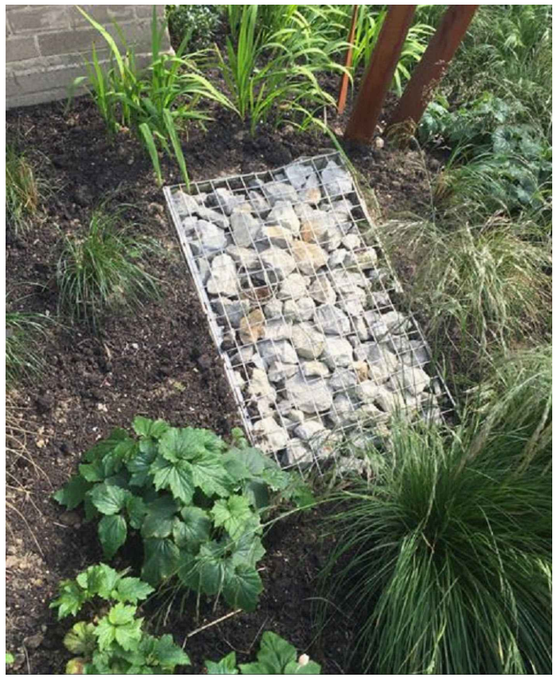
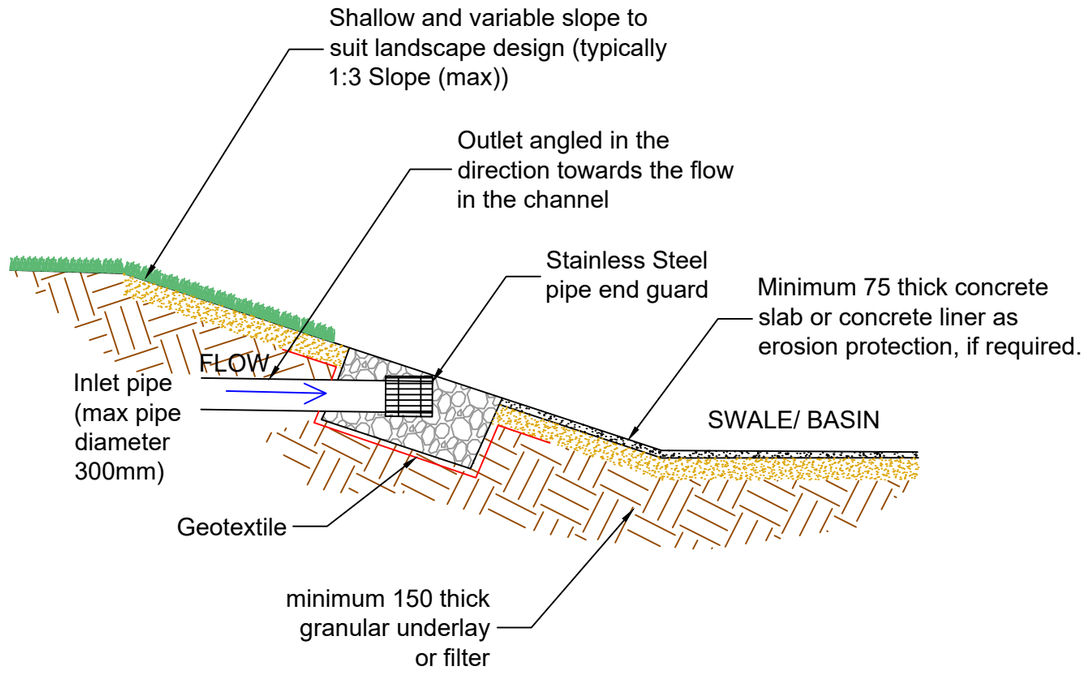
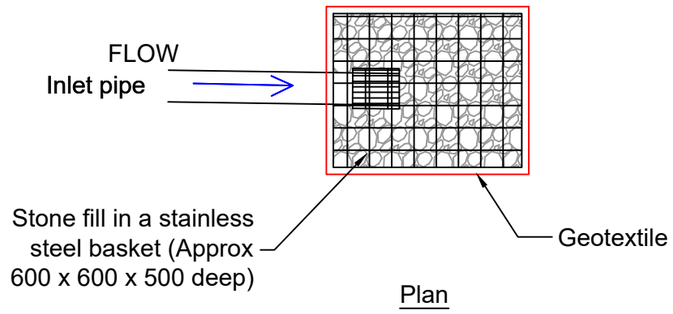




Section

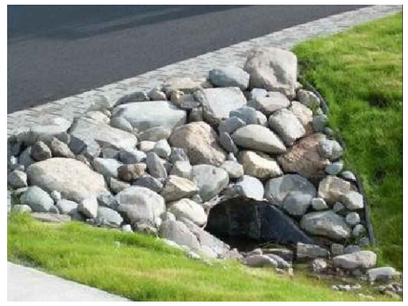


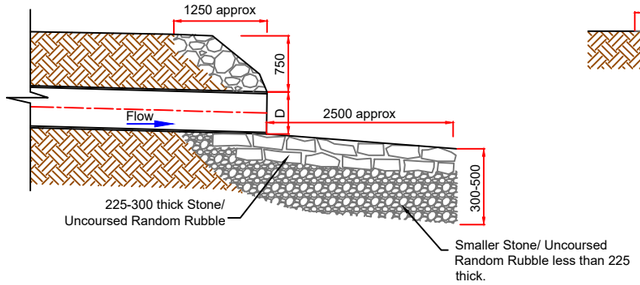
Plan

Notes:

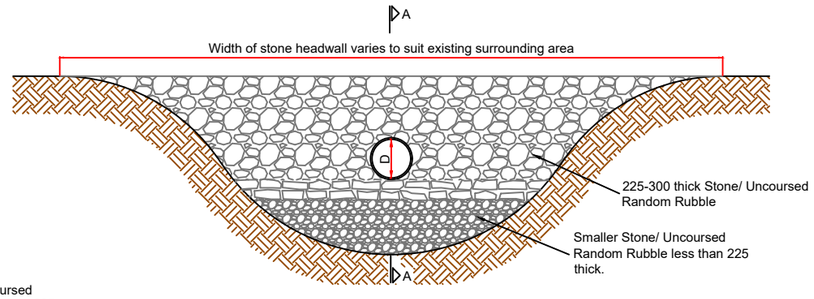
1. All dimensions in millimetres. This drawing is not to scale.
2. Design to be developed using design guidance as set out in CIRIA C753 SuDS Manual.
3. Suitable bedding to achieve a stable footing specific to site requirements. Engineer to specify.
4. Geotextile and granular underlay can be permeable if required. Ground investigation to confirm ground conditions. If the ground is unstable or unsuitable, replace with suitable engineered soil.

TYPICAL DETAIL GABION BASKET INLET

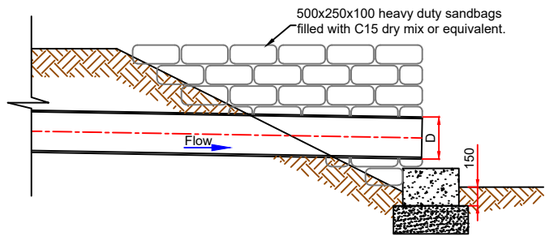




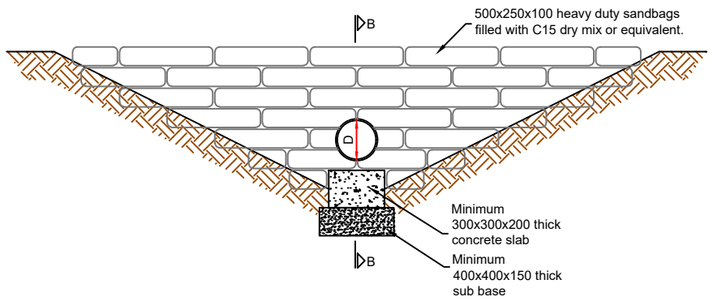
SECTION A-A
TYPE 1 - STONE STACKED HEADWALL



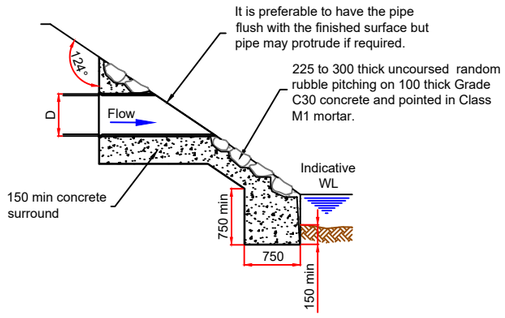
TYPE 1 - STONE STACKED HEADWALL
FRONT ELEVATION



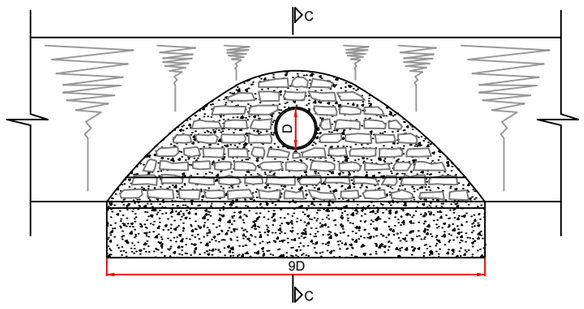
SECTION B-B
TYPE 2 - SANDBAG HEADWALL



TYPE 2 - SANDBAG HEADWALL
FRONT ELEVATION



SECTION C-C
TYPE 3 - STONE PITCHED HEADWALL

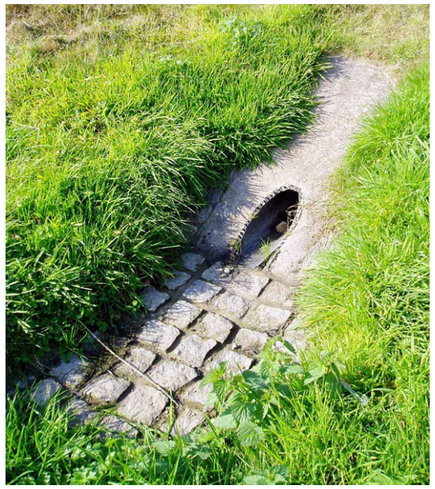


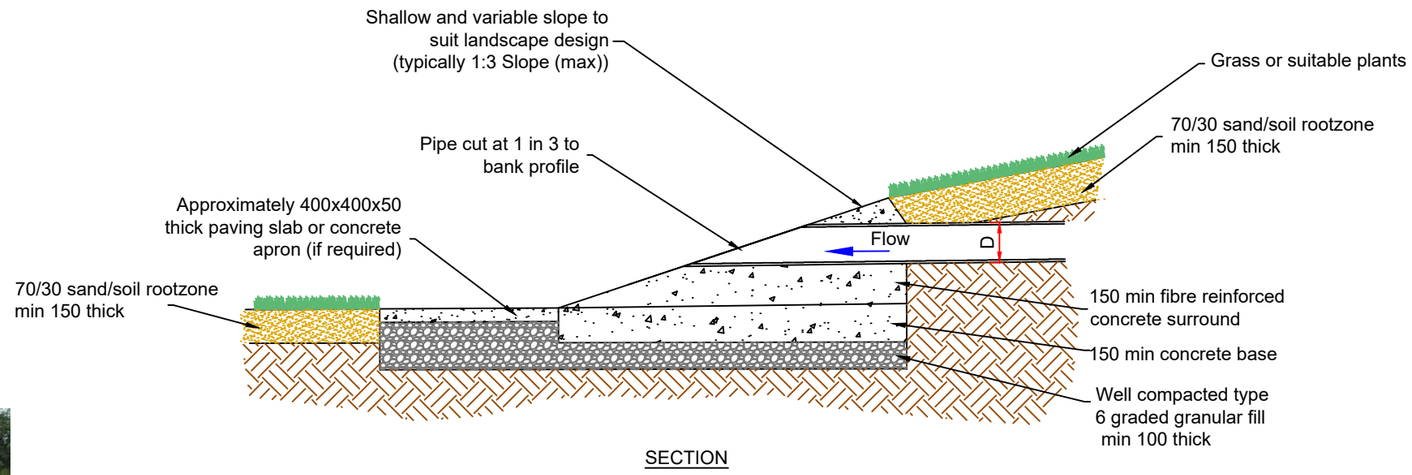
TYPE 3 - STONE PITCHED HEADWALL
FRONT ELEVATION

Notes:

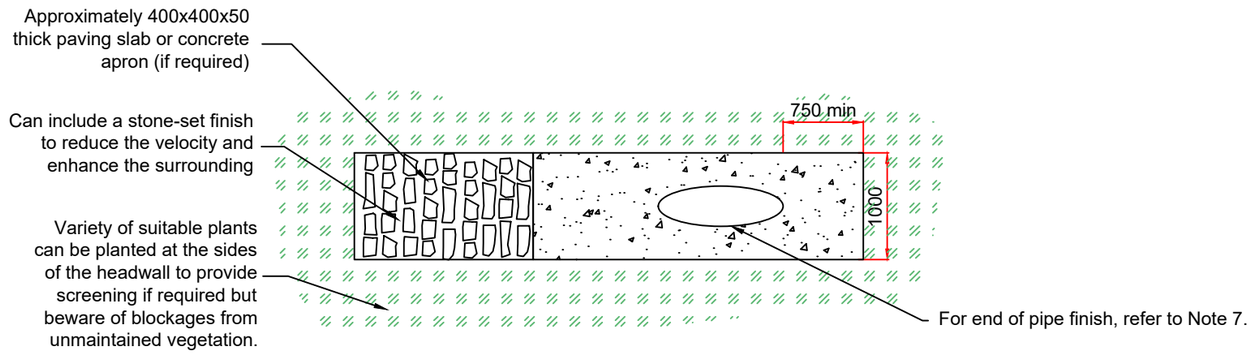
1. All dimensions in millimetres. This drawing is not to scale.
2. Design to be developed using design guidance as set out in CIRIA C753 SuDS Manual.
3. Suitable bedding to achieve a stable footing specific to site requirements. Engineer to specify
4. The bed and opposite bank of the watercourse may in certain circumstances, need to be protected by 225mm to 300mm thick uncoursed rubble pitching laid on 100mm thick bed of C30 concrete and pointed in Class M1 mortar. The stone for pitching shall consist of large smooth faced stones roughly dressed square and shall be of a hard durable and inert material. Bunter sandstones, Keuper waterstones and carboniferous shales and mudstones are not to be used.
5. Diameter 'D':
   Type 1 - Max pipe diameter is 300mm,
   Type 2 - Max pipe diameter is 300mm,
   Type 3 - Pipe diameter is greater than 300mm.
6. Dimensions of sandbags are taken from:
   - S.G. Baker - www.sgbaker.co.uk
4. Headwalls for larger pipe diameters, refer to UU Standard Details STND-00-006 and Design and Construction Guidance (DCG).
5. For safety grille and trash screen, UU Standard Details STND-00-007 and Design and Construction Guidance (DCG).
6. Large outfalls may require the provision of a security screen to prevent others from gaining access to the pipe. Note that there must be a screen at the inlet of the pipe if there is one at the outfall. UU standards specify 375-450mm pipes have safety bars and >450mm dia have safety grille.
7. Where the velocity of flow exiting the outfall is likely to be high, some means of energy dissipation is necessary to reduce the risk of erosion in the vicinity of the outfall. This may take the form of baffle blocks on the apron, or an impact type stilling outfall can be adopted.
8. Outfalls do not have to be large and visually intrusive provided careful thought is given to the purpose of the outfall and the hydraulics (velocity, direction) of the flow.

TYPICAL DETAIL
HEADWALLS





SECTION



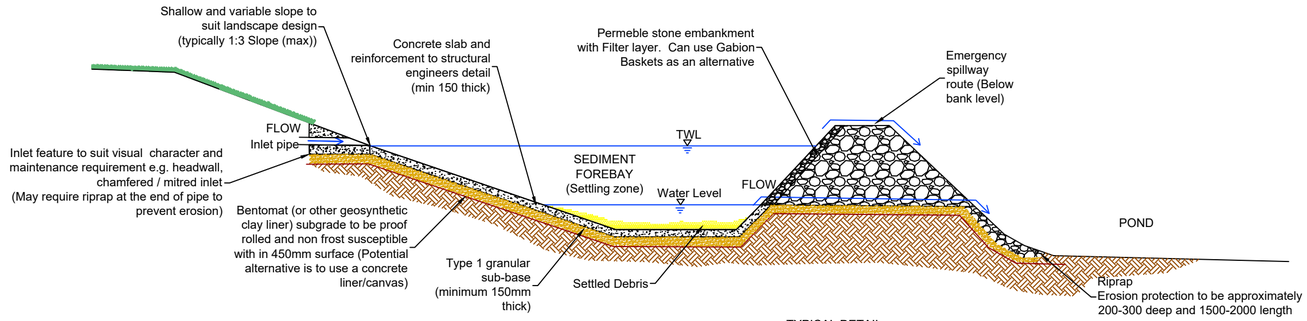
PLAN

Notes

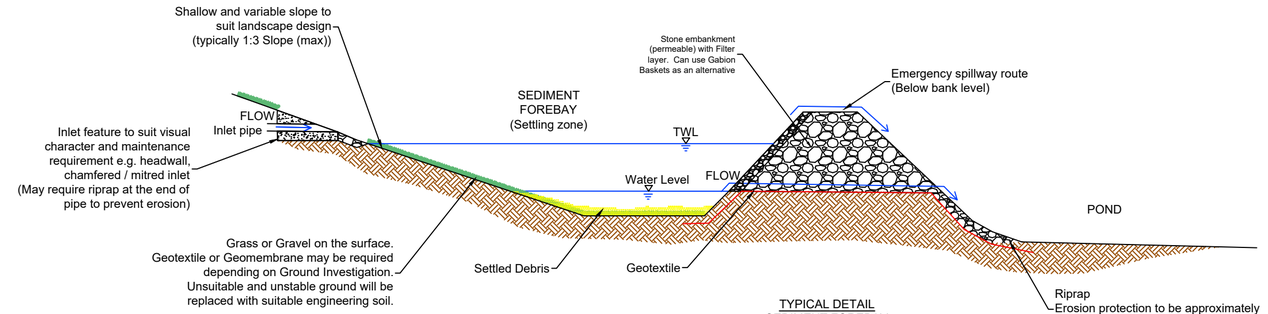
1. All dimensions in millimetres. This drawing is not to scale.
2. Design to be developed using design guidance as set out in CIRIA C753 SuDS Manual.
3. Suitable bedding to achieve a stable footing specific to site requirements. Engineer to specify
4. Recommended maximum slope is 1 in 3.
5. Headwall arrangement is only suitable for small pipe diameters ('D') of up to and including 300mm.
6. Pipe cover depth to achieve 0.9m as soon as it is possible to do so for non-trafficked areas, open space areas. Refer to the 'Design and Construction Guidance'.
7. Pipe end can be moved closer to or further from the concrete slab base if required but must maintain the minimum concrete surround.
8. Paving slab, concrete apron or stone-set finish can be angled at maximum of 1 in 3 slope if required.
9. Concrete, stone or other surrounds to pipe must be flush to bank profile. The cut ends of the plastic pipe should not be left exposed. Plastic pipe end may need to be cut prior to being exposed externally and and reinforce the cut end with a concrete collar, smooth out the concrete surround.
10. Precast concrete mitred inlet/outlet is also available: https://www.althon.co.uk/products /swale-inlet-headwall/ or https://www.aco.co.uk /products/suds-swale-inlet however, mesh grating to be used with care and assess location for suitability. Possible blinding/ blockage risk.
11. Designed water level to be below the outlet/ inlet of the SuDS feature.
12. For larger pipe diameters, refer to the 'Design and Construction Guidance', United Utilities Developer Services Construction Details both of which comply with the Environment Agency's standard details.

TYPICAL DETAIL MITRED CONCRETE HEADWALL

PHOTO OF CONCRETE
SEDIMENT FOREBAY



TYPICAL DETAIL
SEDIMENT FOREBAY
(Concrete Base)



TYPICAL DETAIL
SEDIMENT FOREBAY
(Stone Embankment)

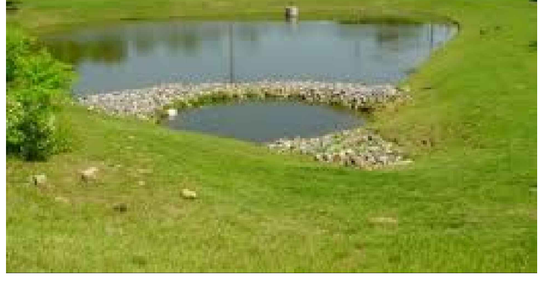
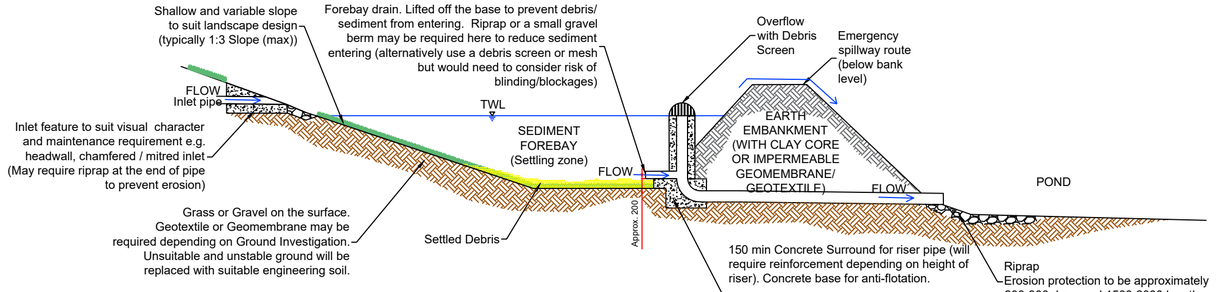


PHOTO OF STONE
EMBANKMENT
SEDIMENT FOREBAY



TYPICAL DETAIL
SEDIMENT FOREBAY
(Riser outlet structure)

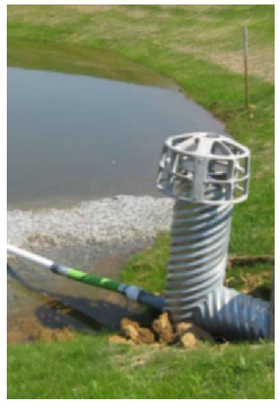
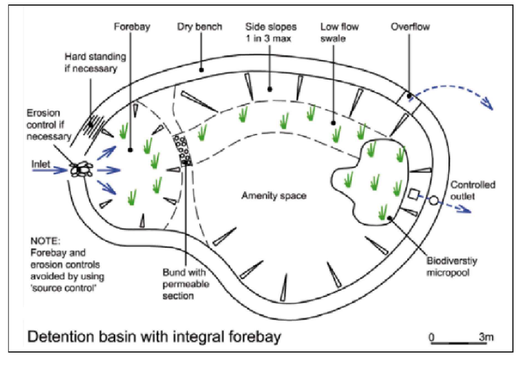
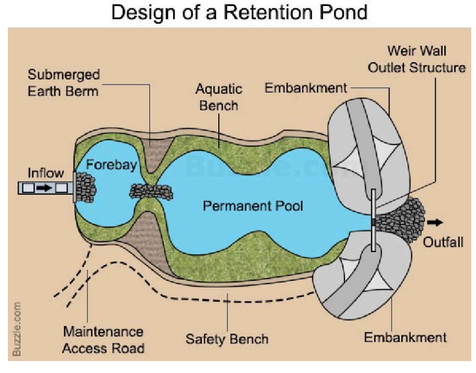


PHOTO OF SEDIMENT
FOREBAY WITH RISER OUTLET
(Alternative options corrugated pipe and concrete chamber)



TYPICAL PLAN OF
SEDIMENT FOREBAY



Notes

1. All dimensions in millimetres. This drawing is not to scale.
2. Design to be developed using design guidance as set out in CIRIA C753 SuDS Manual.
3. Maximum slope is 1 in 2 for riprap stability but recommended maximum slope for bank is 1 in 3 for undertaking maintenance.
4. Headwall arrangement shown on this drawing is only suitable for small pipe diameters. Refer to typical detail for mitred headwall and typical headwalls.
5. Suitable bedding to achieve a stable footing specific to site requirements. Engineer to specify.

RipRap:

Riprap needs a well engineered underlayer to work effectively...

This underlayer must act as:
- a drain parallel to the slope to prevent a build-up of water pressure under the cover layer;
- a filter to prevent the underlying soil from washing out.

The underlayer normally consists of a granular material laid on a geotextile filter cloth that separates it from the bare earth bank. To reduce the risk of voids, the underlayer must be finished to provide an even formation for the cover layer.

Riprap to be light grading 60-300kg as per EN 13383 standard grading requirements, reproduced in CIRIA C683 'The Rock Manual', Table 3.5. Grading requirements for Riprap.

Appropriate characteristics of riprap are given in Table 8.2 Appropriate characteristics of riprap (Escarameia, 1998). Many formulae have been developed to determine the size of rocks in a revetment, but that of Escarameia (1998) is one of the easiest to use. It can be used for bank slopes not steeper than 1V:2H to determine the 50% passing size of the revetment.

Minimum Thickness of placed Riprap to be 2 x DN50 or 1 to 1.5 × maximum dimension of individual stones.

Gabion Mattress:
Reference made to:

River and Channel Revetments: A Design Manual By Manuela Escarameia

A T Pepper, C E Rickard
FDG2 – Chapter 8 – Final, FDG2-Ch8-Final4b.doc 8–18 13Dec09
http://evidence.environment-agency.gov.uk/FCERM/Libraries
/Fluvial_Documents/Fluvial_Design_Guide_-_Chapter_8.sflb.ashx

With a well-constructed gabion mattress smaller stones can be used. The minimum thickness of the mattress is then1.5 times the nominal stone size.

Loose or interlocking concrete block revetment may also be designed, DN50 is taken as the block thickness.

Where material has to be placed underwater (underlayer or cover layer), the ability of the contractor to control the quality of the finished product is reduced –particularly for riprap – and so the specification should be upgraded to compensate.

TYPICAL DETAIL
SEDIMENT FOREBAYS