Solihull
METROPOLITAN
BOROUGH COUNCIL

URBS · IN · RURE

A guide to sustainable drainage in Solihull

April 2023

Document Control

This publication has been produced by:

Solihull Metropolitan Borough Council

Council House

Manor Square

Solihull

B91 3QB

Email: drainage@solihull.gov.uk

Primary Authors:

Dean Ward – Principal Engineer – Solihull MBC

Oliver Monk – Senior Engineer – Solihull MBC

Contents

Please note: The following document is only a basic summary of what we expect to see within an application for developments within Solihull. If you require further information or details, please contact the Lead Local Flood Authority on drainage@solihull.gov.uk whilst also referring to the most current national SuDS standards.

Foreword

This update to Solihull Council's Guide to Sustainable Drainage is a positive step towards a more integrated and environmentally friendly management of surface water drainage in Solihull.

Changing legislation surrounding Sustainable Drainage Systems (SuDS) includes the longstanding expectation that SuDS will be implemented on all major developments, with provision for operation and maintenance of SuDS features for the lifetime of developments. SuDS will be realised through the planning process, with technical support from the Lead Local Flood Authority (LLFA).

We have a responsibility to ensure our solutions to these problems are appropriate for the future and provide multi-functional benefits not only in terms of landscape and ecology but also with regards to public amenity and useable, high quality accessible space for our residents.

As a unitary authority, Solihull Council assumes the role of LLFA. This includes responsibility for management of existing drainage assets and a statutory role to undertake assessment of the impacts of development on surface water. We are working in partnership with Severn Trent Water and other stakeholders to ensure a joined up and effective approach to surface water management.

As we develop SuDS across the borough, we have a great opportunity to enhance the resilience of Solihull so that we can respond effectively to climate change and the pressures between the urban environment and the many water features within the borough.

Councillor Ken Hawkins - Cabinet Member for Environment and Infrastructure - Solihull Council

List of Abbreviations

The following provides an explanation of the common abbreviations used throughout this document. Individual items are clarified within the text where necessary

MBC	Metropolitan Borough Council
NPPF	National Planning Policy Framework
PPG	Planning Practice Guidance
LLFA	Lead Local Flood Authority
EA	Environment Agency
DEFRA	Department for Environment, Food and Rural Affairs
LPA	Local Planning Authority
WFD	Water Framework Directive
SuDS	Sustainable Drainage Systems
STW	Severn Trent Water
SPZ	Source Protection Zone
BGS	British Geological Society
BRE	Building Research Establishment
SFRA	Strategic Flood Risk Assessment

Introduction

Sustainable Drainage Systems (SuDS) are not a new concept. The use of the natural environment to deal with rainfall, has long since been promoted as an integral balance between the developed and undeveloped areas of the UK. At its simplest, rain falling on the land may evaporate or be absorbed into the soil, nourishing our natural habitat, or else flows overland into ponds, ditches, watercourses and rivers, helping to sustain life by replenishing our water resource and ecosystems.

It is only recently that the balance of this natural water cycle has been disrupted. Modern urban development of houses, roads and other impermeable surfaces has increasingly altered the way that rainwater finds its way into our soils, rivers and streams. Surface water has for many years been allowed to be collected and piped directly into our ditches and rivers.

Conveying water away as quickly as possible from a development may adequately protect the immediate development from flooding but increases the risk of flooding occurring downstream. This unsustainable approach to surface water drainage, together with the potential effects of a changing climate, has contributed to some very serious impacts across the UK but also more locally within Solihull during the flood incidents of 2018 and 2007 amongst others.

This document aims to provide guidance on the requirements of planning, design and implementation of SuDS in accordance with national and local policy and guidance.

It notes local policy requirements and provides specific engineering details where the requirements in Solihull differ from national standards.

Who is this guide for?

This guide is to be used by all involved in the planning, design, construction, implementation, operation, maintenance and decommissioning of SuDS in Solihull.

This includes, but is not limited to: developers, designers, consultants, planners, property & land owners and occupiers, prospective adopters & maintainers and others involved in the planning and design of the built environment in Solihull.

This guidance should be used for all types of development, including residential, commercial, industrial and recreational.

Policy Context

Solihull MBC became statutory consultations on all major developments in regard to surface water drainage on 15th April 2015. As part of this role, in advising on 'surface water' the LLFA will consider surface water flood risk to and from any development as well as the provision of appropriate SuDS in line with best practice and the criteria outlined in this guide.

This document should be read in conjunction with policy in the revised National Planning Policy Framework (NPPF), advice in the Planning Practice Guidance – Flood Risk and Coastal Change, and the CIRIA SuDS Manual C753.

Whilst the statutory instruments ensure consultation for 'Major Developments', to assist the local planning authority in their determination of an application the Lead Local Flood Authority will also provide advice, support and review any Prior Notification, Minor Application or Change of Use Application and therefore the applicant should provide with their application an assessment of flood risk. This should demonstrate how the flood risks to the development will be managed so that it remains safe through its lifetime.

INFORMATIVE
The Town and Country Planning (Development Management Procedure) (England) Order 2015 defines a 'major development' as any development involving one or more of the following:

- The winning and working of minerals or the use of land for mineral-working deposits
- Waste development
- The provision of dwelling houses where the number of dwellings to be provided is 10 or more
- The development is to be carried out on a site having an area of 0.5 hectares or more and it is not known whether the development falls within subparagraph 3i)
- The provision of a building or buildings where the floor space is to be created by the development is 1,000 square metres or more
- Development carried out on a site having an area of 1 hectare or more

For ease, the relevant policies of the Solihull MBC documentation in relation to flood risk and drainage are reprinted as follows:

POLICY P10 NATURAL ENVIRONMENT

"…The Council will seek to conserve, enhance and restore biodiversity and geodiversity, to create new native woodlands and other habitats and to protect, restore and enhance ancient woodland and green infrastructure assets across the Borough. Protection of ancient woodland, designated sites and priority habitats shall include the establishment of buffers to any new development. Development should be informed by the latest information on habitats and species, and take full account of national and local guidance on conserving biodiversity, opportunities for biodiversity enhancement and for improving and restoring the Borough's green infrastructure. When appropriate, development should seek to enhance accessibility to the natural environment, especially for disabled people…"

POLICY P11 WATER MANAGEMENT

"All new development should have regard to the actions and objectives of appropriate River Basin Management Plans in striving to protect and improve the quality of water bodies in and adjacent to the Borough, including the Rivers Blythe and Cole and their tributaries. Developers shall undertake thorough risk assessments of the impact of proposals on surface and groundwater systems and incorporate appropriate mitigation measures where necessary.

The Council will expect developers to demonstrate that all proposed development will be served by appropriate sewerage infrastructure and that there is sufficient sewage treatment capacity to ensure that there is no deterioration of water quality, or that the delivery of any development will not be delayed by the need for additional water treatment provision.

The Council recognises the need for water efficiency in all new development. Developers shall demonstrate the highest possible standards of water efficiency through the use of water efficient fittings and appliances, and where appropriate, recycling of potable, grey water and rainwater in order to minimise consumption.

***All new development shall incorporate sustainable drainage systems**, unless it is shown to be impractical to do so. Developers shall ensure that adequate space is made for water within the design layout of all new developments to support the full use of sustainable drainage systems, and shall demonstrate that improvements to the water environment will be maximised through consideration of a range of techniques.*

Wherever possible, sustainable drainage systems will be expected to contribute towards wider sustainability considerations, including amenity, recreation, conservation of biodiversity and landscape character, as well as flood alleviation and water quality control.

*Developers shall explore opportunities to contribute towards the objectives of relevant Catchment Flood Management Plans. Wherever possible, development should promote the reduction of flood risk by seeking to reinstate the natural floodplain, the de-culverting of watercourses and the limiting of surface water runoff to green field rates via the use of sustainable drainage techniques. **On all development sites larger than 1 hectare, surface water discharge rates shall be limited to the equivalent site specific Greenfield run off rate**.*

Developers will be expected to demonstrate that the layout and design of a development takes account of the surface water flows in extreme events so as to avoid flooding of properties, both within and outside the site. Applications for new development where there is a flood risk issue should be accompanied by a site flood risk assessment. Developers are encouraged to secure reduction of flood risk by the provision or enhancement of green infrastructure, wherever possible.

Existing flood defence infrastructure will be protected and development that would compromise the flood defence function will be permitted only if it is demonstrated through a flood risk assessment that the risk both within and outside the site, and to sites further downstream is not increased.

New development will not normally be permitted within areas at risk of flooding. Where it is clearly demonstrated that there are no other viable sites at lower risk of flooding, consideration will be given to development in such locations, providing that it is designed to be safe from the effects of flooding and will minimise flood risk on the site and reduce risks elsewhere."

POLICY P15 SECURING DESIGN QUALITY

"All development proposals will be expected to achieve good quality, inclusive and sustainable design, which meets the following key principles:

…

iv. Makes appropriate space for water within the development, using sustainable drainage (SuDS) principles, to minimise and adapt to the risk of flooding. Further guidance is provided in Policy P11 – Water Management."

This guide forms the local standards for Solihull MBC and, together with the National Standards, strongly promotes the use of SuDS to help reduce surface water runoff and mitigate flood risk.

Design Guidance – Major Developments

There can be challenges in delivering SuDS in some developments, however an integrated approach to design with early stage engagement can unlock pragmatic solutions that provide multi-functional benefits.

Exceedance routes should be provided at each stage of the application process. It should be shown that when flooding does occur, where this flooding will go and how its impacts will be mitigated. Further information may need to be provided to show that all flooding is directed away from existing and proposed buildings.

During times where the proposed drainage system may flood due to blockages, failure or a very large storm event, all excess water that cannot be contained within the pipe network or SuDS features should be maintained within suitable exceedance areas and routes. These routes should direct towards the highways and towards public open space whilst avoiding any risk to people and property.

All flows should be contained on site within above ground, landscaped SuDS features and assessed as part of the overall site drainage proposals.

As an example, we have provided below the design "do's and don'ts" process which should be applied to all proposed developments in Solihull:

The LLFA require that softer and more environmentally and aesthetically pleasing approaches are taken rather than features such as concrete culverts or metal fencing. For example, where possible gabions, sand sacks and meadow planted sides that encourage wildlife can be used.

INFORMATIVE
Applicants are advised to avoid underground storage in crates and tanks and instead plan layouts appropriately with the provision of above ground SuDS at the heart of the design. In keeping with this, the LLFA would object to developments where it is not demonstrated that no alternatives to this approach exist.

Furthermore, in the interest of reducing long term maintenance and blockage risks, the LLFA would request that all applications review the need to include highway gulleys within the design and instead look to measures such as roadside channels and inlet kerbing.

All drainage features should conform to the latest editions of the CIRIA SuDS Manual or Sewers for Adoption. Each SuDS feature has its own specific design specifications, which are expected to be followed unless agreed otherwise with the LLFA.

This section provides specific clarifications and modifications of the advice found in those documents

SOAKAWAYS

Solihull predominantly has clay soils that are unsuitable for infiltration. Therefore, when a soakaway is proposed we will require that full soakage tests are carried out to the method described in BRE Digest 365. Note that extrapolated infiltration rates will not be accepted.

The design of the soakaway should also follow the advice in BRE 365. It will be key to consider managing exceedance flows as individual plot soakaways are designed to a 10 year return period. Ideally rainfall in excess of the 10 year event will be safely stored on site or conveyed to the wider drainage system via an overflow.

SWALES AND HIGHWAY DRAINAGE

Swales should be the first choice for receiving highway water and conveying all surface water through a site. We prefer gully free highways that run off directly to swales or through kerb drainage. Connecting traditional highway gullies to swales is not encouraged. Swale side slopes must be no steeper than 1:4 to allow for maintenance contractors' requirements.

DITCHES

Existing ditch networks on a greenfield site must be preserved and enhanced, taking into account landscape features such as trees which will need to be protected during such works and any existing wildlife within the ditch, or how it may function as part of a wildlife corridor e.g. with hedgerow/trees as a commuting/foraging route for bats has appropriate capacity.

A ditch network should form part of the drainage system for the site.

PERMEABLE PAVING

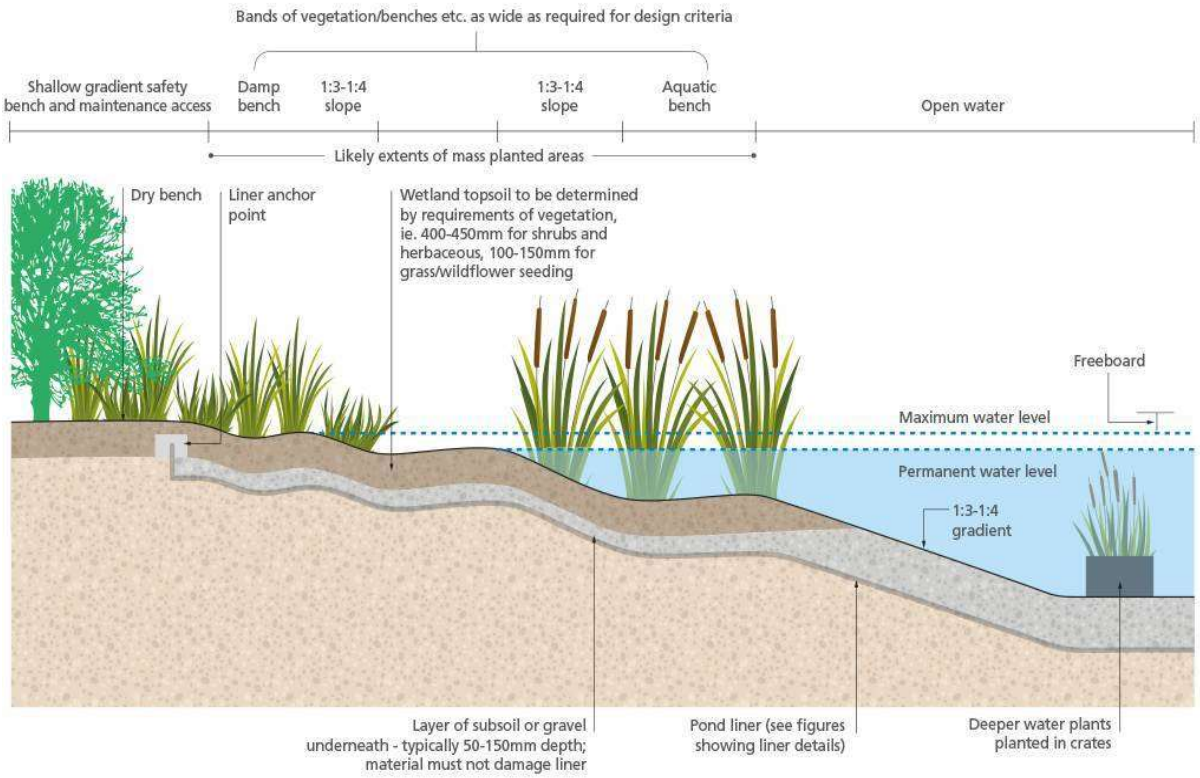
Permeable paving is encouraged as surfacing to parking areas and in the highway on minor roads. The construction can use either permeable sub-base or cellular storage to provide adequate storage volumes as long as the product used is strong enough for the proposed location.

Appropriate corridors should be left to accommodate utility apparatus to avoid a clash between services and the permeable construction.

Roof drainage can be connected to permeable surfacing as long as flows are suitably diffused as to prevent localised overloading of the permeable sub-base.

ATTENUATION

The first choice for attenuation must be a surface feature such as a pond, wetland or detention basin. Surface attenuation features should be considered for dry weather functions such as play areas where they are not expected to be inundated frequently. Attenuation basins should provide a variety of depths and slope gradients so resulting in a variety of habitats including permanently wet areas as per the below diagram



To effectively manage volumes, it is best to spread attenuation features throughout the site and it should be noted that many SuDS features such as swales, rain gardens and permeable paving will provide attenuation if outflows can be limited effectively.

Where ponds can be used to provide storage the opportunity to provide multiple stages of treatment must be taken.

The pond should feature a silt forebay that can be easily accessed for regular maintenance. A low flow channel can be used to route flows from the forebay into the rest of the pond. The flow routing should direct water through the longest possible path to maximise treatment opportunities.

A permanently wet area should be provided, ideally at the outlet, to provide a last phase of treatment.

Flow Controls

Traditionally flow controls have been limited to a minimum discharge rate of 5l/s due to the potential risk of blockage. By using SuDS the risk of blockage can be eliminated allowing for lower discharge rates that match the greenfield rates required by SMBC policy. For example, water filtered through permeable paving or a filter drain cannot carry any material large enough to block even a very small orifice.

Given that flow rates can be safely restricted below 5l/s it is expected that all sites will restrict flows to the greenfield rate and volume and any deviation from this must be justified.

All flow control chambers should have a high level overflow to control levels in the system in the event of blockage or exceedance. The overflow can be in the form of a split chamber with a weir wall or a pipe set high in the side of the chamber that connects to the outlet.

Where flow control chambers are located in Public Open Space consideration must be given to regular access by maintenance vehicles and so provide appropriately constructed paths suitable for HGVs and access control points if necessary.

Design Guidance – Minor Developments

As LLFA we provide comments on minor applications, applying criteria appropriate to the scale and nature of the developments.

The cumulative impacts of minor developments can increase flood risk in a developed area. Current processes for assessing major applications cannot be applied in the same way to minor applications as reduced orifice sizing to meet the greenfield rate can increase the risk of blockages and therefore flood risk.

Minor sites should minimise the areas of hardstanding, and where hard surfaces are necessary, unlined permeable paving should be used. This allows any infiltration potential on the site to be utilised, reducing off-site runoff. This is in line with the drainage hierarchy if water re-use is not possible on the site.

If the site is directing water to a single point of infiltration, then we would request infiltration testing for that location.

Information regarding existing surface water risk at the site should be submitted in order for us to make a complete assessment of potential flood risk on the site. Discharge rates should be limited to the greenfield rate or 2l/s/ha, whichever is greater. A 10% allowance for urban creep should also be included when calculating the required storage.

Where it is not possible to meet the greenfield run off rate, rainwater re-use can be used to increase storage and reduce the run-off rate from the site. It should be demonstrated why this is not feasible if it is not proposed.

All water should have sufficient treatment before leaving the site in line with the CIRIA SuDS Manual C753. The use of above ground features is preferable in order to provide treatment on site, and to provide biodiversity and amenity benefits. A maintenance plan detailing the maintenance arrangements of the SUDS features should be submitted including who is responsible for different elements of the surface water drainage system and the maintenance activities/frequencies.

A drainage plan should be submitted which includes the site layout, location of features (including existing and proposed trees, which will need to be avoided based on a full arboriculture qualitative assessment), outfall location and conveyance. The drainage plan should also consider exceedance flows to ensure potential off-site flooding is managed.

Engineering drawings of the components being used within the scheme should also be included.

Exceedance Planning

Suitable exceedance routing should be identified during times of flooding.

During times where the system may flood due to blockages, failure or a very large storm event, all excess water that cannot be contained within the pipe network or SuDS features should be maintained within suitable exceedance areas and routes.

These routes should direct towards the highways and towards public open space whilst avoiding any risk to people and property. All flows should be contained on site.

INFORMATIVE
Exceedance routes should be provided at the outline stage and then with additional information as part of a full application, or where necessary, discharge of condition.

It should be shown that when flooding does occur, where this flooding will go, where it will sit, and how it will behave. Further information may need to be provided to show that all flooding is directed away from buildings and no increase in risk to third parties.

This can be done through either appropriate levels and earthworks design or, where the assessments are unclear, through detailed modelling.

Ordinary Watercourse Consent

If works are to be undertaken involving an ordinary watercourse then consent must be given by the LLFA.

The Land Drainage Act 1991 gave Solihull MBC the responsibility for ordinary watercourse consents or Section 23 Consents. This means that if you are proposing to undertake the following works you will require ordinary watercourse consent from the Lead Local Flood Authority under Section 23 of the Land Drainage Act 1991:

- erection of any mill dam, weir or other like obstruction to the flow of any ordinary watercourse or raise or otherwise alter any such obstruction; or
- erection of a culvert in an ordinary watercourse, or
- alteration a culvert in a manner that would be likely to affect the flow of an ordinary watercourse.

For works affecting main rivers the prior written consent of the Environment Agency is required under the Water Resources Act 1991 and Environment Agency Byelaws.

Therefore, if you would like to pipe, bridge or alter a watercourse as a part of your application then a S23 Consent is required from the LLFA.

However, it must be made clear that a S23 Consent is a separate application and not part of the planning application process. More information on how to apply for consent can be found on our website.

Alternatively, if you require more information on the LLFA's culvert policy, or you would like further advice and assistance with regards to gaining ordinary watercourse consent, then please apply for the LLFA's ordinary watercourse pre-application advice service.

Maintenance and Adoption

A primary consideration when implementing SuDS is to ensure that the solutions proposed can be maintained easily over the lifetime of the development, and that maintenance considerations and costs are planned for upfront.

All applications will require a maintenance plan that shows what operations will be required to maintain each of the proposed assets. It is recommended that these plans are based on the most recent CIRIA SuDS guidance and it should be made clear about which operations are required and which party or parties are to be responsible for them.

Ease of maintenance will impact the adoption process and will affect the determination of planning applications. In considering planning applications, the LPA must ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

In making every effort to simplify and provide support to the user of this guide, Solihull MBC has provided an example below to demonstrate the information and presentation required in development of an Operation & Maintenance Plan.

Feature Reference	SUDS1	
Feature Type	Attenuation Basin	
Design Information	Depth: 1.2m Control: Hydrobrake Outfall: Ordinary Watercourse	
Regular Maintenance		
	Activity	**Responsible Party**
Monthly	• Litter and debris removal • Mow grasses (where required) and remove resultant clippings • Remove nuisance and invasive vegetation (for 12 months following installation) • Inspect/check all inlets, outlets, surface and overflows (where required) to ensure that they are in good condition, free from blockages and operating as designed. Take action where required	
Six Monthly	• Remove nuisance and invasive vegetation	
Annually	• Remove all dead growth prior to the start of growing season • Remove sediment from inlets, outlet and forebay • Manage wetland plants, where required • Inspect and document the presence of wildlife • Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, where required	
As Required	• Prune and trim trees and remove cuttings. • Remove sediment from forebay, when 50% full and from micropools if volume reduced by more than 25% • Repair erosion or other damage by re-turfing or reseeding • Re-level uneven surfaces and reinstate design levels (typically once every 60 month period) • Remove and dispose of oils or petrol residues using safe standard practices	
Remedial Actions: Significant storms may cause significant damage to SuDS. As such, a number of actions may be required following such events		
Following All Storm Events	• Inspect and carry out essential recovery works to return the feature to full working order	

There are many options that will allow the successful operation and maintenance of a SuDS feature for the lifetime of the development.

With each maintenance option there may be associated risks for the onsite and surrounding land and property owners; LPA and LLFA should the chosen maintenance option become compromised.

Solihull MBC encourage developers to determine the most appropriate maintenance option reflective of the site-specific SuDS features.

For example, if the SuDS solution consists of an attenuation tank and flow control valve connecting into the existing offsite drainage infrastructure, then the most appropriate maintenance body may be the relevant sewerage undertaker responsible for the offsite system.

In an effort to mitigate the associated risks with some maintenance options the LPA may require a number safeguards to be implemented. For example, where SuDS systems are provided within private property, the LPA may require that the SuDS system be incorporated into the property deeds.

Consideration should always be given to safety in design and appropriate consideration of access during the design of SuDS.

CDM Regulations 2015 must also be considered and applied to the planning, design and construction and long term maintenance of SuDS systems.

Solihull MBC encourage the adoption of SuDS either as part of the highway or as Public Open Space. In either case a commuted sum will be payable. The commuted sum will be calculated on a bespoke basis based on the maintenance requirements for the SuDS features.

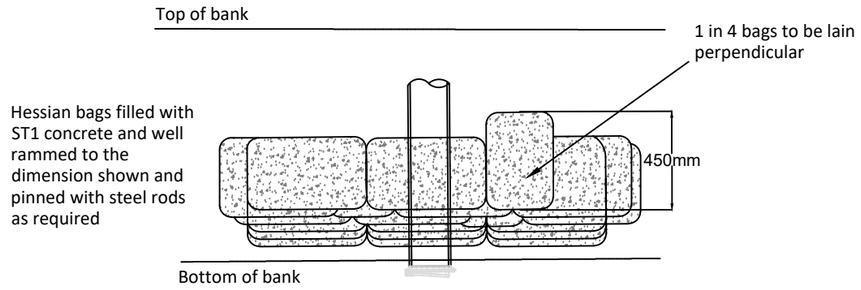
Appendix A – Submission Checklist

The below checklists identify what information is required by the LLFA as a minimum to support each application type. It should be noted that these are generic requirements for all sites and the applicants and associated engineers should seek to provide additional information on a site by site basis where specific details are of importance.

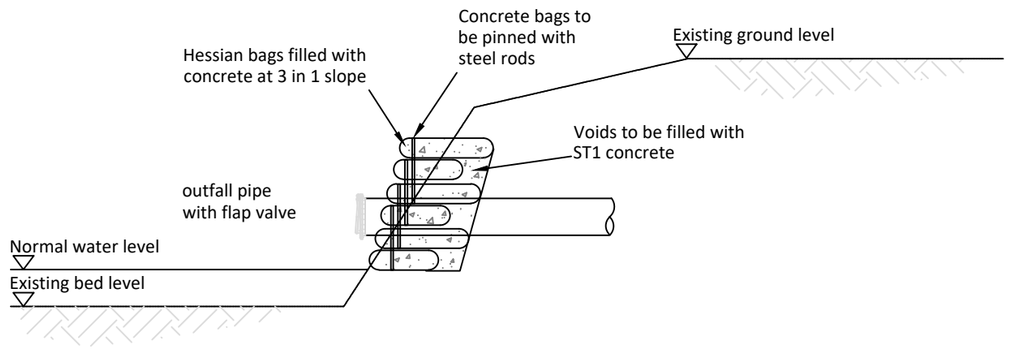
Information Required	Pre-App	Outline	Full	S38 / S278
Pre-Development Plans including: • Existing Topography • Existing Site Layout • Existing Surface Water Features	✓	✓	✓	✓
Soakaway / Ground Investigations in accordance with BRE365 Guidance		✓	✓	✓
Greenfield Run Off Rate Calculations	✓	✓	✓	✓
SuDS Availability Assessment	✓	✓	✓	✓
Proposed Drainage Plans showing: • Proposed Site Levels • Proposed Site layout • All retained and proposed Surface Water features • Proposed Impermeable Catchments		✓	✓	✓
Exceedance Routing plans and calculations		✓	✓	✓
Drainage design calculations for a range of return periods including: • 1 in 30 • 1 in 100 • 1 in 100 + Climate Change		✓	✓	✓
Engineering details for all features			✓	✓
Adoption and Maintenance information		✓	✓	✓

Appendix B – SuDS Standard Details

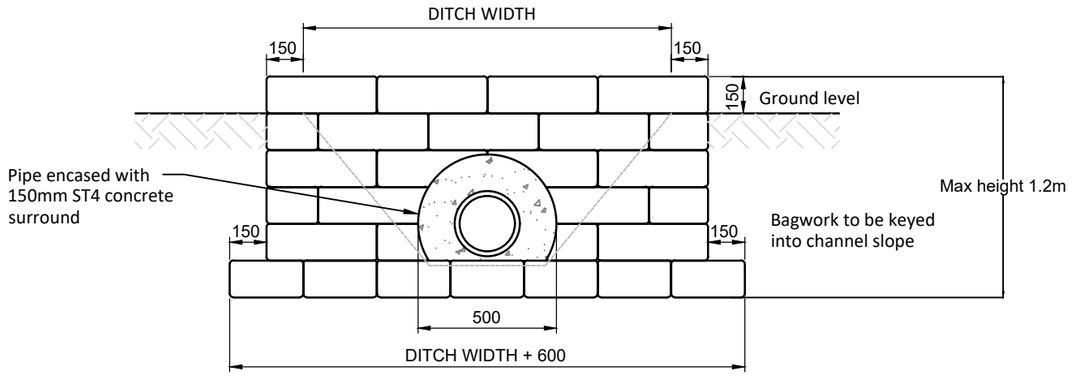
The following standard detail drawings are provided for reference only. All necessary checks should be undertaken by the designers on a site by site basis to ensure the systems are correct and fit for purpose. SMBC accept no responsibility or liability for the use of these drawings.



PLAN



SECTION



ELEVATION

DO NOT WORK FROM REDUCED DRAWINGS. PLEASE REFER TO SCALE AND SHEET SIZE AS INDICATED.
Dimensions to be verified on site. This drawing should not be scaled. Any discrepancies should be referred to the Engineer prior to work being put in hand.

Notes

1. This drawing shall be read in conjunction with all related documentation, drawings and standard details.
2. All dimensions are in millimetres.
3. The works shall be carried out in accordance with the dot MCDHW, DMRB and the local requirements of Solihull metropolitan borough council Solihull design manual.
4. All drainage outfalls and connections to existing systems shall be checked & surveyed and the results passed to the overseeing authority / client in advance of the start of drainage works.
5. The contractor shall take such steps to safeguard against contamination of local watercourses.
6. The contractor shall use setting out coordinates and dimensions provided which take preference over any less accurate scaled dimensions.
7. Temporary works design associated with the construction of the works shall be responsibility of the contractor.
8. All works and programming shall be agreed in advance with the overseeing organisation and the client.
9. The contractor shall maintain free and open access to the public highway and adjacent lands and properties at all time unless otherwise agreed in writing with the interested parties.
10. The design consultant is advised to review the findings of the flood risk assessment the scheme prior to commencing onsite.
11. Dimensions and invert level of outfall to be confirmed on site, with all upstream levels to be laid to suit existing.
12. Where passing over / under existing statutory undertaker's apparatus, pipes to be protected by foamed concrete or similar.
13. Refer to SMBC details for pipe bedding information.
14. This drawing is not to be reproduced in any part or form without consent of SMBC Drainage and Flood Risk team. All copyright reserved.

REV	BY	DESCRIPTION	CHKD	DATE

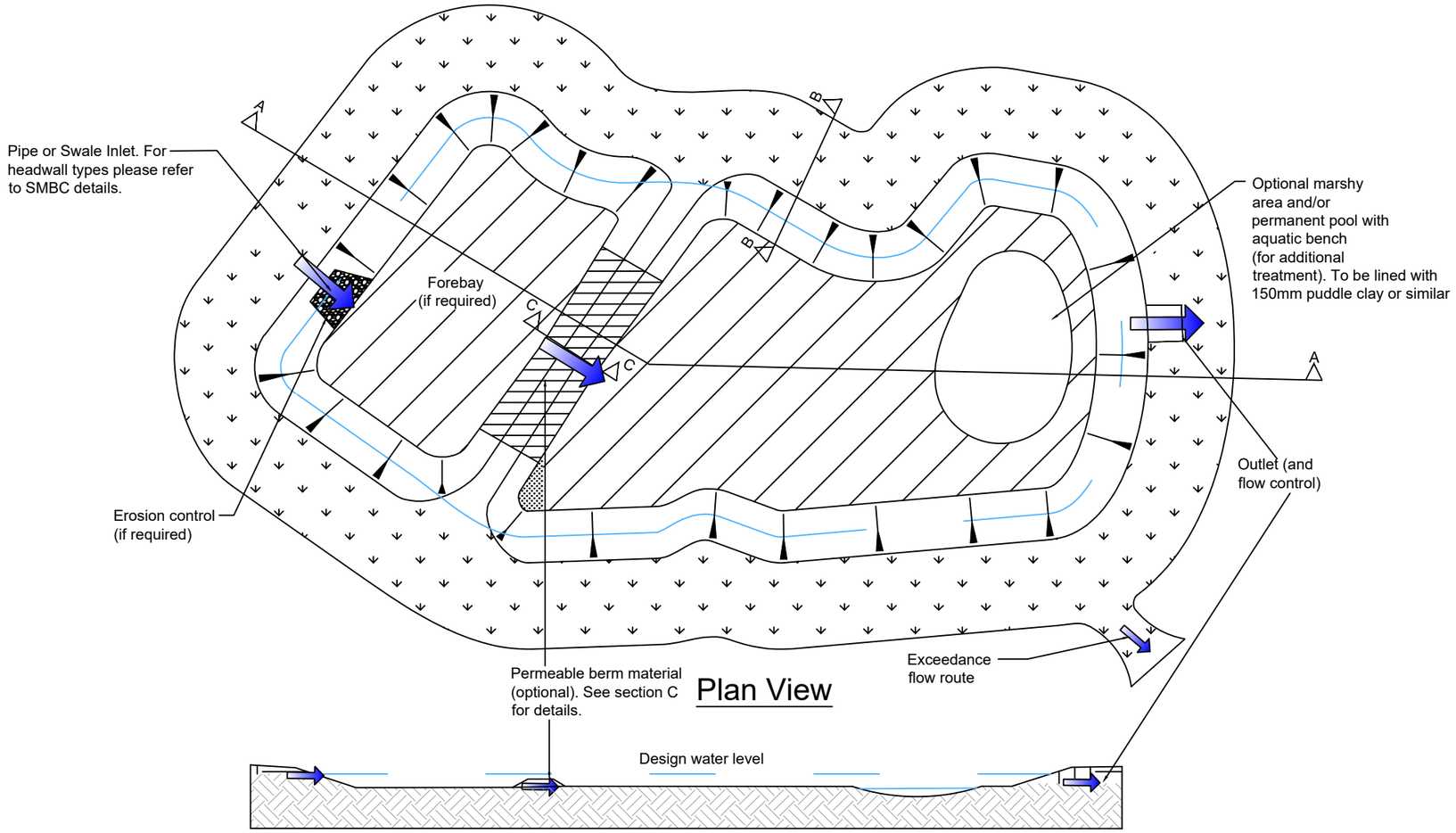
Solihull Metropolitan Borough Council
PJA
Highway Services
Managed Growth Directorate,
Solihull Council,
The Council House,
Manor Square,
Solihull, B91 3QB

DRAWING TITLE: Concrete Bagwork Outlet Standard Detail

DRAWING No.: SMBC-0500
REVISION: P0

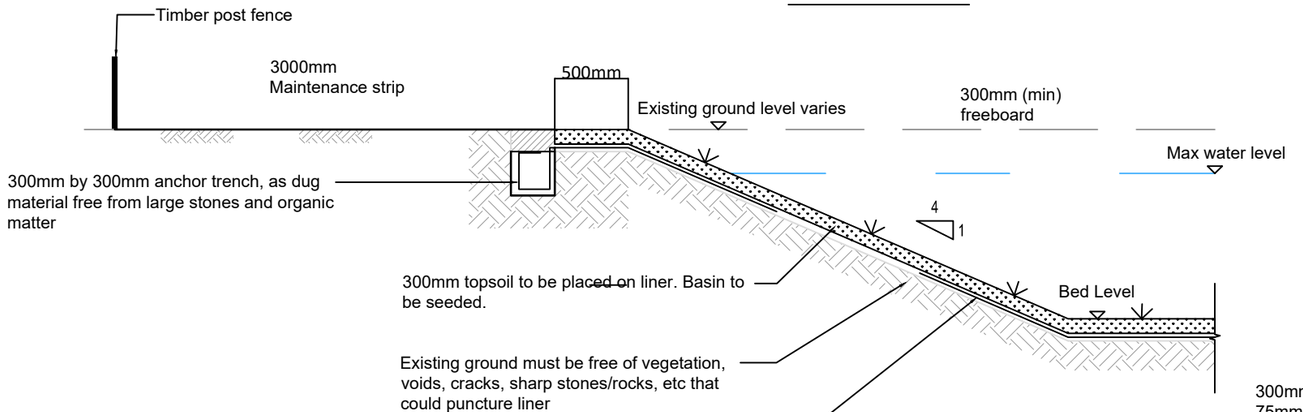
DESIGNED/DRAWN BY: PJA
CHECKED BY: SMBC
SCALE: NTS
DATE: 14/03/2023

STATUS: INFORMATION

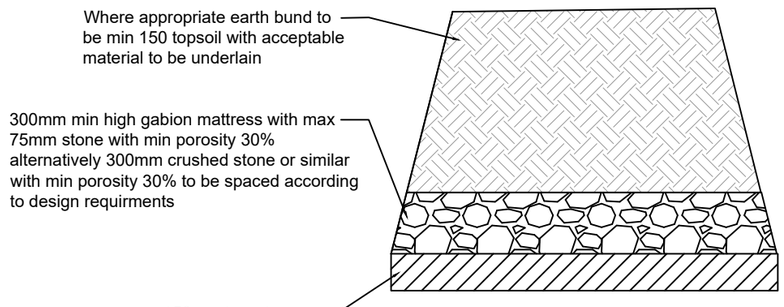


Plan View

Section A-A



Section B-B



Section C-C

Notes continued:

14. Any open water element would require effective integration into the landscape, and consideration would be required of the risk of the pond drying out during the summer.

15. A liner may be required to maintain the water level in any small permanent water feature, prevent infiltration of runoff where water quality risk assessment indicates that this is not acceptable and/or to protect underlying aquifer. Unlined detention basins should not be used on brownfield sites unless it has been clearly demonstrated that there is no risk of groundwater pollution. Any excavation or earthmoving processes required should be assessed to ensure the mobilisation of contamination does not occur. Unlined detention basins should not be used to treat runoff from hotspots if there is a risk of ground water pollution.

16. For catchments of less than three hectares, outlet throttle diameters may have to be very small (ie < 150mm diameter) in order to achieve predevelopment outflow rates. This may mean that they risk clogging and special attention should be given to the design of the outlet area and flow control.

17. Where a micropool at the outlet is required, the soil below the pool area should be sufficiently impermeable to maintain the permanent pool, unless a continuous baseflow or high groundwater table is present.

18. The depth of flow should be maintained below the height of vegetation (ie < 100mm).

19. Maximum flow velocity in the basin for a once a year event should be 0.3m/s to ensure adequate runoff filtration.

20. The required peak flow control and storage volume can be determined using standard hydraulic assessment.

21. Any exceedance flow structure should be located as close to the inlet as possible to minimize the flow path for above-capacity flows, thus reducing the risk of scouring.

22. The overflow should not impede access to any inlet/outlet/control structure that manages more frequent flows.

23. The time of travel of runoff from inlet to outlet of the basin (residence time = length/velocity) should be at least 9 minutes.

24. Inlet and outlet pipes and culverts should not be accessible. The headwalls of larger pipes should be fenced to prevent accidents and deter access. Grilles should also be considered to prevent entry into the pipe but these tend to clog rapidly, leading to more regular maintenance requirements and potentially affecting hydraulic performance.

25. For on-line systems- the number of inlets to the basin should be limited, preferably to one. The flowpath length should be maximized from inlet to outlet for all inlets.

26. The plan area of the sedimentation bay should be at least 10% of the total basin area and could consist of a separate basin or be formed by building an earth berm, stone or rock-filled gabion or rip-rap across the upstream portion of the basin.

27. For systems with multiple inlets, pre-treatment should be provided for each inlet that is likely to contribute a significant sediment load.

28. The energy of the incoming flows should be dissipated to minimize the risk of scouring and erosion.

29. Where there is infiltration capacity, infiltration is acceptable, and the detention basin is designed to facilitate even limited infiltration, then a check should be made to determine whether the basin is able to dispose of 5mm rainfall depth over the contributing catchment area.

DO NOT WORK FROM REDUCED DRAWINGS. PLEASE REFER TO SCALE AND SHEET SIZE AS INDICATED.
Dimensions to be verified on site. This drawing should not be scaled. Any discrepancies should be referred to the Engineer prior to work being put in hand.

Notes:

1. This drawing should be read in conjunction with the relevant SMBC SuDS Design Guide.

2. All dimensions are in millimeters unless otherwise stated.

3. Outflow rates must be agreed with SMBC and the appropriate water company.

4. Where there is no upstream pre-treatment, on-line detention basins should include a forebay to try and contain accumulating sediments. this may result in unusable and unattractive areas which may not be acceptable for public open space.

5. The maximum depth of water in the basin should not exceed 2m in the most extreme event according to CIRIA C753. However discussions with SMBC will be required to determine a safe maximum depth.

6. The bottom of any vegetated basin should be fairly flat with a gentle slope of no more than 1 in 100 towards the outlet, to maximize contact to runoff with the vegetation and to prevent standing water conditions from developing.

7. The base of the basin can be provided with a layer of engineered soil or underdrains to maintain a firm and dry surface.

8. The recommended length to width ratio for on-line vegetated basins is between 3:1 and 5:1. Inlets and outlets should be placed to maximize the flow path through the facility.

9. Side slopes of any vegetated basin should not usually exceed 1 in 3 unless special site an/or safety arrangement allow for steeper slopes.

10. Appropriate access to the detention basin as well as inlets, outlets and control structures for maintenance activities should be provided at all times.

11. Vegetated basins can be designed with a permanent pool at the outlet to help prevent resuspension of sediment particles by high intensity storms and to provide enhanced water quality treatment for frequent events.

12. Historic ground water levels should be checked to ensure that in the case of an event there is no loss of capacity. A seasonally high water table might not impede the function of the basin but can produce a muddy and unaesthetic look if not developed into a permanent wetland feature.

13. For maximum pollutant removal effectiveness in vegetated basins, flows should be distributed across the full width of the basin. Where there are concerns about keeping a proportion of the base dry, a discrete area of the basin can be lowered to constrain frequent events within a specified area reducing the risk of the base of the basin becoming wet and boggy.

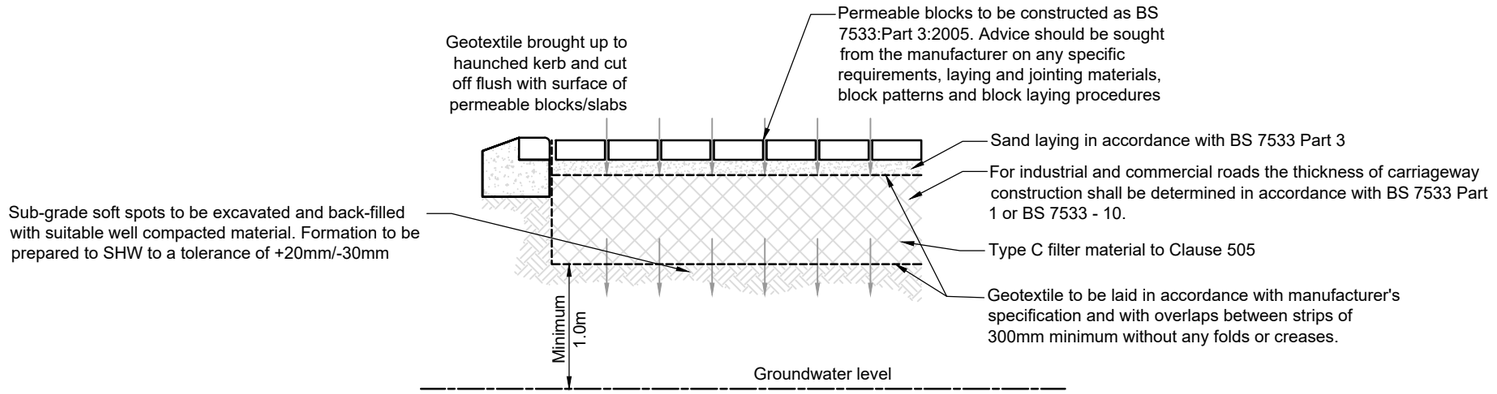
REV	BY	DESCRIPTION	CHKD	DATE

Solihull Metropolitan Borough Council
PJA
Highway Services
Managed Growth Directorate,
Solihull Council,
The Council House,
Manor Square,
Solihull, B91 3QB

DRAWING TITLE: Detention Basin Standard Detail

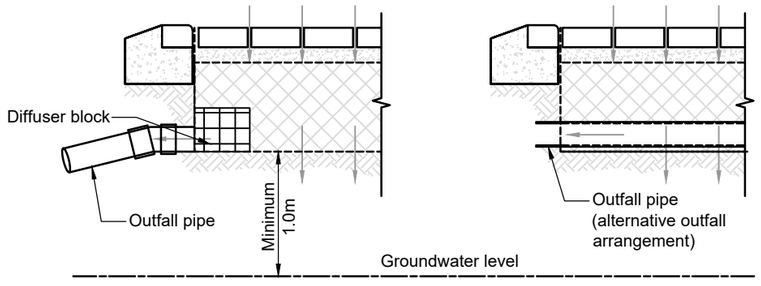
DRAWING No.	SMBC-0501	REVISION	P0
DESIGNED/DRAWN BY	PJA	CHECKED BY	SMBC
SCALE	NTS	DATE	14/03/2023

STATUS: INFORMATION

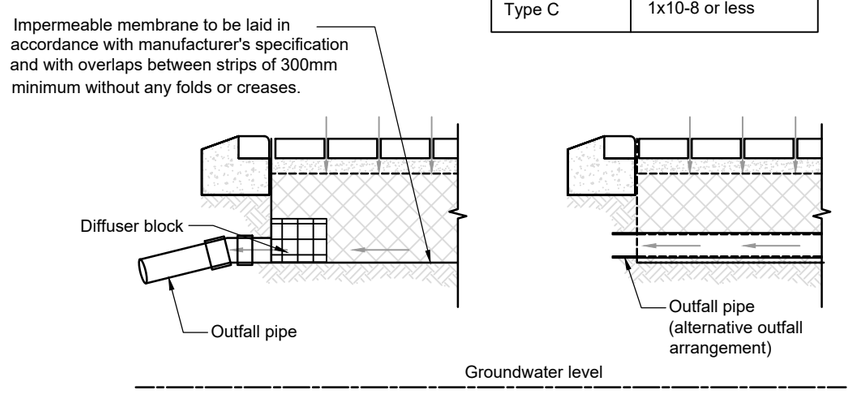


Type A
(Infiltration)

Ground Characteristics	
System Type	Infiltration Rate (m/s)
Type A, B or C	1x10-6 or greater
Type B or C	1x10-6 to 1x10-8
Type C	1x10-8 or less



Type B
(Partial infiltration)



Type C
(No infiltration)

Notes continued

12. Infiltration testing should be based upon BRE Digest 365 with each location tested 3 times. Result should not be interpreted.
13. Infiltration design should be inline with the CIRIA Suds Manual Table 25.2
14. Dimensions and invert level of outfall to be confirmed on site, with all upstream levels to be laid to suit existing.
15. Refer to site specific H&S information regarding the high number of statutory undertaker's apparatus on site.
16. Where passing over / under existing statutory undertaker's apparatus, pipes to be protected by foamed concrete or similar.
17. This drawing is to be read in conjunction with all relevant scheme drawings and specifications.
18. This drawing is not to be reproduced in any part or form without consent of SMBC Drainage and Flood Risk team. All copyright reserved.
19. All dimensions are in millimetres unless stated otherwise.

DO NOT WORK FROM REDUCED DRAWINGS. PLEASE REFER TO SCALE AND SHEET SIZE AS INDICATED.
Dimensions to be verified on site. This drawing should not be scaled. Any discrepancies should be referred to the Engineer prior to work being put in hand.

Notes

1. All clause numbers refer to the specification for highway works, latest edition.
2. Contractor should provide mechanical lifting aids for items heavier than 20 kgs. If mechanical lifting aids are impractical a risk assessment should be undertaken which identifies the appropriate control measures required to avoid risk of injury from manual handling.
3. Type A reflects a system whereby all of the rainfall will infiltrate into the soil beneath. Normally, there will be no discharge from the system to a sewer or watercourse. However, an emergency overflow may be required to cater for events in excess of the design event or to allow the infiltration rates to reduce over its design life.
4. In a Type B system the proportion of the rainfall that exceeds the subsoils infiltration capacity flows to the receiving drainage system. This can be achieved by direct drainage through the sub-base or by perforated pipes.
5. There is no infiltration with a Type C system. Usually this is wrapped in an impermeable, flexible membrane placed above the subgrade.
6. Impermeable contaminants such as soil / mud should be kept from entering the pavement surface and sub-base during and post construction. Runoff from site plant or pedestrian movements should be diverted away to manage the risk to the permeability of the construction layers. Earthworks / landscaping should also be carefully planned.
7. For Types A and B a minimum distance of 1m must be provided below the bottom of the formation level to the seasonally high water table.
8. Type C is useful for situations where:
   - Soils have low permeability or low strength
   - The water is to be harvested and used
   - The underlying groundwater is sensitive and needs protection
   - The water table is within 1m of the sub-base
   - The site is contaminated and the risks of mobilising the contaminants must be minimised
9. If adjacent impermeable areas drain onto the surface of pervious paving then the maximum area ratio of impermeable to permeable pavement surface is 2:1.
10. The location of buried services should be taken into account. Shallow services should be located under impermeable surfaces or within corridors or verges outside of the pervious system. Deeper surface and foul water sewers can often pass below the sub-base formation layer which will minimise the need to excavate through the pervious construction to access service.
11. The three main pervious materials used are:
    - porous asphalt/concrete,
    - Permeable blocks,
    - reinforced grass/gravel

REV	BY	DESCRIPTION	CHKD	DATE

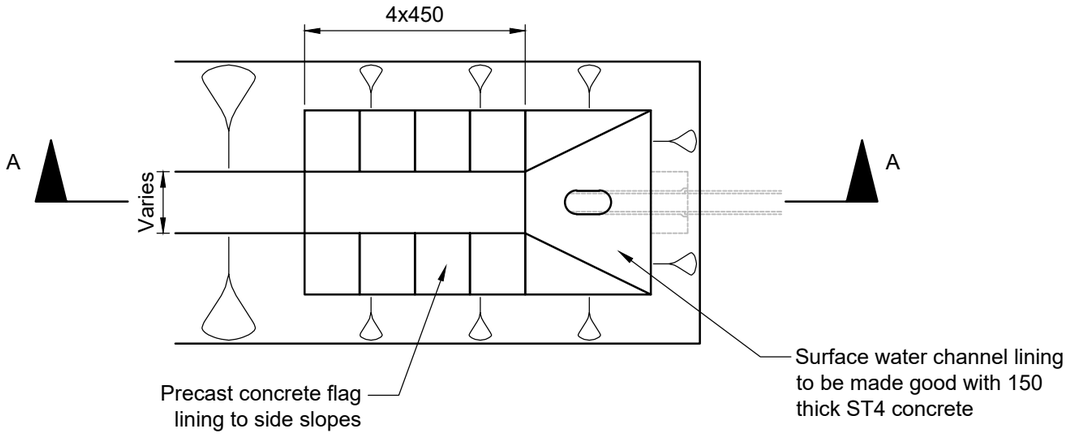
Solihull Metropolitan Borough Council
PJA

Highway Services
Managed Growth Directorate,
Solihull Council,
The Council House,
Manor Square,
Solihull, B91 3QB

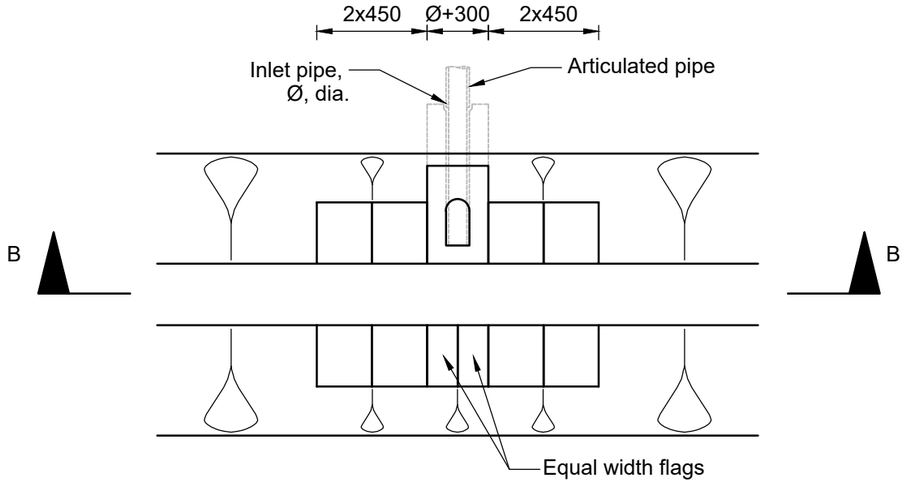
DRAWING TITLE: Permeable Paving Standard Detail

DRAWING No.	REVISION
SMBC-0502	P0
DESIGNED/DRAWN BY: PJA	CHECKED BY: SMBC
SCALE: NTS	DATE: 14/03/2023

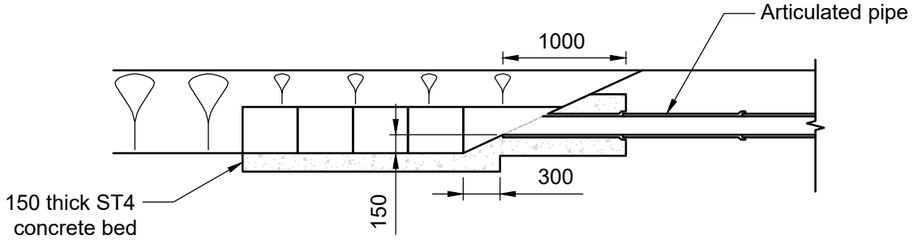
STATUS: INFORMATION



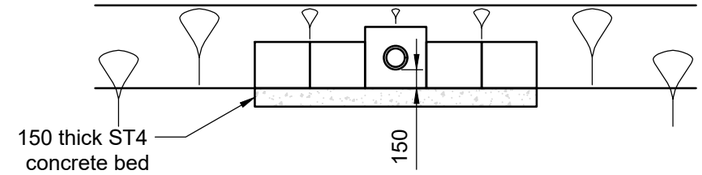
Plan end of swale



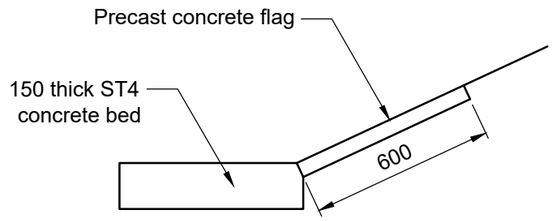
Plan Intermediate outfall



Section A-A



Section B-B



Typical slope/bed arrangement

DO NOT WORK FROM REDUCED DRAWINGS. PLEASE REFER TO SCALE AND SHEET SIZE AS INDICATED.

Dimensions to be verified on site. This drawing should not be scaled. Any discrepancies should be referred to the Engineer prior to work being put in hand.

Notes

1. This drawing shall be read in conjunction with all related documentation, drawings and standard details.
2. All dimensions are in millimetres.
3. The works shall be carried out in accordance with the dot MCDHW, DMRB and the local requirements of Solihull metropolitan borough council Solihull design manual.
4. All drainage outfalls and connections to existing systems shall be checked & surveyed and the results passed to the overseeing authority / client in advance of the start of drainage works.
5. The contractor shall take such steps to safeguard against contamination of local watercourses.
6. The contractor shall use setting out coordinates and dimensions provided which take preference over any less accurate scaled dimensions.
7. Temporary works design associated with the construction of the works shall be responsibility of the contractor.
8. Calculations and drawings of all contractor designed items shall be submitted to the engineer for comments / approvals not less than 10 working days prior to construction. Any comments made by the engineer do not absolve the contractor of his design responsibilities.
9. All works and programming shall be agreed in advance with the overseeeing organisation and the client.
10. The contractor shall maintain free and open access to the public highway and adjacent lands and properties at all time unless otherwise agreed in writing with the interested parties.
11. The design consultant is advised to review the findings of the flood risk assessment relating to the scheme prior to commencing onsite.
12. Dimensions and invert level of outfall to be confirmed on site, with all upstream levels to be laid to suit existing.
13. Refer to site specific H&S information regarding the high number of statutory undertaker's apparatus on site.
14. Where passing over / under existing statutory undertaker's apparatus, pipes to be protected by foamed concrete or similar.
15. This drawing is to be read in conjunction with all relevant scheme drawings and specifications
16.

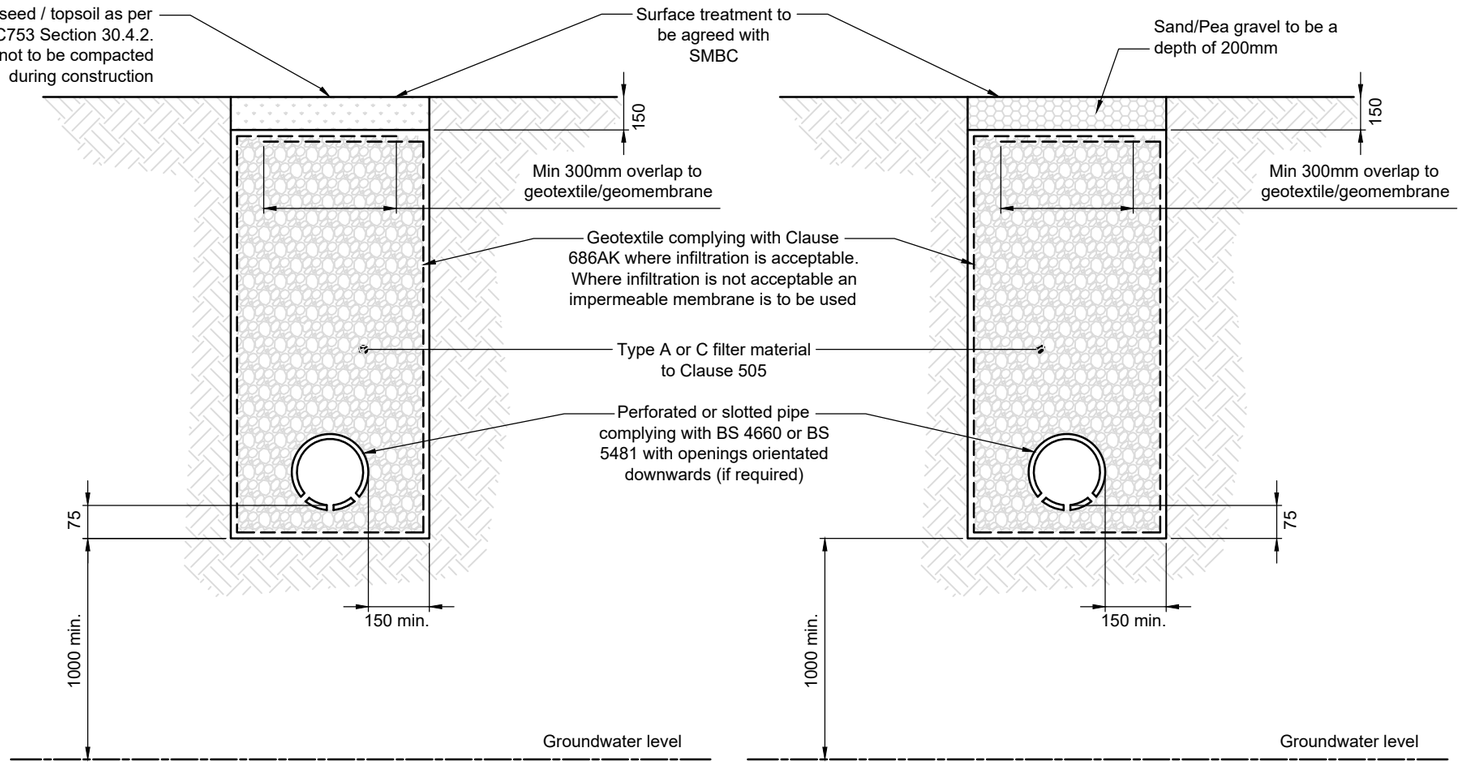
REV	BY	DESCRIPTION	CHKD	DATE

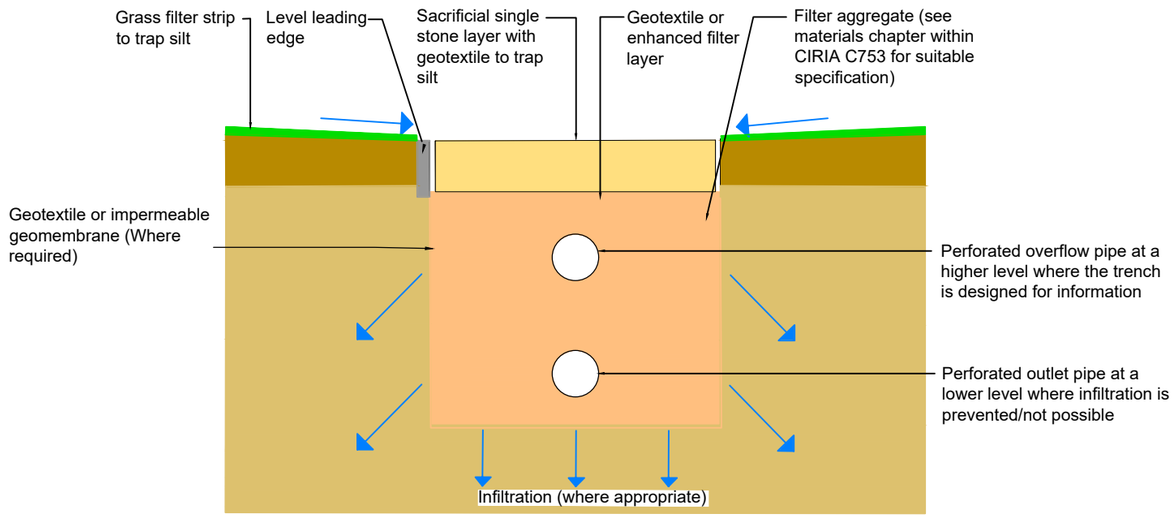
Solihull Metropolitan Borough Council
PJA

Highway Services
Managed Growth Directorate,
Solihull Council,
The Council House,
Manor Square,
Solihull, B91 3QB

DRAWING TITLE: Concrete Outfall Standard Detail

DRAWING No.	SMBC-0503
REVISION	P0
DESIGNED/DRAWN BY	PJA
CHECKED BY	SMBC
SCALE	NTS
DATE	14/03/2023
STATUS	INFORMATION





CIRIA C753 Filter Drain Schematic

DO NOT WORK FROM REDUCED DRAWINGS. PLEASE REFER TO SCALE AND SHEET SIZE AS INDICATED.
Dimensions to be verified on site. This drawing should not be scaled. Any discrepancies should be referred to the Engineer prior to work being put in hand.

Notes

1. Dimensions and invert level of outfall to be confirmed on site, with all upstream levels to be laid to suit existing.
2. Refer to site specific H&S information regarding the high number of statutory undertaker's apparatus on site.
3. Where passing over / under existing statutory undertaker's apparatus, pipes to be protected by foamed concrete or similar.
4. This drawing is to be read in conjunction with all relevant scheme drawings and specifications.
5. This drawing is not to be reproduced in any part or form without consent of SMBC Drainage and Flood Risk team. All copyright reserved.
6. All dimensions are in millimetres unless stated otherwise.
7. All clause numbers refer to the specification for highway works (SHW), latest edition.
8. The longitudinal slope of the trench should not exceed 2% as low velocities are required to promote pollutant removal and infiltration.
9. A minimum distance of 1m must be provided below the bottom of the filter drain to the seasonally high water table.
10. Filter drain formations should be flat or to a shallow grade to reduce the risk of ponding and negative filter gradients. Geotextile and stone fill should be clean before construction. Backfill should be placed in 100-150mm layers and lightly compacted as required.
11. An exceedance flow route will be required for rainfall events that exceed the design capacity of the filter drain. This can be achieved by installing an overflow pipe or weir/overflow structure above the design water storage level to convey excess flows downstream.
12. Filter drain depths should generally be 1-2m. The minimum depth of filter medium beneath any inflow distribution pipework and outfall collection systems should be 0.5m to ensure reasonable levels of pollutant removal.
13. For all filter drains, any lengths of perforated pipes that are more than 10m should be spaced between access sumps/catch pits so that the pipes can be cleaned by jetting out or rodding. Access sumps should always be accessible and clearly identifiable.
14. Infiltration testing should be based upon BRE Digest 365 with each location tested 3 times. Result should not be interpreted.
15. Infiltration design should be inline with the CIRIA C753 Table 25.2

REV	BY	DESCRIPTION	CHKD	DATE

Solihull Metropolitan Borough Council

PJA

Highway Services
Managed Growth Directorate,
Solihull Council,
The Council House,
Manor Square,
Solihull, B91 3QB

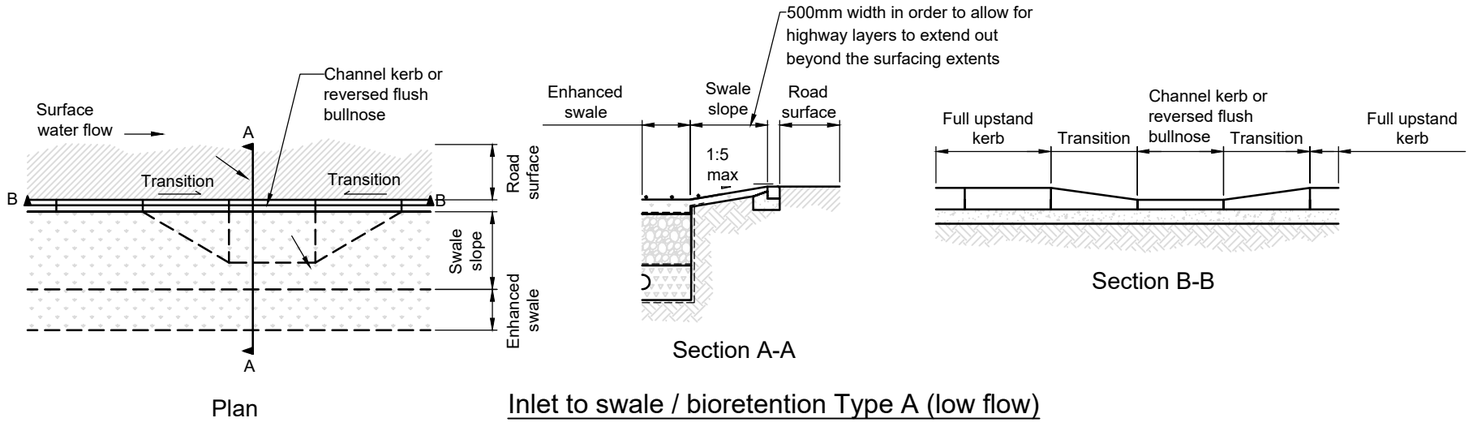
DRAWING TITLE: Filter Drain Standard Detail

DRAWING No.: SMBC-0504
REVISION: P0

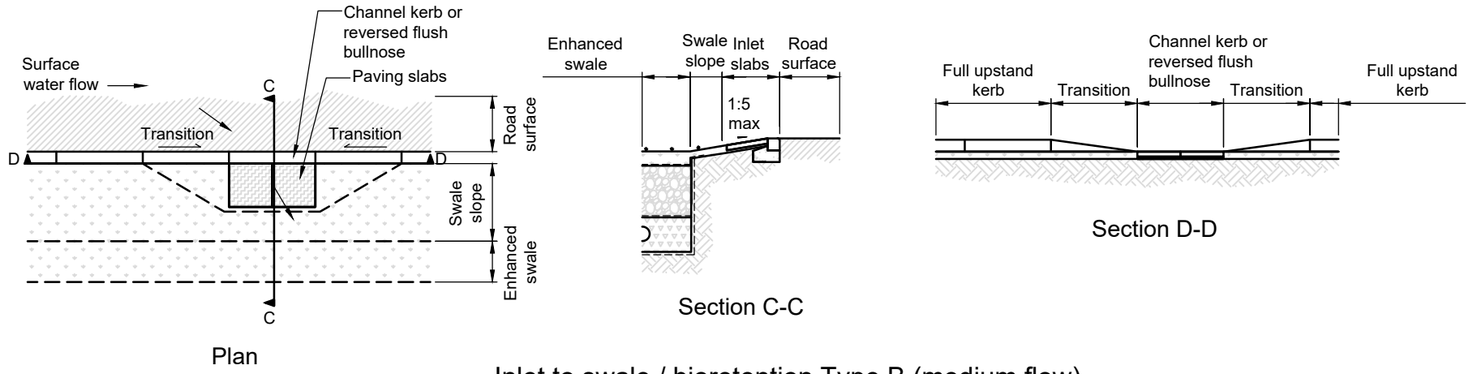
DESIGNED/DRAWN BY: PJA
CHECKED BY: SMBC

SCALE: NTS
DATE: 14/03/2023

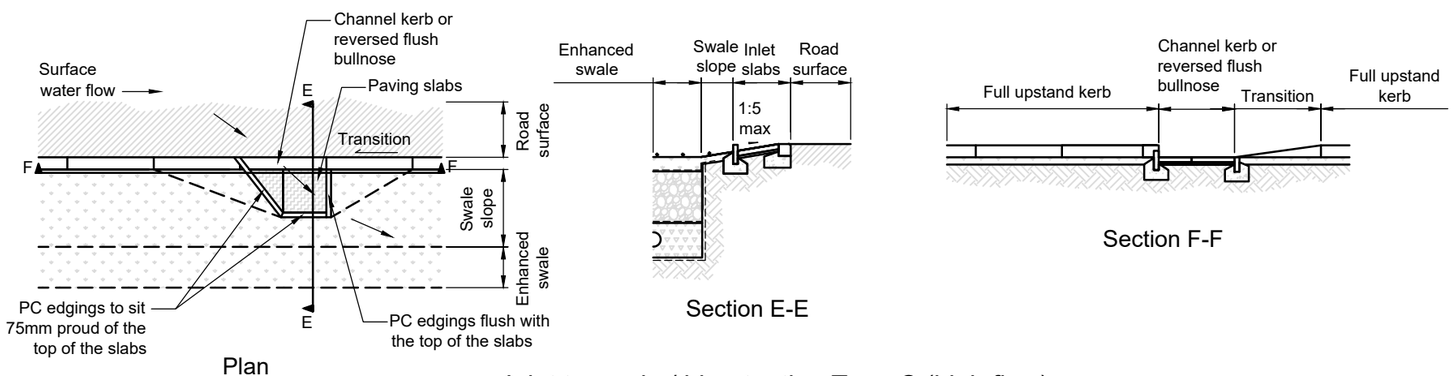
STATUS: INFORMATION



Inlet to swale / bioretention Type A (low flow)



Inlet to swale / bioretention Type B (medium flow)



Inlet to swale / bioretention Type C (high flow)

NOTES Continued

14. Where passing over / under existing statutory undertaker's apparatus, pipes to be protected by foamed concrete or similar.
15. This drawing is to be read in conjunction with all relevant scheme drawings and specifications.
16. This drawing is not to be reproduced in any part or form without consent of SMBC Drainage and Flood Risk team. All copyright reserved.

DO NOT WORK FROM REDUCED DRAWINGS. PLEASE REFER TO SCALE AND SHEET SIZE AS INDICATED.
Dimensions to be verified on site. This drawing should not be scaled. Any discrepancies should be referred to the Engineer prior to work being put in hand.

NOTES

1. This drawing shall be read in conjunction with all related documentation, drawings and standard details.
2. All dimensions are in millimetres.
3. The works shall be carried out in accordance with the dot MCDHW, DMRB and the local requirements of Solihull metropolitan borough council Solihull design manual.
4. All drainage outfalls and connections to existing systems shall be checked & surveyed and the results passed to the overseeing authority / client in advance of the start of drainage works.
5. The contractor shall take such steps to safeguard against contamination of local watercourses.
6. The contractor shall use setting out coordinates and dimensions provided which take preference over any less accurate scaled dimensions.
7. Temporary works design associated with the construction of the works shall be responsibility of the contractor.
8. Calculations and drawings of all contractor designed items shall be submitted to the engineer for comments / approvals not less than 10 working days prior to construction. Any comments made by the engineer do not absolve the contractor of his design responsibilities.
9. All works and programming shall be agreed in advance with the overseeeing organisation and the client.
10. The contractor shall maintain free and open access to the public highway and adjacent lands and properties at all time unless otherwise agreed in writing with the interested parties.
11. The design consultant is advised to review the findings of the flood risk assessment relating to the scheme prior to commencing onsite.
12. Dimensions and invert level of outfall to be confirmed on site, with all upstream levels to be laid to suit existing.
13. Refer to site specific H&S information regarding the high number of statutory undertaker's apparatus on site.

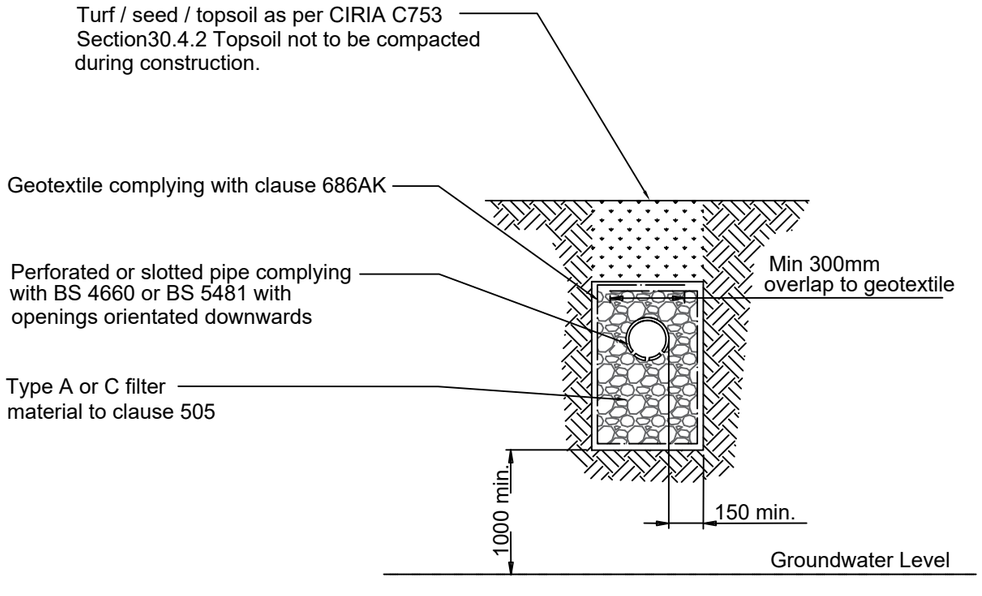
REV	BY	DESCRIPTION	CHKD	DATE

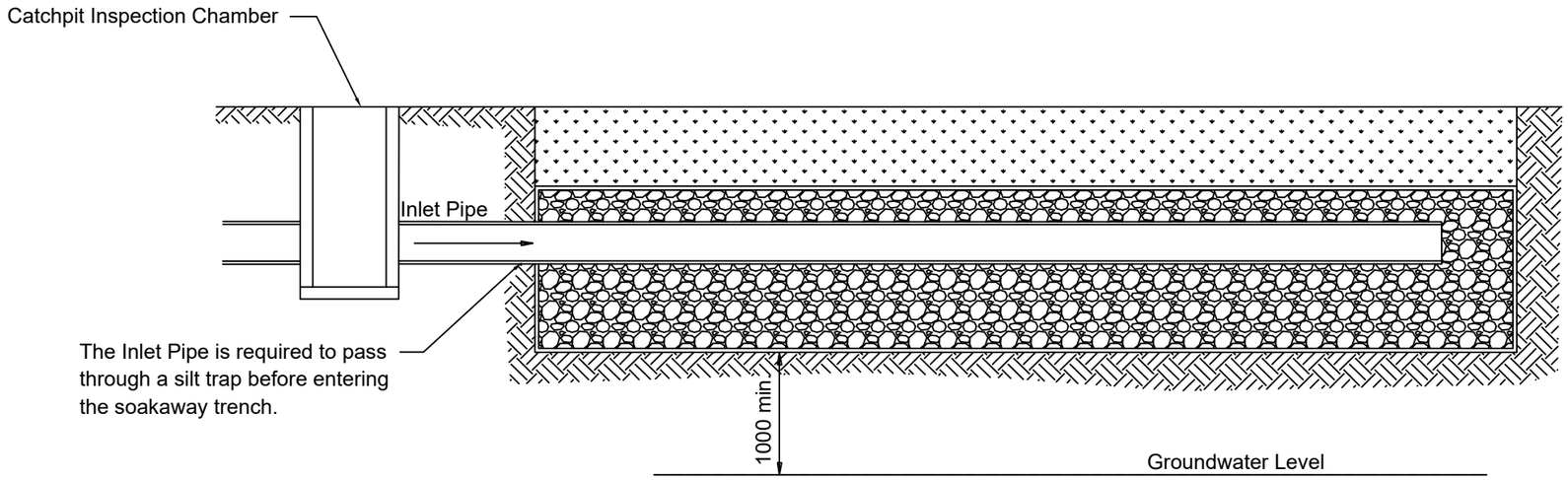
Solihull Metropolitan Borough Council
PJA
Highway Services
Managed Growth Directorate,
Solihull Council,
The Council House,
Manor Square,
Solihull, B91 3QB

DRAWING TITLE: Swale/Bioretention Inlet Standard Detail

DRAWING No.	REVISION
SMBC-0505	P0
DESIGNED/DRAWN BY: PJA	CHECKED BY: SMBC
SCALE: NTS	DATE: 14/03/2023

STATUS: INFORMATION





Notes Continued

14. Roads and/or parking areas draining to infiltration components should be regularly swept to prevent silt being washed off the surface. This will minimize the need for maintenance.
15. CDM 2015 requires designers to ensure that all maintenance risks have been identified and eliminated/reduced and or controlled where appropriate. This information will be required as part of the health and safety file.
16. Dimensions and invert level of outfall to be confirmed on site, with all upstream levels to be laid to suit existing.
17. Refer to site specific H&S information regarding the high number of statutory undertaker's apparatus on site.
18. Where passing over / under existing statutory undertaker's apparatus, pipes to be protected by foamed concrete or similar.
19. This drawing is to be read in conjunction with all relevant scheme drawings and specifications.
20. This drawing is not to be reproduced in any part or form without consent of SMBC Drainage and Flood Risk team. All copyright reserved.

DO NOT WORK FROM REDUCED DRAWINGS. PLEASE REFER TO SCALE AND SHEET SIZE AS INDICATED.

Dimensions to be verified on site. This drawing should not be scaled. Any discrepancies should be referred to the Engineer prior to work being put in hand.

Notes

1. This drawing should be read in conjunction with the relevant SMBC SuDS Design Guide.
2. All dimensions are in millimeters unless otherwise stated.
3. Perforated, precast concrete ring soakaways should be installed within a square pit, with side dimensions about twice the selected ring diameter.
4. It is recommended that the exposed surface of the soil is manually cleaned of any smearing before the geotextile and granular fill surrounding any infiltration system are installed.
5. The design for the filtration trench should include monitoring points where the water level in the system can be observed or measured. Or, if the installation is larger the inspection access should provide a clear view of the infiltration surface (even if the storage zone is filled). For small, filled soakaways, a 50mm perforated pipe is adequate.
6. Replacement of the aggregate or geocellular units will be necessary if the system becomes blocked with silt. Effective monitoring will give information on changes in infiltration rate and provide a warning of potential failure in the long term.
7. An easement should be considered where multiple properties discharge to a single soakaway, to ensure long-term access for maintenance purposes.
8. The bottom of any infiltration system should be flat to provide uniform ponding and infiltration of the runoff across the surface. The tolerance of the base levels should be a maximum level difference of 10mm in 3m.
9. Infiltration systems should be designed to manage storms up to the design standard of service required for the contributing catchment area: this could be the 1:10 or 1:30 year storm, or larger.
10. The void should be separated from the surrounding soil using a suitable geotextile. This will support the soil around the soakaway and prevent ingress of backfill material.
11. Designs should ideally incorporate "multiple pre-treatment", using practices such as swales, sediment basins and filter strips in series upstream of the infiltration basin to minimize the risks of clogging.
12. Fertilizing and the application of herbicides to an infiltration system should be avoided to minimize the risk of pollutants and nutrients entering the groundwater.
13. Excavations should be backfilled with a suitable permeable aggregate material such as Type B filter material, pea gravel or 4/40 aggregate.

REV	BY	DESCRIPTION	CHKD	DATE

Solihull Metropolitan Borough Council
PJA

Highway Services
Managed Growth Directorate,
Solihull Council,
The Council House,
Manor Square,
Solihull, B91 3QB

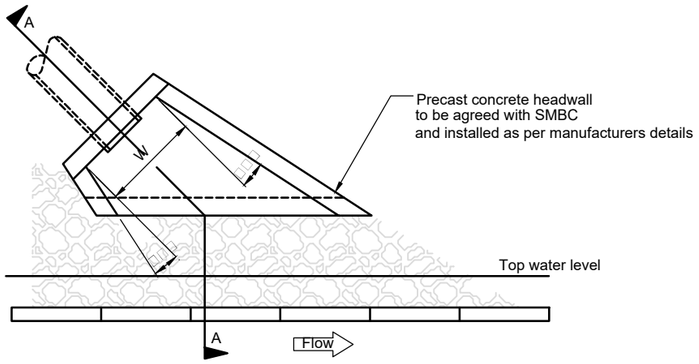
DRAWING TITLE: Trench Soakaway Standard Detail

DRAWING No.: SMBC-0506
REVISION: P0

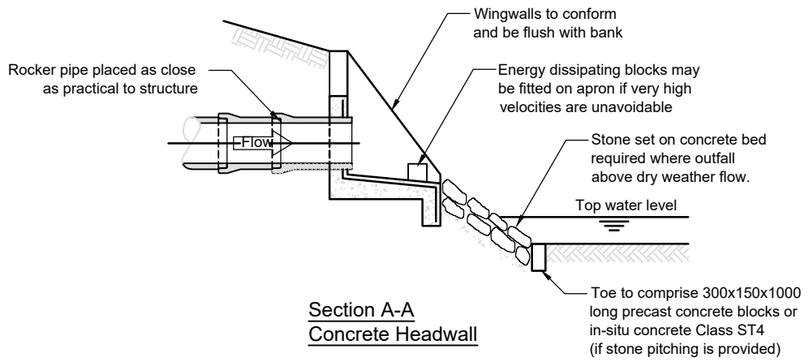
DESIGNED/DRAWN BY: PJA
CHECKED BY: SMBC

SCALE: NTS
DATE: 14/03/2023

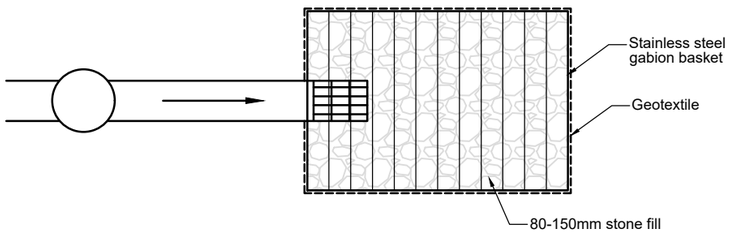
STATUS: INFORMATION



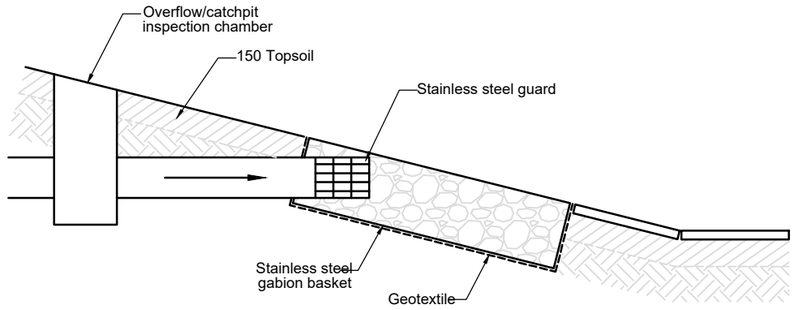
Plan Concrete Headwall



Section A-A
Concrete Headwall



Plan Gabion Basket



Section Gabion Basket

DO NOT WORK FROM REDUCED DRAWINGS. PLEASE REFER TO SCALE AND SHEET SIZE AS INDICATED.

Dimensions to be verified on site. This drawing should not be scaled. Any discrepancies should be referred to the Engineer prior to work being put in hand.

Notes

1. Dimensions and invert level of outfall to be confirmed on site, with all upstream levels to be laid to suit existing.
2. Refer to site specific H&S information regarding the high number of statutory undertaker's apparatus on site.
3. Where passing over / under existing statutory undertaker's apparatus, pipes to be protected by foamed concrete or similar.
4. This drawing is to be read in conjunction with all relevant scheme drawings and specifications.
5.
6. All dimensions are in millimetres unless stated otherwise.
7. This drawing shall be read in conjunction with all related documentation, drawings and standard details.
8. The works shall be carried out in accordance with the dot MCDHW, DMRB and the local requirements of Solihull metropolitan borough council Solihull design manual.
9. All drainage outfalls and connections to existing systems shall be checked & surveyed and the results passed to the overseeing authority / client in advance of the start of drainage works.
10. The contractor shall take such steps to safeguard against contamination of local watercourses.
11. The contractor shall use setting out coordinates and dimensions provided which take preference over any less accurate scaled dimensions
12. Temporary works design associated with the construction of the works shall be responsibility of the contractor.
13. Calculations and drawings of all contractor designed items shall be submitted to the engineer for comments / approvals not less than 10 working days prior to construction. Any comments made by the engineer do not absolve the contractor of his design responsibilities.
14. All works and programming shall be agreed in advance with the overseeeing organisation and the client.
15. The contractor shall maintain free and open access to the public highway and adjacent lands and properties at all time unless otherwise agreed in writing with the interested parties.
16. The design consultant is advised to review the findings of the flood risk assessment the scheme prior to commencing onsite.

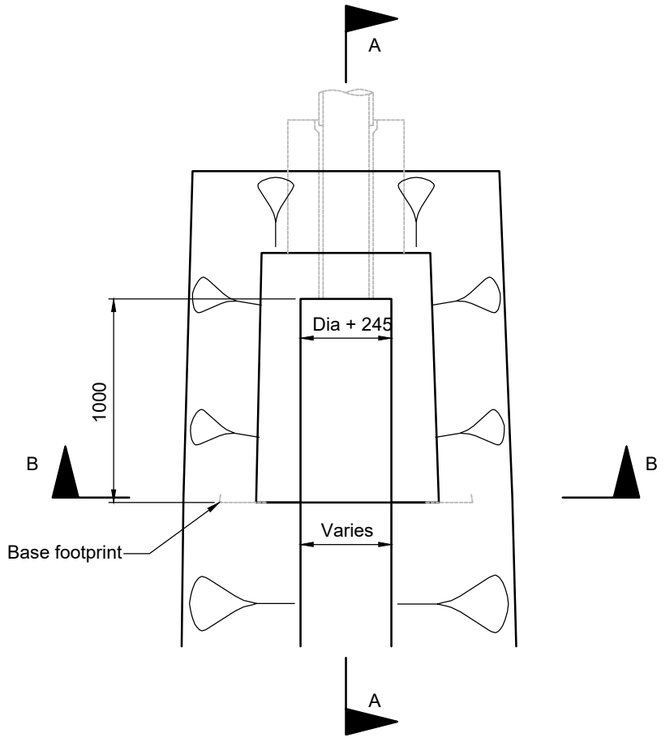
REV	BY	DESCRIPTION	CHKD	DATE

Solihull Metropolitan Borough Council
PJA
Highway Services
Managed Growth Directorate,
Solihull Council,
The Council House,
Manor Square,
Solihull, B91 3QB

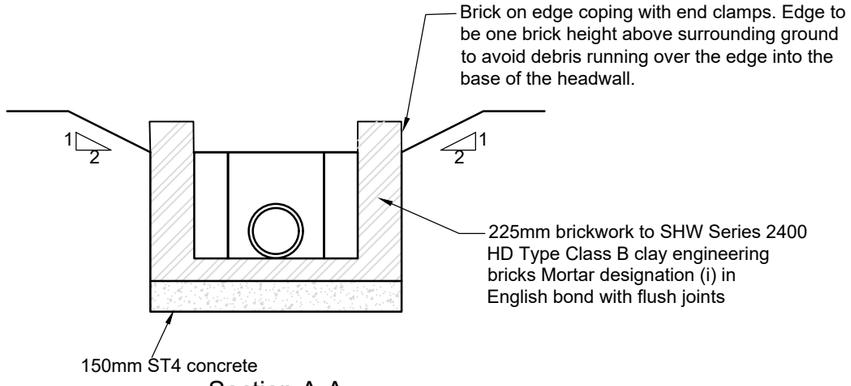
DRAWING TITLE
Concrete Headwall and Gabion Outfall Standard Detail

DRAWING No.	REVISION
SMBC-0505	P0
DESIGNED/DRAWN BY: PJA	CHECKED BY: SMBC
SCALE: NTS	DATE: 14/03/2023

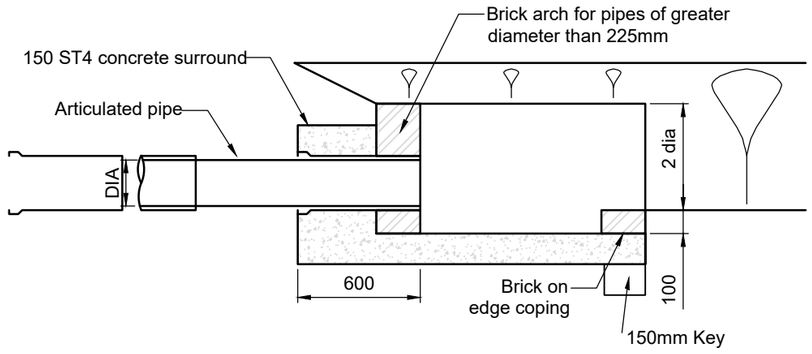
STATUS
INFORMATION



Plan Brick Headwall



Section A-A



Section B-B

DO NOT WORK FROM REDUCED DRAWINGS. PLEASE REFER TO SCALE AND SHEET SIZE AS INDICATED.

Dimensions to be verified on site. This drawing should not be scaled. Any discrepancies should be referred to the Engineer prior to work being put in hand.

Notes

1. All dimensions are in millimetres.
2. The works shall be carried out in accordance with the dot MCDHW, DMRB and the local requirements of Solihull metropolitan borough council Solihull design manual.
3. All drainage outfalls and connections to existing systems shall be checked & surveyed and the results passed to the overseeing authority / client in advance of the start of drainage works.
4. The contractor shall take such steps to safeguard against contamination of local watercourses.
5. The contractor shall use setting out coordinates and dimensions provided which take preference over any less accurate scaled dimensions.
6. Temporary works design associated with the construction of the works shall be responsibility of the contractor.
7. Calculations and drawings of all contractor designed items shall be submitted to the engineer for comments / approvals not less than 10 working days prior to construction. Any comments made by the engineer do not absolve the contractor of his design responsibilities.
8. All works and programming shall be agreed in advance with the overseeeing organisation and the client.
9. The contractor shall maintain free and open access to the public highway and adjacent lands and properties at all time unless otherwise agreed in writing with the interested parties.
10. The design consultant is advised to review the findings of the flood risk assessment the scheme prior to commencing onsite.
11. Dimensions and invert level of outfall to be confirmed on site, with all upstream levels to be laid to suit existing.
12. Refer to site specific H&S information regarding the high number of statutory undertaker's apparatus on site
13. Where passing over / under existing statutory undertaker's apparatus, pipes to be protected by foamed concrete or similar.
14. This drawing is to be read in conjunction with all relevant scheme drawings and specifications.
15. This drawing is not to be reproduced in any part or form without consent of SMBC Drainage and Flood Risk team. All copyright reserved.

REV	BY	DESCRIPTION	CHKD	DATE

Solihull Metropolitan Borough Council

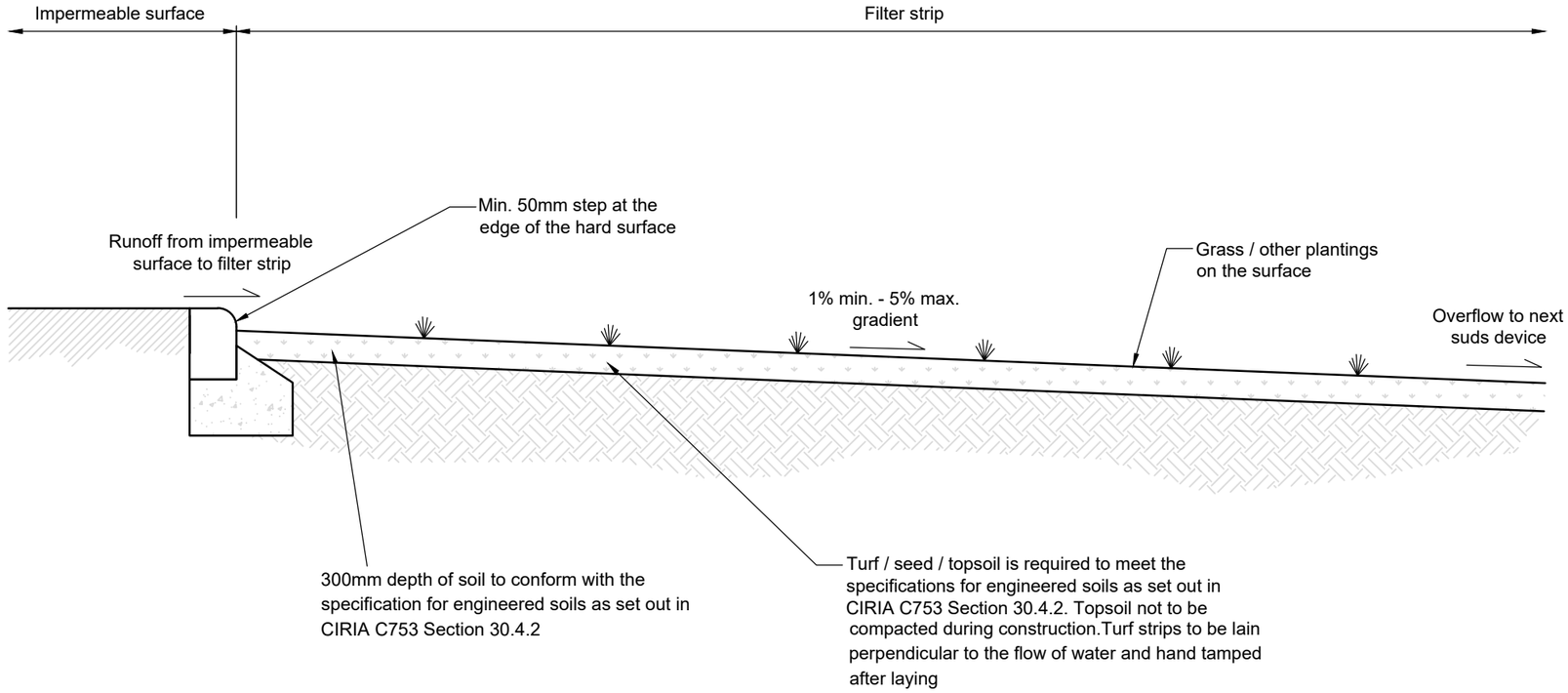
PJA

Highway Services
Managed Growth Directorate,
Solihull Council,
The Council House,
Manor Square,
Solihull, B91 3QB

DRAWING TITLE
Brickwork Headwall
Standard Detail

DRAWING No.	REVISION
SMBC-0508	P0
DESIGNED/DRAWN BY: PJA	CHECKED BY: SMBC
SCALE: NTS	DATE: 14/03/2023

STATUS
INFORMATION



DO NOT WORK FROM REDUCED DRAWINGS.
PLEASE REFER TO SCALE AND SHEET SIZE AS INDICATED.
Dimensions to be verified on site. This drawing should not be scaled.
Any discrepancies should be referred to the Engineer prior to work being put in hand.

Notes

1. This drawing should be read in conjunction with the SMBC SuDS Design Guide.
2. All dimensions are in metres unless otherwise stated.
3. If infiltration is to be allowed then a minimum distance of 1m must be provided below the bottom of the filter drain to the seasonally high water table.
4. Appropriate level spreading devices should be used to maintaining sheet flow onto the filter strip. These include:
   - porous pavement strips
   - stabilised turf strips
   - slotted curbing
   - gravel-filled trenches
   - concrete sills.
5. Filter strips should not be located where trees or structures will cause shade conditions that limit grass growth. Section 15.10 of CIRIA C753 details the necessary considerations to be made when selecting appropriate vegetation and should be consulted.
6. Filter strips should be designed with a minimum longitudinal slope of 1% to prevent ponding and a maximum slope of of 5% to prevent flow channeling. Where filter strip slopes are >5%, a series of level spreaders can be used to maintain sheet flow as runoff flows over the strips. See CIRIA C753 Section 28.4.6 for Flow Spreaders
7. Maximum flow velocities across the filter strip of 1.5m/s are recommended to prevent erosion during design flows. A lower velocity is required for treatment of the water.
8. Good pollutant removal performance is required for all runoff events up to and including the 1 in 1 year event. The duration of this event should be the relevant critical duration for the filter strip flow rate. For this water quality design event:
   - The flow depth should be limited to 100mm to maintain good levels of filtration
   - The peak flow velocity should be lower than 0.3m/s to promote particulate steelment
   - The time of runoff across the filter strip should be at least 9 minutes.
9. Any interim level spreaders should be constructed of durable, non-toxic material graded into the soil - minimum 150mm wide, 50-100mm high, running along the length of the filter strip.
10. Appropriate consideration should be given to installing a low-level, inconspicuous barrier to prevent unauthorised vehicular access onto the filter strips without impeding sheet flow over the strip.
11. In most situations, the outflow from the filter strip should be routed into a downstream component, such as a swale, for conveyance and further treatment, so no outlet mechanism is required.
12. Dimensions and invert level of outfall to be confirmed on site, with all upstream levels to be laid to suit existing.
13. Refer to site specific H&S information regarding the high number of statutory undertaker's apparatus on site.
14. Where passing over / under existing statutory undertaker's apparatus, pipes to be protected by foamed concrete or similar.
15. This drawing is to be read in conjunction with all relevant scheme drawings and specifications.
16. This drawing is not to be reproduced in any part or form without consent of SMBC Drainage and Flood Risk team. All copyright reserved.

REV	BY	DESCRIPTION	CHKD	DATE

Solihull Metropolitan Borough Council

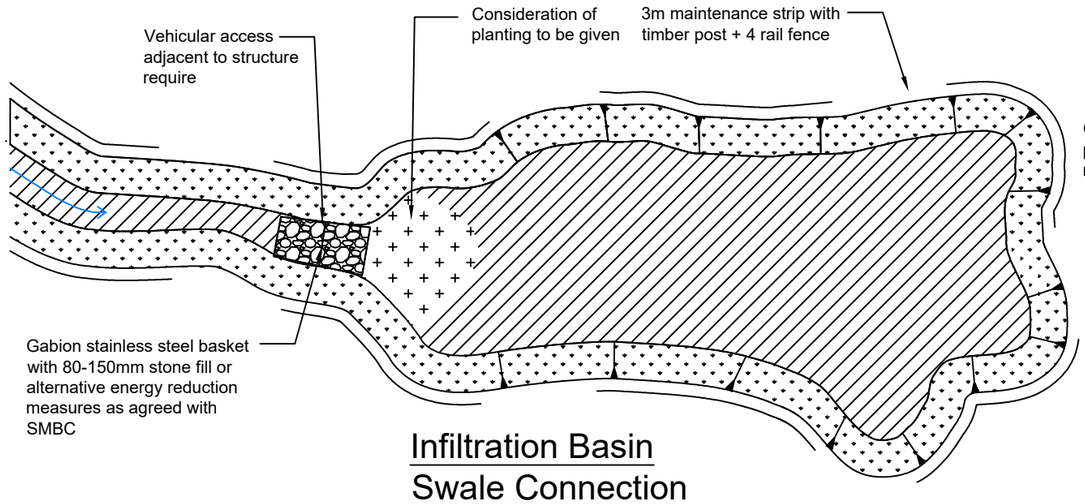
PJA

Highway Services
Managed Growth Directorate,
Solihull Council,
The Council House,
Manor Square,
Solihull, B91 3QB

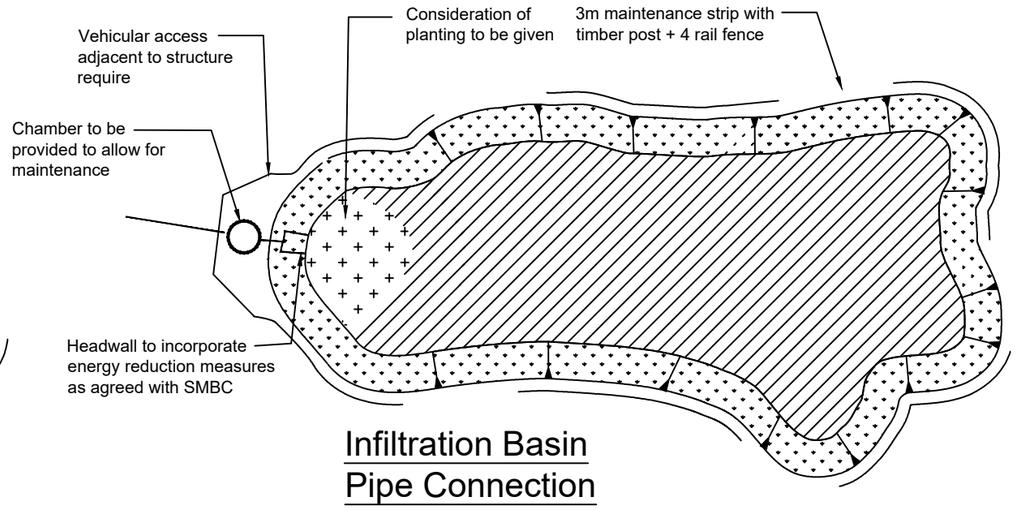
DRAWING TITLE
Filter Strip
Standard Detail

DRAWING No. SMBC-0509	REVISION P0
DESIGNED/DRAWN BY PJA	CHECKED BY SMBC
SCALE NTS	DATE 14/03/2023

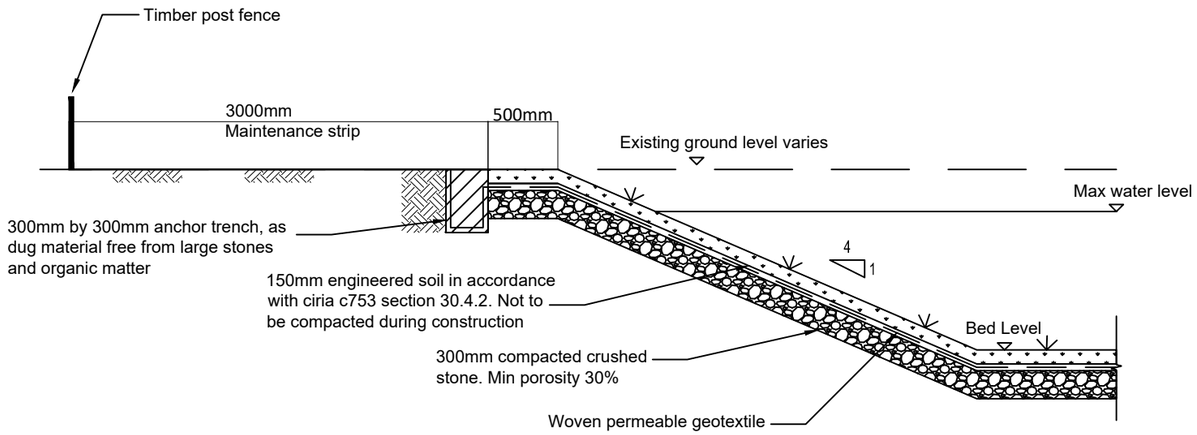
STATUS
INFORMATION



Infiltration Basin Swale Connection



Infiltration Basin Pipe Connection



Infiltration Basin Construction Detail

DO NOT WORK FROM REDUCED DRAWINGS. PLEASE REFER TO SCALE AND SHEET SIZE AS INDICATED.
Dimensions to be verified on site. This drawing should not be scaled. Any discrepancies should be referred to the Engineer prior to work being put in hand.

Notes

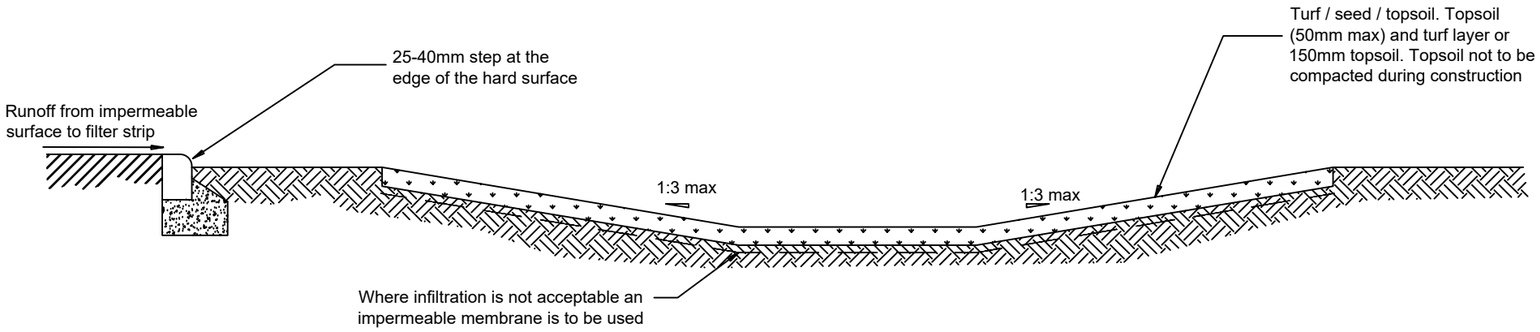
1. This drawing should be read in conjunction with the relevant SMBC SuDS Design Guide.
2. All dimensions are in millimeters unless otherwise stated.
3. A minimum stance of 1m between the bottom of the basin and the maximum likely groundwaer level should always be adopted.
4. Infiltration component should be designed so that exceedance flows are managed effectively. An exceedance flow route or temporary storage area will be required for rainfall events that exceed the design capacity of the infiltration system
5. The maximum depth of water in the basin should not exceed 2m in the most extreme event according to CIRIA C753. However discussions with SMBC will be required to determine a safe maximum depth
6. The bottom of the basin should be flat to provide uniform ponding and infiltration runoff. The max tolerance as set out by CIRIA C753 is 10mm in 3mm on the base levels.
7. The base of the basin can be provided with a layer of engineered soil or underdrains to maintain a firm and dry surface
8. Side slopes of any vegetated basin should not usually exceed 1 in 3 unless special site an/or safety arrangement allow for steeper slopes.
9. Appropriate access to the infiltration basin as well as inlets, outlets and control structures for maintenance activities should be provided at all times.
10. Sedimentation tends to occur within the temporary storage area. An allowance should always be made for this or, preferably, upstream SuDS components put in place to remove sediment before entering the component.
11. CIRIA C753 states that infiltration basin should half drain in 24 hours. If the basin is larger in and this is unrealistic, then a rate should be discussed and agreed upon with SMBC.
12. Dimensions and invert level of outfall to be confirmed on site, with all upstream levels to be laid to suit existing.
13. Refer to site specific H&S information regarding the high number of statutory undertaker's apparatus on site.
14. Where passing over / under existing statutory undertaker's apparatus, pipes to be protected by foamed concrete or similar.
15. This drawing is to be read in conjunction with all relevant scheme drawings and specifications.
16. This drawing is not to be reproduced in any part or form without consent of SMBC Drainage and Flood Risk team.

REV	BY	DESCRIPTION	CHKD	DATE

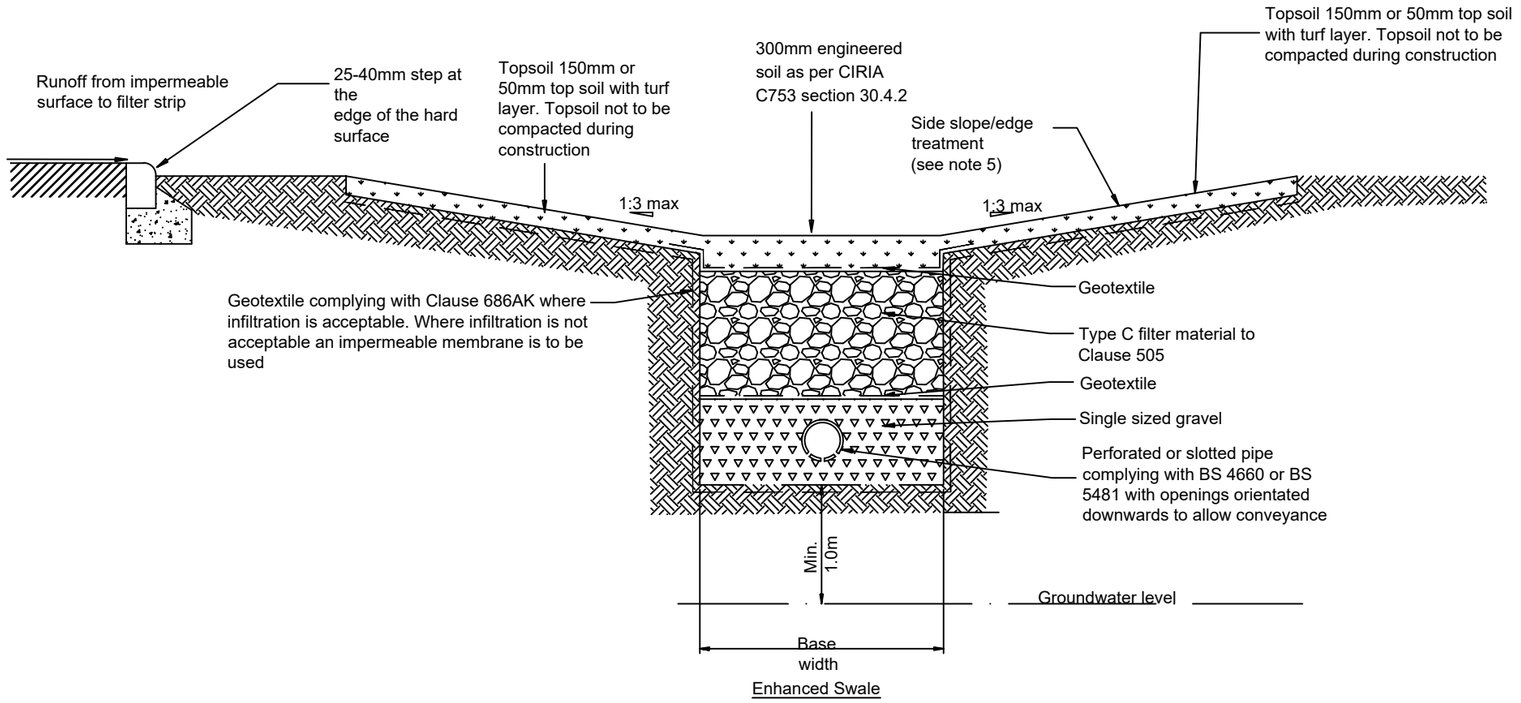
Solihull Metropolitan Borough Council
PJA
Highway Services
Managed Growth Directorate,
Solihull Council,
The Council House,
Manor Square,
Solihull, B91 3QB

DRAWING TITLE: Infiltration Basin Standard Detail

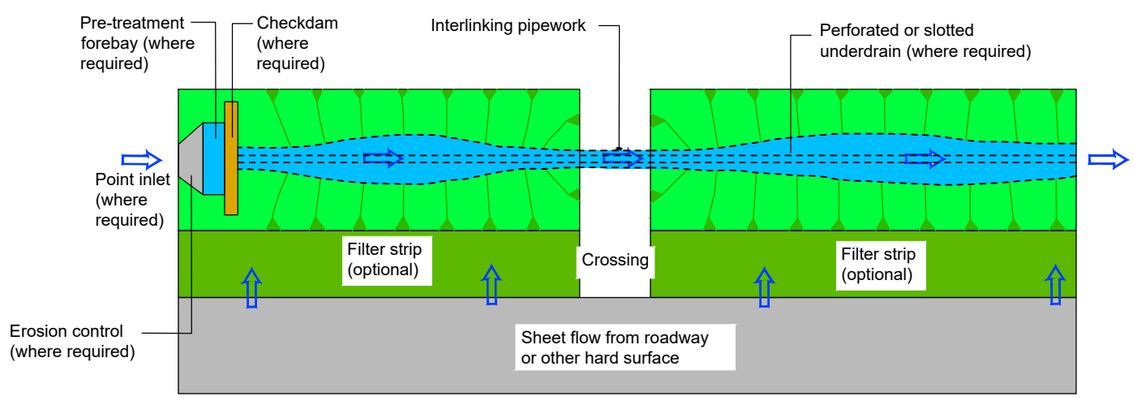
DRAWING No.: SMBC-0510
REVISION: P0
DESIGNED/DRAWN BY: PJA
CHECKED BY: SMBC
SCALE: NTS
DATE: 14/03/2023
STATUS: INFORMATION



Standard Swale



Enhanced Swale



Roadside Swale Plan View

Notes continued

11. Protection from rutting may be required in order to maintain the filtration capacity. This can be achieved through the implementation of reinforced grass verges.
12. Dimensions and invert level of outfall to be confirmed on site, with all upstream levels to be laid to suit existing
13. Refer to site specific H&S information regarding the high number of statutory undertaker's apparatus on site.
14. Where passing over / under existing statutory undertaker's apparatus, pipes to be protected by foamed concrete or similar.
15. This drawing is to be read in conjunction with all relevant scheme drawings and specifications.
16. This drawing is not to be reproduced in any part or form without consent of SMBC Drainage and Flood Risk team. All copyright reserved.

DO NOT WORK FROM REDUCED DRAWINGS. PLEASE REFER TO SCALE AND SHEET SIZE AS INDICATED.
Dimensions to be verified on site. This drawing should not be scaled. Any discrepancies should be referred to the Engineer prior to work being put in hand.

Notes

1. This drawing should be read in conjunction with the SMBC SuDS Design Guide.
2. All dimensions are in metres unless otherwise stated.
3. Materials specifications to be as per CIRIA C753.
4. Longitudinal gradient for the swale should not be greater than 4% (or 10% with check dams) as low velocities are required for pollutant removal and to prevent erosion.
5. A minimum distance of 1m must be provided below the bottom of the swale and, where used, filter drain to the seasonally high water table if infiltration is to be used.
6. In conjunction with CIRIA C753 section 9.11, the maximum side slope gradient of the swale is limited to 1 in 3 with 1 in 4 being the preferred option. (In the case of high-speed roads the gradient is limited to 1 in 5 with a maximum water depth of 200mm). These are for ease of maintenance and to reduce the risk of vehicles overturning.
7. The swale should be designed so that water ingress into the ground will not affect the adjacent pavement construction. If necessary the swale can be lined with an impermeable geomembrane.
8. The vegetation to be planted should have a high tolerance to chloride levels to prevent deterioation of health from road salt etc. This is prevalent to when grit may be spread thus causing damage to the initial filtration process.
9. General road maintenance such as gully emptying and road sweeping are important pollution prevention strategies for road runoff.
10. The swale itself will require regular maintenance encompassing inspections, litter/debris removal and grass cutting and potentially shrub management where applicable. Occasional sediment management maintenance will also be required as per CIRIA C753 Table 32.1.

REV	BY	DESCRIPTION	CHKD	DATE

Solihull Metropolitan Borough Council
PJA
Highway Services
Managed Growth Directorate,
Solihull Council,
The Council House,
Manor Square,
Solihull, B91 3QB

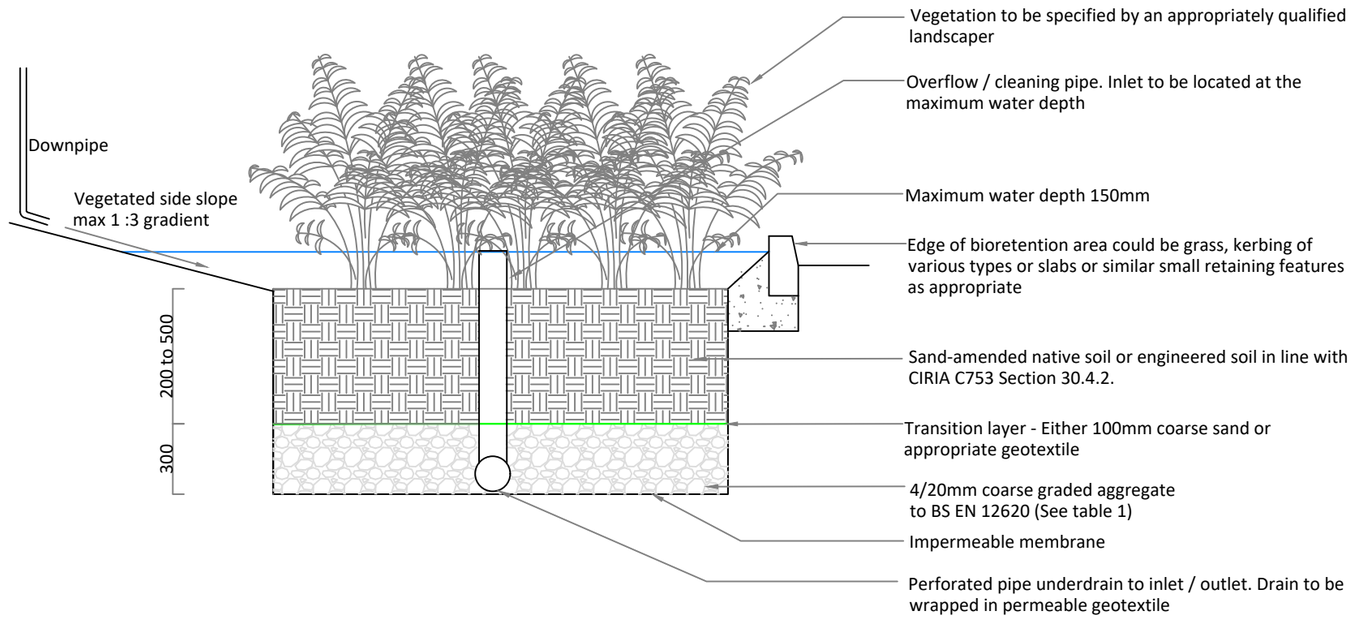
DRAWING TITLE
Roadside Swale
Standard Detail

DRAWING No.	REVISION
SMBC-0511	P0

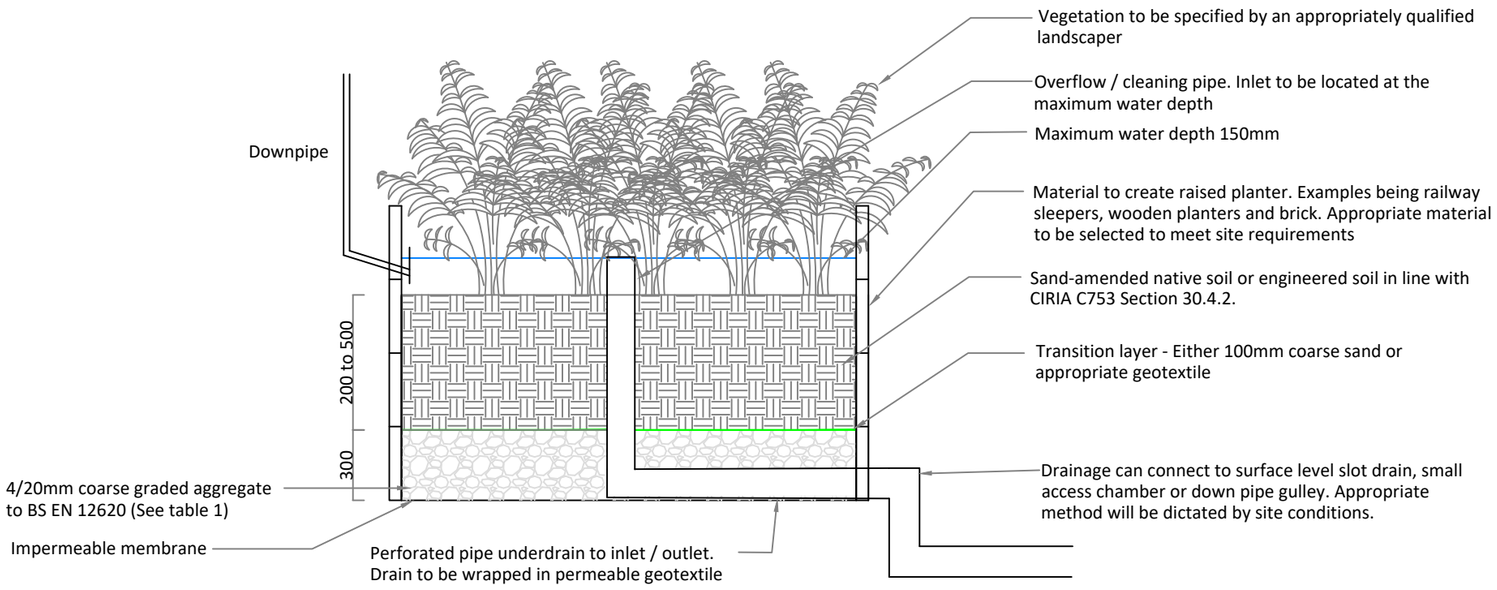
DESIGNED/DRAWN BY	CHECKED BY
PJA	SMBC

SCALE	DATE
NTS	14/03/2023

STATUS
INFORMATION



Bioretention Ground Level



Bioretention Raised Planter

DO NOT WORK FROM REDUCED DRAWINGS. PLEASE REFER TO SCALE AND SHEET SIZE AS INDICATED.
Dimensions to be verified on site. This drawing should not be scaled. Any discrepancies should be referred to the Engineer prior to work being put in hand.

Notes

1. This drawing should be read in conjunction with the SMBC SuDS Design Guide.
2. All dimensions are in millimeters unless otherwise stated.
3. Materials specifications to be as per CIRIA C753.
4. Dimensions and invert level of outfall to be confirmed on site, with all upstream levels to be laid to suit existing
5. Refer to site specific H&S information regarding the high number of statutory undertaker's apparatus on site.
6. Where passing over / under existing statutory undertaker's apparatus, pipes to be protected by foamed concrete or similar.
7. This drawing is to be read in conjunction with all relevant scheme drawings and specifications.
8. This drawing is not to be reproduced in any part or form without consent of SMBC Drainage and Flood Risk team. All copyright reserved.
9. There are many bioretention options and designs available. These details are to assist with the design of those more commonly encountered. Reference should be made to chapter 18 CIRIA C753.
10. It is important that bioretention systems are designed with the character of the area in mind.

REV	BY	DESCRIPTION	CHKD	DATE

Solihull Metropolitan Borough Council

PJA

Highway Services
Managed Growth Directorate,
Solihull Council,
The Council House,
Manor Square,
Solihull, B91 3QB

DRAWING TITLE: Bioretention Standard Detail

DRAWING No.: SMBC-0512
REVISION: P0

DESIGNED/DRAWN BY: PJA
CHECKED BY: SMBC

SCALE: NTS
DATE: 16/03/2023

STATUS: INFORMATION

To use our free consultation service, please email drainage@solihull.gov.uk

Solihull Council
Economy & Infrastructure Directorate
Council House
Manor House
Solihull
B91 3QB

Solihull
METROPOLITAN BOROUGH COUNCIL