How to save money and achieve better environmental outcomes with your Erosion and Sediment control budget

The key to massive budget savings when it comes to works relating to controlling land degradation and containing polluted run off is accepting that traditional hard engineering techniques are not the most cost effective solution and these practices don't bring with them many environmental benefits.

What if there was a win-win solution. A way to hold on to our land, improve the quality of water flows with less piggy backing of pollutants and this way costs much less than any other option available. Sounds perfect doesn't it?

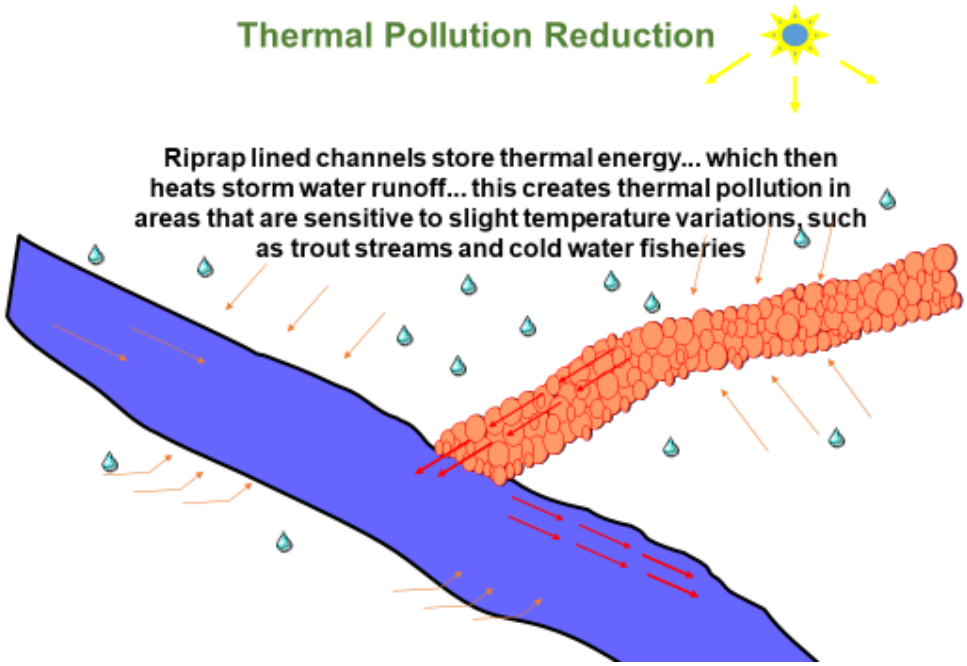
'Soft Engineering' is the way.

Engineers around Australia have the benefit of having access to guidelines advising of appropriate practices to manage and control soil erosion and sediment movement. The guidelines recommend possible erosion minimisation and sediment control strategies. Although developed as guidelines for construction activities, the majority of the methods in these manuals are related to traditional 'hard engineering' practices typically using rock or concrete. Traditional methods such as these may be the current reactive state of practice but they are hardly a proactive approach.

Let's look at some of the methods currently used as Erosion and Sediment control measures to compare the benefits and limitations

Rock rip rap

- Typically not engineered
- Reduces water velocity
- Expensive & labour intensive
- Unattractive & unsafe
- Does not contribute to water quality



Concrete paving

- Perception of less maintenance, in the short term
- Resists very high water velocity
- Prevents groundwater recharge
- Very expensive
- Rigid & inflexible
- Transports sediment downstream
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- Other 'Hard engineering methods such as gabions, articulated concrete block systems, hand-placed concrete blocks and even fabric-formed revetments have similar limitations and few environmental benefits.


Soft Engineering techniques on the other hand, which are available in Australia

- Can limit erosion of soil particles which reduces the sedimentation pollutant load.
- Reduce “piggyback” transportation of other pollutants that tend to chemically and physically attach to sediment particles.
- Removal of sediment also removes harmful contaminants.
- For example, using **Turf Reinforcement Mats** as an erosion and sediment control method extends the performance limits of vegetation and reduces sediment transport to enhance storm water quality

- **TRM reinforced channels provide filtration, grassed channels can increase filtration by as much as 700%**
- **Reinforced channels provide ground infiltration of storm water to help control “First Flush” and long term runoff totals to designated water bodies.**
- **Results show vegetated channels retain 30 to 70% of deposited sediment**
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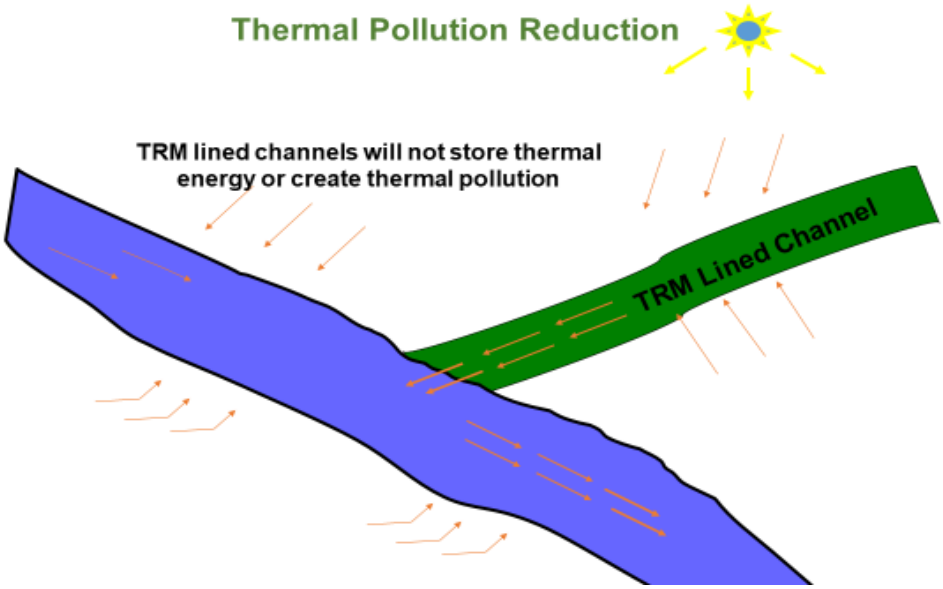
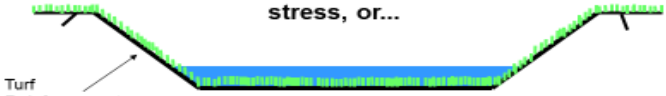
Thermal Pollution Reduction



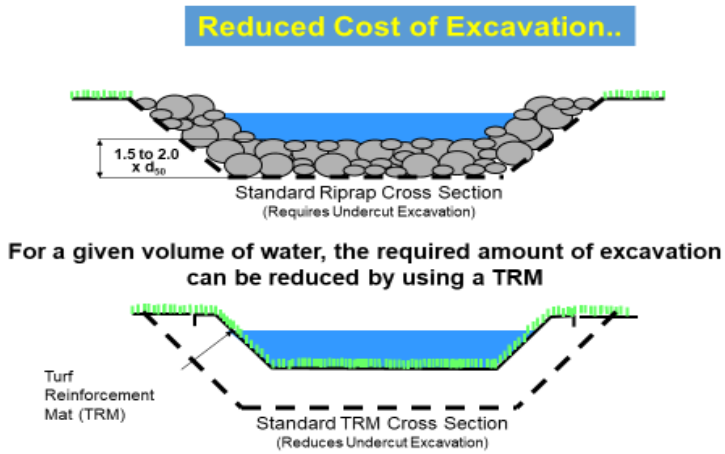
Increased Channel Capacity...

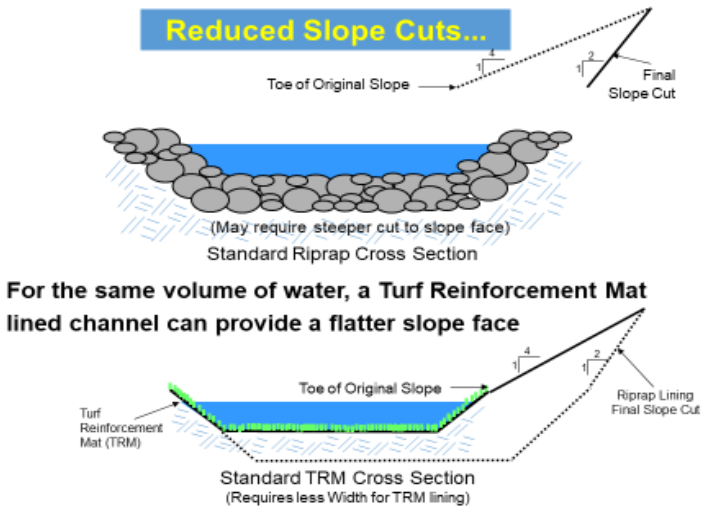
Standard Riprap Cross Section
(Riprap takes up space in channel)

For a given channel cut, a TRM lining will allow the same amount of water to run wider and shallower, reducing velocity and shear stress, or...



TRM Cross Section
(TRM lining leaves more space in channel)





Consider the following **Remediation Options Comparison** from an independent design company for an impending project.

Option: TRMs

Supply Costs: Standard system = $23.00/m2

Comments:

- Increased Anchorage system = $39.00/m2
- Fast installation process
- Minimal risk of dam incident during installation
- Minimal change to existing visual aesthetics
- Minor changes to existing maintenance program
- **Low cost vs benefit**

Option: Reno Mattress

Supply costs: Gabion Mattress + Fill = $50.00/m2

Comments:

- **Moderate cost vs benefit**
- Minimal risk of dam incident during installation
- Increased difficulties to existing maintenance program

Option: Concrete Protection

Supply costs: Concrete + formwork = $1500.00/m3 Note: Geotechnical investigations would be required to provide input in the design to ensure settlement is addressed.

Comments:

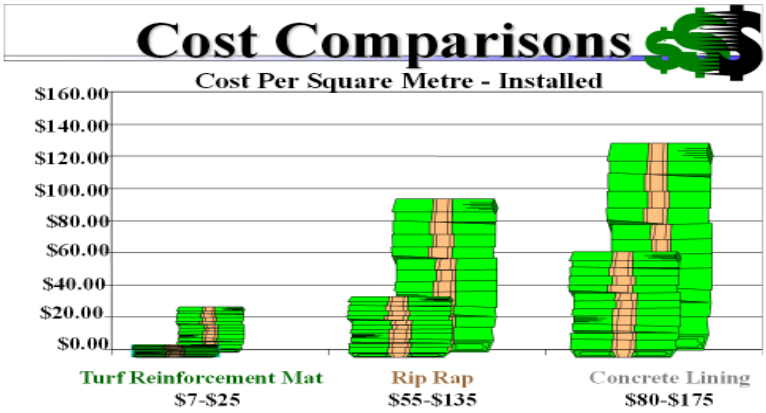
- Highest cost vs benefit
- Longest installation time
- Poorest aesthetics
- Highest risk of dam incident during installation
- Unintentional encouragement of increased patronage

Option 1 – **Turf Reinforced Mats**. Includes the installation of Turf Reinforced Matts (TRM) to protect the embankment from scouring. The TRMs would be keyed in via trenches along the crest and toe of the embankment, along with being fixed via anchors at regular spacing along the TRM.

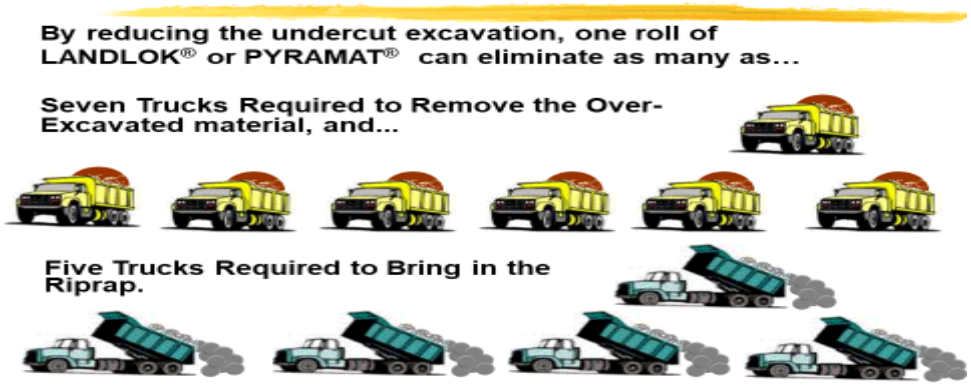
Option 2 – **Reno Mattresses.** Includes lining of the embankment with reno mattresses. The mattresses would be keyed into the embankment with gabions trenched along the embankment crest and tie, and tied to the mattress. The renos would also require anchors at regular spacing to fix in places. The option to protect the embankment with gabions / renos was considered as a more robust option if the TRMs could not provide sufficient erosion protection to the embankment. During consultation with council it was also identified that the gabion / reno mattresses would significantly reduce the aesthetics of the recreational area.

Option 3 – **Concrete Protection**. The option to protect the embankment with concrete was only briefly considered due to the following reasons: The capital cost to install the solution; additional geotechnical investigations would be required to ensure the design provides measures to ensure no future settlement occurs; and, similar to the **Gabions / Reno mattresses, the concrete protection would significantly reduce the aesthetics of the recreation area.**

- You can see the **cost/benefit ratios** vary widely with each application and **using the 'soft' alternative of TRM's to** extend the performance limits of vegetation, to reduce sediment transportation and to enhance storm water quality not only is **better for the environment** but also **saves money**



Reduced Site Disturbance



For more information or to view successful 'soft engineering' projects around Australia visit our website

TECS **Total Erosion Control Services**

The Soft Engineering Specialists

Or contact **Paul Duncan 0404089602**

Promoting the benefits of Turf Reinforcement Mat's (TRM's) for Storm Water, Drainage, Erosion Prevention and Water Quality Solutions