

Erosion & Sediment Controls in Main Roads

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How does the use of E&S controls contribute to sustainability ? Main Roads is promoting the concept that the use of E&S controls is primarily good engineering practice. We need to protect our assets, the road infrastructure, from the impacts of water and wind and the best way of doing this is to stop or at least minimise the erosion process. If we stop erosion then we avoid sedimentation.

If we can protect the cut and fill batters from the effects of rain, flowing water and wind using controls that are available from within the project site we reduce project costs, reuse what was potentially waste, avoid the loss of valuable soil and minimise the cost of sediment controls.

The best way of achieving this proactive approach is to educate everyone from the planners and designers, project managers and inspectors, to the people installing and maintaining both the permanent and temporary erosion controls. It is critical to the whole concept that there is a co-operative approach between the Principal and the contractor to achieve this at a “reasonable” cost.

The additional incentive to stop sediment from leaving or potentially leaving the site is provided by the environmental legislation which is incorporated in the Environmental Protection Act 1994 and more specifically the Environmental Protection (Water) Policy 1997 and the Environmental Protection (Waste Management) Policy 2000. This is intended to protect the ecological sustainability of the receiving environment whilst allowing for development.

EROSION AND SEDIMENT CONTROLS IN MAIN ROADS

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In the words of the good book, we are required to "protect the environment while allowing for the development that improves the total quality of life, both now and in the future, in a way that maintains the ecological process on which life depends."

In days of old, back when those immortal words were first penned in the Environmental Protection Act 1994, people in general, but engineers in particular, read this to mean that since we only build roads for "development that improves the total quality of life" we could do what we liked. And we did, with only the occasional token effort to be "seen" to be looking after the environment. Shares in straw bales and sediment fence soared.

Over the past few years we have noticed that the general public has changed their opinion about the environment and seem to be paying more attention to what activities are causing environmental harm. Even children's shows like "Totally Wild" and "Bush Beat" reflect how our way of thinking is changing slowly but surely to look after the environment. Once upon a time the Great Barrier Reef was about the only environmental asset that Australia advertised. Today the economies of many local governments are dependent upon local environmental features and we do not want to cause any damage to that asset.

So we sat back to look at how we could improve our environmental performance and at the same time improve the public perception of the road construction industry as being D9's, concrete and lots of black stuff. We identified sediment as being the area of greatest impact on the surrounding ecology as well as our highest exposure to prosecution from the EPA.

Although the road infrastructure is recorded as an asset owned by Main Roads it really

belongs to the community, paid for by the community, for the good of the community. We want to provide a service to the State that is "best value" but causes as little damage to the environment as possible. If the community wants to preserve the environment then they are willing to pay a little more. And it is only a "little" more when the whole cost of the project is taken into account. The cost of rework due to erosion of our infrastructure, eg to reinstate a batter, is far more than the original construction costs.

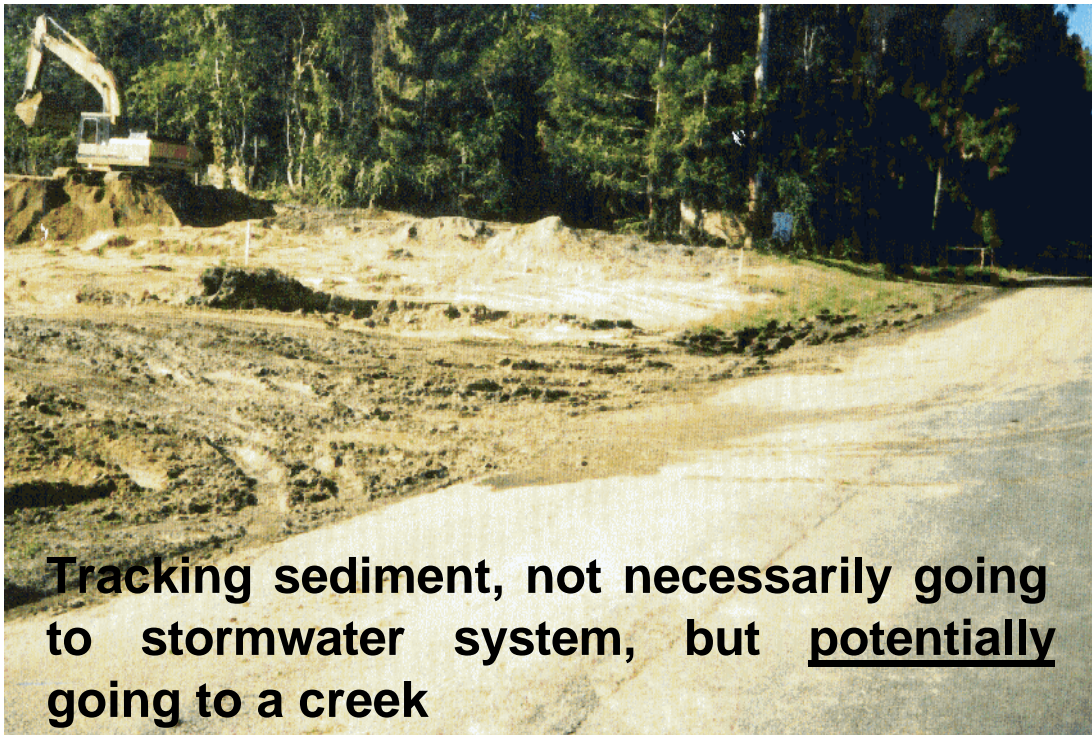
The additional incentive to stop sediment from leaving or potentially leaving the site is provided by the environmental legislation which is incorporated in the Environmental Protection Act 1994 (EPA) and more specifically the Environmental Protection (Water) Policy 1997 (EPP(Water)). This is intended to protect the ecological sustainability of the receiving environment whilst allowing for development. There are 2 clauses in the EPP(Water) that relate directly to the release or potential release of contaminants and sediment:

- † **Section 31** - A person must not deposit or release certain things into, or where it could reasonably be expected to enter, a roadside gutter, stormwater drain or a waterway (eg. rubbish, cement or concrete, paint, paint thinner, herbicide, oil)
- † **Section 32** - A person must not release stormwater runoff nor deposit sand, silt or mud into, or where it could reasonably be expected to enter, a roadside gutter, stormwater drain or a waterway that results in the build-up of sand, silt or mud in the gutter, drain or water.



\$300 on-the-spot fine
tracking dirt from building site

The EPP Water 1997 defines specific offences which can result in on-the-spot fines of \$600 and \$300 respectively. These are photographs of actual on-the-spot fines.



Tracking sediment, not necessarily going to stormwater system, but potentially going to a creek

E&S Controls and Sustainability

How does the use of E&S controls contribute to sustainability? Main Roads is promoting the concept that the use of E&S controls is primarily good engineering practice. We need to protect our assets, the road infrastructure, from the impacts of water and wind and the best way of doing this is to stop or at least minimise the erosion process. If we can stop erosion then we avoid sedimentation.

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In our Erosion and Sediment Control we target the different levels of training that are required for designers and planners, and for construction supervisors and field staff. It is vitally important that everyone associated with

project work is trained in E&S controls. Ensure that you get the message to the people who actually install these E&S control measures. You may know what you want but unless you have them trained in the installation you may not get what you ultimately will be paying for.

There are 2 different general types of E & S controls, Permanent and Temporary, and it is important to distinguish between them. Permanent controls include diversion drains, batter chutes, sediment basins, etc, that are designed in to the project. Temporary controls include check dams, sediment fence, etc that are regularly updated as the work progresses.

All controls have to be costed in to the project. The old adage “you get what you pay for” is very applicable to road construction.

The training is a 3 day course intended for the planners, designers and project personnel that goes into more detail on the sizing and positioning of the control measures. It is “competency based training” and will result in a nationally accredited qualification. It is intended that this qualification (or equivalent) will eventually be required to produce and implement E&S controls.

1. Processes and Principles of Erosion and Sedimentation
2. Land Resource Assessment and Design Development
3. Introduction to Soil Erodibility
4. Typical Control Measures and Practices
5. Revegetation for Erosion Control
6. Site Operations and Management
7. E & S Control Plans

An additional 2 day version of the course is being developed that will address the more specific requirements of actual implementation of E&S controls that inspectors and works supervisors require for effective installation.

The training is divided into 7 sections:



Cost to reinstate erosion damage to the road pavement and embankment ?

What is the incentive to undertake this training?

Beyond the legislative requirements that may incur significant fines, for both the contractor and principal, there is the very real cost of losing cut and fill batters, topsoil and

pavement gravels into the surrounding environment and then having to reinstate them. The direct cost of reinstatement is estimated at between 5 and 10 times the original cost at the construction phase.

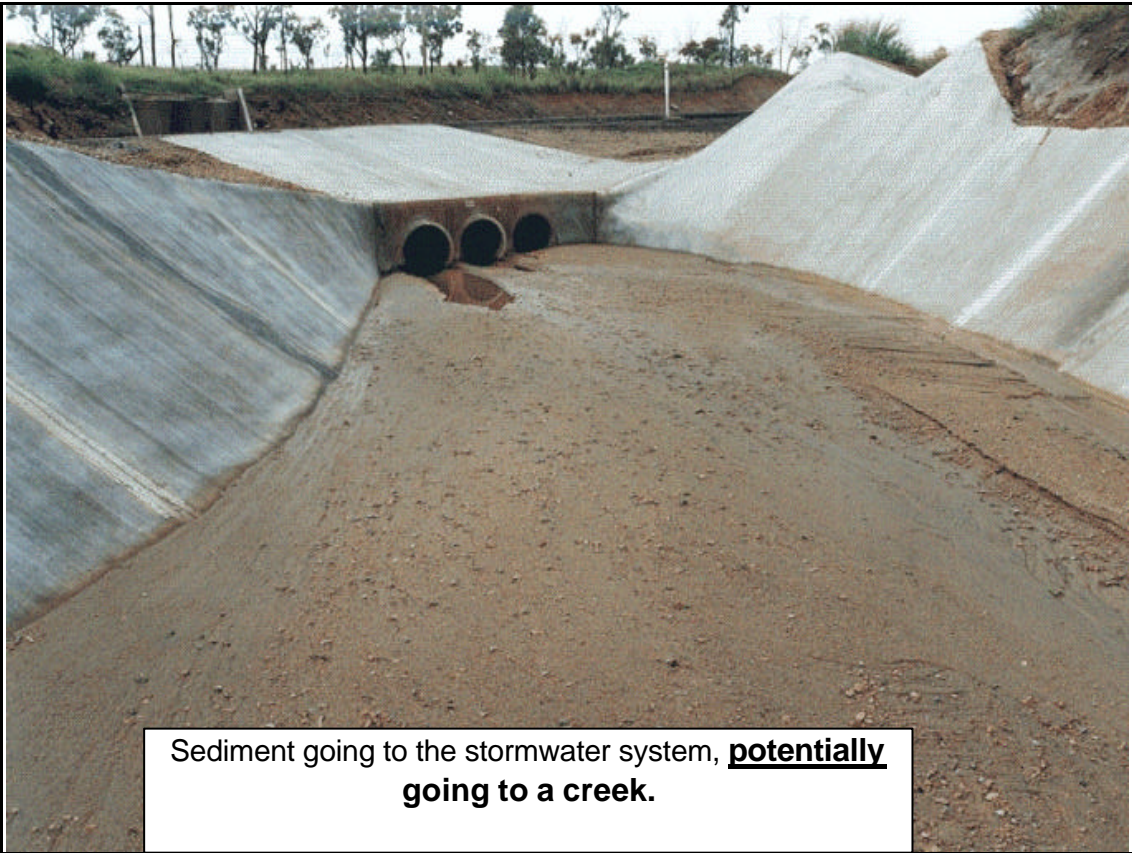


We try to design in balanced cut and fill, and to reuse topsoil from onsite, ie. good sustainable use of the resources available to us. Then we leave the unprotected surfaces to the mercy of the natural forces of water and wind.

All of that sediment has to go somewhere. Initially it will block our drainage structures and incur financial costs to clean out and reinstate, losing valuable resources. Additionally, it stops our carefully designed stormwater systems from conveying all that

water under the road surface and causes a very real safety consideration that we could be legally liable for in the event of property damage or even more importantly personal damage/death.

Finally, it will end up in our creeks and rivers and eventually the bay or ocean, put a cost on that ?



Sediment going to the stormwater system, **potentially** going to a creek.

**Jumpinpin Bar between North and South Stradbroke,
Moreton Bay**



In our Erosion and Sediment Control training and in our new Road Drainage Design Manual we address both the design of permanent structures as well as the temporary, generally “softer” controls. These softer controls like check dams, sediment fence, etc. that we hope will be incorporated in the project documents but also to be recommended by the contractor and superintendent at the construction phase. This ideally will result in a more cost effective project, both for the direct costs, whole of life cost, and reduced cost to the environment.

The training addresses issues like:

- ✍ Minimising the volume of water to be treated
- ✍ Minimising erosion rather than dealing with sedimentation
- ✍ Designing in these controls rather than raising variations
- ✍ Assessment of risk for the receiving environment
- ✍ Preparation and implementation of the Erosion & Sediment Control Plan (ESCP)

We stress the dynamic use of the. By dynamic we mean that the ESCP needs to be revised on a regular basis as work progresses. It is a tool to be produced by the contractor for the contractors use but also to prove to the principal (and ultimately the EPA) that the environment is being considered.

We have managed to “get by” up to this stage but we must do more than the minimum because it is good engineering practice to get both a good product for a reasonable cost and to protect the environmental values. The improved or better practice of designing in and implementing E&S controls will benefit the community in the provision of an infrastructure asset while maintaining the environmental values.

A sustainable Queensland can only be achieved by taking responsibility for our development for planning, design, construction and maintenance of the road infrastructure. A good place to start is to ensure effective E&S controls, and the best way to achieve that is effective training.



JUST MAYBE, YOU MIGHT LIKE TO RETHINK THAT !

Conclusion

We are obliged, both legally and morally to minimise damage to the environment. Also, we need to conserve our resources and to get best value for our road dollars. As one of our areas of highest exposure to prosecution from the EPA and an area where we can potentially improve the delivery of the road infrastructure to the community by reducing whole-of-life costs, E&S controls need to be addressed sooner than later. The training that has been developed by DMR will provide a useful tool to ensure that we, local government included, provide better practice (if not best) in the provision of the road network.

References

Road Construction Erosion and Sediment Control (2002)
Department of Main Roads

Author Biography



John Burton has a Degree in Civil Engineering with 21 years experience primarily associated with the practical aspects of road construction and maintenance. He has worked with Main Roads for 9 years and for the past 2 years in the Technical Training Section he has been responsible for development and delivery of training courses in:

- Basic Road Construction
- Certificate 3 in Civil Construction
- Erosion & Sediment Control
- Environmental Awareness

Prior to this he was involved with construction and maintenance of roadworks including project management, estimating, tendering and quality assurance systems.

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