

Site name / address	Redrow – Calder Grange, Dale View, Billington, Clitheroe, BB7 9LL
National Grid Reference	372536 435919
Number of plots proposed	36
Other construction	Flood Compensation Area



Figure 1: Site Layout (from Planning Boundary © Magic Maps)

This surface water management plan has been prepared to provide a strategy to manage surface water and silt issues that may occur across the site. This is intended as a working/live document to be reviewed and amended as the site progresses and will be updated as required.

<u>Site details</u>	
Site Area (Ha)	2.49
General description	Irregular shaped parcel of land comprising three fields approximately 400m north east of Billington village. An existing sewage pumping station is present in the south west of the site.
Pre-construction condition	Agricultural grassland.
Surrounding areas	North: Agricultural grassland. East: Residential properties. South: Residential properties and Billington Play Park. West: Agricultural grassland.
Topography/slope	Gradual slope down gradient to the north east.
Shallow soils	Predominantly clay soils, with lenses of sand. Over the north of the site clays are often very soft or soft, whilst in the south they are mostly firm to very stiff. Water-bearing sand deposits are typically present at greater depth, generally from greater than 2.0m below pre-development ground levels. (Includes information taken from Ground Investigation report – see 'Data Sources' below).

<u>Hydrology</u>	
Watercourses	On site: Ditch on the eastern site boundary. Issues from a culvert midway along eastern boundary and flows to the north before entering another culvert also on the eastern boundary. Downstream connections unknown. Shallow ditch on western site boundary (observed to be dry in dry weather), Begins on site (with no upstream inputs evident) adjacent to the sewage pumping station and flows to the north. Continues off-site to the north in field boundaries toward the River Calder. Nearby: The River Calder 130m to the north east. Flows north west to join River Ribble some 1.7km north west of site. (Includes information taken from Flood Risk Assessment report – see 'Data Sources' below).
Existing drainage	An existing surface water drain flows into site from the east and then off to the north to discharge to the River Calder. This is to be realigned. An existing culvert discharges into the head of the ditch that lies on the eastern site boundary. This is to be realigned to discharge in the ditch

<u>Hydrology</u>	
	to the west of site. Existing foul drainage flows into site in two places; from the north and from the east. Both flow to the sewage pumping station in the south west from where there is a rising-main connection off-site to the south west. New manholes will be constructed on the foul drain from the north. The foul drain from the east will be realigned.

<u>Proposed Drainage</u>	
Surface water	Attenuation: In-line attenuation pond in the west. Outfall(s): Downstream of the attenuation pond the surface water drainage will outfall into an existing drain in the northern corner of the site in manhole SD04. Description: Drainage for the entire site flows via the attenuation pond then north to connect to the existing drain that flows off-site to the north to the River Calder. A flow restrictor will be fitted at the outfall from the pond.
Foul	The existing foul drain from the east will be realigned to follow the road. New manholes will be constructed on the foul drain from the north to facilitate new connections from site. Foul drainage from the site will flow – partly via the existing infrastructure – to the existing sewage pumping station in the south west. From here there is a rising-main connection off-site to the south west.
Drawings	Infrastructure Delivery Plan, Drawing 4401 / Eng /009 29.06.2021 – Calder Grange
Other details	The existing surface water drainage that enters site from the residential development adjacent to the east and flows to the north to the River Calder will be realigned through site to follow the line of the proposed roads. This will re-join its original course at manhole SD04. The existing ditch on the eastern site boundary will be mostly infilled. The existing culvert that discharges into the head of the ditch and a short section of the southern end of the ditch will be abandoned. A new culvert will be installed within the ditch further north to take existing local drainage from neighbouring properties. From the end of this new culverted section there will remain a short open section prior to the ditch entering the existing culvert further north. The existing culvert that discharges into the eastern ditch will be re-directed through site to discharge into the ditch at the west, just north of the attenuation pond. The section of ditch south of this new outfall point will be abandoned and in-filled.

<u>Runoff / sources</u>	
Surface flows	Surface water runoff will generally follow the site topography, i.e. down gradient towards the north east, and ponding may occur in low points on site. Surface water runoff directions will also be influenced by earthworks as development progresses, and will drain locally to the road gullies and pond of the proposed drainage.
Infiltration	Shallow soils comprise generally stiff to very stiff, gravelly clays, so surface infiltration will be limited and surface runoff and pooling expected. Such soils have a high potential for silt generation.
Excavations	Excavations greater than 1.5m to 2.0m below ground level are likely to encounter sand soils. Within these soils groundwater entry into excavations is expected and so dewatering will likely be required.

<u>Potential receptors</u>	
On-site:	• Drainage ditches on the eastern and western sides of the site. • The existing surface water drainage and foul water sewers (including pumping station) at the site. • The future attenuation pond, gullies, surface water drainage and foul water sewers proposed at the site. • Residents in completed properties within the site.
Off-site:	• Residents in neighbouring properties to the east. • River Calder 130m north east of the site.

<u>Surface water control measures</u>	
site personnel and documentation	The following measures are to be implemented to increase awareness and ensure surface water management activities are detailed in site documentation: 1. All subcontractors undertaking groundworks to consider silt minimisation and management within their RAMS for the works. 2. Detailed site-based awareness training (toolbox talk) on surface water and silt management issues to be provided for all site groundworking staff. 3. A section relating to silt minimisation and protection to be included within site induction folder. 4. Weekly site surface water checks to be undertaken throughout works, with support obtained from the appointed environmental consultant if or when required.
Control measures throughout site works	1. Provision of a road sweeper on site and adjacent road network. Frequency and duration of sweeper visits to be continually assessed by site management and increased during times of more frequent vehicle movements (e.g., muck shifts) and periods

<u>Surface water control measures</u>	
	of inclement weather. - Any grips dug to drain surface water from work areas will have silt mitigation installed so that the water cannot drain freely. Sandbags, straw bales and silt mats will be used (as appropriate) to slow and pool water and provide silt containment. - Installation of soil bunds or silt fencing to prevent surface flows to receptors from surrounding work areas. See Figure 2 Surface Water Management Plan. - Surface runoff will be managed such that any clean flows from non-active areas is diverted away from work areas and excavations. - Monitoring of the discharge when dewatering excavations to ensure it is visually free of silt. If silt is entrained, pumping will be via a settlement tank or discharged onto vegetated area away from receptors. - Positioning of stockpiled soils within designated areas away from receptors. - As much as possible, minimising the movement of plant or other traffic in unsurfaced areas. Early installation of tarmac roads to provide clean access routes and use of physical barriers to restrict off-road access where necessary. - Seeding or turfing topsoil at the earliest opportunity to control surface run-off from completed areas. - General good housekeeping of the site with organised storage and waste/surplus materials removed quickly. - On site storage/availability of surface water management equipment to enable deployment at short notice if required (<i>i.e.</i> during inclement weather) and to facilitate on-going maintenance of potential installations. To include: - Silt fencing (c. 100m – 1No. roll). - Sandbags (and material for filling) (c. 20No.). - Silt matting (c. 5No.). 1 No. 50mm submersible pump with power source.
Additional control measures during enabling and preparatory works (e.g. bulk earthworks, main drain and road installation)	- Adoption of a strip and build approach minimising the amount of topsoil and vegetation removed and the area of exposed soils. - Retention of a strip of topsoil and vegetation between work areas and the ditches (and site boundaries). To include a step up from stripped area to cause any runoff to pool. - For drain diversion works, the replacement section of drainage and any onward connections will be completed prior to intercepting the flow in the existing drain. Where necessary, over pumping will be employed to keep work areas dry. - Phasing of the works to ensure surface water drainage works are

Surface water control measures	
	prioritised to be undertaken as soon as practicable. Headwalls to be installed the attenuation pond at time of construction. 5. Earthworks will be temporarily suspended during particularly wet weather.
Additional control measures during construction phase (e.g. plot construction)	1. The placement of gully protection (straw or gully bags) in all gullies during construction, to be inspected and replaced/cleaned when necessary. 2. Avoiding excessive tracking or washing out next to any drains/gullies. 3. Storage of materials in locations that have stoned or surfaced access. Provision of a temporary tarmac surface to storage, compound and car park areas. 4. The installation of hardstanding areas to the front of all plots to enable 'clean' forklift access and installation of hardstanding to other access routes as required during construction.
Control measures in non-active areas	1. Leaving topsoil and vegetation in place in areas not imminently due for development. 2. Preventing the unnecessary movement of any plant within those areas of the site, as this may cause soil disturbance and silt mobilisation. Use of tape or barriers as required to restrict unnecessary access to areas of the site not undergoing development. 3. Seeding of any exposed topsoil at the earliest opportunity to minimise surface run-off from completed areas.
Monitoring procedures and records	The following monitoring procedures will be carried out on a weekly basis by the site team to enable continuous review of the measures listed above. A record of the effectiveness of the system will be maintained to enable further review by any parties attending site: 1. Inspection of all gullies to monitor for silty runoff entering the drainage network (a gully inspection checklist is included in Appendix C). 2. Maintenance, cleaning and replacement of gully protection and potential silt fences and silt matting as required. 3. Monitoring the conditions on site and the identified receptors at strategic locations on a weekly basis and daily during periods of particularly heavy rainfall. This will assist in identifying any changes needed to the protection systems as the development progresses. 4. Keeping a photographic log and the completion of a site inspection form (Appendix C) on a weekly basis. Specific monitoring locations are identified on the Surface Water Management Plan, see Figure 2 attached. These will not all need monitoring for the duration of the development, but will be monitored when relevant based on development progress and the

<u>Surface water control measures</u>	
	currently active work areas on site. 5. Monitoring records to be reviewed by site observations and use of the checklist, and updated when required to reflect changes to site conditions and operations. 6. Calls to the appointed Environmental Consultant (Neil Coyne – 07880 312 400) will be made in the event of silty runoff breaching protective measures.

CONTACT DETAILS (to be used for support and advice)

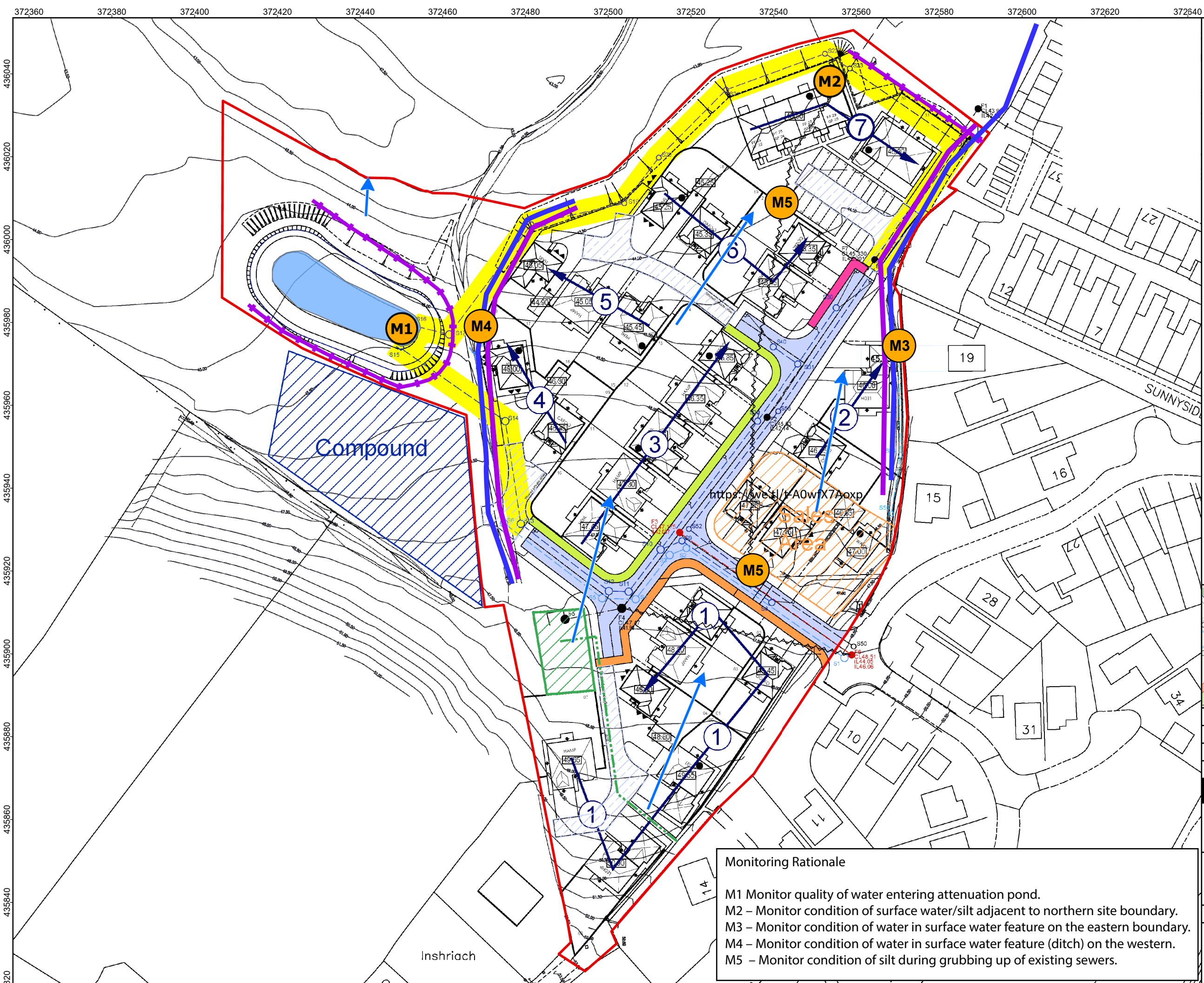
RSK Environment Ltd	Neil Coyne	07880 312 400
RSK Environment Ltd	Richard Newberry	07917 425 179

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Data Sources

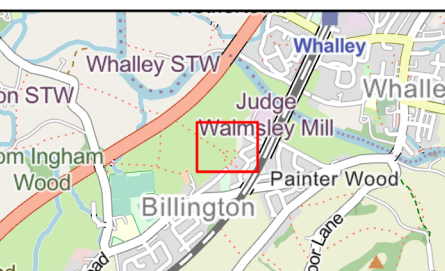
This Plan has been produced by RSK with reference to available online information (MAGIC Maps, Google earth), a site walkover undertaken on 1 July 2022, and the following reports supplied by the client:

- Terra Consult – Phase 2 Site Investigation Report, Residential Development, Dale View, Billington, ref 5334/01 Issue 1 dated June 2021.
- Banners Gate – Flood Risk Assessment, Neddy Lane, ref 20023_FRA, dated 29 September 2021.



- Legend:**
- Red Line Boundary
 - Silt Fence
 - Monitoring Point
 - Anticipated Surface Runoff Direction
 - Surface Water

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



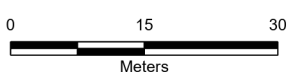
Rev	Date	Description	Drn	Chk	App
00	12/07/2022	Features added	CW	RN	RN
00	11/07/2022	First Draft	CW	RN	RN

Redrow Billington

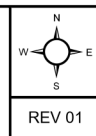


TITLE: Surface Water Management Plan

ID:P323032 Billington SWMP_SWMP



Scale: 1:850 @ A3



Monitoring Rationale

- M1 Monitor quality of water entering attenuation pond.
- M2 – Monitor condition of surface water/silt adjacent to northern site boundary.
- M3 – Monitor condition of water in surface water feature on the eastern boundary.
- M4 – Monitor condition of water in surface water feature (ditch) on the western.
- M5 – Monitor condition of silt during grubbing up of existing sewers.

APPENDIX A

INSTALLATION EXAMPLES

Retention of a wide vegetated buffer adjacent to a surface watercourse. Includes 'step up' from stripped to undisturbed ground which will help retain runoff and cause it to pool



Placement of stone to the front of plots to create clean forklift access



Installation of silt fencing to control run-off from an unsurfaced area



Placement of silt matting to capture settled silt downgradient within a surface watercourse
(image courtesy of Frog Environmental)



Silt matting installed along the base of an unsurfaced swale to capture settled suspended solids prior to discharge into a surface watercourse



Silt Wattles utilised to separate clean and silty water within a watercourse
(image courtesy of Frog Environmental)



Silt Wattles utilised to intercept silt laden run-off on a road
(image courtesy of Frog Environmental)



Silt Wattles utilised to intercept silt laden run-off from an unsurfaced slope
(image courtesy of Frog Environmental)



Silt fencing and straw bales installed across an inlet headwall within an attenuation basin, to promote settlement of silt within the concrete apron (where it can more easily be removed) prior to discharge into the attenuation basin. Coarse stone installed to dissipate flow and prevent scouring, and further promote settlement at the headwall



Silt fencing and straw bales installed across an outlet headwall within an attenuation basin, to promote settlement of silt within the basin prior to discharge into the surface watercourse



APPENDIX B

EXAMPLE MANUFACTURERES AND PRODUCT SHEETS

Product:	Application	Manufacturer and product
Gully Protection	Prevent construction debris and reduce silt entering the drainage system and blocking gully pots. Proprietary products often yield superior results to straw and terram and require less maintenance.	• Forest Group – Gully Guard • Hy-Tex – Ultra drain guards
Silt Fencing	Contain and attenuate water on site to promote settlement of silt within overland run-off.	• Frog Environmental – Silt Fence • Hy-Tex – Terrastop Silt Fence • Siltbuster – Silt Fence
Silt Matting	Capture settled silt as it naturally falls from suspension within watercourses, swales, attenuation basins to prevent its resuspension.	• Frog Environmental – Silt Mat • Hy-Tex – SediMat
Flocculant Treated Silt Matting	Capture settled silt within watercourses, swales, attenuation basins to prevent its resuspension. The addition of flocculant treatment encourages silt to settle out of suspension more readily. The Environment Agency must be consulted prior to utilisation of flocculants, and an environmental permit gained where required.	• Frog Environmental – Flocc Mat
Silt Wattle	Used as check dams within watercourses / swales slowing the flow of water to promote settlement of silt. Typically used in conjunction with silt matting (or flocculant coated silt matting) to capture sediment that was caused to settle. Can also be used to separate silty and clear water (i.e. within attenuation basins, or watercourses), on slopes to reduce erosion from overland run-off or to divert silty water to collection areas (i.e. on roads to divert silty run-off away from gullies).	• Frog Environmental – Silt Wattle • Hy-Tex – Ultra Erosion Guard (suitable for use as a check dam to control erosion only, due to its different construction to the Frog Environmental Silt Wattle).
Filter socks/bags	Fitted to hose end during dewatering of excavations to collect sediment. Socks capable of dealing with smaller temporary volumes and lower flow rates and bags for larger flows and longer-term installations. Additional control measure only – unlikely to significantly reduce silt content.	• Hy-Tex – Pro-Tex Pipe Socks • Murlac – Silt Sock • Dirtbags UK – Utility Bag • Siltbuster – Siltstopa Dewatering Bag
Settlement Tanks	Settlement and capture of suspended solids during dewatering / over pumping works. Minimum practicable pump speeds should be used The unit required is dependent on the grain size of suspended particles, how quickly these settle from suspension, and the required flow rate.	• Siltbuster – wide range of settlement units available • Andrew Sykes Group – settlement tanks / Silt Away. • Dirtbags UK – Dirtbox

Product:	Application	Manufacturer and product
	Liaison with the supplier is best undertaken to ensure a suitable product is selected. Can be used in conjunction with flocculants and coagulants to promote settlement, however the Environment Agency must be consulted prior to their utilisation, and an environmental permit gained where required.	

GULLEY PROTECTION

The Gully Guard

Installation guide



1. Lever open gully grid. Gully Guard is designed to fit all size gullies.



2. Hold handles at top of the Gully Guard, work beads to top and insert base into water filled gully pot.



3. Lower the Gully Guard into the pot. The beads will fall freely into the void within the pot.



4. Tuck the holding handles to the side of the Gully Guard.



5. Close gully grid.

Forest Drainage Products Ltd

Stardens Works, Tewkesbury Road,
Newent, Gloucestershire GL18 1LG

Tel: 01531 828960 Fax: 01531 828969

Email: info@forestgroupuk.co.uk

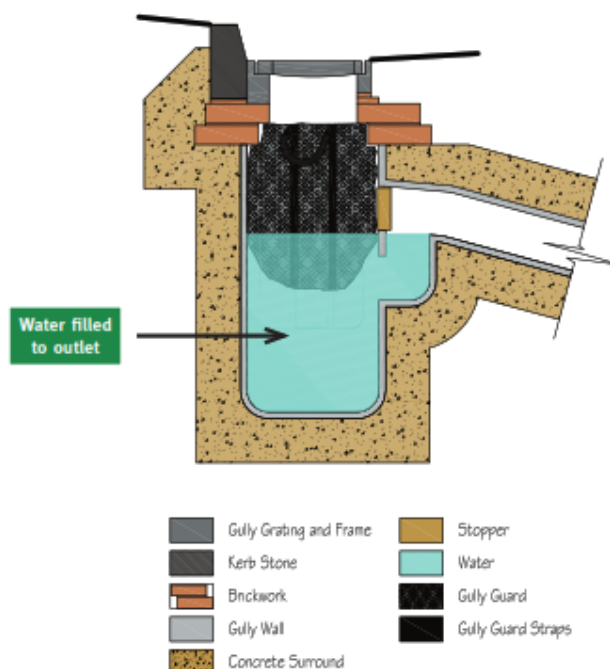
www.forestgroupuk.co.uk

Patent no. 2472690

fg The Forest Group
High performance, versatile solutions

The Gully Guard

Installation diagram



Maintenance

The Company (Forest Drainage Products) would recommend that an inspection procedure be put in place for the product by the organisation on a 3–4 months basis depending on site conditions.

Maintenance would simply involve the removal of the Product and power hose off in a bund to contain and manage silt and any contaminants prior to reinsertion back into the gully pot.

Without prior knowledge of the type and concentration of the contaminants that each Gully Guard has been subjected to, the Company cannot advise on appropriate disposal. The Company advises that an environmental risk assessment is conducted on an individual case-by-case basis to fully evaluate the nature of contaminants. In order to determine the appropriate method of disposal the Company would recommend that you follow your organisation's environmental waste disposal policy.

Forest Drainage Products Limited (the "Company")

Forest Drainage Products Ltd, Stardens Works,
Tewkesbury Road, Newent, Gloucestershire GL18 1LG
Tel: 01531 828960 Email: info@forestgroupuk.co.uk

www.forestgroupuk.co.uk  

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2019 / 69145

SILT FENCING



product information sheet
Silt Fence
temporary silt control barrier



Silt Fence is inexpensive to buy and install, but it must be correctly positioned and maintained for it to be an effective pollution control measure.

Each line of Silt Fence should be inspected on a regular basis, especially after rainfall.

If stakes are broken or gaps appear between the fence and the ground, then the fence should be re-trenched. Accumulated silt must be removed regularly from Silt Fence, typically when it reaches a third of the way up the fence.

Multiple smaller runs of silt fence are usually more effective at controlling pollution than longer lines.

Applications

- Silt Fence is deployed on construction sites to help prevent silt pollution in water bodies or from impacting public highways.
- Silt Fence provides a 'ponding' function; it allows silt laden water to collect behind it and for silt to drop out of suspension while the water slowly drains away or evaporates.
- Silt Fence is usually deployed in conjunction with other silt pollution control measures, especially on sites with clayey soils.

frog environmental Silt Fence is made from high specification geo-textile material and has medium porosity, making it suitable for use on most construction sites.

Poorly installed Silt Fence can cause erosion underneath or around the edges of fencing. This can lead to an increased silt pollution risk.

Technical information

Silt Fence

Dimensions: 100 metres x 0.9 metres (single roll)

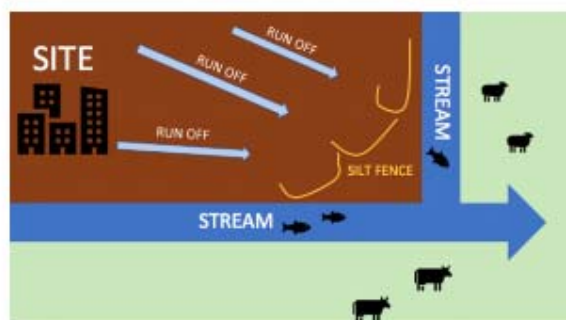
Dry Weight p/m: 110 g/m² (9.9 kg single roll)

Permeability: 7 (l/m² /sec)

Material used: tear resistant polypropylene geotextile, PFSC timber stakes (cable ties or staples/ nails to fix)

Function: creates a temporary fence to provide a pooling function that allows silt to drop from suspension

Disposal: all materials fully reusable or recyclable



Shorter J shaped runs of silt fence typically provide more effective pollution control than longer runs



Silt Fence can be used as a temporary measure to prevent muddy water escaping from construction sites

10 TIPS for successful Silt Fence deployments:

- Fence posts should be spaced a maximum of 1.5m apart
- Silt Fence should be trenched a minimum of 20cm into the ground and compacted
- Shorter 'J shaped' installations of Silt Fence act like mini-retention areas and are typically more effective than longer runs (as shown in the diagram above)
- Longer runs of silt fence will concentrate water in the lowest point, where the fence can become weakened and water can undercut or overflow the fence avoid these where possible
- Water flowing around the edges of silt fence can cause erosion and add to the pollution loading from site
- The lower part of the end of each run of silt fence should ideally be above the top of the middle section of the run
- Removal of accumulated silt and regular inspection are key maintenance activity for silt fence. A named individual should be responsible for this action on site
- Silt fences are not designed to handle continuous high volume flows and will not be an effective stand-alone control in these circumstances
- Factors such as soil type, slope angle and slope length are key factors in determining how much silt fence is needed on site
- If ground conditions are clayey Silt Fence alone is unlikely to be an effective pollution control

for technical support and sales of
Silt Fence contact frog environmental

0345 057 4040

info@frogenvironmental.co.uk

www.frogenvironmental.co.uk

@frogenv

Wales: Llanwrda, Dyfed SA19 8NA
Midlands: The Byre, Blakenhall Park, Barton Under
Needwood, Staffordshire, DE13 8AJ



SILT MATTING



product information sheet

SiltMat
silt capture mat



SiltMat is a fully biodegradable mat that captures and prevents sediment resuspension.

The mats can be placed in natural or artificial channels, ditches or directly on land to trap suspended sediments.

SiltMat can be orientated sideways or lengthways and fits into all channel types.

SiltMats are used to manage sediment release to watercourses from construction sites and for capturing silts suspended by in channel or works on river banks.

Applications

- Silt control from construction sites
- Silt control from river or bank works
- Deployed in rivers, streams and ditches
- Deployed in Silt Capture Channels
- Used in forestry and agricultural applications

SiltMat is proven in the field to reduce downstream levels of suspended solids

Technical information

SiltMat

Dimensions: 2 x 1 x 0.12 metres

Dry Weight: 12kg per mat

Material used: coir (80%) jute (20%)

Function: Captures and prevents resuspension of silt

Performance: Single mat captures up to 40kg of silt

Disposal: Fully biodegradable, with correct permissions used mats can be disposed ofland.



four step guide to using SiltMats

Use our reference table (below) to judge optimal placement. As a rule of thumb, SiltMat is best placed in areas where stream energy is reduced and natural deposition takes place.

SiltMat is unfolded and orientated to cover the width of the channel. The edges of silt mat can be overlaid without gaps. Mats are staked in place or weighted with local material.

SiltMat will trap large amounts of sediment. Stakes or weights are removed and the mats rolled up ready for disposal.

With correct permission SiltMat can be seeded and left on site, creating an environmental enhancement and avoiding disposal costs.

Reference table showing the distance that different particle sizes travel at differing water velocities

Particle Size	Water Speed (m/s)				
	0.2	0.4	0.6	0.8	1
Fine Gravel	20 cm	40 cm	60 cm	80 cm	1 m
Sand	70 cm	1.4 m	2.1 m	2.8 m	3.5 m
Fine Sand	8 m	17 m	25 m	33 m	40 m
Silt	228 m	456 m	683 m	911 m	1139 m

for technical support and sales of
Silt Wattle contact frog environmental

0345 057 4040

info@frogenvironmental.co.uk

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Wales: Llanwrda, Dyfed SA19 8NA

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Needwood, Staffordshire, DE13 8AU



FLOCCULANT TREATED SILT MATTING



product information sheet

Floc Mat™
water treatment mat



Floc Mat™ is a versatile silt control device

A mat created to treat and capture fine silts and suspended particles in construction site run off.

The main function of the mat is to flocculate very fine particles, making them easier to separate from water.

Floc Mats can be laid flat out in dispersion fields, used with Silt Wattles or silt fence and deployed in the frog environmental Silt Capture Channel as part of a versatile water treatment process to remove silt from construction site run off.

Applications

- In a Silt Capture Channel
- With Silt Wattles and SiltMats
- In site ditches and low flow channels
- In combination with silt fence
- On natural dispersion fields
- In combination with dewatering bags and silt socks

- Floc Mat™ is a fully biodegradable water treatment and silt capture mat that treats muddy water and helps prevent silt pollution
- They are a cost effective way of treating water in ditches and channels, without the need for pumps – saving energy and CO₂

Technical information

FlocMat™

Dimensions: 2x1 x 0.10m

Variants: FM1 (30g/m²), FM2 (100g/m²)
FM0(untreated)

Active ingredient: Water Lynx™

Dry Weight: 12 kg per mat

Material used: coir fibres, coir netting, coir rope, anionic flocculant, water

Function: Water treatment – aids solid water separation. Can be used to segregate low flow channel to in bankside works.

Performance: Single mat captures up to 50kg of silt in live test

Disposal: Fully biodegradable, suitable for re-use on site (with correct permit).

Waste classification and disposal legislation must be followed at all times. Always liaise with the regulator before deploying a product containing flocculant. If in doubt contact frog environmental on 0345 0574040 for further information and advice.



Close up FlocMat showing accretion of silt



Deployed in Silt Capture Channels with Silt Wattles

100% sustainably sourced natural fibres are used to create Floc Mat, this ensures the mats are biodegradable and suitable for use as backfill material once used, reducing waste disposal costs. Floc Mat is available in treated and untreated forms. The fibres of the treated version of Floc Mat are coated with Water Lynx™, a non-hazardous, non-toxic, synthetic anionic polymer which contains no coagulants, cations or metals such as Al and Fe that are ecotoxic.

When deployed in a Silt Capture Channel the Floc Mat provides a safe, low carbon and easy solution to support the removal of suspended solids and associated pollutants from construction site run off.



Deployed to treat muddy excavation water

for technical support and sales of
Silt Wattle contact frog environmental

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Needwood, Staffordshire, DE13 8AJ



SILT WATTLE



frog
environmental

product information sheet

Silt Wattle
silt control sausage



Silt Wattles are a versatile silt control device.

They are deployed on building sites to control movement of suspended silt and in ditches, channels and streams to slow the flow and naturally capture silt.

Silt Wattles are often deployed with frog environmental SiltMats and FlocMats as part of a silt pollution prevention strategy.

Applications

- Silt Wattles can be used to reduce silt release into watercourses from construction sites and deployed directly in channel to reduce movement of suspended silts.
- The tough exterior netting means they can be left for months on site with out degradation, whilst the biodegradable treated wood fibre continues to slow the flow and trap silt particles.
- Silt Wattles mould to the shape of the river bed or ground and can be joined end on end or pyramided to help clean dirty water.
- Wattles are highly versatile and can be weighted or staked in position depending on bed/ground conditions and flows.
- Silt Wattles can be joined end of end to create temp low flow channel and protect rivers from pollution arising from bank works.

Silt Wattles are a versatile product suitable for use in a wide range of silt control applications on construction sites and in river works

SETTLEMENT TANKS

Siltbuster®

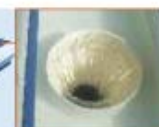
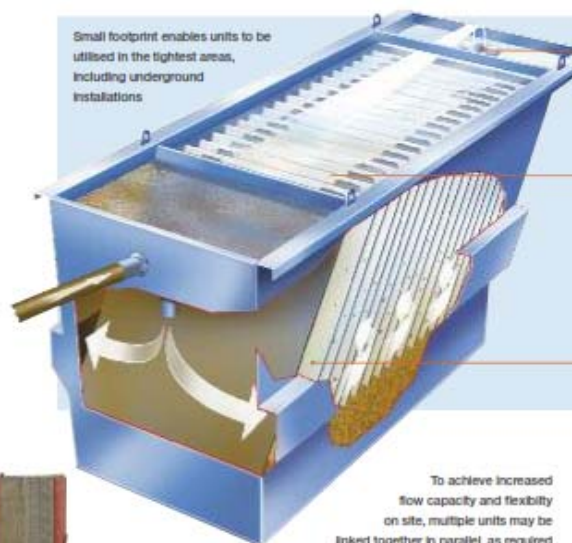


Gravity Settlement ▶ Siltbuster Settlement Units & Water Clarifiers

Siltbuster is the UK's leading provider of mobile settlement units and Lamella Clarifiers. Each unit in the extensive range is specifically designed to remove suspended solids and settleable matter from silt and solids laden surface run-off and groundwater.

Effective gravity based solid/liquid separation requires the largest possible settlement area and optimum hydraulic flow. Siltbuster Clarifiers utilise lamella plate technology to maintain ideal settlement conditions within each unit, thereby, ensuring maximum particle settlement and minimum unit footprint.

Small footprint enables units to be utilised in the tightest areas, including underground installations



Innovative outlet design maintains flow even when the unit is not exactly level



Plate technology and configuration hugely increases settlement area. Plates are designed for easy handling



Flow distribution has been designed to meet the rigours of the modern construction site



Emptying can be achieved by a range of methods, e.g. via drain ports & valves, vacuum tanker or by manual or mechanical means

To achieve increased flow capacity and flexibility on site, multiple units may be linked together in parallel, as required

Siltbuster mobile clarifiers are robust; skid-mounted; compact and lightweight, making them simple to transport, install and operate. They are ideal for sites with limited access, restricted spaces and temporary projects. Hopper bottomed units can be fitted (on request) with an automatic sludge removal system making their operation virtually maintenance-free.

Typical applications

Construction

- ▶ Pumping & de-watering
- ▶ Groundwater treatment
- ▶ Site run-off treatment
- ▶ Drilling, piling & coffer dams
- ▶ In-river & near-river works
- ▶ De-silting & dredging
- ▶ Roads, pipelines & other linear projects
- ▶ Plant, vehicle & wheel washing
- ▶ Site water management

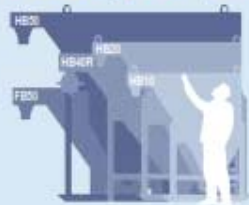


Silt Management

www.siltbuster.com

The Siltbuster Mobile Range
Siltbuster offers a range of various sized units to provide customers with flexibility and the opportunity to hire or purchase a tailored, yet off the shelf, solution.

The Mobile Range, Size Comparison



FB50	HB10	HB20	HB40R	HB50
Flat-bottomed, skid-mounted unit. The Construction Industry's favourite	Hopper-bottomed, skid-mounted unit	Enlarged version of HB10. Increased flow rate and sludge storage. Batch or continuous sludge draw-off	Hopper-bottomed, skid-mounted unit	Performance of the FB50 but with twin hoppers for larger capacity, primary thickening applications and batch or continuous sludge draw-off
Height: 1.9m	Height: 2.1m	Height: 2.6m	Height: 3.1m	Height: 3.1m
Length: 3.7m	Length: 1.9m	Length: 2.5m	Length: 8m	Length: 3.7m
Width: 1.45m	Width: 0.9m	Width: 1.2m	Width: 2.2m	Width: 1.7m
Effective Settlement Area: 50m ²	Effective Settlement Area: 10m ²	Effective Settlement Area: 20m ²	Effective Settlement Area: 40m ²	Effective Settlement Area: 50m ²
Dry Weight: 1,960kg	Dry Weight: 510kg	Dry Weight: 1,120kg	Dry Weight: 2,480kg	Dry Weight: 2,370kg
Inlet: 4" bauer	Inlet: 2" bauer	Inlet: 3" bauer	Inlet: 4" bauer	Inlet: 4" bauer
Outlet: 6" bauer	Outlet: 3" bauer	Outlet: 4" bauer	Outlet: 6" bauer	Outlet: 6" bauer
Typical Operating Capacity: 1-50m ³ /hr	Typical Operating Capacity: 1-10m ³ /hr	Typical Operating Capacity: 1-20m ³ /hr	Typical Operating Capacity: 1-40m ³ /hr	Typical Operating Capacity: 1-50m ³ /hr

The benefits

- ▶ Readily transportable, fast and simple to setup, easy to operate.
- ▶ Small footprint units with large settlement area
- ▶ Unique design enables rapid particle settlement and water clarification
- ▶ Up to 20 times more efficient than conventional settlement tanks and lagoons of the same plan area
- ▶ Choice of unit sizes and capabilities to suit most applications
- ▶ Units can be used individually or linked to accommodate a wide range of flows, pump sizes and particle characteristics



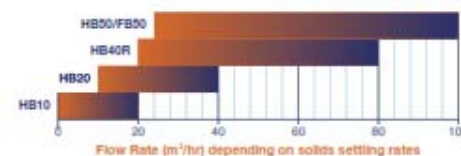
Options & Process Add-ons

Total Water Treatment Solutions

Siltbuster Clarifiers can be configured as single or multiple units for basic gravity separation and discharge-to-sewer applications. They can also be supplied as part of a complete, tailored, packaged treatment solution – including ancillary equipment, such as:

- ▶ Lids, covers, walkways & access platforms
- ▶ Flow splitter valves, flow meters & flanged ports
- ▶ Automatic, flow proportional, single or multi-stage chemical pre-treatment
- ▶ Fully containerised dosing systems
- ▶ Flash mixers
- ▶ Pipe flocculators or mixing/aging tanks
- ▶ Automatic desludging systems
- ▶ Sludge pumps & sludge storage tanks
- ▶ De-watering systems

Siltbuster Mobile Clarifier Operating Range



For hire, sales or more details call Siltbuster on 01600 772256

APPENDIX C

INSPECTION AND MONITORING PROFORMAS

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GULLEY INSPECTION CHECKLIST
SITE: Billington, Clitheroe

Date	Gully no	Fit for purpose (yes/no)	(if no: action required, clean / replace?)	Comment	Signature

SITE INSPECTION CHECKLIST

SITE: Billington

Name of person undertaking inspection:

Date:

Current weather conditions:

Description	Comments	Action	Initial
1) M1 Monitor quality of water entering attenuation pond. <i>Note any discolouration of the water or evidence of sediment build up. Check for overland flows from surrounding areas.</i>			
2) M2 – Monitor condition of surface water/silt adjacent to northern site boundary.			
3) M3 – Monitor condition of water in surface water feature on the eastern boundary. <i>Note any discolouration of the water or evidence of sediment build up. Check for overland flows from surrounding areas.</i>			
4) M4 – Monitor condition of water in surface water feature (ditch) on the western. <i>Note any discolouration of the water or evidence of sediment build up. Check for overland flows from surrounding areas.</i>			

Description	Comments	Action	Initial
5) M5 – Monitor condition of silt during grubbing up of existing sewers. <i>Note any evidence of sediment built up.</i>			
6) What is the current condition of the gully protection measures within the active areas of the site? <i>Note any gullies requiring maintenance/cleaning.</i>			
7) Are site roads clean and relatively free of mud? Is the frequency of scraping and sweeping adequate? <i>Consider whether additional cleaning should be scheduled.</i>			
8) Are there currently unsurfaced areas being trafficked which may be causing silt to enter the site drainage or watercourses? <i>Note if additional measures are required to reduce the run-off from unsurfaced areas.</i>			
9) Are control measures in place to prevent silt run-off from unsurfaced areas and soil stockpiles? <i>Note if the control measures are adequate and whether.</i>			

Description	Comments	Action	Initial
10) Is there any dewatering of excavations taking place on site? <i>Note what activities are taking place, the location, any control measures in place, and the ultimate fate of the water discharged.</i>			

