06

CONSIDERING SUDS THROUGH THE MASTER PLANNING PROCESS

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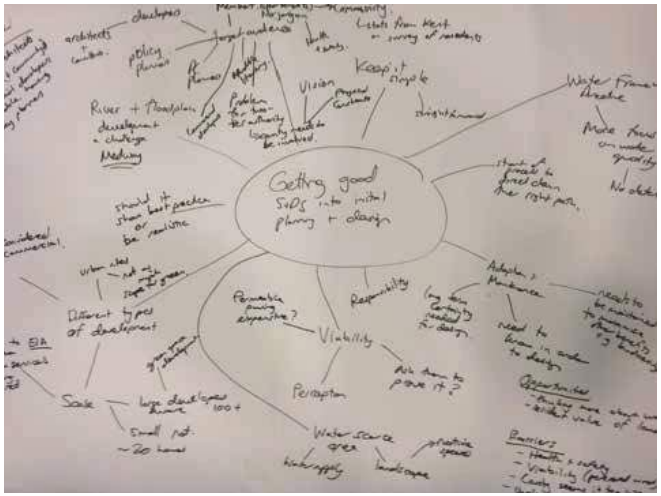
SuDS design should be fully integrated into a master plan as an essential part of land use and development planning, and considered in conjunction with other aspects of the design. This chapter outlines the tasks that should be considered in order to develop conceptual SuDS designs at each stage of the master planning process.

The process is designed to allow planners and designers to scope and embed opportunities for SuDS as land uses and design ideas evolve. The potential benefits outlined in chapter 3 should be prioritised and tailored through design. The site conditions in chapter 4 should also be appraised so that SuDS design is robust and responsive to context. These site-specific benefits and conditions should be identified during design stages A and B, then addressed through design stages C – E.

SuDS design tasks should be tailored to match the appropriate level of detail at each stage. As such, small developers may choose to customise and navigate the process more quickly to suit their needs.



Master planning process		Design process for SuDS	
A. Prepare	AIMS AND OBJECTIVES document aspirations	Identify targets and objectives Identify relevant sustainability targets for water management, including local SuDS policy requirements and development specific targets.	
	OUTLINE BUSINESS CASE viability, feasibility, pragmatic	Give forethought to likely synergies and challenges Ensure synergies and challenges are accounted for in the outline viability testing, particularly noting aspects that could influence the cost and benefits of the SuDS solution, including: • position of the site within a wider catchment, its contribution to flood risk and its ability to support key movement and ecological corridors; • green space and public space requirements where SuDS could be used as a multi-functional amenity feature; • habitat and landscape needs that SuDS could influence; • water recycling needs (often related to Code for Sustainable Homes or BREEAM targets) where SuDS can facilitate rainwater harvesting; • the local planning requirements and stakeholders that may be involved in the adoption and maintenance of SuDS; • likely change in permeability of the site which will influence attenuation needs; and • risk of runoff contamination which will determine the level of water treatment needed through SuDS.	

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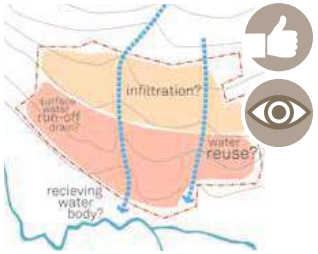
B. Define	CONTEXT APPRAISAL understanding the baseline and how a place works	SuDS baseline analysis Conduct a baseline appraisal of the possible benefits of SuDS and the site conditions that could affect design. See chapters 3 and 4 for benefits and site conditions that should be considered. Identify desired benefits and challenging site conditions that will be considered in the design process.	
	SPATIAL FRAMEWORK opportunities and constraints	Identify flow paths and low points Existing drainage patterns and natural flow paths should be mimicked. Examine the existing topography (and note any substantial required changes to topography through development) to identify natural flow paths. Identify areas at the lowest points where water will naturally gather. This will help to maintain natural processes and eliminate the need for additional infrastructure or pumping. Identify discharge options Work through a hierarchy of options to determine where water should be directed: 1. water reuse – is there a local need for non-potable water? 2. infiltration – are ground conditions suitable for infiltration in some areas? 3. discharge to water body – is there a watercourse or water body on-site or near the site which could receive water? 4. discharge to surface water runoff drain – is there an above ground or below ground conveyance network for surface water only on-site or near the site? Could one be created? 5. discharge to combined drain – as a last resort, find connections to a nearby combined drain that carries both runoff and wastewater. On some sites there may be multiple discharge points and discharge types. SuDS opportunities and constraints diagram Include a high-level spatial diagram that identifies the possible benefits and constraining conditions for SuDS as part of the suite of baseline diagrams that make up the spatial framework for the site.	 
	ASSEMBLE THE MASTER PLANNING TEAM the right range of skills for the team	Bring together the right skills Identify skills that are needed in the master planning team to develop the best SuDS options. These should relate to the desired benefits to be developed and the site conditions that need to be addressed. A specialist with water management skills should be part of every team.	

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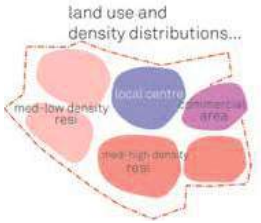
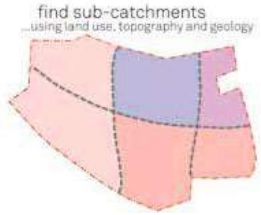
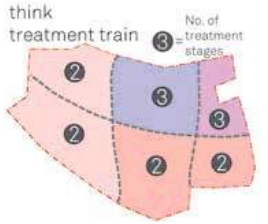
C. Design - Initial Testing	INITIAL TESTING	Explore water movement Design begins with an exploration of the relationship between the developed area and water. The placement and size of development will influence runoff rates and pollution risk and layout will influence the availability of opportunities for the introduction of sustainable drainage systems for amenity and biodiversity benefits.	
	LAND USE & DESTINATION Outline distributions and relationships 	Identify SuDS sub-catchments (where suitable) As the outline land use plan develops, a series of sub-catchments may evolve where distinct sets of SuDS treatment trains will be required. For example, on large developments which will be phased (built-out at different times) SuDS should similarly be phased to ensure each area is functional in itself. Also, there may be varying land uses on a site that give rise to different contamination risks, e.g. an industrial area within a wider residential development. SuDS in sub-catchments can join to regional SuDS systems downstream.	
		Allocate number of treatment stages All rainwater that falls on the site should generally be passed through at least two SuDS treatment stages to improve water quality before it is infiltrated into the ground or discharged (see chapter 3). The number of treatment stages should be scoped at this stage for each distinct drainage area or sub-catchment. Estimate outline attenuation volumes From the types of land use and density of the development, a general assumption can be made about the percentage of the area which is impermeable and will generate runoff. Using the local runoff-rate requirements this can be used to calculate a volume of runoff that needs to be attenuated for the site (and its component sub-catchments). This can be calculated manually or using modelling tools. A specialist member of the design team should be consulted at this time. The amount of source control (management where rain falls to prevent runoff such as rainwater harvesting, permeable surfaces and green roofs) should be estimated here through discussions with the design team to give a realistic estimate of runoff. The volume calculated does not need to be delivered as one storage area, and better solutions are often found by breaking down the storage volume into smaller parts and combining these with multi-functional spaces e.g. paved public areas, open spaces, roads, gardens).	

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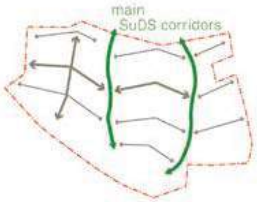
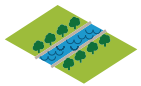
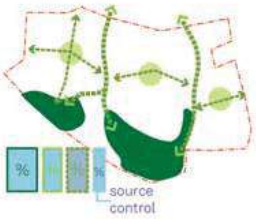
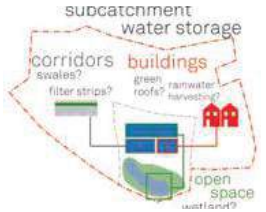
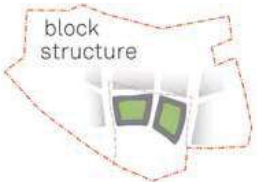
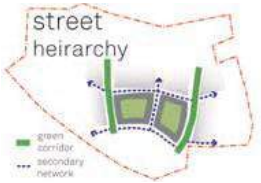
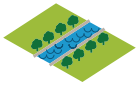
KEY CONNECTIONS Strategic connections between destinations 	Structure conveyance paths At this stage of master planning, key routes and connections for vehicles and pedestrians will be established. Natural flow paths and 'man-made' connection routes (roads, green corridors) should be examined at this point to establish a structuring grid for surface water conveyance to storage areas and discharge points. Conveyance paths should work with topography to safely and effectively direct surface water to the desired location. Water should be kept above ground (not in pipes) where possible.	
OPEN SPACES Connected green infrastructure 	Identify green space and public space locations Most development types will include some form of open space, be it an urban park or a more informal public square. One of the key benefits of SuDS is their ability to be multi-functional - integrating into these spaces in an obvious or more subtle way. e.g. SuDS built into play spaces to prevent flooding. The master planning process may identify key locations for these spaces at this stage, which should be considered as locations for SuDS.	
MASTER PLAN OPTION TESTING	Outline water management diagram As early options for land use distribution are tested in the master plan, the location of SuDS conveyance paths, storage and treatment areas should also be outlined spatially and discussed with the design team and any relevant stakeholders who are involved with the overall master plan. Initial ideas for types of SuDS may be suggested at this stage.	

Master planning process		Design process for SuDS	
D. Design - Preferred Strategy	PREFERRED STRATEGY	**Selection of SuDS portfolio** After the initial land use and spatial options testing, a preferred master plan option will be chosen for further detailing. At this stage, there is the opportunity for the design team to work together to develop the SuDS proposals to concept stage, selecting the possible types of SuDS and creating a SuDS network for the site. In any one area, several types of SuDS could be identified to provide flexibility for the developer in detailed design stage. SuDS components should be threaded together with the urban design vision to ensure they complement the development context and that they act as a treatment train, where water is conveyed from one SuDS component to another. Refer to the SuDS selection tables in chapters 3 and 4 to understand the relationship between site conditions, benefits and the various SuDS types and discuss options with the specialist in the team. Identify possible SuDS which can be used to make up the attenuation and treatment train requirements identified in the previous stage. It is often helpful to identify SuDS components that will be used in and around buildings (blocks), in roadways and in open spaces as described below. Solutions may vary by sub-catchment.	
	BLOCK STRUCTURE patterns of blocks and densities 	**SuDS portfolio – blocks** SuDS in these areas will predominantly take water from roofs and paved areas surrounding buildings. A general selection of suitable SuDS and source control measures should be identified at this stage that can be included on or around the building.	
	MOVEMENT FRAMEWORK street hierarchy and character of routes 	**SuDS portfolio – streets** At this stage, the width of major and minor routes (including green corridors) is likely to be decided. SuDS opportunities should be considered in tandem with requirements of the Highway Authority to allocate space that could be also used as verges, parking areas, or tree pits which could include a SuDS function.	
	OPEN SPACE NETWORK function and character of open space 	**SuDS portfolio – open space** A portfolio of possible SuDS components and their likely storage requirements can be defined at this stage.	
	BUSINESS CASE	**Create SuDS Concept Plan** As the preferred option is finalised, a business case for the master plan will be developed in more detail to underpin viability by estimating the number of units / floor area of development and the corresponding cost-benefit of the master plan proposals. At this stage, the portfolio of SuDS to be integrated into the development, and the general conveyance mechanisms between them should be decided. The outline amounts of attenuation for each sub-catchment should be indicated. This level of detail is appropriate for pre-application discussions or for a surface water management strategy submitted with an outline planning application. This is a good time to discuss adoption and maintenance and the target benefits to be delivered with stakeholders.	

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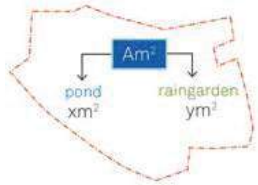
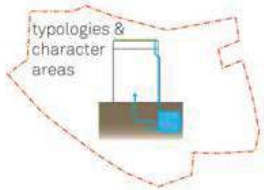
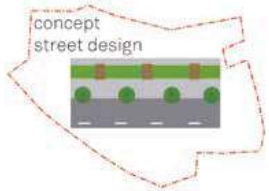
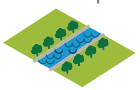
E. Design - Design Refinement	DESIGN REFINEMENT	SuDS concept design and optimisation At this final stage of master planning, the SuDS proposals can be developed to a concept level of design. Detailed design at a development plot scale will be completed at a later stage. This content will begin to build the detail required for a site specific surface water management plan. The solutions can be optimised to provide the best cost-benefit.	
	CONCEPT ARCHITECTURE character areas and building typologies 	SuDS Concept Design - blocks and buildings The final selection and concept design of SuDS should consider the roof type (flat, single slope, dual slope), building surroundings (gardens, forecourts), building uses and water demands. Outline sizing of specific features should be conducted at this stage.	
	CONCEPT STREET DESIGN highways and street 	SuDS concept design – streets In tandem with the development of street sections and visualisations the SuDS components should be selected and roughly sized. Overland conveyance such as swales should be given sufficient space here.	
	CONCEPT LANDSCAPES open spaces and public realm 	SuDS concept design – open spaces In tandem with the development of landscape concepts and visualisations the SuDS components should be selected and roughly sized.	
	DEVELOPER BRIEF OR GUIDELINES	Create SuDS Brief The vision for SuDS should now be integrated into the master plan. This vision can be integrated into developer briefs or design guides through the use of example designs and design criteria for SuDS. The SuDS brief should ensure the key benefits and site conditions are recognised as this will form the basis for further design at the plot scale. A selection of SuDS options could be presented if it is desired that more flexibility is provided for those conducting the detailed design stage.