A submission to Tamar Estuary Management Taskforce

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Problems in the estuary are:-

- **Excessive siltation*** caused by poor tidal flushing, low freshwater flows and redirection/infilling (Davis and Kidd, 2012)
- **Excessive nutrients*** from catchment runoff, treated and untreated sewage (Inappropriate siting of WWTPs especially Ti-tree Bend)
- **Weeds** – willows and rice grass
- **Exotic fish** - gambusia, oysters
- **Sea-level rise*** – 2.7 m expected by 2100

- **Problems*** are interrelated and require holistic solutions
- **Estuarine processes are often counter intuitive** and a specialised knowledge is required when dealing with the estuarine environment. The Tamar is not a river and does not have a flood-plain. 'Launceston' is built on inter-tidal zones - tidal flats and tidal marshes

Criteria to be met

- **Essential criterion #1**:- ***Act with nature for a good chance of success; act against nature for certain failure*** (PIANC, 2011)
- **Essential criterion #2**:- solutions must address the **root cause** of the problem
- **Essential criterion #3**:- Launceston is a first world city and deserves **first world solutions**
- **Essential criterion #4**:- solutions must be **SLR-proof**
- **Other criteria**:- cost, public licence, etc. etc..

Silt

- **The silt issue** has never been solved despite $millions spent because the root causes have never been addressed - see (Davis and Kidd, 2012; Kidd and Davis, 2015; Kidd et al., 2017). Excessive silt is a **symptom** of the root causes mentioned above and studies into the silt per se can never provide a solution. The silt is neither a catchment issue nor a turbidity issue (Davis and Kidd, 2012; Prandle, 2009) "The prevailing estuarine sediment regimes are a consequence of rather than the determinant of estuarine bathymetries" (Prandle, 2009). Peer reviewed solutions are discussed in Kidd et al. (2017).
- **Raking** – arguably working with nature (using the flow) but doesn't provide a permanent solution because it acts to (re)move the symptom rather than removing the root cause of the issue. Works against nature by infilling the channel and removing natural tidal flats.

Sewage

- **Combined sewerage systems** are common around the globe so why has the Launceston system failed? (which implies that the combined system cannot be the root cause of the

problem) - **Answer**: it attempts to act against the natural processes of the estuary. WWTP discharge points all act against the tidal nature of the estuary (see criterion #1).

- **Problem is exacerbated by** reduced flushing caused by redirection of the South Esk and reduced tidal flows due to tidal levees (which in turn causes the excessive silt accretion)
- **A tide flowing at 0.5 m/s for 6 hours travels 10.8 km**, so as a basic starting point, discharge points must be at least **12 km downstream of Launceston** and preferably, discharge into Bass Strait **and** the WWTP must be relocated out of Launceston at an elevation above 10 m AHD.
- **Some piping** is already laid adjacent to new sections of East Tamar Highway from the failed Gunns Pulp Mill Project??
- **Effluent** passes any point in the estuary at exactly the same rate as it is discharged, so.....
- **Under the 12 km scenario** dilution levels remain exactly as at present downstream of the discharge with no effluent reaching Launceston
- **The sewage 'fix'** lies somewhere between more appropriate discharge points and a fully separated tertiary-treatment system.
- **The solution to pollution is dilution**. **Ti-tree Bend** discharges into ~3 million m^3 of tidal prism whereas 12 km downstream the tidal prism is ~30 million m^3 and Bell Bay is 150 million m^3. Dilution at Bell Bay is such that fish-farming is completely safe.
- **TasWater's preferred solution** meets neither criterion #1 nor criterion #2 and **will fail**. Similarly criteria #3 and #4; the centre of the city is no place for such a facility and is threatened by even a modest SLR.

Sea-level rise

- **Retreat is the better part of valour:-** Sea-levels have a direct correlation with CO2 concentrations in the atmosphere. With concentrations above 400 ppm SL ought to be 7-9 metres above the present and increases are inevitable whether emissions are reduced or not (negative emissions are required to prevent catastrophic SLR). To mitigate SLR and satisfy our essential criteria requires retreat and giving the estuary sufficient **accommodation space**. With accommodation space and sufficient sediment supply the estuary has a chance of rising *with* a modest SLR without drowning of the upper Tamar valley.
- **In other words –** infrastructure – plants, pumps, sewerage and waste water pipes must be of sufficient elevation to remain above SL for the life span of the asset.
- **A barrage –** is the ultimate example of working against nature and **will fail**. (Kidd et al., 2016a; Kidd et al., 2016b; Kidd et al., 2017; Kidd et al., 2015)

Solutions – minimum requirements

- **Tailrace waterway** returning Tailrace discharge along the Trevallyn foreshore to the Yacht Basin (Kidd et al., 2017)
- **Return North Esk tidal marshes to the estuary** Acquisition of Glebe Farm, Glebe Gardens inter-tidal flats, Bill Grove inter-tidal flats and removal of associated tidal levees (Kidd et al., 2017)
- **Reinstatement of old North Esk meander system** on the Bill Grove inter-tidal (Kidd et al., 2017)

- **Remove sluice gates** near Henry St Bridge
- **New WWTP beyond the city limits of Launceston** discharging to a point at least 12 km downstream of Launceston. All sewage and storm water to be pumped to that facility. Elevation > 10 m AHD; treated as close as possible to (not worse than) present Ti-tree Bend standard
- **Remove silt ponds and old WWTP** at Ti-tree Bend and return to estuary – possible urban wetland park/ tourist feature
- **Reduce nutrient run-off** from the catchment utilising....
- **Real time monitoring system** for nutrient loads in catchment areas of Esk Rivers. NRM North to coordinate.
- **Discourage** future development below 10 m AHD and encourage retreat from same

Outcomes

- **Root causes** of silt and sewage problems are addressed
- **Upper estuary restored** as close as possible to natural state
- **Physical amenity** returned to the upper estuary allowing Launceston to reach full potential
- **Silt permanently** reduced to acceptable levels without affecting Trevallyn Power Station
- **Raking** not required
- **No sewage (raw or treated)** discharge into the environs of Launceston
- **Separation** of storm water and sewerage infrastructure not immediately necessary
- **SLR resilience**

References (most included in attached thesis (Kidd, 2017)**)**

Davis, J., Kidd, I., 2012. Identifying major stressors: The essential precursor to restoring cultural ecosystem services in a degraded estuary. Estuaries and Coasts 35, 1007-1017.
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PIANC (2011). Working with Nature. Accessed August 2016, from http://www.pianc.org/wwnpositionpaper.php.
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Attachment

- Thesis; (Kidd, 2017)