NEWSLETTER VOL 12, ISSUE 2, AUGUST 2006

International Erosion Control Association

Australasian Chapter

Newsletter

IECA (Australasia) Presidents Report.

Michael Frankcombe

I am pleased to report that our conference run jointly with the NSW branch of the Storm Water Industry Association was a success – top notch key note speakers, excellent technical papers and training courses and a great field day. I made a point of talking with many of our members that attended the event to find out what they thought and generally the feedback was very positive.

For me there many positives with the event – Mike Harding's presentations, the cross over of disciplines with the stormwater guys, falling off the back of the stage in front of everyone on the first day and having Adam Spencer taking the rinse out of me at the awards dinner.

The field day was the best I have been involved with yet. The Macarthur Centre for Sustainable Living was the perfect venue for the event (lunch was huge) and the exhibitors presentations extremely informative and professionally run. Many thanks to Macafferi, Geofabrics, Soilco, Spray Grass, Compex, Treemax, The Silt Fence Plow and Integrated Environmental Providers for your support and technical expertise.

We received a number of excellent applications for the Environmental Excellence award. The award winner for 2006 was EcoCivil Pty Ltd and Soilcon Pty Ltd for Stage 1B of the Clarence Valley to Coffs Harbour Regional Water Supply scheme. The judging panel considered that this project represented a bench mark for future pipeline construction projects. Stand out features of the project included:

- Reuse and recycling of site materials for both erosion and sediment control specifically the use of recycled vegetation and bush rock for erosion and sediment control
- Reduction in the quantity of construction materials imported onto the site and associated reduction in environmental impact in obtaining those materials by modifying trenching machinery to utilise insitu materials for backfill
- The option of simple natural systems that were specifically designed to mimic nature
- The maintenance of biodiversity and ecological function through minimal and progressive disturbance and rapid and successful rehabilitation using local provenance species
- Successful engagement of stakeholders through all phases of project delivery.

Due to the high quality of the application we also presented a merit award to Fletcher Construction for the Upper Waitemata Harbour Bridge Duplication and Causeway Widening Project located in Auckland on the North Island of New Zealand. The judging panel was impressed by a number of aspects of this project:

- Modification of marine sediment for use reducing the amount of construction material required and also negating the need for disposal of excavated marine sediment which can be problematic
- Adoption of a minimum disturbance philosophy for all aspects of the projects including hand removal of mangrove plants
- The utilisation of sediment bunds and ponds to minimise sediment emissions to the harbour environment during construction.
- The containment of bridge stormwater runoff and treatment using vegetation and large-scale sand filters.
- Proactive engagement of all stakeholders including the Auckalnd Regional Council and the Tantaga Whenus people.

Congratulations to the award winners and thanks for raising the bar in our industry.

Michael Frankcombe
IECA (Australasia) President.

INSIDE THIS ISSUE:

Emerald Member

Groundwork

WINNER
IECA (Aust) Environmental Excellence Award
EcoCivil Pty Ltd and Soilcon Pty Ltd

Tony King receiving the Winner's Award on behalf of EcoCivil and Soilcon. L-R Wayne Walshe (SNK Group Award Sponsor), Tony King, Michael Frankcombe (IECA Aust President)

MERIT AWARD
IECA (Aust) Environmental Excellence Award
Fletcher Construction Engineering

Stuart Chapman receiving the Merit Award on behalf of Fletcher Construction. L-R Wayne Walshe (SNK Group Award Sponsor), Stuart Chapman, Michael Frankcombe (IECA Aust President)

Construction of Linear Infrastructure: "Rehabilitation"

By Tim Duckett, LMRS, Director IECA Aust.

ABSTRACT

The development of linear infrastructure such as roads, rail, gas, electricity and telecommunication inevitably results in the disturbance of land. Easements associated with these services can be several 10's of metres wide over thousands of kilometres. The construction disturbances will need to be repaired and the easements managed to prevent environmental degradation arising as a result of erosion and sedimentation, water quality decline, weed invasion loss of native vegetation and fauna habitat, and visual scarring.

The solutions to land remediation and management issues must be practical and cost efficient to implement, guaranteeing their acceptance as a serious component of any construction programme. These issues are now addressed in the design, the construction and the operational phase of the project. Funds are allocated in the construction budget for solution implementation.

The final desirable outcome will be based on the easement being stable and weed free, it presents with an acceptable cover, it doesn't cause any detrimental environmental effects outside the easement and it receives no adverse public comment, then our goals are achieved. Practically "How do we do it"?????

Due to our increasing demand for transportation, energy and communications, linear infrastructure is constantly being constructed and upgraded. Roads, rail, gas, electricity and telecommunications require corridors or easements for their successful delivery. Their development results in the disturbance of enormous areas of land often on a regional scale, that will need to be repaired and managed into the future.

Easement repair and management (rehabilitation) must be practical and cost effective to deliver. It must meet contractual demands, public expectations and regulatory requirements. Unfortunately these often conflict with each other as the contractor wants to be "out of there" as quickly as possible following construction, the public expect no perceived adverse impacts to themselves and the regulators expect an appropriate final land-use that in some instances can take several years to achieve. The balance can be difficult, but through careful consultation, planning, implementation and monitoring we can get it right (most of the time).

The rehabilitation construction processes of "getting it right" consists of the following components :

- Preliminary Investigation/ Planning / Design / Flexibility
- Induction / Supervision
- Minimising Disturbance
- Hygiene
- Soil Management
- Drainage, Erosion Control and Stabilisation
- Site Preparation / Soil Remediation
- Revegetation
- Monitoring and Maintenance
- Long-term Assessment

Preliminary Investigation/ Planning / Design / Flexibility

EIA's, DP and EMP's, EIS', CEMP's are all vehicles that are supposed to cover and deliver the guidelines for construction that includes repairing any land degradation that occurs. They include planning and design specifications based on site investigation and past knowledge and experience. They are a "given" and are essential for any development. However, major construction programmes rarely go as planned due to weather, geological condition, landform/soil change, human error etc and therefore the specifications presented in the covering documentation need to be flexible to cater for change or at least provide an avenue to address change during construction.

Once regulatory requirements are met, specifications are prepared and approvals given, the project proceeds, governed by strict environmental guidelines. How do we meet these requirements in the field ?

Induction / Supervision

Prior to the commencement of any on-ground activities the project staff and workforce must be made aware of the environmental requirements for the project and this includes the components of rehabilitation. The inductions must be pitched at a level to increase awareness within the workforce and the workforce activities must be strictly controlled through appropriate supervision.

Minimising Disturbance

By minimising disturbance you minimise the need for rehabilitation. Minimisation of disturbance is best achieved by the placement and implementation of highly visible construction boundaries around the works site. All construction activities and construction material storage are contained within the boundary. Emphasis must be made that all activities including pedestrian access must remain within the defined area.

Hygiene

Hygiene enforcement on construction sites is critical in preventing the spread of weeds, pathogens and sediments. Hygiene management is best achieved by again using construction boundaries to isolate the construction zone, the use of construction equipment hygiene movement and control forms and the use of wash-down procedures at boundary access and exit points.

Soil Management

Topsoils must be preserved during the construction process as they are the principle medium for plant development and growth. Topsoils and subsoils must be stripped to separate stockpiles and replaced in the order removed, re-establishing the original soil profile. The ideal stockpile is between 0.6 and 1 m deep (windrowing), remaining biologically active. Practically the lack of storage space may prevent windrowing and deep stockpiles will be established. (Soils in this instance will require additional remedial treatments on replacement)

Drainage, Erosion Control and Stabilisation

Exposed construction sites are prone to erosion, drainage management and siltation. Water movement from out-

side the construction perimeter and within the construction zone must be separated where practical and controlled. Control involves diversion and dispersion avoiding concentrated flows. Erosion will occur and the level will be related to the control of water movement within the construction zone. Erosion control can be achieved by limiting the time the site is exposed, minimising the area exposed, and by stabilising exposed surfaces with materials such as concrete, geotextiles, mulches and vegetation. Once erosion occurs sediments are generated. Sediment deposition increases the level of disturbance and has significant environmental consequences. Controls include sediment fencing, buffer strips, sediment traps and dams and turbidity control structures.

All drainage erosion control and stabilisation should be considered in the planning stage through the development of stormwater and erosion control plans that will initially be generic and must be amended during the construction process to cater for daily onsite changes that **will** occur.

Site Preparation / Remediation
One of the final construction phases will be to replace the topsoils and re-establish the soil profile. Replacement can lead to structural problems that will need to be alleviated. This is achieved through deep ripping and surface cultivation. Preparation leads to improved water infiltration and aeration and must be completed to a standard suitable for vegetation establishment.

Soil disturbance often leads to the loss of nutrients and topsoils are often not stockpiled or preserved to the standard where their integrity remains intact. Nutrients will often need to be replaced and other issues such as pH may need to be addressed.

Revegetation
Vegetation selection for revegetation is critical and the species chosen must be able to cope with the on-site conditions, however, if a site is not adequately prepared, it will not matter how suitable the plant species are for the site, they will generally fail. In construction we often change the environment so radically that plant species that are considered local provenance will also fail. Remember species selection will depend on on-site conditions not the condition that once existed on-site prior to disturbance.

Revegetation techniques will include direct seeding and planting and the specific treatment will be based on the prevailing ground conditions, the presence of weeds and subsequent on-going weed control, the prevailing weather conditions, seasonal timing and the general region within the State.

Monitoring and Maintenance
Continuous monitoring following the revegetation activities is essential to ensure success. Stability, vegetation establishment, and weed management are components of the monitoring assessment. Based on monitoring, maintenance remedial measures may be identified where erosion has commenced, vegetation establishment has been poor or where undesirable plants have taken hold.

Long-term Assessment
Contractually, responsibility for the success of rehabilitation is limited to a defects liability period of the contract, usually 12 months and more recently upto 3 years. The establishment of a self sustaining plant community, particularly native forest communities, takes considerably longer than the standard defects period of 12 months. LMRS Pty Ltd are still monitoring sites up to 17 years of age and are still noticing changes. Nutrients can be depleted in areas devoid of appropriate topsoils, monoculture of certain vegetation types can establish, weeds (particularly woody weeds such as gorse and broom) can establish and communities can start to fail several years after construction has been completed. In nature, plant communities develop over decades or even hundreds of years, but often expectations are for their development within the defects period. Many recent rehabilitation specifications reflect this need for the establishment of complex communities within this short time frame. This is unrealistic and a total waste of money as many of the species used will fail as the exposed on-site conditions do not reflect the conditions that these species evolved to meet. As a general statement, the most successful revegetation treatments are achieved by the establishment of colonisers that encourage succession towards the original vegetation types. Once the colonisers establish other species can be re-introduced, but not as a component of the initial treatment. Reintroduction of certain species may be years or decade into the future, once conditions are appropriate.

Only through long-term monitoring can we properly assess the success of a rehabilitation project and the need for successional intervention. We can then learn about success in the long-term and maybe, incorporate what we have learned into the design of the next project. This cannot be achieved within a short-term defects period. In reality, the construction industry would not support long-term assessment and intervention so the implemented rehabilitation treatments are based on the establishment of a vegetation cover that is acceptable to the community, acceptable to the regulators and allow the construction contractor to discharge their responsibility A.S.A.P.

Council Wants Action On Stream Erosion

May 2006, Press Release: Auckland Regional Council

Stream erosion main cause of harmful sediment in waterways

Tonnes of sediment smothering the beds of Auckland's estuaries and harbours every year could be significantly reduced if stream erosion is addressed, according to the Auckland Regional Council.

ARC Stormwater Action Team leader Earl Shaver says international studies have identified stream channel erosion as the primary source of sediment entering waterways from developed areas, and local studies indicate Auckland is no exception to this problem.

"Stream erosion is caused by huge volumes of stormwater washing into streams and gouging them out, carrying the resulting sediment downstream into estuaries such as the Whau, and Waitemata and Manukau harbours," Mr Shaver says.

"As the region grows so does the area of paved and impervious surfaces that rain can't soak into," he says. "Instead what happens is the amount of stormwater running off the land and into Auckland's streams increases, and streams just can't handle the volumes of water rushing into them, so their banks and beds start to erode away."

ARC Environmental Management Committee Chair Cr Dianne Glenn says the best way to stop this sediment degrading Auckland's waterways is to take a new approach to development.

"All over the world a Low Impact Design approach is being taken to development and intensification of urban areas, and it's gradually starting to catch on in Auckland," Cr Glenn says. "LID involves using development practices that have a reduced impact on our sensitive waterways, and I thank those developers who are already working with us, meeting our environmental and design requirements to achieve better outcomes overall."

Sediment from stream erosion smothers bottom dwelling animals such as shellfish, and promotes the growth of mangroves by depositing sediment in shallow, low energy areas where mangroves thrive. Over time sedimentation can also change once sandy-bottomed beds into mudflats, and bury natural features of streams such as stream pools and rock-beds.

Low Impact Design practices that reduce volumes of stormwater include the use of roof gardens, roof tanks, planting of vegetation, and limiting the total amount of paved surfaces on a site so rain can soak into the ground.

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Presidents Technical Tip - Compost filled filter tubes, *Michael Frankcombe CPESC.*

Description:
Consist of a high permeability filter tube of varying lengths and diameters filled with a high quality composted material. The filter tube can be purchased in biodegradable and non-bodegradable forms depending on the application and anticipated life span. A propriety brand distributed in the Australasian Region is Filtrexx™.

Application:
Compost filled filter tubes can be used as an alternative to straw bales, sediment fences, rock, sand or gravel filled bags and geo-logs. Sheet flow applications include placement across the contour to reduce flow velocities, placement across the contour with a depression to pond water for sediment control, placement in a circle to filter sediment from desilting or concrete wash-down application and stacking and staking to produce bio-engineered vegetated walls.

Concentrated flow applications include placement across channels to reduce flow velocities and retain sediment, along the edge of stream channels to protect the stream bank from erosion.

An additional benefit over conventional erosion and sediment control products is that the compost material can attenuate some water quality problems such as elevated pH and heavy metal levels.
Generally the filter tubes are filled with compost from a purpose built blower truck.

Design/Construction Aspects:
The compost filled filter tubes must have complete contact with the soil surface to prevent water running under the filter tube. They must be pegged or staked to the soil surface to maintain the soil contact and prevent movement by high flow velocities. Geogrids can also be used to anchor the filter tubes to the soil.

In sheet flow environments the filter tubes must be pegged along the contour and turned up each end. Care must be taken to ensure that they do not grade down slope. In concentrated flow environments the filter tubes must be installed so that water discharges over the invert and not around the sides.

Due to the potential risks associated with bio-engineered vegetated wall failure the manufacture must be consulted in regard to design and construction applications.

Problems:
Erosion under the filter tubes to poor installation and insufficient staking. Erosion along the filter tube/soil interface due to inappropriate down grade installation. Erosion around the end of the filter tube due to insufficient channel depth or insufficient length of tube placed across the channel.

IECA Australasia Field Day—June 30 2006