

# SoluForm MSE Bagwork

## Prefilled Soil Filled Bagwork Factsheet



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Soil filled, mechanically stabilised earth (MSE) bagwork has been around for approximately 15 years in its current form. In general, they all consist of geotextile bags containing typically free draining sandy soils, for the construction of earthworks such as riverbanks, slopes and walls. In addition to the fabric bags, an integral component to the bagwork is the inclusion of spikes, pins or plates between the rows of bagwork which prevent slippage or movement of the bags.

The characteristics of the geotextile bags, coupled with the soil that the bags contain, allow for the establishment and promotion of vegetation growth, both on and inside the bagwork. This not only greens up the bagwork to improve its appearance, it strengthens the bagwork structure and improves both riverbank habitat and biodiversity.

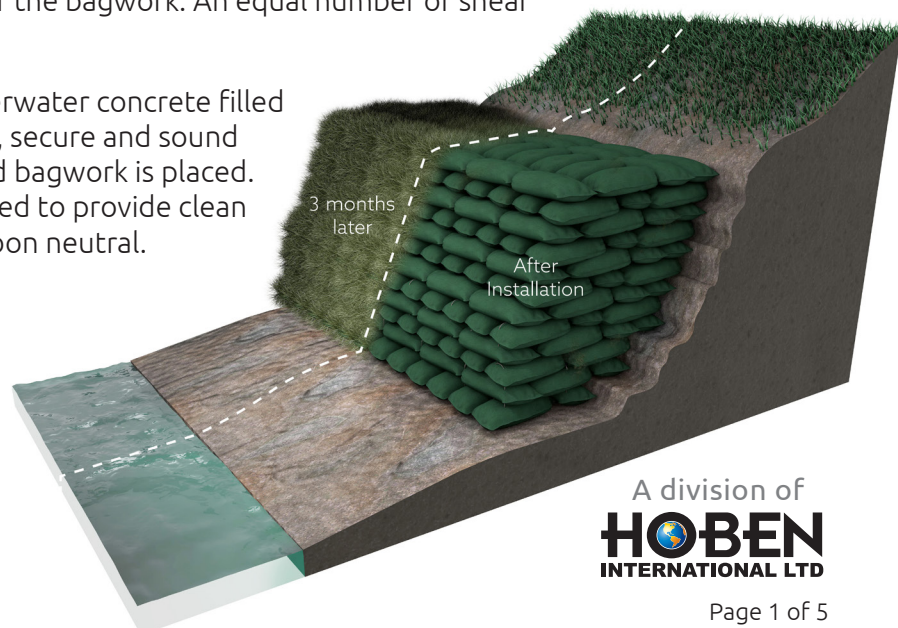
As a form of construction, soil filled MSE Bagwork is very simple, requiring, in many cases, little or no specialist plant and no need for skilled labour. It is often a very cost effective, environmentally safe and ecologically beneficial form of riverbank, slope or wall construction.

### SoluForm MSE Bagwork

SoluForm MSE bagwork consists of soil filled geotextile bags and spikes/pins between the rows of bagwork. Currently, SoluForm MSE bagwork is a prefilled bagwork product, meaning the bagwork arrives to site ready to place and there is therefore no requirement to hand fill bagwork yourself. This ensures a consistent and quality controlled end product, with the bagwork product then covered under our ISO 9001 and 14001 quality system.

MSE Bagwork will be available from 2023 in empty form, for those preferring to reuse reclaimed topsoil already present on site. Bags are held together and prevented from moving by the inclusion of spiked shear keys between the courses of the bagwork. An equal number of shear keys are included along with the bags

For bagwork underwater, typically our underwater concrete filled hand placed bagwork is used to form a firm, secure and sound foundation or base onto which the soil filled bagwork is placed. Remember, our concrete bagwork is designed to provide clean and safe placement in water and is also carbon neutral.



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### Characteristics specific to SoluForm MSE Bagwork include:

- **Small easier to handle bagwork** - This is obviously linked to manual handling, making the bags easier and safer to handle on site. Although this then requires more bags and shear keys for a given volume of bagwork, we have reduced our prices to make SoluForm soil filled bagwork comparable on a cubic metre basis, with larger 40kg alternatives.
- **Soil** - Our prefilled bags are filled with the highest quality BS 3882:2015 compliant sand rich topsoil. This provides a more nutrient rich soil, whilst still ensuring the bagwork is free draining.
- **Practical bag dimensions** - Importantly, the length of the bag is close to being twice the width. This allows for bagwork to be rotated and better fit together to form a consistent width to a wall.
- **Colour and Appearance** - SoluForm MSE Bagwork is dark green. Ultimately, with MSE bagwork, the aim is to “green-up” and vegetate the bagwork, so having a green appearance from the offset seems the most logical approach.



### Fabric Characteristics:

SoluForm’s MSE bags are composed of a needle punched non-woven polyester fabric consisting of randomly orientated synthetic staple fibres.

The fabric is dark green in colour, is light weight but yet tough and is non-biodegradable.

In addition to the UV resistant properties of polyester, the fabric is furthermore protected by additional UV resisting additives, making the fabric resistant to degradation from its exposure to sunlight prior to the establishment of vegetation.

Property		Unit	Typical Value
Fabric Weight		g/m <sup>2</sup>	150
Bag Dimensions (unfilled)		mm	370 x 770
Approximate Bag Dimensions (20kg Filled)		mm	300 x 650 x 100* *(typically 90mm loaded & saturated)
Trapezoid tear strength	longitudinal	N	130
	transverse		130
Breaking strength	longitudinal	KN/m	4.5
	transverse		4.5
Breaking Elongation	longitudinal	%	25 - 100
	transverse		25 - 100
CBR		KN	0.6
UV Resistance After 1000hrs		% Strength	80-90

# Design Guidance



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Design guidance is available on our website [www.soluform.co.uk](http://www.soluform.co.uk) which includes a number of standard designs for a range of common applications, including:

- Simple walls and slopes
- Terraced slopes
- Headwalls
- Berms or earthworks
- Channels

Should you have a particular scheme that you require design input, please do not hesitate to get in touch at [sales@soluform.co.uk](mailto:sales@soluform.co.uk)

## Assembly Instructions / How to Use prefilled SoluForm MSE Bagwork:

- 1. Product acquisition:** Our filled MSE Bagwork is prefilled in the factory, so arrives ready to use and there is no requirement for site staff to fill on site. With a design and quantity in mind, the bagwork should be ordered in advance of the site work commencing. Typical lead times are 3-5 working days for quantities up to 10 pallets.

Each pallet is shrink wrapped to protect from rainfall during storage and each pallet will yield approximately 0.8m<sup>3</sup> of in-situ MSE bagwork. Delivery can be made on curtain sided or rigid vehicles. Dedicated flat bed, Moffett and HIAB deliveries are also possible UK wide.

- 2. Site Preparation:** Ideally, the base onto which MSE bagwork is placed should be level, firm and if necessary, compacted. Stepped foundations can be considered where there is a desire to form level courses to the bagwork. Deeper foundations beneath bed level should also be considered in watercourses where the bed material is prone to erosion, or better still, foundations in rivers created with our hand placed Underwater Concrete Bagwork. These deeper foundations better protect the wall against scour and undermining.

- 3. Placement of the Bagwork:** The first row of bagwork: With the groundwork prepared, the first row of bags can be placed, carefully abutting each bag as close as possible to its neighbour. Bagwork can be orientated in stretcher or header orientation to suit the design or desired width of the wall. Remember, the bagwork is 300x650mm in size, so wall widths of 300mm, 600/650mm or 900mm are typical. Bagwork should be placed in a neat and uniform arrangement patting level wherever necessary. 250mm long ground spikes and 300mm galvanised rebar pins can be utilised to then anchor the bottom row of bagwork to act as an additional shear key. With the bottom row placed, backfill can then be placed behind the bagwork to the top level of the bags.

Additional rows of bagwork: On the top of the lowermost row, place the spiked shear keys. These can either be placed in the centre of each bag, or across the junction between two bags, depending upon the design. The second row of bagwork can then be placed over the bottom row of bagwork according to the design or preferred layout, such that bagwork overlaps. Typically, for a single bag width, this would be in a simple stretcher arrangement. Care should be taken in positioning and aligning the bags before being placed on the shear keys. Once placed, the bags should not be re-lifted or repositioned. Once the second row is placed, additional backfill can be placed behind the bagwork, building up again the fill material level with the top of the second row.

Additional rows can then be built up in the same way by placing the shear keys and bagwork, then backfilling behind the bags, row by row, to within 100mm (the final row) of the desired height of the wall. The backfill material should typically be compacted every two or three rows.

Should geogrid be required to strengthen and support the wall, this can be included, extending between the bagwork and the fill material behind the wall, held into position by the spiked shear keys or plastic spikes. The geogrid should be laid horizontally, pulled tight and the fill material compacted around the placed geogrid.

Final row of bagwork: Typically the final row of bagwork is placed in a header arrangement, such that a section of the top row of bagwork overlays the fill material behind the wall. This improves the structural integrity of the bagwork wall. Additional pins can be added to fasten the bagwork to the fill material behind the wall and often the rear section of bagwork is overlain with topsoil.

## Assembly Instructions / How to Use prefilled SoluForm MSE Bagwork: (Continued)



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4. **Planting:** With the bagwork assembled, the final step is to include planting. Planting is needed to vegetate the bagwork, improve bagwork integrity and protect the fabric long term.

Our prefilled MSE Bagwork is not pre-seeded, as pre-seeding bags can create problems with storage and necessitates the use of the bags within 5 days of manufacture.

Hydroseeding is often used as a way of easily and quickly establishing vegetation on MSE bagwork, particularly on unseeded prefilled bagwork and typically a hydroseeding contractor would ordinarily be engaged to do this.

Other forms of planting include adding live plants to the bagwork or adding live stakes etc. along the front face of the bagwork. Live planting can be a good way of speeding up the establishment of vegetation and it can also improve the biodiversity of any planted scheme.

Please refer to our website [www.soluform.co.uk](http://www.soluform.co.uk) for our Planting Guide.



### Planting

**Ultimately the goal in all MSE Bagwork projects is to establish planting on/in the bagwork, to establish growth and increase biodiversity to the bagwork structure. Rooting within and between the bagwork helps to hold all the soil filled bags together, as well as helping protect the fabric bags long term.**

The establishment of planting on prefilled bagwork can be achieved in a number of ways including any one or a combination of the following methods:

- Hydroseeding by a commercial Hydroseeding Contractor – this involves spraying the bagwork following placing with a seed/mulch mix that then germinates and grows on the bagwork.
- Live planting after placement – Plugs and plants are inserted into the gaps and joints between the bags, which then establish and cover the bagwork.
- As with other forms of MSE Bagwork, other options for planting are available. These may include live stake planting, covering with topsoil and seeding/seeded geotextiles on slopes, covering with turf or pre-vegetated wildflower mats. Some success with seeded fabric (Hytex) has also been achieved, though these need to be regularly watered.

Always bear in mind that any planted solution will require care and attention, particularly during the initial germinating and growing period, to achieve the best results.

Any planted solution should be kept watered until it has established, to avoid it drying out. If this cannot be ensured, placement of the bagwork and planting should avoid sustained periods of dry hot weather.

Regular maintenance and aftercare of the vegetated bagwork is often also required.



# Frequently Asked Questions

## What are the sizes of the bags, as supplied?

A prefilled bag measures 300mm x 650mm x 100mm in height. However, it is important to bear in mind that all soil filled bagwork will compress when loaded and ultimately soaked, in situ. Typically the length and width of the bags remains constant, but the height of each course will compress to typically 90mm. A 1.5m high wall would typically settle into a 1.3m high wall, over the initial settling period, which would typically be several days/weeks, dependent upon rainfall, river levels etc. The weight of each bag, as supplied, is 20kg, though the exact weight may change at the time of placement if the bags are allowed to dry out or if they get soaked by rainwater.

## How many bags will I need?

Volumetrically, each pallet contains 0.8m<sup>3</sup> of in-situ MSE Bagwork. Each pallet contains fifty soil filled bags.

It is important however that you bear in mind the fact that the soil filled bagwork will compress over time and that the height of any wall formed will reduce over a short period of time as the bagwork is loaded and the soil becomes wet. As a guide, please work to the following reductions in height in your estimate of the quantity needed.

Initial Height (m)	1.00	1.50	1.73	2.00	2.30	2.50	2.88
Eventual Height (m)	0.87	1.30	1.50	1.73	2.00	2.17	2.50

## Height comparisons between freshly laid bagwork and compacted, saturated bagwork.

Based upon a known length of the wall, the initial height of the formed wall and a designed width to the wall, the volume of bagwork needed (and hence the number of pallets) can then be calculated. Remember, for below water applications we also recommend forming the base of the bagwork wall with our Underwater Concrete Bagwork. This forms a more stable and scour resistant base to any wall and the special lined nature of the Underwater Bagwork means that placement is very clean and environmentally safe. Concrete bagwork will not compress like soil filled bagwork, and is not affected like soil by the fact that it is constantly submerged.

Note that, unlike concrete filled bagwork, the heights of any wall or feature formed with soil filled bagwork are approximate only and will change during the initial days and weeks following placement.

## How many bags are on a pallet of prefilled bagwork?

Each pallet contains fifty bags and is sufficient to complete 0.8m<sup>3</sup> of in-situ MSE bagwork.

## Do I need any other materials?

We supply the soil filled bagwork prefilled and with the necessary shear keys to link all the soil filled bagwork together. When forming a wall or similar construction, remember to also consider:

- Fill material to be used for back filling
- A geogrid (if required by the design)
- A geo-textile (if required by the design)
- Seeding / planting options
- Concrete filled bagwork for any below water parts to the wall (if required)

## Do you install the bagwork?

No, we supply the materials only. Due to the simple nature of construction, the whole aim with soil filled bagwork is that it can be installed by anyone, so a specialist workforce is not required.

## How are the bags closed?

Prefilled bagwork is now closed in the factory by stitching, rather than using plastic closure ties. This provides a fully rectangular shape to the bags rather than a curved end to the bag, and also doesn't utilise any plastic in the bagwork.

## Do the bags come with the shear keys?

Yes, for every bag there is one plastic shear key.

## Are the bags available empty or filled?

Currently, our MSE Bagwork is only available in prefilled form. These bags are prefilled with a high quality organic and sand rich BS 3882:2015 compliant topsoil, meaning the product arrives ready to place and you do not need to fill any bagwork on site.

Filled bagwork is supplied on a pallet, with fifty bags per pallet and each bag containing 20kg of quality topsoil. Empty bagwork is not currently available but will be available for 2022.

## Can the prefilled bags be pre-seeded?

We currently do not provide pre-seeded prefilled bagwork, although this may change in the near future.

Details of our preferred Hydroseeding Contractor can be provided upon request.