7. Integrated Recommendations and Guidance

The analysis in this Water Cycle Study has concluded that the water companies have plans in place to secure water supplies over the next 25 years, taking into account the proposed levels of growth within the Regional Spatial Strategy and specific to the study area. There should be no constraint to growth, in terms of water supply, provided the water companies can implement their plans. However, the water companies will require 6 to 18 months lead time to plan and implement supply pipelines to new developments (time scale depending on their size and location). Environmental impact assessments, potentially including protected species surveys, are required if pipelines are to be laid in currently undeveloped areas. These could result in further delays.

The capacity of the receiving water, and to a lesser extent the wastewater infrastructure, is the main constraint within the study area. Table 5.5 outlines the issues and the potential constraints they impose on the feasibility of development locations. However, this study has mainly focused on the capacity of the wastewater infrastructure on a WwTW basis. The capacity of the sewerage network is only assessed at a high level where information on the location of preferred development locations has been provided.

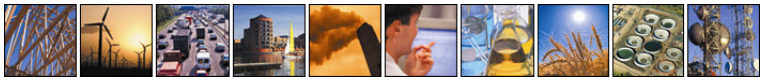
7.1.1 Water Resources and Demand Management

This assessment demonstrates that provided that Anglian Water and Essex and Suffolk Water are able to implement their preferred strategies set out in their draft WRMPs then water supply should not constrain development within Braintree District, Clare and Haverhill.

The strategic requirements to meet growth in their WRZs are summarised in Figure 7.1. In addition from the assessment presented in this report the following recommendations are made:

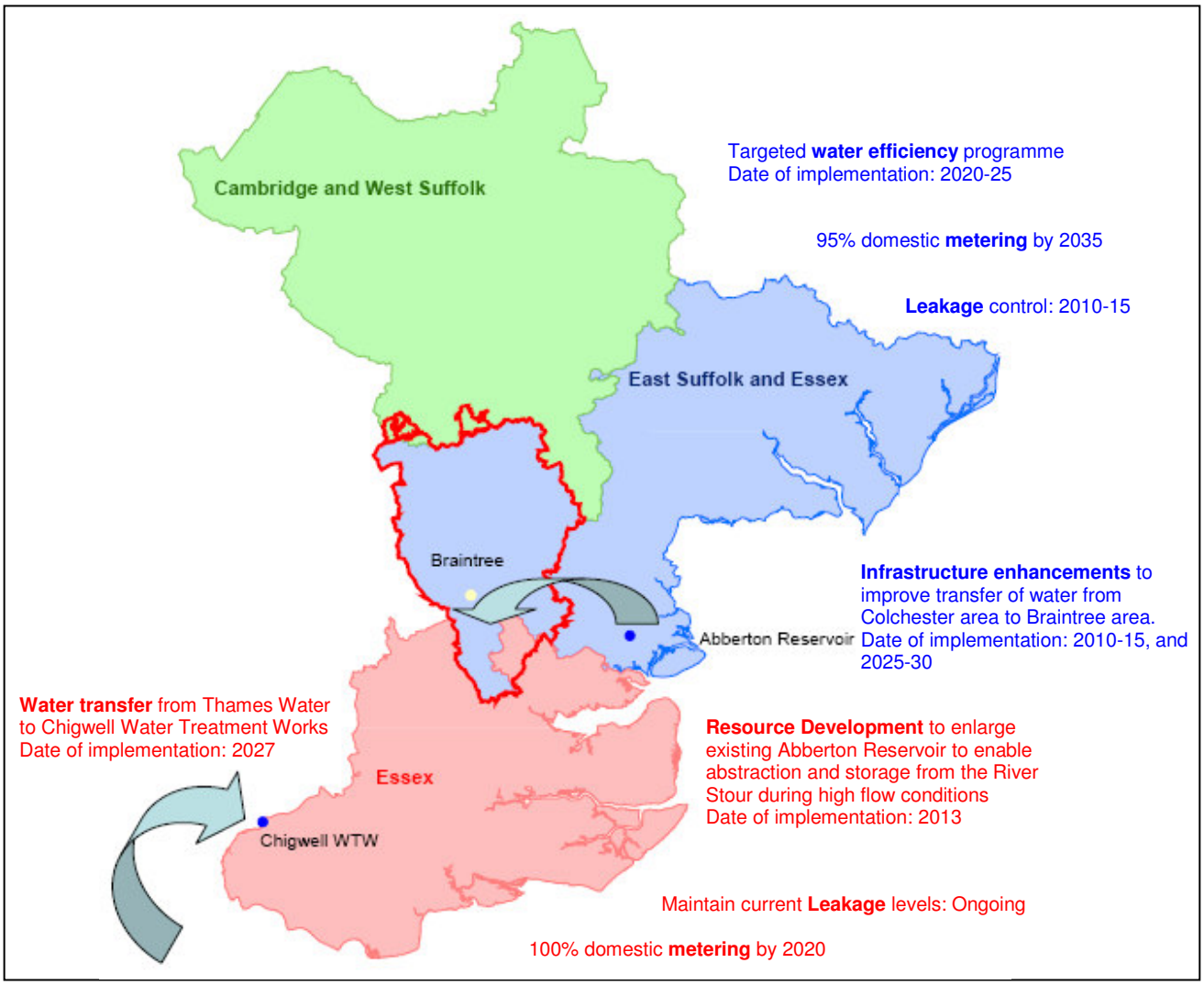
- The sustainable housing agenda should be promoted to minimise demand from new developments in Braintree District Area. It is recommended that the District Council encourages private sector developers to construct new houses to similar levels of water efficiency as those constructed by Housing Associations.
- New non-household developments should be constructed to a high specification of water efficiency and, where appropriate, the collection of rainwater should be implemented in new developments.
- The authorities responsible for delivering new development should continue to proactively engage with the water companies early to ensure that the necessary water supply infrastructure is provided at a timescale to meet demand from new development

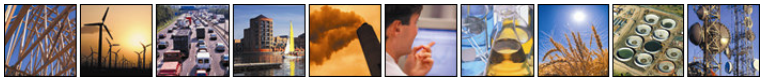
At a strategic level both water companies have prioritised demand management measures to reduce domestic consumption as this is critical to securing water supply. Strategic transfers into the zones are also planned to resolve the immediate deficits in Essex and to maintain supply in the longer term in the Essex WRZ. Anglian Water has also identified strategic infrastructure enhancements that will improve the movement of water within its



East Suffolk and Essex zone. A specific transfer from Colchester to the Braintree area will enable Anglian Water to meet demand from new development in Braintree District. Although across the district reduced occupancy rates and lower per capita consumption figures may offset much of the increase demand associated with the proposed development and even led to a net reduction in demand. At a local level, network improvements such as additional mains laying, pumping stations or service reservoirs (storing treated water within the distribution network) may be required to meet changing demand (see Section 4.4.3).

Figure 7.1 Key elements of the water companies' draft water resource management plans





Different opportunities exist to manage demand more effectively through the design of new buildings and retro-fitting existing properties. These are important to Braintree District despite the overall net reduction in demand as significant household savings can be made in new builds, and smaller but more widespread savings can be made collectively from existing housing stock. Water efficiency measures would help to reduce capacity increases in both the water supply and wastewater collection and treatment infrastructure. Rainwater harvesting has the additional benefit of reducing surface runoff and thus the risk of flooding.

A broad discussion of the water efficiency measures that could be incorporated within the development proposals is provided in Appendix E.

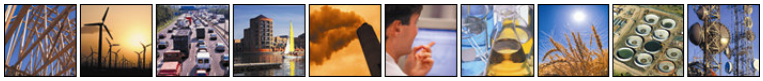
7.1.2 Water Quality and Wastewater

Anglian Water has already identified the likely capital investment required and the potential options to meet the new growth in many of the WwTW catchments to 2016 (i.e. the end of AMP5) and projected the potential increase in capacity required to meet the proposed growth to 2021. This analysis has identified those WwTW with potential capacity issues and follows an approach and uses figures that are consistent with the analysis presented above. This report highlights those WwTW that may also be affected by growth and thus trigger where additional investigations / investment could be required (i.e. Haverhill WwTW, Earls Colne WwTW, Sible Hedingham WwTW and Halstead WwTW) to meet proposed growth to 2026.

Since all wastewater, and in combined systems some surface drainage, is conveyed to the treatment works all development of any size within or connected to the existing WwTW will erode any spare capacity / headroom. Residential properties have the right to connect to the sewerage system. However, for commercial developments there is no right to connect and a contribution may be required towards the costs of any necessary upgrades.

Since sewers are commonly designed to accommodate six times the DWF the capacity of much of the sewer network may be able to accommodate small scale developments (i.e. those below 10 properties or 1 hectare) within a WwTW catchment. However, it is important to consider the cumulative effect of a number of small developments both at the WwTW and at pinch points in the sewer network (i.e. pumping stations and CSOs) as these can lead to both sewer flooding and increased spills resulting in a deteoration of the receiving water quality.

Wastewater flows from significant developments will need to be connected to a point on the sewerage network with sufficient additional hydraulic capacity to convey flows to full treatment. Figures 5.7 and 5.8 provide a high-level analysis of connecting the general development locations provided by Braintree District Council around Braintree and Witham. Figure 5.8 reflects potential network issues around Witham where significant investment would be required to accommodate an increase in flows. This should form the focus of the detailed phase of this Water Cycle Study. However, around Braintree town itself the maps also reflect the environmental capacity of the receiving waters and thus the sustainability of treating increase wastewater loads at Braintree, Rayne or White Notley WWTW.



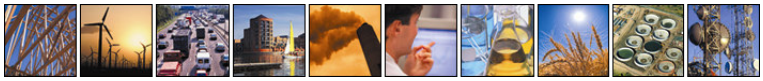
This spatial analysis highlights two preferred development locations where the current receiving water and wastewater treatment capacity present a potential barrier to development. This does not mean that the capacity of the wastewater infrastructure and receiving water present an absolute barrier to all development, but instead investment in these catchments to accommodate any growth could be significant Anglian Water plan to investigate the options for the future provision of wastewater treatment for Braintree and the surrounding area in AMP5. Therefore any capital schemes would not be delivered until AMP6 (after 2016) presenting a potential phasing issue for the development of these sites. Bocking WwTW, with the most relaxed consent conditions and discharge to the River Blackwater, is best placed to receive additional wastewater flows. This outline Water Cycle Study therefore recommends that development is promoted at locations that are either within the existing sewerage catchment or can be easily connected to Bocking WWTW.

However, since both sites (the land North of A120 and land East of Gt. Notley) are earmarked for commercial development and there is no right to connect the non-domestic element to the existing foul drainage the increase demand on the wastewater infrastructure may not be significant. The investigations planned for AMP5 will also assess the feasibility of diverting some of the flows from the Braintree to the Bocking sewerage catchments. This could create some capacity for the development of these locations that are in the Braintree WwTW catchment. As a commercial development a number of alternative options for the development of these locations which should also be reviewed in more detail in the next phase of this study. These options include:

- An inset appointment, the developer makes their own arrangements for water supply and wastewater treatment and enters commercial arrangement with Anglian Water;
- Onsite treatment and negotiate consent from the EA to discharge to the River Brain. Under current circumstances the Environment Agency is unlikely to permit an additional discharge to the River Brain.
- Developer to negotiate with Anglian Water and contribute towards capital works to accommodate additional flows.

Nevertheless, the adoption of water efficiency measures and drainage schemes that reduce wastewater flows, particularly as part of the larger residential, mixed and commercial / light industrial developments on the Greenfield sites offers potential to minimise some of the increase capacity requirements at an individual WwTW basis. Potential water efficiency measures that would reduce flows to sewer are discussed in Appendix E, whilst a high-level overview of potential SuDS options is presented in the next section.

Preferred development locations have not yet been identified for Haverhill and the feasibility of transferring flows to and the capacity of Haverhill WwTW and the receiving water should also be assessed in the detailed study. This assessment should include the requirements for and potential location of a second WwTW to serve the town.



7.1.3 Drainage Recommendations

Due to the site specific nature of drainage requirements/opportunities this study has made high level recommendations that SuDS should be incorporated into development plans, and the environmental issues that control the type of SuDS that can be implemented. Drainage, and its relationship to flooding, should be considered in more detail in the Phase II – detailed WCS.

The Government's Water Strategies *Making Space for Water* (2005) and *Future Water* (2008) and the requirements of the Water Framework Directive require a more sustainable approach to drainage. In these documents Defra highlights the benefits of sustainable drainage systems as an alternative approach to traditional piped systems. Defra is promoting SuDS as a natural drainage process with the characteristics of storage, slow conveyance and some volume reduction. There are a number of techniques that encompass the essential elements of SuDS such as green roofs, porous paving and ponds. The guidance includes examples where SuDS infrastructure has been implemented in the UK over the past few years. A key problem highlighted by Defra is that arrangements for managing surface water drainage are split between the Environment Agency, local authorities, water companies, and other agencies, with no one organisation having overarching responsibility. As a result, decisions about new drainage or development investments are often taken without a complete understanding of surface water risks and the most effective solutions. This Water Cycle Study should be used to develop that understanding, and facilitate informed discussion between the stakeholders involved in developing drainage infrastructure.

New developments should aim to manage surface water runoff in a sustainable manner by considering SuDS as early as possible in the planning process. Each new development greater than 1 ha surface area must prepare an appropriate scale Flood Risk Assessment that demonstrates that SuDS can control runoff rates and volumes from the site to existing runoff rates. These requirements stem from PPS25 and, for developments within Braintree District, the Braintree Local Plan (policy RLP69).

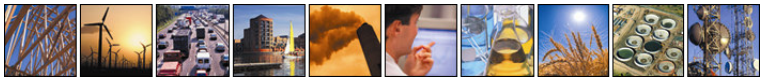
A site specific assessment of ground conditions is needed to determine the most appropriate SuDS for use at the new development. Reference to the SFRA where appropriate will aid the assessment for SuDS suitability.

To comply with PPS25, the development sites in the study area will be required to maintain the current surface water runoff rates and not to increase the load on the drainage infrastructure.

SuDS must be designed so that no flooding occurs at properties at a 1 in 100 year storm event (1% annual probability). A 30% increase in rainfall must be added to the runoff calculations when designing SuDS at both outline and detailed planning application.

Priority should be given to SuDS over more traditional drainage systems, and if SuDS are not considered appropriate then justification should be given.

All new developments should aim to direct surface water runoff into nearby watercourses or surface water systems that discharge to rivers directly. By using separate surface water sewers, the risk of urban flooding and exceedance of foul sewers will be avoided.



Adoption and Maintenance of SuDS in the Study Area

Management of SuDS differs from traditional drainage system management. There are currently no legally binding obligations relating to the maintenance of SuDS. Instead an agreement under Section 106 of the Town and Country Planning Act should be implemented to assign responsibility for managing and maintaining the SuDS prior to the approval of the planning application for each development. The Interim Code of Practice[5] provides a model to assist with this process and is summarised in Table 7.1 below.

Table 7.1 Excerpt from interim code of practice for model agreements

Figure 5.3 Model agreements for use with the Interim Code of Practice for SUDS	
Reference	**Title and description**
ICoP SUDS MA1	**Planning obligation – incorporating SUDS provisions** Implementation and maintenance of SUDS either as a planning obligation under Section 106 of the Town and Country Planning Act, 1990 or as a condition attached to planning permission.
ICoP SUDS MA2	**SUDS maintenance framework agreement** Legal framework that defines which body takes over and maintains the SUDS.
ICoP SUDS MA3	**Model discharge agreement** A model deed in relation to owners of SUDS facilities granting sewerage undertakers rights in perpetuity to discharge, flood and maintain in default.

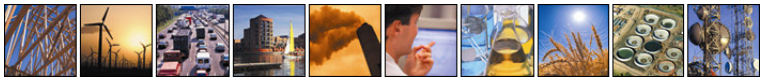
Installing Infiltration Drainage Systems in the Study Area

SuDS techniques can be applied at a range of geographical scales. Many SuDS techniques are based on infiltration of surface water into the ground, these are only applicable in areas in the north of the study that overlying the Cretaceous Chalk. Filter strips, soakaways, swales, infiltration basins and wetlands are all drainage systems that use infiltration to manage surface water. For the majority of the study areas SuDS options are more limited to attenuation techniques, largely storage ponds, due to the low permeability of the London Clay

A decision to implement SuDS should consider a number of factors including:

- permeability of the soils and drift;
- proximity of groundwater abstractions to Source Protection Zones ;
- available land take;
- surrounding land use;

[5] Interim Code of Practice for Sustainable Drainage Systems, National SuDS Working Group, July 2004



- site gradients;
- ecology;
- economic viability; and
- safety issues and maintenance.

By preparing for surface water management at the earliest opportunity in the planning process, options for integrating SuDS techniques between development sites can be identified. For developments in close proximity and limited land space, proposals to use offsite attenuation to serve more than one development should be considered.

Consideration is required at an early stage for land take requirements for certain SuDS features and development design for integrated SuDS. Provision of open space is a normal planning requirement and these areas can be used to include SuDS features, so long as the operation and maintenance is not compromised. Developers should work together with the Environment Agency, sewerage undertakers and local planning authorities during the design of the surface water drainage for a particular site.

It is important that funding mechanisms are identified at an early stage of the planning process.

A flow diagram of the above recommendations for a drainage strategy for each development is presented in Figure 7.2 below.

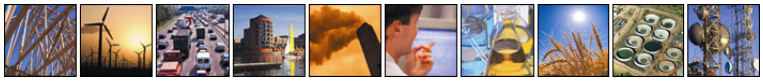
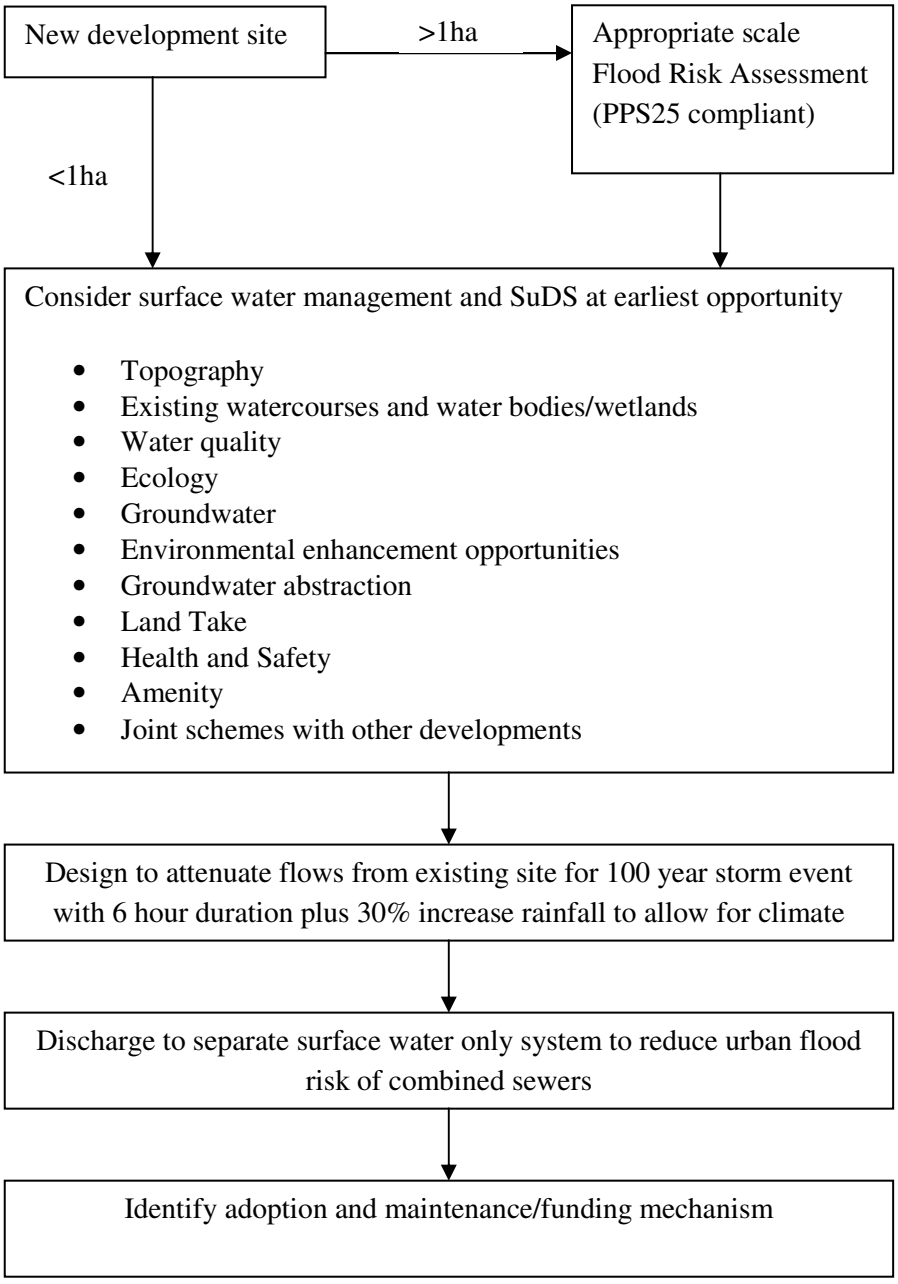
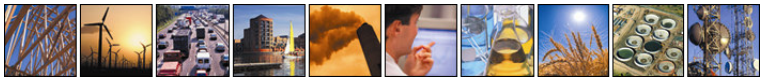


Figure 7.2 Drainage strategy flow diagram





The following list presents relevant guidance for consideration in the design of SuDS and surface water management for new developments.

CIRIA Guidance:

C522: SuDS Design Manual for England and Wales (2000)

C523: SuDS Best Practice Manual (2001)

C582: Model Agreements for SuDS (2004)

C609: SuDS Hydraulic, structural and water quality advice (2004)

C625: Model Agreements for SUDS (2004)

C635: Design for Exceedance in Urban Drainage – Good Practice (2006)

C697: The SuDS Manual (2007)

R156: Infiltration drainage – manual of good practice (1996)

BRE (1991). *Soakaway Design Digest 365* (1991)

HR Wallingford Use of SuDS in high density developments [http://www.hrwallingford.co.uk/projects/MAS0437%20PDS044%20RBBK%200309.pdf]

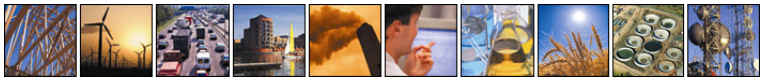
The UK SuDS website provides guidance and tools for managing stormwater drainage. It has been developed to support planners and developers to obtain site-specific guidance [www.uksuds.com].

7.2 Recommendations for Phase 2 Analysis

The water supply, wastewater treatment and drainage options need to be explored further in the Phase 2 Water Cycle Study, particularly at all Greenfield development sites. This detailed study is required to identify the most sustainable approach to managing the whole water cycle and protecting the receiving water environment. Specific areas that should be considered further include:

Network modelling

This study should include a detailed analysis based on network modelling in order to identify the sustainability and phasing issues of connecting the preferred locations identified in the core strategy (including Haverhill) to the sewer network. This modelling based assessment should encompass the additional capacity required to accommodate growth within the catchment, urban creep and the potential implications of climate change. The



feasibility of diverting some of the flows from Braintree to Bocking WwTW should also be assessed to determine the implications for continued development within the Braintree sewerage catchment.

Further assessment of options to resolve barriers

The potential water management options (supply, drainage, and wastewater treatment) surrounding the preferred (and other) locations, where potential barriers to development have been highlighted, should also be assessed. This will necessitate continued and proactive engagement with the Environment Agency and Anglian Water to help inform and assess the long term strategy for wastewater treatment around Braintree, Bocking and Great Notley.

Impact on receiving water quality

The impact on the quality of the local receiving water environment from any increase in continuous sewage derived load or increased spill frequency associated with growth in a sewerage catchment should be investigated further particularly in the River Brian and Stour Brook. This should include an assessment of the implications any reduction in the discharge from Bocking WwTW, should some of the flow be diverted to Bocking WwTW, on the hydrology and water quality of the River Brain. Opportunities to enhance the ecological status and mitigate low flows in these rivers should be explored in considering the long term provision of wastewater treatment, particularly for Braintree and Haverhill.

Potential requirements of Water Framework Directive

Analysis of available data to determine the link between elevated nutrient concentrations and the eutrophic / ecological status of the receiving waters would enable the impact of WwTW discharges on potential non-compliance against future WFD objectives to be assessed. Elevated nutrient concentrations are common to many rivers, particularly in southern and eastern England and therefore a detailed field based investigation would be considered beyond the scope of even a Phase 2 Water Cycle Study. However, an assessment of the potential requirements of the WFD, as outlined in the draft RMBP and any other supporting documents, including the ongoing UKWIR research on source apportionment and better regulation, should be reviewed as part of a Phase 2 study to highlight the potential implications of this directive.

Integrated examinations at specific locations

Phase 2 could examine in more detail, at site specific issues, the interactions between supply (and demand management measures), drainage, and wastewater. The study may explore opportunities that exist to integrate the water cycle with options to improve the visual environment and residents' quality of life. A selection of proposed locations could be targeted and the specific issues and potential solutions fully investigated.

Engagement with developers

Phase 2 could also examine the options that are available to encourage developers to adopt the most sustainable approach.