Daventry Infrastructure Studies

Sewage and Water Infrastructure Technical Report

January 2009

WNDC

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Executive Summary

Introduction

The Milton Keynes – South Midlands Sub-Regional Strategy (part of the East Midlands Regional Spatial Strategy or RSS) has identified that Daventry's population will grow substantially over the next two decades. It has identified that the town of Daventry is expected to grow towards a population of 40,000 by 2021 and that Daventry District, as a whole should continue to grow at an equally steady rate beyond 2021 until at least 2026. This study therefore sets out infrastructure requirements for expected population and dwelling growth for both 2021 and 2026 accordingly.

In order to help West Northamptonshire Development Corporation better understand the implications of these targets for the growth of Daventry in terms of certain types of infrastructure, they have commissioned a series of infrastructure studies from consultants, URS Corporation, ISU Limited and LDA Design.

This technical report covers sewage and water infrastructure, and sets out a series of preliminary conclusions for the infrastructure requirements in association with the growth set down in the Regional Spatial Strategy (RSS).

Purpose of the DIS

The DIS has been produced in accordance with an initial brief received from WNDC. This brief in turn had been developed and consulted upon in mid-2007 by WNDC and has been developed further as the course of the project progressed following consultation and engagement with partners. The views of several major applicants, who were in discussion with WNDC regarding existing or potential planning applications for development in and around Daventry, were also canvassed when the work was commissioned.

The objectives of the DIS have been refined and are:

1 To identify the likely infrastructure investment priorities for Daventry required to deliver long term sustainable growth as set out in the RSS, and recognise how and when they could be delivered;

2 To evaluate the current infrastructure constraints and opportunities for development in the medium to longer term (i.e. to 2021) and having regard to development up to 2026 and beyond;

3 To consider infrastructure development scenarios (but not to allocate land for development or predetermine planning decisions);

4 To consider how infrastructure could be phased alongside growth;

5 To allow consideration of the relationship between infrastructure investment and growth proposals for the town to assist in making planning decisions in the short to medium term; and

6 to provide an evidence base which may be used by other local planning authorities to support the plan making process for Daventry town as a whole.

Key Conclusions - Baseline

The Technical Report has found that the following existing conditions for water and sewer infrastructure within Daventry:

- Anglian Water has a statutory obligation to provide water and wastewater services for domestic purposes under the appropriate section of the Water Industry Act 1991 once a development site has received planning approval, been allocated in an existing local plan or a site allocation under the Local Development Framework Process. The timing and phasing of any infrastructure requirements may be dependant on approval from OFWAT and the Environment Agency, relevant funding from developers where appropriate and subsequent planning approvals that may be required
- Water treatment is near capacity but an increase in capacity at the Wing Water Treatment Works to be completed in approximately 2010 may provide additional capacity to support growth in Daventry to 2021
- The water delivery network is analysed via a complex computer model. Specific information in regards to development size, location and timing is required to evaluate the capacity of the existing infrastructure
- Wastewater treatment is currently at capacity and cannot accommodate further growth in Daventry. Treatment alternatives are currently being evaluated
- There is no network computer model for wastewater collection. The capacity of this network is under evaluation. Limited flow tests are to be conducted in March 2009 on main trunk lines to provide further understanding of capacity
- Stormwater is primarily conveyed via a separate storm sewer. Storm sewers constructed in accordance with guidance are adopted by AWS. AWS do not typically adopt sustainable urban drainage systems (SUDS) but they are evaluated on a case-by-case basis
- The EA Flood Risk Zone maps indicate that the only area at risk from flooding is immediately upstream of Daventry reservoir. However the current Flood Zone maps do not extend to catchments less than three square kilometres. Proposals for an extension of the canal into Daventry are currently being progressed and will include a flood risk assessment in accordance with PPS25

Key Conclusions – Infrastructure Requirements

This Technical Report has concluded that the key strategic additional infrastructure requirements for a population of at least 45,000 (which would be reached with an increase in population of 20,000 as is likely by 2026) are:

- Additional sewage treatment capacity will be required
- Although the capacity of the existing sewer collection network is under investigation, it is anticipated that improvements to the existing infrastructure as well as construction of new infrastructure to areas of new development will be required
- It has been estimated that the capacity of the Wing WTW will be fully utilized by the mid 2020's. Beyond mid 2020's there are a number of schemes proposed in the Draft Business Plan to resolve any deficit in the Ruthamford Water Resource Zone. These include - extension of Clapham WTW, recommissioning of Foxcote and/or Pulloxhill and re-use at Flag Fen. In the long term, schemes will be promoted which will provide an alternative resource for Peterborough and hence, release existing capacity to meet growth in the south of the AWS region
- It is anticipated that improvements to the existing infrastructure as well as construction of new infrastructure to areas of new development will be required. In order to support the proposed growth, irrespective of which sector, further reinforcement of the strategic water network will be required upstream of Daventry

A Sustainable Infrastructure Strategy

Based on the investigations undertaken, the report outlines that developing on the east side of town represents a more sustainable approach due to the proximity to both the sewage treatment works and the water storage reservoir.

1 Introduction

1.1. Background

1.1.1. This technical report is part of the Daventry Infrastructure Strategy. URS has been appointed by the West Northamptonshire Development Corporation (WNDC) to assist in the preparation of the Daventry Infrastructure Strategy (DIS). The DIS will form part of WNDC's evidence base and will be a material consideration that will help to inform decisions about the future expansion of the town and the infrastructure required to support that growth. It should also be of assistance to Daventry District Council in determining planning applications which fall (in whole or part) outside of WNDC's planning functions area or beneath the threshold for determination by WNDC within that area. The DIS will also be used in the development of WNDC's infrastructure delivery programme for West Northamptonshire, within the WNDC Regeneration Framework. This technical report forms part of the DIS.

1.1.2. WNDC has the statutory function of securing regeneration of its three Urban Development Areas (Daventry, Northampton and Towcester) but also has a duty to consider planning applications which fall to it for determination in accordance with proper planning grounds.

1.1.3. The DIS is a wide-ranging multi-disciplinary task, with utilities constituting one of the five infrastructure elements under investigation. In the context of this study, water and sewage infrastructure encompasses that infrastructure associated with the supply of potable water and disposal of wastewater.

1.1.4. The DIS will be used as a tool to assist WNDC in considering proposals for growth and change to the town of Daventry. It will form part of the WNDC's evidence base and will be a material consideration that will help to inform decisions about the future expansion of the town and the infrastructure requirement to support that growth. Further, the findings of the DIS will be used in the development of the WNDC's infrastructure delivery programme for West Northamptonshire, within the WNDC Regeneration Framework.

1.2. Methodology and Scope of the Report

1.2.1. This report is based on a 'desk-top' review of various other sources of information compiled by other agencies that focus on the provision of water and sewage infrastructure related for the town of Daventry. This information was obtained through a variety of means, including face-to-face interviews with the network operators.

1.2.2. The scope of this report is therefore to provide a robust and credible technical evidence base to inform the Daventry Infrastructure Strategy. The technical report covers, accordingly; in respect of the baseline infrastructure position; the infrastructure requirements that will accompany growth to a population of about 40,000; and the opportunities and constraints for the delivery of that infrastructure as they affect the development opportunities adjoining the town. The overall aim of this paper is thus to assist and help guide the evolution of the DIS.

1.3. Stage One Report Framework

1.3.1. This Stage One Report is presented in the following format:

- Section Two outlines the existing water and sewage network;
- Section Three highlights potential water and sewage initiatives in the area that may influence network operations;
- Section Four and Five cover the sustainability issues related to water and sewage provision;
- Section Six commences the review of the sewage and water infrastructure requirements for the expected growth in population to about 40,000 identified for Daventry in the RSS;
- Section Seven divides the town in to sectors and takes the infrastructure requirement assessment further by looking at and analysing the potential infrastructure requirements that would arise from significant development in each sector;
- Section Eight continues the theme of understanding the infrastructure requirements of the proposed growth and identifies key trigger points in population and dwelling growth that will be reached and which will necessitate the provision of certain pieces of infrastructure;
- Section Nine identifies the key implications for a sustainable water and sewage infrastructure strategy; and
- on the basis of the preceding sections and on an assessment of the infrastructure capacity and delivery options, Section Ten identifies the Sustainable Development Scenarios for growth in respect (only) of sewage and water infrastructure

1.3.2. For convenience, figures referenced in the assessment are presented as **Appendices**.

2 Existing Conditions

2.1. Study Area

2.1.1. This study is concerned with the town of Daventry, which is identified in the MKSM SRS as growing towards a population of about 40,000 by 2021. The baseline review, and the remainder of the work that will be completed in support of the DIS is therefore concerned with the infrastructure that presently serves, and will be required in future to serve, Daventry township as it grows in size.

2.1.2. Water and sewer infrastructure in and around Daventry is owned and operated by Anglian Water Services (AWS). Information on AWS resources and operations was obtained from Mr. Gareth Barker, AWS Accounts Manager and Mr. Mick Galey, Assets Manager.

2.2. Existing Water Infrastructure

2.2.1. Potable water for the town is provided by Pitsford Water Treatment Works (WTW), which pipes to Harpole then Weedon, before entering the Borough Hill Reservoir in Daventry. The primary source for Pitsford is Pitsford Reservoir. Pitsford WTW also services Northampton and is near capacity. There is currently no plan to increase the capacity of this facility.

2.2.2. Wing Water Treatment Works is located in the village of Wing, Rutland. The primary source for Wing is Rutland Water Reservoir. The Wing WTW pipes to a reservoir in Harrington and then to the Borough Hill Reservoir in Daventry.

2.2.3. The water distribution network throughout Daventry is complex, and is described through a computer model operated by AWS. In order to determine the network capacity in any one area, the model must be run with some level of detail on the proposed development such as location and anticipated demand. The network model is subject to a programme of ongoing construction and maintenance to address accuracy.

2.2.4. AWS have confirmed that the supply of water is adequate to accommodate the current planned growth in Daventry for the long-term projections regardless of the location of development. This water supply is based on the on-going and anticipated improvements discussed in Section 4.

2.3. Existing Sewage Infrastructure

2.3.1. Foul sewage is collected throughout Daventry and transmitted to the Whilton Sewage Treatment Works (STW) located to the east of Whilton Locks. The plant is a biological filter works. The capacity of the Whilton STW is fully committed. In winter, Whilton discharges to a brook that feeds into the River Nene. In summer flow is split between canal and the River Nene. The Environmental Agency (EA) controls the quality and quantity of treated effluent discharged into the river through a discharge consent.

2.3.2. AWS have advised that the existing sewage collection, treatment and disposal facilities at Whilton are at capacity and cannot accommodate the growth projections for Daventry.

2.3.3. AWS also own and the Long Buckby STW that serves Long Buckby, the immediate surrounding area and the M1 service station, Watford Gap. The capacity of the plant is fully committed.

2.3.4. AWS have stated that the Long Buckby STW is at capacity and cannot accommodate the growth projections for Daventry. In addition, the Whilton STW and Long Buckby STW are not hydraulically connected.

2.3.5. AWS does not have a network model for the Whilton STW catchment. The capacity of the sewer network is currently under investigation. AWS plan to carry out a limited flow survey to understand capacity in the trunk sewer in March 2009.

2.3.6. The AWS strategy for handling future population growth in the area is discussed in Section 4.

2.4. Existing Storm Sewer Infrastructure and Flood Risk Assessment

2.4.1. The majority of Daventry is serviced by a separate storm sewer network.

2.4.2. There are a limited number of combined sewers in Daventry There are two small reaches of combined sewer near pump stations in the south and east of town. These collect storm water runoff along with foul sewer and convey this flow to the Whilton STW for treatment and disposal.

2.4.3. Currently developers design and construct storm water infrastructure in accordance with "Sewers for Adoption", 6th Edition, standards and AWS guidelines for adoption.

2.4.4. In accordance with the Water Industry Act, AWS must adopt the storm water system if constructed in accordance with adoption requirements. AWS is then responsible for the operation and maintenance of the storm sewer system.

2.4.5. There a number of storm sewer collection systems within Daventry. In order to evaluate the capacity of each storm sewer, the surface area associated with each drainage, along with the ground conditions would be used to model surface runoff for a design storm event. Storm sewer infrastructure is dependent on the drainage area and amount of impervious ground.

2.4.6. The EA Flood Risk Zone maps indicate that the only area at risk from flooding is immediately upstream of Daventry reservoir. However the current Flood Zone maps do not extend to catchments less than three square kilometres. Proposals for an extension of the canal into Daventry are currently being progressed and will include a flood risk assessment in accordance with PPS25.

1 Population equivalent is the unit of measure used to describe the size of a wastewater discharge. Population equivalent is the biodegradable load (matter) in wastewater having a 5-day biochemical oxygen demand (BOD) of 60g of oxygen per day. Population equivalent doesn't necessarily reflect the actual population of a community.

3 Currently Proposed Water and Sewage Initiatives

3.1. Introduction

3.1.1. Proposed infrastructure improvements for the entire AWS service area are described in the AWS Draft Business Plan for the years 2010 to 2015.

3.1.2. Private utilities are regulated by the Water Services Regulation Authority (Ofwat). Every five years, the industry enters a new asset management period (AMP). The current AMP is AMP 4 (2005-2010). At the start of each AMP, utilities submit a Business Plan to Ofwat describing business objectives and proposed improvements. Ofwat regulate the rates AWS charge consumers which in turn fund any proposed improvements during the next AMP based on their review of the plan and past performance.

3.1.3. AWS and Ofwat are currently reviewing the Draft Business Plan for the years 2010 to 2015, a finalised plan is expected in March 2009.

3.2. Water Infrastructure Initiatives

3.2.1. The Pitsford WTW is currently near capacity and there are no existing plans to increase capacity at this facility. AWS anticipate additional water for Daventry will be available from the Wing WTW which is in the process of increasing existing capacity by 50 million litres per day (Ml/d) on average and 90 Ml/d peak. The construction of this additional capacity is expected to be finalised in approximately 2010.

3.2.2. The capacity increase at Wing will need to meet growth in a large area, including Peterborough, Corby, Kettering, Wellingborough and Milton Keynes. The increase in capacity at Wing will not be dedicated solely to meet the growth of Daventry in isolation. However, with Pitsford being near capacity, Wing is key to meeting the growth in Daventry

3.2.3. In support of the Wing WTW expansion, AWS will be installing and reinforcing strategic mains over the next five years. Water mains into the Borough Hill Reservoir in Daventry are part of these improvements.

3.2.4. It has been estimated that the capacity of the Wing WTW will be fully utilized by mid 2020's. Beyond 2020 there are a number of schemes proposed in the Draft Business Plan to resolve any deficit in the Ruthamford Water Resource Zone. These include - extension of Clapham WTW, recommissioning of Foxcote and/or Pulloxhill and re-use at Flag Fen. In the long term, schemes will be promoted which will provide an alternative resource for Peterborough and hence, release existing capacity to meet growth in the south of the AWS region.

3.3. Sewage Infrastructure Initiatives

3.3.1. AWS have advised that the Whilton STW is at capacity and they are currently evaluating sewage treatment alternatives to accommodate additional growth in Daventry.

3.3.2. The capacity of the sewer network is currently under investigation. AWS plan to carry out a limited flow survey to understand capacity in the trunk sewer in March 2009.

3.4. Storm Water Infrastructure Initiatives

3.4.1. The West Northamptonshire Strategic Flood Risk Assessment is currently under development.

4 Sustainable Water and Sewage Considerations

4.1. Water and Sewer Infrastructure

4.1.1. As outlined in the MKSM SRS, the regional strategy includes a target saving of 25% on water consumption for new housing[2]. Also utilities must work with the EA and other key stakeholders on water management issues to ensure that environmental standards are not compromised.

4.1.2. There are multiple forms of water conservation methods including reuse and recycle that could be considered for various development scenarios. These methods could potentially require new localised infrastructure for non-potable water use.

4.1.3. Water wells and private sewage treatment systems may potentially be considered as a sustainable alternative to expanding infrastructure but the EA would be responsible for approving any water wells and the EA have stated that developments proposing to use a private sewage system are only acceptable in exceptional circumstances.

4.1.4. The use of clay pipes has been growing in recent years as a more "environmentally sensitive" alternative to plastic and ductile iron pipes currently in use. The applicability of clay pipes is limited and would require approval of the local utility service providers.

4.1.5. It is a fundamental requirement of PPS25 that new development does not increase flood risk. This means that particular consideration needs to be given to the storage and release of any run-off water from the development sites above that of greenfield rates. This approach is additional to the management of peak run-off rates through the use of Sustainable Drainage Systems (SUDS).

2 However, 25% water consumption 'goals' are not included in flow projections. At present, these are not an enforceable goal and therefore the utility provider cannot be assured everyone will reduce consumption. Therefore, including them in the projections could potentially result in an underestimate of the appropriate size for the treatment facility.

5 Issues and Objectives for Sewage and Water Infrastructure Provision

5.1. Constraints and Implications

5.1.1. Anglian Water has a statutory obligation to provide water and wastewater services for domestic purposes under the appropriate section of the Water Industry Act 1991 once a development site has received planning approval, been allocated in an existing local plan or a site allocation under the Local Development Framework Process. The timing and phasing of any infrastructure requirements may be dependant on approval from OFWAT and the Environment Agency, relevant funding from developers where appropriate and subsequent planning approvals that may be required.

5.1.2. There is currently no additional capacity at Whilton STW. AWS are investigating available alternatives, but there is currently no formalised plan in place. The timing of STW improvements and increased development will need to be coordinated.

5.1.3. There is currently no network model for the sewage collection system within Daventry and the existing capacity of the system is under evaluation. Development will require an understanding of network capacity in order to evaluate infrastructure investment.

5.1.4. Regeneration of urban areas needs to consider where existing infrastructure may need to be diverted in advance of development and not just new infrastructure that may be required to support it. This can represent a significant cost.

5.1.5. There does not appear to be a mechanism or formalised procedure in place for AWS, the planning authorities, regulatory agencies and developers to develop long-term integrated strategies. AWS has internal strategies which are being communicated as part of the Water Cycle Strategies. Integrated planning for sustainability requires input from all stakeholders. Implications include a non-unified direction forward for Daventry.

5.2. Principles for the Provision of Sewage and Water Infrastructure

5.2.1. With reference to the review of relevant guidance and policy (see DIS Main Report) and operational considerations, the following principles have been identified for the provision of water and sewage infrastructure:

- The largest core principle for providing water and sewer infrastructure is that the design takes into account potential future growth
- Water and sewer infrastructure should not impact sensitive environmental areas
- Managing and reducing water demand where appropriate, to achieve savings on water use per property, with a target saving of 25% on water consumption for new housing as outlined in the MKM SRS
- Stormwater management must meet the guidelines PPS25 and the design standards set in “Sewers for Adoption”, 6th Edition

6 Infrastructure Requirements

6.1. Population Growth and Dwelling Development

6.1.1. Infrastructure demand is a function of population and dwelling growth.

6.1.2. The assumed population of about 40,000 people for the town of Daventry by 2021 is derived from paragraph 124 of the Milton Keynes and South Midlands Sub-Regional Strategy (MKSM SRS), which constitutes part of the RSS. The population of Daventry in 2007 has been estimated at 25,379[3]. Taking this figure, it was estimated that there are approximately 10,192 dwellings in Daventry[4]. If all of this growth were to be accommodated within or immediately adjacent to Daventry's urban settlement area, then the town could be expected to grow by another 6,337 dwellings (assuming an average household size of 2.42 persons[5]) and at least 14,622 people. Table 6-1 provides a summary of these assumptions.

6.1.3. This growth forecast for the town is in the context of stated RSS policy that the entire Daventry District area (i.e. the town and the rest of the district) should grow by 540 dwellings per annum between 2001 and 2021. Assuming growth in the town of 453 dwelling per annum to reach the stated population target, this equates to the town assuming an 84% share of the growth in dwelling numbers expected of the District.

6.1.4. At the present time, the draft RSS introduces an extension of the planning period to 2026 during which time it is identified that the entire Daventry District local authority area would be required to make continuing provision for housing growth at the same annual average rate of 540 dwellings per annum over the plan period[6]. Assuming that the town continues to absorb the same proportion of development (within the District) after 2021, as it does before – it could be expected to grow by a further 5,222 people and 2,265 dwellings in the ensuing five year period. These assumptions are summarised in Table 6-1

Table 6-1: Population and Dwelling Increase Assumptions, 2007 - 2026

Relevance / Status:	Population (Actual or Expected)	Dwellings (Actual or Expected)	Likely Year / Time Period	Daventry AHS (NCC Projection)
Census Record:	21,774	8,837	2001	2.46
Estimated Baseline:	25,379	10,192	2007	2.49
MKSM Figure:	40,000	16,529	2021	2.42
2026 with continued constant growth:	45,222	18,792	2026	2.41
Estimated Increase:	**+ 14,622**	**+ 6,337**	**2007 - 2021**	**NA**
Estimated Increase:	**+ 19,843**	**+ 8,600**	**2007 - 2026**	**NA**

Source: URS calculations derived from various information sources including ONS Census Data and Mid-Year Population Estimates, DDC Dwelling Completion estimates, NCC estimation of existing and projected average household size in Daventry.

6.1.5. A critical output of the DIS is the estimation of the key trigger points[7] for new infrastructure. Most trigger points will be judged in terms of the increase in population and/or the increase in dwelling numbers. In order to identify the increase in population and set this against an approximate date (in this case a year) the DIS uses the MKSM SRS expected population level of 40,000 for the year 2021 applying an even rate of population increase over that period, as shown in Table 6-2.

Table 6-2: Simplified Population and Dwelling Increase Assumptions, 2007 - 2026

Relevance / Status:	Population (Actual or Expected)	Dwellings (Actual or Expected)
Annual Growth	1,044	453

Source: URS calculations

6.1.6. It should be noted that these annual growth rates are an average and growth in terms of population and dwelling completions is likely to vary from year to year depending on the availability of developable land, economic circumstance and other factors. It is however a useful starting point when projecting growth over a medium to long term period.

3 This figure was estimated using ONS mid year population projections for 2001 to 2005 and extrapolating forward to 2007. The methodology used was confirmed as the best available by K. Palmer, Senior Research and Information Officer, Planning and Growth Department, Northampton County Council and also agreed with DDC.
4 This is based on an average household size of 2.49. Figure supplied by K. Palmer, NCC, 14/02/08.
5 Average household size figures obtained from K. Palmer, NCC, 14/02/08.
6 This number is specific to the whole local authority area rather than for the town of Daventry in isolation.
7 The term trigger point refers to a certain population level, or number of dwellings, which once reached triggers the requirement for additional infrastructure because existing spare capacity has been used up by preceding population and/ or dwelling growth. It is a useful concept for identifying the stage at which new infrastructure must or should be provided.

6.2. Demand Assessment

6.2.1. Average water use in the UK is approximately 150 litres per person per day. A population increase of 14,622 will increase water and sewer demand by approximately 2.2 Ml/d. AWS has estimated the increased demand by 2021 as 2.5 Ml/d average, and 3.2 Ml/d peak.

6.2.2. If growth continued beyond 2021 at the same rate as the preceding period, then the annual demand would continue to grow at a rate of 0.2 Ml/d.

6.3. RSS Infrastructure Requirements for population of about 40,000 in 2021

6.3.1. The required major pieces of infrastructure are:

- Fully utilised Wing WTW and the promotion of schemes that will provide an alternative resource for Peterborough and hence release existing capacity to meet the growth in the south of the AWS service area;
- Expand water delivery network to areas of new development, reinforce existing infrastructure as required;
- New or expanded STW for the Whilton catchment
- Expand the sewer collection network to areas of new development, reinforce existing infrastructure as required;

6.4. Key Constraints at Town-wide Level

6.4.1. The principal constraints for Daventry are there is currently no additional capacity for wastewater treatment at the Whilton STW and the capacity of the existing sewer network is under evaluation.

6.4.2. In order to support the proposed growth, irrespective of which sector, further reinforcement of the strategic water network will be required upstream of Daventry.

5 Office of the Deputy Prime Minister, 2005. Sustainability Appraisal of Regional Spatial Strategies and Local Development Documents.

7 Sector Level Infrastructure Requirements

7.1. Introduction

7.1.1. This section is broken into two parts; the first of which analyses the water and sewage infrastructure requirements for each of the sectors, assuming development of the maximum potential possible within each sector. The second part examines the constraints to the provision of water and sewage infrastructure, and identifies where they potentially limit the opportunity to achieve development in particular areas.

7.2. Sector Level Infrastructure Assessments

7.2.1. As detailed in the DIS Main Report, Daventry was divided into five sectors for the purposes of analysing the infrastructure requirements.

The Town Centre

7.2.2. The maximum potential dwelling increase is 500, which equates to a population increase of 1,210. Water demand and resulting sewage production is estimated to be approximately 0.2 Ml/day average.

7.2.3. Strategic reinforcement of both water and sewer infrastructure will be required to prevent the growth impacting on levels of service to existing customers. Additional sewage treatment capacity would be required. It is anticipated that the Wing WTW could accommodate this growth.

7.2.4. Regeneration of urban areas needs to consider where existing infrastructure may need to be diverted in advance of development and not just new infrastructure that may be required to support it. This can represent a significant cost.

The South East sector

7.2.5. The maximum potential number of dwellings in the southeast sector is estimated to be 6,438 which equates to a population of 15,580. There is also a proposed business park in this sector named Burnt Walls. The estimated water demand and resulting sewage production in this area is 2.3 Ml/day.

7.2.6. AWS anticipates significant growth in this area. Infrastructure will need to consider elevation changes in this area to minimise pumping. Additional sewage treatment capacity would be required. It is anticipated that the Wing WTW could accommodate this growth.

The South West sector

7.2.7. The maximum potential number of dwellings in the southwest sector is estimated to be 2,408, which equates to a population of 5,827. The estimated water demand and sewage production is 0.9 Ml/day.

7.2.8. AWS do not anticipate growth in this area. Infrastructure will need to consider elevation changes in this area to minimise pumping. Additional sewage treatment capacity would be required. It is anticipated that the Wing WTW could accommodate this growth.

The North West sector

7.2.9. The maximum potential number of dwellings in the northwest sector is estimated to be 2,392, which equates to a population of 5,789. The estimated water demand and sewage generated is 0.9 Ml/day.

7.2.10. AWS currently anticipates extension of commercial infrastructure, rather than residential, in this area. The North West sector is the furthest proximity to existing storage and strategic mains. Additional sewage treatment capacity would be required. It is anticipated that the Wing WTW could accommodate this growth.

The North East sector

7.2.11. The maximum potential number of dwellings in the northeast sector is estimated to be 7,256, which equates to a population of 17,560. The estimated water demand and sewage production is 2.6 ML/day

7.2.12. AWS anticipate extensive growth in this sector. New infrastructure and infrastructure improvements will be required. Additional sewage treatment capacity would be required. It is anticipated that the Wing WTW could accommodate this growth.

7.3. Sector Level Specific Infrastructure Provision Constraints

7.3.1. All sectors have the same town-wide infrastructure provision constraints identified in Section 6.4.

7.3.2. Detailed infrastructure assessment on a sector level will require specific details of a proposed development. The need to reinforce existing infrastructure or build new infrastructure is completely dependent on the location and size of the development.

8 Infrastructure Programme and Cost Estimates

8.1. Introduction

8.1.1. The following section identifies the likely trigger points for major pieces of infrastructure required by Daventry's forthcoming growth to 2021 and beyond.

8.1.2. Average annual growth figures for population and housing have been used to determine trigger points associated with the need for new infrastructure. Average annual growth has been derived by starting with the most recent census data mid year population estimates, and then counting back from the population target of about 40,000 people that has been identified for Daventry in 2021. An average household size of 2.42 persons/dwelling in 2016[8] was used to determine average household growth.

8.1.3. Calculations estimate the average annual increase in the population is 1,044 people and the average annual increase in the number of dwellings is 453 over the period from 2007 to 2021.

8.1.4. It should be noted that average growth figures are an average only. Daventry may struggle in the immediate short term to continue achieving these growth rates without a ready supply of land available for development. It is likely that these targets will more easily met over the medium to long term as there are several major development proposals in the pipeline that would come on-stream over the next 14 years.

8.1.5. At that rate, there would be some 5,220 people and 2,265 dwellings added every five years.

8.1.6. This implies that for the period 2021 – 2026, if the average rate of development were to continue in the ensuing five-year period, the population would reach 45,220 in 2026 and 50,400 in 2031.

8.2. Key Infrastructure Item Trigger Points

8.2.1. Water delivery networks, sewage collection networks and storm water management systems are not a function of specific trigger points. They develop in response to growth as growth happens which can be a continuous process. Trigger points apply to the ability of water and sewage treatment works to handle the growing demands.

8.2.2. There currently exists a key infrastructure trigger point. The Whilton STW is at capacity and cannot accommodate further growth. AWS are currently evaluating sewage treatment alternatives.

8.2.3. It has been estimated that the capacity of the Wing WTW will be fully utilized by the mid 2020's. Beyond mid 2020's there are a number of schemes proposed in the Draft Business Plan to resolve any deficit in the Ruthamford Water Resource Zone. These include - extension of Clapham WTW, recommissioning of Foxcote and/or Pulloxhill and re-use at Flag Fen. In the long term, schemes will be promoted which will provide an alternative resource for Peterborough and hence, release existing capacity to meet growth in the south of the AWS region.

8.3. Cost Estimates for Major Infrastructure Item Requirements

8.3.1. The water and sewage strategic infrastructure throughout the town is owned and operated by AWS. Developers are required to pay for connecting to this strategic network as well as pay to use the network. Developers are also required to contribute to strategic schemes in addition to any local off-site reinforcements required to service their sites, in accordance with the Water Industries Act. Storm water management systems are also paid for by the developer. Improvements to the treatment plant and repair of aging infrastructure are typically paid by the utility provider through the AMP funding process.

8.3.2. If these aspects of the infrastructure are constructed to a set of published standards, AWS will adopt the system, meaning they will take over ownership and maintenance. Usually the developer passes the cost for design and construction of this infrastructure to the individual homebuyers and utility users within the property development.

8.3.3. Improvements to the WTW or STW in order to meet new or existing capacity and standard requirements are paid for through rate increases applied to all customers within the AWS service area. AWS currently serves approximately 4.2 million customers for drinking water, and provides sewage collection and treatment services for approximately 5.6 million customers.

8.3.4. It is difficult to estimate the cost of upgrading the water and sewer network infrastructure without details on the location, size and timing of specific developments

8.3.5. If AWS were to construct a new STW to accommodate a population increase of 14,622 by 2021, an approximate budgetary cost was estimated between £5M to £10M based on similar sized facilities and the assumption the new STW would be sized for 3.8 Ml/d and consist of preliminary treatment, biological secondary treatment and a tertiary treatment for nutrient removal.

8 Source: Estimation of the average household size obtained from Research and Information Officer, Transport Planning and Growth Department, Northampton County Council.

9 Water and Sewage Infrastructure Strategy

9.1. Key Implications

9.1.1. The following list summarises the key issues associated with this infrastructure assessment. These issues define a sustainable infrastructure strategy for water and sewer infrastructure growth through till 2021.

- Anglian Water has a statutory obligation to provide water and wastewater services for domestic purposes under the appropriate section of the Water Industry Act 1991 once a development site has received planning approval, been allocated in an existing local plan or a site allocation under the Local Development Framework Process. The timing and phasing of any infrastructure requirements may be dependant on approval from OFWAT and the Environment Agency, relevant funding from developers where appropriate and subsequent planning approvals that may be required
- The Pitsford WTW is currently near capacity and there are no existing plans to increase capacity at this facility. AWS anticipate additional water for Daventry will be available from the Wing WTW which is in the process of increasing existing capacity by 50 million litres per day (Ml/d) on average and 90 Ml/d peak. The construction of this additional capacity is expected to be finalised in approximately 2010
- The capacity increase at Wing will need to meet growth in a large area, including Peterborough, Corby, Kettering, Wellingborough and Milton Keynes. The increase in capacity at Wing will not be dedicated solely to meet the growth of Daventry in isolation. However, with Pitsford being near capacity, Wing is key to meeting the growth in Daventry
- In support of the Wing WTW expansion, AWS will be installing and reinforcing strategic mains over the next five years. Water mains into the Borough Hill Reservoir in Daventry are part of these improvements
- In order to support the proposed growth, irrespective of which sector, further reinforcement of the strategic water network will be required upstream of Daventry
- It has been estimated that the capacity of the Wing WTW will be fully utilized by the mid 2020's. Beyond 2020 there are a number of schemes proposed in the Draft Business Plan to resolve any deficit in the Ruthamford Water Resource Zone. These include - extension of Clapham WTW, recommissioning of Foxcote and/or Pulloxhill and re-use at Flag Fen. In the long term, schemes will be promoted which will provide an alternative resource for Peterborough and hence, release existing capacity to meet growth in the south of the AWS region
- AWS have advised that the Whilton STW is at capacity and they are currently evaluating sewer treatment alternatives to accommodate additional growth in Daventry
- The capacity of the sewer network is currently under investigation. AWS plan to carry out a limited flow survey to understand capacity in the trunk sewer in March 2009. The sewer network in the Whilton catchment has not been modelled
- Strategic reinforcement of both water and sewer infrastructure will be required to prevent the growth impacting on levels of service to existing customers. Additional sewage treatment capacity would be required. It is anticipated that the Wing WTW could accommodate this growth
- There does not appear to be a mechanism or formalised procedure in place for AWS, the planning authorities, regulatory agencies and developers to develop long-term integrated strategies. AWS has internal strategies which are being communicated as part of the Water Cycle Strategies. Integrated planning for sustainability requires input from all stakeholders. Implications include a non-unified direction forward for Daventry
- Water, foul sewer and storm sewer networks are constructed on an as-needed basis because they are typically paid for by the developer. Upgrades to treatment works are typically funded as part of the AMP process
- Development in the North East and South East sectors of town may be considered a preferred area for development in terms of water and sewer infrastructure, due to proximity to STW and water storage
- Storm sewer systems built in accordance with "Sewers for Adoption", 6th Edition, will be adopted and maintained by AWS. SUDS will typically not be adopted by AWS, but they are evaluated on a case-by-case basis
- Private wells or sewage treatment systems may alleviate pressure on the water and sewer infrastructure, but these systems would need approval from the EA who have stated that decentralised systems are typically only allowed when a development does not have access to the municipal utility system

10 Sustainable Development Scenarios Assessment

10.1. Introduction

10.1.1. The following chapter describes the opportunities and constraints for the provision of sewage and water infrastructure, before setting out the implications of this analysis for growth in terms of Sustainable Development Scenarios for Daventry.

10.2. Principles for Sustainable Sewage and Water Infrastructure Provision

10.2.1. To help inform the assessment of the constraints and opportunities, it is useful to re-consider the basic principles for sewage and water infrastructure provision.

10.2.2. The principles for a sustainable provision of sewage infrastructure to meet the growth needs of Daventry are considered to be:

- Prudent use of natural resources
- Minimising excessive cost
- Minimising undue environmental or stakeholder disturbance
- Various technical considerations

10.3. Sewage – Opportunities and Constraints for Infrastructure Provision

10.3.1. Figure W&S1 (Appendix A) attempts to illustrate the relevant opportunities for providing sewage infrastructure opportunities for providing to meet Daventry's growth.

10.3.2. It would be reasonable to assume that the east side of Daventry would be more favourable for growth in comparison with the west because of the location of the existing sewage treatment works.

10.3.3. Considering the principles for sewage infrastructure, the most prudent use of natural resources is to limit the amount of infrastructure and pumping required to move sewage and install pipes large enough to accommodate future growth.

Implications for Sustainable Development Scenarios (Sewage Infrastructure)

10.3.4. In terms of sewage infrastructure, the above analysis implies that the Sustainable Development Scenarios for the growth of Daventry would involve development on the east side of town. The implication is that infrastructure improvements and investment on the west side of town may be less likely.

10.4. Water Supply – Opportunities and Constraints for Infrastructure Provision

10.4.1. Figure W&S2 (**Appendix B**) attempts to illustrate the relevant opportunities for providing water supply infrastructure opportunities for providing to meet Daventry's growth.

10.4.2. It would be reasonable to assume that the east side of Daventry would be more favourable for growth in comparison with the west because of the location of the existing water storage reservoir atop Borough Hill.

10.4.3. Considering the principles for water infrastructure, the most prudent use of natural resources is limit the amount of infrastructure and pumping required to move water and install pipes large enough to accommodate future growth.

Implications for Sustainable Development Scenarios (Water Supply Infrastructure)

10.4.4. In terms of infrastructure, the above analysis implies that the Sustainable Development Scenarios for the growth of Daventry would involve development on the east side of town. The implication is that infrastructure improvements and investment on the west side of town may be less likely.

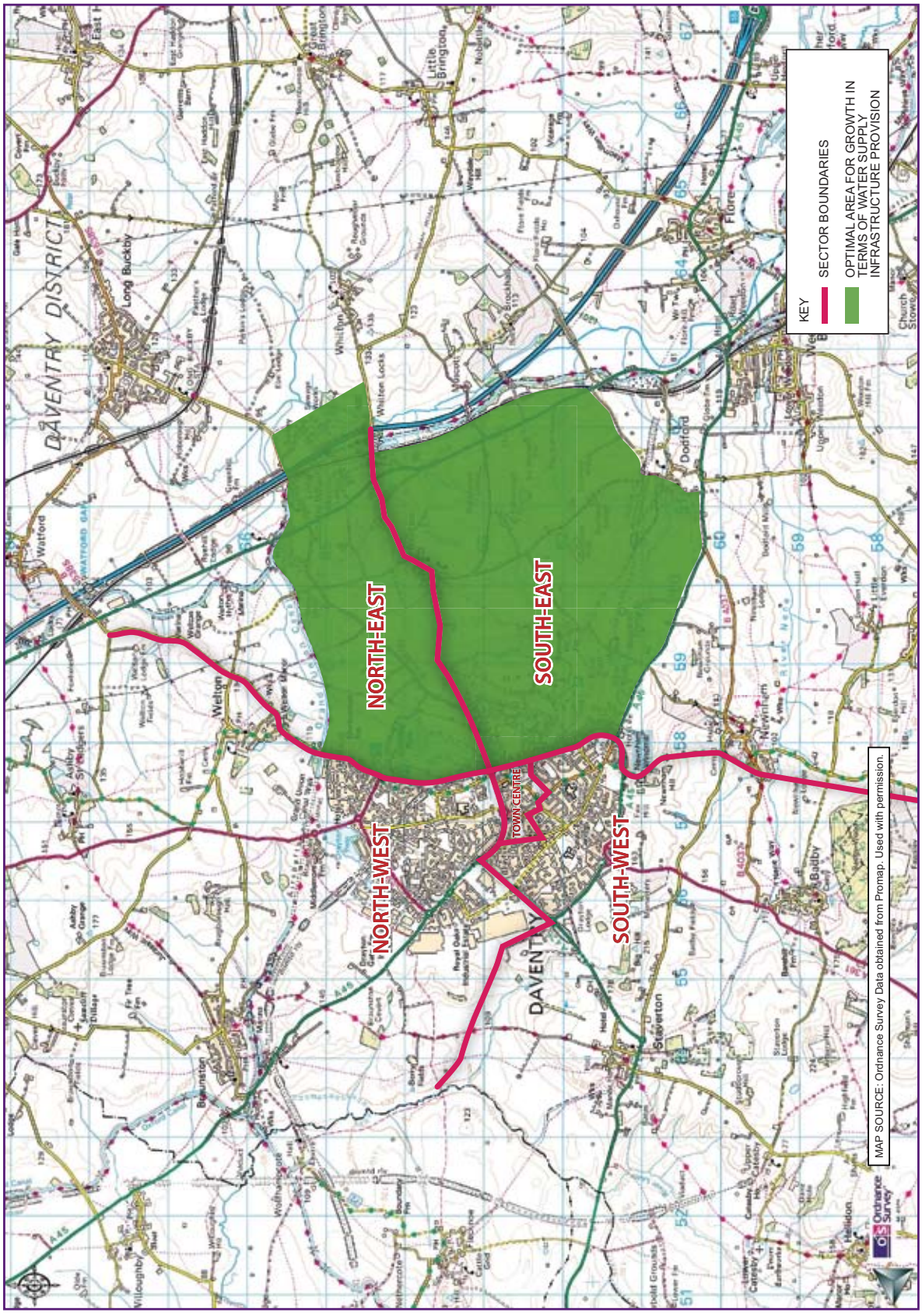
10.5. Conclusions

Sewage and Water Supply Infrastructure

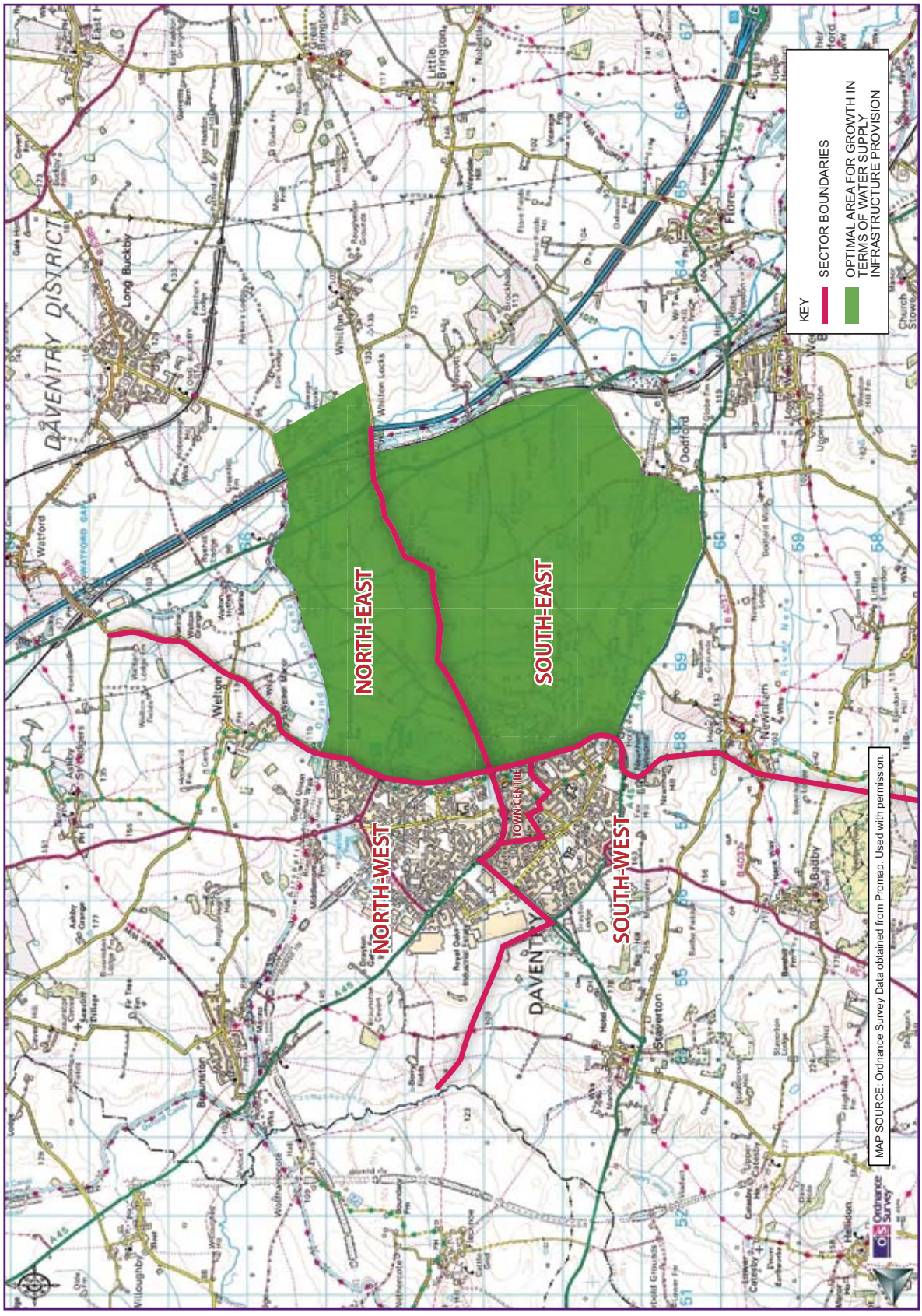
10.5.1. The requirements and impact of water and sewer infrastructure is highly dependent on the location and details of a specific development. Computer models are required to determine the ability of any new development to utilize the existing system. In an effort to adhere to the principles of sustainable infrastructure provision without specific development details, it was determined that minimising the length of a potential water and sewer network, sizing networks to handle future growth, avoiding environmentally sensitive areas and considering constructability would be a prudent use of natural resources, minimize excessive cost, minimize stakeholder and environmental disturbance and address various technical considerations.

10.5.2. As such it is these considerations that have led to the identification of the more sustainable development locations for growth in respect for water and sewage infrastructure.

Appendix A Figure S&W 1 Sewage Infrastructure Sustainable Development Scenarios



Appendix B Figure S&W 2 - Water Supply Infrastructure Sustainable Development Scenarios



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