EnviroStraw™
PROVEN REVEGETATION SOLUTIONS

EnviroMatrix ECM

(Erosion Control Matrix)

Setting a new world standard in revegetation and Biotic Growth Media

1. A marketing statement of no more than 200 words outlining the submission that can be used for media releases and award publications.

EnviroStraw's stand out hydromulch, EnviroMatrix (ECM) patent pending is a unique product available to the erosion control market. It is already changing the way industry approaches hydraulic erosion control. Proven to rebuild soil health and carbon levels for fast, sustainable revegetation, ECM's ability to rehabilitate extremely disturbed construction, road and mine sites is a game changer. Since its inception in 2016, its adoption rate has grown significantly due to its successful outcomes. Projects such as Maules Creek mine rehabilitation, and revegetation on the Woolgoolga to Ballina highway upgrade attest to this. ECM is an integral part of EnviroStraw's BioGrowth™ revegetation system, an innovative soil science program based on over 12 years of research.

ECM is best described as a hydraulically applied biotic growth media. Using pioneering biological technology, ECM switches on the mechanism of disturbed soil to bring it back to life and helps reinstate the all-important relationships of a wide range of beneficial living organisms found in a healthy soil microbiome. With a bespoke suite of 22 microbes, and containing up to 64 different mineral nutrients, ECM is a system that has a unique ability to revive soil in harsh conditions with less water and with no need for topsoil addition.

Figure 1: ECM International application

2. Summarise the entry description in abstract form with a maximum of 400 words (1 page).

EnviroMatrix (ECM) patent pending is a hydromulch that is distinctive to EnviroStraw. Providing a viable alternative to traditional approaches to soil science, ECM is designed for disturbed soil on construction sites to provide successful long-term outcomes and to restore soil biology to a level where it is self-sustaining. ECM has an excellent proven track record in Australia and overseas and is being accepted by well-known participants within the erosion control industry. It is a 'one-bag product' with key inputs included and only the addition of seed is necessary. It is designed to enhance native plant establishment.

ECM is a perfectly balanced revegetation formula which includes a blend of multiple different types of mechanically and thermally processed natural plant-based fibres, a natural soil conditioner, naturally derived hydrocolloid biopolymers, bio-compatible tackifiers and binders. Natural water absorbents, a multi-strain suite of diverse beneficial microorganisms (bacteria and fungi), microbially-mediated controlled release mineral fertiliser (CRF) and a polymer-coated CRF nitrogen fertiliser are also included.

When hydraulically applied, ECM forms a matrix bonded with the soil surface to create a continuous, porous, absorbent and flexible erosion-resistant mulch that allows for rapid germination and plant growth. ECM's success stems from the cost effective and timely manner in which it delivers effective and consistent results.

EnviroStraw strove to bring a product to the market that initiates the development of healthy soil through a combination of the essential elements that contribute to a quality, robust topsoil. ECM's blend of ingredients has been carefully developed by Australian scientists, rigorously tested in the lab, and successfully proven in the field. ECM contains a CRF nitrogen source which is released gradually to ensure there is not an over-supply of nitrogen, and ensuring it is not lost via leaching and volatilisation. This minimises nitrogen drawdown but still satisfies the demands of establishing vegetation at different growing stages.

ECM's biotic amendments (including bio-stimulants to enhance early microbial development) were carefully selected to encourage the stimulation of a diverse range of beneficial microbes and plant species.

ECM exceeded industry requirements when independently tested, and significantly improves water use efficiency (a huge industry plus as irrigation is a challenge), by reducing evaporation and increasing water infiltration and water holding capacity though improved growth of plant shoot and root and microbial biomass. As a result, organic carbon levels increase with ECM application, providing significant boosts for revegetation. EnviroStraw is very proud of the long-term results achieved by EnviroMatrix (ECM).

3. Describe the location, beginning, respective milestones and completion dates (as applicable) for the entry. List the major parties involved with the entry. Summarise the sequence and dates of activities.

EnviroMatrix (ECM) patent pending has been tested independently and proven in the field. It is the result of over a decade of research and made its successful debut on the South Walker creek diversion project in 2016.

Originally, EnviroStraw enlisted the help of soil scientist Paul Storer, and university colleagues in Western Australia. The development of the ECM product began in 2014 with a focus on testing EnviroStraw's environmental hydromulch media and its binders to ensure they were biocompatible. It was vital to ensure the media would enhance beneficial microbe activity and transfer it to the soil in an effective non-harmful way.

EnviroStraw set itself a challenging task, accepting it would be a huge learning curve – to develop a stand-alone product that would not only deliver results – but would continue to do so. EnviroStraw wanted a product that would be cost effective, easy to use and eliminate the need for site reworks and further rehabilitation. The design brief was challenging but EnviroStraw was committed.

In short, EnviroStraw's goals were:

- To produce a biotic growth media for Australia's highly dispersive, low nutrient, low carbon, and often sodic soils.
- To develop a product that would holistically rehabilitate disturbed environments – in as short a time as possible.
- To provide a product that would restart the carbon-building process immediately and contain a suite of beneficial microbes to suit all soil types.
- To provide an 'all-in-one bag product' – just add seed!
- To vertically integrate manufacturing – to develop its own blending and packaging line.
- To improve on site efficiencies and provide an economical advantage over any other comparable products.
- To minimise maintenance and costly reworks.
- To enhance native plant establishment and self-sustainability.
- Improve on site compliance.
- To use Australian manufactured resources and benefit the local communities.
- Ultimately, to remain environmentally friendly.

Figure 2: Landloch overland flow testing.

By 2019, EnviroMatrix (ECM) patent pending was well established and achieving positive outcomes. It was independently tested in 2015 and 2018 by Landloch, and the results spoke for themselves. Root mass and biomass were superior in ECM's trials, and water use efficiency and carbon levels were greater (than control). ECM was meeting its design brief. Under rain simulation testing, ECM successfully met the targeted C-Factor rating of 0.01 which met industry standards.

After ECM's launch, EnviroStraw saw measurable outcomes and benefits for industry, community, and the environment, as well as for the company themselves – outlined in Section 5.

4. Describe the distinctive features, special accomplishments, difficult challenges and other unique aspects of the entry. Include a Microsoft PowerPoint presentation with between 10

and 20 pictures along with written descriptions of each picture to illustrate the entry. These pictures may be used for media and promotional use. PowerPoint presentations must be submitted on USB or emailed to admin@austieca.com.au. A PowerPoint presentation must be submitted with each entry. Include 3 good quality pictures that could be used for promotional purposes.

Please see accompanying Microsoft PowerPoint presentation.

5. Describe the quantifiable benefits the entry has contributed to the environment, the community and the erosion control industry and your company/organisation

Since its development, EnviroMatrix (ECM)[patent pending] has been applied to combat erosion on numerous disturbed sites in the construction, mining, development and infrastructure industries.

Broadly, ECM positively contributes to the erosion control industry and the environment at large by providing a proven bio-friendly solution to resolving the issues associated with poor soil. Based on a holistic and microbial approach, ECM provides an alternative to conventional soil amelioration in Australia and overseas – EnviroStraw is currently developing new export markets in Papua New Guinea, Asia, NZ and elsewhere. The industry now has an opportunity to consider rebuilding soil health for long term results. ECM is a true 'one-bag' solution for revegetation that just requires the addition of seed - all microbes, nutrients and binders are included in the bale. This makes monitoring compliance simpler and is genuinely a cost-effective solution in even the harshest conditions.

ECM provides further environmental benefits by requiring less water than other hydromulch products (up to 42,000 litres per hectare) and contributing to environmental carbon savings; reworks can be minimised greatly; there is less heavy vehicle movement and less machinery operating on site and nutrient leaching and volatilisation can be reduced by up to 95 per cent. There is no need for cover crop irrigation when the reliable non-watering option is used. The program minimises the need for extra costly maintenance so that nature can take its course.

ECM has been responsible for the successful revegetation at the following sites, resulting in the implementation of self-sustaining, soil biological systems:

- Crocodile Station, north Queensland (see attached extract from report).
- Maules Creek mine site -successful steep slope revegetation with no added topsoil, New South Wales.
- South Walker Creek.
- Pacific Complete, highway upgrade, Ballina to Woolgoolga, New South Wales.

Figure 3 Pacific Complete 12 months Native plant establishment

- Glencoe Cut comparison trial where ECM out-performed conventional inorganic program.
- Successful international application with ECM being applied to steep slopes in Asia.
- Liddell mine NSW.
- Toowoomba 2nd crossing range revegetation.
- Binna Burra fire rehabilitation project.

Figure 4 Pacific Complete cover crop strike.

Utilising ECM makes a difference on a local level, a goal EnviroStraw has striven for. It is Australian owned and manufactured. Natural, pasteurised, and biologically friendly materials are sourced locally for the product and it is available year-round. It will not pollute the environment, being weed, pest and pathogen free, and it is designed to work in harmony with the eco-system. Non-leaching fertilisers are used ensuring environmentally sensitive areas and water ways are not contaminated with excess run-off of chemicals and nutrients such as phosphorus and nitrogen. It is safe for the community. During difficult drought conditions, ECM has offered a timely, cost-effective and water efficient solution. ECM's growth has significantly supported local farmers and rural communities, providing a demand for renewable resources such as straw stubble and waste wood fibre material - a solution to using waste materials that previously had little or no value to the farmer. This is value-adding for the farming community, particularly across regional Victoria and New South Wales.

To reiterate, quantifiably, ECM has achieved the following:

- Significant cost savings at the 'application' or 'front-end' of revegetation projects:
    - There is minimal requirement for 'amelioration inputs' meaning less delivery to site of bulk lime, gypsum and compost (significant off-site transport cost savings and also much lower carbon footprint).
    - Less need to apply bulk inputs as there is reduced heavy vehicle movement and machinery operating on site (Improved on site efficiencies with labour and time saving, improved safety and also a lower carbon footprint).
    - Australian made and manufactured (which also lowers the carbon footprint due to international shipping).
    - Due to the optimal outcomes achieved using the ECM system – (unwanted) reworks can be minimised greatly – a significant quantifiable cost and time saving at the 'back-end' of rehabilitation/revegetation projects.

- Uses non-water-soluble microbially activated controlled release fertilisers (CRF) designed for disturbed soils and in particular environmentally sensitive areas (ie river safe, reef safe).
- Contributes to environmental carbon savings (both in improving levels of biological soil carbon and in lowering the carbon footprint).

Figure 6: Manufacturing plant

ECM has given EnviroStraw a genuine opportunity to make a difference. Proven time and again, the company can rely on its consistent results and delivery. EnviroStraw is able to confidently offer their product as a realistic, and economical solution for even the most disturbed sites. EnviroStraw has achieved its goal of developing its own manufacturing plant with their strategic partners Multicube and present the ECM product consistently with regard to presentation and quality. Staff numbers have grown significantly to ten members from 2016, a very significant achievement. EnviroStraw are extremely proud of its stand alone, innovative product EnviroMatrix, and will continue to strive for excellence within the erosion control industry.

EnviroMatrix (ECM)[patent pending] Biotic Growth Media serves as a perfect model going forward - the era of microbiological revegetation and rehabilitation is beginning.

In summary:

- ECM's combined cutting-edge technologies include scientifically designed and rigorously tested inputs including the hydromulch mediums, specific multi-strain beneficial micro-organisms (bacteria and fungi), controlled release mineral fertiliser (CRF) and other biologically and environmentally friendly inputs.

- ECM programs cost effectively and systematically revegetate and stabilise bare ground and highly disturbed soil, help prevent erosion, and enhance soil health, biological activity, and soil fertility -particularly in unbalanced and/or nutrient deficient soils. These have consistently achieved desirable outcomes within designated time frames and with significantly reduced soil amelioration rates and cost compared to conventional practices.

- EnviroStaw's ECM is all about utilising easy to adopt, economical and environmentally sustainable inputs to achieve optimal outcomes. By helping improve soil health, quality and fertility, and the resilience of vegetative cover - ECM reduces

costs for amelioration, watering, and on-going maintenance, and lowers the risk of expensive reworks.