Profitable Problems
Resource Transformation Specialist

TAMAR RIVER SILTATION STUDY

Introduction

There are two substantive issues confronting the Tamar River estuary: 1) siltation; and 2) sewerage discharge. Regardless of what physical manifestation the estuary is reconfigured into, these two primary issues must be addressed. This is not a situation unique to Launceston but is quite common in both tidal and riverine ecosystems that are interrupted by urban development.

Resolving the environmental deterioration of the Tamar estuary can therefore best be achieved by adopting proven methods from other estuaries. Whilst silt and sewerage are separate issues, combined they pose an increased health risk. Thus, resolution becomes not an either or exercise but a dual imperative. Resolution, though, can be easier to achieve if they are separated.

Siltation

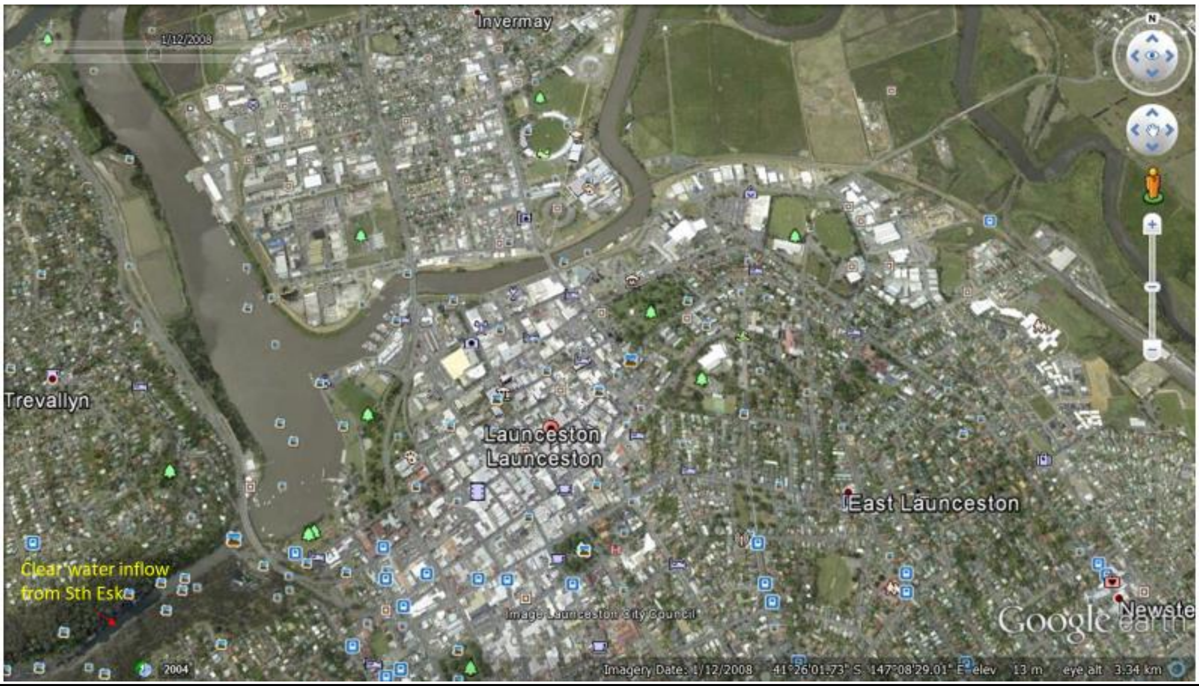
Most proposed action on siltation to date have focused on an engineering assumption that by altering the inter-tidal zone to prevent flocculation, then the silt will stay immersed in the water flow rather than deposit in the confluence of the three rivers. Regardless of where the silt is deposited, it must eventually be physically removed or be allowed to form resultant alluvial delta plains. The choice is to either remove deposited silt or prevent silt entering the upstream watercourse.

From a cost and political perspective, stopping silt entering the river system across the catchments is not feasible in an active agricultural geography. Which dictates the need for a silt harvesting approach, where engineering is directed towards silt capture and extraction. Past efforts involving dredging in the inter-tidal navigation zone are the most expensive option and do not improve the physical attractiveness of the river. The by-product spoil may also contain unacceptable salt content and faecal matter, limiting its commercial value.

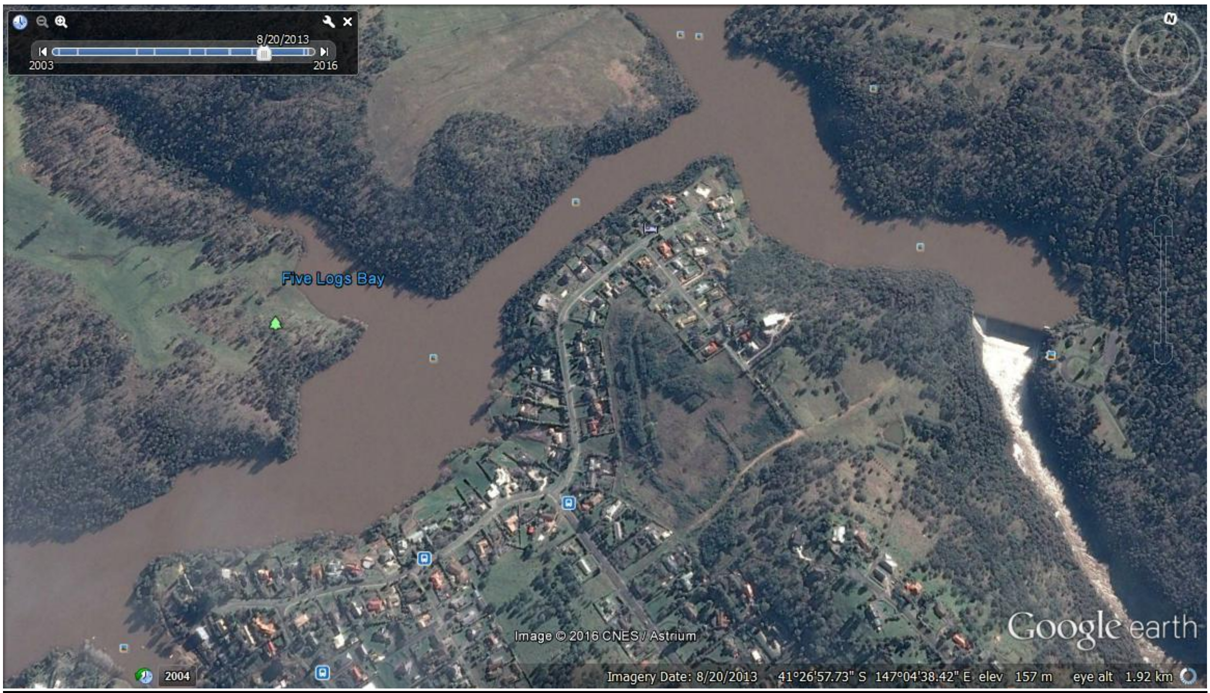
Silt raking has also been attempted with limited attributable value: akin to moving the deck chairs on the Titanic. Deliberately emulsifying silt can also impact the marine ecology and lower oxygen levels, as well as increasing microbial activity from the embedded sewerage.

The most common approach adopted elsewhere is to create up-stream on a dry-land site, a system of detention basins where silt can be trapped by reducing the flow rate by spreading out the water. Most siltation appears to be contributed by the North Esk River, as the Trevallyn Dam acts as a detention basin for the South Esk River. Satellite imagery tends to confirm this, as depicted below.

North Esk – South Esk – Tamar River Confluence



Lake Trevallyn on the South Esk River



What is apparent from the satellite imagery, is that the intersection of the North and South Esk is not a natural configuration. Intersecting rivers create a Y-shaped confluence which allows the stronger flow to draw out the weaker flowing river and merge side-by-side. It appears that the

North – South confluence has been "stream-lined" at some stage, directing the North Esk flow back into the mouth of the South Esk, causing silt-laden water to back up; heavily silting the Seaport precinct. The first recommendation would be to build an abutment on the southern tip of the North Esk to create a Y-shaped intersection and reinstate the natural venturi effect.

North Esk Y-Shaped Abutment

Now, instead of the down-river flow power of the North and South Esk countering each other, they would combine to push against the tidal power of the Tamar and move the silt drop zone further down-river; making it less visually obtrusive.

Next recommendation is to create the detention pondage upstream of the current silt drop zone on the North Esk. Land identified as being subject to flood inundation and therefore of limited economic value, should be examined for detention-basin potential. A concept plan of a silt-trap pond is shown below. The pondage would be created by excavating the alluvial silt down several metres rather than raising a dam wall above current water levels to avoid increased flood risk and to minimise encroachment on non flood-prone land. This will require environmental study of the impact on the marine ecosystem of changing from an inter-tidal system to a pure riverine one upstream of the impoundment. It is possible to maintain the tidal system using a series of locks and flood barriers, but it is questionable whether any environmental benefit would justify the cost, as it is a mostly fresh-water zone and maintaining a constant water level could be advantageous.

Silt Detention Pondage Concept

Incorporated within the design would be an ability to drain the pondage when silt level reaches a desired point to allow for its simple dry removal (much as from dredge ponds but without silt plumage from the actual dredging).

It should be noted that a considerable amount of the Seaport deposited silt has been eroded from the alluvial plains down-stream from St Leonards and the North Esk riverbanks are in very poor condition. Maintaining a constant water level equivalent to the average high-tide level should reduce the river-bank erosion currently occurring and provide for recreational water-based activities such as canoeing.

Sewerage and Stormwater

These are normally two separate issues but as stormwater enters the sewerage system in Launceston, they are linked. Until such time as the stormwater is removed from the sewerage pipelines, it will be uneconomic to attempt to fix the discharge problem in the Tamar estuary.

Stormwater separation should be attempted on a volume basis; prioritise the largest volumes entering the system first and work down.

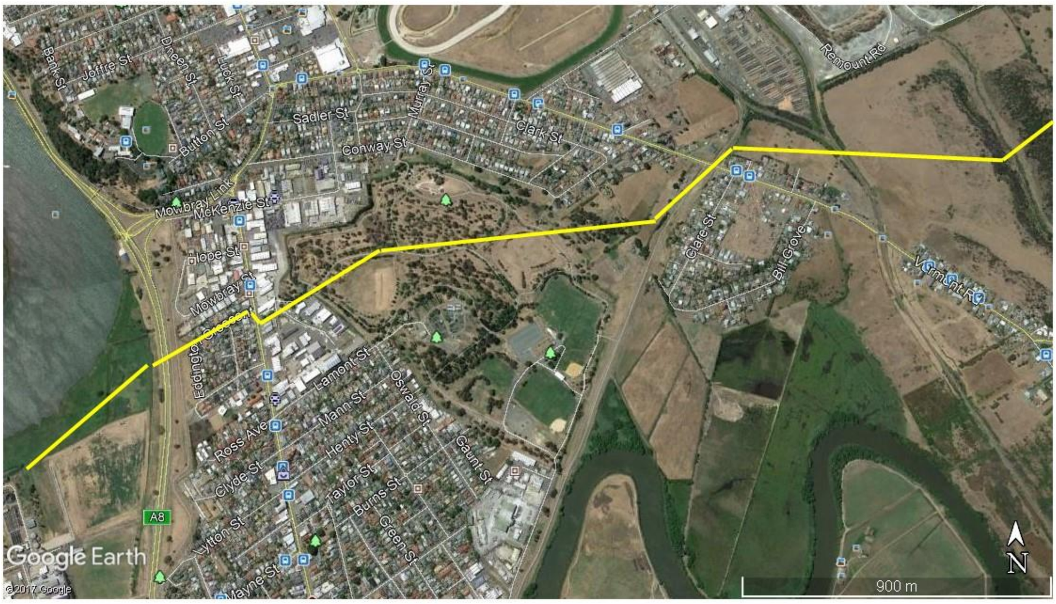
Once the volume of stormwater has been lowered to a more manageable level, a decision on sewerage management can be considered. Depending on availability of funding and political imperative to solve the issue, either a long-term tertiary upgrade or a short-term low-cost method adopted by other Councils with a similar problem, could be investigated.

The Armidale Council in northern NSW was compelled by the Environment Protection Agency to urgently cease discharging treated sewerage water into a waterway because of the impact of nutrients on the aquatic ecosystem. As the Council had neither the funds nor time to upgrade to tertiary-level treatment, they devised an interim solution by acquiring a nearby grazing property and piping the treated water to it and using it to irrigate fodder crops which they then sold to defray costs.

A similar concept could be employed in Launceston, as suitable land is within a practical distance from the main treatment works and pipeline corridors, whilst not ideal, are present. A long-term lease of land may be possible and enable a less financially burdensome timescale to upgrade to full tertiary treatment.

An indicative route is outlined below from one of the treatment plants.

Tee-tree Bend Treatment Works to Open Farmland



Conclusion

The suggested options are designed to create an awareness of utilising applied innovation to solve complex and difficult problems cost-effectively. Positioning silt detention pondage upstream of the current siltation problem, allows for not only a low-cost construction but an ability to easily remove silt build-up and capture a cleaner saleable top-soil product than the current contaminated dredged spoil. An additional benefit is that the pondage would be aesthetically pleasing and could incorporate elements of outdoor recreation.

Treated sewerage contains useful nutrients for plant growth. In waterways this leads to algal blooms or choking reedbeds, but in a controlled farming situation can be managed profitably.

Whilst these might not be the government's preferred options, they should at least encourage other innovative ideas.

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