

Bonded Fibre Matrix

EROSION CONTROL TECHNIQUE

Revegetation	✓	Temperate Climates	✓	Short-term	✓
Non Vegetation	[1]	Wet Tropics	✓	Long-term	[3]
Weed Control	[2]	Semi-Arid Zones		Permanent	[3]

- [1] Can be used without seed content as a non-vegetated, short-term erosion control technique but not recommended.
- [2] Weed control benefits depend on the mulch type, glue type and application rate.
- [3] Long-term benefits can be provided by the resulting vegetation cover (if hydro-seeded prior to application of BFM).



Symbol



Photo 1 – Application of Bonded Fibre Matrix



Photo 2 – Treated surface prior to drying

Key Principles

1. Application rate and surface cover are critical to its short-term erosion control.
2. Wet strength is determined by the choice and mix of non-rewetting glues.
3. Treated soil should **not** be visible after application of the Bonded Fibre Matrix (BFM).
4. Soil testing, soil treatment and preparation is critical for successful vegetation establishment

Design Information

Application rates of 4 to 6 tonnes/ha of organic material (weight measured with water content of 10 to 15%). Table 1 provides recommended **minimum** application rates.

Note: An application rate of 5 tonnes/ha is equivalent to 5000kg/ha or 0.5kg/m².

Table 1 – Recommended minimum application rates^[1]

Location	Slope	Mulch	Tackifier
Months of extreme erosion risk (e.g. wet or dry tropics during the wet season) ^[2]	10% or steeper	6000kg/ha	210kg/ha of cross-linked guar, plus 30kg/ha of copolymer PVA binder
	< 10%	5000kg/ha	135kg/ha of cross-linked guar, plus 15kg/ha of copolymer PVA binder
Wet or dry tropics (dry season) ^[3] South-east Queensland	10% or steeper	5000kg/ha	100kg/ha of cross-linked guar, plus 50kg/ha of PAM binder
	< 10%	5000kg/ha	80kg/ha of cross-linked guar, plus 40kg/ha of PAM binder
Other locations	All	4000kg/ha	60kg/ha of cross-linked guar, plus 20kg/ha of PAM binder
Weed control application	< 10%	6000kg/ha ^[4]	300 to 400kg/ha of copolymer PVA or PAM binder

[1] Local conditions (e.g. slope, soil stability, and expected weather conditions) may require a variation in applications rates—always seek expert advise. Maximum water content of 15% in the raw mulch in all cases.

[2] Includes any month that immediately precedes a month of extreme erosion risk. Months of extreme erosion risk determined in accordance with locally adopted procedures, otherwise using the procedures presented in IECA (2008) Section 4.4.

[3] Includes any period **not** included in the above category. The monthly erosion risk must be determined in accordance with locally adopted procedures, otherwise using the procedures presented in IECA (2008) Section 4.4.

[4] Recycled paper organic matter only for weed suppression

Description

Bonded Fibre Matrix (BFM) is the application of organic matter, non-rewettable glues and water through a hydroseeder. Organic matter can include milled sugar cane toppings, milled cereal straw, shredded paper, bagasse and wood fibre.

The process differs from *Hydromulching* mainly in the application rate and the use non-rewetting glues. The applied tackifiers typically incorporate a cross-linked, guar product, copolymer PVA binder or PAM's or various combinations of each..

BFMs are viewed as hydraulically applied mulches or erosion control blankets. They have a viscous bonding agent that dries to form a protective skin over the treated surface. Once dry, the applied material often look like papier-mache.

BFMs incorporate a range of fibre lengths (wood, cane fibre, paper) with a high percentage of long fibres providing added strength.

BFM's should be the second application following hydro-seeding. Often seed and fertiliser and other soil ameliorants are incorporated in the mulch and glue (tackifier) slurry.

Purpose

Used for erosion control and revegetation, particularly on steep slopes and areas where heavy rainfall could dislodge loose mulch or *Hydromulch*.

Can be used for the revegetation of minor waterways and drainage channels that may experience heavy rainfall or minor flows soon after placement (i.e. before vegetation establishment).

Useful in the revegetation of irregular (e.g. heavily rilled/gutted) ground that cannot be successfully reshaped.

Limitations

Limited to low to medium scour velocities. The allowable scour velocity is higher than *Hydromulch*, but is significantly less than many other *Erosion Control Blankets* and *Erosion Control Mats*.

Short-term erosion control can be compromised by pedestrian and vehicular traffic. Treated areas should be considered non-disturbance areas until vegetation is established.

Revegetation can be poor if applied directly to poor subsoils.

Soil testing and soil preparation is fundamental to successful vegetation establishment

Advantages

Requires less surface preparation than rolled erosion control products (e.g. *Erosion Control Blankets*).

Good seed germination and establishment is normally achieved.

BFM's are more cost effective than rolled *Erosion Control Blankets*.

Disadvantages

Application requires experienced operators.

Not all hydroseeders are capable of applying sugar cane fibre BFM's. Pump blockages can result.

Common Problems

Inferior application rates, products, and/or tackifiers applied.

The short-term surface seal formed by a BFM can be easily damaged by traffic (pedestrian or vehicular).

Special Requirements

The blanket should be sprayed on the soil surface from at least two directions to provide a complete and continuous coverage (i.e. no gaps).

Must not be applied on excessively wet or smooth soil. Excessively smooth soil surfaces can limit the penetration of the newly established root fibres into the soil.

Depending on the product, BFMs typically require 12 to 24 hours to dry before their erosion control benefit becomes fully effective.

Important not to add too much copolymer PVA as the resulting crust may inhibit the emergence of germinated plants.

Location

BFMs are often preferred over other mulching and revegetation techniques in wet environments (i.e. high rainfall) and in drainage channels that may experience minor flows within the weeks following application.

Site Inspection

Treated soil surfaces should **not** be visible after application of the BFM.

Performance Indicators

Application rate can be determined by recording the amount of raw material added to each truck load of BFM and measuring the area of ground treated.

Percentage cover of vegetation can be measured using the quadrant method (a grided inspection plate which is photographed and analysed) or by visual estimation (refer to the *Revegetation* fact sheet).

Operational performance with respect to the control of raindrop impact erosion can be measured by comparing the relative change in land elevation of a treated surface with an adjacent non-erodible surface such as a metal plate set into the soil level with the surface of the matrix.

The metal plate must be attached to the soil surface without solid foundations such that the plate can respond to any natural soil compaction, but not be affected by soil erosion (i.e. do not compare the newly treated surface with a solid object such as a concrete kerb of building foundation).

Operational performance with respect to the control of dust can be measured using dust deposition gauges.

Material

- Mulch: Typically includes 75% milled sugar cane fibre and 25% shredded recycled paper. Other organic material such as milled cereal straw, bagasse and wood fibre can be used without recycled paper.
- Tackifier: non-retwettable, cross-linked, guar product combined with either copolymer PVA binder (tropical environments) or PAM's, unless used specifically for weed control

Application

The following specification applies to grass seeding, not the application of native tree or shrub seed. The adopted specification must be appropriate for local conditions.

1. Refer to approved plans for location, extent, and application details. If there are questions or problems with the location, extent, or method of application contact the engineer or responsible on-site officer for assistance.
2. Ensure the surface is free of deep track marks of other features that may result in ongoing flow concentration down the slope. Where necessary, establish up-slope drainage controls to limit run-on water that may disturb the matrix.
3. Contour scarify the soil surface and fill areas prior to application of the matrix.
4. Hydro-seed the area treated with seed, fertiliser and other soil amendments determined by soil testing
5. Machine applications must comprise a minimum of two passes in opposite directions unless otherwise specified. Ensure complete coverage of the specified treatment area occurs.
6. During application, all reasonable efforts must be taken to avoid spray onto roads, pathways, drainage channels not intended for application, and existing vegetation.
7. Continue to water after allowing 24 hours drying time. Water in accordance with the weather conditions, or as required to maintain suitable germination and plant growth. The matrix should be kept moist until successfully seed germination occurs.

Maintenance

1. Inspect the application fortnightly and after runoff-producing rainfall.
2. Check for rill erosion, or dislodgment of the fibre matrix.
3. Replace any displaced fibre matrix to maintain the required coverage.
4. If stormwater runoff displaces more than 10% of the fibre matrix, then investigate the need for additional drainage controls to prevent further displacement.
5. Continue inspections until vegetation is suitably established or erosion control is no longer required.
6. If the fibre matrix is not effective in containing the soil erosion it should be replaced, or an alternative erosion control procedure adopted.