitment of $150 million from the Australian Government (AG), which has thus become the main funding partner. As of April 2017, the proposed AG (Commonwealth of Australia-CoA) project funding contribution of $130 million for the Launceston component constitutes the major part of the Launceston City Deal- LCD- (CoA, 2017) which is part of the Australian LNP Government's Smart Cities Plan (SCP).

### *1.1.2 Locations*

This Northern Tasmanian based project aims to improve tertiary education opportunities at the existing UTas locations of Launceston and Burnie. As Launceston is the much larger northern campus, the major proposed developments and costs are at Launceston. The evaluative components of this review are confined to the proposals for the Launceston developments – those for Burnie are not considered. The main UTas Launceston campus is located in the northern suburb of Newnham, approximately 5km from the city centre, and there are also existing UTas facilities at Inveresk (≈4km from Newnham campus), which is adjacent to the city centre. The EDERNT proposes to construct new UTas buildings/facilities at Inveresk on land that was owned by the CoL, but in June 2018 was transferred without cost to UTas; it also proposes to use land (also previously owned by the CoL, but transferred to UTas) on the opposite eastern (city) side of the North Esk river to the Inveresk precinct. This is usually referred to as the Willis street car park site, and includes the adjacent National Automobile Museum of Tasmania which, with UTas funding, is planned to be moved as part of the project implementation. Considerations of the proposed UTas Inveresk campus

implicitly include the Willis street site, which is planned to be linked by a footbridge to the Inveresk precinct, part of the larger Invermay tidal-influenced river floodplain (originally a wetland) protected by a recently renewed levee system. The spatial relationship of project related sites is shown on the following image copied from the EDERNT. The Inveresk area shown on this image is referred to as the Inveresk Precinct, which incorporates several entities eg the sports/football stadium, UTas School of Architecture and Design, Launceston showgrounds. At this stage UTas only proposes to build on/use three Inveresk land parcels (for two buildings and a carpark) and the Willis St site (for a building with ground level parking) . Also at Inveresk, a 120 room residential block, now housing students, was completed in 2015 on a land parcel transferred from the CoL to UTas ownership. Nevertheless, all the UTas documentation identifies the entire Inveresk precinct in its proposals and plans. The sports stadium (traditionally called York Park), has recently undergone a naming rights change from Aurora Stadium to UTas Stadium.


*Sites image from the EDERNT page 20*

### *1.1.3 Key Identified Issues*

For Northern Tasmania, the EDERNT identifies two main, significant and related socio-economic issues, which the project aims to address. These are:

(i) That community wide education attainment levels in Northern Tasmania are significantly below those of the other states and hence below Australian levels (ps 6, 13).
(ii) That the overall productivity of Tasmanian industries is significantly less than industries in mainland Australia, and the Tasmanian workforce has the lowest full-time weekly wage earnings in Australia (p 14).
The project proposal links this lower productivity to community education levels:

> *"The low level of educational attainment of Tasmanian workers has been described as the single most important contributor to Tasmania's productivity ranking significantly below mainland levels" ( p14).*

Hereafter in this section and unless otherwise specified, page numbers refer to the EDERNT (UTas, 2016).

### *1.1.4 The Proposed Opportunities/Solutions*

To address these two related issues, the project aims to initiate, through UTas, a range of new two-year tertiary education courses at the Associate Degree level (Australian Qualification Framework level 6), in identified regional business/industry domains that are considered key opportunities and drivers in the Tasmanian economy (ps 6, 30). Associate degrees are a relatively new qualification to be offered by UTas (they commenced in 2015), and their provision, mainly at the northern campuses requires a suitable range of facilities, staff, course units, systems and management/administration, some or all of which may already exist. Nevertheless, some expenditure is required to provide the necessary infrastructure, either through new facilities or modification/improvement of the existing infrastructure. In a five year timeframe from 2017, the project proposes new buildings associated with campus relocations and consolidation, and the repurposing of the existing northern campuses. In Launceston, all the existing UTas courses (and associated research) will be consolidated/retained (ps 19, 34), and, apart from the Australian Maritime College (AMC), are proposed to be moved to the Inveresk (inner-city) site, where UTas already has a presence. Inveresk is planned to be developed to accommodate current offerings, growth in current offerings and the new Associate Degrees (ps19, 34). The existing Newnham campus, except for the AMC (which is an important part of UTas), is to be considered for `repurposing' in some way not yet decided (p 27). In collaboration with the CoL, UTas plans to develop a `community led masterplan' for the future of the Newnham site.

### *1.1.5 Predicted Student Numbers*

Over the `next' decade (presumably by 2026-27), the new Associate Degrees, together with growth in the existing and relocated UTas courses, are predicted to attract a total of 12,000 new students above current numbers – 10,000 to the Launceston campus, and 2,000 to Burnie (ps 9, 25, 30), as follows:

| Qualification | Numbers of New Students over 10 years | | |
|---|---|---|---|
| | Launceston | Burnie | Total |
| **New Associate Degrees** | 4,000 | 1,600 | 5,600 |
| **Growth in Existing Undergraduate Courses** | 6,000 | 400 | 6,400 |
| **Total** | 10.000 | 2,000 | 12,000 |

The geographic origination for the 12,000 new students is predicted to be:

| | |
|---|---|
| Tasmania: | 9,800 (8,167 to Launceston on pro rata basis) |
| Interstate: | 500 |
| International: | 1,700 |
| Total | 12,000 |

Thus at the Launceston campus during the next decade (2016-17 to 2026-27), on average 1,000 new `additional' students are expected to enrol at UTas each year, the majority of whom will be from Tasmania, many `first-in-family' tertiary attendees. In total, the: "*New facilities at Inveresk will house 16,000 students, researchers and staff," (p19).*

### *1.1.6 Proposed Costs and Outputs*

The overall gross predicted project costs are (ps 7, 9):

| | Millions of Dollars ($ 000,000) | | |
|---|---|---|---|
| | **Launceston** | **Burnie** | **Total** |
| **Project Partners** | 130 | 20 | 150 |
| **Australian Government** | 130 | 20 | 150 |
| **Total** | 260 | 40 | 300 |

For the Northern Tasmanian communities, the Northern Transformation Program is projected to contribute $1.1bn direct and indirect economic output during construction (5 years), and when operational generate $428m/annum in economic impact, including increase jobs (p 8).

### *1.1.7 Recent Developments (late 2018 - early 2019)*

#### *`Report' of Adjusted Key Projections*

It has been reported informally that in a November 2018 meeting with the Launceston City Council, UTas indicated that it had revised its key Launceston projections, based on more detailed Inveresk design work, and on recent student enrolments in Associate Degrees, which have been offered since 2016 through a new and expanding entity the UTas `University College'. The reported revised projections are:

- That the estimated project cost has been revised up from $260M to $400M.
- That the number of new (additional) students during the first 10-year period, attracted by the transformation, has been revised down from 10,000, to a number in the order of 1,500-2,000.

The UTas V-C did not refute these projections when approached directly via email in December 2018. If these reports are correct, then the basis on which funding has been committed by partners and the AG, has been significantly compromised.

#### *UTas Strategic Directions Paper*

Around mid-2018, the EDERNT document was removed from the UTas website. After the new UTas V-C, Professor Black, commenced work in March 2018, he conducted a range of conversations/discussions with staff, and consequently in November 2018 a 12-page futures document was released: University of Tasmania Strategic Direction. This is available at http://www.utas.edu.au/vc/strategic-direction, and was presumably crafted and approved, if not written, by the V-C. It has a human-centred approach and accordingly aims to readjust, within limits, the direction and development for UTas. Some pertinent general introductory statements are:

> *"Our mission invites us to choose to focus a significant portion of our inquiry on shaping the future of the state. (p2);*
>
> *On the policy front, the research we do generates evidence-based, long-term policy ideas for our tough problems from housing and transport, to environmental management and improved public health. (p3);*
>
> *Islands are great reminders that we have to work with ecosystems not against them. Sustainability is a theme that needs to echo through all that we do. (p3);*
>
> *These university partnerships should be characterised by both a commitment to collaborative work and the essential preservation of a truly evidence-based and independent perspective. (p3)."*

And later implementation related statements:

> *"Before we received that support [AG funding], the question the University faced was the viability of our Launceston campus. Unless the Northern Transformation project is a success, that question will arise again, so it is critical we get this right.(p8);*
>
> *The only way in which we can get resources to do the activity we really need is to stop doing the activities that are wasting our time and effort and are not adding value to our core objectives. (p9);*
>
> *Likewise, whenever we see unnecessarily elaborate processes being designed, we should be comfortable pointing out that 'that's not very lean' and suggesting a simpler way. (p9);*

*Taking a mission or a vision and making it real is a challenge, and it will require us to change the ways we think about and do things. (p10)"*

The Strategic Direction paper warrants reading as it provides a somewhat adjusted context for the Inveresk Precinct Redevelopment. Although the importance of the Northern Transformation Program (NTP) is acknowledged in the relevant parts of Strategic Direction (ps 5,7,8,11), the actual (and major) Inveresk Precinct Redevelopment (IPR) is not mentioned. It could be assumed as integral to the NTP, or alternatively the aspirations and plans expressed in the Strategic Direction could be seen as location neutral within the Launceston component of the NTP, especially in the context of the amended projections above - so leaving open the option of the proposed redevelopment being progressed at the current site (Newnham).

### *A Detailed Business Case and Infrastructure Australia*

On January 31 2019 UTas submitted its detailed business case for the Northern Transformation Program to Infrastructure Australia (IA), as stage 3 in the IA project assessment process. It was at least 18 months overdue and was not preceded by stages 1 and 2 which would normally be the case for projects of this magnitude. For the EDERNT, the normal IA expectations for AG funded projects greater than $100m have not been met and the whole process has been confused and problematic. It is discussed more fully in section 2.

### *Updated Flood Modelling and Mapping*

In November 2018, BMT consultants provided to the CoL, technical and mapping reports for the North and South Esk Rivers flood modelling. These reports updated similar reports by the same consultants prepared in 2008, which were used in the design for the levee renewal completed in 2014. The updated reports are discussed in a later section, and are available at https://www.launceston.tas.gov.au/News-Media/Council-releases-updated-flood-modelling-report

## 1.2 Terminology Used in this Review

Important terms used in this review are explained below; they are standard planning and project terms.

***Project*** – refers generically to the overall developments associated with the proposed $300 M undertaking: Transforming lives. Transforming cities. *An Education-Driven Economic Revitalisation of Northern Tasmania.*

***Infrastructure*** - for the purposes of this review, infrastructure refers to all the project/institutional elements that support and contribute to the conduct of the teaching, the research, and the community service undertakings of UTas; eg physical facilities, staff, course structures/units, IT systems, governance, management and administrative systems. Buildings and their contents are considered key elements of the infrastructure that support the provision of outcomes, and although they are the most obvious part of the infrastructure, the other elements are critical to provision.

***(Project) Inputs*** – these are usually project funding and factors directly supported by it, that drive the project planning and implementation; eg money to pay for the project, and which may be used for: consultation with stakeholders/community, consultants' reports, management/administration for planning and implementation, planning and detailed design, meeting regulatory requirements, systems for implementation and governance. Inputs also include any gifts towards project realisation eg gifted land, services etc.

***(Project) Outputs*** – these are the demonstrable primary (first level) results from the planned utilisation of inputs during project implementation. In this project they include: resultant infrastructure such as buildings and other physical facilities; new jobs and staff; courses and course units; ongoing management; and consequent student enrolments.

***(Project) Outcomes*** – are the manifestation of the various stated purposes and rationales for the project, and are generally consequent upon inputs and outputs. Those mentioned in project

documentation (although not always as outcomes) include: student course completions; number of graduates employed in appropriate (targeted) industries; changes in the numbers of first-in-family tertiary students; (causal) improvements in the productivity and/or economic viability of targeted industries; higher degree (eg PhD) student enrolments in targeted domains; increase in numbers of high value/highly paid professionals; overall (causal) improvements in the Tasmanian economy; increases (longer term) in average weekly wage levels of the Tasmanian workforce, and increase in overall education levels in the community.

***(Aspirational) Goal(s)*** – the ultimate vision for the project, supported by inputs, outputs and outcomes. In this project they are represented by statements such as:

- *"The Education-Driven Economic Revitalisation of Northern Tasmania project is an ambitious, transformative and once in a generation investment opportunity to achieve enduring renewal of North and North-West Tasmania," (p6).*
- *"The opportunity and timing now to catalyse economic and community prosperity …… is unprecedented," (p17).*

***(Project) Monitoring*** - systems whereby the progress and incremental changes in the inputs, outputs and outcomes can be rationally measured and followed, using specified information/data. This usually involves the use of specific metrics (measures) that may be standard (eg output completions to a set standard, return on investment), or established for the project (eg economic improvement for a targeted industry). Such metrics are often referred to as indicators.

***Indicator*** – this is generally an individual metric or a defined group of metrics, that are standard or established measures to indicate the level/status of an input/output/outcome at a given time and/or location.

***Baseline (Data)*** – the baseline usually refers to the time (and information) immediately prior to the project commencing. Baseline data is usually collected prior to a project commencing, and is the data that will be used for the project indicators/metrics. Without reliable and valid baseline data the actual project outputs, and more importantly outcomes, cannot be effectively assessed or evaluated over time (and space) in relation to the project proposals and baselines.

***Assessment –*** this term is generally relates to the metrics/indicators used for the progress of project inputs and outputs. For example, the metrics of/indicators for infrastructure implementation and student enrolments are said to be assessed, over time and in relation to baseline data and/or targets.

***Evaluation –*** is generally used in reference to progress/changes in the project outcomes and to the project as a whole. For example, the EDERNT and its proposed outcomes are said to be evaluated in relation to project proposals and objectives.

***Risk –*** is a rational combination of probability (likelihood) and consequence (severity); that is the probability of the occurrence of an event, and the consequence of that event (usually in the human context). For example a one in 500 year flood event for Launceston has a low annual probability of 0.2% (named the annual exceedance probability, AEP), but would have a high/severe consequence. Therefore the risk would be considered medium to high. Risk is usually associated with human assets and lives, and if there was no development on the Launceston floodplains, the risk for a 0.2 AEP flood would be low/negligible unless ecological factors were the asset focus. The levels of risk are usually established using a two dimensional grid with axes of probability and consequence, both graded appropriately from low to high depending on the situation.

## 1.3 Timeline of Project Events/Publications

Relevant events prior to, and associated with, the EDERNT proposal are described briefly below.

| Date | Event/Action/Publication | Comment |
|---|---|---|
| Feb 2012 | CoL amends Inveresk planning scheme | For (student) accommodation to be built at Inveresk |
| Late 2013 | UTas and TasTAFE sign an MoU | To investigate shared facilities, possibly in CBD |
| Dec 2014 | Leaked UTas future development plans for all UTas locations statewide | Total of $453M including proposed $190M expansion of the UTas Inveresk campus |
| May 2015 | The first official announcement of project, with the signing of the MoU for the UTas relocation to Inveresk project | Signing partners: UTas, TasTAFE, TasG, CoL; TasG pledges $60M, of an anticipated $200M+ budget |
| Aug 2015 | UTas Northern transformation project presentation to Joint Commonwealth and Tasmanian Economic Council (JCTEC) | UTas will establish a statewide system of Associate Degrees aligned with industry needs – facilities will be required |
| 25 Sep 2015 | UTas releases Inveresk project concept plans – form the basis for any consultation | Concerns expressed by northern suburbs residents and traders. MLC Ivan Dean regrets no prior consultation |
| Mar 2016 | Release of main document: Transforming lives. Transforming cities. A partnership proposal to deliver an Education-Driven Economic Revitalisation of Northern Tasmania (EDERNT) | The major project proposal document publically released by UTas. $150M sought from the AG for North and NW: $130M for Inveresk relocation of a total $260M budget– a section in the proposal is named as the `business case'; but EDERNT is effectively a marketing proposal, not a business case |
| 28 April 2016 | Bill Shorten pledges Labor will give $150m for the project – A political decision for coming election | Decision appears reliant on EDERNT - unlikely that other due diligence undertaken re Inveresk site, project options etc |
| 29 April 2016 | AG launches its `Smart Cities Plan' which will include `City Deals' | `To help build an agile, innovative and prosperous nation'. Announced just prior to setting next election date of July 2 |
| 8 May 2016 | PM Turnbull announces election date for July 2 | A double dissolution federal election |
| 24 June 2016 | PM Turnbull commits $150M to relocate and expand UTas in the north - political commitment | LNP thus matches Labor – EDERNT based? - unlikely that any other due diligence undertaken re Inveresk, options etc |
| May-Jun 2016 | 8 week Federal election campaign after double dissolution; Bass a marginal seat | UTas Inveresk move neutralised as an election issue, as both major parties support; Greens also announce support |
| 2 Jul 2016 | Federal Election; Labor wins Bass from Liberal National Party | LNP retains Government (just), and is then to act on its UTas commitment |
| 29 Sep 2016 | PM Turnbull in L'ton to sign MoU with TasG to establish and implement City Deals – AG committed $130M for UTas as part of the L'ton City Deal. AG Dept of Educ/Training request UTas to submit Business case to Infrastructure Australia (IA) before funding transfer from AG to TasG | UTas also officially launches its University College to run Assoc degrees – at Newnham campus until Inveresk completed<br>UTas Rathjen states he expects planning/business case to be completed by March 2017 – apparently considered a relatively straightforward process! |
| 20 Apr 2017 | Launceston City Deal (LCD) program/contract, as part of Smart Cities Plan (SCP), signed by AG, TasG, CoL (PM, Premier, Mayor) | UTas project with $130M from AG, is the major component of LCD, and general terms based on earlier AG-TasG MoU.<br>UTas Business case not yet complete |
| 29 June 2017 | TasG transfers $10M of its pledged $60M to UTas<br>UTas releases masterplan concept images for site | To support ongoing design, planning and development of the business case, which by now is 3 months overdue |
| July 2017 | UTas releases `Inveresk Precinct Redevelopment Masterplan' – Architects McBride Charles Ryan | Really a series of broad concepts/designs, with no detail - any text reiterates EDERNT; UTas parking at showgrounds flagged |
| July 2017 | CoL GM Dobrysinski `retires' | Departs Launceston in October, after short consultancy role |
| Oct 2017 | UTas V-C Prof Rathjen leaves UTas | Next position is as VC Uni of Adelaide |
| 26 Oct 2017 | Federal Minister for Educ/Training Birmingham states UTas Business case to IA still outstanding | Project needs IA approved Business case before funds released to state |
| Nov 2017 | UTas submits `Strategic-level Business Case' to IA – apparently not the full detailed case required | IA states it will provide feedback to assist in preparation of the final detailed business case due in Jan 2019 |
| Dec 2017 | AG conditions for grant to UTas finalised | Expect students to start at Inveresk sem 1 2021 |
| Dec 2017 | New UTas V-C appointment - Prof Rufus Black | |
| 16 Jan 2018 | PM Turnbull announces agreement for funding transfer (to TasG) for UTas/Lton City Deal project – as political support for Tas Libs in coming election. Birmingham states `strategic business plan' has been approved allowing project to move forward | Main component of LCD is UTas agreement for $130M. Apparently this major funds transfer will occur in stages linked to construction despite there only being a `Strategic-level Business Case' to IA, with no acknowledgement of its satisfactory nature or approval by IA |
| 25 Jan 2018 | TasG settles funding agreement with UTas | For $60M, $10M of which already provided in June |
| 28 Jan 2018 | Tas Premier announces date for state election on March 3 | |

| | | |
|---|---|---|
| Feb 2018 | Inveresk soil testing – no issues | Also UTas seeks EoI from architects for major design work |
| Mar 2018 | New V-C Black commences work at UTas | Continues to support Inveresk relocation |
| 3 Mar 2018 | Tas state election | Liberal party returned to power with workable majority |
| 31 May 2018 | DA to CoL for Inveresk land transfer from CoL to UTas | Transfer completed June 2018, no cost to UTas; CoL contribution to UTas project |
| 9 July 2018 | John Wardle Architects announced as Inveresk lead architects for Inveresk project | Three other Tasmanian firms to contribute |
| July 2018 | First annual Launceston City Deal report released | Report states in Nov 2017 UTas submitted to IA a strategic-level business case about which IA provided feedback to assist UTas prepare its final detailed business case due in Jan 2019 |
| Nov 2018 | DA for Inveresk site now expected in mid-2019 | Announced by CoL Mayor – previously expected Nov 2018 |
| Nov 2018 | UTas releases a new Strategic Direction paper | Available on UTas Vice Chancellor website http://www.utas.edu.au/vc/strategic-direction |
| Nov 2018 | UTas meets with CoL Aldermen to inform them of revised projections for Inveresk | Reported that project cost up from $260m to $400m, and 10year student enrolments down from 10,000 to around 2,000 |
| 22 Jan 2019 | CoL releases latest Flood Modelling and Mapping Report for North and South Esk Rivers | Undertaken by BMT Consultants – some significant modifications to past modelling, with increased hazards |
| 31 Jan 2019 | UTas finally submits detailed business case to Infrastructure Australia for evaluation (Stage3), after skipping Stages 1 and 2 | The Northern Transformation Program: https://infrastructureaustralia.gov.au/projects/infrastructure-priority-list.aspx#anc_current |
| | | |

# 2. REVIEW OF PUBLIC PROJECT INFORMATION

## 2.1 Politics, Smart Cities, Infrastructure Australia, and a Business Case

On page 17 of the EDERNT there is a large text box headed `Summary of business case needs', which indicates that the document, in addition to being a project proposal, also purports to serve as a business case, at least in the early public stages during which political financial support was being sought. This review sub-section (2.1) considers the political, jurisdictional and legislative factors that relate to the project – and it is perhaps one of the most instructive.

### *2.1.1 Political Support*

The EDERNT document was released in March 2016, after a period of earlier discussions/decisions and MoUs regarding the UTas proposal for Northern Tasmania (see the timeline above). This release was three months prior to the federal election of July 2 2016, the date for which was announced by the then Prime Minister (Mr Turnbull) on May 8. Just prior to the PM's election-date advice, in late April 2016, the Leader of the opposition Labor Party, Mr Bill Shorten, pledged that Labor, if elected, would fully financially support the UTas EDERNT with the $150M AG funding sought through the EDERNT. In late June, just prior to the election, the Liberal National Party (LNP), through Prime Minister Turnbull, made the same commitment, after the project had been made an election issue by Labor in the seat of Bass which is, and always has been, a marginal, swinging electorate. In addition, two months prior to the election and as part of its election campaign, the LNP also initiated its Australian Smart Cities Plan, which aims to contribute to creating `an agile, innovative and prosperous nation,' and has provision to set up targeted `City Deals.' Before the election, the Greens also announced their in-principle support for the UTas Inveresk project, which was thus neutralised as an election issue in the marginal seat of Bass. At the July 2016 federal election, the LNP was returned to office nationally although the then incumbent LNP member for Bass lost his seat to the Labor candidate Mr Ross Hart. The returned LNP Government had supported the Inveresk project, and consequently soon after the election, the $130M commitment (for UTas Launceston) was incorporated in the new Launceston City Deal, the second of such deals in Australia. That the federal election based funding commitment to UTas was primarily a political promise, with little or no supporting evidence base, apart from the marketing-focused EDERNT document, is demonstrated from two sources, a 2018 Senate Estimates hearing and the maiden speech to parliament of the newly elected local Bass MHR,

Mr Hart. The overt political nature of the funding was further reinforced in the lead-up to the Tasmanian State election of March 2018, by what appears to have been the premature release by the AG of the UTas project funding.

### *Senate Estimates*

One of the Rural and Regional Affairs and Transport Legislation Committee's meeting days was Monday 21 May 2018. The Department of Infrastructure, Regional Development and Cities - Cities Division, was represented by several staff including its executive director Ms Mary Wiley-Smith. The relevant transcript extract is below:

> *"Senator McCARTHY: Of the seven City Deals that have been announced to date, which were recommendations of the department and which were recommendations of the minister?*
> *Ms Wiley-Smith: The first couple of City Deals, I believe, were announced as part of an election announcement. That would have been, I think, the first three, which were Launceston, Townsville and Western Sydney. Our division has been working with our colleagues in both state and local governments on providing advice to government on the sequencing of future City Deals. The Prime Minister has also written to his colleagues, other first ministers, to seek their views on doing City Deals for their capitals. That information has also been taken into consideration in looking at the sequencing of the next City Deals.*
> *Senator McCARTHY: Just to clarify, you mentioned that it was an election announcement. Were they recommendations of the department or recommendations of the minister?*
> *Ms Wiley-Smith: They were in an election context, so the department didn't have anything to do with those at that point," (p55).*

(http://parlinfo.aph.gov.au/parlInfo/download/committees/estimate/4238ef83-0928-4944-9ef0-e38de415a570/toc_pdf/Rural%20and%20Regional%20Affairs%20and%20Transport%20Legislation%20Committee_2018_05_21_6173.pdf;fileType=application%2Fpdf#search=%22committees/estimate/4238ef83-0928-4944-9ef0-e38de415a570/0000%22)

### *The Honourable Ross Hart, MP: Maiden Speech*

An excerpt from Ross Hart's first speech to Parliament (1 September 2016) also indicates the political nature of the bipartisan funding promises for UTas Inveresk:

> *" I thank the entire Labor leadership team—the Leader of the Opposition, Bill Shorten; our deputy leader, Tanya Plibersek; Penny Wong; Chris Bowen; Mark Dreyfus; and others—for their wonderful support of me during the election campaign. This included specific policies announced for Bass including the commitment of $150 million towards the UTAS transformation project. ……*
> *I am doubly proud that this commitment was made prior to the formal launch of the campaign and that the Tasmanian Labor team and visiting shadow ministers hammered the [Liberal] government on their commitment to this vital project throughout a long winter campaign until the government finally relented and committed to the project. There is no doubt that this project—with $150 million of federal money, $75 million of state money and $75 million of university funding—will provide important jobs in construction, as an infrastructure project, and will also, in the long term, play a significant part in the revitalisation of the CBD of Launceston as well as driving better education and job outcomes for young Tasmanians."*

(https://www.aph.gov.au/Senators_and_Members/Members/FirstSpeeches/Ross_Hart)

If Mr Hart's ranking of the project provisions is taken at face value, the priority order for the project's future outcomes seems to be construction jobs (which are short term), revitalisation of the CBD (a questionable and problematic potential outcome), and lastly education/employment opportunities (which are of long term personal and social value), raising a question about the perceived primary role of the University in this situation.

### *Infrastructure Australia and the Tasmanian State Election, March 2018*

This sub-section is a summary of later descriptions in which the relevant references are provided. In September 2016, when the MoU to establish Tasmanian City Deals was signed between the AG and the TasG, it appears that, as a prerequisite to future funding release for Inveresk, UTas was directed to submit a full, detailed business case to Infrastructure Australia (IA), in order to meet the legal requirements for projects with AG funding of more than $100M. The then UTas Vice-Chancellor (VC) Rathjen indicated that he expected such planning to be completed by the end of Q1 2017. Six months after the initial Federal-

State MOU, on 20 April 2017, the Launceston City Deal (LCD) itself was officially signed. It was the first City Deal in Tasmania and the second in Australia, and the AG's promised $130M contribution to the Inveresk relocation is by far its major component; the business case had still not then been completed. Later that year, in September 2017, the Minister for Education and Training, Mr Birmingham publicly stated that the business case was still outstanding and had to be submitted to IA for approval before funds could be released. The Tasmanian State Liberal Government was obliged (by statute) to call an election in early 2018, and in the latter part of 2017, this election and its issues were becoming media topics. On January 16 2018, the Prime Minister signed-off on the UTas Inveresk $130M funds release and transfer from the AG to the TasG, and the Minister for Education and Training justified this by stating that *"….. the strategic business plan that the University lodged with infrastructure Australia late last year, which we have now approved ……."* It was not clear by whom approval was given, but it appears to be a political `we', as IA is an entity independent of government, and one of its roles is to advise Government. Two weeks later the Tasmanian Premier announced the date for the March 3 State election, and subsequently his Liberal Party was returned to office. Four factors appear relevant in the approval of the UTas funds release:

- The approval was on the basis of a `strategic-level business case', not a full detailed business case, as would normally be expected (the latter to be submitted by January 2019); it appears that a strategic-level business case is in some ways (unexplained) less adequate than a full business case;
- It was not clear if IA, or alternatively another entity or persons, had approved this strategic-level business case, to enable funds transfer to the TasG; IA is the statutory authority with a responsibility to approve the relevant stages of project initiatives and business cases;
- Until February 2019, the UTas Northern Transformation Program (NTP) did not appear at any level (from an Initiative-Identified Problem/Opportunity to a project with an approved business case) on the IA Infrastructure Priority List (IPL), which would be expected for such a project. It was listed in early Feb 2019 as a business case at Stage 3 of the IA assessment schedule (submitted 31 Jan 2019) to be evaluated by IA, a process that would normally take 2-3 months. Stages 1 and 2 of the IA assessment were never undertaken or completed.
- IA has a legislative obligation to assess the stages and evaluate all projects and their full business cases, with more than $100M AG contribution, and to publish the evaluations. The NTP did not progress through the normally expected IA stages 1 and 2, which possibly could have resulted in a negative finding for the program, and possible discontinuance. Nevertheless the AG funds were released without progress through IA stages 1 and 2 (as an IA `Initiative' for assessment prior to the preparation of business case) and also without the evaluation of a detailed business case, which will occur after 31 Jan 2019.

The first annual report for the Launceston City Deal (July 2018) states on p15 that:

> *"In early November 2017, UTas submitted a strategic-level business case to IA. Feedback from IA has been provided to help UTas prepare its final detailed business case which is due in January 2019."*

In that report there is no indication of the status or approval of the strategic-level business case. The inescapable conclusion is that the January 2018 UTas funding release agreement between the AG and TasG was made opportunely just prior to the State election which at that time was considered quite open, with a chance that the Liberal Party may lose power.

### *2.1.2 Smart Cities and Infrastructure Australia (IA)*

For the AG-initiated Smart Cities Plan, cooperation between the three levels of Government is regarded as a necessary element, and one means of achieving this is through City Deals. (https://cities.infrastructure.gov.au/city-deals). The UTas Inveresk project with its existing group of partners, (TasG, CoL, UTas, TasTAFE) had such tripartite involvement, as the AG had made a full funding commitment during the election campaign, and both TasG and the CoL had financially committed to the project. In addition, the CoL had several projects in the pipeline (eg City Heart), and it was evident that the UTas move from its large campus in Launceston's northern suburbs to the inner city would necessitate flow-on projects

to deal with some of the consequences of the relocation eg repurposing the Newnham campus, `revitalising' the northern suburbs. Thus many components were already available for incorporation into the framework and templates of a City Deal. In late September 2016, only three months after the election, the Prime Minister visited Launceston to sign an MoU with the TasG, (since AG funding is transferred initially to the State), to establish and implement City Deals in Tasmania. At this time (Sept 2016) UTas was also notified that it was expected to submit to Infrastructure Australia (IA) a business case for the Inveresk relocation, approval of which was a precondition to the release of the committed AG funding, (https://www.examiner.com.au/story/5011701/government-waits-on-utas-case-to-transfer-150m-for-relocation/). This was an acknowledgement that the EDERNT was not regarded as a business case, and at the time the UTas VC Rathjen stated that he expected the required planning/business case to be completed by the end of the next quarter next year (ie Q1 2017).

With the MoU in place, focussed work continued towards finalising the Launceston City Deal (LCD) with its various components, the major one of which is the UTas relocation, whose public documentation was confined to the marketing-oriented EDERNT. Six months after the City Deal's Tasmanian MoU, on April 20 2017 in Launceston, the LCD was signed by the Prime Minister, the Premier and the Mayor, (https://cities.infrastructure.gov.au/launceston-city-deal). However the business case was not complete, as might have been expected based on the UTas VC's earlier statement. In June 2017, the TasG released $10M of its $60M commitment to UTas to enable ongoing planning, and the development of the still outstanding business case, and in July 2017 UTas released an architect's `masterplan' for the Inveresk site, which entailed simply broad concepts and associated text from the EDERNT, adding little to the existing EDERNT. The Commonwealth Department of Infrastructure Regional Development and Cities is the AG entity that is responsible for, and manages, the Smart Cities Plan and the City Deals, and reports on progress of the LCD. The Commonwealth Department of Education and Training also has a level of involvement in the UTas relocation (as UTas is an educational institution), and so there are two federal ministers linked with the UTas project (during 2016-17these were Mr Fletcher – Infrastructure/cities, and Mr Birmingham – Education/training). On 26 October 2017, it was reported that the Inveresk funding transfer was stalled as the business case was still outstanding, (https://www.examiner.com.au/story/5011701/government-waits-on-utas-case-to-transfer-150m-for-relocation/). The Minister for Education and Training stated the funding was ready to go when UTas completed the business case and submitted it to IA, and a UTas spokesman indicated that a strategic business case was complete. In early November 2017 this `strategic-level business case' was submitted to IA. On the basis of some type/level of approval for this type of business case, the $130m funding was released in mid-January 2018 to the TasG, to enable Inveresk site works to proceed - initially soil testing, (https://www.examiner.com.au/story/5171264/utas-construction-likely-to-start-before-end-of-2018/). The announcement of the funding release was made six weeks prior to the Tasmanian state election, (at which the Liberal Party was returned to office), and provided the voting public with reassurance that the UTas Inveresk project was ready to move to implementation. That the strategic-level business case for Inveresk was submitted to Infrastructure Australia is reported in the LCD first Annual Progress Report of July 2018 available at https://cities.infrastructure.gov.au/launceston-city-deal. That report also states (p 15) that on the basis of the strategic-level business case IA provided feedback to UTas to assist with the preparation of the final detailed business case, due in January 2019. This is an acknowledgement that the strategic-level business case which was `approved', and upon which funding was released, is a less than adequate business case for the requirements of IA.

> *"IA is an independent statutory body with a mandate to prioritise and progress nationally significant infrastructure, by auditing Australia's nationally significant infrastructure, developing 15-year rolling Infrastructure Plans, and maintaining an Infrastructure Priority List", (http://infrastructureaustralia.gov.au/).*

IA operates in accordance with the Infrastructure Australia Act (2008), and the Public Governance, Performance and Accountability Act (2013). In June 2017, the Minister (then Mr Fletcher) signed a

statement of expectations for IA, current to June 30 2019, and which included the following points relevant to the UTas project:

- *"……. provide robust and independent advice to government on infrastructure policies and reforms across the transport, water ……., including social infrastructure (excluding Defence), with a focus on building productive cities and regions.*
- *Promote best practice in reforming strategic infrastructure planning, improved asset utilisation …. project identification for the infrastructure priority list, the development of business cases, and whole of life asset management.*
- *Evaluate project proposals that are nationally significant or where Commonwealth funding of $100M or more is sought:*
  - *…. perform evaluations where Commonwealth funding has yet to be committed;*
  - *Review the cost-benefit analyses by proponents for …….. and social infrastructure proposals;*
  - *Undertake these in a timely manner."*

IA determines which projects should be included on their Infrastructure Priority List (IPL):

*"This [the IPL] is a rigorous prioritisation process that ensures there is a highly credible pipeline of nationally significant infrastructure projects. The IPL is a live document that is regularly updated by the independent Infrastructure Australia Board as they approve business cases of new nationally significant projects.*
*The IPL is made up of two broad groups:*

- ***Initiatives** are potential infrastructure solutions for which a business case has not yet been completed. Initiatives are identified through a collaborative process between proponents and the Infrastructure Australia Board, using the Australian Infrastructure Audit and other data as evidence.*
- ***Projects** are potential infrastructure solutions for which a full business case has been completed by the proponent and positively assessed by the Infrastructure Australia Board."*

IA has a five stage Assessment Framework used to consider initiatives and projects for inclusion in the IPL:


- *"Stage 1: If a problem or opportunity is positively assessed by the Infrastructure Australia Board after Stage 1 [submission], the problem or opportunity is added to the IPL as an Initiative—Identified Problem/Opportunity.*
- *Stage 2: Proponents should undertake an options assessment process to generate a shortlist of potential options for consideration in a business case, and complete the Stage 2 template for submission. IA assesses whether the range of options is appropriate and the options assessment is robust. If the initiative is positively assessed by the Infrastructure Australia Board, the initiative is added to the IPL as an Initiative —Shortlisted Options Identified.*
- *Stage 3: IA does not complete any formal assessment at this stage. If IA is notified that business case development is underway, the initiative is added to the IPL as an Initiative—Business Case Development.*

- *Stage 4: IA undertakes an assessment of the business case and works with the proponent to clarify content in the business case and seek supplementary information where required. If a business case is positively assessed by Infrastructure Australia at this stage, the project is added to the IPL as a Project".*

(http://infrastructureaustralia.gov.au/projects/Stages-of-the-Assessment-Framework.aspx).

### *2.1.3 UTas, a 'Business Case' and Infrastructure Australia (IA)*

The nature and sequence of project events, including the requirement to submit a very late business case to IA, indicate that, at least in relation to the normal, expected IA needs and processes, the UTas Inveresk project is very anomalous, if not open to serious question. This is evidenced by the following:

- The UTas Inveresk project, although seeking $130M, was not initially submitted to IA for assessment as a project initiative, and as a consequence, was never submitted or considered as a properly endorsed project suitable for the development of full business case;
- The EDERNT document of March 2016 was the public and political publication used by UTas, (with TasG and CoL as partners) to seek support and associated funding, especially from the AG, even though the AG expects projects seeking AG funds of more than $100M to proceed through the IA assessment framework;
- Public, political funding commitments were made by all levels of government on the basis of the EDERNT, which was the sole public funding instrument, although there are likely to have been ongoing discussions and assurances that were not made public;
- Neither the Labor Party's, nor the AG's funding commitment, both before and shortly after the July 2 2016 election, of $130M for Inveresk, did not have any reference to IA, which appears to have been first mentioned in September 2016;
- That the requirement for a full business case submission to IA (well after funding was committed) was publicly acknowledged by politicians and UTas, indicates that the EDERNT document was patently inadequate as a business case, and by implication a poor and non-IA compliant basis for the commitment of funding;
- The statement by Minister Birmingham that the business case submission to IA is required, and a later statement that 'we approved' the strategic-level business case, are indicative that both submission to, and approval by IA, of the business case, are expected before AG funding can be released;
- Due to its tardiness, UTas received several political promptings since September 2016, and eventually, in November 2017, submitted to IA what was called a `strategic-level business case', 14 months after the initial request to submit a proper/full business case;
- The nature, content and status of this or any other `strategic-level business case' is not clear, and although it was submitted to IA, there did not appear to be any such document type referred to on the IA website, especially in relation to the assessment process;
- However the Minister for Education and Training (the Honourable Simon Birmingham) as part of the funding release announcement in January 2018, stated that `we have now approved' the `strategic business plan' submitted to IA. To whom `we' referred was not explained, but it appeared more of a collegial assertion rather than one referring to an independent entity such as IA;
- There was no past or current record of the UTas Inveresk project in any of the regularly released IA Infrastructure Priority Lists, (either as an initiative or a project) where it would be expected to appear as a project that had been approved for the development of a full business case. The LCD first annual report indicated the business case was due to be submitted to IA in January 2019; this occurred on 31 January 2019, and the first IA reference to the Northern Transformation Program appeared in early February: https://infrastructureaustralia.gov.au/projects/infrastructure-priority-list.aspx#anc_current
- The funding release announcement and the `we-approved' strategic-level business case of Jan 2018, have enabled the Inveresk project to proceed to site soil testing and the preparation of

detailed site and building plans which will be used as part of the development application (DA) to the CoL;

- It is assumed that DA submission to the CoL will follow the probable IA approval of the full detailed business case;
- The full business case could be an expensive, time consuming, bureaucratic `tick-the-box' exercise with little or no tangible influence on the project. In addition, IA may feel compromised if it is expected to accept and approve a business case to satisfy political expediency;
- In a recent update of its comprehensive Assessment Framework document (March 2018), IA has included a significant section about the consideration of climate change risks (under environmental considerations), which reinforces the relevance of climate change issues raised later in this review.

In this maladroit state of affairs, neither UTas nor the TasG can argue ignorance of IA or its processes, as both have projects in current and past IPLs, some initially submitted more than a year ago, eg the new UTas STEM building in the Hobart CBD, and the TasG with several large infrastructure projects, one of which (sewage infrastructure upgrades) would likely involve the CoL. One logical explanation appears to be that the three Tasmanian partners (UTas, TasG, CoL) purposefully and knowingly participated in an undertaking that side-stepped due process, and so avoided the very important due diligence of normal project progress through IA, especially stages 1 and 2 of the assessment framework, in which options are considered and costed. In recognising this may occur, IA has recently published `Infrastructure Decision Making Principles' (http://infrastructureaustralia.gov.au/news-media/media-releases/2018/2018_07_24.aspx) which, in its introduction, notes important aspects for improvement:

- *"Across all stages of many projects' lifecycles, decisions should be more transparent, with an enhanced focus on public release of analysis and processes that form the basis of infrastructure decisions.*
- *Projects are often developed without fully considering all available options to solve an identified problem, including potential solutions that make better use of existing infrastructure through technology and data.*
- *Too often we see projects being committed to before a business case has been prepared, a full set of options have been considered, and rigorous analysis of a potential project's benefits and costs has been undertaken.*
- *Governments could generally do better at engaging with communities, both in communicating the long-term plan, the benefits and risks of public infrastructure priorities, and by incorporating community input in a meaningful way in project processes.*
- *Despite broad agreement on the merits of undertaking post-completion reviews of projects, including the application of lessons and feedback for future investments, these reviews are rarely undertaken and published."*

The decision and willingness of the federal Labor Party, without reference to IA, to be the first to commit financial support to the project, initiated the consequential chain of events described previously. That decision was based on the very limited and selective EDERNT document, and was no doubt supported by political exigencies. The success of the EDERNT as a marketing instrument, (together with the necessary political lobbying) is manifest through the current advanced state of the Inveresk project, and represents a good example of style/spin over substance.

### *2.1.4 A Retrospective*

#### *Possible Alternatives*

The UTas planning documents leaked to the media in December 2014 (see the timeline in 1.3), indicate that the Inveresk project would have been seriously discussed during a significant period prior to that month; a conservative estimate for the start of such planning considerations is early in 2014, say March, when the University year is fully underway. On this basis, UTas, the CoL and the TasG had around two years in which to plan and prepare the EDERNT proposal (released March 2016) that included broad costings. As the UTas and TasG partners had other projects with IA and so were aware of its processes, an alternative or addition within the EDERNT preparation period, would have been to commence the IA initiative submission process.

If this had been done, then during the two years of the EDERNT preparation, it is likely that at least IA assessment stages 1 and 2, (and perhaps stage 3) could have been undertaken, (http://infrastructureaustralia.gov.au/projects/Stages-of-the-Assessment-Framework.aspx):

> *"Stage 1: Proponents identify evidence-based problems and opportunities and complete the Stage 1 template for submission. Proponents are encouraged to engage with Infrastructure Australia during this process, to support the submission."*

After positive assessment by IA of stage 1, proponents continue to stage 2:

> *"Stage 2: Proponents develop initiatives that could potentially address the problems and opportunities identified in Stage 1. Proponents should undertake an options assessment process to generate a shortlist of potential options for consideration in a business case, and complete the Stage 2 template for submission."*

After positive assessment by IA of stage 2, proponents can continue to stage 3:

> *"Stage 3: Proponents advise Infrastructure Australia that business case development is underway. There is no Stage 3 template, however, proponents are encouraged to review the Stage 4 template, as well as the Stage 3&4 checklist, during the development of the business case. This helps to ensure the business case is ready for a future Stage 4 submission."*

Thus there were alternatives open to the project partners in preparing their case for public and political consideration. The table below shows the actual main events with a possible alternative sequence.

**Simplified Sequence Using Actual Key Events, and a Possible Alternative Sequence Involving IA**

| Date | Actual Events/Actions | *Feasible Alternatives and IA Involvement* |
|---|---|---|
| March 2014 | Some level of agreement between partners to initiate and progress the UTas Northern expansion, including the Inveresk relocation | *Submit Stage 1 proposal initiative to IA - the partners/UTas identify any evidenced problems and/or opportunities, and complete & submit the IA template* |
| Dec 2014 | Leaked documents reveal UTas intentions for Inveresk | *Continued liaison/discussion with IA about the Stage 1 submission, including a preliminary assessment by IA* |
| May 2015 | Official announcement of project, and partners sign MoU | *Assume IA stage 1 approved, so project could be announced as commencement of Stage 2 - consideration by partners and public of options to address the problems/opportunities* |
| Sept 2015 | UTas releases concept plans for Inveresk | *Such concepts plans could have been included in one of the options being developed for stage 2* |
| March 2016 | Official EDERNT document released – the so called business case for the project | *IA Stage 2 submission completed – this includes a short list of options with their environmental, social and economic considerations. This would have also been a good time to prepare a public document for discussion of options* |
| Apr-June 2016 | Based on EDERNT, first Labor then LNP commit to the full financial support of the project if elected to government | Instead of simply agreeing to the UTas proposal without reservation, the politicians could have made their funding commitments conditional upon submissions of stages 1 &2 to IA for approval and on a subsequent full business case |
| July 2016 | After federal election, LNP returned to office | |
| Sept 2016 | MoU for Tas City Deals signed. UTas reminded that Inveresk business case is required and must go to IA | *This could have the period of business case development (IA stage 3) in preparation for inclusion as part of the LCD* |
| Apr 2017 | Launceston City Deal signed; UTas Inveresk at $130M is the major component of the LCD; business case for IA still in progress | *IA Stage 4: Continued development and submission of the business case for assessment by IA and consequent possible iteration and improvement. Inclusion in the LCD with provisional budget, and conditional on IA feedback and evaluation* |
| Oct 2017 | UTas again reminded publicly by Minister that business case to IA is still outstanding, and is required before AG funds can be released | *IA Stage 4 business case finalised, and with IA for final evaluation* |
| Nov2017 | UTas submits `strategic-level business case to IA | *Assuming a positive evaluation, then funding made available and detailed planning commences* |

| | | |
|---|---|---|
| Jan 2018 | Funding agreement signed - to release funds from AG to Tas G for Inveresk project as part of LCD | *Planning and DAs submitted* |
| Mar 2018 | Tas state election – Liberals returned to office | *Any planning issues resolved* |
| June 2018 | CoL transfers its land parcels to UTas for the Inveresk project | *Construction could have started* |
| July 2018 | JWA architects appointed as lead for Inveresk<br>First annual progress report for LCD released | |

### *IA Assessment and UTas Project Conduct*

A summary of the IA assessment process has been provided previously (2.1.2 above), and further detail is available at http://infrastructureaustralia.gov.au/projects/technical-guidance.aspx. Much of the detail is in the checklists and templates for the assessment stages, together with the extensive assessment framework document. There is no need to consider such detail here but it is important to point out the broad information requirements for proponents as they enter and progress the IA assessment process. The main ones (from IA, see www reference above) are listed below:

- The five assessment stages are rigorous and represent the planning elements of the design process (discussed in section 2.2 below):
    - Clarify/define the problem/need/opportunity
    - Establish possible options to address the problem/need/opportunity
    - Analyse possible options using relevant criteria
    - Rationally compare options and select the optimum option
    - Prepare a detailed business case/plan for the preferred option
- Environmental, Social and Economic project considerations are major aspects of option analyses and the preparation of a business case/plans
- Detailed projected costings and cost-benefit analyses
- Possible economic modelling
- Expected links between outputs and outcomes
- Assumptions, risks and sensitivities
- Data to support assertions

Both the project information provided herein (previously) and that in the following sections demonstrate that the EDERNT document neither follows a design process, nor incorporates the key IA elements listed above – hence the government demand that a full detailed business case be submitted to IA. However this raises the question of why UTas and its partners made an apparently conscious decision to proceed with the EDERNT marketing document and ignore IA and its demanding but valid processes. Furthermore it appears that this decision was made with awareness of government guidance/legislation re major projects, and with the knowledge of IA and its processes. It is only possible to speculate about reasons why such a decision was made and why IA was not involved from the outset. As this evaluative review continues, its analyses relate to information in, and omissions from, the EDERNT, which may reveal some of the motivations behind the EDERNT and reasons for not engaging with IA.

The first step is to examine the EDERNT in relation to the design process, and later sections will consider environmental, social, economic and ethical aspects of the project. The preceding sub-section 2.1 was written in the latter period of this review, and was prompted by conversations with politicians in which their views (apparently not well informed) were that so called `due diligence' had been integral to the project from the beginning.

## 2.2 A Project Design Framework

The key public documents used to inform this sub-section are:

- Transforming lives. Transforming cities. A partnership proposal to deliver an Education-Driven Economic Revitalisation of Northern Tasmania (UTas, 2016); this is the main document (EDERNT); it is no longer accessible on the UTas website;
- Transforming lives. Transforming cities. The Inveresk Precinct Redevelopment Masterplan (IPRMP), (UTas, 2017); also no longer accessible on the UTas website;
- Smart Cities Plan – Launceston City Deal (LCD), (CoA, 2017); https://cities.infrastructure.gov.au/launceston-city-deal
- Norther Expansion: FAQs - http://www.utas.edu.au/northern-expansion/faqs 8 Jan 2018, (UTas, 2018a);
- The UTas website, especially in relation to the provision of Associate Degrees, eg http://www.utas.edu.au/college/study-with-us/associate-degrees
- The Strategic Asset Management Framework (SAMF), UTas Commercial Services & Development, (now Infrastructure Services & Development – ISD), (UTas, 2015) Downloaded on 27 Jan 2018, from http://www.utas.edu.au/__data/assets/pdf_file/0012/691698/Strategic-Asset-Management-Framework.pdf

The EDERNT referred to internal UTas references which do not appear to be publically available; these are:

- ACIL Alllen Consulting 2015. University of Tasmania: Economic Contribution to Tasmania in 2014. Report to the University of Tasmania 2015;
- University of Tasmania Associate Degree Project. Phase 1 Report July 2015. Phillips KPA. Unpublished;
- Scoping Pre-degree Options in Health and Allied Health. Report to the University of Tasmania. Barbara Hingston July 2015. Unpublished.

In this section, the relevant information from the publically available documents is presented in a design-style framework. The design process is a standard way of approaching issues, planning and projects, and is used in many professions eg engineering, architecture, interior design, applied science, business and social programs. The main elements are usually: clarify problem/issue; explore alternatives; select an optimal option; plan; implement; review/evaluate; iterate aspects as appropriate. In practice the phases are not always definitively separate but overlap and often have some degree of circularity. Organising the available project information in a design framework reflects normal professional practice and also provides a foundation for subsequent analyses both of which are appropriate for a project of this magnitude and expense. The relevant design phases are:

- Clarify the Problems/Needs/Opportunities;
- Note any fundamental Design Considerations/Criteria and Constraints;
- Consider/analyse the Options or Alternative Possible Solutions;
- Select, with justifiable reasons, the Optimal Option/Solution;
- Prepare Initial Plans (including Business Plan) for the Preferred Solution; also include monitoring/evaluation needs and methods as relevant;
- Consult, Review and Finalise the Plans;
- Implement Plan/Business Plan;
- Monitor and Assess Project Inputs and Outputs;
- Monitor, Review and Evaluate Outcomes and the Project Progress;
- Consider Options to Improve Outputs and Outcomes.

As detailed development application (DA) plans have not been submitted to the CoL, and the business case only recently submitted to IA, only the first four phases are considered here. In the following subsections, information/data from the public documents are presented by design phase, and then phase relevant information that is not available is identified and discussed. Each design phase subsection generally has three components: (i) what is available (Public Project Information); (ii) what is not provided publicly but would further inform the design phase and overall project process (Unavailable Important Information); and (iii) Comment/discussion about the phase and its needs. Where references to page numbers only are

given, eg (p7) these refer to the main document (EDERNT). For other references, the document reference is provided, and if needed, a page number. In the context of a proposed $260 million public project promoted as having a strong community focus, an analysis of the apparent underlying design process and its associated phase details is important, both to ensure veracity, quality and accountability, and to fully inform partners and stakeholders about the rationales, processes and plans.

*"Direct quotations from documents are given in this way and font size/colour."*

Other statements not directly quoted but with page numbers, (in brackets), are summaries of the documents' texts.

## 2.3 Design: Clarify the Problems and/or Needs/Opportunities

### *2.3.1 Public Project Information*

*"The [EDERNT] project reflects over two years of research and modelling within the university into new course delivery to increase higher education participation", (p18).*

The information provided about problems/needs/opportunities can be grouped into three broad categories: Tasmanian population demographics; Tasmanian industries, workforce and productivity; and UTas educational infrastructure. It is summarised below.

#### *Tasmania's Population*

- Is regionally dispersed, has a low growth rate, and is the oldest and most rapidly ageing in Australia, (p13);
- Is characterised by low levels of further education participation (VET/TAFE and University), and associated `severe' economic challenges, (p13).

#### *Tasmanian Economic Productivity*

- Tasmania's economy is almost 20% less productive than the national economy; and in most Tasmanian industries productivity is ≈15% below the rest of Australia, (p14);
- Tasmanians earn the lowest full-time wages in Australia, (p14);
- Tasmanian youth unemployment (16%) is significantly higher than the national average (12.9%), (p14);
- Poor employment and education opportunities contribute to youth leaving the State, and to a low appeal for possible immigrants – from the mainland or overseas, (p14).

#### *Tasmanian Industry/Workforce Needs*

The following quotations from the EDERNT are the main needs-related industry statements, and they indicate the very general non-specific manner in which industry needs have been analysed and described:

- *"Over and above the University's current offerings, the EDERNT project is about responding to workforce and industry needs, and to reaching those who may not have traditionally considered higher education", (p15);*
- *"Education and skills are critical to regional resilience. The intergenerational education deficit in Tasmania is stalling economic growth and placing existing industries at competitive risk", (p13);*
- *"The low level of educational attainment of Tasmanian workers has been described as the single most important contributor to Tasmania's productivity ranking significantly below mainland levels", (p14);*
- *The University undertook a series of studies to analyse the needs of the Tasmanian community, industry and students", (p14); "*
- *"…. consultation with relevant industries including aquaculture and agriculture which are important in Northern Tasmania, has revealed a strong demand for applied research and opportunity to add value to build competitive advantage through research, teaching, collaboration and commercialisation", (p18);*
- *"In consultation with industry, the University is currently refining the detail of its Associate Degree program. The following broad discipline areas have been identified as likely early priority specialisations for course delivery within the Associate Degree program:*
    - *Applied Science (Agriculture/Food, Food Technology, Aquaculture;*
    - *Applied Business (Logistics, Tourism and Hospitality, Lean, Agribusiness);*
    - *Allied Health (Community/Human Services, Case Worker, Aged Care);*
    - *Design and Technology (Disruptive Technologies, Innovation, Design Thinking)", (p30).*

### *Education Levels in the Tasmanian Population*

- Compared to other states, Tasmania has the lowest proportion of the population with a Bachelor degree or higher - compared to ≈20% in NSW/Vic, Tasmania (overall) has 14.2 %, with the Bass electorate (north) at ≈11%, and the Braddon electorate (north-west) at ≈8%, (p13);
- Compared to national population averages there are 15,000 Tasmanians under 24 years old who could be, but are not, in higher education, (and 20,000 over 24 years old), (p14);
- Contributing to the above are cultural, historical and structural factors eg high school education has generally finished at year 10, and years 11-12 are at centrally located colleges, (p13);
- Low education levels contribute to the stalling of economic growth, (p13).

### *UTas Education Provision*

*The Newnham campus caters for ≈20% of the UTas student population, and student numbers, as measured by EFTSL (effective full-time student load) fell by 14.5% between 2010 and 2014, (p16);*
*"The University cross-subsidises the Newnham [main Launceston] campus by $22 million annually, with a backlog of maintenance estimated at almost $70 million", (p16);*

- UTas research (unpublished) finds that for a significant proportion of the Tasmanian population (UTas) Bachelor level courses are unattractive or felt to be unattainable, (p15);
- There is a gap in Australian education provision, particularly in Tasmania (and thus relevant to UTas), at level 6 of the AQF (Australian Qualifications Framework) – namely Advanced Diploma and Associate Degree qualifications, (p14);
- For the North and North-West of Tasmania, UTas considers that without significant and immediate change to its delivery offerings and operating model, there will be ongoing low levels of higher education participation and an untenable future for the campuses, (p15);
- *"There is a critical need for an educational 'product' that is relevant, accessible, affordable, leads to jobs and is achievable for First in Family attending university", (p15)*;

### *UTas Research Provision*

- *"The University now conducts the majority of research for Tasmanian Industry. There is a demonstrable link between Tasmania's research capacity and the creation of jobs and success of the economic sectors which have the potential to transform Tasmania's economy, particularly in regional areas", (p16);*
- *"Consultation with relevant Industries …… has revealed a strong demand for applied research to build competitive advantage through research, teaching, collaboration and commercialisation", (p18).*

### *UTas Newnham Campus Facilities and Location*

- Newnham facilities are considered to be under-utilised and `run-down', and although aged (mainly 1968-74 construction) have been upgraded, but are still regarded as generally inadequate for contemporary teaching and learning, expensive to operate with poor energy efficiency, and their maintenance is considered `loss-making'. The campus is viewed to have *"now largely reached the end of its useful life"*, (p16);
- In some domains (eg engineering, biology), teaching is restricted due to lack of suitable laboratories, and ICT facilities do not fully support intra- and inter-state teaching links (p16);
- The distance of the Newnham campus from the Launceston CBD (≈4km) is considered detrimental to a locationally `visible' UTas profile and a disadvantage in attracting students, compared to the `inner' city, (p16);
- The Newnham facilities are generally described as *"out of sight, out of date, and no longer fit-for-purpose to meet the region's current and future needs", (p16).*

## *2.3.2 Unavailable Important Information*

A comprehensive descriptive clarification (and possible enumeration) of the needs/opportunities/problems is the critical first phase in the design process, and is necessary to fully inform the consequent consideration and costings of possible solutions. Review of the EDERNT project information provided reveals that there are vitally important business case needs/problems that are not mentioned nor analysed.

These are described below within the two broad groups of (i) Tasmanian workforce needs, and (ii) UTas educational provision.

### *Tasmanian Workforce Needs*

The EDERNT states that the project is essentially about responding to workforce and industry needs (p15), and has involved over two years of research and modelling within the university into new course delivery (p18), although it is not clear if this is informed by industry needs, or is wholly internal to UTas. Workforce planning, a standard undertaking, is thus acknowledged as a foundation for the project, and a helpful definition of workforce planning is given on page 2 of the Tasmanian Auditor General's Report No. 2 2016-17, Workforce Planning in the State Service (TasG-AudGen, 2016):

> *"A core process of human resource (HR) management that is shaped by organisational strategy and ensures the right number of people with the right skills are in the right place at the right time to deliver short and long-term organisational objectives.*
> *It is not the sole responsibility of the HR function: it is a management and leadership capability.*
> *It can be undertaken on a systemic basis, or it can be undertaken on an occupational basis specifically assessing the resource requirements for a single occupation or defined role."*

However the explanation/analysis of industry needs in the EDERNT is very general, superficial, and provides no useful detail, apart from the naming four discipline areas for UTas course planning/delivery (refer the Tasmanian Industry/Workforce Needs above). It is essentially a series of textual assertions with no industry detail or quantitative analyses (see 2.3.1 above under Tasmanian Industry/Workforce Needs).

With a workforce-needs focus and two-year period of research, a much greater level of investigation, analysis and reporting of industry workforce needs would be expected in the proposal for a $300M project, especially as current/future workforce skills and the associated skill demands, are (as stated by UTas) the very foundation for the consideration of suitable new courses. In workforce-related deliberations, an available tool is the Australian and New Zealand Classification of Occupations (ABS, 2013), maintained by the Australian Bureau of Statistics (ABS). This provides an extensive range of occupations each with a designated skill level. ANZSCO skill level 2 is the appropriate level for AQF Associate Degree and Advanced Diploma qualifications, and skill level 3 for AQF Certificates IV/III (TAFE). There are a number of ANZSCO occupations that are within the four project identified discipline areas: Applied Science, Applied Business, Allied Health, and Design and Technology. The project proposal does not mention ANZSCO or incorporate any ANZSCO features.

A thorough proposal/business case would name the occupations for which there is current and/or future demand, either using the relevant ANZSCO occupations and levels, or by using other specific industry-defined occupations and associated necessary workforce capabilities. Additionally an estimate of a time-based industry demand (over annual or longer periods) for people within the named occupations would be a key part of a business case. Provision of both these factors, (ie occupations and the demand for them over time) as a minimum, is a realistic expectation for a proposal/business case for the following reasons: (i) they constitute the foundation of a sound business case and further design phases; (ii) the size of Tasmanian industries is consistent with the size and population of the State (ie not large), and industry data and leaders are accessible, so relevant data would be readily obtainable; (iii) there is already a range of very useful Tasmanian workforce planning resources available, which can be drawn upon, eg https://www.business.tas.gov.au and http://www.skills.tas.gov.au/.

Therefore it is a reasonable expectation that UTas, with its acknowledged research capacity and two-year proposal preparation period, would provide as part of its proposal/business case, at least the following minimum information about workforce needs:

- Workforce domain/discipline area (eg Allied Health, Agribusiness);
- Specific industry (eg Aged Care, Viticulture);
- Whether the industry/business is expanding, contracting, or stable, ie future expectations;
- Name(s) of relevant occupation(s);

- Skill level required, or type of skills/knowledge/capability required;
- Are there existing employment positions available and/or are new position(s)/occupation(s) being mooted;
- If existing positions, an estimated number of current employees;
- If existing positions, the qualifications of current employees;
- Estimated position/occupation numbers required, including any existing numbers:
    - In 2 years;
    - In 5 years.

This data could be presented in some type of tabular format, for example as shown below:

| Domain | Specific Industry | Growth | Occupation | Lvl | New ?? | Existing | | Estimated Demand | |
|---|---|---|---|---|---|---|---|---|---|
| | | +, -, = | ANZSCO or Other | | | No. | Lvl | 2 yrs | 5 yrs |
| App Sci | Agriculture– cropping/agronomy | | Agricultural Technician ANZSCO 311111 | 2 | | | | | |
| | Aquaculture- fish | | Aquarist | 3 | | | | | |
| Allied Health | Aged care | | Aged or Disabled Carer ANZSCO 423111 | 4 | | | | | |
| | | | | | | | | | |

Well researched and valid industry needs provide the basis for: (i) an initial indication of likely demand for graduates, hence course places (and especially Commonwealth Supported Places – CSPs – so students do not have to pay full fees), and hence the economic viability for possible courses; (ii) a constructive, rational consideration of course/unit and qualification provision.

### *UTas Educational Provision*

Consistent with the lack of an informative analysis of workforce needs, the EDERNT proposal presents no substantial related UTas responses to workforce needs. This poor response might be expected, since if there is an inadequate workforce needs analysis (in the proposal) a consequential coherent educational response cannot be formulated. Any valid initial educational response as part of an overall needs-analysis would largely involve the potential provision of educational content (and teaching/learning) to meet the knowledge/skills/capability requirements of the identified workforce needs. A detailed analysis of physical facility requirements and options would be a subsequent undertaking, once course/unit content (knowledge, skills etc) needs are established. The educational content considerations could include the following:

- Industry area;
- Occupation and level;
- Knowledge/skills/capabilities required;
- Existing UTas courses/units consistent with requirements;
- Gap analysis to identify necessary new content provision;
- Any new units/courses required;
- Possible adaptation of existing courses;
- Current staff expertise.

And as with the workforce needs analysis, the elements could be presented in tabular format – a possible example follows:

| Industry Area | Occupation | Knowledge/Skills/Capabilities Overview | Lvl | Existing UTas | | New required | |
|---|---|---|---|---|---|---|---|
| | ANZSCO or Other | | | Name | Lvl | Crse | Units |
| Agric-cropping | Agricultural Technician ANZSCO 311111 | | 2 | | | | |
| Aged care | Aged or Disabled Carer ANZSCO 423111 | | 4 | | | | |
| | | | | | | | |

### 2.3.3 Comments

- A thorough, clearly presented, needs analysis provides a rational foundation for the remainder of a business case and design process, particularly the consideration of options. For this project the needs analysis has two key elements: workforce needs and educational provision. It is apparent that the EDERNT document addresses neither of these adequately.
- The `Summary of business case needs' on page 17 of the EDERNT contains only general statements, and the overall document itself provides no detailed information or quantitative data about workforce needs that can be used to support a rationally argued case for either a new educational provision, or its likely demand.
- These significant weakness (above), must cast doubt on the veracity of any (consequent) educational proposals that purport to respond to the business case needs.
- A comprehensive needs analysis can also provide the foundation for preparing a project `design brief', if appropriate, and for selecting a subsequent course of action. Thus without such a needs analysis, the design process is compromised.

## 2.4 Design: Considerations/Criteria and Constraints

Accompanying an analysis of problems/needs/opportunities, there is usually a range of preferences or factors that may influence plans/outputs and that should be considered in the planning stages. If there is a documented design `brief', these factors are often included in the brief. They may be criteria that should/must be met, constraints that limit planning, or considerations that may be taken into account, depending on circumstances.

Although it is not written as a `Design Brief', the EDERNT document includes aspects that could be included in a design brief, and since nothing else is available, will be considered as such a brief for the purpose of exploring criteria and constraints. That it is a form of design brief is evident in the consequent UTas document - The Inveresk Precinct Redevelopment Masterplan - IPRMP (UTas, 2017), in which the architects McBride Charles Ryan, in conjunction with UTas, used the EDERNT proposal and some of its text as basis for the initial Inveresk `masterplan'.

### 2.4.1 Public Project Information

The design considerations, criteria and constraints summarised below have been extracted from the various sections of the EDERNT proposal, on the basis that they can be regarded as elements of a `design brief' within the structure of the proposal. They are phrased below as objectives, initially for planning, and they can also act as proposed outputs/outcomes against which the various aspects of the project could be assessed/evaluated:

a. To provide a broad tertiary education curriculum for the whole state either on campus (at Hobart, Launceston and Burnie) or through on-line delivery, (p13);
b. In the North/Northwest, to create a critical mass of quality University teaching and research, accessible to a wide population cohort, (p18);
c. To maintain and consolidate existing (Newnham and Inveresk based) courses and research, and facilitate both growth in current offerings and the new Associate Degrees (ps 19, 31);
d. To work to expand and extend UTas research in the North/Northwest, (p18);
e. To attract and retain Tasmanian students who would otherwise not be motivated to take up University studies, (ps 15, 30);
f. To create facilities that will attract and retain students from throughout Tasmania, interstate and internationally, (p19);
g. Through its physical location, to be a `visible' campus to a wide socio-economic group, (p23);
h. To develop and undertake outreach and marketing programs aimed towards potential new students, especially in Associate Degrees, (p18);

i. To support environmental sustainability (p19), including environmentally focused initiatives and partnerships (p13); and to reduce the UTas carbon footprint, (p19);
j. To secure easy pedestrian, bike and public transport access, (p19);
k. To provide quality fit-for-purpose teaching and research facilities, (p18);
l. To provide a facility such that it can create opportunities both for cross-disciplinary experimentation and for start-up enterprises, (p18);
m. To support the Tasmanian economy, through the creation of a critical mass of STEM (science, technology, engineering, mathematics) researchers, teachers and students, and associated suitable laboratories/teaching spaces; and to remedy the current [poor] facilities (at Newnham) that put the physical sciences at risk due to facility age and condition (p16);
n. To employ quality teaching intensive staff, (p18);
o. To facilitate closer integration, site co-location and course articulation with TasTAFE (p9), and enhance integration with other community partners eg QVMAG, LGH, (p23);
p. To deliver the major project stages within 3 years of funding, (p18);
q. To restructure the UTas operating/management model to incorporate new Associate Degrees, (p18);
r. To seek Government support to lift the restriction on UTas designated undergraduate degree places to enable the possibility of higher enrolments in Associate Degrees (ADs), which are 'designated' (ie not part of the uncapped, demand-driven, Commonwealth Supported Places), (p15);
s. To complement/contribute to the Northern Suburbs Revitalisation Strategy (p27);
t. To inject vitality and growth to the Launceston CBD, (p18).

### *2.4.2 Unavailable Important Information*

Specification of design considerations and constraints is the prerogative of UTas, and to attempt to identify relevant but unavailable criteria is not productive unless there are obvious omissions. The most obvious missing criteria is specification of an appropriate monitoring, assessment and evaluation regime/plan, especially as the project is large, expensive, long-term and with ambitious outputs and outcomes. Comprehensive considerations of monitoring/evaluation are also important as the project is in an arena where causal relationships between outputs and outcomes can be problematic, and there may be several extraneous intervening variables. The proposal contains no mention even of the need for project monitoring and evaluation, nor any descriptions of potential indicators that could be established and used. This is a significant omission, and may reflect a rather shallow overall approach to the project.

### *2.4.3 Comment*

- Although environmental sustainability and carbon footprint are mentioned, they are not discussed in any detail, and seemingly rank behind other criteria/objectives whose intent is to attract students.
- `Designated' student places are those whose number the AG determines in a funding agreement (with UTas) and for which the AG will provide normal financial support, ie Commonwealth Supported Places (CSPs). Associate Degrees are constrained by designated places (ie limited in number) in contrast to Bachelor Degrees which are fully demand driven and so are not `designated'. If designated places are limited, this could be a very important potential constraint on enrolment numbers for ADs. The implications are not fully discussed in the proposal, apart from flagging the need for a formal request to the AG to increase the number of designated places to align with the projected numbers of new students enrolled in ADs. Since commencing this review, the AG has recently committed funding for additional CSPs for Associate Degrees at UTas.
- There is a strong emphasis on the public visibility of the campus, and the associated expectation that such `routine' visibility will act to attract students, and help them decide to enrol. This possible

visibility effect can only occur with potential Launceston students who live in the area, and is not relevant to the intent to attract students from elsewhere in the state, from mainland Australia and from overseas. Also much learning/teaching is now online (as in the ADs), so location as an attractor becomes less relevant. Thus the purported `visibility' effect in driving enrolments is problematic, is based on a questionable assumption, and if at all evident is likely to be very minor.

- Online teaching/learning is mentioned only briefly as one mode of delivery. However with the increase in online delivery, and its functionality and apparent economy, it is an area of educational development that warrants more attention than it has received in the proposal, especially in relation to the target market for Associate Degrees – whose potential students are likely to require and prefer significant interpersonal support and teaching.
- The majority of the design criteria in 2.4.1 above are effectively location neutral, ie they can be implemented at Newnham or Inveresk. Some improvement works have been recently undertaken at Newnham, as indicated on the UTas website, (http://www.utas.edu.au/infrastructure-services-development/building-works/completed-projects), and there was a major comprehensive Newnham development masterplan prepared in 2007 and supplements in 2011.
- It is possible that the EDERNT project purpose of injecting vitality and growth to the Launceston CBD by moving from Newnham, may be at odds with the aim of contributing to the Northern Suburbs Revitalisation Strategy, (even if the Newnham campus was redeveloped in some yet unresolved way), especially as the UTas Newnham campus is in the `heart' of the northern suburbs.

## 2.5 Design: Analysis of Options/Alternative Possible Solutions

The earlier sections (2.3.2 – 2.3.3) showed that the industry workplace needs analysis and the consequent UTas educational responses are inadequate in terms of a quality business case - the industry needs were described briefly through a variety of statements that are a poor design foundation for subsequent educational planning. This design phase normally considers options or possible solutions, in response to the defined need(s) and criteria, so that some level of comparative assessment (usually based on design criteria) of options is undertaken, to enable selection an optimal solution. In this case, the options are wholly within the educational arena and are in two categories: educational course offerings and educational infrastructure, both of which allow some scope for options. However the EDERNT proposes no possible options for consideration, and gives a definitive un-analysed solution/selection within both categories, namely Associate Degrees for course offerings, and relocation to Inveresk in relation to infrastructure.

### *2.5.1 Public Project Information*

- *"A presentation …….. in August 2015, set out the University's proposal to establish a state-wide system to deliver new Associate Degree course offerings which are closely aligned with industry, community and state economic development priorities", (p18).*
- *"… the project proposes to consolidate and relocate all University teaching and research facilities and programs, with the exception of the Australian Maritime College (AMC), from the current suburban Newnham site, to extend the University's presence at Inveresk", (p19).*

These two statements represent the two major UTas responses to the poorly analysed workforce needs: to create industry aligned (two year) Associate Degree courses/qualifications, and to locate all Launceston UTas infrastructure at Inveresk, except the AMC which will remain at Newnham. Relevant aspects of the Associate Degrees and the UTas infrastructure are given below.

#### *Associate Degrees*

*"Two fundamental conditions currently challenge the University's ability to deliver an Associate degree level program that meets the needs of students, industry and employers in Tasmania: inadequate infrastructure and the availability of designated undergraduate degree places to the University ……. The University seeks the consideration and support of the Government to lift this restriction on designated undergraduate degree places to enable the University to fully deliver this program to the community", (p15).*

UTas commenced to offer ADs in 2015, and they were generally constituted by units from years one and two (or equivalent) of bachelor courses, and conducted during the normal UTas semesters through the relevant Faculty or School (eg AMC, Health, Education). During 2016-17, UTas established the UTas University College (UC - http://www.utas.edu.au/college) to manage and/or conduct ADs, and to conduct the University Preparation Program (UPP, a UTas `bridging' entry pathway for otherwise unqualified individuals), and the Diploma of University Studies (an alternative entry pathway that can be discipline aligned). Most of the earlier ADs have moved into the jurisdiction of the UC, and a number of new ADs have commenced within the UC, whose major physical presence is at the Launceston Newnham campus (TUU building Z). The annual scheduling of the UC programs, including ADs, is now the same that of the four Tasmanian school terms, each of 10 weeks, ie it does not follow the Bachelor degrees' two (or sometimes three) semesters (each of 13 weeks) schedule . A mid-2018 summary of the UTas ADs is below, collated from UTas course information websites (eg http://www.utas.edu.au/courses/cse/courses/j2c-associate-degree-in-applied-science-marine-environment), and the University College website.

| Associate Degree | Code | Through | Start | 2018 | Availabiity |
|---|---|---|---|---|---|
| *Early Associate Degrees* | | | | | |
| Applied Science (Marine Environment) | J2C | IMAS | 2015 | Yes | Lton, Sem 1 & 2 |
| Aquaculture | J2A | IMAS | 2015 | No | Transferred to UC, App Sci |
| Education Support | 42A | Education | 2015 | Yes | Lton & Distance, Sem 1,,2, sum |
| Furniture Design | S2F | Arch&Des | 2015 | No | Lton – no new enrolments 2017 |
| Health and Community care | 52C | Health | 2016 | Yes | Distance (Hbt), Sem 1,2 |
| Maritime and Logistics Management – new: (Global Logistics and Maritime Management) | J2B | AMC | 2015 | No | New AMC Bach & AD course Lton & Distance, Sem 1,2, spr |
| | | | | | |
| *New ADS Through University College (UC)* | | | | | |
| Agribusiness | Z2A | UC | 2016 | Yes | |
| Applied Business | Z2C | UC | 2016 | Yes | |
| Applied Business (Specialisation) | Z2D | UC | 2016 | Yes | |
| Applied Design | Z2E | UC | 2017 | Yes | |
| Applied Science | Z2J | UC | 2017 | Yes | |
| Applied Technologies | Z2F | UC | 2017 | Yes | |
| | | | | | |

The provision of a sufficient number of designated (ie funded by the AG) undergraduate degree places for students enrolling in the UTas ADs was mentioned in the EDERNT (p15) as a potential issue. Currently the provision of Commonwealth Supported Places (CSPs) for Associate Degrees is not demand driven (and hence unlimited) as is the case with Bachelor degrees. Universities are granted a limited number of AG funded designated places (effectively CSPs) for allocation to ADs (and some other courses). Once these places are filled, any additional AD students will face the prospect of full fees. This legitimate and serious concern was raised briefly in the EDERNT, and its solution relied on the AG agreeing to provide an increased number of designated places to meet the anticipated demand for UTas ADs. If the AG does not provide these extra places, enrolment demand in ADs is likely to be restricted as students will reconsider options if faced with full fees. Recently the AG has made extra CSPs places available, so students can pay upfront or incur a HECS debt.

### *UTas Building Facilities*

UTas Infrastructure and Services Development (ISD and formerly Commercial Services & Development - http://www.utas.edu.au/infrastructure-services-development/about-us) has responsibility for the physical management of, and reporting upon, building and property assets, and reports to the UTas Chief Operating Officer (COO). During 2011-12, ISD undertook a building condition and functionality audit of all UTas buildings with a gross floor area (GFA) of more than 500m$^2$, so excluding only 9% of the University's GFA. 93

buildings were audited, including larger student residential facilities. The published report is: The Strategic Asset Management Framework, UTas Commercial Services & Development, February 2015, (UTas, 2015). "*The Strategic Asset Management Framework (SAMF) establishes high level strategic objectives/desired business outcomes for the development and management of the University's physical environment and assets for the period 2014-2019"*, (p3). Thus the document is current to 2019. Although individual buildings have been assessed, the SAMF does not report condition and functionality results for individually specified buildings, but does so at an aggregated level for the University. For the purposes of this section (analysis/comparison of options), two results reported in the SAMF are relevant:
(i) The building condition audit revealed that 42% of buildings rated very poor (1-2) or poor (2-2.5), on a 5-point `overall condition rating (OCR)' scale, with 25 of the 34 poorest buildings (specified as less than 3 on the 5-point scale, and so including the fair category of 2.5-3), are located at the Hobart Sandy Bay campus, (SAMF p11). Depending on the number of buildings assessed at Newnham, this may indicate that some of the Newnham buildings have a condition rated in the good-excellent range (3-5), but unfortunately there is no individual building data provided; (ii) The functionality audit indicated that 71% of buildings rated less than 3 on a 5-point `overall functionality rating (OFR)' scale, with the majority of these in the fair (2.5-3) range. 17 buildings were assessed for functionality as poor or very poor (1-2.5), and 16 of these were in Hobart and one at Newnham campus (the Aquaculture facility). This would indicate that all Newnham buildings (except Aquaculture) are in the fair to excellent functionality range (2.5-5), with a number most probably rated as good-excellent (3-5). Again no individual building data is available. Nevertheless, these reports tend to belie the rather negative and disparaging descriptions of the Newnham campus facilities in the EDERNT, and such negative descriptions constitute a significant part of the EDERNT proposal/case.

#### *Other Information*

Some other Newnham-Inveresk comparative information is put forward in EDERNT to support of the Inveresk project:

- Distance from city centre: Newnham ≈ 4km; Inveresk < 1km
- Anticipated reinvigoration of the city centre: Newnham – minor; Inveresk - major;
- Public visibility (to local public): Newnham – low; Inveresk - high;
- Pedestrian, bicycle and public transport access: Newnham – good; Inveresk - better;
- Buildings footprint area: Newnham – >75,000 square metres; Inveresk – 45,000 square metres (although this may need revision as there are three new buildings in the Inveresk Masterplan compared to two in the EDERNT) ;
- Facilities' potential attractiveness to students/staff: Newnham – older, outdated; Inveresk – new, modern, world class teaching, learning and research facilities;
- Predicted annual operational $CO_2$ emissions: Inveresk 895 tonne $CO_2$ emissions per annum less than Newnham with no change, ie business as usual, (but again may need revision in view of the Master plan), (p19);
- Car parking availability: Inveresk potential spaces are listed as greater than currently available on the basis that the showgrounds site is converted to parking as per the Masterplan; but this is not compared to the Newnham site, which has a much larger number of spaces.

### *2.5.2 Unavailable Important Information*

#### *Educational Courses*

The provision of Associate Degrees meets several design considerations: broaden the tertiary offerings in the State, provide suitable qualifications directly related to industries, enable opportunities for potential students who may not otherwise start higher education, and provide substantial course credit towards bachelor degrees. In addition to attracting students into new Associate Degrees, the project aims to encourage enrolment growth in current Newnham courses (planned to be relocated to Inveresk). However,

in conjunction with AD provision, there was no apparent consideration of other related educational options that may also support industry needs and/or foster growth in current courses. Some possibilities that could have been considered/proposed are:

- Modify/improve existing Bachelor degrees (AQF 7);
- Create new Bachelor degrees that reflect an analysis of market needs (AQF 7);
- Specify which Associate Degrees (AQF 6) are based on current Bachelor degrees - and hence for which, existing infrastructure is available;
- Specify which Associate Degrees (AQF 6) will be largely or completely new, and so possibly requiring new infrastructure;
- Existing TAFE provisions that can provide pathways to ADs, or are at Associate Diploma level.

### *Educational Infrastructure*

The proposed campus relocation from Newnham to Inveresk is the most significant undertaking of the project. It is presented as unproblematic, and based largely on (i) the perceived inadequacies of the physical facilities at Newnham (see 2.3.1), a campus which is said simply to be *"out of sight, out of date, and no longer fit-for-purpose to meet the region's current and future needs" (p16)* - in the context of 2.5.1 above, this simplistic rationale must be questioned; and (ii) on the proximity of Inveresk to the city, which is seen as some type of educational advantage, as well as benefitting the city centre. Nevertheless for a proposed expenditure of $260 million, a thorough comparative analysis of the attributes and problems for both campus locations, in the context of the proposed educational offerings, would be a minimal expectation. Individual University building data was collected and aggregated for the SAMF report, published in 2015 and current to 2019 (2.5.1 above), so there are no individual building results available in the SAMF. The SAMF audit techniques are standardised for the tertiary sector, so such techniques and their results for individual Newnham buildings could inform this section if they were available. In the absence of such information, an overview of the possible components of an analysis, is presented below, using considerations based on each domain/course (current or new), and the subsequent synthesis of the various domain/course infrastructure needs to enable a comparison of three campus-related options: (i) retain and upgrade all the required facilities at Newnham; (ii) consolidate/demolish/repurpose and/or modify/adapt/improve the Newnham facilities, and build new if necessary; (iii) relocate from Newnham and construct new facilities at Inveresk to cater for growth in all current courses (except AMC), and for growth in all existing and new ADs. Cost estimates are obviously a vital part of such comparisons.

| **Undertake Analysis Based on Domains/Courses and Current Infrastructure** | | |
|---|---|---|
| **Criteria to Consider – What** | **Examination of Possible Provisions - How** | **Do Costings** |
| Teaching/learning spaces required | Analysis by Criteria | |
| *Lectures* | *Is Criterion required?* | |
| *Tutorials* | *Current Availability* | |
| *Flexible spaces – meetings, breakouts* | *Utility and Standard of Current* | |
| *Laboratories* | *Possible Adaptation of Current* | Yes |
| *Workshops* | *Full Upgrade of Current* | Yes |
| *Other eg IT Online* | *New an Absolute Necessity* | Yes |
| Staffing requirements | Possible Consolidation by Site Context | |
| *Staff numbers/profiles* | *Retain All/most at Newnham and Upgrade* | Yes |
| *Staff office/meeting spaces* | *Consolidate/Adapt/Improve +/- New at Newnham* | Yes |

| | | |
|---|---|---|
| Research Facilities | *Relocate All to Inveresk as New Builds* | Yes |
| *Laboratories* | | |
| *Workshops* | | |
| Other Generic | | |
| *Library* | | |
| *IT facilities/networks* | | |
| *Student hubs* | | |
| *Recreation, gym etc* | | |
| *Commercial – cafes, bookshops etc* | | |

In the EDERNT, there is no comparative analysis of costs for educational infrastructure, even at the basic level of two options: Newnham (upgrade current) and Inveresk. The project proposal simply provides a gross figure of $260 million to relocate all Newnham operations to Inveresk in newly built facilities, without even any breakdown of this gross figure. The facility information provided is again highly inadequate for a business case. The UTas Infrastructure and Services Development department could have been tasked with undertaking such a comparative audit. If it was, there is no public report of its work.

### *2.5.3 Comment*

- Not only is there no serious consideration of infrastructure options and associated financial analyses, there is not even any breakdown of costings for the proposed Inveresk location – the only figure quoted is the $260 M total for the project. A reasonable expectation would be a comparative financial analysis of options, with relevant cost-benefit projections.
- The EDERNT put forward no other educational options apart from Associate Degrees, and as acknowledged previously, these meet several design considerations. They are also wholly within the jurisdiction of UTas as a tertiary educational provider, and although relevant industry personnel have been consulted, there is no necessary need for other external involvement.
- However in the EDERNT the provision of ADs is linked to, and seemingly made dependent upon, the closure of the Newnham campus and the development of an expanded new campus at the Inveresk precinct with the direct support of the CoL and the TasG. Related to this geographical move, there are many aspects of the project proposal which do warrant community concern, and which importantly have not been mentioned in the EDERNT. Some of these are (i) Inveresk has acknowledged flooding and geotechnical issues, (ii) no substantial case has been made to show the Newnham facilities are inadequate, and (iii) the Newnham campus contributes significantly to the Launceston northern suburbs, (iv) other site factors described below. Such concerns will be examined in more detail in later sections.
- Thus although this review has established that the case for ADs was based on a poorly argued foundation, it recognises that the provision of ADs is essentially an internal decision for UTas and the consequences will be carried by UTas. For the purposes of this review, it is therefore sensible to accept the UTas decision about ADs, and incorporate it as part of the context for the considerations of educational infrastructure.
- In the EDERNT there is little or no consideration/discussion of the UTas online provision of units/courses. This could be significant planning factor and it is not part of the project proposal.
- Thus the major infrastructure factors revolve around the relative strengths and weaknesses of the two possible sites, Newnham and Inveresk.
- As the proposed move to Inveresk involves the CoL and the TasG, and will have impacts on the local communities, it is essential the two options are fully analysed as part of a decisive business case.

The previous sections demonstrate that this is unlikely to have been done, as there is no evidence of such analyses in the public documents.

- As has been mentioned previously, the majority of the stated design considerations, described previously in 3.3.1, are location neutral, ie they can be implemented at Newnham of Inveresk.
- The only comparative analyses of site factors in the EDERNT are relatively minor (eg distance from CBD, visibility and attractiveness, foot/cycle access, CBD factors), or are not addressed in adequate detail to enable site comparisons, eg building condition and functionality, traffic issues and parking needs.
- There are other major site factors that have not been considered and warrant a full analysis. Some of these are:
    - Environmentally, only a reduction in annual operational $CO_2$ emissions are considered. There is no analysis of embodied energy (and equivalent $CO_2$ production) for the Inveresk site development and buildings in comparison to retaining/upgrading Newnham;
    - Inveresk is effectively a `Greenfield' (new) site, whereas Newnham is a `Brownfield' (existing) site. The costs associated with developing/improving both types of sites are generally quite different, and this has not been acknowledged or quantified;
    - Provision and maintenance of building services (water, sewerage, energy, telecoms) in the unstable Inveresk soil strata;
    - Depth of underlying geological strata, and soils, in relation to building foundation needs;
    - Propensity for flooding and consequent damage;
    - Possibility of earthquake damage;
    - Emergency access and egress after major events such as flooding;
    - Risks of personal injuries and potential deaths as a result of major environmental events;
    - Overall risk analyses.

## 2.6 Design: Selection of a Solution

### *2.6.1 Public Project Information*

The previous subsection (2.5) shows that there has been no consideration of options in the public documents, and despite this inadequacy, UTas has proposed a solution that has been accepted by the AG, the TasG and by the CoL: ie to create industry aligned (two year) Associate Degree courses/qualifications, and to relocate and consolidate all Launceston UTas courses and infrastructure at Inveresk, except the AMC.

#### *Educational Management*

The EDERNT describes how UTas would incorporate the ADs into its operating structure:

> *"The University proposes restructuring of its operating model to support delivery of Associate Degrees through a discreet entity within the University's management framework. This proposed model reflects analysis of the successful University College model in the United States. It will ensure distinctiveness, flexibility of course management, and appropriate governance to support different workforce requirements, while also ensuring articulation and integration with University degree and research programs. The vision is to create a university system with two institutions under one governance and services structure:" (p32).*

The two entity operating model would consist of:

(i) An Extension and Teaching Program that would offer ADs and pathway programs for `underqualified' school leavers, mature age students and international students - with an industry/employment focus.

(ii) A University Program that offers undergraduate, postgraduate and higher degrees for high achieving university-ready students and international and interstate students – with a research led focus, (p32).

The University program is essentially a continuance of the existing system, and UTas has established its University College to conduct the Extension and Teaching program.

### *Inveresk Facilities*

The following major infrastructure solutions are provided in the EDERNT:

- The project will provide infrastructure at Inveresk that will `house' (cater for) a total of 16,000 students, researchers and staff, and that Inveresk will be developed with capacity to accommodate: (i) all functions and programs that are offered at Newnham; (ii) growth in current offerings; and (iii) the new Associate Degree programs, (p19,34);
- Retain the two current facilities at Inveresk – namely the School of Architecture and Design, and the Tasmanian College of the Arts (TCotA), (ps19,34);
- Establish a new Launceston Institute for Applied Science and Design as a new purpose designed building located on the (city side) Willis street carpark, with specialist teaching/research laboratories, to bring together the current range of disciplines and staff in agriculture, biological and biomedical sciences, engineering, chemistry, technology, (ps 18,19,34);
- Create a new Teaching and Academic building at Inveresk on the site of the old velodrome adjacent to the stadium, (ps 19,34);
- The AMC will remain and continue to develop at the existing Launceston Newnham site (ps19,34).

After a period for community input, and during the time interval between the EDERNT (UTas,2016) and the IPRMP (UTas, 2017) `masterplan', (which was simply a concept), there was an increase in the number of new buildings, from two to three, with the additional Inveresk precinct building named the Gateway building, to enable a height reduction in the other two buildings:

| **Building** | **Document** | | |
|---|---|---|---|
| | **EDERNT** | **IPRMP** | **Change** |
| **Teaching & Academic Building** | 5 stories<br>On ground under building parking<br>Completion: Sem 1 2019 | 3 stories ?<br>Parking spaces not specified<br>No completion date | Height/scale reduction |
| **Applied Science & Design Building** | 5 stories<br>On ground under building parking<br>Completion: Sem 1 2019 | 3 stories ?<br>Parking spaces not specified<br>No completion date | Height/scale reduction |
| **Gateway Building** | Not planned | 3 stories, no parking ? | New |

The graphic below shows the current and proposed features.

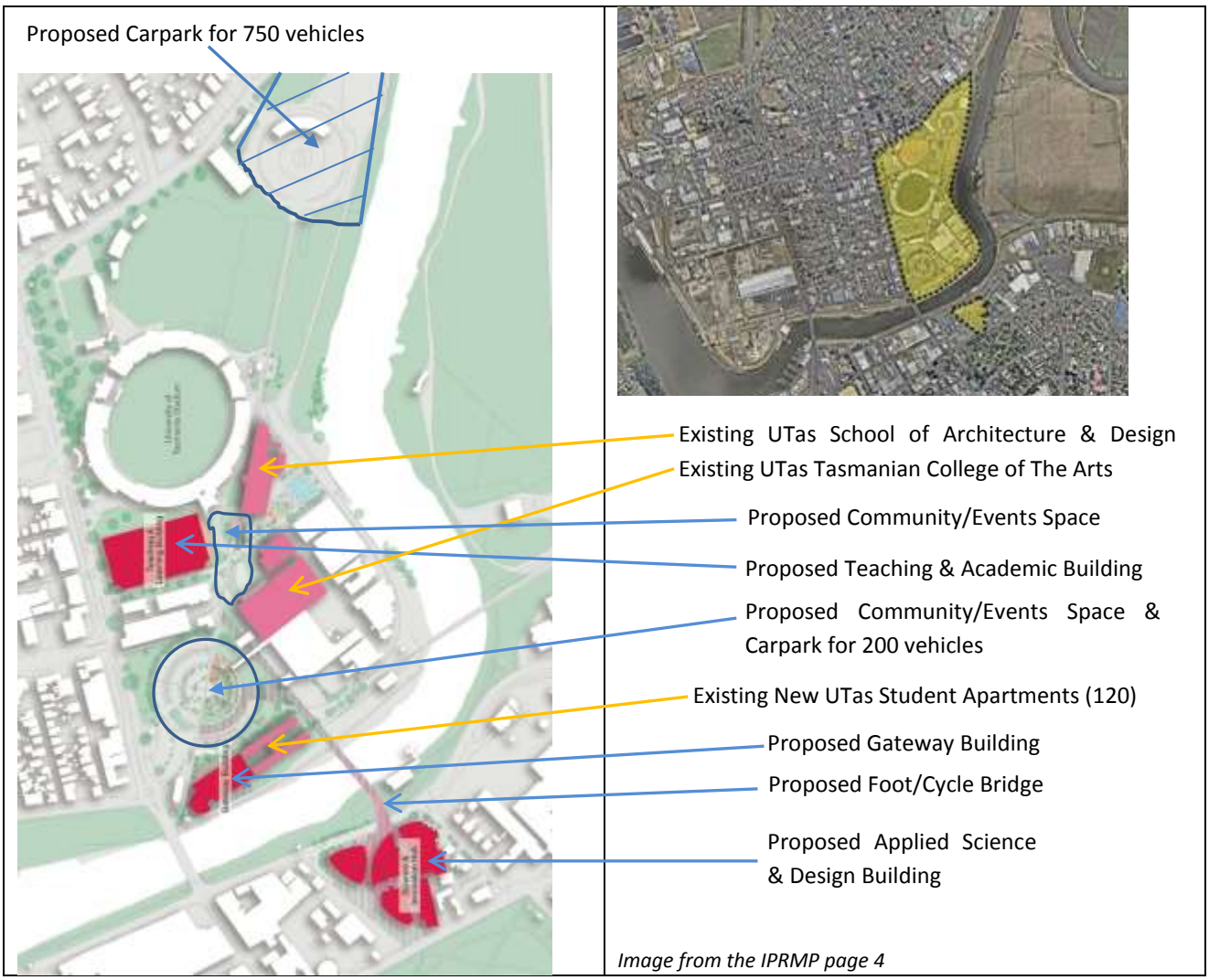


*Image from the IPRMP page 4*

The student accommodation facilities, the 120 NRAS (National Rental Affordability Scheme) apartments were completed in 2015. They are located immediately adjacent to the recently redeveloped levee on the north bank of the North Esk river (see above image). In addition to the major facilities described above, the EDERNT proposes a number of other features associated with the move to Inveresk:

*"The vision for the redeveloped Inveresk Precinct also includes new, inviting spaces for the community, including an area for events and a public space that could be used for a variety of purposes," (IPRMP p8);*

- *"Retention of community plaza and park-like setting and preservation of sight lines to key heritage buildings;*
- *Establishment of a community hub, based around current central plaza;*
- *Creation of student hub (support services, catering and social spaces);*
- *Retention of current community uses of Inveresk – Aurora Stadium, QVMAG, Don Railway, Tram Shed etc;*
- *Retention of student accommodation at Newnham including the NRAS accommodation (180 beds) and Investigator Hall (250 beds);*
- *Improved transport linkages between the Inveresk and Newnham sites and from the sites by pedestrian/ bicycle links into the CBD, including a pedestrian and bike bridge;*
- *Additional car parking on both Inveresk sites will be made available to the community for weekends and non-peak times, supporting community events;*
- *Development of parts of Newnham allowing AMC to function as a separate campus;*
- *Repurposing of remaining land at Newnham for various community uses and potentially mixed use housing, as part of the Northern Suburbs Revitalisation Strategy;*
- *Provision of commercial/retail opportunities to further activate Invermay Road." (p34)*

Three factors indicate that UTas, either implicitly or under some agreement with the CoL, considers that it will have a significant (if not absolute) level of control over the entire Inveresk precinct:

(i) All the UTas maps and images show the entire Inveresk precinct (and Willis St) as the site for the proposed campus developments, (and the stadium was renamed UTas stadium);
(ii) In addition to the specific UTas buildings, the textual descriptions about development include existing Inveresk facilities not currently in the remit of UTas (see dot points above);
(iii*) In February 2017, architects McBride Charles Ryan conducted detailed analysis of the Inveresk site ….* (UTas, 2017, p3). The resultant `masterplan' showed that, to provide adequate parking for the project, a 750 space carpark would be constructed on the existing Launceston showgrounds site which is the large north-eastern part of the Inveresk precinct, and over which the Show Society currently has a long term lease.

#### *Comment*

Although this review has concluded that both the workforce/educational needs analysis and the consideration of both infrastructure and educational options were inadequate for a project of this scale, it will progress on the basis of an acknowledgement of the proposed educational provision - namely a range of Associate Degrees and pathway programs in addition to the maintenance all existing Newnham based courses and research. However it will further analyse the proposed infrastructure provision designed to meet the educational needs of the project – namely the relocation of all UTas infrastructure, (except the AMC), to Inveresk. As determined in previous sections, there are no adequate project analyses in the public documents to demonstrate that the move to Inveresk is the optimal solution to meeting the identified needs, and to fulfilling the design brief factors.

As the subsequent phases of the design process are in the future they are not considered herein, but are listed below for reference:

- Design: Preparation of Plans (and submission of a Development Application to the CoL);
- Implement Plan/Business Plan: construct new facilities, or renew older Newnham facilities;
- Monitor and Assess Project Inputs and Outputs (this is important, and can, in part, be started now as the ADs are in place through the University College);
- Monitor, Review and Evaluate Outcomes and Project Progress (very important, and structures/processes can be put in place now to ensure a quality evaluation);
- Consider Options to Improve Outputs and Outcomes.

Thus this review will next focus on site-based infrastructure provision and other project issues that are in the public domain, some of which have been outlined in 2.5.3 above.

# 3. ENVIRONMENTAL CONSIDERATIONS

## 3.1 Area, Elevation and Basic Geology

### *3.1.1 Newnham*

The Newnham site is bounded by the East Tamar Highway/Tamar estuary (to the west), University Way (north), Newnham Creek (east), and by the streets of the suburb of Mowbray to the south. The total area of the site under UTas ownership, which includes the area occupied by the AMC is approximately 50 ha.
The elevation of the majority of the Newnham campus is between 16 and 23 metres above the zero referent, the Australian Height Datum (AHD – based on Mean Sea Level for Tasmania). An area at the northern end of the campus is lower at 10-15m, as it slopes towards Newnham Creek that drains to the Tamar. The site is essentially an elevated terrace adjacent to, but significantly above, the Tamar River estuary. It is not flat but has low relief topography with natural drainage lines and is not subject to potential inundation/flooding from the Tamar estuary.

Geologically it consists largely of terrace sedimentary deposits from the relatively recent Pleistocene to the late Neogene period (around 1/2 million to 5 million years ago), of clay, slit, sand and cobbles, loosely to poorly consolidated or cemented, with some varied pieces of older rocks eg dolerite. There is also an area of undifferentiated and slightly hardened sedimentary deposits and rocks generally older and of a wide age

range (up to 65 million years – Cainozoic). The terrace sedimentary material is subject to landslip around the terrace edge (the west/river side which is vegetated and without buildings), but is otherwise stable, with variable subsurface drainage and gravel/sand aquifers (Forsyth, 1996). Normal stormwater drainage is in place and the site surface drainage is largely to the north-east and east into the adjacent watercourse (Newnham Creek) and/or road drainage.

*Newnham Campus, Google Images March 2018*

### *3.1.2 Inveresk*

The Inveresk precinct is part of the larger Launceston suburb of Invermay, and is bounded by Invermay Road, Forster Street and the North Esk River. Currently it has mixed use.

The elevation of the majority of the Inveresk site is generally in the range of 1.7-2.5m, with a few locations at 1.5m. The elevations are measured above the Australian Height Datum (AHD), and as the Tamar Estuary and lower North Esk River are tidal, it is instructive to consider the potential tidal effects at Inveresk. Tidal heights are measured against a zero datum of the Lowest Astronomical Tide (LAT – the lowest tide predicted/calculated to occur under average meteorological conditions, and any combination of astrological conditions). At Launceston, the AHD is 2.45m above the LAT, and the Mean High Water Spring (MHWS) tide level is 4.12m above the LAT; (spring tides have high high-tides, and low low-tides). This means that in relationship to the AHD, the MHWS tide elevation is 4.12-2.45 = 1.65m, which is higher than those Inveresk locations with 1.5m elevations. As the MHWS is an average over years there will be some spring tide high water levels greater than 4.12m, eg on 7/3/18, HW was 4.27m, and a recent (July 2018) high tide was 4.5m. Thus the springtide high water levels (of up to AHD 1.8m) are approaching the same level as the 2m elevations of Inveresk land. The Highest Astronomical Tide (HAT – and calculated like the LAT) is 4.65m which is 2.2m above the AHD, but is unlikely to occur without other influences. These calculations are consistent with (i) A statement by Fullard (Fullard, 2013, p1) that: *"Much of Invermay is below the high tide level and is reliant upon levees for its sustainability;"* (ii) a statement on the CoL website (https://www.launceston.tas.gov.au/Emergency-Management/Flood#section-2)*: "In fact, Invermay's ground level is actually below the high tide, and if the flood levees were not in existence some parts of Invermay would be subject to water inundation twice a day with high tide;"* and (iii) personal observations at high water, when surface water appears behind the levees presumably as a result of river side hydrostatic pressure through the ground water of the underlying sedimentary material.

Levee banks were constructed on both sides of the North Esk River in the 1960s and those on the Invermay (north) side have recently been reconstructed or renewed (completion 2014). Although the new levees are keyed into the underlying strata (Fullard, 2013), this may not provide a uniform or complete barrier to the movement and continuity of groundwater, which is difficult to interdict due to the depth of sediments. The levees and their influence will be discussed more fully in a later section.

Invermay was established on reclaimed swamp, underlain by alluvial/lake sediments, at the confluence of the North and South Esk Rivers which become the Tamar River Estuary. Geologically, Inveresk/Invermay

consists of recently deposited (within the last 12,000 years, and more recently than the Newnham site) alluvial estuarine, deltaic and swamp sediments including silt, mud, organic matter, sand and gravel, deposited along major watercourses (Forsyth, 1996).

Fullard 2013, p11) in describing alluvial sampling to inform the new levee design, indicated that:

*"The general subsurface conditions were characterised by a sequence of layers:*

- *Surface to approx. 0.8m AHD: Fill comprising clayey sand, clay, ash, railway ballast.*
- *Below 0.8m AHD: organic clay/silt, high liquid limit, black. Soft, increasing strength with depth. Lenses of varying materials were present as layers."*

This indicates that parts of the Inveresk site may have had various types of fill added to the surface, which is supported by the GHD report for Invermay: *"In some locations fill has been used for reclamation and varies between 2 m and 4 m in depth. …The fill is typically firm to stiff and features a random combination of clays, railway cinders, ash, rubble and other materials,"* (GHD, 2006, p7).

From a geotechnical perspective, the Inveresk alluvial strata display:

- potential for local flooding;
- poor drainage;
- a high water table;
- a high potential for settlement ;
- potential for landslip on embankments, (Forsyth, 1996)

The GHD report states*: "The major consequences of the [Invermay] geological and geotechnical conditions include the potential for ongoing consolidation settlements, large variations in foundation strength and large variations in foundation permeability. The ongoing consequences of building on these materials are differential settlements resulting in damage to structures and the movement of non-piled structures including civil infrastructure,"* (GHD, 2006, p7).

The descriptions above typify the Inveresk precinct which is essentially flat, and is part of the larger Invermay floodplain which, in its natural state at European habitation, was categorized as a swamp (or wetland). The sediments are quite deep and are underlain by relatively unweathered strong dolerite, a common Tasmanian igneous rock. Forsyth (1996) states the depth of the sediments is from 5 to 30m, which is generally corroborated by seismic studies, although in places they may be significantly deeper, as the surface of the underlying bedrock is uneven (see Michael-Leiba & Jensen, 1996a); potential sites requiring piled foundations warrant in situ assessment.

*Inveresk Precinct, Google Images March 2018*


*South Esk River and North Esk river confluence, and `home reach' of the Tamar River estuary*

To view elevations for both sites, a high resolution contour map of Launceston can be accessed at: http://opendata.launceston.tas.gov.au/datasets/f0ddbaff2ca644a8aa3bbec3d4cda753_0?geometry=147.106%2C-41.433%2C147.164%2C-41.422

## 3.2 Seismic Considerations

Launceston has experienced five earthquakes since 1884, the most recent being in 1946.The epicentres for all these events were in the west Tasman Sea to the north-east of the Tasmanian land mass, 140-240 km distant from Launceston, and with epicentre Richter magnitudes of 5.6-6.9. Due to epicentre distances, the recorded damage (which was around the city centre) in Launceston was not extensive or serious, but in some instances had the potential for human injury or fatality, (Michael-Leiba & Jensen, 1996a). In 1990 and with this historical awareness, the then CoL city engineer commissioned Dr Owen Ingles to carry out a seismic risk assessment for the Launceston municipality, and his report was submitted in March 1991, (Ingles, 1991). Ingles considered four risk factors from potential earthquakes: fault displacement; landslide/landslip; sediment liquefaction; and fill settlement. As Launceston itself is not in a known earthquake zone (Michael-Leiba & Jensen, 1996a), and the distance of the epicentres of historical earthquakes attenuates liquefaction risk, liquefaction of saturated sediments is considered of low probability/risk, unless the local faults become assessed as active (and there is an earthquake with an epicentre close to Launceston). Ingles states that significant fill settlement similarly has low probability, since most fills are relatively old and have settled; in contrast, the more recent 2006 GHD study notes the presence of fill and *"the potential for ongoing consolidation settlements"*. As Inveresk is flat, landslip is not a general topographical issue (as in other parts of Launceston), apart from the earth riverside levee banks, as evidenced by Fullard, (2013, p4). Ingles (1991) records that Launceston is traversed by three major fault lines, the activity of which is unknown. He considered that such lack of knowledge warranted establishment of a monitoring system to assess the level of movement/activity (however slight), along/across the fault lines. There is no apparent record of this being done.

The two known faults closest to Inveresk are: (i) the major NNW-SSE (N-S) fault which is located along the western flank of the Tamar river and continues south along the central Margaret St-Southern Outlet valley. To the west of this fault lie the suburbs of West Launceston and Trevallyn-Riverside on the uplifted block (largely dolerite), and this fault line also defines the eastern end of the South Esk river gorge; this N-S fault is 700-1000m west of the Inveresk precinct. (ii) a WSW-ENE (W-E) fault line in which the South Esk river has eroded its course in the several kilometres before forming the Tamar; this fault continues east across the Tamar graben (along the northern edge of the CBD) to the uplifted dolerite hills to the east (Waverley-Ravenswood), and so it would pass close to and perhaps a little south of the Inveresk precinct. The third

fault is the N-S trending fault to the east of the city (Ravenswood-St Leonards) which forms the east flank of the Tamar graben. Inveresk clearly is within the zone of influence of the faults which are considered to have been active in the early tertiary period, but may be sites of further displacement in a future possible earthquake. Some detail is available at: http://qvmag.cms.dedicated1.autech.com.au/qvmag/index.php?c=112#GeologyLaunceston which is the local museum website. Ingles (1991, p3) notes that: *"Marsada's chart for earthquake interval-magnitude-strain rate (1975) fits very well with moderate activity on the Launceston faults; so they cannot be ignored and should be monitored ……. This writer's own opinion on the soil evidence in the Launceston area is that a major fault displacement (ie earthquake) occurred between 7 and 15 thousand years ago …… clearly the risk should not be ignored."* One of Ingles's conclusions was that: *"Microzoning of seismic risk should be especially useful in guiding the type and number of structures which can be approved in landslip and fault zones."* This led to the 1994-5 seismic microzonation studies also commissioned by the CoL and reported by Michael-Leiba & Jensen (1995, 1996a, 1996b). Vegn Jensen was then an employee of UTas in the geology department. The area studied included Inveresk, which is an acknowledgement that it is located in a fault zone. Michael-Leiba & Jensen, (1996a) report that preliminary investigations showed two deep NNW-SSE trending valleys filled with sediments variously consolidated. One is along the Tamar river axis (Riverside to Kingsmeadows) with maximum sediment thickness over 250m, and the other (more easterly) lies along the North Esk valley with maximum sediment depths of 130m. The reported past earthquake damage in Launceston from the distant epicentres is considered largely to be the result of amplification of earthquake waves by the sediments, and especially if the structures concerned were situated on sedimentary deposits. This is a recognised phenomenon, and was evident in the Newcastle earthquake of 1989 and the 2011 Christchurch (NZ) earthquake, where the major damage was to buildings located on sediments. The purpose of the microzonation study was to prepare a zoning map of Launceston related to the requirements of the Australian Standards for structural design relating to earthquake actions (AS 1170.4). Using a seismometer and digital recorder, microtremors were recorded at 53 sites on sediments and three sites on dolerite. Five of the sediment sites were in the Inveresk precinct, and the others in/around the CBD and the nearby suburbs to the south and west. Newnham was not included.

### *3.2.1 Inveresk*


The five microtremor recording sites are shown as • in the adjacent image. The microtremor data (wave periods for each of the 3 spatial dimensions) from the 53 sites was used to produce site factors (S) which are an estimate of the expected amplification of earthquake shaking due to the nature of the underlying geology (foundation material eg sediments, dolerite); the site factor is a part of the Australian Standards for earthquake design. Using data from all the recording sites, site factor (S) zones were established in the following categories:

Zone S=0.67-1.0
Zone S=1.0-1.25
Zone S=1.5
Zone S=1.5-2.0
Zone S= 2.0

S=0.67 is the value for clean solid dolerite – it is the baseline site factor, as there is no earthquake wave amplification in clean, solid dolerite.

The ratio of any estimated S to the baseline S (0.67) indicates the expected level of amplification of the earthquake wave power eg for S=2, the amplification is 2÷0.67 = 3. So for the zone area where S=2, a threefold amplification of earthquake wave power would be expected, (Michael-Leiba & Jensen, 1996a).

The majority of the Inveresk precinct (including the sites of proposed UTas buildings) is in the zone S=1.5-2.0, so earthquake power amplifications by factors of 2.3 - 3 would be expected. The Willis St carpark site is in an S=1-1.25 zone so amplifications will be by 1.4 - 1.9. In addition to earthquake amplification, the study also considered a second factor that can influence levels of building damage: possible earthquake resonance effects in buildings depending on their height. If the period of vibration (ie one oscillation) of the ground (due to an earthquake) matches that of a building on that ground, there is a resonance effect – ie a self-reinforcing oscillation in the building. Resonance increases the probability of building damage in an earthquake, as the resonance can itself amplify building movement. As buildings increase in height, the oscillation period increases – with standard increments of 0.1 second for every building storey, commencing with a period of 0.1 second for a single storey building. Knowing the vibration period of the ground (from the microtremor data) enables comparison with the oscillation periods of increasingly higher buildings. For the Inveresk precinct, buildings of 4 storeys and above are expected to be subject to resonance effects in addition to earthquake power amplifications caused by the sediments, and for the Willis St carpark site, buildings of 1-3 storeys are likely to be subject to resonance, (Michael-Leiba & Jensen, 1996a). Thus the two factors that can increase the impact of an earthquake are amplification due to subsoil strata material (especially sediments) and structural resonance related to building height.

The potential earthquake effects must be considered in conjunction with an assessment of the probability of earthquake occurrence. There are three possible epicentre regions that may affect Launceston: (i) the west Tasman Sea (as above), for which the average time interval between large earthquakes is about 70 years, although the potential Launceston impact is attenuated by distance; (ii) the west coast area of Tasmania (estimated time interval of 290 years); and (iii) sites close (within 43km) to Launceston (which is not in an acknowledged earthquake zone). The study considered probabilities from the three locations for earthquakes of low and medium magnitudes. For minor to serious structural damage to buildings on sediments, (low magnitude earthquake) the combined probability (from the three epicentre areas) is 1 in 880 in a year. For moderate to more serious damage on sediments, (medium magnitude earthquake), the annual probability increases to 1 in 18,000, (Michael-Leiba & Jensen, 1996a).

### *3.2.2 Newnham*

The Newnham area was not included in the microzonation study, but it would obviously be affected in some way by an earthquake felt in Launceston. But as the sediments are older and more consolidated than Inveresk, amplification effects would be expected to be less, and any possible resonance for current building probably low.

## 3.3 Climate Change

Sub-section 3.1.2 shows the Inveresk precinct is a floodplain of quite deep, varied, unconsolidated, recent sediments, with ground levels just above and sometimes below high water marks. The water table is generally high and at times around ground level. The soils/sediments when saturated show instability, with the possibility of liquefaction under extreme movement or shaking. The area is protected from flooding by a system of levee banks recently upgraded (2014) and designed, on the basis of a 2008 study, to mitigate a 1 in 200 year food event. Although the risk associated with earth tremors cannot be ignored, the major and potentially most frequent environmental hazard for Inveresk/Willis St is water from various sources, mainly river flooding. Although groundwater and surface water are closely linked especially across a floodplain, their related sources can be considered separately:

| Inveresk Ground water | Inveresk Surface water |
|---|---|
| Subsurface links with river estuary systems and tides;<br>Direct rain ingress and possible stormwater discharge;<br>Breakdown in sewage egress. | River/estuary flooding(catchment rain) and tidal effects;<br>Direct rain and stormwater surface accumulation;<br>Groundwater breaching surface. |

Floods, heavy rainfall, sea level/tidal effects, and possible storm surges, are the main natural hazards and are largely dependent on climate and seasonal weather. The fairly recent consensus on human induced atmospheric warming renders past climate records less reliable for future predictions than they otherwise would have been. Nevertheless past records and weather patterns, together with atmospheric (warming) models are used to predict future climate parameters and patterns. For the Inveresk precinct, rainfall is the most significant, followed by possible sea level rise, and wind. All are influenced by the primary factor of increases in atmospheric temperature. The amount and temporal/spatial distribution of catchment rainfall, together with other related catchment conditions (eg soil moisture, vegetation) is the main influence on flooding at Inveresk.

Subsection 3.4.2 below describes some of the features of the North and South Esk river catchments, and provides catchment maps. The North Esk catchment is located to the east of Launceston, and is largely in the north-east ranges. The upper to middle reaches of the South Esk catchment are also part of the north east and east coast ranges. The other parts of the South Esk catchment are in the midlands, north midlands, and north-eastern fringes of the central plateau. The north-east/east-coast ranges (ie catchments of the North and South Esk rivers) are subject to the influence of (Australian) east coast low pressure systems which can bring heavy consistent rain over extended periods. They are also influenced by other east coast rain events.

There have been several substantial high quality studies undertaken to enable a range of environmental projections about the influence of climate change on Tasmania as the 21st century progresses. The most significant group of these is the Climate Futures for Tasmania (CFT) project established and managed by the Antarctic Climate and Ecosystem Cooperative Research Centre (ACE-CRC) which is located in the UTas Waterfront Building, a modern scientific facility in Hobart's waterfront precinct. The ACE-CRC is a partnership of seven key participants, one of which is the University of Tasmania. The main funding for the ACE-CRC climate futures work was provided by Tasmanian and Federal Governments, together with a number of other funding bodies (eg Hydro Tasmania), and between 2010 and 2012, the ACE-CRC published seven reports based on relevant historical data and down-scaled dynamic modelling (using ≈10km grid cells), about a range of climatic factors for Tasmania: http://acecrc.org.au/climate-futures-for-tasmania/. These reports provide the most important source of Tasmanian climate change projections at a local level, and together with the CSIRO/Bureau of Meteorology work, (available at https://www.climatechangeinaustralia.gov.au/en), and assessments from the Intergovernmental Panel on Climate Change (IPCC), they are used to inform the Tasmanian Government's policies and planning for adaptation to climate change (eg Tasmanian Framework for Action on Climate Change, and Climate Action 21). Such work is undertaken by the Tasmanian Climate Change Office, a division of the Department of Premier and Cabinet, (http://www.dpac.tas.gov.au/divisions/climatechange). The dynamic 10km grid modelling used to prepare the CFT reports, enabled spatial and temporal discriminations in the climate projections, ie monthly/seasonal and local/regional parameter variations were able to be modelled/predicted, and consolidated to provide statewide average expectations. As described above, the pertinent catchment areas for Inveresk are the north-east/east-coast ranges and the central/northern midlands, and these, where relevant, will be the focus of the following summaries regarding climate futures. The CFT analyses used two levels of greenhouse gas emissions (ghge), low (B1) and high (A2), for projections during the 21st century (C21). As the CFT reports were written in 2010-11 and based on data to 2008, the higher A2 projections are currently more pertinent as the atmospheric $CO_2$ levels have increased and are currently above 400ppm, previously regarded as a significant threshold. Climate variables such as wind speed, cloud cover, radiation, humidity and evapotranspiration are not considered in the summaries below.

### *3.3.1 Temperature*

During the C21, mean (average) temperatures across Tasmania are projected to rise by 1.6 °C (low ghge) to 2.9°C (high ghge), and do so fairly uniformly across the State (with some seasonal spatial variations). After

2025, the projections for the two ghge scenarios begin to diverge. There is a similar pattern of increase for both daily maximum and daily minimum temperatures, although mean daily minimums increase slightly more than mean daily maximums. There is more diversity in seasonal temperature changes than in the average annual changes, and there is also some spatial diversity associated with seasons. For high ghge, the number of summer days warmer than 25°C is projected to double or triple in most regions. The largest increases in extreme temperatures (high ghge) are projected to occur in spring and autumn, with increases of greater than 4.0 °C (more than the mean temperature increase), implying an extension of summer and more frequent heat waves, eg the number of heat waves at Launceston is projected to increase progressively during C21. Accordingly, temperature increases in summer and winter are expected to be commensurately less than the annual mean increases, and the frequency of cold waves is expected to decline, especially in the central highlands. The temperature projections for Tasmania are less than global averages due to the moderating effect of the Southern Ocean, (Grose et al, 2010, and White et al, 2010).

### *3.3.2 Ocean Effects*

During C21, there is a projected increase in mean sea surface temperature (SST) around Tasmania in all seasons, with a greater increase in the east and north-east than elsewhere, and a greater increase in autumn than other seasons. This is also related to the southward extension of the East Australian Current (which brings warmer water south), leading to enhanced warming in the north-east, already seen in direct ocean measurements of east coast waters. By the latter third of C21 mean SSTs along the east coast of Tasmania are projected to increase by 2.5-3.5°C. Increases in mean SST during the C21 will lead to increased moisture in the atmosphere, and contribute to increased relative humidity. *"The sea surface temperature rise, along with changes to the dominant pressure patterns, is projected to lead to an increase in moisture flux, atmospheric instability and convective processes. These changes, combined with a continuing increase in atmospheric blocking in summer and autumn, are consistent with the increase in rainfall on the east coast margin during these seasons"*. (Grose et al, 2010). Broader sea surface temperature changes (`anomalies') for the Tasman Sea are given on page 6 of the Bureau of Meteorology November 2016 report of the June 2016 `Tasmanian record major flooding event', (BoM 2016).

Globally, climate change is causing an increase in the volume of the ocean and a consequent rise in global mean sea level, through both the expansion of ocean waters as they warm, and an increase in mass of the ocean as glaciers and ice sheets lose mass, ie melt (McInnes et al, 2016). In 2016 the Tasmanian Government commissioned CSIRO to provide updated sea level rise planning allowances for the State. The resultant report (McInnes et al, 2016) described a planning allowance for a projected future sea-level rise as a vertical height: *"that if added to current design values would mean that the expected number of exceedances at the future time with sea-level rise would be the same as expected under current-day conditions without the sea-level rise. In other words the performance of the mitigation measures would be as effective in the future as they are today…… the allowance depends not only on the mean sea-level rise and its uncertainty, but also on the variability of the extreme sea levels."* Thus future estimated sea level rises for relevant locations are the basis for calculating the planning allowances. The report (McInnes et al, 2016) concluded that: *"For Tasmania as a whole, the median sea-level rise {and 5-95% model range} in 2050 are 0.17 [0.11-0.24] m and 0.22 [0.15-0.29] m relative to 2010 values under RCP 2.6 and 8.5 respectively. For 2100 the projected increases are 0.22 [0.15-0.29] m and 0.70 [0.48-0.95] m for RCP 2.6 and 8.5 respectively. The projections vary spatially around Tasmania with the largest increases expected on the east coast of Tasmania and the smallest on the west coast."* (p31). RCP is the Representative Concentration Pathway for greenhouse gases, and higher values represent higher ghg atmospheric concentrations; RCPs replaced the previous categorisation of ghge levels A2, B1 etc. For Launceston, the projected sea level rises for 2050 are 0.17 [0.11 - 0.23]m and 0.21 [0.15 - 0.28]m for RCPs 2.6 and 8.5 respectively; and for 2100, 0.38 [0.22 - 0.55] and 0.70 [0.48 - 0.95]m for RCPs 2.6 and 8.5 respectively. Thus by 2100 under a high emissions with low probability (95 percentile), sea level at Launceston may rise by up to nearly 1 metre (95 cm). Using these projected sea level rises, the sea level rise planning allowances, based on RCP 8.5 for Launceston are 22 cm (2050) and 83 cm (2100).

http://www.dpac.tas.gov.au/divisions/climatechange/climate_change_in_tasmania/impacts_of_climate_change/coastal_impacts

### 3.3.2 Rainfall, Extreme Events and Catchments

The overall rainfall projections are described in the General Climate Impacts report (Grose et al 2010), and one summary statement is quoted below:

*"Spatial and seasonal patterns of rainfall show significant changes with climate change.*

> *There is no significant change to projected total annual rainfall over Tasmania under either emissions scenario. Total annual rainfall over the state is expected to remain within the range of 1390 ± 200 mm seen in historical observations. However, there are significant changes in the spatial pattern of rainfall. Annual rainfall shows a steadily emerging pattern of increased rainfall over the coastal regions, and reduced rainfall over central Tasmania and in some areas of northwest Tasmania. The changes in seasonal rainfall are more prominent than annual total rainfall. The west coast of Tasmania experiences a significant increase in rainfall in winter and a significant decrease in summer rainfall after 2050. The central plateau district shows a steady decrease in rainfall in every season throughout the 21st century. A narrow strip along the northern east coast shows a steady increase in autumn and summer rainfall throughout the 21st century."*

More detailed locational and seasonal rainfall projections are in the body of the report (ps 29-34) and include the relevant catchment areas (for Inveresk) as follows:

- The east-coast and north-east areas show an increased annual rainfall of up to 6%, and a narrow east coast strip shows an increase to 14%;
- These projected increases in annual rainfall are the result of significantly increased east coast summer and autumn rainfalls, and a slight reduction in winter and spring rainfalls;
- Projected changes in the Blocking Index are strongly consistent with the increases in rainfall in the east during summer and autumn

Another report titled Extreme Events (White et al, 2010), describes in further detail how the projected spatial and temporal changes in rainfall are likely to be experienced. Again the best way to present this information is by direct quotations from the Extreme Events report summary:

*"There will be more frequent and more intense extreme rainfall events interspersed with more dry days.*

> *Extreme wet days will increase in the south-west and north-east with up to seven days (or about 25% more events) per year. The projected increases in the south-west are driven predominantly by the number of winter events, with smaller increases in autumn and spring. For the central highlands, there are projected decreases in extreme wet days in all seasons. The results show a projected increase in peak intensity rainfall events across the whole of Tasmania, with an increase of up to 60% in some seasons, in some coastal regions. Paradoxically, the number of rain days across the whole of Tasmania is likely to decrease. This decrease will be felt most in the north-west. Particularly strong signals of increased intensities are projected in late summer and autumn in the east of the state."*

*"Drier conditions and wetter conditions on 6-month and 12-month intervals are both likely to increase in the coming century.*

> *Both cumulative rainfall deficits (drier conditions) and surpluses (wetter conditions) are likely to increase towards the end of the century, with normal conditions likely to occur less often in some regions. The patterns of drier and wetter conditions are distributed unevenly over Tasmania; however, the tendency is for an increase of the occurrence of wetter and drier in all regions on these two time intervals. Where annual rainfall increases, there is a lower level of occurrence of drier conditions and greater occurrence of wetter conditions. Where rainfall decreases, there is increased tendency for drier conditions and a decrease in wetter conditions.*

In the north-east/east-coast areas annual rainfall is expected to increase, with time/seasonal based changes experienced as a greater occurrence of wetter conditions (ie the overall increase is not distributed evenly across the annual cycle).

*"Extreme and record rainfall events will become more frequent in the coming century, consistent with a warmer climate.*

> *The broad consistency between the estimates of the average recurrence intervals for 24-hour rain events and those from the observations is notable, providing confidence that the future projections to the changes in the risk of the most extreme rainfall events are plausible. The projections show a substantially greater frequency of events, with the recurrence intervals likely to decrease substantially relative to the 1961-1990 reference period."*

The statements above summarise a very detailed study related to projected changes to extreme precipitations, in which their frequencies, intensities and spatial/temporal distributions are considered. Some of the Inveresk-relevant expectations are provided below as direct quotations (from ps 40-46 of the report).

- *The eastern side of Tasmania is projected to have an increase in mean precipitation, resulting in less extreme levels of deficit conditions and an increased level of surplus conditions relative to other regions in the state;*
- *By the end of the century, the frequency of days with precipitation higher than the baseline 95th-percentile are notably greater in the south-west and north-east;*
- *Particularly strong signals of increased intensities are projected in late summer and autumn in the east of the state;*
- *5-day totals display projected changes with a spatial pattern similar to that of the mean annual total precipitation changes, with a drying trend in the central highlands combined with an increase in the north-eastern, eastern and western coastal regions …… indicating that the heavy precipitation events that occur over 5 consecutive days make up a large fraction of the total (annual) precipitation and therefore have a pronounced impact on mean precipitation changes;*
- *There is a projected increase in the number of very wet days, more intense 1-day precipitation totals and increases in the six-minute precipitation rates, particularly across eastern Tasmania. These increases are likely to increase the risk of flooding in many regions;*
- *Considerable changes are projected to the magnitudes of extreme precipitation events …… The projected changes indicate an increase in the intensity of both the 24-hour and 48-hour duration precipitation events;*
- *The trend in the 24-hour duration events is strongest in the eastern and northern regions. The projected change in the magnitudes of the ARIs in the north-east is particularly noteworthy as it is this region that has the highest observed precipitation magnitudes in Tasmania;*
- *The largest increases in the average recurrence intervals occur in the north-east (in some regions as much as 90%), precisely where the most variable and intense precipitation already occurs.*

Catchment water run-offs are economically important for both agricultural irrigation storage and hydro-electrical generation. To this end a report titled Water and Catchments (Bennett et al, 2010) was prepared. Analyses used the climate/rainfall projections but also included catchment parameters. Predictions were largely in relation to annual/mean runoffs as economically these are more relevant than extremes. Relevant expectations are below.

- *Runoff across Tasmania is projected to increase slightly by 2100;*
- *On average, annual runoff in eastern areas of the state are generally projected to increase, particularly in the lowlands …… Annual runoff is likely to increase in the lower South Esk River and lower Macquarie River catchments, increasing by more than 15% in most areas ……and are projected to be greatest in winter;*
- *Changes in high daily runoff events essentially reflect changes to rainfall extremes. On average, annual runoff in eastern areas of the state are generally projected to increase, particularly in the lowlands ……. However, high runoff events are likely to increase proportionately more than mean runoff in regions where mean runoff increases, ……. The largest increase in high runoff events occurs in the east, particularly in the lower Macquarie and South Esk Rivers, and in the lower Derwent Valley.*

Overall, climate change information and projections across Australia are available at the Climate Change in Australia website (https://www.climatechangeinaustralia.gov.au/en/). For this review, the relevant sub cluster on that website is Southern slopes – Tasmania east, (the eastern half of Tasmania) for which the key messages are:

- *Average temperatures will continue to increase in all seasons (very high confidence).*
- *More hot days and warm spells are projected with very high confidence. Fewer frosts are projected with high confidence.*
- *Generally less rainfall in spring (high confidence) and little change or an increase in winter rainfall is projected (medium confidence). Changes to summer and autumn rainfall are possible but less clear.*
- *Increased intensity of extreme rainfall events is projected, with high confidence.*
- *Mean sea level will continue to rise and height of extreme sea-level events will also increase (very high confidence).*
- *A harsher fire-weather climate in the future (high confidence).*

- *On annual and decadal basis, natural variability in the climate system can act to either mask or enhance any long-term human induced trend, particularly in the next 20 years and for rainfall.*
- *Even though annual mean rainfall is projected to experience little change ……. modelled projections indicate with high confidence a future increase in the intensity of extreme rainfall events. However the magnitude of the increases cannot be confidently predicted.*

In relation to the projections provided above, a very instructive description of a recent extreme rainfall event, that includes meteorological and hydrological detail for the North and South Esk river catchments, is provided by the Bureau of Meteorology report about the June 2016 floods, (BoM, 2016).

## 3.4 Flooding

Flooding is a complex interaction of precipitation extremes and other factors such as soil parameters, ground cover, basin geometry, antecedent conditions and water management systems, (FM Global, 2016).

### *3.4.1 Newnham*

Due to its elevation, the site is not subject to river or estuarine flooding. After consistent heavy rain there may be potential for some overflow of the Newnham Creek (to the north) onto adjacent grassed areas, that are below and distant from UTas facilities. In the most recent flood modelling reports and maps (BMT 2018a, BMT 2018b), it is very clear that the Newnham campus is not subject to either river (fluvial) or estuarine flooding.

### *3.4.2 Inveresk/Invermay*

Much of the fundamental flood information below is drawn from the GHD 2006 report, Invermay Floodplain: A Social, Economic, Infrastructure and Risk Evaluation Study, (GHD, 2006). Other sources are also used.

- Parts of Launceston (particularly Invermay) can be flooded by the North and/or South Esk Rivers, which have their confluence at Launceston, forming the Tamar River estuary. The two river systems are distinct and independent until approaching their confluence, and in a flood, tail water levels from a South Esk flood can have an influence on water surface levels in the North Esk for some distance upstream. Together they drain about 14% of the area of Tasmania;
- The North Esk, has a catchment area of approximately 1,000 square kilometres with a concentration time of around 15 hours;
- The South Esk has a catchment area of approximately 9,000 square kilometres with a concentration time between 36 hours to 3 days depending on the magnitude of the flood; generally larger floods have a higher velocity and arrive sooner than smaller floods;

South Esk Catchment –Tributary catchments (eg Macquarie) in a lighter shade


North Esk Catchment

*Images TasG-DPIWE*

- With separate catchments, both rivers have the potential to cause flooding in their own right. Under equivalent meteorological, hydrological and catchment conditions it is thought that the North Esk delivers its flood peak at Launceston around 30 hours before the flood peak of the South

Esk. However rainfall and conditions between the catchments can vary in several ways, and it is possible for the flood peaks to be reasonably contemporaneous;

- River flows and flood discharges are measured in cubic metres of water per second passing a given river point (cross section) – cumsecs or $m^3/s$. Peak Flood Discharge (PFD) is the maximum river discharge measured for a flood event; another measurement used is the maximum flood water height in relation to the AHD – the flood level. The probability/risk of a pending level (height) flood recurring is described by the Annual Recurrence Interval (ARI), which is estimated from available data (usually historic), and expressed as a 1 in X year event, eg the ARI for a Launceston flood of 3.9m AHD is 1 in 100 years. In recent analyses/reporting (eg rainfall and runoff), the ARI has being replaced by the Annual Exceedance Probability (AEP), which is the probability of a given limit been exceeded in any one year, eg a 1 in 100 ARI has an AEP of 1% or 0.01 (ie 1/100); for events more frequent than 50% AEP, they are expressed as the (expected) number of Exceedances per Year (EY), eg events with a 6 month recurrence interval have a 2EY;
- The first recorded Launceston flood was in September 1828; there have been 36 significant floods recorded since then; (https://www.launceston.tas.gov.au/Emergency-Management/Flood#section-1);
- Until 2016, the 1 in 100 year ARI event of April 1929 for the South Esk river was the best recorded and photographed major flood event. It affected the CBD and especially Invermay where flood waters were up to 1.5-2m deep, 1,000 homes were inundated, businesses or belongings were destroyed, 4000 people were evacuated, and many homes declared unfit for habitation;
- For the South Esk River, the historical minimum and maximum flood event measurements are shown below (GHD, 2006):

| | South Esk Peak Flow Discharge $m^3/s$ | AHD Peak Flood Level m | ARI |
|---|---|---|---|
| Maximum | 4,625 (1863) | 4.4 | 1 in 200 year |
| Minimum | 2,430 (1872) | 3.0 | 1 in 20 year |
| 1929 | 3,964 | 3.9 | 1 in 100 year |

- With Inveresk at AHD elevations of 1.5-3 m, and assuming the North Esk would also be in flood, it is evident from the data above that Inveresk would regularly flood without the protection of levees;
- To create a given ARI event at Invermay, the (presumably combined) peak flows for the North and South Esk rivers are shown in the table below (GHD, 2006); the AHD levels (from Fullard 2013) are measured at the Charles St bridge:

| ARI Years | North Esk Peak Flow $m^3/s$ | South Esk Peak Flow $m^3/s$ | Peak Flood Level m AHD (Fullard 2013) | |
|---|---|---|---|---|
| | | | Current | Previous |
| 20 | 480 | 2,500 | 2.8 | 2.8 |
| 50 | 620 | 3,200 | 3.4 | 3.2 |
| 100 | 750 | 3,700 | 3.8 | 3.4 |
| 200 | 990 | 4,700 | 4.2 | 3.9 |
| 500 | 1,240 | 5,600 | 5.0 | 4.3 |
| 1000 | 1,600 | 6,200 | | |
| PMF | 3,700 | 11,000 | | |

- Probable Maximum Flood (PMF) is the flood calculated/estimated to be the most severe which is likely to occur at a particular location. Such a flood would result from the most severe combination of critical meteorological and hydrological conditions, and so has low probability;
- The lower reaches of the two rivers and the Tamar estuary at and below the confluence of the North and South Esk are subject to significant siltation from sediments carried by the rivers. Such sedimentation raises the level of the river beds and the Tamar estuary, and so acts to increase the height of potential flooding. To date dredging has been used to remediate this problem, but its use has declined. A report of one study indicates a very high siltation rate for the home reach basin (top of estuary) at 33mm per year, (http://www.tasmaniantimes.com.au/index.php/article/launceston-

that-sinking-feeling); other modelling studies have predicted that in a 0.5% AEP flood (1 in 200 yr), dredging would have had little effect on flood height – a possible reduction of around 12-15 cm.

- Fullard (2013) indicates that the tidal range at the Tamar heads (Bass Strait) is around 2.3m, and that the tidal effect is "*transformed through amplification and asymmetry as it progresses up the estuary to have a range at Launceston of approximately 3.3m with a shorter flood tide period than its ebb tide period".* This tidal effect can impact the nature of the floods at Invermay. Tidal influence on flooding tends to be varied, and for the North Esk, flood levels will be affected by tidal levels almost up to the North Esk PMF, whereas in the South Esk, the tidal influence may be overwhelmed by a 50 year ARI event, due to the volume of water from the South Esk, which can also push into the North Esk. For potential Inveresk flooding, the tidal influence can be significant. The Invermay area may also be referred to as a tidal flat, as in terms of groundwater and surface water protection when there is no river flooding, daily tides are the major influence;
- Strong northerly winds can also act to create a storm type surge on a flood tide in the estuary, and so accentuate the effect of a high tide on flood levels and potential impacts.

Thus there are a number of environmental factors that may bear upon the nature and intensity of flooding at Invermay, and the congruence in time of flood-exacerbating factors cannot be discounted, (eg high tides, storm surges, contemporaneous peak flows, silt accumulation). A flood levee system is designed to protect flood prone assets at a certain AEP level.

### *Levees*

A levee system to protect Invermay and the Launceston CBD was constructed during a decade from the mid-1960s. By the early 2000s the levees were in variously poor conditions, with subsidence and/or deterioration, and were in need of major repairs or replacement. The 2006 GHD report provided relevant analyses of the levee system with costed options for improvement. A new Launceston Flood Authority was established in 2008 to design, construct and maintain proposed new and existing flood levees. A number of other important preliminary studies were undertaken, and plans developed for upgrading or rebuilding the Invermay levees. Funding was obtained from the Federal, State and Local Governments, and the new flood mitigation work commenced in 2010 to provide Launceston with flood protection up to the 0.5% annual exceedance probability (AEP) – or in the superseded terminology a 200 year Annual Recurrence Interval (ARI) event - with freeboard in the order of 50-60cm. The AHD for the top of the concrete wall levee was 5.2m, which included 600mm freeboard over the highest 95% 1 in 200 ARI event (2008 modelling) of 4.6m AHD, (Fullard, 2013). This exceeds the Building Code of Australia standard for flood hazards of 1% AEP with 30-40 cm freeboard. Bewsher makes the following observation (Bewsher & Maddocks, 2003):

> *"The 1% AEP flood has been adopted by many authorities throughout Australia as an almost uniform standard for flood-related planning controls. This flood has also been used to define the 'floodplain' or the 'limit of flooding' in many cases. The consequences of flooding above this level have, in the past, been largely overlooked…….. But floods larger than the 1% AEP flood do occur, and in many instances such events do need to be considered."*

BMT consultants were employed to undertake relevant flood studies and hydrodynamic modelling that guided levee design. Their 2008 report with modelling and projections guided levee design, and was updated in 2018 – the 2018 report indicates that the new levees will now only prevent a 1 in 100 year flood (see later section). The levee renewal project was completed in 2014, and comprises a levee and flood gate system including 12 kilometres of earth levee, 700 metres of concrete levee and 16 floodgates. A thorough description of the need for a levee upgrade, and the design and construction process from an engineering perspective is provided by Fullard (2013). His account indicates that the reconstruction maintained very high design and construction standards, within the geotechnical and budgetary limitations, and provides confidence that, in the short term at least, the levees can act to protect the assets on the floodplain. However the report does acknowledge that sections of the renewed earth levees have subsided more quickly than expected and that subsidence continues (although at a lower rate than occurred initially). This

greater than expected (by calculation) subsidence is attributed to an engineering miscalculation of the allowable soil pore pressure (presumably when predicting rates of subsidence). The subsidence would indicate that the mass of the renewed/new levees was at the limit for the underlying strata to support, which is a difficult engineering prediction. However no mention is made of any potential long term effects of the `miscalculation' in relation to either ongoing subsidence or possible embankment landslip, as they may affect (ie diminish) the planned mitigation of the 0.5% AEP flooding, after taking into account the constructed `freeboard' of the levees. The nature of the deep sedimentary materials and the history of the original levees, both point to probable continued subsidence and slow but incremental reductions of levee utility, during a period in which climate change impacts (especially re flooding) are expected to increase in frequency and intensity. As Fullard acknowledges, levee monitoring and maintenance are ongoing important functions; this responsibility has now been transferred to the City of Launceston, whose resources are limited and whose other responsibilities are large. As earth levees subside due to the unstable substrate, they must be built up with suitable material to maintain their height and utility; this adds more weight to the levee, increasing pressure on substrates and exacerbating the subsidence. The earth levees are now considered to be at their maximum height in relation to proclivity for subsidence – ie further additional earth to increase height will cause increased rates of subsidence and associated instability.

Nevertheless, it is widely recognised that the primary purpose of levee systems is to protect existing assets that would otherwise be subject to flooding, and not to encourage the siting and construction of new assets within the flood-protected areas, although this does occur – and when it does, the Importance Level (on the 4 point scale of the Building Code of Australia) of any such new facilities should be 1 or 2, and not 3 (eg education facilities) or 4. New development behind the levees is often referred to as the flood protection paradox and is fully discussed in a later section. The City of Launceston website (https://www.launceston.tas.gov.au/Emergency-Management/Flood#section-2) describes the levee system as follows:

> *"These levees require regular and ongoing maintenance. While they are unlikely to fail, the levees may be overtopped in an extreme flood event. Any levee system may fail. Those in Launceston are no exception: they may collapse or water may flow over the top of them, and the adequacy of the system can't be guaranteed. Should the levees fail, some properties in Launceston may be affected by flood waters isolating the property or even rising above the floor level."*

The GHD (2006 piii) report, written prior to the levee renewal, also acknowledges the fact that: *"There will be a major flood in Invermay – the question is not if, but when."* The renewed levees have improved the flood control situation, but the GHD observation is consistent with the following flood advice from FM Global (2016):

> *"Site Selection for New Construction: Proper site selection is the best solution for avoiding the effects of flooding. Selecting the correct site is far less difficult than designing a facility located in a flood zone to resist the effects of flooding." (see also section 3.5.2)*

### *2016 Launceston Floods*

The most recent major flood, and the largest since 1969, was In June 2016. Fortunately the improved levees held and damage was limited. The flood emergency plan was instigated, the SES and police were heavily involved, transport was disrupted, evacuations were undertaken from Invermay, and an emergency centre was established. The heavy rain and flooding affected catchments in Northern Tasmania, and an overview of the flood events is described in a Risk Frontiers (Roche et al, 2016) briefing note:

> *"Between June 5 and June 8 the northern region of Tasmania experienced severe rainfall. During the height of the storm the Mersey, Meander, Forth and North Esk experienced some of their highest flows since records began. The speed of the rise in water levels caught out many farmers before they could shift stock to higher ground. Flooding in Launceston had been forecast to exceed that of the 1929 flood, though water levels would eventually peak well below this mark. The Launceston Flood Authority reported the event as a one in 50 year event, with estimated flows of 2,500 cubic meters per second – well below the estimated 4,000 cubic meters in the 1929 flood.*

*One of the major factors limiting the impact to Launceston this time around was that the North Esk peaked more than 24 hours before the South Esk, with water levels in the North Esk dropping more than three meters by the time the South Esk peaked. In 1929 both rivers peaked almost simultaneously. The outgoing tide also played a significant role in draining the river as the peak was reached."*

Launceston and Invermay were fortunate in that there was a 24 hour interval between the peak flows of the North and South Esk rivers, and that around the time of these peaks, the tide in the Tamar estuary was ebbing. Had the peaks been contemporaneous and coincided with an incoming high tide, the situation may have been more serious. A comparison of PFDs for the 1929 and 2016 floods is shown below from CoL website, but all values were revised/recalculated by BMT in their recent report (BMT, 2018a).

| | Peak Flow Discharge $m^3/s$ (CoL, 2017-18) | |
|---|---|---|
| | 1929 | 2016 |
| South Esk | 4,250 (3,964, GHD) | 2,375 |
| North Esk | 567 | 800* |

* Revised up to 1253 by BMT in updated modelling report (BMT, 2018a)

The Bureau of Meteorology (BoM, 2016), one responsibility of which is to provide flood warnings, prepared a report about the Tasmanian Floods of June 2016 and the descriptions of the nature of the rainfall events are instructive, especially in the context of climate change projections (as described previously):

*"The widespread rainfall in May 2016 helped return soil moisture conditions to what was typical at that time of year. A system originated as an East Coast Low off the coast of New South Wales on 5 June. It developed over an area of record warm sea surface temperatures in the Tasman Sea. This system, along with a strong high pressure system over New Zealand, caused a very strong, moist north-easterly flow to be directed over Tasmania from 5 to 7 June. This resulted in exceptional rainfall, particularly Sunday night into Monday morning 5 - 6 June.*

*The recorded rainfall rates for durations less than 6 hours were not particularly intense and generally less than the 5% Annual Exceedance Probability (AEP) intensities, or 20 year Average Recurrence Interval (ARI) in the old terminology. For durations greater than 12 hours, and out to 24 hours and 48 hours, many locations throughout the northern half of the state, particularly at higher elevations, recorded rainfall totals much greater than the 1% AEP (100 year ARI) design rainfall intensities. This led to record flood levels, in some cases exceeding previous records by a substantial margin. For example, the North Esk at Corra Linn experienced the worst floods since at least 1929, exceeding the previous record by nearly 1.3 metres. The flooding peaked on most rivers on 6 June although the most downstream locations peaked as late as 8 June, with river levels remaining high for many hours."*

Through Geoscience Australia, the Bushfire and Natural Hazards Cooperative Research Centre (BNH-CRC) was contracted by a group of relevant stakeholders (including the CoL) to undertake a cost- benefit analysis (among other aims) of the 2016 Launceston floods, especially in relation to the reconstructed levee system (Maqsood et al, 2017). Possible 2016 flood losses if the old levees were still in place (ie prior to levee reconstruction) were calculated through the estimated economic costs of potential building damage, contents damage, clean-up actions, rental income loss, business interruptions and fatalities (direct tangible costs). The estimates did not include potential damage to storm water and sewage systems, to vehicles, investment income loss, indirect costs (eg emergency service responses, loss of utility/services), nor intangible costs (eg stress, trauma, depression, and loss of living environments or social contacts/relationships). The potential (total) direct tangible costs/losses for residential and commercial sectors in Invermay were estimated for a range of AEP (ARI) events and the one most relevant is the 0.5% AEP (1 in 200 year ARI), as the recent 2018 BMT study indicates Invermay would flood badly in a 0.5% AEP event. Estimated losses/costs are shown below:

| Sector | Estimated Invermay Direct Tangible Losses/Costs for a 1 in 200 AEP Flood |
|---|---|
| Residential | $212m |
| Commercial | $164m |
| Total | $376 m |

After levee reconstruction, probabilities for damages were based on the assumption that the new levee system offers protection up to a 200 ARI event. Key findings of this study are quoted below:

- *"The losses that would have been experienced during the June 2016 floods should the old levee had failed would be approximately four times the total investment in the new levee system;*

- *The investment in building the new flood levee system in Launceston was found to be a sound economic decision based on the estimated costs at the time of decision making and improved estimates of benefits from this study;*
- *Actual benefits of the mitigation works to the community are greater than could be assessed economically and would further support the investment in mitigation;*
- *It is found that sea level rise scenarios have only a limited impact on building losses. However, the combined impact of sea level rise and increased rainfall intensity due to climate change, on the total losses may be significantly greater and could be further investigated."*

The first three dot points clearly show the importance of the renewed levees in the protection of existing Invermay assets, and the last point acknowledges the possibility of a combination of climate change factors on future floods/losses.

### *The Flood Protection Paradox*

However the discussion section of the BNH-CRC report above (Maqsood et al, 2017) recognises directly the possibility of overtopping the new levees and the flood protection paradox associated with levee improvement:

*"the benefit of increased land utility and value as experienced in Launceston …… can lead to increased risk due to increased human exposure in a large flood event which overtops the new levee."*

Bewsher and Maddocks (2003), in considering the need to address flooding at higher levels than 1% AEP, state:

*"Flood risk management requires consideration of both probability and consequence given that risk is defined as the product of probability and consequence under AS/NZS 4360: 1999 Risk Management. Whilst the probability of these events may be rare, the consequences in some cases may be so significant that the flood risk cannot be ignored……*

*A proper assessment of the risks of using and occupying floodplains requires that the consequences of floods of all probabilities, not only the 1% AEP, be identified and evaluated."*

The statements above indicate that increased land values and associated uses (eg new developments) for land protected by levees, can lead to increased human exposure (as a result of development and use) during floods that overtop or breach the levees. This is often referred to as the `flood protection paradox' and is described more fully in the GHD (2006) report:

*"It can be demonstrated that levees or other flood protection measures can increase the likely flood damage in the long term, potentially allowing more damage than if the measures were never introduced. This occurs where the measures encourage or enable more intensive development in the risk area, creating a larger problem when the measures are eventually breached. This situation is called the flood protection paradox …… in essence it deals with the response after a public authority, at one point in time, decides to construct a dam or a levee etc to reduce the damage from the next flood. What happens is that a community tends to forget the reason the dam or levee was built and to assume that the community downstream or behind the levee is protected. As a result, approvals are given for more development in the so-called protected areas. The next flood comes and there is great concern about how much damage was done by the flood when the dam broke or the levee was overtopped or failed. The response is often to build an even bigger dam or higher flood levee to protect the much greater development, which had occurred downstream or behind the levee. If this situation continues, the dams get even bigger or the levee walls even stronger or higher – usually at greater and greater cost. …… The paradox is that flood losses rise in tandem with the spending on flood protection. Another paradox is that one way to justify more flood protection is to allow more buildings to be built on the floodplain or in the hazard area. …… One of the major responses to the paradox is that action should be taken, as far as possible, to stop the problem getting any worse. This usually means far more attention to land use planning responses which discourage or prohibit further development in clear hazard areas such as floodplains. Accordingly we are of the view that that much more recognition of the paradox is important and that more attention must be given to ensuring that such perverse consequences do not arise in Launceston in the future."*

The proposed UTas Inveresk development is such a perverse consequence, and the revised cost estimates for the IPR of $400m will add greatly to the value of the assets protected by levees. The latest flood modelling report of 2018 indicates that a 1 in 200 AEP flood would overtop the levees and seriously impact Inveresk, so there will be pressure to increase levee height. However the levees are at their maximum height in terms of the geotechnical conditions. The UTas Inveresk proposal was preceded by two other major floodplain developments for which the CoL had to gain State Government approval to modify a deed of agreement prohibiting a range of floodplain developments behind the levees at Invermay – in this case,

the CoL wanted to support both a UTas student residential block at Inveresk and a nearby Invermay floodplain-located retail complex. The CoL commissioned the local engineering/environment consultants Pitt & Sherry to prepare a document (Pitt&Sherry, 2012) about modifications to the two prohibitions that would support and potentially allow the developments, which did in fact proceed. As part of their arguments in support of the deed modifications in the planning approval, Pitt&Sherry clearly demonstrated one of the flood protection paradoxes ie a justification for flood protection spending is to allow more development in the hazard area:

> *"The community of Launceston would never accept a situation whereby after spending what would be in excess of $70million, there would continue to be a strict prohibition on development within Invermay with risks that are able to be managed in Invermay," (Pitt&Sherry, 2012, p9).*
> *"Given the public investment in upgrading the levee system, it is only reasonable to expect that there will be a reasonable degree of economic activity within this important precinct so close to the Launceston City Centre," (Pitt&Sherry, 2012, p23).*

That the CoL (in conjunction with consortium partners) has chosen to ignore the range of independent expert advice it had commissioned (and rely largely on Pitt&Sherry, 2012), is shown by information in the following section 3.5. But before quoting the various advices, it is both timely and instructive to review the most recent flood study of November 2018, and released by the CoL in mid-January 2019. These reports became available after this evaluative study was first completed in October 2018, and it has been revised to incorporate the reports.

### *BMT Flood Modelling Update and Mapping - Nov 2018*

The CoL commissioned BMT to update the North and South Esk Rivers' flood modelling and mapping, originally undertaken by BMT WBM in 2008. The two reports are available from the CoL website:
https://www.launceston.tas.gov.au/News-Media/Council-releases-updated-flood-modelling-report
For the needs of this review the relevant purposes of the BMT updated reports are to:

- *Update the existing flood modelling (hydrologic assessment and hydraulic modelling) to current best practice standards in line with the 2016 release of the Australian Rainfall and Runoff Guidelines (ARR 2016) (Ball, et al. 2016)*
- *Calibrate the flood model to the June 2016 flood event*

The BMT technical report (BMT 2018a) describes the hydrologic and hydraulic modelling methods used, provides a range of appropriate results, and incorporates the following improvements upon the previous 2008 flood mapping, (which contributed to the Launceston levee renewal design):

- *The flood modelling methodology has been updated to current best practice standards in line with ARR 2016*
- *The TUFLOW hydraulic model incorporates new LiDAR and ground survey topographic data and advances in computing have allowed for the model definition to be improved and extended up the North Esk River to the Corra Linn stream gauge*
- *The TUFLOW hydraulic has been calibrated to the June 2016 flood event for which a large amount of recent historic flood event data was available*
- *Additional streamflow data has been used to revise the Flood Frequency Analyses defining the North and South Esk Rivers design event inflows*
- *A joint probability analysis has been undertaken to better define design flood levels*
- *An estimation of flood risk under 2050 and 2090 climate conditions based on the IPCC AR5, RCP 8.5 emissions estimates.*

Revised Flood Frequency Analyses were carried out using updated techniques and currently available data (including 2016 flood data) and where appropriate historic data (eg Sth Esk flood events of 1852 and 1863). The `old' and new calculated peak flows are shown in the table below:

| | Calculated **Peak River Flows** at Designated Locations - cubic metres per second ($m^3/s$) | | | |
|---|---|---|---|---|
| River | 1% AEP (1 in 100yr ARI) | | 0.5% AEP (1 in 200yr ARI) | |
| | Previous | New (Adopted) | Previous | New (Adopted) |
| North Esk R | 614 | 1056 | - | 1252 |
| South Esk R | 2910 (HEC) | 3902 | 3430 (HEC) | 4975 |

For the major floods of 1929 and 2016, BMT makes the following AEP estimates based on the adopted (new) peak flows in the above table:

| | **1929** | | **2016** | |
|---|---|---|---|---|
| River | Peak Flow $m^3/s$ | AEP | Peak Flow $m^3/s$ | AEP |
| North Esk R | 710 | 4% | 1253 | 0.5% |
| South Esk R | 3964 | 1% | 2398 | 4% |

These revised peak flows and AEPs clearly demonstrate that AEPs (ARIs) and associated flood heights are not calculated once and fixed indefinitely, but that their calculated values are based on data suites that can change over time and that can be used in more accurate and comprehensive computer models as these are developed, eg recent flood data, old flood data not previously included, future rainfall and runoff predictions. This is why the Launceston levees are now predicted to be seriously overtopped by a 1 in 200 (0.5%) AEP flood, whereas they were constructed to contain a 0.5% AEP flood (with 50-60 cm freeboard) based on earlier less data rich and comprehensive modelling.

For AEPs, peak flows and flood heights, the BMT reports include projected effects of climate change at RCP 8.5 (see section 3.3.2) for 2050 and 2090, and using an increase in catchment rainfall intensity of 7.2% and 16.1% respectively. The future estimates also took into account projected rises in sea levels, and for all time points joint variate analyses were undertaken to consider the two river variables, the tidal variable and their temporal relationships. The table below shows current and future peak flows for the two key AEPs.

| | Calculated River **Peak Flow Discharge** at Designated Locations - cubic metres per second ($m^3/s$) | | | | | |
|---|---|---|---|---|---|---|
| River | 1% AEP (1 in 100yr ARI) | | | 0.5% AEP (1 in 200yr ARI) | | |
| | Updated 2018 | 2050 | 2090 | Updated 2018 | 2050 | 2090 |
| North Esk R | 1056 | 1207 | 1383 | 1252 | 1414 | 1614 |
| South Esk R | 3902 | 4548 | 5300 | 4975 | 5656 | 6506 |

The Probable Maximum Flows (PMF) for each the two rivers have been selected (from alternative methods) as:

North Esk 11,405 $m^3/sec$ South Esk 38,520 $m^3/sec$

It is evident that there a very large difference between both 1% and 0.5% Peak Flow Discharges (table above) and the Probable Maximum Flows. This indicates a high variability in possible catchment conditions and outflows, and is usually regarded as indicative of a cautionary approach to planning in susceptible floodplains (Bewsher 2003).

The table below shows the `old' and new (updated) Peak Flood Levels in metres above AHD, at the North Esk (Charles St Bridge), just upstream from the rivers' confluence for a range of AEPs. It is relevant here that the top of the renewed levee system is constructed at 5.2m AHD, and that the levees are prone to subsidence. So under the current (existing) conditions (ie using updated data and techniques), at 0.5% AEP, the flood level would reach the top of levees at 5.2m, and would be likely to overtop them. Projected future levels are also shown.

| | **Peak Flood Level (m AHD)** | | | | |
|---|---|---|---|---|---|
| River Confluence AEP | Pre-2008 Study | 2008 Study | **Existing Conditions** | 2050 Conditions | 2090 Conditions |
| 2% | 3.2 | 3.4 | 3.9 | 4.4 | 5.0 |
| 1% | 3.4 | 3.8 | 4.6 | 5.1 | 5.5 |
| 1 in 200 (95%) | 3.9 | 4.2 (4.5) | 5.2 | 5.6 | 6.1 |
| 1 in 500 | 4.3 | 5.0 | 6.1 | 6.5 | 6.9 |

BMT used their modelling techniques to create a range of flood maps (BMTb, 2018). For each AEP, the three water parameter maps show: (i) Flood Extent (ii) Flood Depth and (iii) Flood Velocity , for AEPs ranging from 20% to 1 in 2,000. Such maps have been produced for each of the three time points: present

(existing 2018), 2050 and 2090. In addition to the water parameter maps, for each AEP and time point a flood hazard map was prepared. All these maps are available from the CoL website (see above).

*"Hazard mapping was undertaken using the combined flood hazard criteria presented in Book 6, Chapter 7 of ARR 2016.*

*Hazard is defined in terms of the depth and velocity-depth product at the following classes:*

*Class 1. **Generally safe for vehicles, people and buildings** - velocity x depth less than 0.3 $m_2/s$ if depth is less than 0.3 m and velocity is less than 2 m/s*

*Class 2. **Unsafe for small vehicles** - velocity x depth less than 0.6 $m_2/s$ if depth is less than 0.5 m and velocity is less than 2 m/s*

*Class 3. **Unsafe for vehicles, children and the elderly** - velocity x depth less than 0.6 $m_2/s$ if depth is less than 1.2 m and velocity is less than 2 m/s*

*Class 4. **Unsafe for vehicles and people** - velocity x depth less than 1 $m_2/s$ if depth is less than 2 m and velocity is less than 2 m/s*

*Class 5. **Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure** - velocity x depth less than 4 $m_2/s$ if depth is less than 4 m and velocity is less than 4 m/s*

*Class 6. **Unsafe for vehicles and people. All building types considered vulnerable to failure** - velocity x depth greater than 4 $m_2/s$"*

From the maps, a summary of flood depths and hazard classes for two relevant AEPs is shown below:

| | 1% AEP – 1 in 100 ARI | | | | 0.5% AEP – 1 in 200 ARI | | | |
|---|---|---|---|---|---|---|---|---|
| Year | Flood? | Depth metres | Willis St? | Hazard Class | Flood? | Depth Metres | Willis St? | Hazard Class |
| 2018 | No | - | No | - | Yes ** | 2-5 | Yes | **5 ** ** |
| 2050 | Yes | 0 – 0.5 | Yes | 1 | Yes | 2-5 | Yes | **5 #** |
| 2090 | Yes | 2-5 | Yes | **5** | Yes | 2-5 | Yes | **5 #** |

** see BMT map below # Hazard Class 6 over much of Invermay and evacuation possibilities

The table above and the map below indicate that even at present, Inveresk would experience hazard class 5 (Unsafe for vehicles and people, all buildings vulnerable to structural damage**)** in a 1 in 200 year flood event, something for which the renewed levees were previously designed in 2008-9.

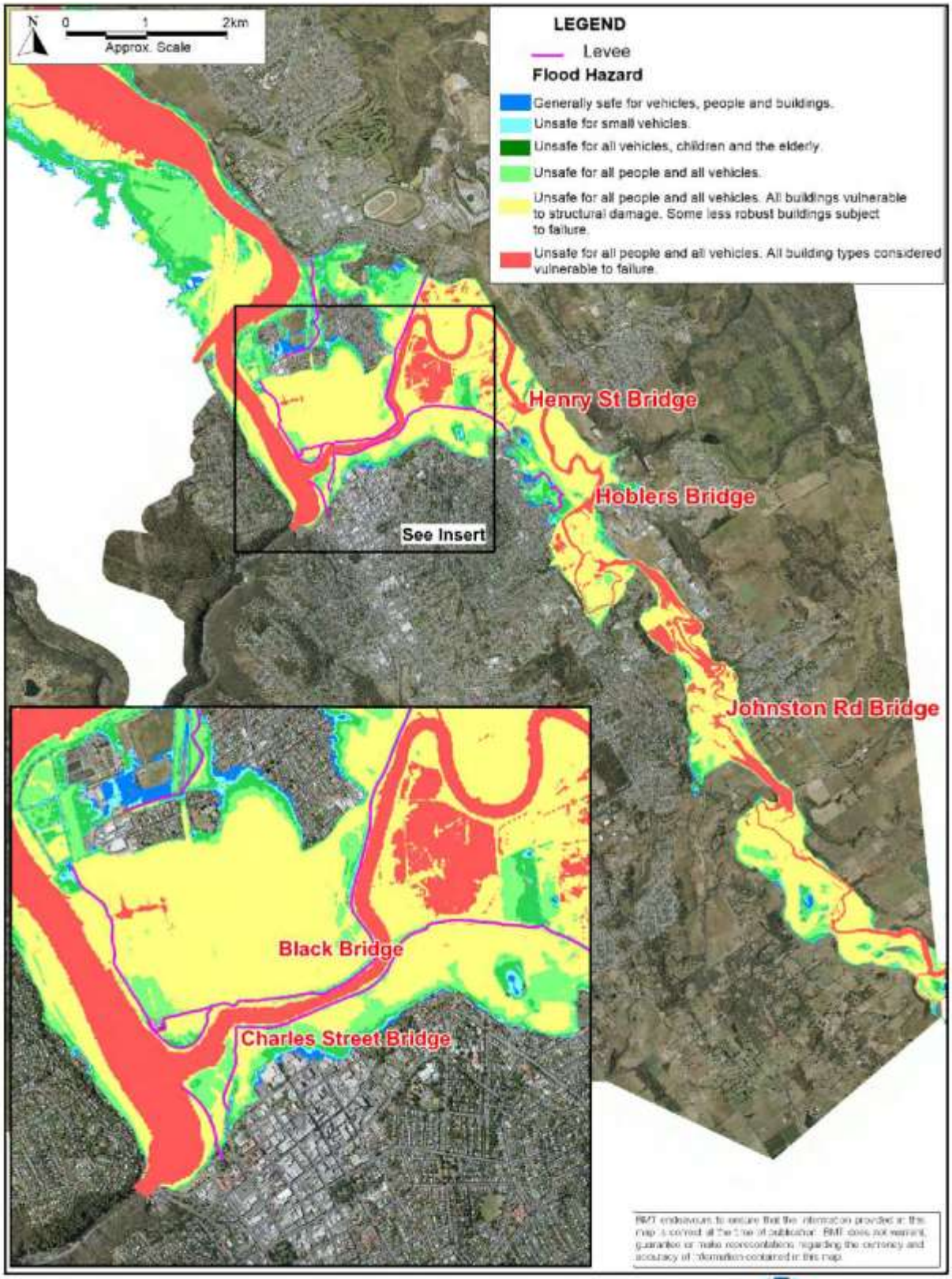


Figure 1-33 Existing Conditions 1 in 200 AEP Event Flood Hazard

Filepath: T:\M220921.MS.Launceston_Mapping_2017\MapInfo\Drawings\Final\Figure 1-33_LAU_Hazard_200y_RevA.WOR

It must be pointed out that there are several important assumptions in the BMT reports:

- That the levee system retains its top level at 5.2m AHD – ie that there is no subsidence or slumping, both of which have occurred since the new levees were completed;

- That the CoL continues to maintain the integrity and height of the levees and associated structures (eg gates) and retains the capacity/capability to do so in the foreseeable future;
- That the climate change projections (higher at RCP 8.5) used in the modelling are reasonable and are not likely to be superseded by more severe predictions or actual climate developments;
- That the recent Bathymetry undertaken for the modelling will not change – ie there will be no further fluvial or estuarine sediment accumulation that changes profiles.

If in a flood event, one or more of these assumptions are invalid then it is likely that the projected hazard levels in the BMT report will increase.

## 3.5 Advice about Developments on the Floodplain - Invermay/Inveresk

The primary purpose of the documents examined so far for this review, has been to provide the expert descriptions of relevant environmental/situational conditions and factors. Often as cautionary views, they are accompanied by professional expert opinions about potential developments on the Invermay/Inveresk floodplain. As the CoL does not currently employ relevant professional engineering staff, it is justifiable to argue that the expert opinions expressed in the documents and reports (some of which were commissioned by the CoL/TasG) should be those considered and followed by the CoL. If such expert opinion is not accepted and used, then it understandably becomes the responsibility of the CoL (and UTas) to publically justify any development/use decisions that ignore such professional advice. Pertinent advice (based on the situational analyses) contained in these documents is provided below, together with relevant or related advice from other professional sources.

### *3.5.1 Seismic/Geotechnical Related Advice*

Ingles and Michael-Leiba provide advice in relation to seismic and geotechnical factors:

Ingles (1991) in his seismic risk assessment report makes the following recommendations:

> *"Future planning approvals should be cognisant of the undesirable nature of allowing highly concentrated populations (eg in public halls) on or near fault lines, even though the risk may seem extremely low numerically."*
>
> *"The possible interruption of some services should be considered for their community impact. Particular attention should be directed to bridges, main access roads, power lines and water/sewage reticulation lines where they cross active faults or landslip areas."*

The Inveresk site is on/adjacent to two fault lines whose level of activity has not been properly assessed (as recommended by Ingles), although the `working' assumption is that they are stable. The existing UTas three story residential block does, and the proposed UTas buildings will, house concentrated human populations, not advised by Ingles at this location.

Michael-Leiba (1995) in her cautionary notes as part of the microtremor survey conducted for the CoL states:

> *"Care should be taken in planning any building development on the anomalous soils of the old railway yard."*

The proposed UTas Inveresk buildings are in the old railway yards area.

### *3.5.2 Flood Related Advice*

The Tasmanian Launceston Flood Risk Management Act of 2015 has a very clearly marked map in Schedule 1, showing flood risk areas after the renewal of the levees. This is a fundamental acknowledgement that the Inveresk area is subject to flood risk, and the city centre and even the fringes on the south side, are not. The map is below


In relation to flooding, FM Global (2016, p4-5) makes the following generic loss prevention recommendations:

> *"Site Selection for New Construction: Proper site selection is the best solution for avoiding the effects of flooding. Selecting the correct site is far less difficult than designing a facility located in a flood zone to resist the effects of flooding.*
>
> - *Select a site that is not in an area protected by a levee or other man-made flood control works.*
> - *Select a location where the entire site and all access routes (highway, marine, railroad, etc.) are outside 0.2% annual exceedance (500-year) floodzones (by both elevation and footprint). ….. and a building site that includes 0.3 to 0.6 m of freeboard, ….. and is at least 152 m from direct wave impacts and or high flood-flow velocities.*
> - *……. Protecting a facility from the negative effects of flooding, however, is not as simple as merely locating it outside known flood zones; inappropriate site layout and building design can create a storm water runoff flood exposure anywhere. In addition, off-site flooding can block access routes to and from the site, as well as interrupt vital utilities."*

In its international flood mapping project prepared for insurance purposes, FM Global includes Invermay/Inveresk as a high hazard flood area, despite the renewal of the levees. https://www.fmglobal.com/research-and-resources/global-flood-map

In its 2006 report, GHD considers both flooding and geotechnical issues in relation to developments on the Invermay floodplain. The report is very objective and impartial in its analyses, and although it was prepared before the levee reconstruction it raises a number of issues and gives specific advice in relation to planning, development and management at Invermay that are still valid and pertinent after levee renewal. The relevant aspects are quoted below:

GHD p1 - Overview of Key Issues

*"Detailed flood risk management is required in the suburb of Invermay as a result of the following concerns:*

- *Risk of flooding and the consequent danger to people and property;*
- *Difficulties of providing and maintaining infrastructure in the soft base material, including the combined stormwater and sewerage pipe system, the discharge of sewage into the river in heavy rain and the lack of a drainage system for private property;*
- *Difficulties of erecting and maintaining structures on unstable ground; and*
- *Potential liabilities faced by the Council and Government arising from a major flood."*

GHD p26 – Potential Climate Change Impacts (written in 2006)

*"The potential of rising sea levels together with some evidence of more violent extremes of weather, suggests that there are grounds for erring on the side of caution in relation to planning decisions where water inundation is a significant factor. Accordingly we would conclude that in planning for the hazards in the Invermay area, due regard must be had to this issue. The above also means that there should be close consideration to such matters when considering any developments in close proximity to the levees."*

The more recent detailed Tasmanian climate change studies described herein serve to reinforce and strengthen the above view.

### *3.5.3 Planning Related Advice*

Risk management is a well-documented approach to integrated floodplain management (eg SCARM Report 73, 2000; AIDR, 2017) that in essence is based on the three level hierarchy below (although different terms may be used for each level). The states and catchment management authorities have also published floodplain management plans and related documentation for their jurisdictions. As part of what is termed integrated floodplain management, in recent years a focus has been on the level 2/3 strategies ie for avoidance and response (eg levee maintenance, building design/controls, education, emergency planning). These are particularly appropriate for the purpose of protecting existing assets, in this case the suburb of Invermay and low lying parts of the city. However they can also be used (inappropriately/irrationally) to rationalise/justify new developments in flood risk areas (eg Pitt&Sherry, 2012), which by increasing the value of 'protected' assets through planning within the avoid/respond levels, can actually increases the risk – ie the probability of a flood event may not change, but the consequences increase as asset value increases.

GHD pii (in executive summary) – A Hierarchy of Actions, Levels 1, 2 and 3

*"1. Prevent: Stop people, businesses and the community placing themselves, their property or their facilities at risk.*

- *Land use planning including zoning to limit development;*
- *Purchase of properties with people, businesses or facilities moving to higher ground;*

*2. Avoid: Control, manage and dissipate the risk to life, property and infrastructure.*

- *Construction of engineering works – these include levees, dams, diversions and floodgates, dredging, detention basins, etc;*
- *Ongoing maintenance and monitoring;*
- *Building & infrastructure controls such as design regulations.*

*3. Respond: Ensure authorities, people and businesses know what to do before, during and after a flood. Preparedness (planning for the flood) through:*

- *Information and education, utilisation of forecasting and warning systems;*
- *Ensuring appropriate personnel and equipment are available;*

- *Emergency response plans including evacuation procedures."*

GHD p15 - Strategic Planning: Policy Papers used for the Launceston Planning Scheme 1996

*"A series of Policy Papers form the basis of zonings, provisions, objectives and strategies included within the Planning Scheme. A number of issues relating to use and development in identified flood prone areas are acknowledged in the "Flood Liable Land" section of the Environmental Papers.*
*In summary, the following issues are identified [by CoL]:*

- *Controls are necessary to avoid inappropriate land use and to ensure that inappropriate developments do not take place on floodplains.*
- *Flooding and poor drainage can affect the suitability of land for development, result in danger to life and property and create potential health hazards.*
- *Flooding can have serious impacts on infrastructure such as roads, bridges and the like.*
- *There are potential flood risks associated with development on the Invermay floodplain."*

This shows that the CoL has itself identified the major issues associated with development at Inveresk/Invermay, and although the probability of flooding is diminished with the renewed levees, it is not removed, and the risk increases with new/additional developments.

GHD p 38 – False Assumptions and the Review of the Planning Scheme (in 2005-6), and refers to the possible development (improvement) of the levees

*"It is noted that Council is currently in the process of reviewing the Launceston Planning Scheme. If the current false assumption that land within the levees is protected from water inundation continues, the review is not likely to result in significant change to the existing pattern of land use zoning, nor the controls applying to the area, and areas protected by the levee system development could continue unfettered. It is essential the review process abandon the false assumptions that;*

*i. Invermay is not subject to flooding; and*
*ii. has a stable geotechnical base.*

*Considering the importance of the issues involved with floodplain planning, and the time involved in reviewing entire planning schemes, we believe that a separate planning study should be urgently commissioned for planning in the Invermay floodplain."*

GHD p37 and ps 66-7 – CoL Planning and Building Controls

Although written before the levee renewal, and the levees are now at 0.5% AEP, the planning observations are still relevant

*".....Further evidence was available to Council from its own experiences in maintaining water and sewerage systems in Invermay. So great is the movement of the ground that pipes continue to fracture and have to be regularly replaced thus adding greatly to the cost of the provision of services. The same problems are experienced in the additional costs of road maintenance.*
*In relation to flood liability, the Council has received many reports over the last decade into various aspects of the conditions or parts of the levee system. .....The bottom line of this assessment is that Council has been aware for some years about the flooding and geotechnical hazards and has not taken action to reflect this knowledge in its planning scheme for Invermay. The willingness of Council to endorse for public comment, the Inveresk Master Plan, in recent years without any reference to flooding or geotechnical hazards is further evidence of the fact that the flood and geotechnical hazards have not been appropriately dealt with."*

*"The planning and building controls have to stop people, businesses and the community placing themselves, their property or their facilities at risk. The rules should be such that new construction or land uses minimise risk to life limb or property. This will mean some uses will not be allowed. In addition, it is difficult to force the retrofit of existing buildings. The cost in most cases would be prohibitive and in some cases, it would not be possible. However, where there is a desire to amend or change existing use or buildings there should be compliance with the new rules. .....*
*Investing in planning and building controls has a very high return. Accordingly, planning and building controls should be developed and implemented such that:*

- *The risks and community vulnerabilities associated with flooding are adequately considered when making decisions about development and land use;*
- *Controls recognise that effective land use planning is an important means of promoting resilient communities and reducing the communities' vulnerability to flooding;*
- *No development should be allowed within the floodplain (including the area inside the levees), except where it: – minimises as far as practicable the adverse impacts from flooding; – does not result in unacceptable risk to people or property."*

These comments indicate that land use planning controls are the cheapest, most effective and reliable means (through active prevention) of flood protection, and reflect the same generic advice as given by FM Global (see above), especially where non-flood prone alternatives are available.

### *3.5.4 Liability Related Advice*

Potential Liability - GHD p59

> *"A more serious dimension of this issue is the liability for damage in the event of a major flood, which resulted in water entry to Invermay. Under the current arrangements, it is possible that some businesses and homeowners could mount a legal argument that the State Government, but particularly the Council, had some legal responsibilities and a "duty of care" to them. In relation to the Council, it could be argued that by issuing planning approvals and building permits etc, it was providing an implicit indication that no significant risk from either geotechnical conditions or flood risk was known or existed."*

The potential for liability is also discussed in the SCARM report 73, (p 30), which indicates that it is dependent on State legislation and that public authorities may not have the same level of duty of care as individuals or corporations especially where there are political or other constraints. This may warrant further advice.

More recently, predominantly in western countries including Australia, there has been a range of litigations around the theme of climate change, and such litigation is only likely to increase. The United Nations Environment Programme, recently published (May 2017) `The Status of Climate Change Litigation – A Global Review' (UNEP, 2017) which provides wide ranging information about the topic. It is available at: http://wedocs.unep.org/handle/20.500.11822/20767. Some relevant extracts are shown below:

> *"Technical understanding of climate change and the quality of predictions about future temperature and weather patterns are improving. Recognizing that adaptation efforts have not kept pace with these improvements, litigants are bringing claims that seek to assign responsibility where failures to adapt result in foreseeable, material harms.*
>
> *Litigants are making arguments for climate action based on the public trust doctrine, which assigns the state responsibility for the integrity of a nation's public trust resources for future generations. Such claims raise questions of individuals' fundamental rights and intergenerational equity, as well as concerns about the balance of powers among the judicial, legislative and executive branches or functions of governments.*
>
> *Although standards vary, courts generally only grant standing if the alleged causal connection between the injury and the action (or inaction) complained of is plausible."*

In the usual spirit of opportunity and need, commercial legal firms are also offering advice, eg http://www.mondaq.com/australia/x/731544/Climate+Change/Climate+change+litigation+is+your+business+prepared. Relevant introductory extracts are:

> *"Climate change litigation is becoming increasingly prevalent and has the potential to substantially disrupt business activities or operations, with subsequent cost implications. Accordingly, it is not surprising that businesses have considered stepping up their efforts to understand, assess and minimise their exposure to risks associated with climate change related legal action……*
> *Key risks to business associated with climate change litigation, among others, include exposure to damages claims, financial and reputational cost of defending litigation, disruption to operations and enforcement of financial disclosure requirements."*

Neither UTas nor the CoL would be immune to such climate change litigation, especially in view of the results of the updated 2018 BMT flood modelling and mapping. To this end BMT provided one appropriate planning map in its technical report presumably as an example for judicious future planning by the CoL.

### *3.5.5 Flood Planning Constraint Mapping Advice – BMT 2018*

> *"To assist Council with land use planning activities, a flood planning constraint map has been developed for 2050 climate conditions. Guideline 7-5: Flood Information to Support Land-use Planning of the Australian Disaster Resilience Handbook Collection (AIDR 2017) identifies four flood planning constraint categories (FPCCs) across a floodplain. For Launceston the FPCCs mapping has been produced using the following categorisation:*
> ***FPCC 1** - Areas of flood hazard class 6 (Section 5.2.4) in the defined flood event (DFE) which is the 1% AEP event*
> ***FPCC 2** - Areas of flood hazard class 5 in the DFE or of flood hazard class 6 in the 1 in 2000 AEP event*
> ***FPCC 3** – Areas within the DFE extent [defined flood event]*

***FPCC 4** – Areas within the PMF extent" [probable maximum flood]*

The resulting FPCC Map is presented below, and the Inveresk Precinct is categorised as FPCC 2 which includes hazard classes 5 and 6. Hazard class 5 is described and represented in prior tables and map.

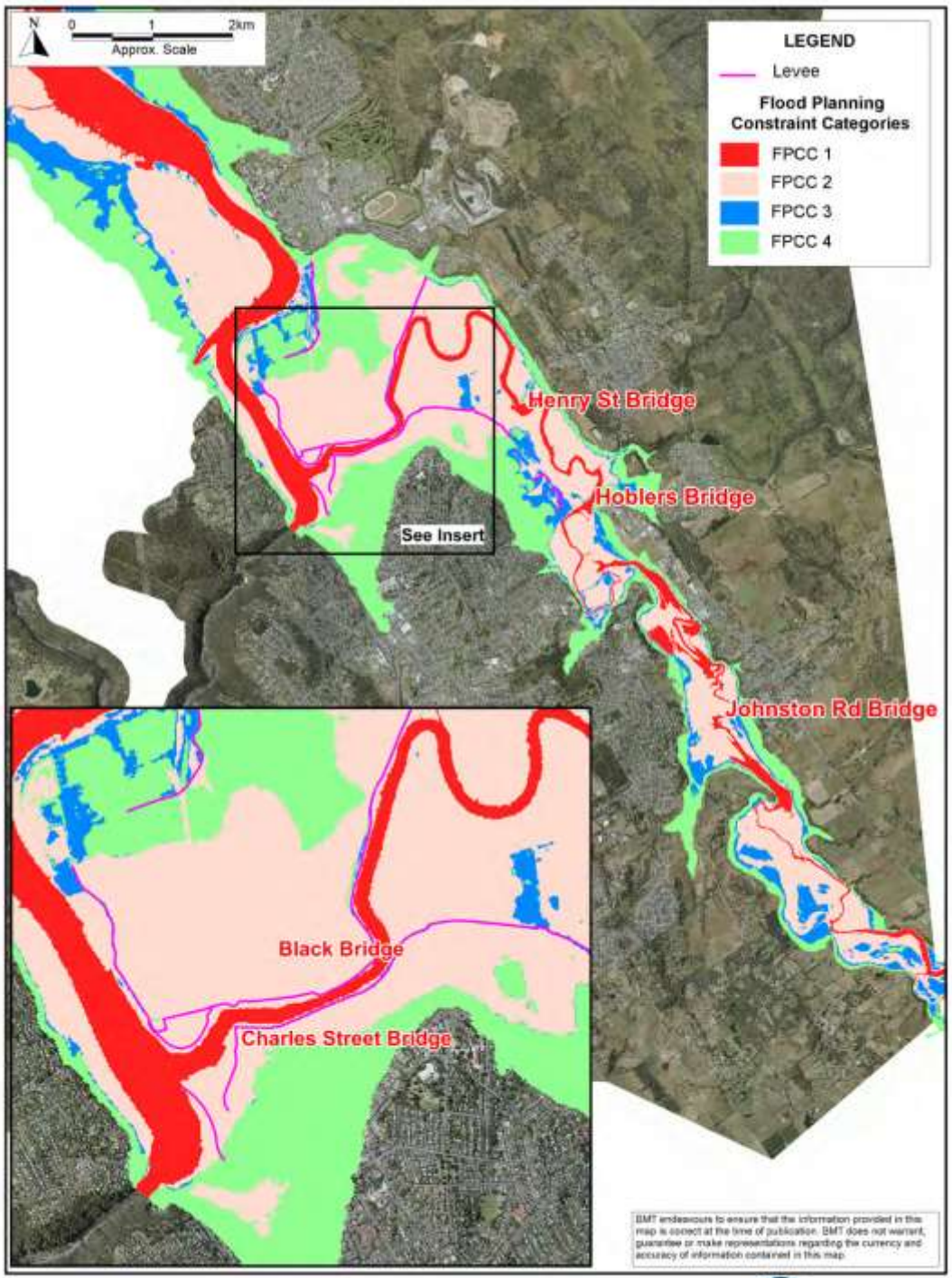


**Figure 5-10 2050 Climate Conditions Flood Planning Constraint Map**

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It appears that BMT is providing the CoL with timely, rational and informative advice, especially through the flood planning constraint map. UTas should also be made aware of the reports and advice, and both entities would be wise to review the planning and progress undertaken to date for the Inveresk Precinct Redevelopment.

To complement the previous environmental section, the following sections continue with the expected social, economic and ethical considerations. However they are only presented in summary form as key, important considerations, with their assessed inclusion in the EDERNT (ie UTas original planning) and a brief comment. They were prepared as part of the scope and intent for this review, and remain as summary lists due to time constraints. Nevertheless they provide an overview of valid project elements that warrant inclusion in the review with much fuller expositions. Numerous references have been assembled and can be made available. Currently UTas is progressing the project on the basis that there are engineering/design solutions to the appropriate environmental problems with the site. If, in some instances this may be so, technology cannot resolve all environmental issues, nor most of the social, economic and ethical aspects that deserve to be properly addressed.

# 4. SOCIAL CONSIDERATIONS

| ***Considerations/Constraints for the Proposed UTas Relocation to Inveresk*** | ***In the EDERNT?*** | ***Comment/Relevance*** |
|---|---|---|
| **Social Considerations** | | |
| • Educational – new Associate degrees | Y | Useful addition to UTas courses/quals – but must retain existing courses/standards |
| • Educational interactions, learning/teaching | N | Learning needs of students enrolling in Assoc degrees |
| • Services- water, sewage etc | N | Difficulties/maintenance especially in fluid soils – also in flooding/earthquakes |
| • Traffic and parking | N/Y | Trying to sort after the primary decision to relocate |
| • Floodplain risk management – a hierarchy 3 levels and the Flood Deed (TasG-CoL) | N | Prevent (land use), avoid (control), respond (education, disaster plan) |
| • Flood protection (levee) paradoxes | N | Encourage development, (to) justify levee expenditure |
| • Levees as 0.05% AEP and maintenance | N | All acknowledge levees can be overtopped or fail |
| • Risk as probability & consequence, esp levees | N | More buildings, increases consequence and so risk |
| • Emergency plans &evacuations etc | N | Third level action - UTas competing with Invermay |
| • Gifting of public land by CoL to UTas – tender/public loss?? | N | CoL approves title change gift to UTas for land parcels |
| • Community consultations | N/Y | After the proposals (minor tweaks –eg parking/traffic) |
| • YPIPA involvement | N | Initially involved/feedback, then sidelined |
| • Contribution to sustainability | N/Y | On many criteria not environmentally sound |
| • Northern suburbs revitalisation strategy?? | Y/N | Moving UTas likely to devitalise the northern suburbs |
| • UTas Inveresk to enliven CBD | Y | Dubious, as not CBD – at expense of northern suburbs |
| • Future of AMC at Newnham | Y/N | Could become problematic – stranded asset, known interest from Sth Aust |
| • Future use of non-AMC Newnham | Y/N | No genuine needs identified – asset sale $s to UTas?? |
| • Duty of care, legal liability – to court/in media | N | What would decision makers say to a judge/media?? |

# 5. ECONOMIC CONSIDERATIONS

| *Considerations/Constraints for the Proposed UTas Relocation to Inveresk* | *In the EDERNT?* | *Comment/Relevance* |
|---|---|---|
| **Economic Considerations** | | |
| • Detailed project costings, budget, timelines | N | Only broad projections provided |
| • Engineering/design costs for Inveresk site | N | Significantly higher than normal - environmental issues |
| • Analysis of recent Newnham financial losses | N | Only a statement, no breakdowns to improve |
| • Recent planning/improvements at Newnham | N | Much done but ignored – still useful, but sunk money? |
| • Comparison of alternatives | N | Renewal (even partial) at Newnham not considered |
| • Cost-benefit analyses of options | N | None |
| • Involvement of Infrastructure Australia | N | Only after the event, but a legal requirement |
| • Facility Insurance | N | Not discussed – FM Global would not insure Inveresk |
| • Maintenance and services - eg TasWater/CoL | N | May prove more costly than normal – not considered |
| • Recovery costs after water /seismic event | N | Part of long term economic planning – not done |
| • Personal/social recovery after bad event | N | Part of long term planning – not done |
| • Potential expansion of campus | N | No mention of this possibility, but what if needed? |
| • Future of AMC | N | Increased costs without other UTas? – not done |
| • Economic losses to northern suburbs | N | Economic impact not discussed/assessed |
| • Possible future legal claims | N | Potentially costly – trauma, injury, loss of life |
| | | |

# 6. PROCESS and ETHICAL CONSIDERATIONS

| *Considerations/Constraints for the Proposed UTas Relocation to Inveresk* | *In the EDERNT?* | *Comment/Relevance* |
|---|---|---|
| **Process and Ethical Considerations** | | |
| • UTas as rational entity – evidence based decision making, and EEES? – expect of staff | N | Eg if research staff published papers & conclusions without argued evidence, they would be sanctioned |
| • Political due diligence prior to 2016 election | N | Lacking – ran with the marketing concept |
| • Involvement of Infrastructure Australia (IA) | N | Only after the event, but a legal requirement |
| • Level of involvement of UTas Council | N/Y | Not known, but seems 'rubber stamped' |
| • Relevant public opinions of UTas academics | N | UTas academics have had contrary opinion pieces in local media |
| • Consultation with staff/students | N | No input re primary decisions; some after event |
| • CoL processes since 2012-13 | N | Open to question re acceptable/ethical/legal actions |
| • YPIPA terminated (2016-17) | N | Action of CoL, removal of a questioning voice |
| • Roles of CoL-GM and UTas-VC | N | Appears to be joint top-down decisions and pressures |
| • Impact on northern suburbs | N | City centre takes precedence over northern suburbs |
| • Possibility of AMC as stranded asset | N | Not considered - assumption it will manage |
| • Legal implications and potential liability | N | A possibility after a bad event – not considered |

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