

## **Elsenham New Market Town**

### **Water Cycle Strategy - Initial Scoping Study**

The Fairfield Partnership

December 2008









# 1 Introduction

## 1.1 APPOINTMENT AND BRIEF

1.1.1 WSP have been appointed by The Fairfield Partnership to undertake an initial scoping study for a Water Cycle Strategy to support the proposed new Market Town at Elsenham.

1.1.2 The proposed development of 3000 dwellings at Elsenham has been put forward by Uttlesford District Council as their preferred option in the recent Core Strategy consultation (issued in November 2007) for the Local Development Framework (LDF). In addition, two other scenarios are also under consideration. These are additional development at Elsenham in the form of an expansion of the 3000 LDF scheme to 5000 dwellings as part of future or emerging Regional Spatial Strategy (RSS) figures for new households within the Uttlesford District over the longer term, and also proposals for a 5000 dwelling Eco-town.

1.1.3 It is envisaged that for the scenario of 3000 dwellings up to 39,000sq m of on-site employment would be provided, of which around 9,000sq m has been assumed as B1(a) office floorspace, 20,000sq m B1(b) light industry and 10,000sq m B2 general industrial use. The employment is to be located in the town centre and on the western edge of the market town, in close proximity to the rail line. For the scenario with 5000 dwellings the employment would increase to approximately 54,000sq m.

1.1.4 The new settlement will combine with the existing village of Elsenham to provide a distinct new market town community and form a new main settlement within Uttlesford District. As such Elsenham will feature a full range of shops, schools and services to serve the day to day needs of the new population, and offer new opportunities to access services and facilities to the existing population.

1.1.5 In line with current industry guidance, this report scopes out the consultation, and further studies required to inform the technical and environmental constraints on the development and associated water service infrastructure.

1.1.6 It should be noted that this report is a scoping study, and while it does reference the preliminary technical work completed to date by WSP, it is not a full water cycle strategy.

1.1.7 We have undertaken initial consultation with Uttlesford District Council, who has advised that the District wide water cycle strategy has been commenced and is likely to be completed within the next 12 months. Ongoing consultation with Uttlesford District Council will be undertaken as the site specific Water Cycle Strategy develops.

1.1.8 Consultation will be through a formalised project steering group, which will include Uttlesford District Council, Anglian Water Three Valleys Water, Thames Water and the Environment Agency.

1.1.9 It is the intention that Uttlesford District Council will be a key partner, with the water cycle strategy for Elsenham integrating into the district wide strategy, through ongoing consultation and cooperation.

1.1.10 This scoping study will define the agreed boundary of the water cycle strategy however this may be adjusted as required, as the outline strategy is developed.



## **1.2 BACKGROUND**

1.2.1 The Government has projected substantial growth in housing and jobs in the growth areas of the wider south / east of England. The Sustainable Communities Plan 'Sustainable Communities: Building for the Future', published by the Office of the Deputy Prime Minister in February 2003, proposes higher levels of growth for the London-Stansted-Cambridge-Peterborough (L-S-C-P Corridor). Increases in population and employment will intensify pressures on limited water resources.

1.2.2 This growth will require additional water resources, water abstraction and treatment, associated infrastructure for water supply wastewater treatment / disposal, surface water drainage and flood risk alleviation measures.

1.2.3 A strategic approach to development is now a requirement of Government Regional Spatial Strategies and Sub Regional Strategies. Policy is directing Local Authorities to provide an evidence base to support their Local Development Framework (LDF).

1.2.4 It is important to consider the effect of development on the water environment, as this forms a key element of the Sustainability Appraisal (SA) and Strategic Environmental Assessment (SEA) of the LDF Core Strategy Process.

1.2.5 The potential impacts of development need to consider the effects on water quality, water demand and the strain that could be placed on existing sewerage infrastructure. A key consideration will be whether there are sufficient water resources to serve the housing provision under the Regional Spatial Strategy.

1.2.6 The demands for clean water and Sewage Treatment will increase to match the demand for new homes, employment, land and community infrastructure.

1.2.7 It will also be necessary to demonstrate how flood risk, water resources, water supply, sewage infrastructure, wastewater treatment and water quality will be addressed to ensure that the evidence base can demonstrate that the development is sustainable.

## **1.3 REPORT STRUCTURE**

1.3.1 The remainder of this report is structured as follows:

- Section 2 provides the background to the reasons why a water cycle strategy is required, together with the need to provide a legal framework;
- Section 3 identifies the proposed project steering group and identifies the key outputs required of the water cycle strategy;
- Section 4 sets out in more detail the aspects of the Elsenham proposals which require further study, analysis and consultation; and
- Section 5 provides a summary and recommendations of the inputs necessary to progress the water cycle strategy.



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## 2 Planning Context & Legislative Framework

### 2.1 PLANNING CONTEXT

2.1.1 The planning system is continually evolving and this supports a two phase strategy approach so that important considerations are not overlooked in the intervening period before a detailed strategy can be evolved.

2.1.2 This scoping study sets out a framework to be agreed with the Environment Agency, from which a water cycle study for the development of a sustainable community on land northeast of Elsenham can be undertaken and prepared.

2.1.3 The strategy will provide a link between the planning process and the infrastructure required to meet development demand.

2.1.4 In accordance with current EA guidance an outline water cycle study should be undertaken while the LDF Core Strategy is being prepared.

2.1.5 The outline study will:

- Identify environmental risks;
- Identify if environmental resources can cope with further development;
- Identify if the development would overload the existing infrastructure;
- Identify if major new systems are needed to allow development;
- Provide the evidence base for the local planning authority Core Strategy;
- Show if more detailed assessments are required.

2.1.6 A Scoping Study should be carried out at a very early stage in the LDF process. The outputs of a scoping study should be to:

- Set up a project steering group, confirming the relevant organisations, and their responsibilities;
- Define the study area;
- Identify what studies have already been carried out and what data is available;
- Confirm development scenarios and planning data;
- Identify natural and artificial water infrastructure risk;
- Identify the purposes of the water cycle strategy and which plans and strategies it will be informed by and draw information from;
- Agree a project scope and project plan for further work if needed; and
- Identify sources of funding for future phases of work if needed.

### 2.2 LEGISLATIVE FRAMEWORK

2.2.1 Potable water and sewage treatment will always be required to support development and maintain public health. With the introduction of the Water Framework Directive, the quality of water will also be required to improve by 2015.



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2.2.2 The Future Water Strategy for England sets out the Governments plans for water to the year 2030, and identifies the practical steps that will need to be taken to ensure good quality water will be available for people, businesses and nature.

2.2.3 Local Development Framework documents submitted to the Secretary of State without sufficient evidence run the risk of being rejected. This would result in the consultation process having to be restarted, slowing development progress in the area.

2.2.4 It is envisaged that a legal agreement framework will be required to tie the key stakeholders together in common agreement, the details of which will be discussed and agreed at steering group meetings. The steering group meetings will enable infrastructure requirements identified in the WCS to be discussed and a programme for funding and delivery agreed. This will avoid a disjointed approach to planning, and the potential scenario of the EA objecting on sustainability grounds, while the planning authority is in support of the proposals.

2.2.5 Any legal framework will need to be a statement of general principles and be sufficiently flexible to account for future changes in environmental targets / legislation.



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## 3 Water Cycle Strategy

### 3.1 AN OVERVIEW

3.1.1 Within the Water Cycle there are opportunities to consider reduced consumption, recycling and re-use of water. These can be identified through a water cycle strategy. Implementation of a water cycle strategy is recognised as best practice and allows the principles of sustainable development to be fully exploited.

3.1.2 Supplying clean water and conveying dirty water to treatment facilities requires a significant energy input. It is important that energy requirements and carbon considerations are taken into account when planning water infrastructure.

3.1.3 Development of housing and businesses must be capable of being supported by existing wastewater networks or will necessitate development of additional sewerage treatment works and infrastructure.

3.1.4 Water services infrastructure requirements need to be included in development plans. If water services infrastructure is not considered in line with other infrastructure requirements, this may result in slower growth and / or environmental damage and impact on water quality if sewage treatment systems are overloaded.

3.1.5 Development planners need to liaise with the Environment Agency and appropriate water and wastewater providers at the earliest opportunity so that all parties understand and take account of each other's processes, practices and issues in order to promote the efficient and sustainable delivery of infrastructure.

3.1.6 Unless infrastructure is funded and implemented in a timely manner this could affect the pace of growth. To achieve the Government's aim of sustainable development, infrastructure needs to be in place alongside new development and combined with resource efficiency measures.

### 3.2 THE STRATEGY

3.2.1 The provision of a water cycle strategy is achieved in three stages; an Initial Scoping Study, an Outline Strategy (should significant issues be identified in the Scoping Study) followed by a Full Strategy, considering the impact of the efficiency measures proposed, infrastructure requirements and associated costs. .

3.2.2 It considers all the elements, how they interact, the impact of the scale and rate of development and how water should be properly managed. It ensures that new developments do not compromise existing ones and that water quality and the environment are protected and enhanced.

3.2.3 The solutions to these challenges can be achieved through a water cycle strategy. A water cycle strategy provides a plan and programme of water services infrastructure implementation. It is determined through an assessment of the environment and infrastructure capacity for:

- Water supply.
- Sewage disposal.
- Flood risk management.
- Surface water drainage.



3.2.4 It also considers the impact of efficiency measures and provides an overall estimate of cost for the identified solutions and of the identified infrastructure improvements required.

3.2.5 In considering flood risk, drainage and efficient use of water, development will need to be resilient to the predicted impact of future climate change.

3.2.6 The collation of information from key stakeholders will provide much of this evidence base. Strong partnership working will be required to agree a funding mechanism to ensure the fair distribution of costs.

A water cycle strategy is needed to:

- Inform the LDF by highlighting major issues, including immediate funding and longer-term maintenance costs;
- Minimise the need for additional and potentially costly infrastructure;
- Confirm the scale and timing of infrastructure needed at an early stage of planning;
- Propose a strategic and tactical solution to infrastructure provision that will reduce disturbance to existing communities;
- Inform developers of the required flood mitigation infrastructure and likely program;
- Provide supporting information for water companies to justify investment plans with Ofwat;
- Ensure environmental standards are met through compliance with Government Planning Policy Statements and other planning obligations; and
- Provide general guidance on measures that developers should provide in order to reduce their impact on the water cycle, and where possible make improvements.

### **3.3 THE PROJECT GROUP**

3.3.1 Consultation with other stakeholders will be required and this process has already commenced. The strategy will need to be developed as new data becomes available.

3.3.2 Uttlesford District Council (UDC) has taken the lead on the strategic assessment of the Water Cycle for the district and has held preliminary discussions with Anglian Water and the Environment Agency.

3.3.3 The other stakeholders include Thames Water, The Environment Agency (eastern region), and Three Valleys Water.

3.3.4 UDC is currently in the process of undertaking a district wide water cycle strategy and has commissioned a consultant to undertake this work. We understand that this work is likely to be completed within 12 months and will be available to inform the site specific water cycle strategy required for Elsenham. Regular consultation via the steering group will ensure that the site specific water cycle strategy integrates into the District wide strategy.

3.3.5 WSP has commenced consultation with the various parties to collect baseline data and to assess the current situation. Further consultation will be required for the



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Phase 1 water cycle strategy in order to identify key constraints, such as flood risk, sustainable drainage, water efficiency, environmental water quality, capacity / demand and funding / delivery issues.

3.3.6 The proportions of the costs that can be charged to the developer will be set down by agreements with Ofwat.

3.3.7 A possible mechanism for apportioning cost would be to split the costs between developers based on the number of houses they propose to build, which would also need to include an allowance to cover the lifetime costs of undertaking maintenance. Charges could be applied through the Section 106 mechanism.

3.3.8 Other funding mechanisms will be investigated as part of the Phase 1 water cycle strategy.



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## 4 Initial Scoping Study

### 4.1 BACKGROUND

4.1.1 WSP Development and Transportation has been commissioned by The Fairfield Partnership to provide an Initial Scoping Study, the objective of which is to identify the key issues and constraints relating to the provision of water services and infrastructure in the vicinity of the proposed development at land north-east of Elsenham, Essex. The site extent is shown in Appendix 1.

4.1.2 WSP has previously completed a preliminary appraisal of flood risk, water, and sewage infrastructure as part of the Preliminary Utilities Appraisal and Outline Drainage Strategy report.

4.1.3 An outline water cycle strategy for Elsenham will be required to update and collate all base line data to establish the existing situation and provide a framework to inform the phase 1 outline water cycle strategy.

4.1.4 The principle objective is to provide an integrated water cycle strategy for Elsenham based on the Eco-town scenario (5000 units), which allows the planned development to proceed with the satisfaction of all stakeholders and this will need to be jointly agreed between the Environment Agency, the local authority and water authorities.

4.1.5 It is envisaged that the outline water cycle strategy would include a review and update of baseline data, including a preliminary programme to demonstrate how development would be phased. The likely scope for the outline strategy would include:

- Project Management;
- Agreement on the study area;
- Data collection;
- Consultation with Key Consultees;
- Review of environmental data, additional survey work, ground investigation, flood modeling and hydrological assessment;
- Identification of measures and targets against which the development can be assessed;
- Identification of recommended outline strategy;
- Identification of preliminary cost estimates for all water cycle infrastructure and a cost apportionment mechanism; and
- Gap analysis to identify additional data requirements, and to inform development of the full Strategy.

### 4.2 KEY ISSUES

4.2.1 The end result of an outline strategy is a report providing a summary of all the latest information relating to the water environment within the study area, together with an initial assessment of constraints and issues.

4.2.2 It is likely that the water companies will have carried out some high level analysis of environmental capacity and major infrastructure capacity. These can be used to identify the key issues.



4.2.3 The output of the outline water cycle strategy will be a report which answers the following questions:

- Is there enough water - has the water companies' approach to water resources made sure that there is enough water available to serve the projected growth levels? Do time lines for the implementation of demand management measures fit in with that of the development?
- Will there be an adverse knock-on-effect resulting from changes to the existing supply arrangements to make resources available to the Elsenham development?
- Will there be a water quality impact, can the existing sewerage infrastructure and sewage treatment networks cope with the increased load, and can receiving waters cope with the resulting increased volume of treated effluent in terms of flood risk and water quality targets?
- If not, are there alternative discharge locations that will not cause increased flood risk or a failure of water quality targets? The water cycle strategy will consider imminent Water Framework Directive requirements, to ensure that water quality targets will be obtained.
- Is there an increased risk of storm water overflows operating outside their agreed limits as a result of the proposed development?
- Can development be accommodated without increasing flood risk?
- Is there sufficient land at low risk of flooding for all the proposed development; will rain water be adequately managed to prevent surface water flooding in the development or elsewhere?
- Are there other location specific environmental risks that need to be considered, for example relating to biodiversity or conservation requirements?
- Are there outstanding concerns about infrastructure provision that need to be addressed in a detailed water cycle strategy?
- Will the development be resilient to the effects of climate change, and its impact on flood risk, drainage and water supply, over the developments projected lifetime?
- How will the effects of climate change impact on water supply and flood risk?

4.2.4 The outline study will need to confirm that proposed development is within environmental capacity, that environmental opportunities are taken advantage of, and that major infrastructure (where required) can be planned, designed, funded and built in time to serve development.

4.2.5 Consultation will be required with the utilities companies and the EA to ensure the Water Resource Management Plan (WRMPs) is valid at a local level.

It will need to:

- Confirm demand management, leakage reduction measures, and new resource schemes identified by the WRMP are adequate for the projected development and population increase;



- Assess the risk of sustainability reductions. Details of existing licenses and consents held by the statutory undertakers will be obtained to provide a baseline against which development impacts can be measured;
- Compare and confirm the water company population estimates and projections in the WRMP against the latest forecast population projection;
- Assess the balance of demand management and leakage reduction schemes against new resources schemes, and identify future demand;
- Identify the opportunities to save money or improve sustainability through an integrated approach with other elements of the water cycle study;
- Where this is the case, the outline study will need to identify what further work is required (as part of a detailed study) to achieve the benefits;
- Identify high level policy advice on water efficiency measures and achieving water neutrality; and
- Identify any information, data, funding or policy gaps that need further study.

4.2.6 The various water services infrastructure networks in the area are relatively limited since the site is currently undeveloped and located within a predominantly rural area.

### **4.3 FLOOD RISK**

4.3.1 Flooding can occur from a variety of sources, including sewers, ground water, overland flow, land drainage and main rivers and their associated tributaries.

4.3.2 To provide certainty on requirements, the EA recommended to UDC that a water cycle study be undertaken together with a Strategic Flood Risk Assessment (SFRA) to provide a greater understanding of flood risk across the site.

4.3.3 The SFRA has since been commissioned and completed by Uttlesford District Council consultants. The majority of the site is located within Flood Zone 1 (land assessed as having a less than 1 in 1000 year (<0.1% annual probability of flooding). Although a small area of land adjacent to the Stansted Brook lies within Flood Zone 2, (between the 1% and 0.1% annual probability flood event level). The extent of flood envelopes for the 1 in 100 year flood event will need to be confirmed.

4.3.4 The EA has published Flood Zone Maps (FZM), which show areas deemed to be potentially at risk of flooding. The FZM have been produced using appropriate good quality mapping and modelling data to the EA's acceptable criterion. The modelling excludes the presence of man made features such as flood defences road and railway embankments. The flood mapping provided by the Environment Agency does not give predicted flood levels, nor does it provide flood extents from ordinary water courses.

4.3.5 The site drains predominantly towards the north and south into the River Cam and tributaries of the River Stort (Stansted Brook). Stansted Brook flows east to west, to the south of the site. A drain bisects the middle of the site and drains a portion of the site west into another watercourse running either side of the railway line. This ultimately feeds into the River Stort.

4.3.6 The site overlies an aquifer and therefore the risk of groundwater flooding will need to be confirmed.



4.3.7 The extent of the flood envelopes for all water courses will need to be assessed by hydraulic modelling to ensure development is not located within areas at risk of flooding.

#### **4.4 SURFACE WATER MANAGEMENT**

4.4.1 Anglian Water records show few surface water sewers in the area. Those surface water sewers that do exist appear to be limited to the area of Elsenham to the west of the rail line.

4.4.2 OS mapping for the area indicates a number of drainage ditches around the site. The capacities of the existing ditches will require modelling in detail to assess flood risk.

4.4.3 The majority of existing buildings drain to soakaways. Highway drainage discharges are via culverted water courses which generally drain to the north.

#### **4.5 GREENFIELD RUNOFF**

4.5.1 We have undertaken an initial assessment of the green field runoff rate from the existing site catchment (circa 130 hectares), using the Institute of Hydrology Report 124 method which is appropriate for catchments up to 200 hectares in size. They are summarised below:

*Table 1 Greenfield Runoff Rates*

Return Period (Years)	Runoff Rate (l/s/ha)
1	1.34
30	3.73
100	4.97

4.5.2 Assuming the most conservative scenario that the Environment Agency restrict the post development surface water discharge rate to the green field 1 year return period flow (circa 1.34 l/s/ha), the total site runoff would be in the order of 174 l/s.

4.5.3 The water cycle strategy will investigate options to reduce surface water discharge further; this would be subject to assessment of receiving watercourses.

#### **4.6 FLOOD MITIGATION**

4.6.1 The Flood Risk Assessment will address how the use of SUDs on the site will be maximised, with any obstacles to their use clearly justified.

4.6.2 Depending on the characteristics of the underlying subsoil, there are several SUDs options to consider for the management and disposal of surface water. These are summarised in the table on the following page.

4.6.3 Ownership and maintenance of SUDs is a key issue, the steering group will identify responsibilities for the adoption and maintenance of SUDs.



Table 2 SUDs Options

SUDs	Rationale
Living Roofs	Green roofs can reduce run-off by up to 60%.
Basins and Ponds	Soakaway testing required to confirm permeability.
Swales / Filter Drains	Soakaway testing required to confirm permeability.
Soakaways (deep borehole)	Desktop study indicates areas of potential permeability. Soakaway testing required to confirm permeability.
Porous Paving	Should be considered for some areas of hardstanding / car parking.
Tank Storage / Source Control	Grey water recycling and Rainwater Harvesting will also be considered to reduce demand on supply and discharge.

#### 4.7 ATTENUATION STORAGE

4.7.1 Locations have previously been identified for on-site storage (this represents a conservative approach with no site infiltration). Depending on the degree of post development impermeable area, storage volumes could vary from 59,000 m<sup>3</sup> (50% impermeability) to 103,500m<sup>3</sup> (80% impermeability).

4.7.2 Using various SUDs options and green roofs is likely to reduce these volume requirements significantly. Volumes stored in excess of 25000m<sup>3</sup> above existing ground level at any one location are required to comply with statutory reservoir requirements under the Reservoirs Act 1975. However, preliminary calculations have indicated that, in the worst case the volume of each balancing pond could remain below this 25,000m<sup>3</sup> threshold, with the balance of surface water stored in a variety of ways including existing ditches, new swales, and above ground using open landscaped areas.

4.7.3 Other methods for storage could include the use of cellular storage, and permeable pavements with underlying drainage blankets consisting of open graded aggregate with a minimum void ratio of at least 30 %.

4.7.4 It is envisaged that the SUDs system will integrate with the Green Ring.

#### 4.8 GEOLOGY/SUITABILITY FOR SUD'S

4.8.1 The sustainable management of surface water is essential for reducing the flood risk to both the site and the surrounding area. An assessment of surface water will be required as part of the site specific FRA supporting any future planning application.

4.8.2 Geological plans and some borehole information have been obtained from the British Geological Survey (BGS) and show sections of the site to consist of sands and gravels, in particular towards the west. There is therefore potential to incorporate SUDs measures within the overall masterplan.



4.8.3 A limited site investigation has been undertaken to assess the viability of the subsoil for infiltration techniques. Permeability's were found to be low, which indicate shallow soakaways may not be suitable. The testing was limited however to three test pit locations and do not necessarily reflect the permeability across the whole site.

4.8.4 However, deep borehole soakaways may be viable subject to additional geotechnical investigations being undertaken. A copy of the initial geotechnical findings is included in Appendix 2.

4.8.5 A detailed site investigation is required to confirm the depth and nature of the soils. This will, in turn, determine the types of SUDs techniques that may be considered for the development in the detailed design stage. Monitoring of ground water level is also recommended.

4.8.6 The arrangement and design of the SUDS system will be subject to an assessment and verification of permeability and topography across the site. It is envisaged that SUDS will be integrated with proposed landscaping such as the Green Ring.

4.8.7 Appropriate storage structures with pollution controls will be required and the drainage strategy will be developed to ensure there is no increased risk of flooding to the site or downstream catchment. This can be achieved by the implementation of a SUDS scheme and/ or the use of flow controls to restrict the discharge rate.

4.8.8 The SUD's system will follow a hierarchy of best practice techniques:

- Prevention
- Source Control
- Site Control
- Regional Control

#### **4.9 WATER SUPPLY**

4.9.1 Three Valleys Water (TVW) are the local water supplier for the Elsenham area. The primary source of water for the Three Valleys Water area is from groundwater / reservoirs. The existing settlement of Elsenham is currently supplied from distribution mains running alongside the highways adjacent to the development site (Old Mead Lane, Station Road, Henham Road and Mill Road). However, there is no existing direct supply onto the site itself.

4.9.2 Three Valleys Water supply potable water to the area under a supply agreement with Anglian Water. Supply is supplemented with additional water sourced from TVW boreholes.

#### **4.10 WATER RESOURCE STRATEGY**

4.10.1 It is imperative that development should not be committed ahead of secure water supplies. Water resources will need to be properly managed with measures taken to reduce overall consumption. The production of a Water Conservation Strategy will assist in achieving the standards set out in the "Code for Sustainable homes".

4.10.2 The key aims of the strategy will be to reduce water demand, to ensure water is supplied in an efficient manner and to consider all potential sources of supply.



4.10.3 All new houses and businesses will be constructed with water meters fitted. Other water saving measures that the EA require to be incorporated include low flush toilets, low flow showerheads, water butts etc. Grey water recycling has the potential to reduce water consumption in the average household by up to 35%.

4.10.4 It is generally assumed that water will be supplied from the mains. The site lies within the area traditionally supplied by 3 Valleys Water. However supply can potentially be obtained from other suppliers and sources, this would be subject to discussion with the EA and consideration against the North and South Essex Catchment Abstraction Management Strategies (CAMS). Numerous companies now design build and operate sustainable integrated community and urban water management systems which as far as possible are self supporting.

4.10.5 It is assumed that water will be supplied using existing sources and under existing abstraction license permissions. The developer will need to seek advice from the water company to find out if this is the case or whether a new source needs to be developed or a new abstraction license sought. The EA may not be able to recommend a new or increased abstraction license where water resources are fully committed to existing abstraction.

4.10.6 The outline water cycle strategy will help inform development of the master plan as well as inform the phasing of development to match the timing of increases in capacity at the existing sewage treatment plants or new STW.

#### **4.11 WATER SUPPLY INFRASTRUCTURE**

4.11.1 TVW have supplied an initial view on the new supply infrastructure required to service a development scenario of circa 5,000 residential units. They state that approximately 5,800m of new off site mains, pump booster stations and a reservoir will be required to provide water for such a development at Elsenham. It should be noted that these figures take no account of reused water.

#### **4.12 WATER EFFICIENCY OUTCOMES**

4.12.1 The water conservation hierarchy of reduce – re-use – recycle will be adopted in development proposals. The WCS will examine the viability of the water hierarchy in delivering water efficiency within the development scenarios. The report will examine how such measures can be incorporated, in line with best practice guidance, to reduce water consumption, before options to supply water from alternative sources will be considered.

4.12.2 The total environmental impact of new technologies will need to be assessed on a case by case basis. Some technologies may be energy intensive and could have a significant impact on carbon emissions.

4.12.3 Future Water (Defra 2008) sets out the long-term vision for water and the framework for water management in England. The report sets out targets to reduce the average per capita consumption in the UK to 130 litres per person per day, or possibly 120 litres per person per day depending on new technological development and innovation.

4.12.4 Homes within Eco-towns are expected to achieve code level 6 for energy, i.e zero carbon. Post 2016 all eco town homes are required to reach code level 6 for water not just social housing. Currently the housing corporation proposals are set to require



code level 6 to be achieved by 2014/15 for schemes receiving corporation funding, equating to an internal water use figure of 80 litres per person per day. In areas subject to increased level of water stress, the LPA may impose higher standards of water efficiency. In the case of eco towns, a higher level of water efficiency is likely to be desirable, such as working towards water neutrality.

4.12.5 The water cycle strategy will be developed with the above water efficiency outcomes in mind, with an aim to achieve exemplar standards of water efficiency.

4.12.6 In order to protect water supplies EA consent must be obtained for:

- Abstraction of water from surface or underground sources (above 20m<sup>3</sup> per day);
- Interrupting the flow or impounding water from a watercourse; and
- Discharging to a watercourse or into the ground.

#### **4.13 WATER NEUTRALITY**

4.13.1 Water neutrality is where the total water demand after the new development is completed is equal to or less than the total water use before the new development took place.

- Studies indicate that water neutrality can be achieved through a combination of options including minimising demand by designing highly efficient buildings, using wide spread water metering and water tariffs; and offsetting the remaining water demand through retrofitting existing homes and buildings with water efficiency measures.

#### **4.14 WATER QUALITY AND BIO DIVERSITY**

4.14.1 Good surface water and ground water quality is vital for human health and the maintenance of aquatic ecosystems and bio diversity. All new development must include effective measures to prevent pollution of water.

4.14.2 In regard to improving water quality the Eco-towns water cycle worksheet states that *“Eco-towns must not create adverse pressures on the water environment (adjacent surface waters, watercourses or groundwaters) that could compromise our ability to meet Water Framework Directive (WFD) objectives and other statutory objectives. Under the WFD, development must not result in any deterioration in the status of surface water bodies. A breach of WFD or other Directive objectives would put the Government at risk of infraction proceedings by the EU.”*

4.14.3 The report goes on to list a number of water quality outcomes that are required from Eco-towns. These include;

- Eco-towns should aspire to improve environmental water quality through the improved design and location of sewage treatment and the use of SUDs;
- Eco-towns must not result in a deterioration of water quality and should contribute to achieving the environmental objectives set out in the Water Framework Directive.

4.14.4 The perennial spring fed source of the river Stort at Stansted Mountfitchet is of high environmental and ecological value. It would be preferable to see no increase in sewage effluent input at this location. The EA would have reservations over any new developments that discharged to water courses in this vicinity due to the potential for harmful impacts on the quality of the river environment.



## 4.15 SEWAGE TREATMENT

4.15.1 A key aspect in the production of the WCS for Elsenham will be to assess the options available for sewage treatment in order to identify the most sustainable and feasible solution. This will require further consultation with sewerage undertakers and the EA to ensure the solution complies with the necessary consent criteria.

4.15.2 Initial consultation with Anglian Water and Thames Water has identified four options for the disposal of foul water:

- A new sewage treatment works to be located at a suitable location discharging clean flows into the ground.
- A new sewage treatment works to the north of the development draining into the River Cam;
- A new sewage treatment works at the south of the site draining into Stansted Brook;
- Foul drainage to drain into the existing system, with upgrades to enable it to be pumped to the sewage treatment works at Stansted Mountfitchet;

4.15.3 The potential to use small on site packaged sewage treatment plants, incorporating wetlands / reed beds, will also be investigated.

4.15.4 Elsenham lies on an operational boundary between Anglian Water (AW) and Thames Water (TW) service areas. This operational boundary line appears to broadly follow Elsenham High Street with AW's region to the north and TW's region to the south. The location of the boundary historically has been based on the catchment of Rivers.

4.15.5 From the AW asset plans for the area, foul water from Elsenham and Henham is conveyed southwards (eventually crossing into TW's region), this is achieved by a combination of gravity sewers and rising mains. The pipe network around the site area forms part of AW's assets. However the three pumping stations on Old Mead Road, south east of Golds Mead Nursery Business Park and to the south of 'Oziers' are owned by TW. As both TW and AW assets are likely to be affected by the proposals both companies have been approached for their views on current capacities and possible upgrades. A review of TW asset plans, indicate that existing foul flows are discharged by a gravity system to the Stansted Mountfitchet sewage treatment plant.

4.15.6 Foul sewage is conveyed from Henham (to the north east) via a network of (primarily) 150 mm diameter pipes. This network then connects to the 225 mm diameter pipe which runs west from Mill Road, along Old Mead Lane towards Old Mead Road where it turns north and flows towards the Old Mead Road pumping station.

4.15.7 A foul rising main runs southwards from the Old Mead pumping station and outfalls to a 225mm diameter gravity pipe in Park Road, to the south of Elsenham. This pipe then connects to the 150-225mm diameter pipe running eastwards along Elsenham High Street. The AW network then connects to the TW network at a manhole at the corner of "Hailswood" and Elsenham High Street. "Hailswood" also houses a 150 mm diameter foul network which connects to the same TW manhole.

4.15.8 The area of Elsenham to the west of the rail line benefits from a more extensive public foul network. Part of this area, to the north of the Station Road / "Oziers" T-junction, drains northwards to the Golds Mead Nursery Business Park pumping station. A rising main then conveys this sewage southwards along Station Road where it outfalls



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to a 225mm diameter gravity pipe running southwards from the Station Road / "Oziers" junction and connecting to the Thames Water foul network near to the Stansted Road / Station Road / Elsenham High Street junction.

#### **4.16 FOUL DRAINAGE STRATEGY**

4.16.1 Consultation with Anglian Water has identified that the preferred option would be to treat wastewater on site, via a suitably designed STW (sewage treatment works) discharging to either the River Cam or Stansted Brook.

4.16.2 Anglian Water advise that although foul flows currently discharge to the STW at Stansted Mountfitchet , the costs of upgrading the sewers, pumping stations and STW itself would be extremely costly and disruptive. However this option will be fully assessed and evaluated as part of the WCS.

4.16.3 Hydraulic and environmental analysis of the foul networks for the proposed development will be required to assess the capacity currently available and inform with more certainty the infrastructure work required to meet demand. It is envisaged that both Anglian Water and Thames Water will need to undertake an assessment.

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# 5 Summary and Recommendations

## 5.1 SUMMARY

5.1.1 An outline water cycle strategy is required to assess the impact on the environment, and existing water services infrastructure arising from proposed development. ,

5.1.2 It will provide an evidence base for the local authority Core Strategy and demonstrate that the development is sustainable. The outline water cycle strategy will:

- Identify environmental risks;
- Assess if environmental resources can cater for further development;
- Assess the capacity of the existing water services infrastructure to accommodate additional loading; and
- Identify what new infrastructure is required, together with an initial assessment of construction costs and programme for delivery.

## 5.2 RECOMMENDATIONS

5.2.1 Form the project steering group, agree responsibilities and develop a legal agreement framework to tie the key stakeholders together.

5.2.2 Agree the scope of the outline water cycle strategy with the Environment Agency.

5.2.3 Consult with all key stakeholders and review existing plans, studies and strategies. Update baseline data including confirmation of development proposals.

5.2.4 Identify sources of funding for future phases of work and agree a funding mechanisms and delivery programme.

5.2.5 Undertake hydraulic modelling of the ordinary watercourses, tributaries and riparian ditches in the vicinity of the site in order to assess fluvial flood risk and confirm the extents of the flood envelopes for the 1 in 100 year return period event, including an allowance for climate change.

5.2.6 Review the hydraulic modelling and re-assess the master plan with regards to flood risk, including an assessment of surface water run off and the forecast impacts of climate change.

5.2.7 Undertake a review of the existing watercourses within the development area and how they will be incorporated in to development proposal. Including an assessment of any diversionary works required and the impact upon flow regime.

5.2.8 Commission a topographical survey of the site to inform the hydraulic modelling.

5.2.9 Undertake additional site investigation to establish / monitor ground water levels and permeability across the site, including identifying the viability of deep borehole soakaways.

5.2.10 Assess preliminary water demand scenarios and consult with Anglian Water / Thames Water and undertake hydraulic modelling of the catchment to assess available capacity of the sewerage treatment works and identify the upgrading work required to the foul sewerage infrastructure. Consider a range of drainage options and appraise these to determine the most effective and sustainable solution.



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5.2.11 Consult with the EA and Three Valleys Water to assess the available supply of potable water to meet demand and undertake hydraulic modelling to confirm the water supply infrastructure required.





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## Appendices, Figures & Tables





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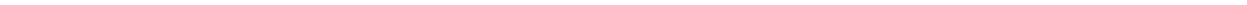
# Appendix A Site Location Plan





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# Appendix B Preliminary Geotechnical Findings





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# Appendix C Minutes of EA meeting and Summary Notes of Consultation.

