

Appendix

A1

Checklists

This chapter provides a series of checklists that can be used by people constructing, managing, inspecting or approving SuDS, to ensure that all relevant design, construction and maintenance considerations have been taken into account and documented in a consistent way.

TABLE Pre-construction checklist
A1.1



Is there sufficiently detailed topographic information available about the site?	
Have all below ground services been surveyed, and is all statutory and utility provider information available?	
Are full details available of the extent or protection zones and approved protection measure for trees and habitats to be retained, or constraints around heritage artefacts or structures? Is information available regarding the restrictions of seasonal works for protected species?	
Is all information available regarding watercourses, drainage ditches or culverts, and history of flooding?	
Has the potential impact of water flow from off-site land been considered?	
Is the full site investigation report available? Does it include infiltration tests for areas designed for infiltration?	
Are any studies into the previous use of the land available (such as contamination or groundwater)?	
Are the construction drawings and specifications for all the SuDS available? Do they include full planting plans and specification? Make sure the drawings are the latest versions issued for construction and provide adequate information to allow construction.	
Do the construction drawings clearly show the management train, and whether the SuDS is an infiltration or attenuation system? Is the SuDS design report available?	
Are all levels at inlets and outlets provided along with storage volumes for each component and the permitted discharge rate from site? Are the levels in the system consistent with the level of the discharge point? Check the level of the discharge point before starting construction.	
Is the management of exceedance flows shown on the design drawings? Do they show how they interact with the main SuDS component or scheme?	
Are full contour plans (which include levels) for all ground works, banks, basins and other components provided?	
Have the designers considered the overall cut and fill requirements for the site against proposed levels?	
Are the details of specialist suppliers available, along with the manufacturer's recommended installation requirements for all proprietary products?	
Have the installation standards for all construction items been confirmed?	
Has a schedule of construction inspection checklists and hold points been compiled and agreed?	
Has it been agreed who will inspect each part of the works for each/ every phase, the notice required before inspection, and what needs to be recorded (written and photographically)?	
Is the local community aware of the SuDS scheme and do they understand the approach taken?	

TABLE Pre-construction checklist**A1.2**

Location of soil heap is appropriate, and not subject to surface water flows, site sediments or silts	
Area for soil stockpile has been cleared of weeds and/or other site materials before depositing soil	
Weather conditions before stripping and stockpiling operations, and cease activities during and immediately after heavy rainfall	
Overall height of soil heap is no greater than two metres, profile to shed water, angle of bank slope (ideally) not greater than 1 in 2, and that it is adequately consolidated, but not compacted	
Soil heap has been sown with a ground cover, and that cover is adequate to prevent weed infestation	
Outcome of soil test before reuse and that appropriate fertilisers are used to improve the soil to the specified standard	

TABLE Pre-construction checklist – managing erosion**A1.3**

Planting is properly established before allowing water to drain through it or that turf is partially established and well pinned down	
Erosion control matting is used on steep slopes where problems are likely to occur	
Slopes are well prepared to receive matting	
Matting will deal with velocity of water anticipated	
Anchor trenches are used and adequately sized	
Matting is properly lapped, pinned and stapled	
Hydroseed mix and application rate is correct for site location as specified	
Slope is properly roughened to receive hydroseed	
Temporary check dams are necessary to reduce velocity during establishment	

TABLE Pre-construction checklist – managing silt**A1.4**

Exposed soils either in the SuDS or next to it are not washing out and causing silt problems	
Silt fences or temporary silt basins are required to manage on-site silt and provide where necessary	
Where SuDS are used to hold silt temporarily, they are cleaned out before final planting or seeding	
Protection is in place to prevent silt washing into pervious paved areas	
Protection is in place for all underground storage systems and they have provision for cleaning	
A mobile silt catchment plant is necessary	
Runoff from fresh concrete is managed to prevent damage to SuDS	

TABLE Handover inspection checklist**A1.5**

All changes to the designed system have not affected the ability of the SuDS to deliver the quantity/quality/biodiversity and amenity requirements as originally designed	
Inlet and outlet levels are correct	
Structural components are as specified in the design	
Slopes are constructed to the correct gradients	
Correct planting/turfing has been installed and has established	
Is there uneven settling of soil, channelling, unwanted ponding or erosion of bed or side slopes	
Is there evidence of construction sediment or unexpectedly rapid build-up of sediment	
Agreed access for maintenance is clear	
Site photographs of all key stages and a record of below ground works that are now covered up	
Test certificates	
Topographic survey of completed SuDS scheme	
Operation and maintenance plan for SuDS	
Other (TBC)	

TABLE Soils checklist**A1.6**

Certified analysis of soil as delivered against specification	
If analysis of site soil is required, take several samples from different areas of the site	
Each type of delivered soil is separately identified to avoid misuse	
Existing soil heaps are being managed and protected in good condition	
Delivered soils are managed/handled correctly in good condition	
Batch procedure to ensure that site-mixed soil proportions and extent of mixing is correct	

TABLE Materials: geosynthetics and aggregates checklist**A1.7**

Materials delivered to site conform to specification	
If on-site sampling or testing is required, take several samples from different parts of the site	
Supplier's requirements for storage, handling and installation are followed	
Requirements on certificates (eg BBA) for storage, handling and installation are followed	
Qualifications or experience of geomembrane installers	

TABLE Inlets, outlets and flow control systems checklist**A1.8**

Level of outlets and overflows are as specified on the design drawings	
Dimensions of outlets and flow controls are as specified on design drawings	
Flow control is from the supplier specified on design drawings (if appropriate). If not, the designer has confirmed their performance as acceptable	
Flow controls (eg vortex flow controls) are installed the right way up and in the position shown on design drawings (eg on the outlet pipe)	
Finishing of the details is as shown on design drawings (ie construction is visually attractive)	
The connection to sewer is via the demarcation manhole in accordance with WRc (2007)	

TABLE Rainwater harvesting checklist**A1.9**

Both the tank and the overflow are built to the correct level	
All areas planned to drain to the tanks are included	
Drainage field has right capacity for volume of drainage required	
All filters are installed correctly	
Underground tank has correct surround and bedding	
Above ground tank has stable supports	
There are no misconnections between SuDS and mains water supply	

TABLE Green and blue roofs checklist**A1.10**

Roof/insulation surface is clean and free of sharp protrusions that could puncture the membrane	
Roof membrane is installed as per design details and verified/tested by appropriate person as specified	
Protection layer/root barrier placed over membrane if required	
Drainage layer installed across whole of design area (do not just check at edges)	
Drainage layer is the same product as specified on design drawings and is installed the right way up	
Drainage layer connected to outlets	
Correct number, size, specification and location of drainage outlets	
Growing media as specified in design both for content and laying depths	
Growing media/substrate is correct thickness across the whole area (not just the edges)	
Mounds introduced for biodiversity or other purposes are as shown on design drawings	
Plants/seeds as specified on design drawing and at correct density, or that sedum mat is the correct thickness	
Biodiversity features are installed (eg old tree branches or logs)	
Edge drainage, border zones and fire breaks installed as per design	
An appropriate watering regime is in place to ensure the successful establishment of the plants/seeding/sedum mat	
Ensure monitoring regime for plants is in place (to inform early decisions on performance and maintenance, and allow for the possible introduction of additional species as the roof establishes)	

TABLE Infiltration systems checklist**A1.11**

Excavations are to the correct design levels	
Sides and base of excavation to expose soils and check against type assumed in the design	
The base is level and suitable for construction of the soakaway tank or basin	
The area for infiltration has not been compacted. If so, rectify and re-inspect	
Soakaway units are as specified on the design drawings	
Backfill is as specified and compacted sufficiently with machinery that is not too heavy	
Basin topsoil is as specified and sufficiently permeable	
Basin planting is as specified – species, size and density	
Muddy runoff – ensure that dirt has not been allowed to enter the system. If it has, then ensure that it has been cleaned out to an acceptable standard	
The specified depth of soil in the design drawings has been placed over the top of the soakaway tank	

TABLE
A1.12 **Proprietary treatment systems checklist**

Read and follow suppliers' instructions before receiving delivery to site (ask the site manager for these if they not been provided or download from the manufacturer's website)	
Products and materials are stored on site correctly as described in suppliers' instructions	
Handle products and materials as described in suppliers' instructions	
The base of the excavation is clean and level and at correct depth	
Inlets and outlets are installed the correct way round	
Casing/chamber are installed correctly	
All seals are installed correctly	
Filters etc are installed right way round	
Water flow through the component is tested before covering it up	
Backfill is as specified on design drawings	

TABLE
A1.13 **Filter strips checklist**

For infiltration filter strips (where infiltration is required by the design), check that permeability of soils is still effective following construction	
Where specialist soils are used to promote infiltration, delivered soils comply with the specification. This may require re-testing samples from across the soil storage area	
Completed levels accord with original design drawings (see next point)	
Audit trail of changes to ensure revised scheme still fulfils requirements of the original scheme	
Size of area drained has increased (see next point)	
Sizing of filter strip has been increased to accommodate increased drainage area	
Drop from paved surface to filter strip is continuously at a level of between 50 mm to 100 mm	
Adequate 'edge protection' measures are in place to avoid vehicle overruns	
Level of filter strip is consistently between one and five per cent	
Topsoil depth is as specified	
Seed/turf mix complies with the original specification	
Vegetation is sufficiently dense to withstand water flow to allow runoff across the strip without the soil eroding before being brought into use	

TABLE
A1.14 **Filter drains checklist**

The area shown on drawings falls adequately towards the drain	
Levels in bottom of trench to ensure a continuous fall	
Adequate stone below invert of drain pipe – sized to pipe diameter	
Trench width and depth is correct	
Geotextile is as specified and has the correct porosity	
Geotextile is lapped and has no tears or damage	
Aggregates are the correct size and the material is clean and does not include fines	
Aggregate size used is in accordance with the specification	
Sacrificial layer of geotextile/stone provided if no filter strip used	
Outlet is the size as specified and is installed at the correct level	

TABLE Swales checklist**A1.15**

Completed levels along length of system and at weirs/outfalls agree with original design drawings, if not (see next point)	
Audit trail of changes to ensure revised scheme still fulfils requirements of the original design criteria and specification	
Gradient of side slopes and width of base to swale are as designed	
Soil permeability for infiltration swales is as specified	
Depth and cover of membrane where used are as designed	
That seed/turf mix or plants supplied complies with the original specification	
That vegetation is sufficiently dense to withstand water flow before use	
Level of grass/road edge where 'over-the-edge drainage is used is as designed	
Drainage material and pipe in under-drained swales are as specified	
Correct geotextile provided to underdrain and pipe are as specified	

TABLE Bioretention systems checklist**A1.16**

Where infiltration is required by the design ensure that permeability of natural soils is effective and delivers the design infiltration capacity	
Particle size of delivered engineered soils or individual soil elements for site mix comply with specification	
Depth of engineered soil is as designed/specified and undertake on-site permeability test to check soils drainage capacity	
Audit trail of changes to ensure revisions to scheme still fulfil requirements in-line with original scheme	
Graded filter or geotextile used, and compliance to specified materials/depth	
Piped drains are installed in base of system and connected to main drainage system correctly (not infiltration systems)	
Overflow system is in place, and functioning correctly	
Inspection tube installed correctly	
Plant sizes and species are supplied and located to the correct specification and design	
Organic soil mulches have not been used	
Specified components are in the correct place to break inlet velocity	
Where forebays are used, finished levels allow even flow of water into system	

TABLE Trees checklist**A1.17**

Runoff areas connected to each tree pit are as designed	
Soil volumes provided are as specified	
Soil mix, depth and width of installation are as specified	
Services do not conflict with tree pits, and are located outside drainage zone	
Surface of tree pit allows aeration of soil below using an aeration pipe (or other agreed means)	
Overflow pipe is provided where soils do not infiltrate	
Tree root barriers are installed where required	
Proposed and actual location of utilities are given – seek advice if within proposed SuDS area	

TABLE Surfaces – subgrade and sub-base checklist**A1.18**

CBR value checked when formation exposed to confirm design value	
Formation is to specified line and level	
Formation permeability has not been reduced by compaction	
Geotextile placed as per design specification with no tears or holes, and lapped correctly between sheets	
Geomembrane (if required) placed as per design specification with no tears or holes, with joints sealed as per design, and penetrations sealed with Top Hats	
Sub-base meets the specification for: <ul style="list-style-type: none"> • grading • porosity • hardness and durability • permeability. 	
Sub-base compacted to specified density and depth and is screeded to specified line and level	
Stabilisation layer placed on top of sub-base if necessary	

TABLE Modular permeable surfaces checklist**A1.19**

Laying course is at design thickness	
Blocks laid and joints filled and then compacted	
Surface tolerances specified in design have been achieved	
Block pattern is as specified in design	
Edge restraint and block cutting is acceptable and as shown in design (no cut block should be less than one-third of the whole)	
Joints are full of specified jointing material	
Blocks meet requirements of specification	
Surface is clean and free draining	
Runoff from nearby soil areas cannot occur	

TABLE Porous asphalt checklist**A1.20**

No evidence of segregation or pooling of binder in delivery truck beds	
Asphalt meets requirements of specification	
Suitable laying machine is used	
Asphalt laid in thickness specified in design (maximum layer thickness and total thickness)	
Asphalt delivered and compacted within temperature specified in design	
Asphalt compacted in accordance with specification and to specified line and level (and correct tolerances)	
Surface is clean and free draining	
Runoff from nearby soil areas cannot occur	

TABLE Porous concrete checklist**A1.21**

No evidence of segregation during delivery	
Concrete meets requirements of specification	
Suitable roller screed is used as specified in design	
Concrete laid in thickness specified in design	
Contraction joints are formed by rolling or forming at spacing specified in design	
Surface is clean and free draining	
Runoff from nearby soil areas cannot occur	

TABLE Resin-bound gravel checklist**A1.22**

Surface is clean and free draining	
Runoff from nearby soil areas cannot occur	

TABLE Grass reinforcement checklist**A1.23**

Reinforcement elements are as specified in design	
Sand or gravel infill as specified in design: <ul style="list-style-type: none"> • permeability • organic content 	
Reinforcement is placed to designed line and level	
Infill is placed to correct depth and is below top of reinforcing elements	
Correct grass or plant mix is used	
Allowance for expansion has been provided	
Surface is clean and free draining	
Runoff from nearby soil areas cannot occur	

TABLE Attenuation storage tanks checklist**A1.24**

Formation is to correct depth and level shown on design drawings	
Side slopes to excavation and ground conditions are as assumed in the geotechnical design report	
Base of excavation is level and firm	
Tank units are as specified and shown on design drawings (make sure correct classification or strength units have been delivered)	
Correct number and location of connecting units used and flat packed units assembled correctly	
Correct geotextile or geomembrane is as shown on design drawings, including the protection fleece if specified	
Backfill is as shown on design drawings and as specified	
Compaction of backfill with plant is as specified by the designer (ie not too heavy)	
Backfill over top of tank to depths is specified on design drawings and in the specification	
Backfill is compacted with correct plant and to the required density	
Tank is fenced off to prevent overloading by construction traffic (if necessary)	
At pre-handover inspection of tank, it should be free of silt and other debris (CCTV survey may be necessary)	

TABLE Detention basins checklist**A1.25**

Completed levels agree with original design drawings (if not, see next item)	
Audit trail of changes to ensure revised scheme still fulfills requirements of the original scheme	
Location, sizing and level of inlets and outlets are as design drawings	
Level of base to planted basin is consistent and no >1 in 100	
Where engineered soils are used to provide infiltration, check delivered soils comply with specification	
Seed/turf mix complies with the original specification	
The species and size of planting has not been changed (refer to the designer for suitability)	
Vegetation is sufficiently dense to withstand water flow without eroding before bringing into use	

TABLE Ponds and wetlands checklist**A1.26**

Land used for temporary site runoff – fully remediated before construction of pond/wetland	
Plan dimensions, depths and levels throughout including inlets and outlets agree with original design drawings	
Audit trail of changes to ensure revised scheme still fulfils requirements of the original scheme	
Size of area drained has not increased from that specified or designed	
Banks and benches are constructed to widths and gradients specified	
Liners are installed, sealed and protected as specified	
Inlets control water velocity to provide slower flows and provide forebays for sediment where specified	
Inlets and outlets are protected from blockage by debris and silt build-up	
Plants and species are supplied to size/form as specified before planting	
Plants set out and planted in accordance with the specification	
Agree how successful natural regeneration is to be approved, and agree supplementary planting/change to management approach	
Agree remediation measures for areas of erosion	