Rye Meads Water Cycle Strategy Review

Stevenage
BOROUGH COUNCIL

September 2015

Front cover image: Stevenage Brook at the south-east of the town

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Executive summary

A detailed study considering the likely impacts of future development on the water environment and water infrastructure for Stevenage was completed in 2009. This 'Water Cycle Study' considered the whole catchment area of the Rye Meads Wastewater Treatment Works (WwTW) on the Hertfordshire / Essex border.

Rye Meads serves a number of larger towns including Harlow, Hertford and Welwyn Garden City as well as Stevenage. This means that the future plans of a number of local authorities need to be considered to develop a full picture.

Since 2009, there have been substantial changes to the planning system. These have been compounded by wider economic issues, particularly including the downturn and subsequent tightening of access to mortgage finance. These have had a significant impact on development levels and household formation, two key factors underpinning demand for water services.

As such, many of the assumptions underpinning the 2009 study are now obsolete.

This report reviews the key features of a more tightly defined study catchment, focussing on Stevenage and its surrounds. This concludes that many of the environmental issues identified in 2009 remain relevant. This includes the (over) abstraction of water resources leading, in turn, to significant challenges in meeting European directives that require improvement to the quality of all watercourses. However, it also identifies that a number of interventions to address these issues have been agreed.

A review of authorities' emerging Local Plan proposals demonstrates that the levels of development anticipated in the 2009 study have not been realised in the intervening period. Furthermore, planned levels of future development are also significant reduced.

Meanwhile, the economic downturn means that current and future household sizes are now projected to be larger than was assumed in the original study while sustainability standards in new buildings are not being implemented to the same extent.

Through a series of updated development calculations which takes these matters into account, it is demonstrated that Rye Meads WwTW should now have capacity to treat all wastewater arising from within its catchment over the period to 2026 with a reasonable prospect of being able to accommodate demand to 2031.

This has significant implications for the local plans of Stevenage and North Hertfordshire[1]. The 2009 study identified that a number of substantial interventions, including new solutions for the treatment of wastewater, would be required. This update demonstrates that the reduction in the scale of development, both locally and across the broader catchment, means that neither the demand nor the economies of scale necessary to support or justify such a significant infrastructure intervention now exist.

The findings of this report have been developed in consultation with, and endorsed by, both the Environment Agency and Thames Water.

[1] Insofar as the latter lies within Thames Water's operational area

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1 Introduction

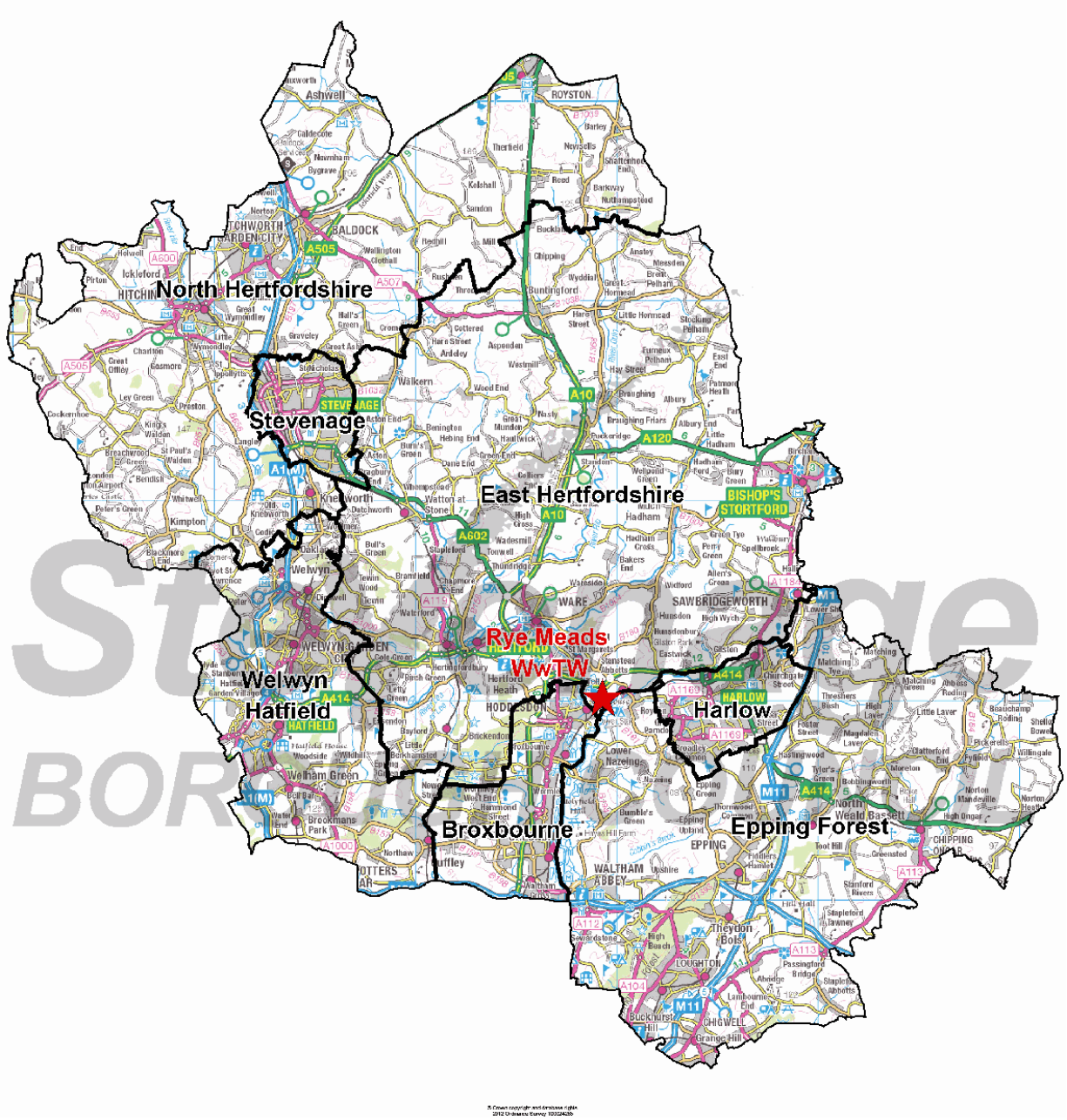
What is the Water Cycle Study?

1.1 A Water Cycle Study (WCS) considers the demand for, and use of, water as part of its continuous circulation on, above and below the earth. It looks at the engineered use of water for domestic consumption and disposal alongside the natural cycle through water courses and aquifers.

1.2 In 2009, Stevenage Borough Council (SBC), in association with other project partners, commissioned Hyder Consulting (UK) Ltd to produce a WCS for the Rye Meads area. This is referred to as "The WCS" or "the 2009 Study" throughout this document.

1.3 A map detailing Rye Meads and the participating local authorities is shown below.

Figure 1: 2009 Water Cycle Strategy study area



1.4 The 2009 Study examined the water resources and infrastructure within the study area. In particular, it focussed upon the capacity of the Rye Meads Wastewater Treatment Works

(WwTW), as the primary recipient of wastewater within the study area, to cater for the proposed levels of growth contained in the East of England Plan (EoEP). It also examined the likely demands that future growth would place upon water supply and the potential to address associated environmental impacts such as flows, water quality and flood risk.

1.5 In broad terms, the main conclusions of the WCS in relation to the demand for water and wastewater treatment included that:

- Subject to the implementation of demand management measures, there would not be a supply / demand deficit in terms of water supply in the study area prior to 2035;
- The water supply network should not constrain new development though network modelling would be carried out on a case by case basis and could reveal local issues;
- The sewerage network is close to capacity in places and upgrades would be required in order for some strategic developments to occur
- Rye Meads WwTW should be able to operate within existing consents until after 2021. Upgrades would be required to increase the existing capacity of the works though the scale of these had been quantified;
- Demand post-2021 would be dependent on the amount of development that actually occurred within the catchment. A long-term solution would need to be agreed once the likely spatial distribution of development was known.

1.6 A range of more detailed conclusions and interventions were identified for individual authorities and / or settlements within the study area. The full WCS is available on the Stevenage Borough Council website as part of the evidence base for its local plan[2]. It should be referred to for more detailed analysis.

Why does the 2009 Water Cycle Study need to be updated?

1.7 Since the WCS was finalised, there have been significant changes to the planning system. These have included:

- The abolition of regional planning and the revocation of regional plans on a case-by-case basis. The EoEP was revoked in January 2013;
- The replacement of all previous national planning guidance into a single National Planning Policy Framework (NPPF) with associated practice guidance (PPG); and
- The introduction, through the Localism Act, of a statutory Duty to Co-operate between local planning authorities and other bodies.

1.8 This has led to a number of changes. In relation to the WCS, the most significant is the scrapping of the housing targets which underpinned the original study. Each local planning authority (LPA) is now responsible for determining the most appropriate housing target for its own area in the future.

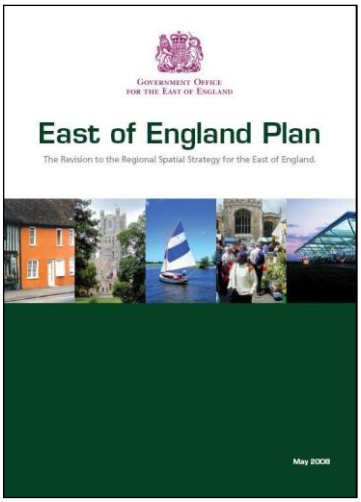
1.9 This has led a number of authorities to halt progress with previous plans and / or re-appraise the housing targets previously set through the EoEP.

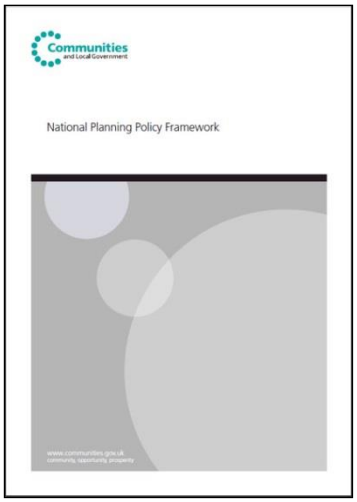
1.10 Wider changes, such as the recessions and economic downturn have also had an impact. This includes lower levels of house building activity, tightening of mortgage supply and consequential impacts in terms of household formation. These mean that the assumptions underpinning the 2009 Study need to be revisited.

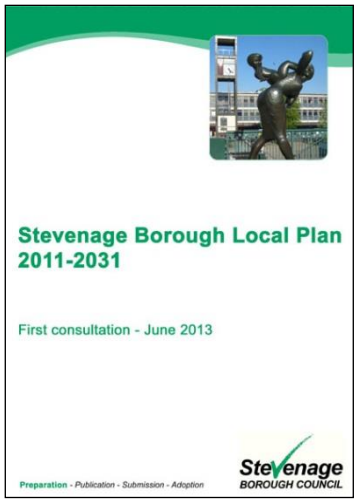
1.11 Other developments will also impact on the future use of water. This includes the production of new business and funding plans by the water companies, the on-going implementation of water management strategies by the Environment Agency driven, in large part, by the

[2] http://www.stevenage.gov.uk/planning/planning-policy/

requirements of the European Water Framework Directive and changes made by Government to the standards that local authorities are allowed to set in terms of water consumption in new development.







Former East of England Plan (2008); National Planning Policy Framework (2012); Stevenage Borough Local Plan 1st Consultation (2013)

1.12 This study reviews these changes in the context of the WCS' original findings, with particular regards to infrastructure capacity and requirements. It seeks to establish the likely, or potential, impact of emerging housing requirements on water supply and wastewater treatment.

1.13 SBC are currently preparing a new local plan for Stevenage. This will set new development targets for the amount of residential and commercial development that will take place over the period to 2031.

1.14 A first consultation on the local plan was carried out in 2013. This sought opinions on a range of matters and suggested a preferred housing target of 5,300 new homes over the period 2011-2031.

1.15 However, following the release of new household projections, a review of the Borough's 'Objectively Assessed Need' was conducted[3]. This shows a significant uplift in the figures that were used to inform the first consultation. Further work has also been carried out to identify potential sites for housing and employment development within the town[4].

1.16 In June 2015, SBC issued a consultation on revised housing targets for the Borough. This identified a preferred target of 7,600 homes for the period to 2011-2031. This has been used to inform the development assumptions in this report.

1.17 Stevenage Borough is 'underbounded'. To the east and south, the town is built right up to the administrative boundary. To the north-east, the Great Ashby neighbourhood already extends into neighbouring North Hertfordshire. North Hertfordshire and East Hertfordshire District Councils are similarly preparing new plans for their areas.

1.18 North Hertfordshire District Council completed a 'preferred options' consultation on their local plan in January 2015. This was a full draft of the plan including proposed land allocations. Several sites around the edge of Stevenage were included.

[3] Stevenage and North Hertfordshire Strategic Housing Market Assessment Update (ORS, 2015)
[4] Strategic Land Availability Assessment (Housing) (SBC, 2014), Strategic Land Availability Assessment (Employment) (SBC, 2014)

1.19 East Hertfordshire carried out consultation on their local plan in 2014. Although it did not propose significant development on the edge of Stevenage, land around the town has been promoted for consideration in response.

1.20 Although the implications of development across their wider administrative areas will need to be considered by each authority, it is important that any emerging proposals for land immediately surrounding Stevenage are considered in a co-ordinated fashion.

1.21 The NPPF requires that all new local plans are 'deliverable' and have considered the likely infrastructure requirements that arise from their proposals. The new local plan will be supported by an evidence-based Infrastructure Delivery Plan which identifies the key projects and interventions that will be required.

1.22 Taking these factors into account, this review tests the implications of a 'preferred development scenario' for the town. It is important to be clear that this scenario has not been formally endorsed as planning policy by any Council. However, it provides an estimate of the quantum and locations of future development that may take place in order to meet development targets.

How has the review been carried out?

1.23 This study is not a full review of the 2009 WCS. It has been carried out insofar as is necessary to determine the potential impact of proposed future development in and around Stevenage. However, where necessary, reference is made to emerging plans and / or strategies for other authorities within the original study area.

1.24 It uses available secondary data sources to update the information and assumptions in the WCS and re-consider the potential impacts in terms of water supply and demand for wastewater treatment.

1.25 All authorities who participated in the 2009 Study were contacted prior to this review taking place. Although there was broad agreement that the study findings would need to be revisited, a number of authorities were not, at the time of writing, in a position to identify preferred development targets or locations or commit to a joint update.

1.26 However, it is recognised that the cumulative impacts of future development from all areas within the catchment will need to be properly assessed – both to ensure that infrastructure requirements are properly identified and also to inform relevant environmental assessments including Sustainability Appraisal and Appropriate Assessment.

1.27 This update considers these broader implications using publicly available and / or agreed information for other authorities. This includes housing numbers released for Local Plan consultations, data from Annual Monitoring Reports and the latest Government household projections.

1.28 This information is used to update findings in relation to Rye Meads' capacity to accommodate future development from across the catchment.

1.29 Further consideration is given to the Stevenage area in terms of the water environment and future demand. This includes areas around the town but outside the administrative boundary as well as Knebworth, which drains into the same river and sewerage networks. The review also encompasses the watercourses between this area and Rye Meads:

- Stevenage Brook from the town to its confluence with the River Beane near Watton-at-Stone;
- The River Beane from east of Weston to its confluence with the River Lee at Hertford;

- The River Lee from Hertford to Rye Meads - recognising that the relative influence of development and change at Stevenage will be increasingly diminished with distance due to the other influences also acting upon this watercourse.

1.30 These findings are assessed against the WCS' original conclusions relating to the scale of future demand and / or the potential timing of necessary interventions to determine if these remain valid.

1.31 The scope of the review was agreed with the Environment Agency (EA) in September 2014. Along with the EA, a number of other groups have been involved in the consideration of future water infrastructure demands and / or the production of this update:

- North Hertfordshire as one of the local planning authorities immediately adjacent to Stevenage and who are proposing development on the edge of the town as part of their emerging strategy;
- Broxbourne, East Hertfordshire, Epping Forest, Harlow and Welwyn Hatfield councils as the other local planning authorities within the Rye Meads authority;
- Hertfordshire County Council (HCC) as Lead Local Flood Authority and co-ordinator of wider projects examining the cumulative impacts of proposed change on the water environment; and
- Thames Water (TW), who are responsible for the Rye Meads wastewater treatment works, water disposal in the significant majority of the Stevenage urban area and Knebworth and water supply in the southern part of the 2009 study area.

1.32 Affinity Water (AfW), who are responsible for water supply in the review area, and Anglian Water (AgW), who are notionally responsible for wastewater disposal in the north-west of the Stevenage urban area, were contacted as part of the review but have not made any substantive contribution to its outputs.

How will the other findings of the 2009 Study be reviewed?

1.33 As explained above, the 2009 Study considered the implications of proposed development across the whole of the Rye Meads catchment. Following the abolition of the East of England Plan, authorities are free to pursue their own timetables for the preparation of their plans.

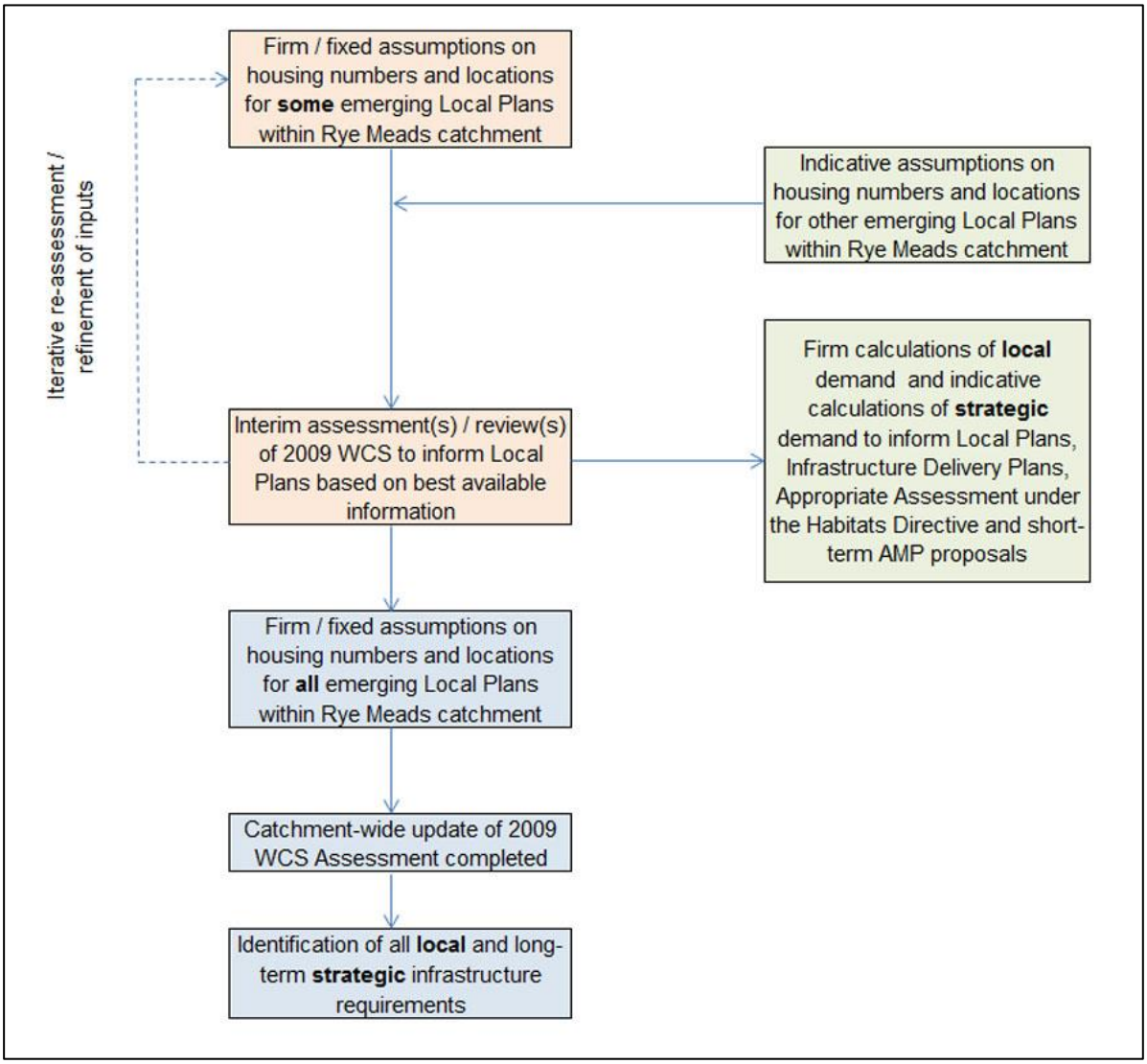
1.34 As such, the information that is required to enable a definitive and comprehensive update of the 2009 WCS is likely to become available iteratively as individual, or small groups of, authorities refine their emerging development strategies.

1.35 This process is shown in the diagram below. Stevenage and North Hertfordshire are the first authorities to update the findings of the WCS since 2009. Both authorities are working towards the publication of a full draft plan. As such, the development assumptions for these areas are based on preferred, or emerging, development strategies.

1.36 Other plans within the catchment are at earlier stages of plan preparation and / or will influence watercourses and habitat which will not be affected by development around Stevenage and / or (may) require the resolution of complex, cross-border issues. This update uses best available information for these areas but it is anticipated that this will be refined by the respective affected authorities as they progress.

1.37 One means in which this wider clarification of development scenarios and demand may occur is in the county-wide project currently being pursued by Hertfordshire County Council. This aims to identify sources of stress in the water environment over the long-term to inform strategic level planning and infrastructure investment decisions. A 'Phase 1' report is anticipated early in 2016. The project may be extended into a second phase which undertakes more detailed analysis of the issues raised.

Figure 2: Water Cycle review process



<u>What does this review consider?</u>

1.38 This review follows the structure of the 2009 WCS to enable easy comparison and reading between the two studies.

1.39 **Section 2** establishes the study catchment. It details a smaller area of focus in which the potential impacts of development around Stevenage will be considered. It updates the findings of the 2009 WCS in relation to this area of focus with particular regard to:

- The Water Framework Directive;
- Hydrological issues;
- Surface water quality;
- Hydrogeological issues;
- Environment and key habitats; and
- Infrastructure.

1.40 **Section 3** provides an update on the planning policy context since 2009. It considers emerging development proposals for the authorities within the catchment of the Rye Meads WwTW. It considers the overall levels of development that may now occur and compares these with the assumptions of the original study.

1.41 **Section 4** contains revised development impact calculations in the context of the information in Section 3. It gives consideration to likely future flows to Rye Meads.

1.42 **Sections 5 and 6** of the 2009 WCS considered catchment capacity and conducted some initial optioneering to inform future infrastructure investment decisions. The respective sections of this document consider how this information might now be viewed in the context of the updated information in the preceding sections of the report.

1.43 **Section 7** brings together the main findings of the report and sets out the conclusions.

2 Study catchment

2.1 The 2009 Study encompassed a wide area. This included the entirety of the local authorities of Stevenage Borough and Harlow District councils as well as significant parts of Welwyn Hatfield District, East Hertfordshire District and Broxbourne Borough councils. The study area also included small parts of North Hertfordshire and Epping Forest District Councils.

2.2 The study area was primarily chosen to include the areas that are connected to the sewerage system of the Rye Meads WwTW. The study area also encompassed the wider area in order to assess the potential to divert flow from the Rye Meads catchment.

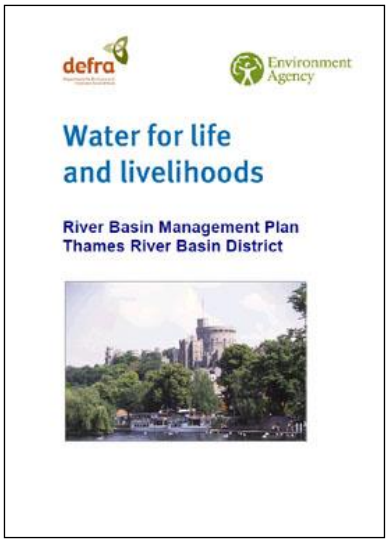
2.3 This update paper focuses upon a reduced area:

- In terms of hydrology, this is the main rivers that flow between Stevenage and the Rye Meads WwTW:
  - The River Beane (including the tributary of Stevenage Brook); and
  - The River Lee from the confluence with the River Beane at Hertford to Rye Meads; while
- In terms of future development, this is the administrative area of Stevenage and its immediate surrounds including Knebworth.

2.4 The areas of focus for the review are shown in the map on the following page. Other sites and areas within the 2009 study area are considered as appropriate.

2.5 Plainly, the main physical features of the study area in terms of main settlements and hydrology remain unchanged from the WCS as these are only subject to (ultra-) long term change. This section highlights key updates and differences in terms of both the natural water environment and infrastructure since 2009.

<u>The Water Framework Directive and River Basin Management Plans</u>



2.6 The European Water Framework Directive (WFD) sets out a strategy for protecting and enhancing the quality of groundwater, rivers, lakes, estuaries and coasts. It came into force in 2000 with the aim of ensuring all water bodies reached 'good' status by 2015.

2.7 Although many of the provisions of the Directive were in place at the time of writing the 2009 WCS, a number of further milestones have subsequently been reached including:

- **December 2009**: Publication of River Basin Management Plans (RBMPs)
- **December 2012**: Identification of measures required in each River Basin and interim progress reports on their implementation

2.8 The significant majority of the area of focus lies within the Thames River Basin District (RBD). The watershed that marks the boundary with the Anglian RBD passes through the north-west corner of Stevenage, broadly follows the Borough boundary to the west and then loops west and then north across the Langley Valley. This is shown in Figure 4, below.

2.9 The majority of the analysis below therefore focuses upon the Thames RBD. Relevant implications for the Anglian RBD are discussed where appropriate.

Figure 3: Areas of focus for current review

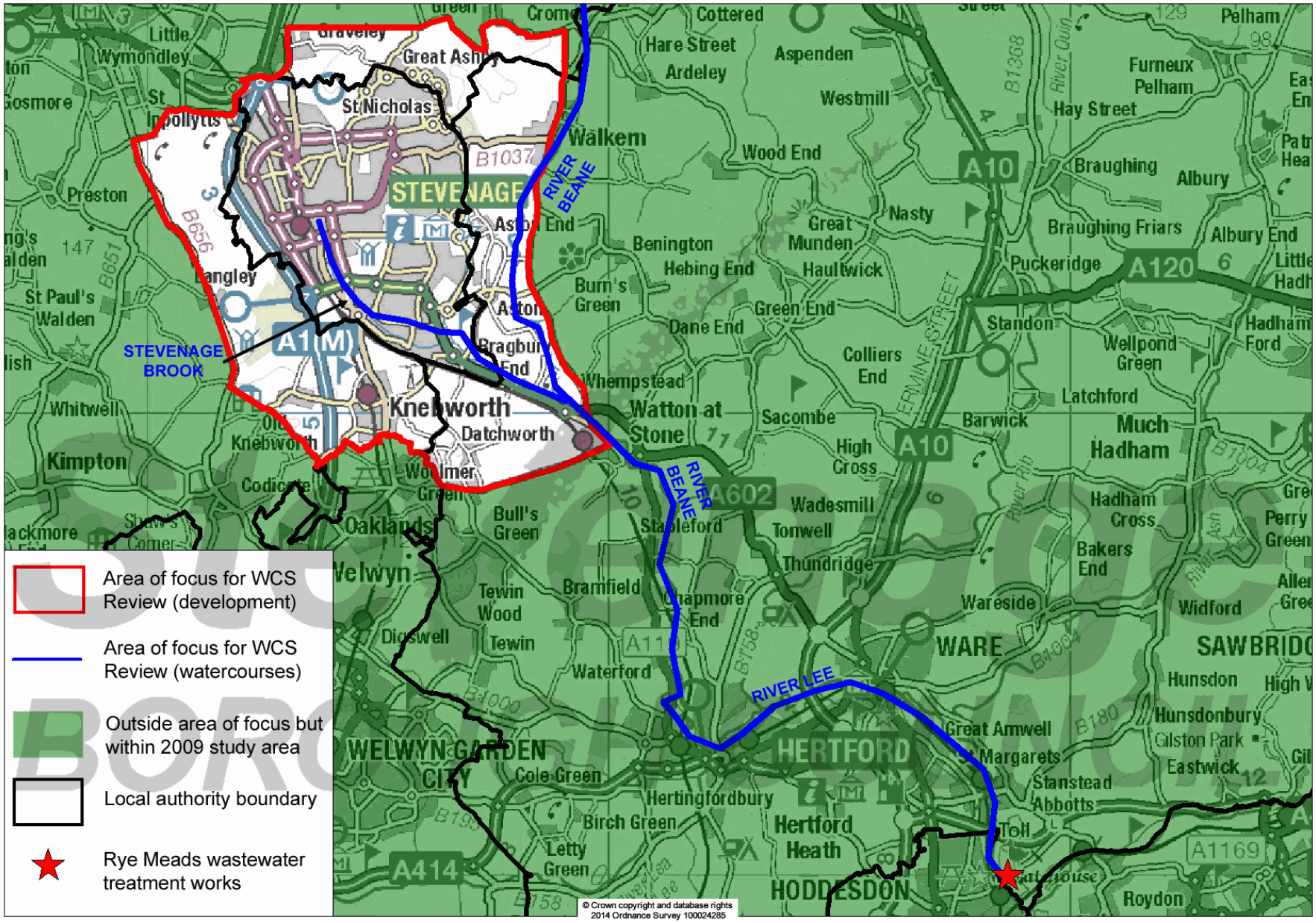
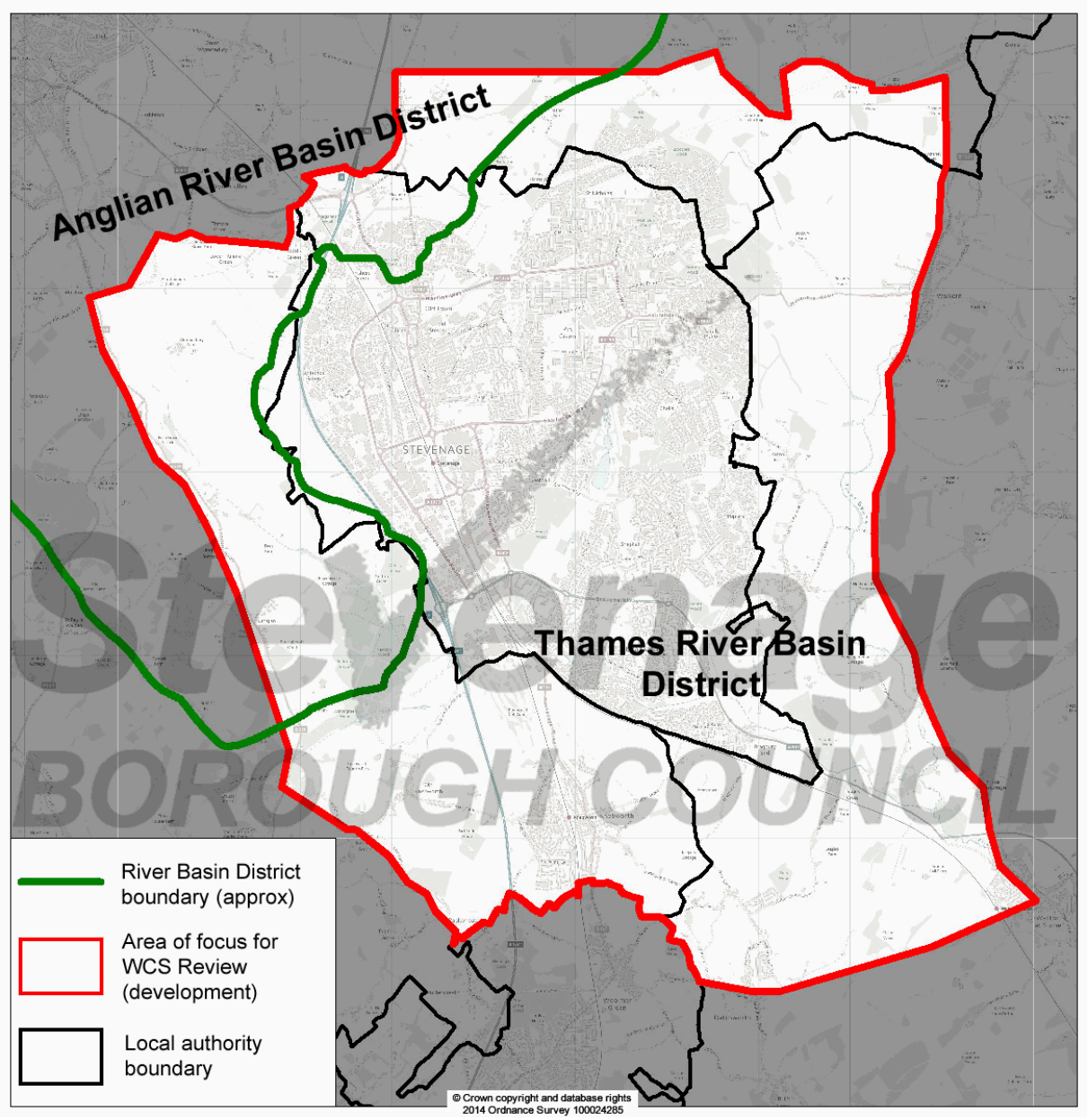


Figure 4: River Basin District Boundaries



Thames River Basin District

2.10 The Thames RBMP was published in line with the provisions of the Directive. It identified a challenging series of actions that would be required in order to meet the requirements of the WFD. It recognised that, at the time of writing, only around one-quarter of surface waters and one-third of groundwaters within the Thames River Basin met the standards required by the WFD. A number of reasons for failure were identified, including abstraction

2.11 The RBMP identified that the majority of surface waters within the Thames RBD would not meet the 2015 target to reach 'good' status. RBMPs will work on three six-yearly cycles with the second of these commencing in 2015. Where the target of the WFD cannot be met by 2015, alternative objectives of meeting 'good' status by either 2021 (at the end of the second RBMP cycle) or 2027 (third) are identified where feasible.

2.12 The RBMP said that achieving 'good' status across all water bodies in the Thames RBD by 2027 is not possible using only current technologies. It set an aspiration to achieve good status in at least 60% of bodies by 2021 and as many as possible by 2027.

2.13 The RBMP contained further analysis and targets for more detailed sub-areas within the Thames RBD. The area of focus for this review falls wholly within the Upper Lee sub-area.

Upper Lee Catchment Summary

The area is dominated by the upper chalk formation, which serves as an important water supply source and base flow for many local streams and rivers. The increased demand for water has compounded many low flow issues, most noticeably on the rivers Mimram, Beane and the backloops of the Lee and Stort navigations. This has influenced the diversity of plant, invertebrate and fish species currently found.

Groundwater quality is variable with large areas of the lower catchment being affected by a significant contaminated site. River water quality is generally good. The Stort and Lee Navigations, along with discharges from Stansted Airport and urban diffuse pollution have affected water quality in some of the eastern watercourses. Urban run-off can also lead to a deterioration in water quality. This is particularly noticeable within the Stevenage Brook and the River Lee through Luton.

The main land use in the Upper Lee catchment is predominantly arable agriculture, bringing pressure from diffuse rural pollution. The catchment has been designated a Nitrate Vulnerable Zone as land management practices have led to many of the watercourses reaching high nitrate and phosphate levels.

The use of in-river structures and unsympathetic management of river channels has also compromised the value of some watercourses. Many of these structures are used to maintain water levels but equally restrict fish passage.

2009 Thames River Basin Management Plan (p.73)

2.14 The RBMP set a target for the proportion of river and lake water bodies in the Upper Lee catchment at good ecological status or potential to increase from 16% to 19% by 2015. It aimed for 44% of rivers to improve for one or more of the three measure elements ~ biological, ecological and chemical by the end of the first cycle.

2.15 It is recognised that many of the actions, programmes and changes subsequently identified in this review for the period since 2009 flow, either directly or indirectly, from the overarching requirements of the WFD and implementation of the RBMP. For the avoidance of repetition these links are not explicitly identified in each instance unless particularly pertinent.

2.16 In 2013, the Environment Agency ran a *Challenges and Choices* consultation to inform development of the draft 'RBMP2'. This recognised that 95% of the actions in the RBMP had started or been completed. It also identified that Hertfordshire had some of the highest water use per person in the country ~ around 10% above the national average ~ and this was a contributory factor to the stresses upon water supplies. It identified a need for a significant reduction in abstraction.

2.17 Draft RBMP2 was released for consultation in October 2014. At RBD Level, six significant water management issues are identified:

- Pollution from waste water – affecting 50% of water bodies in the RBD;
- Physical Modifications – 45%;
- Pollution from Rural Areas – 33%;
- Changes to the natural flow and level of water – 27%;
- Pollution from towns, cities and transport – 19%; and
- Negative effects of non-invasive species – 4%

2.18 New local measures are proposed to address these issues.

2.19 It is proposed to revise the headline objective to achieving at least good status or potential in 61% (333) of water bodies by 2027. For 39% (213) of water bodies an alternative objective of less than good status or potential is proposed.

2.20 The consultation also includes an updated catchment summary for the Upper Lee. This recognises that

- The catchment is an area of 'water stress', where average daily water use is amongst the highest in the country;
- Groundwater and rivers supply water for local people, and 90% of water abstracted is used for this purpose;
- Since 2009, the Environment Agency has carried out 380 investigations in the Upper Lee catchment; and
- A number of key partnerships, including the Beane and Mimram Partnership have helped to influence and progress key initiatives.

2.21 The catchment summary states that 96% of the water bodies in the Upper Lee catchment should have a long term objective of achieving good status. RBMP2 will be published in its final form in December 2015.

2.22 The Environment Agency's *Catchment Data Explorer*[5], contains a significant quantity of monitoring data for the water courses within the area of search and should be referred to for detailed technical information. This data identifies the following changes to the overall classification of the water bodies within the area of focus:

- The **upper River Beane** (from source to Stevenage Brook) fluctuated between moderate and poor between 2009 and 2013. In the first cycle of 2014, the classification was poor before falling to **bad** in the second cycle of 2014;
- The **lower River Beane** (Stevenage Brook to River Lee) was classified as **moderate** in 2009 but has been rated **poor** since 2010;
- The **Stevenage Brook** was classified moderate from 2009 to 2012 but has been **poor** since 2013; while
- The **Lee Navigation** has fluctuated between moderate and poor between 2009 and 2014 but achieved **moderate** status during the last round of monitoring.

2.23 It should be noted that the entire stretch of river takes its classification from the result(s) across a number of categories. A river can be classed as "good" in all but one category but still be ranked on the one measure which fails to meet the WFD standard.

2.24 The following key pressures are identified which are preventing watercourses from achieving 'good status'. Where relevant, these are also discussed further under relevant headings below:

- Groundwater abstraction is identified as the key issue for the **River Beane**, with physical modification due to agriculture and rural land management being an issue in relation to invertebrates between the river source and Stevenage Brook;
- Physical modification due to urbanisation is a key pressure upon the **Stevenage Brook**, particularly in relation to invertebrate levels; while
- The **Lee Navigation** (between Hertford and Fieldes Weir) contains barriers to fish migration due to physical modification while surface abstraction by the water industry impacts upon the hydrological regime.

2.25 Further detailed monitoring data has been obtained from the EA. This reveals that:

[5] http://environment.data.gov.uk/catchment-planning/

- Stevenage Brook is rated poor for fish and bad for the hydrological regime;
- The River Beane (from source to Stevenage Brook) is rated bad for invertebrates, dissolved oxygen and the hydrological regime with high levels of ammonia;
- The River Beane (from Stevenage Brook to Lee) is rated poor for fish and bad for the hydrological regime with high levels of phosphate and ammonia; while
- The Lee Navigation (from Hertford to Fieldes Weir) is rated poor for macrophytes and phosphates, bad for the hydrological regime with high levels of dissolved oxygen and ammonia

2.26 The EA consider that, overall, for these water bodies, action is needed to improve or change riparian land management and to reduce diffuse and point source pollution impacting the water bodies. In addition, adapting or removing in channel structures such as weirs, and restoring more natural channel form, are considered important. Increasing flow is also necessary, and ambitious plans by Affinity water to reduce abstraction impacting local water bodies, together with river channel (morphology) improvements are currently in development.

2.27 Summaries for the watercourses relevant to this update are reproduced in Appendix 1.

Anglian River Basin District

2.28 As shown in Figure 4, the north-west of the area of focus lies within the Anglian RBD and is therefore covered by the RBMP for this area. The relevant area falls within the Upper and Bedford Ouse Management Catchment and the operational catchment of the River Ivel.

2.29 There are no monitored water bodies within the area of focus. This land drains to the River Purwell, monitoring of which begins just outside the north-western boundary of the area of focus at St Ippolyts.

2.30 The EA summary for this water body is included in Appendix 1. It can be seen that the overall water body classification has declined from moderate to poor since 2009. The objectives of draft RBMP2 are to restore the condition to moderate.

2.31 Detailed EA data shows this watercourse has high levels of ammonia and dissolved oxygen.

2.32 Any treatment solutions at the headwaters of the River Purwell, at Anglian's Ashbrook treatment works, would have potential WFD implications. This is discussed further in Section 6 of this report.

Hydrological Issues

2.33 The 2009 WCS identified eight main rivers, of which two are most relevant to this update:

"The **River Beane** is a river of 11 miles in length that derives much of its flow from chalk aquifers, which form springs in several places along the length of the river. The river has a predominately natural character with low, often shallow banks and a clear moderate to fast flow over gravels. The River Beane is joined by the Stevenage Brook upstream of Watton-at-Stone. This increases peak flows in the Beane, cause by the urban runoff from Stevenage. The Stevenage Brook drains a highly urbanised catchment area (75%) therefore the town of Stevenage significantly influences the river system. Basic statistical analysis of the gauged data indicates a catchment dominated by peak flows rather than base flows as would be expected in such a catchment"

"The **River Lee** is 42 miles long and travels from its source near Luton to its confluence with the Thames. As it passes through the catchment the characteristics change from being a largely unmodified channel supporting excellent bank-side habitat with wide areas of marsh and wet grassland, to becoming more constrained within the urban fabric of the town with canal interactions and locks. From Hertford to its confluence with the Thames at Bow Creek

> the main channel of the River Lee is split between the River Lee Navigation (with water levels and associated structures controlled by British Waterways) and the old course of the river. This reach also includes the convergence of four of the five major tributaries of the Upper Lee (Ash, Beane, Mimram and Rib), resulting in a section of major flow accretion with a minimum of 25 Ml/d [mega litres per day] even in times of drought."
>
> 2009 Water Cycle Study (pp.12-13)

2.34 The 2009 study identified three key hydrological issues relevant to this update:

- Low river base flows in the River Beane;
- Flood risk, especially at Watton-at-Stone and towns along the middle Lee. Hertford was identified as being especially at risk due to the convergence of three rivers, including the River Beane, with the River Lee in the centre of the town; and
- Key areas of designated wetland habitat.

2.35 The first two of these are discussed in turn below. Designated habitats are considered at paragraph 2.79.

River base flows

2.36 Since the completion of the 2009 Study, the EA have continued to develop the Restoring Sustainable Abstraction programme.

2.37 DEFRA presented the Water for Life White Paper to Parliament in 2011. Among a number of measures, this set out proposals for an overhaul of the abstraction regime to make it more responsive to the competing challenges of climate change and growth in demand. It recognised that a number of areas had suffered from over-abstraction.

2.38 Consultation on these changes ran from December 2013 to March 2014. It is anticipated that new legislation to allow these reforms will be introduced during the course of the current Parliament.

2.39 The EA recognised that the Beane suffered from low flows as early as the 1990s. The river has been subject to a number of studies while campaign groups – ranging from local to international - have lobbied for its restoration.

2.40 Working in partnership with Affinity Water (AW), the EA identified that low flows in the River Beane could primarily be attributed to groundwater abstraction. This in turn has led to an adverse impact on ecology.

2.41 The main source of abstractions is the Whitehall Pumping Station, to the south of Aston. This is a significant source of water supply for the Stevenage area. In 2012, the EA advised that Whitehall should be closed.

2.42 The implications of this for Affinity Water, and their response, is discussed further below in the section on infrastructure (see paragraphs 2.109 to 2.123 and section 5)

Flood Risk

2.43 A hierarchy of documents seek to identify flood risk and mitigation or alleviation measures.

2.44 The Thames Catchment Flood Management Plan was published in its final form in December 2009, shortly after completion of the WCS. The Upper Lee area was identified as one where flood risk was generally being managed effectively. It sought to maintain capacity in the river system and retain remaining floodplain for compatible uses.

2.45 A small area to the north-west of Stevenage lies within the area covered by the Great Ouse Catchment Flood Management Plan. This was published in January 2011.

2.46 As largely undeveloped land, it was identified in a large rural sub-area which was generally considered to be at low to moderate flood risk where risk was generally being managed effectively.

2.47 A more detailed Flood Risk Management Strategy was adopted in 2013. In relation to this update, this document covers the area from Ware to the Rye Meads WwTW. In the sub-area from Ware to the River Stort confluence ~ located immediately south of Rye Meads ~ no specific structural measures were identified.

2.48 It recommends the continued maintenance of the existing channels and compliance with current planning policies on flood risk.

2.49 Since the completion of the WCS, Stevenage have completed a review of their Strategic Flood Risk Assessment (SFRA). This did not result in any substantive changes from the findings of the 2009 Study.

2.50 Neither North Hertfordshire nor East Hertfordshire have updated their SFRAs since the publication of the 2009 Study.

2.51 The Environment Agency maintains a public record of its environmental and monitoring activities, *What's in Your Backyard?*[6]. Maps detailing risk of flooding from rivers and surface water are reproduced on the following pages.

2.52 Figure 5 details the risk of flooding from rivers. It can be seen that the largest areas at risk lie downstream of Stevenage, particularly from the confluence of the River Beane and Dane End tributary, south of Watton-at-Stone. There are significant areas of flood risk from the confluence with the River Lee to the Rye Meads WwTW.

2.53 The areas of flood risk within Stevenage correspond with those identified in the SFRA, following the route of the Stevenage Brook from south of the town centre through the Broadwater neighbourhood. A risk is also identified along the eastern edge of the Poplars neighbourhood.

2.54 Figure 6 details the risk of surface water flooding within the area of focus for development. This risk is present in a greater number of locations, being associated with drainage routes and sewers as well as natural watercourses.

2.55 Within Stevenage, areas of risk are identified in a line which runs broadly from north to south through the Old Town and new town centre. Areas in the east of the town generally drain in a south-easterly direction towards the Beane Valley following the topography.

2.56 To the west of the town, a line of flood risk follows the topography draining northwards towards Hitchin.

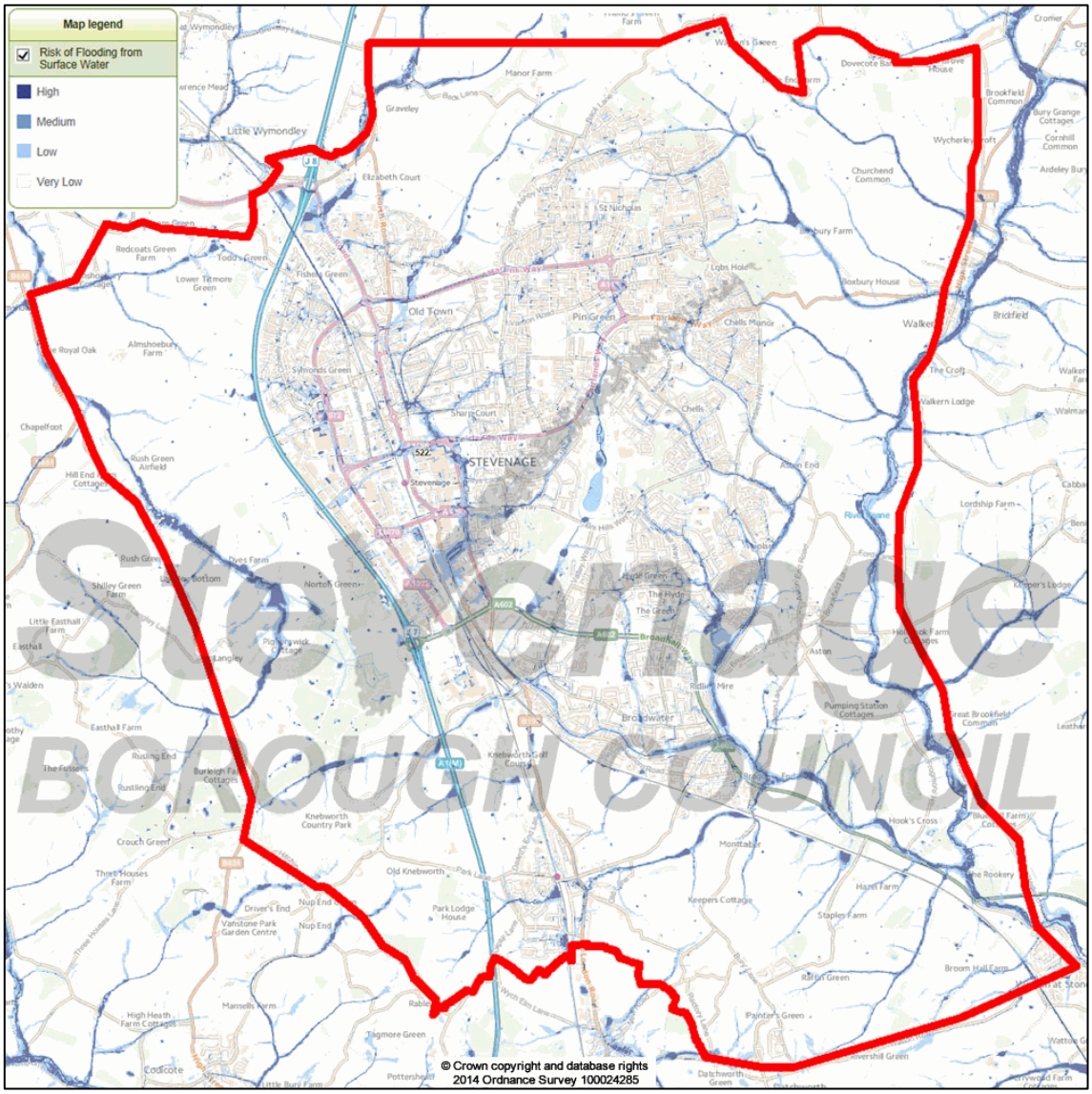
2.57 Alongside the consultations on RMBP2, the EA are consulting upon draft Flood Risk Management Plans (FRMP) which are also due to be published in December 2015. The Thames FRMP identifies 29 existing future or proposed flood prevention measures within the Upper Lee catchment (15 on-going, 4 agreed and 10 proposed).

[6] http://apps.environment-agency.gov.uk/wiyby/default.aspx

Figure 5: Risk of flooding from rivers

Source: Environment Agency. Contains Environment Agency information © Environment Agency and database right

Figure 6: Risk of surface water flooding



Source: Environment Agency. Contains Environment Agency information © Environment Agency and database right

2.58 It acknowledges that, in the main urban areas of the Upper Lee catchment such as Stevenage, rivers flow through well-defined flood plains with relatively few properties at risk from fluvial, or river, flooding. These urban areas are highly impermeable and there are known risks from surface water flooding.

2.59 The site-specific scheme of most relevance to this update is the proposed Hertford Flood Alleviation Study. This will investigate the feasibility of flood alleviation schemes to protect the town. This sits alongside more generic measures which seek to develop surface water management plans and promote the consistent use of standards by Local Planning Authorities in relation to SFRAs and SUDs.

Surface Water Quality

2.60 For twenty years, the Environment Agency used a General Quality Assessment approach to assess river water quality by looking at chemistry, biology and nutrients. The 2009 WCS reported against these parameters.

2.61 Following the WFD, the Environment Agency has revised its monitoring regimes in order to comply with the new requirements. This now looks at over 30 measures which are used to generate an ecological status and a chemical status.

2.62 The RBMP identified the current status of rivers in the Upper Lee catchment when it was published in 2009. At this time, all the rivers within the area of focus for this review were rated as moderate.

2.63 The latest EA monitoring information is shown in Figures 7 and 8 on the following pages. It can be seen that the current ecological statuses of the watercourses pertinent to this review remain unchanged from those identified in the RBMP.

2.64 Within the defined areas of focus, no further change in ecological status is anticipated by the end of 2015 and the first RBMP cycle. This reflects the recognition in the RBMP that there would be significant challenges in reaching the objectives of the Water Framework Directive. The impacts of measures outlined in this update, such as the proposed reduction in abstraction from the River Beane, will be seen through the second and third cycles of the management plan over the periods to 2021 and 2027 respectively.

2.65 Stevenage Brook and the River Beane do not form part of the chemical monitoring programme. From their confluence at with the River Lee at Hertford, this water course records good chemical quality through the area of focus to Rye Meads WwTW.

2.66 However, the chemical status reverts to ‘failed’ status immediately south of Rye Meads where the Lee converges with the River Stort. The Environment Agency have identified that Rye Meads treatment works contributes to a chemical (phosphate) failure, whilst discharges from the River Stort – which are beyond the remit and influence of this review – contribute to other chemical failures.

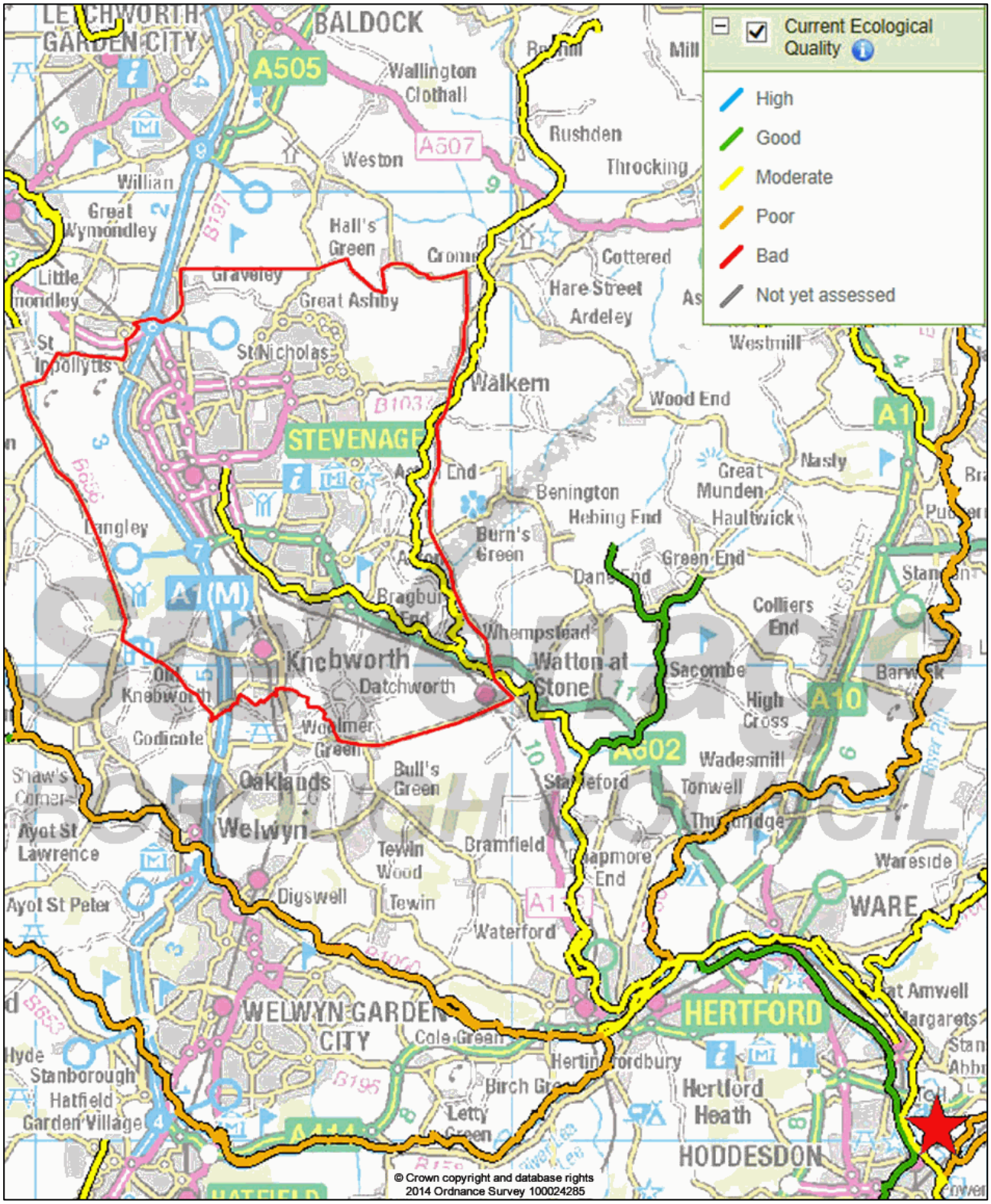
Hydrogeological issues

Groundwater

2.67 The 2009 Study identified that the geology underlying the catchment contains a significant chalk aquifer which is used extensively for water abstraction.

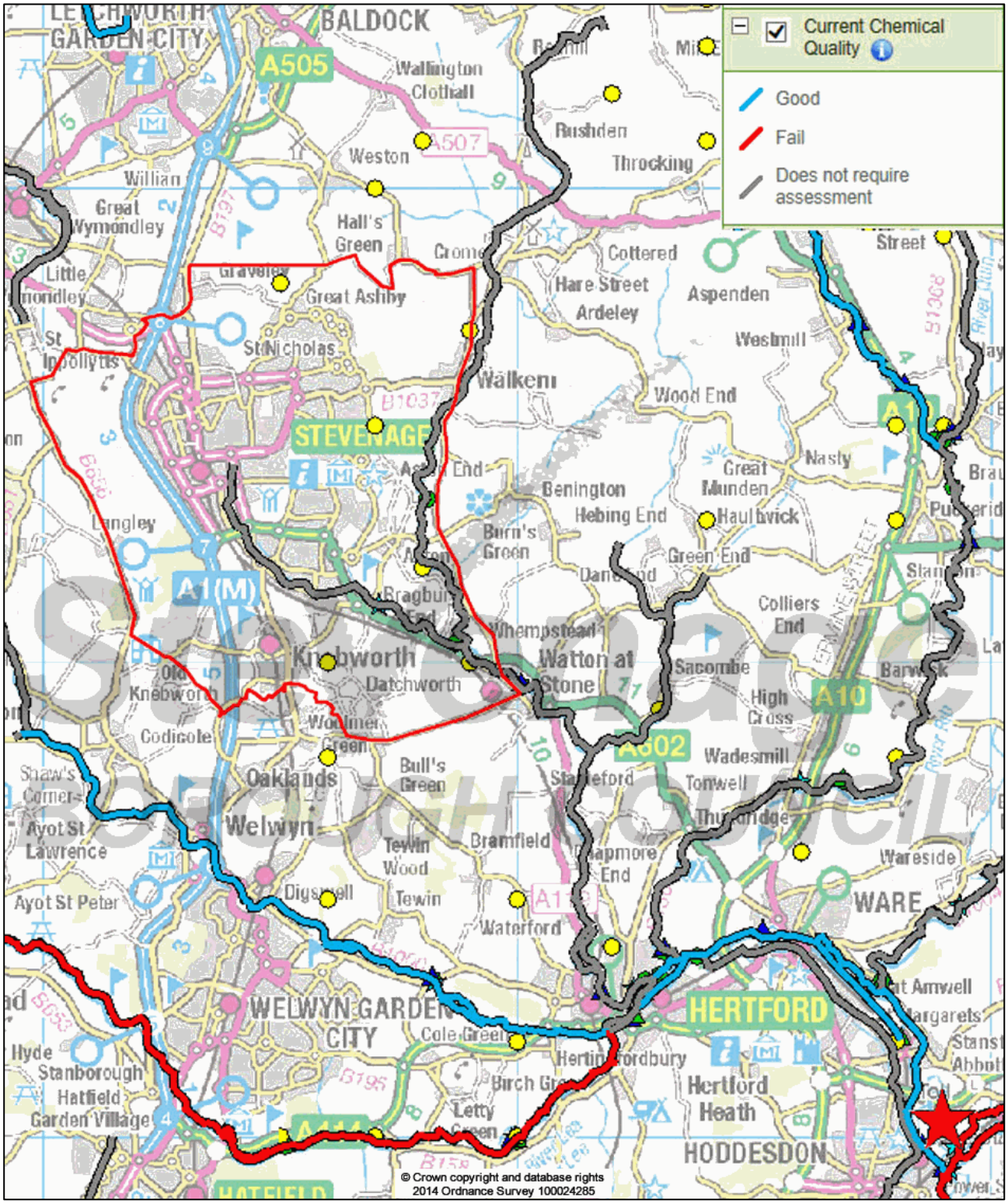
2.68 The Upper Lee Catchment Abstraction Management Strategy (CAMS) was updated by the Environment Agency in 2013. This recognises that the river network in the area it covers ~ including the Stevenage Brook, River Beane and River Lee ~ is well below the resource required to support river ecology at most assessment points.

Figure 7: Ecological river quality



Source: Environment Agency. Contains Environment Agency information © Environment Agency and database right

Figure 8: Chemical River Quality



Source: Environment Agency. Contains Environment Agency information © Environment Agency and database right

2.69 It states that no new consumptive licenses from surface waters or the groundwater aquifer will be permitted. The CAMS identifies a range of actions, including an on-going programme of groundwater modelling to increase understanding of resource availability.

2.70 Affinity Water are responsible for water supply within the area of focus for this review. They are responsible for plans saying how they will maintain water supply. Affinity published an updated Water Resource Management Plan (WRMP) in June 2014. This identifies that approximately 60% of their water supply is sourced from groundwater and the chalk aquifer. It sets out how this resource will be managed over the period to 2040. This includes proposals to alleviate stresses on the River Beane (see paragraphs 2.36 to 2.42 above).

2.71 Groundwater quality is monitored by the EA. The latest maps are shown in Figures 9 and 10 on the following pages. The quantitative quality (the amount of water available) is rated as poor across the area of focus. No change to this status is anticipated by the end of 2015.

2.72 This is consistent with the analysis above. To achieve good groundwater status, the quantum of water required to recharge the aquifer should not exceed levels of abstraction.

2.73 Chemical status is a measure of water quality. Groundwater which feeds into watercourses in the Upper Lee / Thames catchment is considered to be of poor and deteriorating quality with an anticipated poor rating in 2015. This is consistent with the high levels of water stress.

2.74 Groundwater which feeds across the watershed into the Great Ouse / Anglian Water catchment is considered to be of good quality but deteriorating. It is expected that this area will retain its good status at the end of the current RBMP cycle in 2015.

2.75 The aquifer is also susceptible to groundwater contamination from the surface. Source protection zones are identified around wells, boreholes and springs as the groundwater from these zones will all, eventually, end up in public water supply.

2.76 These zones are used to limit allowable discharges and monitor potentially polluting activities. The current Source Protection Zones for Stevenage and the surrounding area are detailed in Figure 11. There have been no substantive changes to the zones around Stevenage since the completion of the 2009 Study.

2.77 Nitrate Vulnerable Zones (NVZs) are established in areas where farming activities have caused pollution of the water environment. The whole of the area of focus for this review has been identified as a NVZ for surface water. The areas to the north, east and west of Stevenage are additionally identified as a NVZ for groundwater.

2.78 These various designations cumulatively demonstrate that there are significant stresses upon water supplies in the study area.

Environment and Conservation

Designated sites

2.79 There are a number of sites within the area of focus that have been designated as being of local, national or international importance. There is one European Site within the area of focus for this review. This is the Lee Valley SPA. The whole of the SPA is also designated as a RAMSAR site[7].

[7] Paragraph 118 of the National Planning Policy Framework (NPPF) states that RAMSARs should be given the same protection as European Sites.

Figure 9: Quantitative groundwater quality

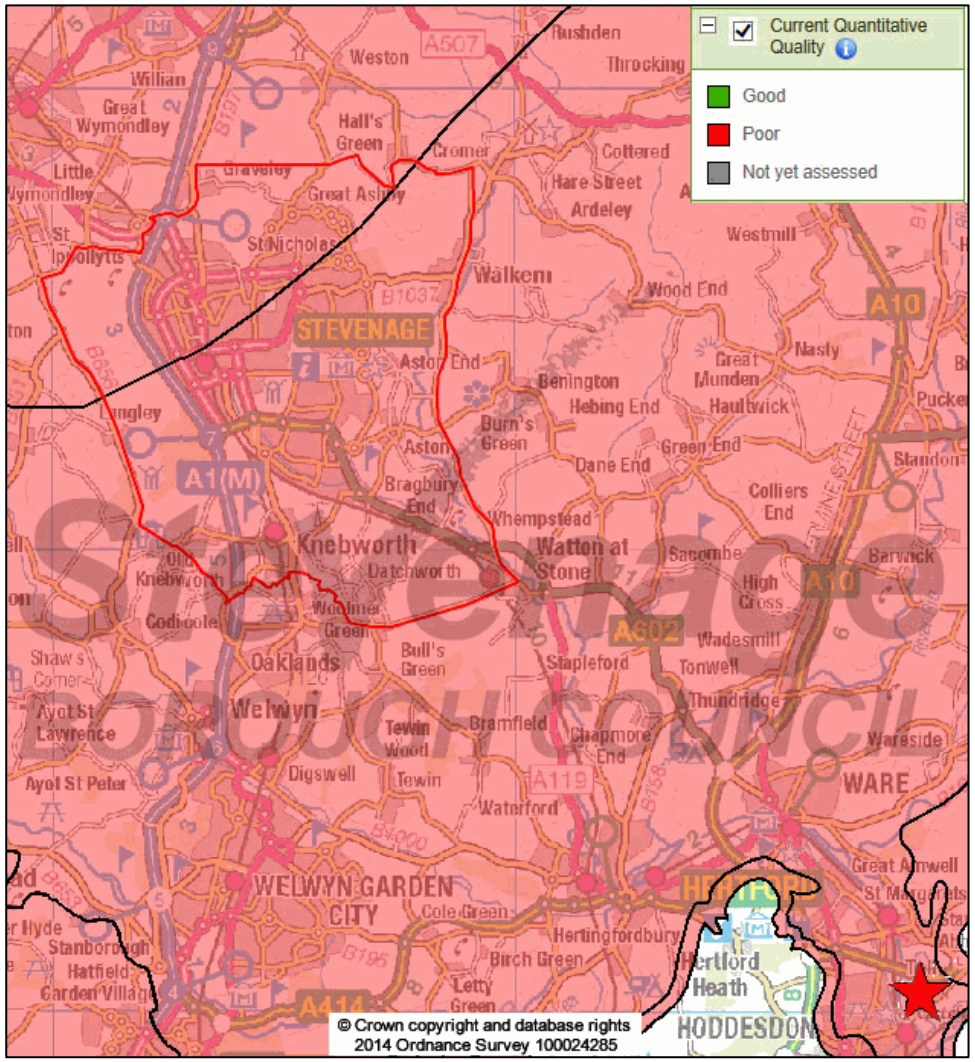
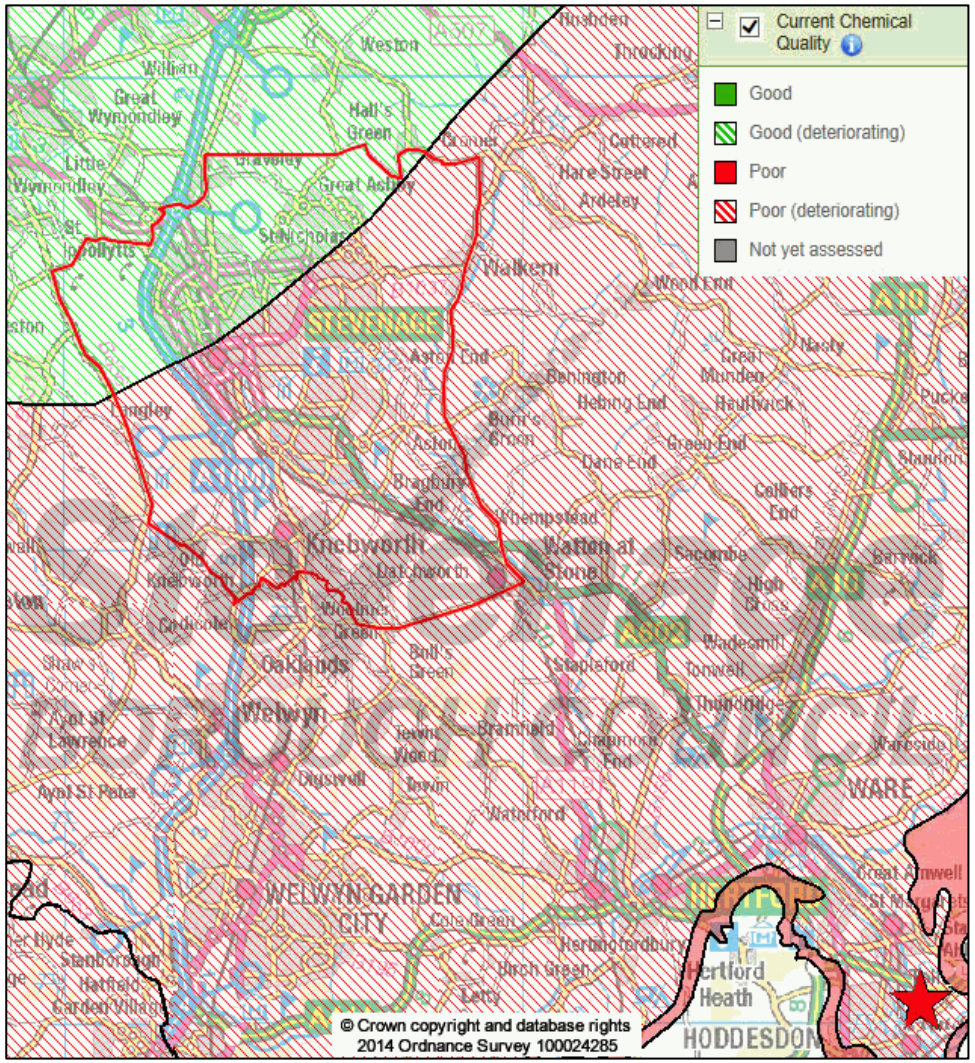
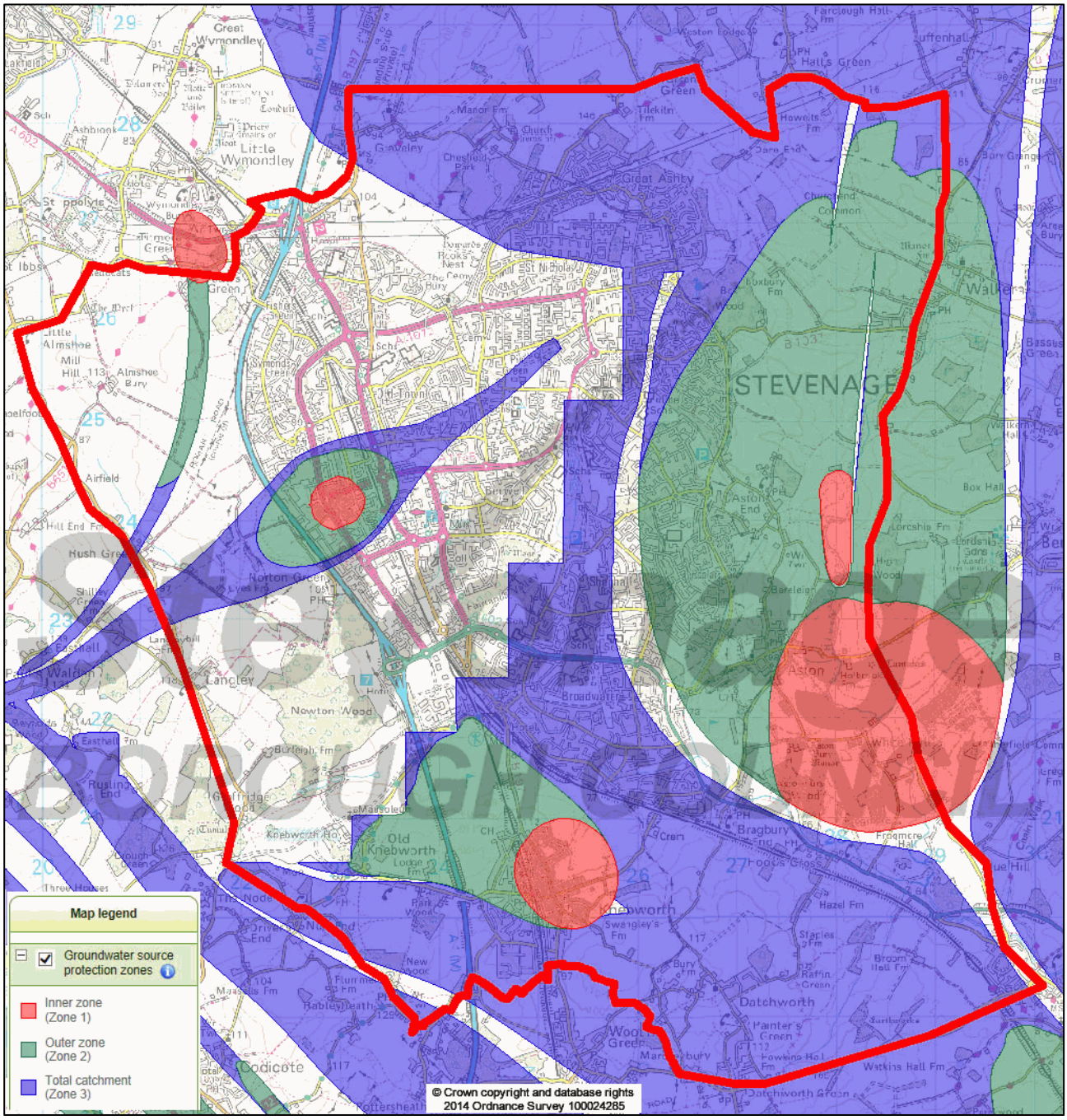


Figure 10: Chemical groundwater quality



Source: Environment Agency. Contains Environment Agency information © Environment Agency and data base right

Figure 11: Groundwater source protection zones



Source: Environment Agency. Contains Environment Agency information © Environment Agency and database right

2.80 The SPA covers four separate sections of the Lee Valley, stretching intermittently from Great Amwell near Ware to Walthamstow in London as shown in Figure 12. Rye Meads WwTW lies immediately adjacent to the SPA.

2.81 The site has been designated due to the presence of three protected bird species. These are northern Shoveler (*Anas Clypeata*), Gadwall (*Anas strepera*) and Great Bittern (*Botarus sterllaris*). It is considered to be vulnerable to the following pressures:

- Poor water quality;
- Recreational activities such as walking or water sports;
- Over-abstraction of water; and
- Urban development.

2.82 Survey data suggests that site-specific pressures may be particularly affecting Shoveler numbers within the SPA, which have fallen by one-third since classification[8].

2.83 Local Planning Authorities are required to consider the likely effects of their local plans on European Sites through a process known as Appropriate Assessment. This will take place outside of the WCS and will identify any necessary mitigation measures and a schedule for their implementation.

2.84 The RAMSAR designation has been made to protect the Shoveler and Gadwall populations on the site and therefore does not raise any additional issues beyond those that will be identified through analysis of the SPA.

2.85 The whole of the SPA is also nationally protected as a Site of Special Scientific Interest (SSSI). The SPA is covered by four separate SSSI designations:

- The northern most portion of the SPA, to the north of Stanstead Abbotts is the Amwell Quarry SSSI;
- The area adjacent to the WwTW is the Rye Meads SSSI;
- The area to the east of Cheshunt is the Turnford & Cheshunt Pits SSSI; while
- The southernmost portion of the SPA, to the west of Walthamstow, is the Walthamstow Reservoirs SSSI.

2.86 The confluence of the River Beane and River Lee at Hertford is approximately 4.5km upstream of the Amwell Quarry SSSI / northernmost segment of the SPA. Although upstream of Rye Meads, there remains potential (however slim) for adverse impacts arising from water borne from the Stevenage area.

2.87 The Rye Meads SSSI lies immediately adjacent to the WwTW and incorporates lagoons and beds associated with the works.

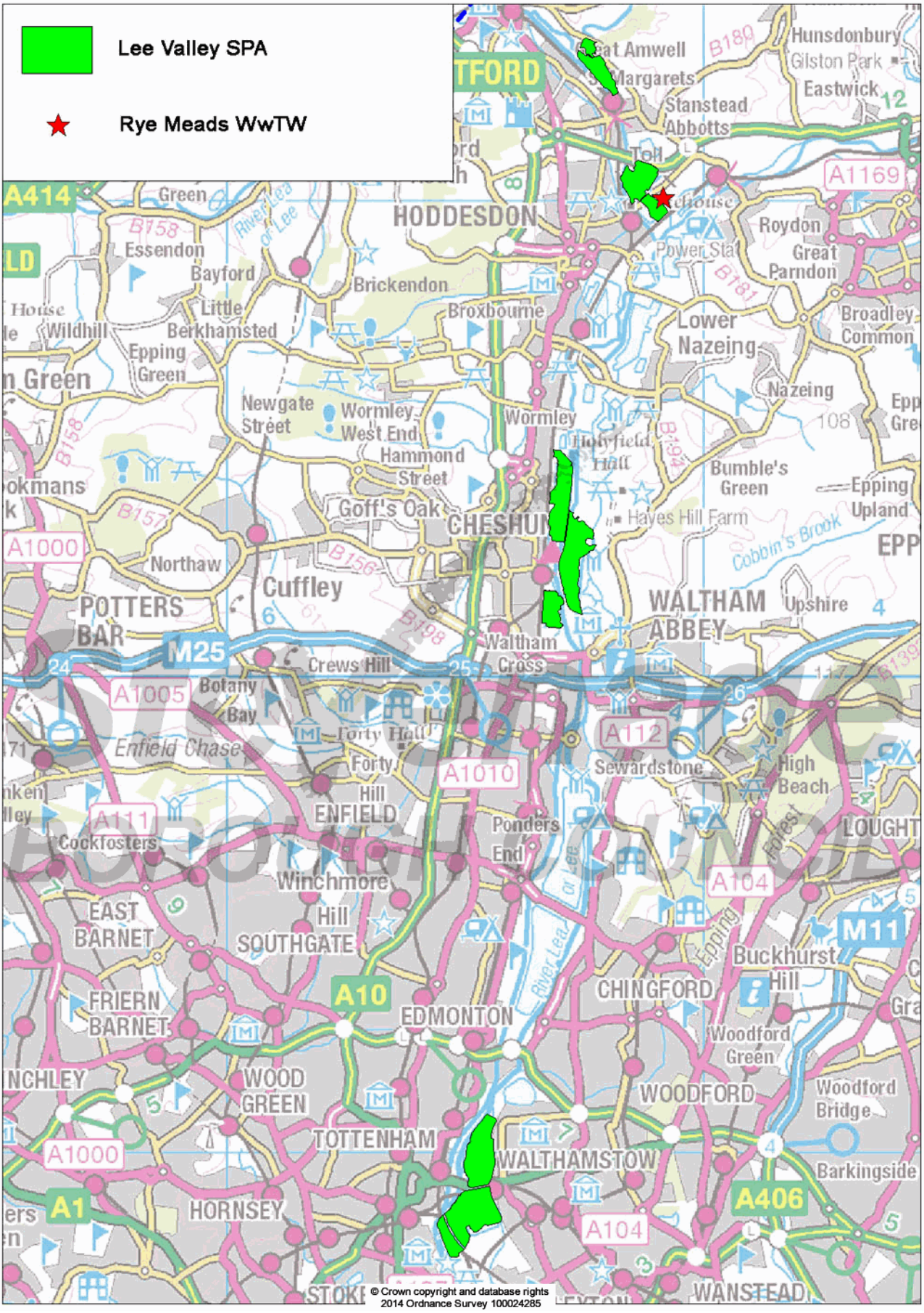
2.88 Two further SSSIs / sections of the SPA lie downstream and to the south of the Rye Meads WwTW. These are the Turnford & Cheshunt Pits SSSI and Walthamstow Reservoirs SSI. Although they lie outside the immediate area of focus for this review, they are theoretically susceptible to any adverse impacts on, for example, water quality which could arise at Rye Meads. However, the EA's regulatory role as granter of discharge licences to Thames Water should ensure no further adverse impacts arise as a result of future development.

2.89 Figure 13 summarises features of the SSSIs considered most relevant to this update.

2.90 The condition of the Rye Meads SSSI has deteriorated since the 2009 WCS, at which point its condition was considered to be 100% favourable.

[8] BTO Research Report 641, http://www.bto.org/webs/alerts

Figure 12: The Lee Valley SPA



2.91 Further investigation reveals that those areas of the SSSIs identified as unfavourable are due to below threshold levels of certain species, though not those for which the sites are identified as SPA. At Rye Meads levels of tufted duck and common tern are highlighted. The underlying causes are being investigated.

2.92 Notwithstanding this, Natural England's Views About Management (VAM) for the Rye Meads SSSI remain unchanged since 2005 and no additional measures or interventions have been deemed necessary since the completion of the 2009 WCS. The VAM require, inter alia, the sensitive management of both water levels and quality.

Figure 13: Summary features of relevant SSSIs

SSSI	Main Habitat(s)	Key species	Condition	Management issues
Amwell Quarry	Standing open water and canals	Bittern, Gadwall, Shoveler, dragonflies and damselflies, Roman Snail	100% favourable	Water quality and levels, species management, human activity
Rye Meads	Fen, marsh, swamp lowland, standing open water and canals	Bearded Tit, Bittern, Common Tern, Gadwall, Shoveler, , Snipe, Tufted Duck, Water Rail	40% favourable 60% unfavourable recovering	Water quality and levels, species management, human activity

Source: Natural England / SBC analysis

2.93 Other SSSIs within the area of focus include Knebworth Woods SSSI to the south-west of Stevenage and Benington High Wood SSSI to the east of the town. However, these are not considered dependent on the water environment for their main features of interest.

2.94 No National Nature Reserves are identified within the area of focus for this update.

2.95 There is a Local Nature Reserve at Waterford Heath, north of Hertford. Although the site lies adjacent to the River Beane, the site is predominantly identified and protected for its grassland and woodland habitats and associated species.

2.96 In 2013, a two-year programme of works was initiated at the site. This included dredging and the creation of new ponds and scrapes to maintain the marsh habitat.

Biodiversity Action Plans

2.97 As well as these designated sites, locally and nationally important species and habitats are identified through Biodiversity Action Plans (BAPs).

2.98 The Hertfordshire BAP has not been updated since the publication of the 2009 WCS. The relevant targets for wetland habitats were identified in that document. The BAP also contained a number of species action plans including water voles, otters and great crested newts.

2.99 A number of areas of Floodplain Grazing Marsh BAP Priority Habitat have been identified in the area of focus for this review including:

- A small area to the south of Walkern;
- At the confluence of Stevenage Brook and the River Beane north-west of Watton-at-Stone;
- Intermittent sites between Watton-at-Stone and Hertford; and
- The meadows between Hertford and Ware

2.100 A Biodiversity Action Plan for Stevenage was published in 2010. This identifies the importance of the bog habitat at Ridlins Mire in the south-east of the town as well as the aquatic species potential of the lakes at Fairlands Valley Park.

2.101 The BAP identified a number of actions for wetland habitats, including the need to promote water conservation initiatives to benefit the River Beane and the investigating the potential for restoration of (stretches of) Stevenage Brook.

2.102 The Borough Council's website, www.stevenage.gov.uk, maintains an up-to-date register of actions taken in response to these.

Local Nature Partnership

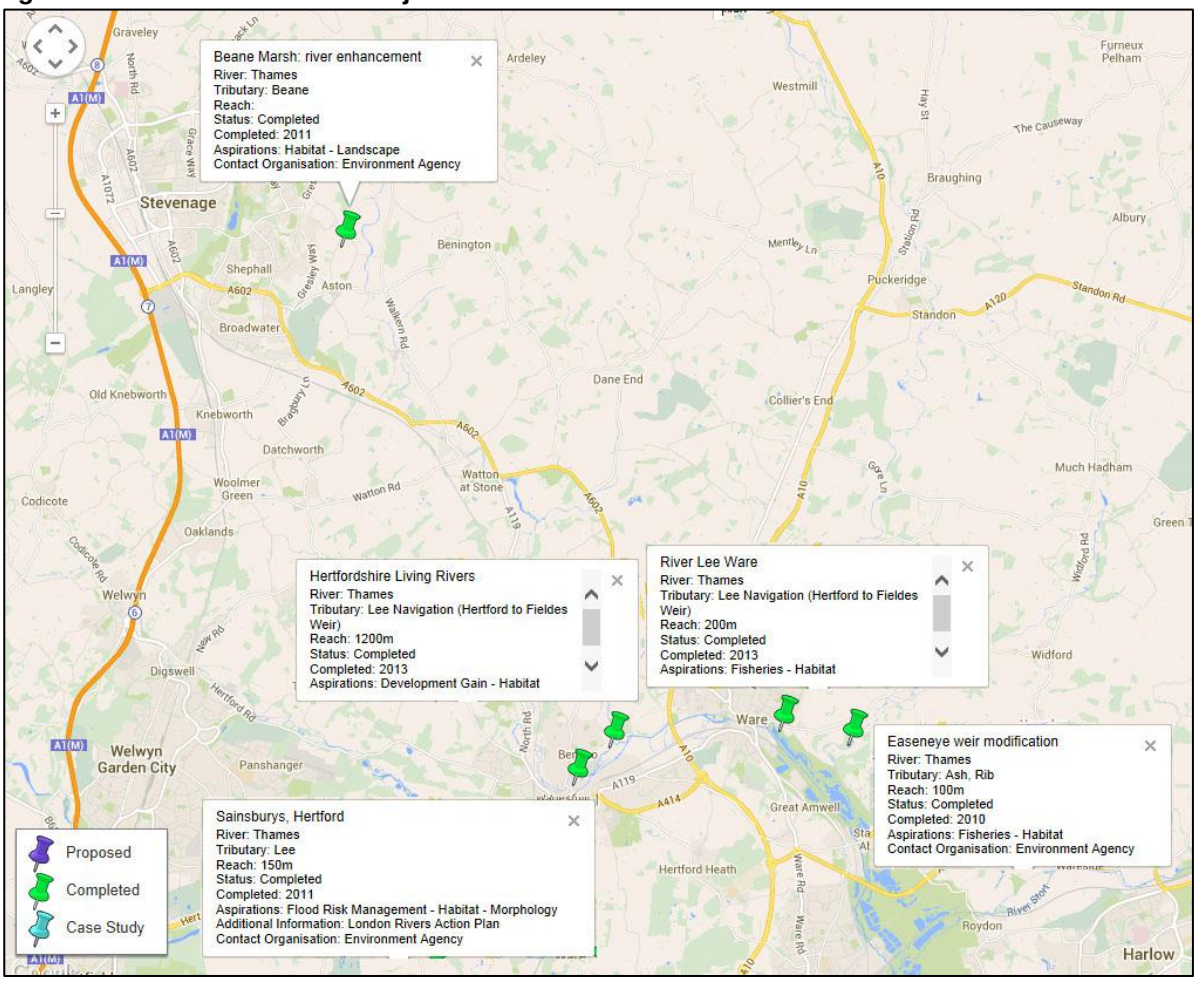
2.103 Local Nature Partnerships (LNPs) are partnerships of a broad range of local organisations, businesses and people who aim to help bring about improvements in their local natural environment. They were introduced in a Government White Paper in 2011.

2.104 The Hertfordshire LNP was established in 2012. Their Strategic Plan for the period 2013-16 recognises the importance of the county's chalk rivers as well as habitats along the River Lee, including Rye Meads.

River Restoration Projects

2.105 A number of river restoration projects have been carried out within the study catchment since the completion of the 2009 WCS. These are documented by the River Restoration Centre and are summarised on the map below.

Figure 14: River Restoration Projects within the area of focus 2010-2014



Source: The River Restoration Centre, http://www.therrc.co.uk/rrc_map.php. Map data © Google 2014

2.106 DEFRA piloted a Catchment Based Approach to the UK's rivers in 2012 before rolling out the programme nationally in 2013. This establishes partnerships formed of local people, landowners and statutory bodies.

2.107 The Beane Catchment Partnership was formed in 2012 and established a Catchment Management Plan. Their website contains up-to-date information on a variety of completed, on-going and planned projects[9].

2.108 A further catchment partnership and associated management plan exists for the Middle Lea which, in relation to this update, covers the Lee from Hertford to Hoddesdon.

Infrastructure

Potable Water Supply

2.109 The 2009 WCS identified that the majority of the population in the study area, including Stevenage, were supplied with potable water by Three Valleys Water. Parts of the 2009 WCS study area, including much of Broxbourne, are served by Thames Water but these lie outside of the area of focus for this review.

2.110 Following the completion of the WCS, Three Valleys Water was renamed as Veolia Water Central. This company was, in turn, sold to Affinity Water in 2012. Affinity are now responsible for water supply within the area of focus.

2.111 All water companies produce Water Resource Management Plans (WRMPs) every five years to coincide with Asset Management Periods (AMP). These show how water will be supplied to meet demand over the next 25 years. Affinity's latest WRMP was approved in May 2014 to inform the AMP6 funding period from 2015-2020.

2.112 Affinity's supply area covers three distinct geographical areas. Stevenage lies within the Central region. This serves a population of more than 3 million in north London and parts of Surrey, Buckinghamshire, Hertfordshire and Essex.

2.113 The Central region is subdivided into six water resource zones (WRZ). Stevenage lies within WRZ3 (Lee).

2.114 As in the 2009 Study, the latest WRMP identifies that the majority of supplies within the area are sourced from groundwater. It also continues to acknowledge the role of surface water sources outside of Affinity's operational area in meeting demand. Bulk transfers from the Anglian water region currently supplement water supply within WRZ3.

2.115 The WRMP recognises that both WRZ3 and the Central Region as a whole were forecast to have a supply deficit in both 2020 and 2040 (including existing bulk transfers). Various options have been explored to remedy this.

2.116 The preferred plan set out in the WRMP seeks to deliver a number of efficiency improvements in the forms of reducing distribution leakage, metering and water efficiency measures. It also introduces two new bulk transfer agreements. Neither of these are to WRZ3, though capacity does exist to transfer water between zones within the Central region.

2.117 It is proposed to maintain the existing bulk transfer arrangement from the Anglian region to WRZ3 ~ whilst also recognising that the Anglian region itself is forecasting deficit ~ to ensure demand can be met over the next 25 years.

[9] http://www.riverleacatchment.org.uk/index.php/river-beane-cmp/river-beane-projects

2.118 The deficits that were initially forecast within WRZ3 were strongly influenced by the Environment Agency's recommendation in 2012 that that Whitehall Pumping Station on the River Beane to the south of Aston be closed (see paragraphs 2.36 to 2.42)

2.119 The draft WRMP in 2013 considered completely replacing water presently sourced from Whitehall with bulk transfers from Grafham in Bedfordshire. However, in order to retain some resilience in the supply system, the final WRMP does propose to retain some peak output capacity at Whitehall.

2.120 These transfers are commercial arrangements between private water companies and it lies beyond the remit of this study, or any local plans, to come to a view on the appropriateness or otherwise of these.

2.121 In June 2014, the Environment Agency consulted on a proposal to reduce the quantities of water that Affinity are licensed to abstract from the River Beane by more than 90%. Under the proposed licensing arrangement, a new daily limit of 10,000m^3 (down from 30,000m^3) and an annual limit of 730,000m^3 (down from 8,300,000m^3) would apply to the Whitehall Pumping Station.

2.122 The proposed reductions will come into effect from April 2018. In order to deliver these changes, the WRMP identifies almost £5m of investment in a new trunk main to Stevenage and pumping station modifications that will be delivered within the same timescale to ensure continuity of supply.

2.123 Affinity Water have not identified any specific infrastructure requirements for the Stevenage area beyond what has been publicly stated in the WRMP.

Sewerage network

2.124 In terms of wastewater disposal, the majority of the area of focus for this review is served by Thames Water. However, a small area of north Stevenage lies within Anglian Water's operation area. The 2009 study identified that wastewater from this area is currently pumped over the operational border into the Thames Water network via the Coreys Mill pumping station.

2.125 As set out previously, wastewater from Stevenage is treated at Rye Meads WwTW. As a consequence, wastewater travels some 19km via trunk sewers, firstly to Hertford and then onwards to Rye Meads.

2.126 The wastewater treatment works is located within sites which are designated for their nature conservation value (see paragraphs 2.79 to 2.87 above).

2.127 TW are currently reviewing their plans regarding the future upgrade of Rye Meads Sewage Works. A growth upgrade investigation is being undertaken. This is discussed further in the consideration of infrastructure capacity (see Section 5).

Key Catchment Constraints

2.128 This section has given an overview of the catchment as it stands as well as setting out policies and strategies that are in place to promote and improve sustainability. It has demonstrated there are a number of key interactions that need to be considered within the area of focus for this review. In particular it is highlighted that:

- The Water Framework Directive sets challenging targets for the improvement of water bodies within the study area;
- These targets are reflected in the River Basin Management Plan. The forthcoming second round of RBMPs will set new targets and actions for the period to 2021;

- Base flows in the River Beane remain a source of concern, though a proposed significant reduction in abstraction from 2018 should have a positive impact;
- Small areas of Stevenage and its immediate surrounds are at risk of flooding from rivers and / or surface water. The implications for any new development will need to be considered, as will any downstream risks that arise from further urbanisation;
- River quality will not meet WFD standards by the initial target of 2015, though this is acknowledged and actions are being taken;
- The groundwater aquifer is a significant source of water supply. However, over-abstraction is a particular issue leading to 'poor' assessments in terms of both quality and quantity;
- The Rye Meads wastewater treatment works are located within a site designated for its conservation importance at the European and national levels;
- Other sites of more local importance also rely on the water environment for their vitality;
- Maintaining a future supply of water that corresponds with demand will require challenging measures to be implemented and met; while
- Wastewater is transported significant distances from Stevenage prior to treatment placing stresses on infrastructure.

2.129 The key constraints identified in the 2009 WCS remain valid and relevant to this update, in terms of both the natural water environment and infrastructure. However, with the latest WRMP issued by Affinity and the associated consultation on a significantly reduced abstraction license at Whitehall, proactive steps are being taken to address the interrelated issues of over abstraction and resultant low river flows in the River Beane, water quality and health of the groundwater aquifer.

3 Planning Policy Context

3.1 As outlined in Section 1, there have been significant changes in planning policy since the completion of the 2009 Water Cycle Study.

3.2 This section briefly sets out the relevant legislation and guidance regarding new development. It provides an overview of the latest planning proposals in the authorities covered by the 2009 WCS.

Legal framework

3.3 Although much of the Planning and Compulsory Purchase Act 2004 remains to guide the production of new plans, it has been subject to significant modifications.

3.4 In particular, the Localism Act 2011 changed the strategic planning context. It removed the regional tier of planning and allowed for the revocation of existing Regional Strategies on a case-by-case basis (see paragraphs 3.22 to 3.24 below)

3.5 It also introduced a legally binding 'Duty to Co-operate' between Councils and other key agencies. This has proved to be a significant hurdle to a number of plans at examination.

3.6 The detailed regulations and guidance now contain an expectation that Councils will produce a single local plan, rather than the suite of 'Local Development Framework' documents originally envisaged by the 2004 Act. The process for plan production has also been streamlined with two statutory stages – "preparation" and "publication" – that must be completed before a plan is submitted for examination.

3.7 Long-standing European Directives requiring plans to be accompanied by relevant environmental assessments ~ including Sustainability Appraisal and Appropriate Assessment ~ remain in place.

National Planning Policy Framework

3.8 In March 2012, the Government issued the National Planning Policy Framework (NPPF). This consolidated all previous Planning Policy Statements and Planning Policy Guidance notes into a single, significantly shorter document.

3.9 The NPPF was accompanied by the release of Technical Guidance, which provided further detail on policies relating to flood risk and minerals.

3.10 In March 2014, Planning Practice Guidance (PPG) was launched as a web-based resource. This provides additional information to aid Councils, developers, infrastructure providers and other relevant agencies interpret the NPPF. It replaced a significant number of best practice guidance documents, circulars and letters.

3.11 The NPPF says that individual authorities should try to meet the development needs of their areas. In relation to this WCS update it says:

- The NPPF must be taken into account in the preparation of local and neighbourhood plans, and is a material consideration in planning decisions (Paragraph 2);
- Local planning authorities should positively seek opportunities to meet the development needs of their area and should meet objectively assessed needs unless the adverse benefits of doing so would significantly or demonstrably outweigh the benefits or specific policies in the NPPF indicate development should be restricted (Paragraph 14);
- Plans should be based on joint working and co-operation to address larger than local issues (Paragraph 17);

- The transition to a low carbon future in a changing climate should be supported, taking full account of flood risk (Paragraphs 17 and 95);
- Inappropriate development in areas at risk of flooding should be avoided and Local Plans should be supported by evidence as well as advice from the EA and other relevant agencies (Paragraph 100);
- In preparing plans to meet development needs, the aim should be to minimise pollution and other adverse effects on the local and natural environment (Paragraph 110);
- Authorities should plan positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure (Paragraph 114);
- Local plans should plan positively to ensure the provision of infrastructure for water supply, wastewater and flood risk, including an assessment of its quality and capacity (Paragraphs 156, 157 and 162);
- Planning Policies should be based on up-to-date information about the natural environment including River Basin Management Plans (Paragraph 165);
- Sustainability appraisal, and other relevant environmental assessments such as required under the Habitats Regulations, should be an integral part of the plan preparation process (Paragraphs 165 and 166);
- Plans should be deliverable such that the scale of infrastructure and other contributions to not deter new development from taking pace (Paragraph 173); and
- Local planning authorities will be expected to demonstrate evidence of having effectively cooperated to plan for issues with cross-boundary impacts (Paragraph 181).

3.12 The accompanying guidance contains further information on flood risk, in particular rolling forward the 'sequential test' requirements previously contained in PPS25: Development and Flood Risk. It also provides guidance on strategic and site-specific flood risk assessments.

3.13 PPG provides detailed advice on a range of plan-making and planning matters. In relation to this update it says:

- Local Planning authorities must, in exercising their functions, have regard to the RBMPs which implement the requirements of the Water Framework Directive;
- There should be early discussions with water and sewerage companies to ensure proposals are reflected in business plans. The duty to co-operate across boundaries applies to water supply and quality issues;
- Analysis and decisions should be informed using a catchment-based approach;
- Plan making should consider the need for new or enhanced infrastructure and / or phasing new development to ensure water and wastewater infrastructure will be in place when needed;
- Consideration should be given to protecting and enhancing local surface and groundwater in ways that allow development to proceed, including the use of sustainable drainage systems; and
- Water issues should be properly reflected in the sustainability appraisal.

Code for sustainable homes

3.14 The Code for Sustainable Homes (CSH) was introduced in England in April 2007. It sets a framework to create homes to higher environmental standards. The CSH levels require different standards of water use.

3.15 At the time of the 2009 WCS, the timetable for the implementation of the CSH required that new homes would be built to Level 3 from 2010 onwards (with a maximum per capita water consumption of 105 litres per person per day (l/p/d)) and Level 6 from 2016 (80 l/p/d).

3.16 However, the recommendations of *Greener Homes for the Future*[10] cited above were not implemented. Subsequent to the publication of the WCS, the Government made clear that CSH was voluntary and had no intention to make it mandatory.

3.17 In August 2013, the Government published the *Housing Standards Review* consultation[11] which aimed to slim down and simplify the range of measures that local authorities could require to be applied to new build housing.

3.18 It proposed to 'wind down' the role of CSH and, with particular regards to water consumption, seek to deliver any future standards through the Building Regulations. In March 2015, the Government's proposals were confirmed by ministerial statement and the CSH has now been withdrawn by the Government, aside from the management of legacy cases.

Building Regulations

3.19 The Government updated Part G of the Building Regulations in April 2010. This set a whole building standard of 125 l/p/d for domestic buildings. This comprised of 120 l/p/d (in line with CSH Levels 1 and 2), plus an allowance of 5 litres per person per day for outdoor water use.

3.20 Following the *Housing Standards Review*, the Government have introduced a new, tighter level of water efficiency into the Building Regulations, at 110 l/p/d. This has been achieved through an amendment to Part G of the building regulations and will apply from October 2015. This optional higher level can only be applied in areas of water stress. This would be chosen by the local authority, set out in the Local Plan and subject to viability testing.

3.21 Work is continuing with the Environment Agency regarding the circumstances where the tighter standard might apply. This will be published later in 2015 though the EA have, for the purposes of this review, confirmed that they anticipate Stevenage and its surrounds will be identified as such an area and that they will seek the testing of the higher standard through local plans.

Regional Policies

3.22 The 2009 WCS was conducted with reference to the development targets set for the catchment authorities in the 2008 East of England Plan (EoEP). Of particular relevance were the proposals in that document to make both Stevenage and Harlow 'Key Centres for Development and Change' with significant housing delivery targets set for both.

3.23 As set out above, the Localism Act 2011 introduced the statutory powers that allowed the Secretary of State to revoke existing regional plans on a case-by-case basis.

3.24 The EoEP was finally revoked in January 2013. At this point, local planning authorities within the East of England region effectively became the strategic planning authorities for their areas with responsibility for setting development targets through their local plans.

Local Policies

3.25 The changes to the policy framework outlined above have had a significant impact upon plan preparation within the original study catchment area. None of the seven authorities adopted a local plan incorporating the development targets in the EoEP prior to its revocation.

[10] http://webarchive.nationalarchives.gov.uk/20120919132719/www.communities.gov.uk/publications/housing/codeleaflet, accessed September 2015
[11] https://www.gov.uk/government/consultations/housing-standards-review-consultation, accessed September 2015

3.26 The authorities are at various stages of plan preparation. The position at the time of this updated is summarised in Figure 15 on the following page. This is based on publicly available information.

3.27 Some authorities have issued plans with preferred development targets and these are shown. However, the expectation of the NPPF is that Government population and household projections will form the 'starting point' against which Local Plan targets are tested.

3.28 New 2012-based household projections were released by the Department for Communities and Local Government in February 2015. The projections for each authority are shown for comparison purposes, along with the development rates formerly required by the EoEP.

3.29 There is currently considerable uncertainty around the local plans of the catchment authorities. However, it is necessary to consider emerging proposals for this wider area so that demand arising from within the area of focus for this review can be set in the context of the potential demand from within Rye Meads' overall catchment. From the information presented it would appear that a total of at least 66,100 new homes are being planned for. (Significantly) higher numbers would rely on the resolution of a number of issues including the future scale and distribution of development around towns such as Harlow and Welwyn Garden City, and agreement as to whose needs it would meet.

3.30 Planning to the upper limits of numbers presently identified could result in the provision of approximately 79,000 new homes over the same period, around 5% less than the targets and provisions in the former East of England Plan which informed the 2009 Study.

3.31 The household projections sit between these figures, suggesting a total increase of 74,700 over the same period. However it is noted that there are some differences in how these are distributed when compared to the emerging authority-level figures.

3.32 Rebased to 2011, the requirements which underpinned the 2009 WCS amount to approximately 84,000 homes over the period 2011-2031.

Development locations

Development since 2007 and planned supply

3.33 The findings of the 2009 WCS were based upon a trajectory of assumed completions for each constituent authority and, by implication, the study area as a whole. These sought to meet the requirements of the East of England Plan.

3.34 Since the study has been completed, there have been significant changes. The policy developments outlined above have resulted in a number of anticipated projects failing to come forwards or progress in the timetable that was originally assumed.

3.35 This has been compounded by wider economic factors including the downturn and recessions and the significant tightening of mortgage availability.

3.36 As a consequence, the development trajectory assumed by the 2009 Study has not been met. The 2009 Study assumed that, between 2007 and 2014, there would be over 23,000 housing completions across the study area.

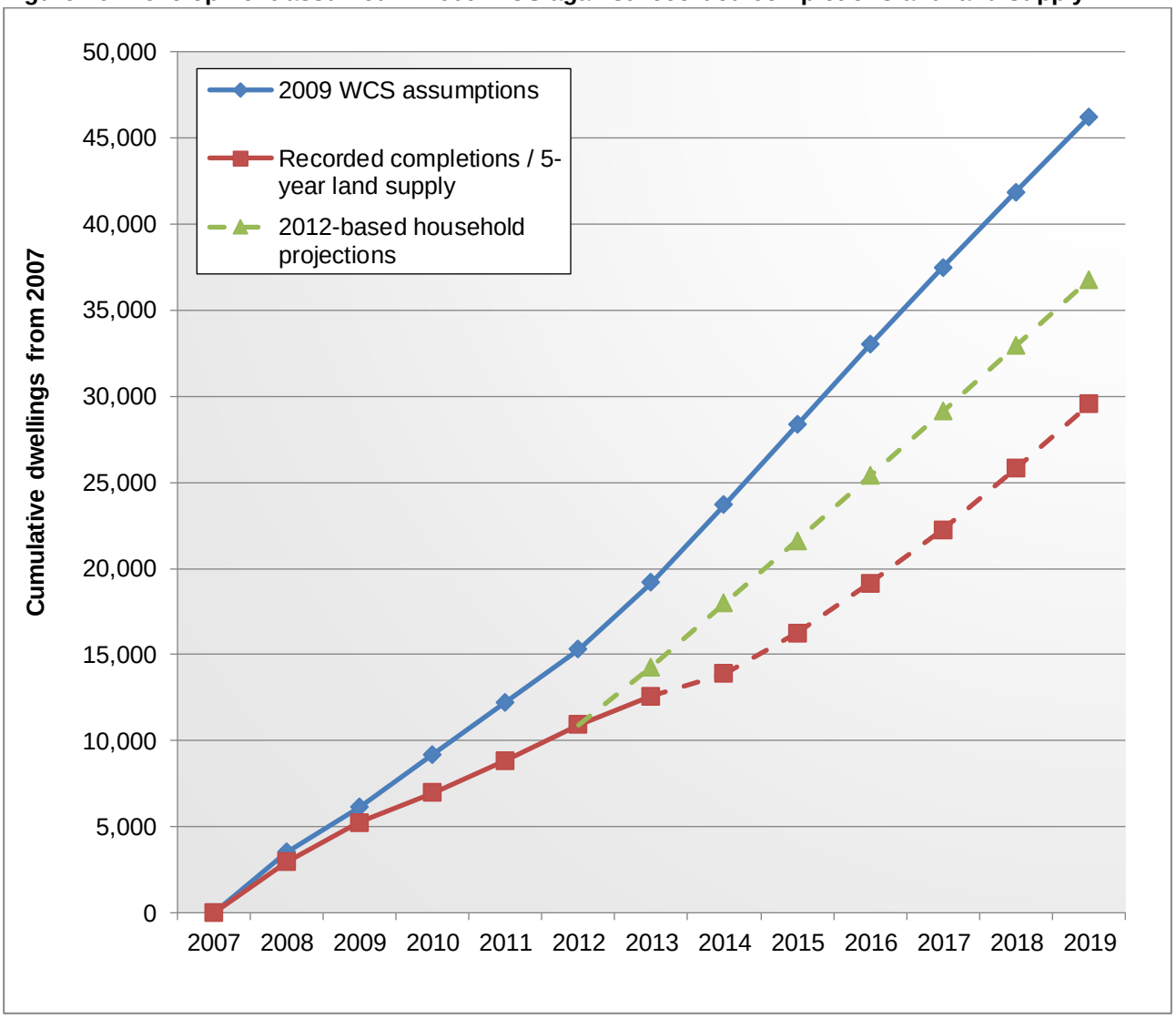
3.37 In reality, less than 14,000 were delivered. This is around 40% lower than was envisaged in the WCS. Looking forward at projected supply over the next five years, this divergence is expected to close slightly but still remain significantly behind the original assumptions.

Figure 15: Plan progress of authorities within the 2009 Study area

Authority	Current plan	Most recent stage in new plan process	Expected adoption and time period covered	Current proposed housing target 2011-2031	Household projections 2011-2031	Requirement 2011-2031 based on former East of England Plan targets*
North Hertfordshire	District Local Plan no.2 with alterations (1996)	Preferred options, December 2014	April 2017 for the period 2011-2031**	12,100 plus 2,100 towards unmet needs from Luton	13,700	19,200
Stevenage	District Plan 2nd Review (2004)	Revised Housing Targets Consultation, June 2015	December 2016 for the period 2011-2031**	Preferred option of 7,600 identified in June 2015	7,600	7,900
Broxbourne	Local Plan 2nd Review (2005)	No consultation held to date	Early 2016 for the period to 2030	Approximately 6,800 based on completions to 2015 and target of 5,000 for period 2015-2031	7,500	5,100
East Herts.	Local Plan 2nd Review (2007)	Preferred Options consultation, February 2014	February 2016 for the period 2011-2031	15,000 including development on the edges of Harlow and Welwyn Garden City to meet own development needs	15,700	13,900
Epping Forest	Adopted Local Plan 1998 and 2006 Alterations	Issues and Options consultation, July 2012	September 2017 for an unknown period	Unknown. Effectively consulted upon range of 7,000 – 10,400	12,900	2,900
Harlow	Replacement Harlow Local Plan (2006)	Emerging Strategy and Further Options Consultation, April 2014	No up-to-date Local Development Scheme but plan consultation states it will cover period 2011-2031	8,900 within Harlow based upon capacity though an overall requirement for 12,000 – 15,000 is recognised	6,400	24,500
Welwyn Hatfield	Welwyn Hatfield District Plan (2005)	Emerging Core Strategy Consultation, November 2012	2016 for the period 2011-2031**	Local Plan consultation contains sites for 8,700 though this does not meet needs of 12,500.	10,900	*10,300*
Totals				**At least 66,100**	**74,700**	**83,900**

*Calculated using residual target to 2021 as at 1 April 2011 with target for the period 2021-2031 calculated as per Policy H1 of former East of England Plan. Rounded to nearest 100. Figures for Harlow include urban extensions within East Hertfordshire and Epping Forest. Figures for North Hertfordshire include urban extensions at Stevenage. North Hertfordshire disputed requirements for the period after 2021. Welwyn Hatfield's housing target was quashed by the High Court and removed from the plan but is included for completeness.
**Plan period may be extended to ensure compliance with 15-year time horizon for plans recommended in NPPF.

Figure 16: Development assumed in 2009 WCS against recorded completions and land supply



Source: Individual authority monitoring reports / CLG / SBC analysis

Figure 17: Actual and projected completions by authority - 2009 WCS vs 2015 update

	Completions anticipated by 2009 WCS 2007-2014	Actual completions 2007 - 2014[12]	Actual as a % of anticipated	Completions anticipated by WCS 2007-2019	Completions now anticipated 2007-2019	Actual as a % of anticipated
North Hertfordshire	1,961	2,867	146%	3,256	6,438	198%
Stevenage	5,673	1,732	31%	11,843	3,437	29%
Broxbourne	1,875	1,520	81%	2,955	3,152	107%
East Herts	4,106	3,227	79%	7,656	6,823	89%
Epping Forest	1,675	1,231	73%	2,675	1,750	65%
Harlow	5,504	1,304	24%	12,274	3,475	28%
Welwyn Hatfield	2,899	2,013	69%	5,554	4,474	81%
Totals	**23,693**	**13,894**	**59%**	**46,213**	**29,549**	**64%**

Source: 2009 WCS / Individual authority websites / SBC analysis

[12] At the time of writing, neither Epping Forest nor Harlow had published monitoring reports for the year ending 31 March 2014. Actual completions to 31 March 2013 are recorded along with anticipated completions for the period 1 April 2013 to 31 March 2014.

3.38 It is now anticipated that by 2019 around 16,500 fewer new homes will have been built than were included in 2009 WCS' assumptions.

3.39 The picture varies significantly by authority:

- Development in North Hertfordshire is significantly above the levels anticipated in the WCS, though this is skewed by the inclusion of development around Stevenage which, in the 2009 study, was attributed to the latter[13];
- Development in Broxbourne is expected to accelerate to a point slightly above the levels anticipated by the 2009 study by 2019;
- By 2019, East Hertfordshire, Epping Forest and Welwyn Hatfield are all forecast to be below the trajectory set in the 2009 Study; while
- Harlow and Stevenage are only expected to deliver around 3 in every 10 of the homes anticipated by the WCS by 2018. This is due to the revocation of the East of England Plan which included a significant agenda for these towns.

3.40 At 1 April 2014, the actual trajectory was around two years 'behind' that envisaged by the 2009 WCS. It is anticipated that, by 2018, this gap will have widened to approximately three-and-a-half years. Total development by this time is now anticipated to be nearly 30,000 homes when measured from 2007. The 2009 WCS envisaged that this quantum of development would be realised during 2015.

3.41 The 2012-based household projections sit between these two lines. They anticipate nearly 26,000 new households forming over the period from 2012 to 2019. Notwithstanding advice in the NPPF that these figures form the 'starting point' in the consideration of Local Plan housing targets, it is already anticipated there will be a notable shortfall in actual provision over the next five years.

3.42 There are more nuanced arguments surrounding issues of household formation, the distribution of new development into areas inside / outside the Rye Meads WwTW catchment, and likely future levels of consumption that need to be taken into consideration (see below and Section 4). However, this headline overview already suggests that the slow-down in build rates could have implications for the findings of the 2009 WCS in terms of the timing of new infrastructure and the 'headroom' available within the existing system.

3.43 The following sections consider emerging proposals for Stevenage and North Hertfordshire. The emerging proposals of the other individual authorities within the 2009 WCS study area are also set out in more detail.

Authorities within the area of focus: Stevenage

3.44 As set out in the previous sections, all wastewater from Stevenage is treated at Rye Meads. The significant majority of the Borough lies within the Thames area. A small proportion of the Borough lies within the Anglian catchment but a commercial arrangement means that wastewater is pumped across the catchment boundary and treated by Thames.

3.45 Stevenage conducted a first consultation on its local plan in the summer of 2013. This identified a preferred housing target of 5,300 homes. This was based upon the Government's 2011-based population and household projections released following the Census.

3.46 However, subsequent analysis determined that these projections were likely to be an underestimate of future requirements.

[13] Even accounting for this, North Hertfordshire remains 'ahead of the curve' set in the WCS and is anticipated to stay this way at 2019.

3.47 The release of the 2012-based household projections in February 2015 suggested a requirement for 7,700 dwellings over the plan period to 2031. The Borough Council commissioned further analysis[14] on these figures to inform a consultation on revised housing numbers in the summer of 2015. This identified an objectively assessed need of 7,300 homes with the subsequent consultation identifying a preferred target of 7,600 homes.

3.48 The 7,600 homes figure has been used to inform consultation with Affinity Water, Thames Water, Anglian Water and the Environment Agency and, in turn, this update.

3.49 An indicative development scenario was assumed to allow further consideration of localised or site-specific issue, recognising that the Council will not formally determine which sites will be used to meet its housing target until the Publication version of the plan is released.

3.50 The indicative development scenario includes four major development sites / areas:

- 2,700 homes in and around the town centre;
- 1,350 homes to the west of the A1(M) within the administrative boundary;
- 800 homes on land currently within the Green Belt to the north of the town; and
- 550 homes on two sites currently within the Green Belt to the south-east of the town.

3.51 As at 1 April 2014, 1,000 homes had been completed or granted planning permission. The residual 1,200 homes are dispersed across a number of smaller sites within and on the edge of the existing town.

3.52 Taking into account completions prior to 2011, a total of 8,878 dwellings are anticipated within the Rye Meads catchment over the period 2007-2031.

3.53 Of this total number of homes, just under 1,000 fall within the Anglian area. However, for the purposes of this update, it has been assumed by all parties that the existing commercial arrangement, whereby waste is transferred across the catchment boundary by the pumping station at Coreys Mill and treated by TW, would continue and also apply to new developments in this part of the town.

Authorities within the area of focus: North Hertfordshire

3.54 North Hertfordshire released a 'Preferred Options' plan for public consultation in December 2014. This includes provision for 12,100 homes across the district between 2011 and 2031, plus an additional 2,100 homes on the east of Luton to contribute towards unmet needs from that authority.

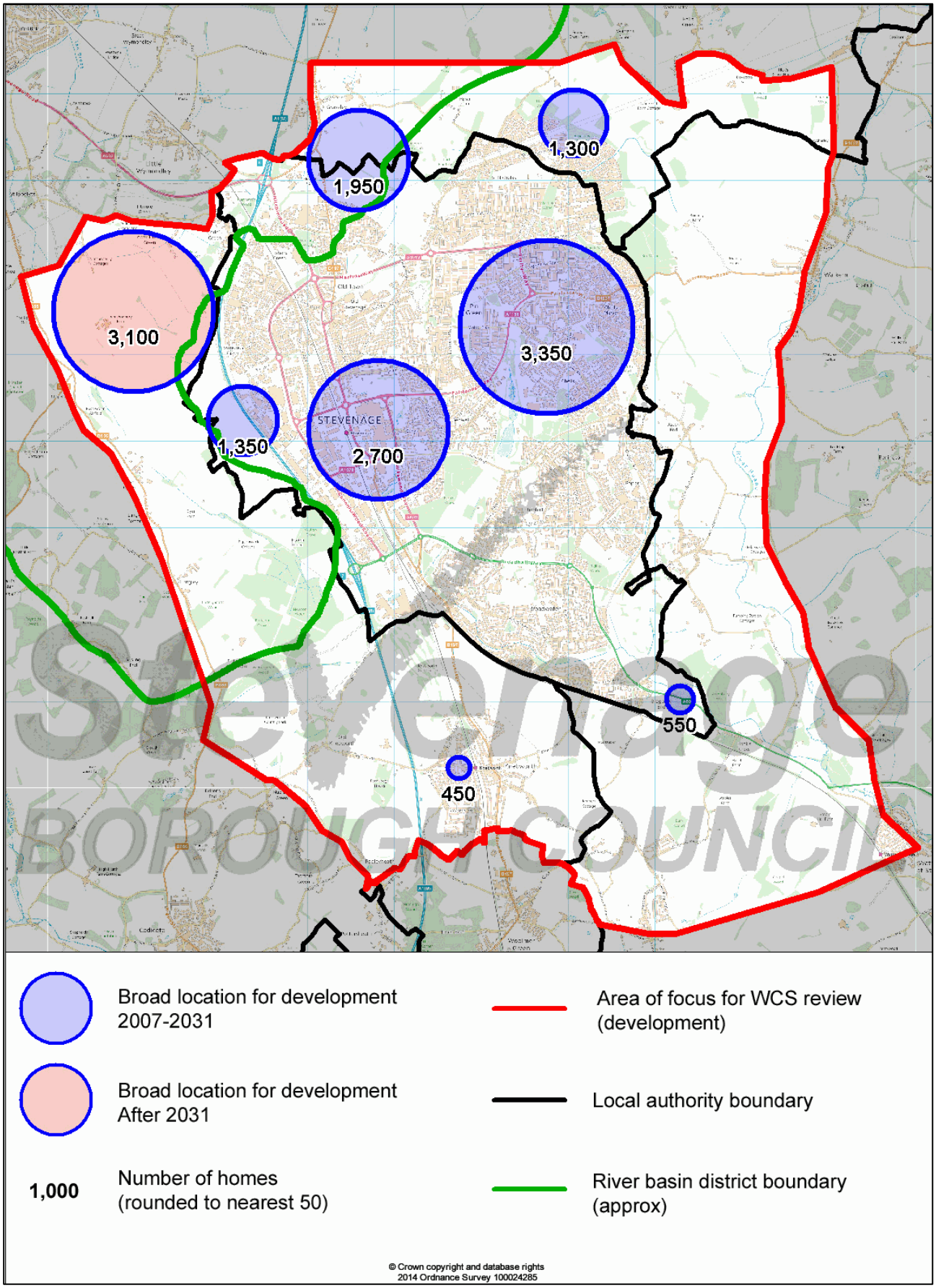
3.55 The majority of North Hertfordshire does not drain to Rye Meads and the authority lies substantively within the Anglian region. However, the plan does contain a number of proposals which fall to be considered in this update.

3.56 The plan proposes a total of 1,857 dwellings on the edge of Stevenage with land for a further 3,100 'safeguarded' for long-term needs. There are further allocations at Knebworth and Codicote[15].

3.57 Taking into account completions and permissions, a total of 3,005 dwellings are anticipated within the Rye Meads catchment over the period 2007-2031. This represents 21% of development within the district (excluding homes to the east of Luton).

[14] Stevenage and North Hertfordshire Strategic Housing Market Assessment Update (ORS, 2015)
[15] Wastewater from Codicote drains to Rye Meads. However the village is located in the Mimram valley with sewerage infrastructure broadly following the route of this watercourse. It therefore lies outside the immediate area of focus for this review though the draft allocations here are included in the calculations for Rye Meads set out in Section 4.

Figure 18: Development areas within Area of Focus for Water Cycle Review



3.58 Of the proposed allocations at Stevenage, the two sites to the north-east of the town lie in the Thames area. These contribute 857 dwellings. The 1,000 homes to the north of the town lie within the Anglian region as does the safeguarded land to the west. However, in general, Thames have taken a proactive lead on these sites and provided comments as if the whole site would be draining into the Thames catchment whilst Anglian have not provided specific feedback.

3.59 This, in effect, assumes, that the existing operational agreement for sites in and around Stevenage in the Anglian region would be extended to cover any additional such sites.

3.60 The implications of this are considered further in the scenarios considered in the following sections.

3.61 The map on the preceding page details the broad development sites and areas contained in both Stevenage's indicative development scenario and North Hertfordshire's Preferred Options Plan insofar as they relate to the area of focus for this update.

3.62 The release of the 2012-based household projections in February 2015 showed an increase of 13,700 households over the plan period to 2031. North Hertfordshire and Stevenage commissioned further analysis on these figures. Any implications will be reflected in future iterations of North Hertfordshire's plan.

Authorities outside the area of focus

3.63 Estimates for a number of the authorities outside of the area of focus are less well defined due to uncertainties around future growth strategies, alternate local plan timetables and other factors. The estimates below have been derived by Stevenage Borough Council based on information provided by the relevant authorities and / or publicly available information such as Annual Monitoring Reports (AMR), Strategic Land Availability Assessments (SHLAA or SLAA) and emerging Local Plan consultations.

3.64 These figures are used to inform the high-level consideration of overall development impact within the Rye Meads catchment in Section 4.

3.65 As plans for these authorities are further developed it is anticipated that the findings in this section will be further refined through further focussed updates to the 2009 WCS and / or this review and / or other joint working opportunities.

Authorities outside the area of focus: Broxbourne

3.66 Broxbourne developed a Core Strategy broadly based upon the strategy for the Borough set in the former East of England Plan. It was submitted to the Government in December 2010 and subjected to independent inspection in spring 2011. However, some of its key policies were found to be "unsound" and were recommended for deletion.

3.67 In light of this, the Council has decided not to adopt the Core Strategy and to instead prepare a new-style Local Plan that combines strategic policies and site allocations.

3.68 Broxbourne are yet to carry out a first consultation on this plan, though this is anticipated to occur in 2015. A report to the Council's Executive in March 2015 identifies a provisional figure of 5,000 homes for the period 2015-2030. However, it also recognises that meeting the new household projections would require approximately 1,000 additional homes.

3.69 The majority of Broxbourne is served by the Deephams WwTW. Hoddesdon is served by Rye Meads.

3.70 In 2014, Broxbourne granted planning permission for 523 dwellings and supporting uses to the west of Hoddesdon. The Council currently anticipate this will be the only major development that will be allocated and delivered in the period to 2030 which will be served by Rye Meads.

3.71 From this information and a review of Broxbourne's monitoring reports and SLAA, it would appear reasonable to anticipate a total of approximately 1,200 dwelling completions in and around Hoddesdon over the period 2007-2031, approximately 17% of the total for the Borough.

Authorities outside the area of focus: East Hertfordshire

3.72 East Hertfordshire are progressing their new local plan for the district. Public consultation on the draft District Plan (Preferred Options) ran between February and May 2014.

3.73 This version of the plan contained proposals for a minimum of 15,000 dwellings over the plan period to 2031 and up to 9,500 dwellings beyond this point. The draft plan proposed significant allocations. This included sites on the edge of Welwyn Garden City and Harlow to meet East Hertfordshire's own development needs.

3.74 Of the main settlements in East Hertfordshire, only Bishops Stortford and Buntingford are not served by the Rye Meads WwTW. Approximately 6,500 dwellings are anticipated in these locations over the period 2007-2031.

3.75 The balance of approximately 11,500 homes is attributed to Rye Meads. This represents around two-thirds of all development within the district. This figure includes all development attributed to the villages, only some of which actually lie within the Rye Meads catchment.

3.76 These figures include an allowance for approximately 3,000 homes at Gilston to the north of Harlow. This forms part of a scheme which is being promoted for up to 10,000 homes over the long term. The scheme promoters currently envisage that the development will provide on-site wastewater treatment to ensure no impact upon Rye Meads, and the opportunity to supplement flows in the River Stort[16].

3.77 Notwithstanding this, these homes have currently been included within the calculations of demand at Rye Meads.

3.78 The latest household projections are broadly in line with the figures used to date to inform the local plan. An increase of 15,700 households is anticipated over the period 2011-2031.

Authorities outside the area of focus: Epping Forest

3.79 Epping Forest are currently at the early stage of plan preparation. A first consultation on broad issues and options was conducted in 2012. This considered a range of housing options equivalent to between 7,000 and 10,400 homes over the period 2011 to 2031[17].

3.80 The main towns of Epping and Loughton are outside the Rye Meads WwTW catchment. The consultation identified a number of sites around Roydon which could, theoretically, accommodate around 1,300 homes.

[16] Gilston Park Estate Sewage Treatment & Drainage Strategy, http://www.eastherts.gov.uk/index.jsp?articleid=29742, accessed March 2015

[17] The plan covers the period 2011-2033. The proposed targets have been pro-rated to a twenty year period for consistency with discussion of other authorities.

3.81 However, the main likely impact on Rye Meads would be any decision by Epping Forest to locate development on the edge of Harlow, either to meet their own needs or the needs arising from that town.

3.82 Epping Forest, Harlow and East Hertfordshire Council have previously assessed the potential options for delivering growth and regeneration in and around Harlow[18]. This concluded that between 3,000 and 4,000 homes could be accommodated within Epping Forest within environmental, landscape and infrastructure limits. Epping Forest's SLAA has previously confirmed that land is broadly available around Harlow.

3.83 The new 2012-based household projections show significantly higher levels of change than considered in the 2012 local plan consultation. Nearly 13,000 new households are anticipated over the plan period.

3.84 There is currently no indication as to which (if any) of the housing target options proposed will be taken forward. The Council's last published AMR calculates housing requirements on the basis of the now revoked East of England Plan.

3.85 In June 2015, Epping Forest's Cabinet considered a revised timetable for the production of the local plan. This defers any further consultation until the summer of 2016.

Authorities outside the area of focus: Harlow

3.86 All wastewater from Harlow is currently treated at Rye Meads WwTW. Harlow are also at an early stage in the preparation of a new plan.

3.87 A consultation was undertaken in Spring 2014. This recognised that the authority had a capacity for 8,900 homes over the plan period 2011-2031. Taking completions into account leads to a total capacity for the period 2007-2031 of 9,500 homes.

3.88 However, Harlow's consultation plan also identified a requirement for between 12,000 and 15,000 new homes over the plan period to meet needs.

3.89 This is plainly in excess of the authority's current capacity. However, authorities can only make plans for their own areas and any overspill provision would need to be reflected, as appropriate, in the plans of any nearby authorities who agreed to make provision under the Duty to Co-operate.

3.90 It is worth noting that the 2012-based household projections only anticipate an increase of 6,400 over the plan period.

Authorities outside the area of focus: Welwyn Hatfield

3.91 Welwyn Hatfield began a consultation on a preferred options local plan in January 2015. The issue of wastewater treatment, in particular, is a complex one for Welwyn Hatfield as their settlements are served by a number of different works.

3.92 The 2009 WCS confirmed that Welwyn Garden City is mostly contained within the Rye Meads WwTW catchment, whilst urban areas to the south, such as Hatfield, are treated at Mill Green WwTW or Maple Lodge WwTW. Cuffley, at the south-east of the authority area, is connected to the Deephams WwTW in north London.

3.93 The amount and distribution of development within Welwyn Hatfield is therefore an important factor.

[18] Generating and Appraising Spatial Options for the Harlow Area – Scott Wilson (Jan 2010)

3.94 The current plan consultation identifies a requirement for 12,500 homes over the plan period to 2031. However, it also acknowledges that supply is likely to fall below this level: The plan includes suggested allocations that would deliver a total of approximately 8,700 homes.

3.95 As with Harlow, Welwyn Hatfield will need to (attempt to) make good any under-provision of new homes in their area, either through increasing supply, or through the Duty to Co-operate. However, as also set out above, any such arrangements which require land outside of Welwyn Hatfield's administrative area would be reflected in the plan target of the receiving authority.

3.96 Reviewing the distribution of development in the plan, and allowing for permissions and completions since 2007, a total of approximately 4,700 dwellings are proposed for Welwyn Garden City and the smaller settlements to the north including Welwyn, Tewin, Oaklands and Woolmer Green. This represents approximately 47% of all development in the Borough.

3.97 Allowing for the inclusion of the 'finely balanced' sites identified in the consultation, this figure rises to approximately 5,500 dwellings over the period 2007-2031. This represents a slightly lower proportion of the overall total at 43%. This is due to the greater number of dwellings that could be accommodated on finely balanced sites outside the Rye Meads catchment, notably at Hatfield.

3.98 The 2012-based household projections suggest an increase of 10,900 households over the plan period 2011 to 2031.

Catchment contribution summary

3.99 Following the review of relevant plans and documents, it is possible to produce high level estimates of the number of homes that may be located within the Rye Meads WwTW catchment over the period to 2031.

3.100 These are summarised in the table on the following page under both a current and alternate scenario, along with a comparison of the assumptions in the 2009 WCS and the latest household projections.

3.101 In general, the current scenario reflects the latest known and publicly available development proposals. The alternate numbers reflect what could theoretically happen if:

- Land that has been identified for the period after 2031 is brought forward for development more quickly; and / or
- Authorities change the proposed distribution of development in future iterations of their plans; and / or
- Authorities' local plans increase housing numbers to reflect unmet needs that have been identified in other areas; and / or
- Authorities choose to include sites or land that have been identified but are currently considered less favourable options for development.

3.102 It is important to note that these higher assumptions have been made for the purposes of this study only. They have not been specifically endorsed by the affected authorities. However they are considered reasonable variables and have been included to ensure a conservative, 'worst-case' scenario is included in this update consistent with the approach of the 2009 WCS.

3.103 The estimates for both Stevenage and Harlow are fixed under both scenarios. This is because both authorities are constrained and are limited by their available capacity.

Figure 19: Catchment contribution summary

Authority	Total dwellings 2007-31	In Rye Meads WwTW catchment					Notes
		Current scenario		Alternate scenario	Pro-rated Household projections*	2009 WCS Assumption	
		Dwellings	% of total	Dwellings			
North Hertfordshire	14,000	3,000	21%	6,100	3,400	0	2009 WCS attributed all development around Stevenage to that authority. Alternate position includes 3,100 dwellings west of Stevenage served by Thames that are currently not envisaged to come forward until after 2031.
Stevenage	8,900	8,900	100%	8,900	9,100	23,700	Stevenage current figure maximises deliverable capacity so no uplift under alternate scenario.
Broxbourne	6,800	1,100	16%	2,400	1,500	3,100	Current figures suggest around 1,100 homes in Hoddesdon. Alternate scenario broadly doubles this to test higher level of growth.
East Hertfordshire	16,900	10,800	64%	20,000	11,500	7,200	2009 WCS attributed all development around Harlow to that authority. Alternate scenario considers that East Hertfordshire and / or Epping **might** make some contributions to unmet needs in neighbouring areas.
Epping Forest	10,300	1,000	10%		1,300	0	2009 WCS attributed all development around Harlow to that authority. Alternate scenario considers that East Hertfordshire and / or Epping **might** make some contributions to unmet needs in neighbouring areas.
Harlow	9,500	9,500	100%	9,500	7,400	23,000	Harlow current figure maximises deliverable capacity so no uplift under alternate scenario.
Welwyn Hatfield	10,000 – 12,700	4,700	47%	5,500	5,700	9,300	Current scenario includes proposed sites in 2015 Local Plan consultation. Alternate scenario adds in 'finely balanced' sites identified in that consultation which **might** be used to meet a greater proportion of needs.
Total	**76,500 – 79,100**	**39,100**	**51%**	**52,400**	**39,800**	**66,300**	

Sources: SBC analysis of individual authority plans and monitoring reports. All figures independently rounded to nearest 100.
*Pro-rated household projections apply the % figures in Column C to the total household projection figures for each authority for the period 2007-2031.

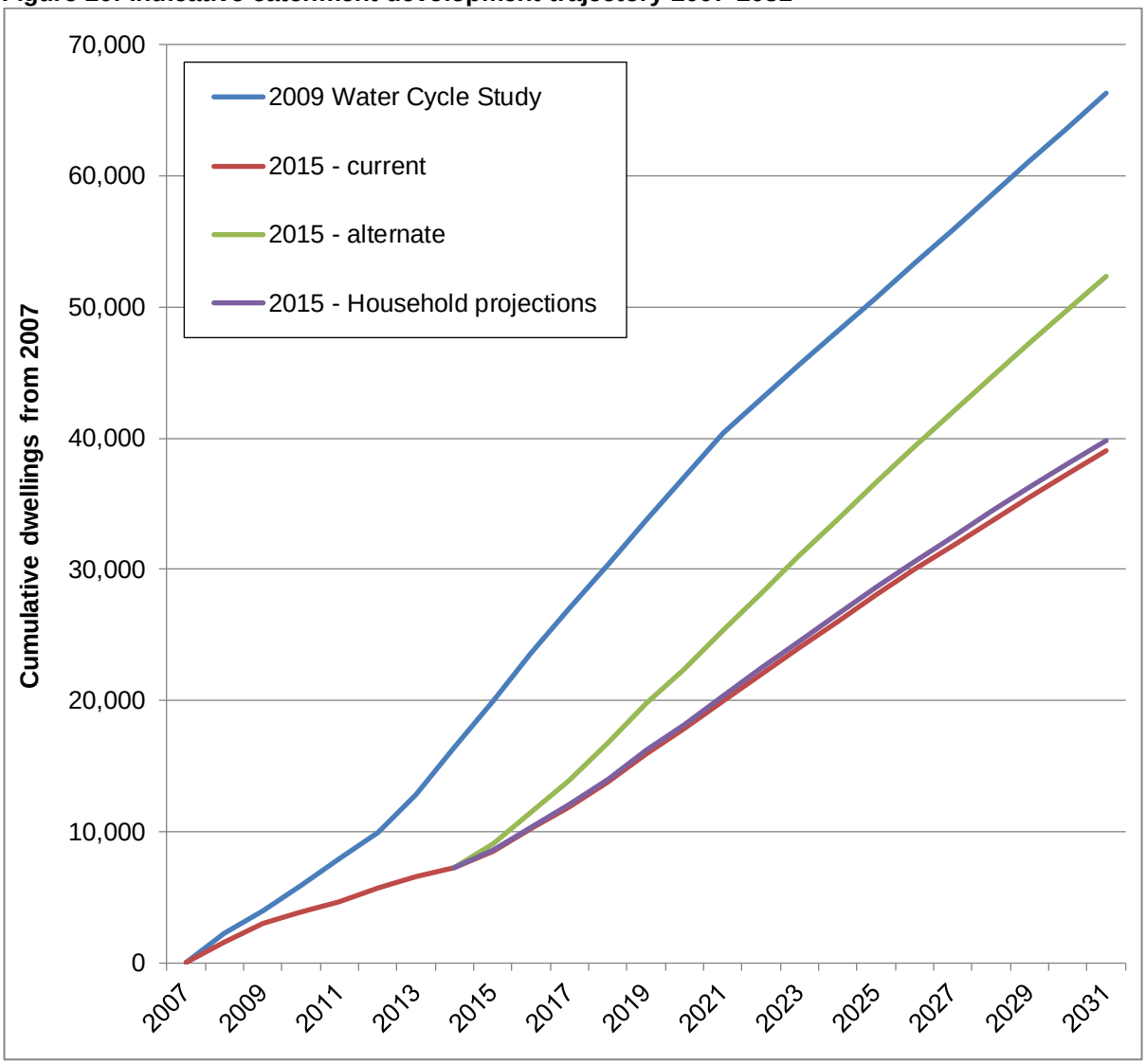
3.105 It is apparent from the table that both the current and alternate scenarios result in dwelling numbers notably below those used in 2009. The current scenario anticipates approximately 39,000 new dwellings in the Rye Meads catchment over the period 2007-2031. This is 40% lower than the assumptions in the 2009 Study. The alternate scenario is more than 13,000 dwellings short of the original WCS figures.

3.106 These figures reflect the changing legislative and economic context outlined at the outset of this section.

3.107 The current scenario is, at catchment area level, broadly in-line with pro-rated household projections, albeit that this masks differences between individual authorities.

3.108 Figure 20 provides an indicative trajectory of these various scenarios. This assumes that a constant proportion of total development in each authority will occur within the Rye Meads catchment each year. This, in turn, is based on annualising the residual figures. In reality, sites in different towns and locations will come forward at different times and rates over the plan period. However, it provides a high level illustration of potential development rates to inform the subsequent sections of this report.

Figure 20: Indicative catchment development trajectory 2007-2031



4 Development Impact Calculations

4.1 High level calculations were used in the 2009 Study to test the likely impacts of proposed developments. This process recognised that future development actually accounts for a relatively small proportion of future demand. It identified that the way in which existing properties were considered – in terms of occupancy rates and water use – had a significantly greater impact and was potentially key to unlocking future capacity.

4.2 As established in the preceding section, the primary aim of this update is to determine whether (waste)water infrastructure and, in particular, current wastewater arrangements are likely to inhibit the emerging local plans of Stevenage Borough Council and of North Hertfordshire District Council insofar as is relates to the area of focus.

4.3 It is anticipated that the calculations in this section will be updated and / or refined by other authorities within the Rye Meads WwTW catchment as they establish greater certainty with regards to their own proposed development strategies.

4.4 It is important to note that the inputs to the development impact calculations have been based on publicly available and / or agreed inputs. They will not necessarily align exactly with the figures used by water companies in their own planning. However, the key advantage of using data in the public domain is that it is not subject to constraints of commercial confidentiality or any other restrictions which can cause significant delays in studies of this nature, and was a key issue in the production of the 2009 study.

4.5 Notwithstanding these points, both EA and TW have agreed that the inputs used represent a reasonable basis for modelling and have endorsed the outputs as an appropriate means of updating findings from the 2009 WCS.

Variables

4.6 The key variables in water infrastructure calculations were identified as

- Occupancy rate
- Per capita consumption (PCC) for new and existing dwellings; and
- Infiltration rates for sewerage calculations.

4.7 One of the key changes since the 2009 Study was completed has been the economic slow-down and recession. This has had a significant impact in household occupancy rates, especially compared to the assumptions used in the original Water Cycle Study.

4.8 New household projections were released in February 2015 and provide an up-to-date indication of average household size (occupancy) over the period to 2031 and beyond. These give the district-level occupancy rates shown in the table below.

Figure 21: Average household size for districts in the 2009 Study area

	2006	2011	2012	2017	2022	2027
North Hertfordshire	2.29	2.35	2.35	2.32	2.30	2.28
Stevenage	2.33	2.39	2.38	2.35	2.33	2.30
Broxbourne	2.44	2.48	2.47	2.45	2.44	2.42
East Hertfordshire	2.38	2.40	2.39	2.36	2.35	2.33
Epping Forest	2.34	2.38	2.38	2.36	2.34	2.32
Harlow	2.36	2.36	2.36	2.35	2.35	2.33
Welwyn Hatfield	2.34	2.45	2.46	2.46	2.44	2.43

Source: 2009 WCS (2006 data); Interim 2011-based household projections (2011 data); 2012-based household projections (all other years)

4.9 The projections that informed the 2009 Study envisaged average household size across the Rye Meads catchment declining from approximately 2.36 in 2006 to 2.19 by 2031. However,

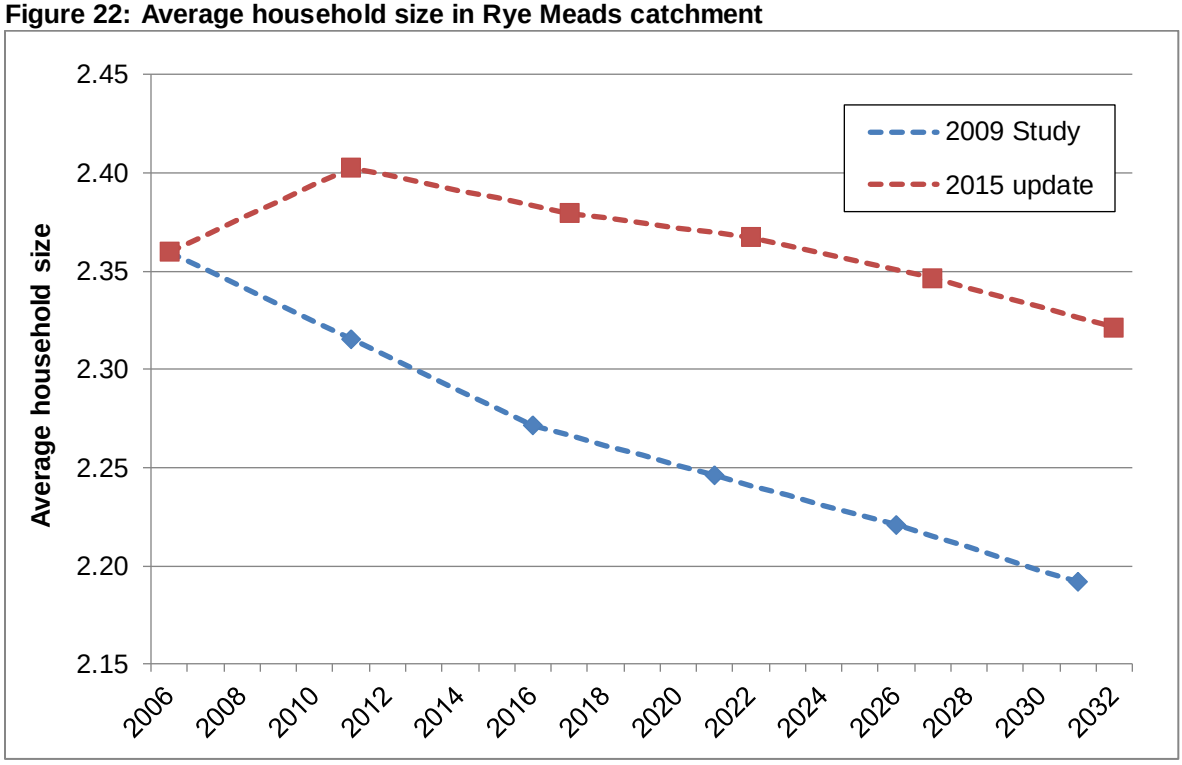
the latest Government projections show that household sizes actually rose between 2006 and 2011. Within the Rye Meads catchment, they are now not anticipated to fall back below 2006 levels until the mid-2020s.

4.10 This comparison is shown in the graph below. As such, although the previous section demonstrates that there will be lower levels of future development within the catchment, this is at least partly offset by the higher level of population that will now be expected to be accommodated within both new and existing dwellings.

4.11 As set out in Section 3, the *Housing Standards Review* proposes a different approach to future water efficiency than was considered in the 2009 WCS. Current building regulations mandate a maximum consumption of 125 litres per person per day (l/p/d).

4.12 Once the *Review* is implemented, authorities will be able to set an optional lower target of 110 l/p/d in areas of water stress. This will be subject to viability testing as part of local plan preparation but will be implemented through the building regulations regime.

Figure 22: Average household size in Rye Meads catchment



Source: 2009 WCS / 2012-based subnational household projections / SBC analysis

4.13 The Environment Agency have confirmed that the Rye Meads WwTW catchment falls within an area of water stress and they will be encouraging the relevant local authorities to pursue this optional measure.

4.14 Affinity Water's latest Water Resource Management Plan contains estimates of per capita consumption once their preferred strategy is implemented. These have been used to estimate future water use in existing properties[19].

[19] The Central region weighted average PCC has been used, as set out in Table 73 of the AfW WRMP. The majority of the Rye Meads catchment falls within water resource zones 3 and 5. These areas are predicted to have lower PCC levels than the Central area average. Consumption in zone 3, which includes Stevenage, is 6-10% lower. However, the higher figure has been used to ensure calculations can be considered robust. A small part of the 2009 Study area lies within the TW water supply area. The PCC levels for the London area in the Thames WRMP are broadly comparable with those used by AfW so the AfW rates are applied.

4.15 No changes have been made to the estimates of dwellings at 2007 included in the 2009 WCS.

Scenarios

4.16 In line with the 2009 WCS, three scenarios have been used to explore the implications of potential future growth.

4.17 The **base case** assumes:

- Average household sizes fall from 2011 levels in line with the latest household projections as per the best case above;
- New buildings implement the 110 l/p/d standard from 2016 but with no further change beyond this point; and
- Existing dwellings follow the assumptions set out in the latest Affinity Water WRMP.

4.18 The **best case** assumes:

- Average household sizes fall from 2011 levels in line with the latest household projections;
- New buildings implement the 110 l/p/d standard from 2016 with a further 10% cut (to 99 l/p/d) following in 2021; and
- Existing dwellings follow the assumptions for the best case in the 2009 WCS to reach an aspirational target of 130 l/p/d by 2031.

4.19 The **worst case** assumes:

- Average household sizes remain at 2011 levels;
- New buildings remain at the current building regulations level of 125 l/p/d; and
- Existing dwellings remain at the 2012 PCC identified by Affinity Water.

4.20 Additional assumptions for wastewater are as per the 2009 WCS, namely:

- Wastewater arises at 95% of the per capita consumption rates for water supply;
- An additional 30% allowance is made on top of this for infiltration[20]; and
- Trade effluent demand is held constant at 2006/07 levels.

4.21 These three scenarios have been run for both the 'current scenario' and 'alternate scenario' dwelling figures identified in Figure 19 in the previous section.

4.22 The figures derived from the 2012-based household projections were, in terms of development within the Rye Meads catchment, judged to be sufficiently close to the 'current scenario' that it would not result in a difference in outcomes that would necessitate a materially different response and these have not been modelled as a separate scenario.

4.23 Copies of the development impact calculations are available as a separate technical appendix to this report.

Development Impact Results

Water supply

4.24 The information that has been gathered for this exercise would allow for the water supply results in the 2009 WCS to be updated.

[20] This is not direct input (rainwater) but an allowance for leaking pipes (groundwater infiltration) and flows that may be connected to the sewers from unknown sources.

4.25 However, AfW recently published their WRMP for the period to 2040. This has been approved by the relevant statutory bodies and establishes how AfW will ensure continuity of supply over this period for their entire supply area.

4.26 The WRMP contains a number of assumptions around development levels, household occupancy and per capital consumption. It further contains measures to reduce demand from existing dwellings as well as reflecting the proposed reduction in the abstraction license for Whitehall discussed in Section 2 of this document.

4.27 At the time of writing, AfW had raised no comments or objections to the emerging plans for development around Stevenage.

4.28 It is therefore not considered appropriate or necessary to update the water supply elements of the 2009 WCS, which included analysis of water supply resources and concluded that water supply need not constrain future growth in the study area.

4.29 Notwithstanding this point, technical calculations for water supply have been carried out to inform the wastewater estimates set out below and are included for information in the technical appendix.

Wastewater treatment – Stevenage and North Hertfordshire

4.30 All the wastewater results refer to dwellings within the Rye Meads catchment only. The tables below summarise the wastewater results for Stevenage and North Hertfordshire for the two development scenarios that have been explored.

Figure 23: Summary of wastewater treatment results, Stevenage and North Hertfordshire

Scenario	2031 Change in DWF of existing dwellings (m^3 / day)	2031 Total DWF increase from new dwellings	2007 to 2031 net DWF increase
Current scenario			
Best	-3,317	3,697	380
Worst	487	4,324	4,811
Base	-2,663	3,872	1,210
Alternate scenario			
Best	-3,317	4,629	1,312
Worst	487	5,455	5,941
Base	-2,663	4,859	2,196

4.31 The current scenario, base case shows an increase in demand of approximately 1,200m^3 over the period 2007-2031. New development will add an additional 3,900m^3 to the DWF figures. Around two-thirds of this is offset by savings from existing dwellings. Under the best case, there would be almost no change over this 24-year period with demand for new dwellings broadly offset by savings from existing dwellings.

4.32 The alternate scenario, which is based upon illustrative higher housing numbers, would see increases in demand ranging from approximately 1,300m^3 to a little under 6,000m^3

4.33 The current scenario, base case total DWF is illustrated in Figure 24. The jagged nature of the graph is explained by the fact that the 2009 WCS assumed changes in PCC every five years but remaining static in the intervening period. This results in an increase in anticipated demand over each five-year period before a readjustment to the 'new normal' for the next period. This is replicated in the initial results for this update to ensure consistency.

4.34 However, changes in PCC will not change overnight at the end of each five-year period, they will occur gradually over time as demand management techniques, such as compulsory metering, are deployed. The dashed line shows the likely impact if changes in PCC are

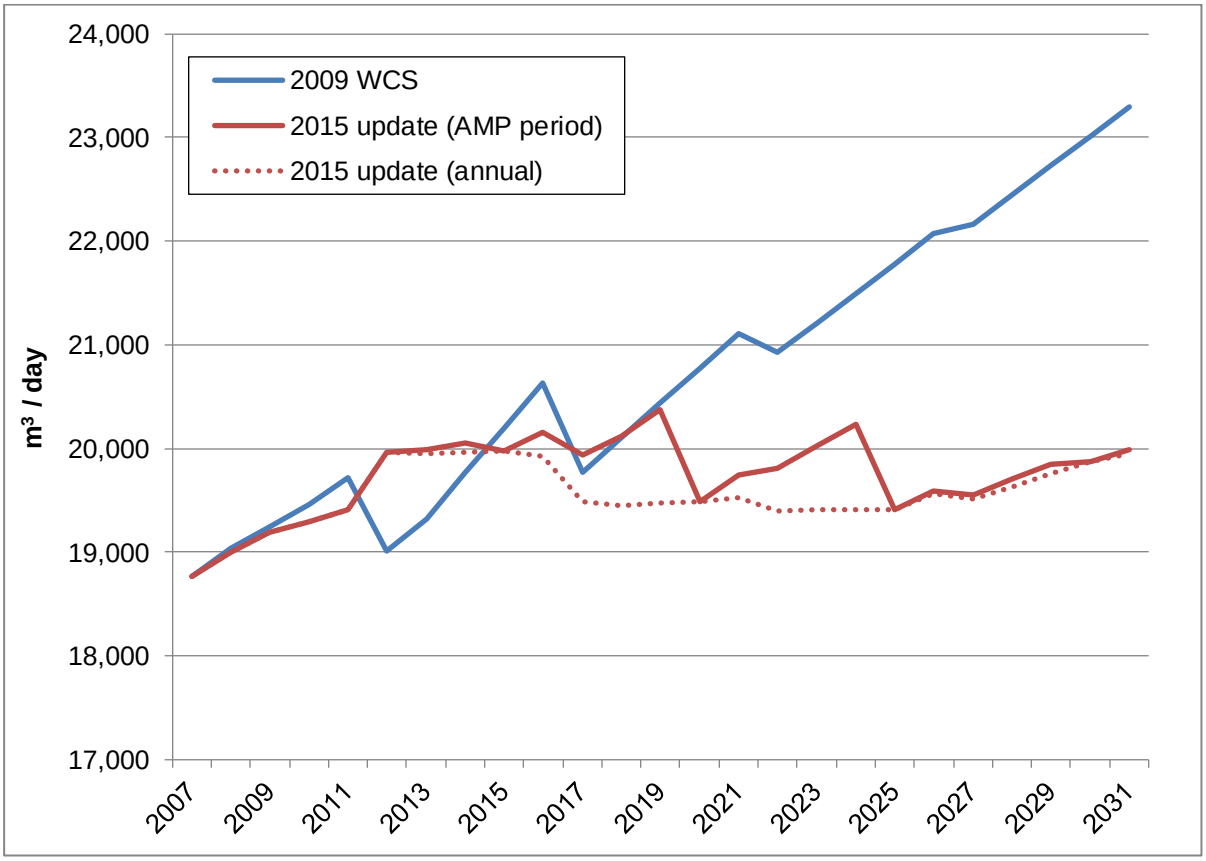
assumed to be phased evenly over each five-year AMP period and are perhaps a more accurate indicator of future demand.

4.35 If this is assumed to be the case, the latest results actually show that current (2015) demand is likely to represent the peak over the remainder of the plan period as improvements in PCC and falling household sizes combine to reduce demand to around 19,500m^3 / day at 2025 before increasing again to 2031.

4.36 This upward curve beyond 2025 is a combination of two main factors:

- The significant majority of PCC savings having been achieved by this point; and
- The 'backloading' of a significant proportion of new development meaning that demand from new homes begins to outweigh savings from existing dwellings.

Figure 24: Comparison of base case scenarios – 2009 WCS vs. 2015 update – Stevenage and North Hertfordshire

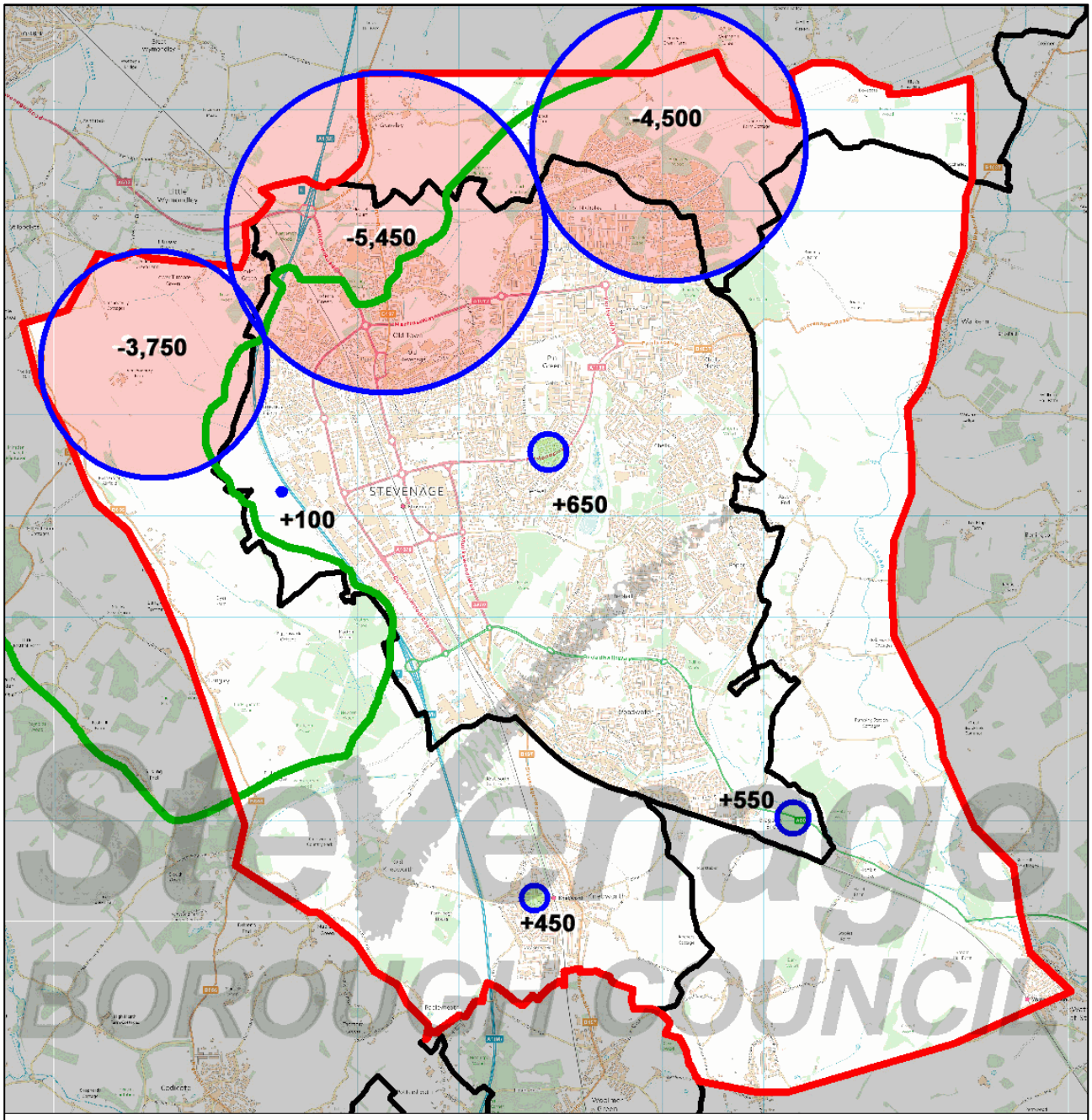


4.37 Based on information at the time of writing, the current scenario base case is assumed to be the most likely of those considered to be realised. It is based on up-to-date intelligence on the emerging local plans of both Stevenage and North Hertfordshire, household size data from the latest Government projections and PCC levels identified in AfW's latest WRMP.

4.38 The differences between the 2009 and 2015 results can be further illustrated by comparing the development assumptions made for the area of focus in 2009 versus those set out in the current scenario in Section 3. These are shown in the map on the following page.

4.39 A slightly higher level of development is now assumed to occur within the Stevenage urban area. Along with smaller urban extensions to the south-east of the town and sites in Knebworth, these areas will see an increase of around 1,600 homes when compared against the assumptions in the 2009 study. However, this is more than offset by the loss of major urban extensions around the town. By 2031, it is now assumed there will be:

Figure 25: Comparison of development assumptions within area of focus



Broad location where number of homes to 2031 has decreased

Broad location where number of homes to 2031 has increased

+1,000 Change in number of homes (2015 update - 2009 WCS, rounded to nearest 50)

Area of focus for WCS review (development)

Local authority boundary

River basin district boundary (approx)

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- 3,750 homes fewer to the west of Stevenage; and
- Almost 10,000 homes fewer to the north and north-east of the town[21].

Wastewater treatment – Rye Meads catchment

4.40 These results refer to all dwellings within the Rye Meads catchment, including the figures for Stevenage and North Hertfordshire above. The tables below summarise the catchment-wide results for the two development scenarios that have been explored.

Figure 26: Summary of wastewater treatment results, Rye Meads WwTW catchment

Scenario	2031 Change in DWF of existing dwellings (m^3 / day)	2031 Total DWF increase from new dwellings	2007 to 2031 net DWF increase
Current scenario			
Best	-12,568	12,371	-197
Worst	1,341	14,413	15,755
Base	-9,998	12,980	2,982
Alternate scenario			
Best	-12,568	16,463	3,896
Worst	1,341	19,361	20,702
Base	-9,998	17,326	7,328

4.41 The current scenario, base case shows a net increase of just less than 3,000m^3 in demand across the period 2007 to 2031. Although new development will add an additional flow of approximately 13,000m^3, this is largely offset by an anticipated saving of approximately 10,000m^3 from existing dwellings. Under the best case, there would virtually no change with demand from new dwellings almost exactly offset by savings from existing dwellings.

4.42 The alternate scenario, which is based upon illustrative higher housing numbers, would see increases in demand ranging from approximately 4,000m^3 to a little under 21,000m^3

4.43 Figure 27 details the components of demand. It illustrates that future reductions in occupancy rate and proposed PCC reductions unlock some capacity at Rye Meads, allowing the treatment of wastewater from new development to be accommodated.

4.44 Figure 28 provides a comparison with the results from the 2009 study. It can be seen that demand since 2007 has been broadly in line with that identified in the 2009 study. The lower levels of future demand are offset by higher levels of occupancy and PCC. However, over the plan period this reverses. The PCC reductions now assumed by Affinity Water in their latest WRMP go beyond those that were assumed in 2009, while the 2012-based household projections show that occupancy levels will fall from their 2011 peak.

4.45 If this is assumed to be the case, the latest results actually show that current (2015) demand is likely to be the peak over the remainder of the plan period as improvements in PCC and falling household sizes combine to reduce demand to below 80,000m^3 / day at 2025 before increasing again to 2031.

4.46 As with demand in the area of focus, the upward curve in the wider catchment beyond 2025 can predominantly be attributed to the same two factors:

- The significant majority of PCC savings having been achieved by this point; and
- The 'backloading' of a significant proportion of new development meaning that demand from new homes outweighs the savings from existing dwellings.

[21] Although almost 11,000 homes around Stevenage were identified within AW's operational boundary, the initial calculations for the 2009 WCS were made on the assumption that all Stevenage development would be served by Rye Meads.

Figure 27: Components of wastewater to Rye Meads WwTW (current scenario, base case)

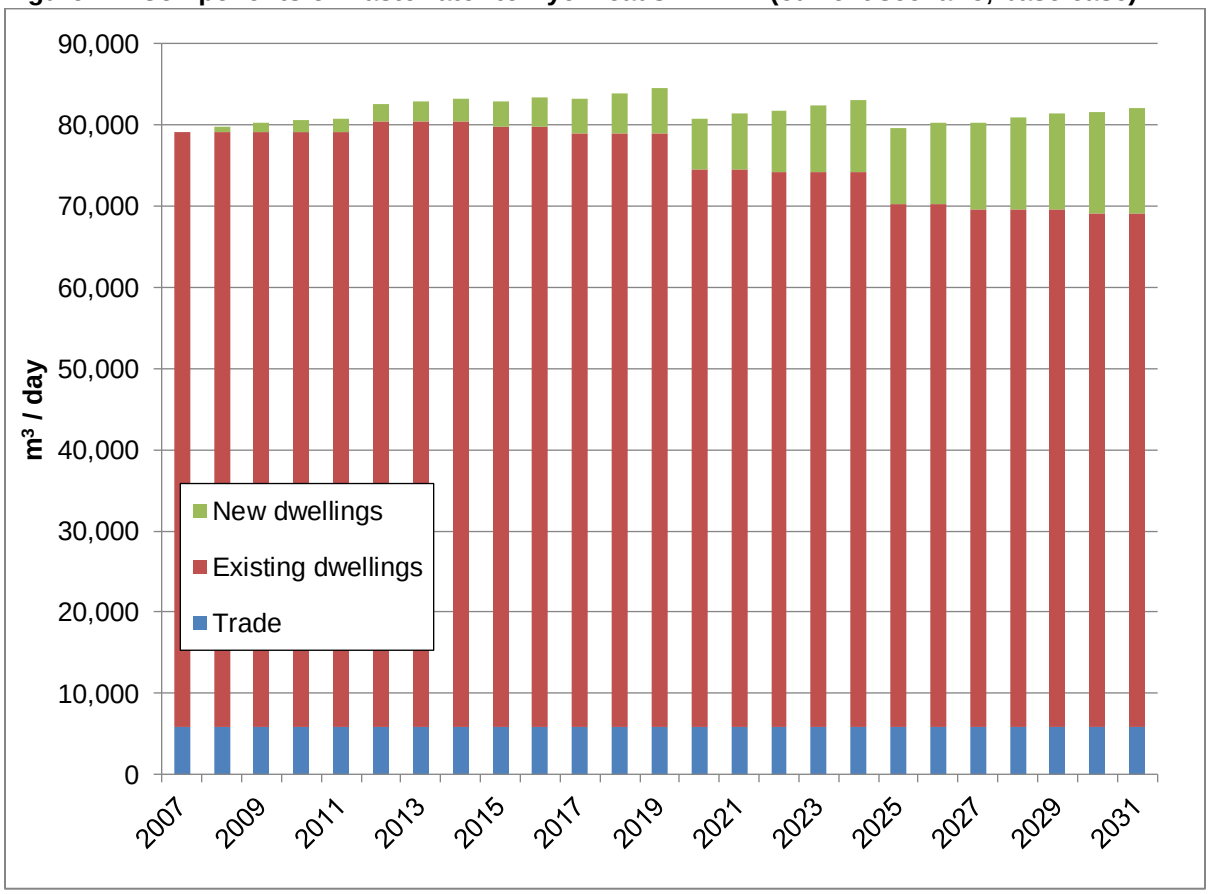
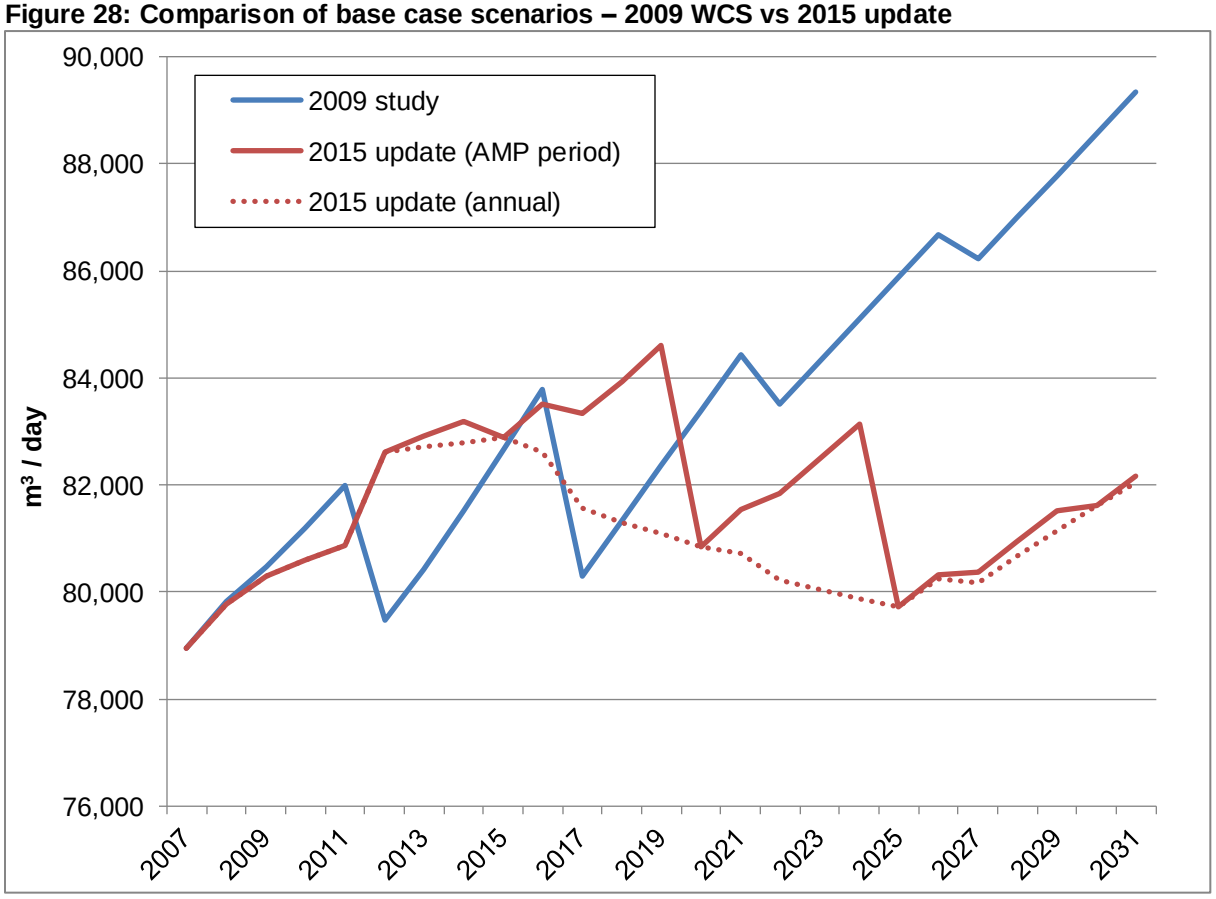


Figure 28: Comparison of base case scenarios – 2009 WCS vs 2015 update



4.48 Based on information at the time of writing, the Current scenario base case is assumed to be the most likely of those considered to be realised. It is based on up-to-date intelligence on emerging local plans within the Rye Meads catchment, and PCC levels identified in Affinity Water's latest WRMP. It is broadly consistent with the most recent Government household projections.

4.49 The capacity of Rye Meads to accept these flows is considered in subsequent sections.

5 Catchment capacity

5.1 This section reviews the content of the corresponding chapter in the 2009 Study and provides updated information where applicable and / or appropriate.

The Water Cycle

5.2 This section of the 2009 WCS provided a factual description of the natural and wider water cycles. This element of the study does not require updating and the 2009 Study should be referred to for further information.

Managing Potable Water Demand

5.3 The information gathered for this update would allow for an updated suite of statistics to be presented. However, in the 2009 study this information covered the entirety of the local authority areas considered in Section 3, a geographical extent that goes well beyond this study's area of focus as defined in Section 2.

5.4 As established in paragraphs 4.24 to 4.29, Affinity Water have an up-to-date WRMP which considers a wide range of demand management measures over the period to 2040 and sets targets for per capita consumption. It identifies no specific constraints to future supply within the area of focus for this review.

5.5 It is considered that the measures and issues considered in this part of the 2009 WCS are, in the first instance, matters to be considered by and agreed between a private water supply company and its regulator(s) through WRMPs and other relevant processes.

5.6 Although a water cycle (or similar) study may identify ways in which water demand may be managed, it is ultimately through statutory documents and processes that any such measures will be defined, agreed and delivered.

5.7 This is not to undermine the broad ambitions set out in the 2009 report, relating to reductions in per capita consumption, increased sustainability in new builds, the concept of water neutrality or ensuring security of supply.

5.8 Stevenage Borough and North Hertfordshire District councils will seek to work with AfW in order to identify opportunities for promoting water efficiency and develop messages about the benefits this can bring.

Sewerage network and Wastewater Treatment

5.9 The 2009 Study identified a number of wastewater treatment works in and around the broader study catchment. It considered, in broad terms, their capacity. The assumption remains, as a starting point at least, that development within the Rye Meads WwTW catchment will drain to that facility.

5.10 It is considered unnecessary at this stage to revisit, or come to any different conclusions to the 2009 WCS on the ability of other works to be able to accept significant flows from new developments, particularly as the majority of them do not relate to the area of focus.

Infrastructure Capacity and Planned Upgrades

5.11 The volumetric discharge consent for Rye Meads was identified in 2009 as being 110,000m^3 / day. This remains unchanged at the time of this update.

5.12 For sewage treatment, flows are only one part of the calculation of required capacity. Although the modelling results suggest that growth may not have a major impact upon flow

or, by association, flow consents, the increase in population will still generate an increase in the organic load to the WwTW.

5.13 TW consider there to be minimal spare capacity within existing processes to accommodate additional load. The main capacity constraint relates to the main biological treatment stage. A growth upgrade will be delivered during the AMP6 period (2015 – 2020) that will provide around 40,000 persons equivalent (PE) increase from 2016 levels.

5.14 Based on the average household sizes identified in in Figure 22, this would equate to around 17,000 homes worth of additional capacity. This work is due to commence in early 2016 with completion in the middle of 2017. This increase in treatment capacity should accommodate currently proposed growth through to at least 2026.

5.15 Should additional tank volumes be required beyond 2026, TW consider there to be ample space to provide these within the site. It is considered that such works would be unlikely to have a direct impact on the SPA. Any such proposals would be subject to the relevant regulatory regimes and, if necessary, mitigation measures before they could be approved in any case.

5.16 Rye Meads WwTW would therefore appear to have the potential to achieve **sufficient hydraulic treatment capacity** across the current plan period. TW similarly confirm there would be **sufficient volumetric capacity** within the current discharge consent for future growth, even well beyond the 2026 growth horizon.

Sewerage network

5.17 The 2009 WCS identified that the sewerage network was known to be close to capacity at a number of locations. This included in and around Stevenage.

5.18 Plainly, the amount and spatial distribution of development anticipated within the area of focus has changed significantly since 2009. The implications of this have been considered in Section 3.

5.19 TW are conducting further infrastructure modelling for the Stevenage area – including connecting infrastructure to Rye Meads WwTW - based upon the sites and assumptions for the Stevenage area contained in this report. Once finalised, this will inform an addendum to this report and / or Infrastructure Delivery Plans.

Environmental Capacity

5.20 As set out in the 2009 study, increases in discharge can adversely impact downstream water quality and flood risk. The base case scenario demonstrates that the increase in discharge at Rye Meads is likely to be well within the volumetric consent stipulated by the EA. It is considered that the discharge will not significantly alter flood risk downstream beyond that which is deemed acceptable under the existing consent.

5.21 Providing the WwTW could continue to operate within the standards prescribed in its consents, there should further be no deterioration in water quality.

5.22 However, the EA are driven by the requirements in the Water Framework Directive (WFD) to ensure water bodies meet ‘good’ status by 2027. Further consent changes could be required to achieve this while the reductions in water consumption in concert with increasing population is likely to mean that effluent is received in a more concentrated form as the plan period progresses.

5.23 As set out in Section 2, the watercourses between Stevenage and Rye Meads, as well as downstream of the works, record only moderate ecological quality. Chemical water quality

between Stevenage and Rye Meads is good but reverts to a failed status immediately downstream of the WwTW at the confluence between the rivers Lee and Stort. This is triggered, in part, by phosphate levels arising from the WwTW.

5.24 Interventions may be required to ensure WFD requirements are met. The EA cannot at this stage guarantee that consent changes will not be required beyond 2020. However, it is also acknowledged that it would be impracticable for new consents to be imposed that go beyond the best available technology available to TW at the time.

5.25 Any **changes in consents to (attempt to) meet the requirements of the Water Framework Directive will be the factor most likely to restrict the use of Rye Meads WwTW** in the future. As established above, there is theoretical physical capacity to accommodate the quanta of development considered in Section 4.

5.26 Notwithstanding this point, it is established above that TW are proposing an upgrade to the works during the AMP6 period. It is considered extremely unlikely that the EA would allow a capacity upgrade and then impose new constraints which would prevent that capacity from being realised, even though further treatments or interventions may become necessary in the event new technology becomes available.

5.27 The development impact calculations suggest that, using annualised water consumption figures, current flows to Rye Meads are likely to represent the peak flows within the current plan period. The proposed upgrade would provide some additional headroom in terms of load.

5.28 It is further noted that the development impact calculations in the base case may ultimately prove an overestimate of likely future demand on a number of grounds:

- The development figures for Stevenage assume that sites around the town in the Anglian catchment will be served by TW (see paragraphs 3.53 and 3.58);
- The development figures for East Hertfordshire include 3,000 homes at Gilston, north of Harlow, where on-site wastewater treatment is being proposed (see paragraphs 3.76 to 3.77) as well as development assumptions for some small villages that lie outside of Rye Meads' catchment (see paragraph 3.75);
- It is assumed for the purposes of this study that all outstanding planning and 'Duty to Co-operate' issues will be resolved allowing all sites assumed in the 'current' scenario to be delivered within the period to 2031. As established, the emerging plans for other authorities within the Rye Meads catchment may be at an earlier stage of preparation and / or have significant issues that require resolution before they can proceed which may result in a delay in delivery or in certain schemes not being realised; while
- The PCC figures are based upon averages for the whole of the Affinity Central area, as set out in the latest WRMP. However, zones within the Rye Meads catchment, and Stevenage in particular, record lower PCC rates (see paragraph 4.14 / footnote 19)

5.29 If any of these factors were realised, flows (and / or associated loads) would be lowered beneath the levels identified in Figures 26, 27 and 28[22]. On this basis it is considered that environmental capacity should not restrict new development from coming forward over the period to at least 2026, and is only a moderate risk over the period to 2031.

[22] A reference case that allows for some of these factors to be realised suggests future flows to Rye Meads would be less than 80,000m^3 over the period to 2031, 3.5% below the demand levels at 2031 in the current scenario, base case which forms the basis for the main conclusions in this section. These figures are provided for illustration only and do not form part of the formal assessment.

Flood Risk

5.30 As outlined in Section 2, Stevenage has completed an update of its Strategic Flood Risk Assessment (SFRAs) which did not identify substantive changes from the study completed in 2009. These documents should be referred to for additional information.

5.31 The status of SFRAs for other authorities within the Rye Meads catchment lies outside the scope and remit of this update.

Surface Water Management

5.32 The 2010 Flood and Water Management Act designated unitary and county councils as Lead Local Flood Authorities (LLFAs). Hertfordshire County Council are the LLFA for the area of focus for this review and for five of the seven authorities who participated in the 2009 Study[23]. The LLFA is responsible for managing local flood risk from surface water, ground water and ordinary watercourses.

5.33 The 2009 Study recognised that the nature of the geology in the study area meant that infiltration systems would often be feasible and, where this was the case, they should be encouraged.

5.34 This finding is reiterated in the SFRAs completed for both Stevenage and North Hertfordshire Councils. The widespread use of sustainable drainage systems (SuDS) can reduce the discharge of rainwater to the sewerage system, hence reducing impacts on capacity at treatment works.

5.35 From April 2015, changes to the planning system will secure the delivery of SuDS in all new major developments while the LLFA becomes a statutory consultee for all such schemes.

5.36 Hertfordshire County Council adopted a SuDS policy document in February 2013. In March 2015 it was updated to reflect these changes to the planning system and adopted as an addendum to the Hertfordshire Local Flood Risk Management Strategy. This provides detailed technical guidance on the provision of SuDS in new developments.

Environmental opportunities

5.37 The 2009 Study identified improvements to the River Beane as a major objective. It noted that opportunities to increase water flow could assist the watercourse in attaining quality targets. As set out in Section 2, the EA now propose to significantly halt extraction at Whitehall Pumping Station, which is reflected in Affinity Water's latest WRMP.

Catchment Capacity Summary

5.38 As per the 2009 study, it is not considered that **potable water supply** is an issue that need constrain development within the area of focus. Affinity Water have an up-to-date WRMP which identifies a combination of resource development and demand management measures to ensure longevity of water supply.

5.39 The calculations in section 4 and analysis above, suggest that Rye Meads WwTW should be capable of treating wastewater from all proposed development without requiring an amendment to its volumetric consent. Upgrades are planned for the AMP6 period and these should provide sufficient headroom to accommodate development over the period to 2031 and beyond.

[23] Harlow and Epping Forest are both in Essex where Essex County Council is the LLFA for non-unitary areas.

5.40 However, there is some risk that stricter discharge consents may be imposed by the EA to achieve the higher water quality and ecological standards required by the WFD. However, for the reasons identified in paragraphs 5.24 to 5.27, these are not considered to pose a significant risk to the delivery of new homes within the area of focus.

5.41 Further work to identify any detailed infrastructure interventions within the area of focus are ongoing.

5.42 Low river base flows have already been identified as a key issue (see Section 2). However, within the area of focus, this primarily relates to the River Beane. It has been established that measures will be taken during the forthcoming AMP period to substantially reduce abstraction in order to restore flows to this watercourse.

6 Optioneering and strategy development

6.1 The 2009 WCS contained a number of high-level options for the catchment that would both solve the wastewater and sewerage issues and also identify schemes that would help to address the environmental constraints that had been identified.

6.2 It is not the role of this update to reassess the overall feasibility of these options. There is nothing to suggest that the broad conclusions reached in 2009, in terms of constraints, areas where mitigation would be required or potential benefits, need be revisited.

6.3 Furthermore, the analysis in Sections 4 and 5 demonstrates that the levels of demand that will be placed on the Rye Meads WwTW in the future will now be significantly lower than anticipated in 2009. At the time of the 2009 study, it was concluded that Rye Meads could be approaching its volumetric consent limit of 110,000m^3/day by 2031 and that, consequently, a new solution was likely to be required to allow housing delivery to continue in the long-term.

6.4 The updated results show that, due to a combination of lower levels of future development and more ambitious PCC reductions for existing properties, the requirement to optioneer alternative approaches has largely fallen away.

6.5 Notwithstanding this, there could still be benefits in pursuing (a combination of) alternate approaches over the long-term. This could particularly be the case in terms of environmental capacity.

6.6 This section therefore provides a brief commentary on the potential solutions that were identified in 2009 insofar as they relate to the area of focus and the revised levels of development that have been identified.

WwTW upgrades

Rye Meads

6.7 As per the commentary above, it is now envisaged that a large-scale upgrade of Rye Meads WwTW will not be required in the period to 2031. TW have plans to install capacity for the period to (at least) 2026 and consider that physical capacity exists within the site to provide additional treatment streams beyond this time if required and technically feasible.

Ashbrook

6.8 The Ashbrook WwTW is located to the south-east of Hitchin. It was identified as a potential solution in the 2009 study as it was located close to the planned urban extension west of Stevenage.

6.9 As explained in Section 3, it is now anticipated that only a smaller quantum of development will be realised in this area prior to 2031. This area of land, within Stevenage Borough, falls almost wholly within TW's operational area in any case.

6.10 However, North Hertfordshire have identified the adjacent land, which lies almost exclusively in AW's operational area, to be 'safeguarded' for the provision of 3,100 homes in the subsequent plan period beyond 2031.

6.11 The EA have highlighted that any solution which results in additional sewerage infrastructure being added to the headwaters of the River Purwell is likely to have WFD implications for that watercourse that would need to be considered.

6.12 Subject to the issues and constraints previously identified, there may be merit in considering the potential for Ashbrook to serve this element of the development when forward planning

for the delivery of this site commences. However, notwithstanding the inclusion of this scheme in the 'alternate scenario' calculations above, it is considered beyond the remit of this WCS review to consider this issue further at this time.

Letchworth or Hitchin

6.13 Concerns were raised in the 2009 study over the sustainability of a solution that would require wastewater to be transported over long distances, with the provision of associated infrastructure. Given the reduction in levels of development around Stevenage, it is considered highly unlikely that the necessary economies of scale would now exist to make this a viable option.

6.14 As with the Ashbrook works above, the suitability of otherwise of this option should be revisited by North Hertfordshire when they commence forward planning of their 'safeguarded' land to the west of Stevenage which is identified for the period after 2031.

New WwTW

River Beane

6.15 The 2009 study gave high level consideration to a new WwTW on the River Beane that could serve the proposed development to the north of Stevenage and / or divert flows from the eastern Stevenage outfall sewer.

6.16 It was identified that this had the potential to restore flows to the River Beane. However, as explained elsewhere, it is now anticipated that a significant reduction in groundwater abstraction will have a positive impact.

6.17 As previously shown in Figure 25, almost 10,000 fewer homes are now anticipated to the north and north-east of Stevenage over the period to 2031. This reduction in the scale of development means that neither the demand nor economies of scale necessary to support such a significant infrastructure intervention now exist.

6.18 This update demonstrates that the conditions which made a new treatment plant on the River Beane a reasonable alternative at the time of the 2009 study no longer exist.

Other locations

6.19 The 2009 WCS also investigated the potential to deliver new WwTW on the rivers Mimram, Lee and Stort as well as the Cripsey Brook. These watercourses, and the areas of development they could potentially serve, all lie outside the area of focus for this review.

6.20 At the time of the 2009 WCS, these options were not recommended to be carried forward. In some cases, this was due to perceived 'absolute' constraints. However, the shortlist of options was also, in part, influenced by the distribution of development proposed at that time. As demonstrated, this has reduced significantly but also changed in its geographical distribution. In particular, substantially lower levels of development around Stevenage are now anticipated.

6.21 Notwithstanding the conclusion in Section 5 that Rye Meads WwTW may now be able to accommodate all proposed development within its catchment over the plan period, it will be for the other authorities elsewhere in the 2009 study area, in concert with TW and the EA, to determine whether any of these solutions should be revisited and whether they, or any other options, represent reasonable alternative solutions worthy of further investigation in order to serve proposed developments in their areas.

7 Strategy and conclusions

Wastewater Treatment Works

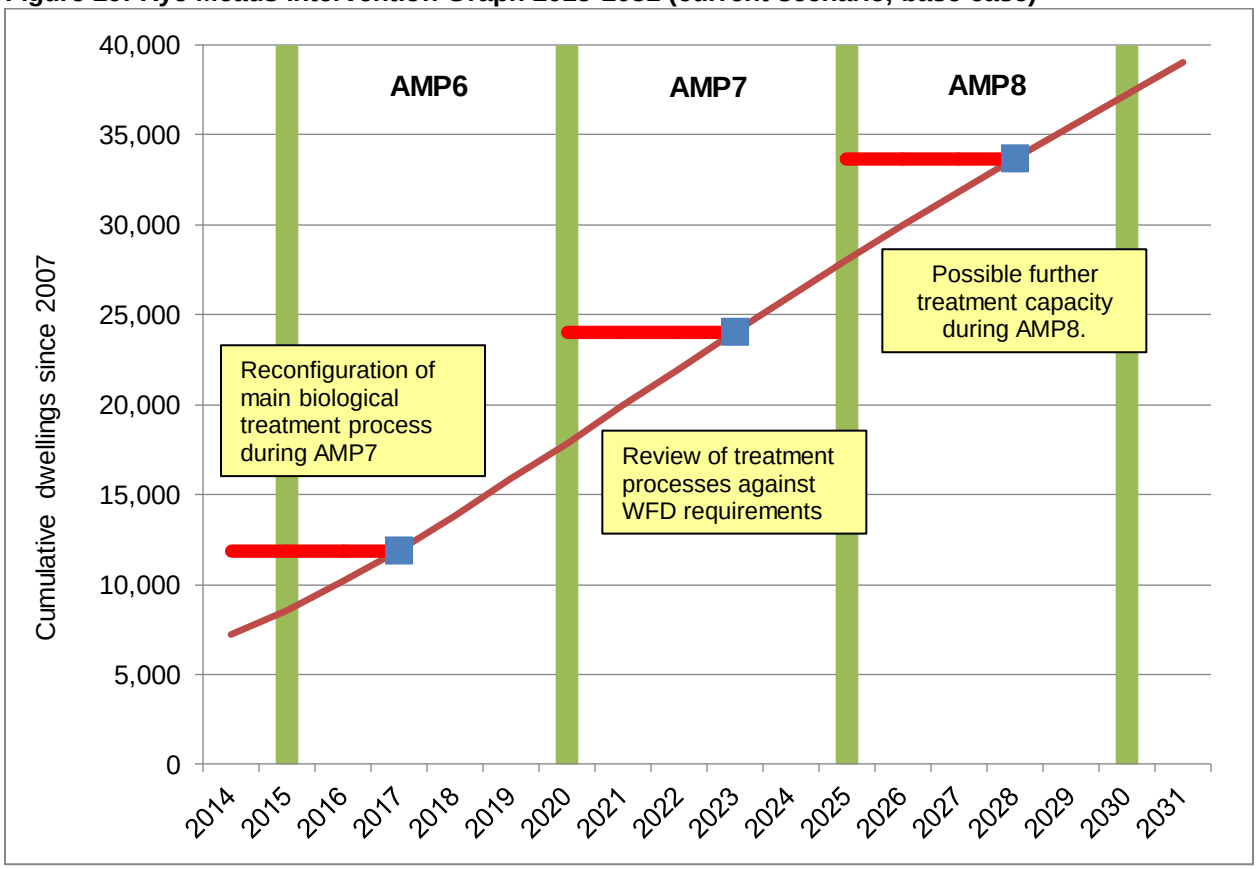
7.1 Following the optioneering process, the 2009 Study concluded that Rye Meads WwTW should continue to treat wastewater from Welwyn Garden City, Hertford, Ware and Harlow, albeit that this would still necessitate strategic upgrades to the works.

7.2 It was concluded that, by enabling wastewater from Stevenage to be treated in a different location, sufficient capacity could be unlocked at Rye Meads.

7.3 As established through this update report, it is now considered that Rye Meads should now have capacity to treat all wastewater arising from within its catchment over the period to 2026, with a reasonable prospect of being able to accommodate demand to 2031. This arises from a combination of reduced future development allied with increased long-term decreases in consumption from existing homes that are now predicted by Affinity Water. Furthermore, some of the development assumed in the modelling results in this report may ultimately be served by alternate works or even not come to pass in the timescales currently envisaged.

7.4 The modelling results are based on publicly available information to avoid issues of commercial confidentiality. Notwithstanding this, TW have confirmed that they consider the modelling in this report an appropriate basis for updating the 2009 WCS and that their own figures bear out the suggestion arising from this modelling that flows to the Rye Meads WwTW may have peaked.

Figure 29: Rye Meads Intervention Graph 2015-2031 (current scenario, base case)



7.5 Figure 29 identifies the interventions that have been identified as (potentially) necessary at Rye Meads to allow the current scenario, base case presented in this report to proceed. However, it must be noted that these interventions are for guidance only. They are based upon the assumptions detailed within this report and certain variables being achieved in the

future such as the project annual dwelling completion rates within individual authorities and across the Rye Meads catchment as a whole.

7.6 An upgrade is currently being planned for delivery in 2017 to provide additional load capacity to at least 2026.

7.7 The EA consider that tighter consents may be required beyond the AMP6 period in order to achieve the objectives of the WFD. These may ultimately preclude Rye Meads from realising the full volumetric capacity of their current discharge consent (110,000m^3). However, the EA have confirmed that any changes to licenses and consents will not go beyond the limits of best available technology and would not seek to inhibit TW from realising installed capacity at the works.

7.8 Notwithstanding, it is considered prudent to anticipate a review of processes at Rye Meads beyond 2021 to coincide with the third RBMP cycle.

7.9 The extent to which the AMP6 upgrade provides capacity for the period beyond 2026 will need to be kept under review. Further treatment capacity may be required beyond this time. TW have confirmed physical capacity exists, recognising that any further treatment streams will be subject to appropriate regulatory regimes and / or WFD requirements.

7.10 Whether or not additional treatment is required will depend on the extent to which the following are realised:

- The scale of development currently identified in the current scenario base case;
- The water efficiency savings assumed by AfW and TW in their latest round of WRMPs; and
- Alternate treatment solutions within the Rye Meads catchment that alleviate pressure on the WwTW.

7.11 As these may be subject to change in the future, it is vital that good communication is maintained between the Local Authorities and TW, to update and amend the development proposal assumption in this report as more, or updated information becomes available to enable TW to seek funding approval for any necessary works within appropriate timescales.

7.12 Additional flood risk mitigation and water quality improvement needs arising after 2021 due to potentially tighter WFD targets should be factored into any upgrade proposals through close consultation between TW and the EA. Similarly, the impact on Rye Meads SSSI (and, by extension, relevant areas of the Lee Valley SPA) should be avoided through negotiations with Natural England and the inclusion of any appropriate mitigation measures.

7.13 It has been established, in consultation with TW, that the significant downscaling of development proposals of Stevenage (in comparison to the 2009 WCS) means the necessary economies of scale and / or volumes of wastewater will not arise to make the strategic solutions discussed in 2009, that would have allowed treatment to take place closer to the town, viable options under the development scenarios now being considered.

7.14 As such, the strategic wastewater treatment options for Stevenage considered in 2009 – namely a new treatment works on the River Beane and / or a solution in the Anglian catchment - are no longer considered appropriate or necessary to enable the local plans of Stevenage and North Hertfordshire (insofar as the latter relates to development around Stevenage within the Rye Meads catchment) to proceed.

7.15 Other options and interventions may be available outside the area of focus for this study that would alleviate any potential future pressures on Rye Meads. However, these are for other authorities within the catchment of the WwTW to evaluate and consider.

Sewerage Network

7.16 The 2009 study additionally identified a series of more detailed infrastructure interventions required at Stevenage and Harlow.

7.17 Harlow lies outside of the area of focus for this review. Notwithstanding the inclusion of assumptions for this area to inform the overall assessment of potential development, any further detailed modelling and / or updates that are considered necessary should be developed as the plans of Harlow and / or its neighbours progress in concert with TW.

7.18 As set out above, TW are undertaking more detailed infrastructure analysis for Stevenage based upon the assumptions in this report. Any interventions identified will continue to inform preparation of the local plan as well as TW's forward plans.

Appendix 1: Thames River Basin Catchment Data

Table A1: Water body classification data

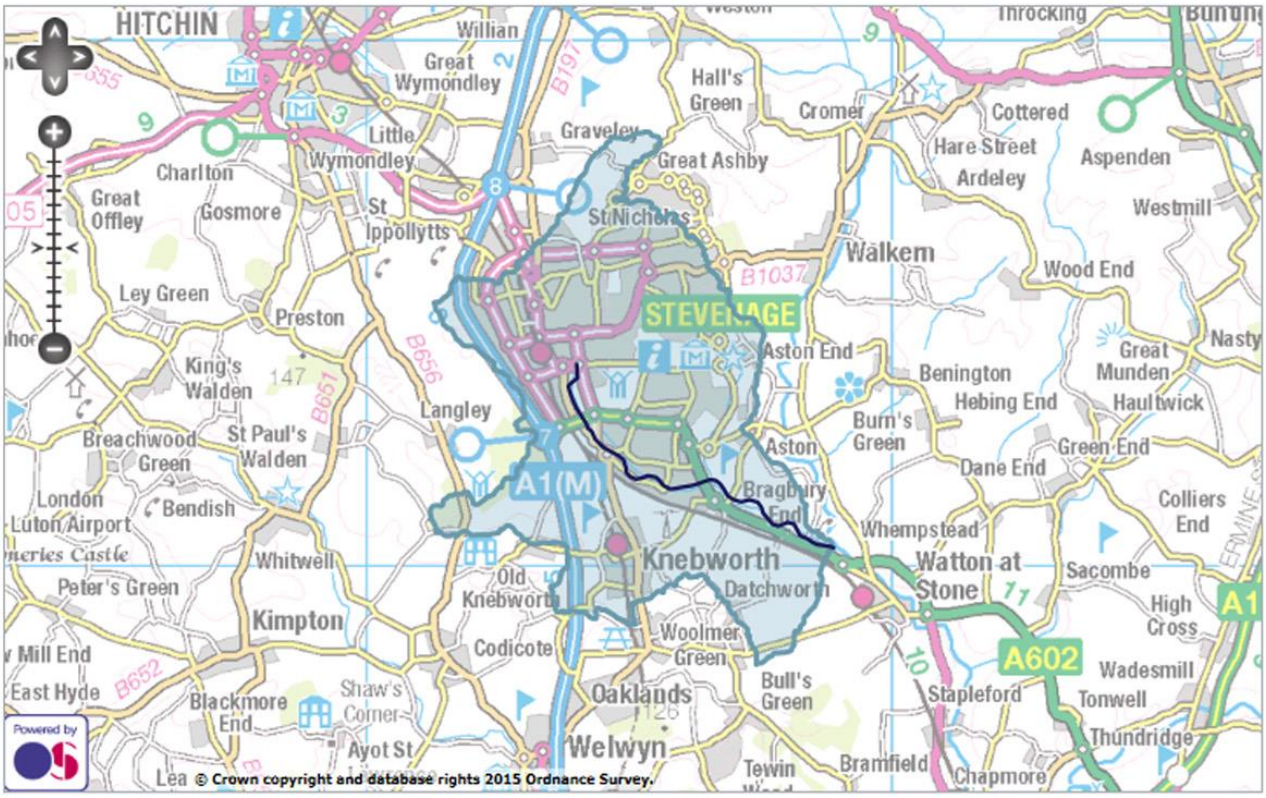
Overall	2009 Cycle 1	2010 Cycle 1	2011 Cycle 1	2012 Cycle 1	2013 Cycle 1	2013 Cycle 2	2014 Cycle 1	2014 Cycle 2
Stevenage Brook	Moderate	Moderate	Moderate	Moderate	Poor	Poor	Poor	Poor
Beane (Source to Stevenage Brook)	Moderate	Poor	Moderate	Moderate	Poor	Moderate	Poor	Bad
Beane (Stevenage Brook to Lee)	Moderate	Poor	Poor	Poor	Poor	Poor	Poor	Poor
Lee Navigation (Hertford to Fieldes Weir)	Moderate	Poor	Poor	Poor	Poor	Moderate	Poor	Moderate

Ecological	2009 Cycle 1	2010 Cycle 1	2011 Cycle 1	2012 Cycle 1	2013 Cycle 1	2013 Cycle 2	2014 Cycle 1	2014 Cycle 2
Stevenage Brook	Moderate	Moderate	Moderate	Moderate	Poor	Poor	Poor	Poor
Beane (Source to Stevenage Brook)	Moderate	Poor	Moderate	Moderate	Poor	Moderate	Poor	Bad
Beane (Stevenage Brook to Lee)	Moderate	Poor	Poor	Poor	Poor	Poor	Poor	Poor
Lee Navigation (Hertford to Fieldes Weir)	Moderate	Poor	Poor	Poor	Poor	Moderate	Poor	Moderate

Chemical	2009 Cycle 1	2010 Cycle 1	2011 Cycle 1	2012 Cycle 1	2013 Cycle 1	2013 Cycle 2	2014 Cycle 1	2014 Cycle 2
Stevenage Brook	n/a	n/a	n/a	n/a	n/a	Fail	n/a	Fail
Beane (Source to Stevenage Brook)	n/a	n/a	n/a	n/a	n/a	Good	n/a	Good
Beane (Stevenage Brook to Lee)	n/a	n/a	n/a	n/a	n/a	Good	n/a	Good
Lee Navigation (Hertford to Fieldes Weir)	Good	Good	Good	Good	Good	Good	Good	Good

Source: Environment Agency, http://environment.data.gov.uk/catchment-planning/, accessed May 2015

Stevenage Brook



River

Id: GB106038033410 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified

Easting: 525963 **Northing:** 221446 **NGR:** TL2596321446

Upstream water bodies

Show 10 entries Search:

Name
No results

Showing 1 to 1 of 1 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Beane (from confluence with Stevenage Brook to Lee)

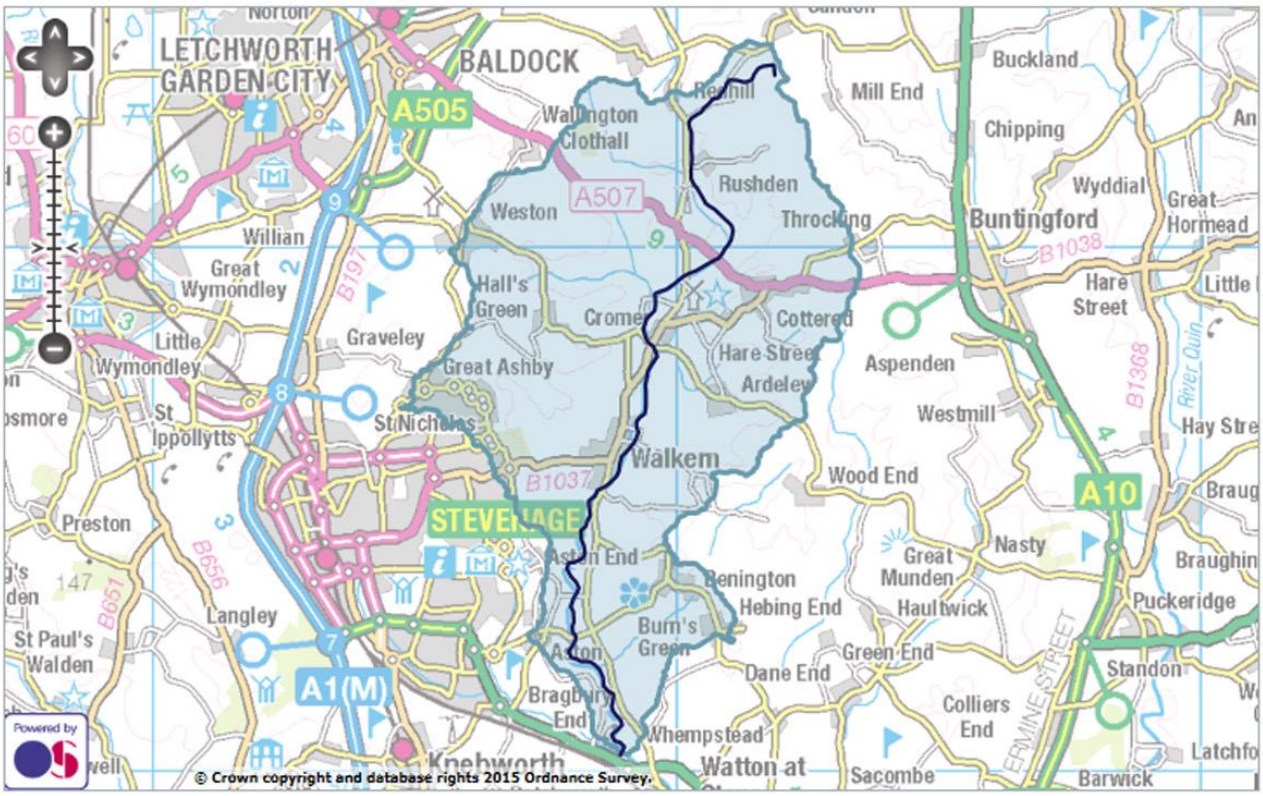
Showing 1 to 1 of 1 entries Previous Next

Water body classification

Select year: 2009 Cycle 1 Select year: 2014 Cycle 2

	2009 Cycle 1	2014 Cycle 2	Objectives
Overall Water Body	Moderate	Poor	(Cycle 2) good
Ecological	Moderate	Poor	(Cycle 2) good
Chemical	Not assessed	Fail	(Cycle 2) good

Beane (Source to Stevenage Brook)



River

Id: GB106038040110 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified

Easting: 529410 **Northing:** 227086 **NGR:** TL2941027086

Upstream water bodies

Show 10 entries Search:

Name
No results

Showing 1 to 1 of 1 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Beane (from confluence with Stevenage Brook to Lee)

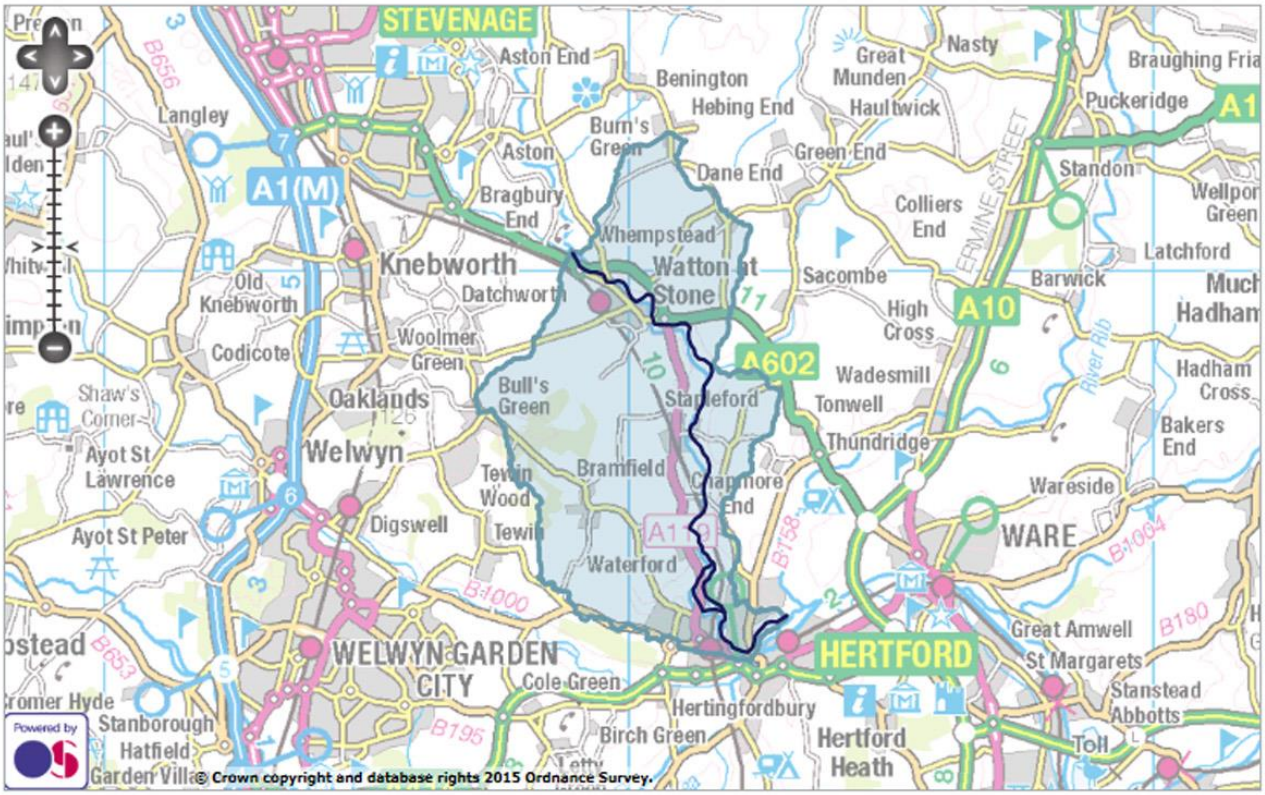
Showing 1 to 1 of 1 entries Previous Next

Water body classification

Select year: 2009 Cycle 1 Select year: 2014 Cycle 2

	2009 Cycle 1	2014 Cycle 2	Objectives
Overall Water Body	Moderate	Bad	(Cycle 2) good
Ecological	Moderate	Bad	(Cycle 2) good
Chemical	Not assessed	Good	(Cycle 2) good

Beane (from confluence with Stevenage Brook to Lee)



River

Id: GB106038033310 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified

Easting: 532254 **Northing:** 212705 **NGR:** TL3225412705

Upstream water bodies

Show 10 entries Search:

Name
Beane (Source to Stevenage Brook)
Dane End Tributary
Stevenage Brook

Showing 1 to 3 of 3 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Lee Navigation (Hertford to Fieldes Weir)

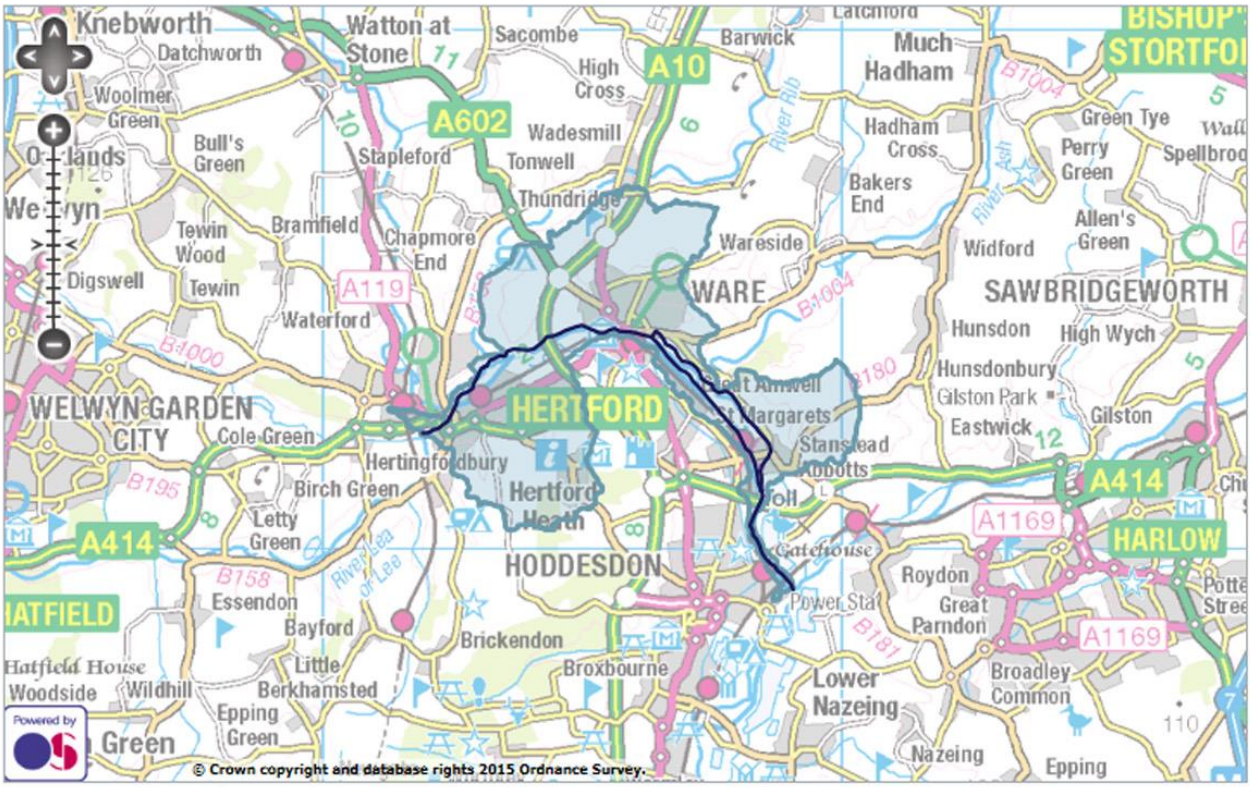
Showing 1 to 1 of 1 entries Previous Next

Water body classification

Select year: 2009 Cycle 1 Select year: 2014 Cycle 2

	2009 Cycle 1	2014 Cycle 2	Objectives
Overall Water Body	Moderate	Poor	(Cycle 2) good
Ecological	Moderate	Poor	(Cycle 2) good
Chemical	Not assessed	Good	(Cycle 2) good

Lee Navigation (Hertford to Fieldes Weir)



River

Id: GB106038033240 **Type:** River **Hydromorphological designation:** heavily modified

Easting: 537827 **Northing:** 213029 **NGR:** TL3782713029

Upstream water bodies

Show 10 entries Search:

Name
Ash (from confluence with Bury Green Brook to Lee)
Beane (from confluence with Stevenage Brook to Lee)
Lee (from Luton Hoo Lakes to Hertford)
Mimram (Codicote Bottom to Lee)
Rib (from confluence with Quin to Lee Navigation)

Showing 1 to 5 of 5 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Lea Navigation (Fieldes Weir to Enfield Lock)

Showing 1 to 1 of 1 entries Previous Next

Water body classification

Select year: 2009 Cycle 1 Select year: 2014 Cycle 2

	2009 Cycle 1	2014 Cycle 2	Objectives
Overall Water Body	Moderate	Moderate	(Cycle 2) good
Ecological	Moderate	Moderate	(Cycle 2) good
Chemical	Good	Good	(Cycle 2) good

Appendix 2: Development Impact Calculations

Table A. Projected district completions (2015) compared against assumptions in 2009 Water Cycle Study (Baseline)

	Broxbourne		East Herts		Epping Forest		Harlow		North Hertfordshire		Stevenage		Welwyn Hatfield		Total		Cumulative from 07	
	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015
2008	296	281	873	557	108	108	419	145	407	722	692	386	732	747	3,527	2,946	3,527	2,946
2009	235	179	489	553	144	157	465	259	259	462	543	366	460	327	2,595	2,303	6,122	5,249
2010	389	333	433	469	434	176	621	107	259	334	581	233	372	59	3,089	1,711	9,211	6,960
2011	311	271	181	200	366	368	679	116	259	415	685	300	538	204	3,019	1,874	12,230	8,834
2012	212	173	710	383	275	288	612	389	259	384	722	190	283	293	3,073	2,100	15,303	10,934
2013	216	185	710	699	148	89	1,354	152	259	291	970	85	214	147	3,871	1,648	19,174	12,582
2014	216	98	710	366	200	45	1,354	136	259	259	1,480	172	300	236	4,519	1,312	23,693	13,894
2015	216	211	710	581	200	192	1,354	341	259	412	1,380	223	531	375	4,650	2,335	28,343	16,229
2016	216	292	710	*754*	200	158	1,354	440	259	552	1,380	367	531	358	4,650	2,921	32,993	19,150
2017	216	400	710	*754*	200	113	1,354	485	259	499	1,190	182	531	643	4,460	3,076	37,453	22,226
2018	216	372	710	*754*	200	43	1,354	465	259	995	1,110	375	531	554	4,380	3,558	41,833	25,783
2019	216	357	710	*754*	200	13	1,354	440	259	1,113	1,110	558	531	531	4,380	3,766	46,213	29,549
2020	216	*306*	710	*754*	200	716	1,354	*504*	259	*633*	1,110	595	531	289	4,380	3,797	50,593	33,346
2021	216	*306*	710	*837*	200	716	1,354	*504*	259	*633*	1,110	662	531	*478*	4,380	4,136	54,973	37,482
2022	280	*306*	600	*837*	175	716	800	*504*	310	*633*	960	563	500	*479*	3,625	4,038	58,598	41,519
2023	280	*306*	600	*837*	175	716	800	*504*	310	*633*	960	550	500	*479*	3,625	4,025	62,223	45,544
2024	280	*306*	600	*837*	175	716	800	*504*	310	*633*	960	513	500	*478*	3,625	3,987	65,848	49,530
2025	280	*306*	600	*837*	175	716	800	*504*	310	*633*	960	543	500	*479*	3,625	4,018	69,473	53,548
2026	280	*306*	600	*837*	175	716	800	*504*	310	*633*	960	426	500	*479*	3,625	3,901	73,098	57,448
2027	280	*306*	600	*837*	175	716	800	*504*	310	*633*	960	402	500	*478*	3,625	3,876	76,723	61,324
2028	280	*306*	600	*837*	175	717	800	*505*	310	*633*	960	336	500	*479*	3,625	3,813	80,348	65,136
2029	280	*306*	600	*837*	175	717	800	*505*	310	*633*	960	317	500	*479*	3,625	3,794	83,973	68,930
2030	280	*306*	600	*837*	175	717	800	*505*	310	*633*	960	317	500	*478*	3,625	3,793	87,598	72,722
2031	280	*315*	600	*837*	175	717	800	*505*	310	*633*	960	217	500	*479*	3,625	3,703	91,223	76,425
Total 2007-2031	**6,187**	**6,833**	**15,076**	**16,779**	**4,825**	**10,346**	**22,982**	**9,527**	**6,874**	**14,034**	**23,663**	**8,878**	**11,616**	**10,028**	**91,223**	**76,425**		
Difference from WCS		646		1,703		5,521		-13,455		7,160		-14,785		-1,588		-14,798		
Total 2011-31		5,769		15,000		9,537		8,900		12,101		7,593		8,691				

Notes / sources

Shaded cells denote annualised rates / figures informed by annualised rates

Broxbourne: Completions taken from 2014 AMR. Five-year supply figures provided by BBC. Report to Executive March 2015 identifies previously proposed target of 5,000 dwellings 2015-2030. Balance of this annualised over period 2019-2030. Annual target of 315 used for remaining year of trajectory

East Herts: Completions taken from 2014 AMR. Five-year land supply calculations provide figures for 2015 and overall delivery for period to 2020 which has been annualised. Emerging local plan contains target for 15,000 homes to 2031. Balance of this annualised over period 2020-2031.

Epping Forest: Figures taken from 2013 AMR. Five-year land supply figures used. Annualised requirement to meet mid target option in 2012 consultation pro-rated and annualised to 2031

Harlow: Figures taken from 2013 AMR. Trajectory figures used to end of five-year supply period then residual amount required to meet 8,900 capacity identified in 2014 Local Plan consultation annualised over period to 2031

North Herts: Completions and five-year supply figures taken from 2014 AMR / SHLAA. Preferred Options Local Plan sets target of 12,100 homes 2011-2031. Residual requirement annualised over period 2019-2031. Excludes 2,100 homes adjacent to Luton.

Stevenage: Completion figures taken from 2014 AMR. Indicative development scenario for 7,593 homes over plan period has been used for infrastructure testing. This includes a year-by-year trajectory which has been used.

Welwyn Hatfield: Figures taken from 2014 AMR. Five-year supply figures used to 2020. Balance of draft allocations contained in 2015 Local Plan consultation annualised over period to 2031

All websites / reports accessed March 2015 and updated June 2015

Table B. Alternate scenario district dwelling figures compared against assumptions in 2009 Water Cycle Study

	Broxbourne		East Herts		Epping Forest		Harlow		North Hertfordshire		Stevenage		Welwyn Hatfield		Total		Cumulative from 07	
	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015
2008	296	281	873	557	108	108	419	145	407	722	692	386	732	747	3,527	2,946	3,527	2,946
2009	235	179	489	553	144	157	465	259	259	462	543	366	460	327	2,595	2,303	6,122	5,249
2010	389	333	433	469	434	176	621	107	259	334	581	233	372	59	3,089	1,711	9,211	6,960
2011	311	271	181	200	366	368	679	116	259	415	685	300	538	204	3,019	1,874	12,230	8,834
2012	212	173	710	383	275	288	612	389	259	384	722	190	283	293	3,073	2,100	15,303	10,934
2013	216	185	710	699	148	89	1,354	152	259	291	970	85	214	147	3,871	1,648	19,174	12,582
2014	216	98	710	366	200	45	1,354	136	259	259	1,480	172	300	236	4,519	1,312	23,693	13,894
2015	216	211	710	933	200	192	1,354	341	259	526	1,380	223	531	498	4,650	2,925	28,343	16,819
2016	216	292	710	1,211	200	158	1,354	440	259	705	1,380	367	531	475	4,650	3,649	32,993	20,468
2017	216	400	710	1,211	200	113	1,354	485	259	638	1,190	182	531	854	4,460	3,883	37,453	24,350
2018	216	372	710	1,211	200	43	1,354	465	259	1,271	1,110	375	531	736	4,380	4,473	41,833	28,823
2019	216	357	710	1,211	200	13	1,354	440	259	1,422	1,110	558	531	705	4,380	4,706	46,213	33,529
2020	216	403	710	1,211	200	716	1,354	*504*	259	809	1,110	595	531	384	4,380	4,622	50,593	38,151
2021	216	403	710	1,344	200	716	1,354	*504*	259	809	1,110	662	531	635	4,380	5,073	54,973	43,223
2022	280	403	600	1,344	175	716	800	*504*	310	809	960	563	500	636	3,625	4,975	58,598	48,198
2023	280	403	600	1,344	175	716	800	*504*	310	809	960	550	500	636	3,625	4,962	62,223	53,160
2024	280	403	600	1,344	175	716	800	*504*	310	809	960	513	500	635	3,625	4,924	65,848	58,084
2025	280	403	600	1,344	175	716	800	*504*	310	809	960	543	500	636	3,625	4,955	69,473	63,039
2026	280	403	600	1,344	175	716	800	*504*	310	809	960	426	500	636	3,625	4,838	73,098	67,876
2027	280	403	600	1,344	175	716	800	*504*	310	809	960	402	500	635	3,625	4,813	76,723	72,689
2028	280	403	600	1,344	175	717	800	*505*	310	809	960	336	500	636	3,625	4,750	80,348	77,439
2029	280	403	600	1,344	175	717	800	*505*	310	809	960	317	500	636	3,625	4,731	83,973	82,170
2030	280	403	600	1,344	175	717	800	*505*	310	809	960	317	500	635	3,625	4,730	87,598	86,899
2031	280	379	600	1,344	175	717	800	*505*	310	809	960	217	500	636	3,625	4,607	91,223	91,506
Total 2007-2031	**6,187**	**7,964**	**15,076**	**24,999**	**4,825**	**10,346**	**22,982**	**9,527**	**6,874**	**17,134**	**23,663**	**8,878**	**11,616**	**12,658**	**91,223**	**91,506**		
Difference from WCS		1,777		9,923		5,521		-13,455		10,260		-14,785		1,042		283		
Total 2011-31		6,900		23,220		9,537		8,900		15,201		7,593		11,321		6,900		

Notes
Shaded cells denote annualised rates / figures informed by annualised rates
Broxbourne - March 2014 Executive report identifies that household projections would require 379 homes per annum 2015-2030. Residual requirement annualised from 2019.
East Herts - Additional 8,220 dwellings required to reach an indicative 20,000 across East Herts **and** Epping Forest recognising potential under provision in surrounding areas. Baseline figures increased pro-rata from 2015
Epping Forest - no difference from baseline as all additional dwelling assumptions added into East Herts figures for calculation purposes
Harlow - no difference from baseline as maximises capacity within authority
North Hertfordshire - Additional 3,100 dwellings that are identified in Local Plan as being safeguarded for development around Stevenage after 2031. Baseline figures increased pro-rata from 2015
Stevenage - no difference from baseline as maximises capacity within authority
Welwyn Hatfield - Additional 2,630 "finely balanced" dwellings identified in Local Plan consultation. Baseline figures increased pro-rata from 2015

Table C. 2012-based district household projections compared against assumptions in 2009 Water Cycle Study

	Broxbourne		East Herts		Epping Forest		Harlow		North Hertfordshire		Stevenage		Welwyn Hatfield		Total		Cumulative from 07	
	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015	WCS	2015
2008	296	281	873	557	108	108	419	145	407	722	692	386	732	747	3,527	2,946	3,527	2,946
2009	235	179	489	553	144	157	465	259	259	462	543	366	460	327	2,595	2,303	6,122	5,249
2010	389	333	433	469	434	176	621	107	259	334	581	233	372	59	3,089	1,711	9,211	6,960
2011	311	271	181	200	366	368	679	116	259	415	685	300	538	204	3,019	1,874	12,230	8,834
2012	212	173	710	383	275	288	612	389	259	384	722	190	283	293	3,073	2,100	15,303	10,934
2013	216	185	710	699	148	89	1,354	152	259	291	970	85	214	147	3,871	1,648	19,174	12,582
2014	216	98	710	366	200	45	1,354	136	259	259	1,480	172	300	236	4,519	1,312	23,693	13,894
2015	216	289	710	565	200	265	1,354	253	259	473	1,380	230	531	477	4,650	2,551	28,343	16,445
2016	216	400	710	733	200	218	1,354	326	259	634	1,380	378	531	455	4,650	3,145	32,993	19,590
2017	216	548	710	733	200	156	1,354	360	259	573	1,190	188	531	817	4,460	3,375	37,453	22,965
2018	216	510	710	733	200	59	1,354	345	259	1,143	1,110	387	531	704	4,380	3,881	41,833	26,845
2019	216	489	710	733	200	18	1,354	326	259	1,279	1,110	575	531	675	4,380	4,095	46,213	30,941
2020	216	419	710	733	200	987	1,354	374	259	727	1,110	613	531	367	4,380	4,221	50,593	35,162
2021	216	419	710	813	200	987	1,354	374	259	727	1,110	683	531	608	4,380	4,611	54,973	39,773
2022	280	419	600	813	175	987	800	374	310	727	960	580	500	609	3,625	4,510	58,598	44,283
2023	280	419	600	813	175	987	800	374	310	727	960	567	500	609	3,625	4,497	62,223	48,780
2024	280	419	600	813	175	987	800	374	310	727	960	529	500	608	3,625	4,457	65,848	53,237
2025	280	419	600	813	175	987	800	374	310	727	960	560	500	609	3,625	4,490	69,473	57,726
2026	280	419	600	813	175	987	800	374	310	727	960	439	500	609	3,625	4,369	73,098	62,095
2027	280	419	600	813	175	987	800	374	310	727	960	414	500	608	3,625	4,343	76,723	66,438
2028	280	419	600	813	175	989	800	374	310	727	960	346	500	609	3,625	4,278	80,348	70,716
2029	280	419	600	813	175	989	800	374	310	727	960	327	500	609	3,625	4,259	83,973	74,975
2030	280	419	600	813	175	989	800	374	310	727	960	327	500	608	3,625	4,257	87,598	79,232
2031	280	432	600	813	175	989	800	374	310	727	960	224	500	609	3,625	4,168	91,223	83,400
Total 2007-2031	6,187	8,800	15,076	16,400	4,825	13,800	22,982	7,400	6,874	15,700	23,663	9,100	11,616	12,200	91,223	83,400		
Difference from WCS		2,613		1,324		8,975		-15,582		8,826		-14,563		584		-7,823		

Notes
All authorities: Difference between baseline and CLG 2012-based household projections for the period 2007-2031 calculated. Baseline figures increased / decreased pro-rata from 2015 onwards to ensure overall figure for period 2007-2031 matches CLG projection.

Current scenario calculations

Table D: Additional dwellings in Rye Meads catchment for wastewater calculations

Authority	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Broxbourne	62	90	44	14	46	26	7	41	56	77	71	69	44
East Herts	393	366	311	168	264	471	252	367	476	476	476	476	476
Epping Forest	*41*	*42*	*42*	*41*	*42*	*42*	*41*	*42*	*42*	*41*	*42*	*42*	*41*
Harlow	145	259	107	116	389	152	136	341	440	485	465	440	504
North Hertfordshire	253	154	62	26	2	0	-1	93	124	112	224	250	142
Stevenage	386	366	233	300	190	85	172	223	367	182	375	558	595
Welwyn Hatfield	*336*	*147*	*27*	*92*	*137*	*69*	*111*	176	168	301	259	249	135
Total	**1,616**	**1,424**	**826**	**757**	**1,070**	**845**	**718**	**1,283**	**1,673**	**1,674**	**1,912**	**2,084**	**1,937**

Authority	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total 2007-31	Total 2015-31
Broxbourne	44	44	44	44	44	44	44	44	44	50	50	1,143	854
East Herts	528	528	528	528	528	528	528	528	528	528	528	10,780	8,555
Epping Forest	*42*	*42*	*41*	*42*	*42*	*41*	*42*	*42*	*41*	*42*	*42*	1,000	709
Harlow	504	504	504	504	504	504	504	505	505	505	505	9,527	8,223
North Hertfordshire	142	142	142	142	142	142	142	142	142	143	143	3,005	2,509
Stevenage	662	563	550	513	543	426	402	336	317	317	217	8,878	7,146
Welwyn Hatfield	224	224	224	224	224	224	224	224	224	224	224	4,671	3,752
Total	**2,146**	**2,047**	**2,033**	**1,997**	**2,027**	**1,909**	**1,886**	**1,821**	**1,801**	**1,809**	**1,709**	**39,004**	**31,748**

Sources: Local authority AMRs / local plan consultations / SBC analysis. For period 2008-2014, dwellings attributed to Rye Meads catchment by SBC where information allowed. 2015-2031 proportion of anticipated future development within Rye Meads calculated (see Section 3) and applied to overall authority figures in Table A

Table E: Dwellings and occupancy rates

Authority	2007 Total dwellings	2007 Dwellings in Rye Meads catchment	% in Rye Meads catchment	Projected occupancy rates – water supply						Projected occupancy rates - wastewater					
				2006	2011	2016	2021	2026	2031	2006	2011	2016	2021	2026	2031
Broxbourne	38,119	14,910	39%	2.44	2.48	2.45	2.44	2.42	2.39	2.44	2.48	2.45	2.44	2.42	2.39
East Herts	56,702	35,123	62%	2.38	2.40	2.36	2.35	2.33	2.30	2.38	2.40	2.36	2.35	2.33	2.30
Epping Forest	53,441	3,346	6%	2.34	2.38	2.36	2.34	2.32	2.29	2.34	2.38	2.36	2.34	2.32	2.29
Harlow	35,051	35,051	100%	2.36	2.36	2.35	2.35	2.33	2.31	2.36	2.36	2.35	2.35	2.33	2.31
North Hertfordshire	52,707	4,406	8%	2.29	2.35	2.32	2.30	2.28	2.24	2.29	2.35	2.32	2.30	2.28	2.24
Stevenage	35,397	35,397	100%	2.33	2.39	2.35	2.33	2.30	2.28	2.33	2.39	2.35	2.33	2.30	2.28
Welwyn Hatfield	44,061	24,985	57%	2.34	2.45	2.46	2.44	2.43	2.40	2.34	2.45	2.46	2.44	2.43	2.40
Total	**315,478**	**153,218**	**49%**	**2.35**	**2.40**	**2.38**	**2.36**	**2.34**	**2.31**	**2.36**	**2.40**	**2.38**	**2.37**	**2.35**	**2.32**

Sources: 2009 WCS, 2011-based interim household projections, 2012-based household projections, SBC analysis
Note: 2017 occupancy rates from 2012-based household projections used for 2016, 2022 rates for 2021 etc.

Table F: Change in water supply demand from existing dwellings in WCS

Authority	Water consumption from existing properties (PCC)				Water demand from existing dwellings (m3)			
	2007	2031 - Best	2031 - Worst	2031 - Base	2007	2031 - Best	2031 - Worst	2031 - Base
Broxbourne	164.22	130	164.24	142.63	15,274	11,992	15,526	13,157
East Herts	164.22	130	164.24	142.63	22,162	17,175	22,351	18,844
Epping Forest	164.22	130	164.24	142.63	20,536	16,118	20,890	17,684
Harlow	164.22	130	164.24	142.63	13,584	10,617	13,586	11,648
North Hertfordshire	164.22	130	164.24	142.63	19,821	15,622	20,343	17,140
Stevenage	164.22	130	164.24	142.63	13,544	10,584	13,895	11,612
Welwyn Hatfield	164.22	130	164.24	142.63	16,932	13,919	17,730	15,271
Total					121,853	96,027	124,320	105,356
Change from 2007						*-25,826*	*2,467*	*-16,497*

Sources: 2009 WCS, AfW WRMP, SBC analysis

Table G: PCC rates – water supply

Year	Existing dwellings			Year	New dwellings		
	Best	Worst	Base*		Best	Worst	Base
To 2011	164.22	164.22	164.22	To 2016	125	125	125
To 2016	160.14	164.24	164.24 (to 2014)	To 2021	110	125	110
To 2021	150	164.24	162.53 (to 2019)	To 2031	99	125	110
To 2026	140	164.24	152.75 (to 2024)				
To 2031	130	164.24	143.68 (to 2029)				
			142.63 (to 2031)				

Sources: 2009 WCS, AfW WRMP, SBC analysis. *Phasing of base year consumption for existing dwellings aligned AfW WRMP / AMP periods

Table H. Year on year water supply calculations

Year	New dwellings in year	Best			Worst			Base		
		Existing	New	Total	Existing	New	Total	Existing	New	Total
2007		121,853		121,853	121,853		121,853	121,853		121,853
2008	2,946	121,853	866	122,719	121,853	884	122,736	121,853	866	122,719
2009	2,303	121,853	677	123,396	121,853	691	123,427	121,853	677	123,396
2010	1,711	121,853	503	123,899	121,853	513	123,940	121,853	503	123,899
2011	1,874	121,853	551	124,450	121,853	562	124,502	121,853	551	124,450
2012	2,100	121,216	630	124,443	124,320	630	127,599	124,320	630	127,547
2013	1,648	121,216	494	124,938	124,320	494	128,093	124,320	494	128,041
2014	1,312	121,216	393	125,331	124,320	393	128,487	124,320	393	128,435
2015	2,335	121,216	700	126,031	124,320	700	129,187	123,025	700	127,841
2016	2,921	121,216	876	126,907	124,320	876	130,063	123,025	876	128,716
2017	3,076	112,433	804	118,928	124,320	922	130,986	121,825	804	128,320
2018	3,558	112,433	930	119,858	124,320	1,067	132,053	121,825	930	129,250
2019	3,766	112,433	984	120,842	124,320	1,129	133,182	121,825	984	130,234
2020	3,797	112,433	992	121,834	124,320	1,139	134,321	114,494	992	123,895
2021	4,136	112,433	1,081	122,915	124,320	1,240	135,561	114,494	1,081	124,976
2022	4,038	104,285	944	115,711	124,320	1,211	136,772	113,782	1,049	125,313
2023	4,025	104,285	941	116,652	124,320	1,207	137,979	113,782	1,045	126,358
2024	3,987	104,285	932	117,583	124,320	1,196	139,175	113,782	1,035	127,394
2025	4,018	104,285	939	118,523	124,320	1,205	140,380	107,026	1,043	121,681
2026	3,901	104,285	912	119,434	124,320	1,170	141,550	107,026	1,013	122,694
2027	3,876	96,027	898	112,075	124,320	1,162	142,712	106,132	998	122,798
2028	3,813	96,027	884	112,959	124,320	1,143	143,855	106,132	982	123,780
2029	3,794	96,027	879	113,838	124,320	1,138	144,993	106,132	977	124,757
2030	3,793	96,027	879	114,717	124,320	1,137	146,131	105,356	977	124,958
2031	3,703	96,027	858	115,575	124,320	1,110	147,241	105,356	954	125,912
Change from 07	76,425	-25,826	19,548	-6,278	2,467	22,921	25,388	-16,497	20,556	4,059

Source: SBC analysis

Table I. Wastewater treatment from existing dwellings in WCS 2007 vs 2031

Authority	Waste water from existing properties (PCC)				Waste water output from existing dwellings (m3)			
	2007	2031 - Best	2031 - Worst	2031 - Base	2007	2031 - Best	2031 - Worst	2031 - Base
Broxbourne	156	130	156	135.5	7,378	6,098	7,500	6,356
East Herts	156	130	156	135.5	16,954	13,830	17,098	14,415
Epping Forest	156	130	156	135.5	1,588	1,312	1,615	1,367
Harlow	156	130	156	135.5	16,777	13,802	16,779	14,386
North Hertfordshire	156	130	156	135.5	2,046	1,698	2,100	1,770
Stevenage	156	130	156	135.5	16,727	13,759	17,160	14,341
Welwyn Hatfield	156	130	156	135.5	11,857	10,261	12,416	10,695
Total					73,327	60,759	74,669	63,329
Change from 2007						*-12,568*	*1,341*	*-9,998*

Source: SBC analysis.
Wastewater PCC for 2007, worst and base case calculated at 95% of supply. Output includes 30% 'overage' for infiltration. Both assumptions as per 2009 study

Table J. Year on year wastewater treatment demand calculations

Year	New dwellings in year	Best				Worst				Base			
		Existing	New	Total domestic	Total	Existing	New	Total domestic	Total	Existing	New	Total domestic	Total
2007		73,323		73,323	79,184	73,327		73,327	79,188	73,327		73,327	79,188
2008	1,616	73,323	587	73,910	79,771	73,327	587	73,914	79,775	73,327	587	73,914	79,775
2009	1,424	73,323	517	74,427	80,288	73,327	517	74,431	80,292	73,327	517	74,431	80,292
2010	826	73,323	300	74,727	80,588	73,327	300	74,731	80,592	73,327	300	74,731	80,592
2011	757	73,323	275	75,001	80,862	73,327	275	75,006	80,867	73,327	275	75,006	80,867
2012	1,070	72,741	396	74,816	80,677	74,669	396	76,743	82,604	74,669	396	76,743	82,604
2013	845	72,741	313	75,129	80,990	74,669	313	77,056	82,917	74,669	313	77,056	82,917
2014	718	72,741	266	75,395	81,256	74,669	266	77,322	83,183	74,669	266	77,322	83,183
2015	1,283	72,741	475	75,870	81,731	74,669	475	77,798	83,659	73,891	475	77,020	82,881
2016	1,673	72,741	620	76,490	82,351	74,669	620	78,417	84,278	73,891	620	77,640	83,501
2017	1,674	68,718	540	73,008	78,869	74,669	620	79,037	84,898	73,175	540	77,464	83,325
2018	1,912	68,718	617	73,625	79,486	74,669	708	79,746	85,607	73,175	617	78,081	83,942
2019	2,084	68,718	673	74,297	80,158	74,669	772	80,517	86,378	73,175	673	78,754	84,615
2020	1,937	68,718	625	74,923	80,784	74,669	717	81,235	87,096	68,772	625	74,976	80,837
2021	2,146	68,718	693	75,615	81,476	74,669	795	82,030	87,891	68,772	693	75,668	81,529
2022	2,047	65,067	591	72,554	78,415	74,669	758	82,788	88,649	68,420	657	75,974	81,835
2023	2,033	65,067	587	73,141	79,002	74,669	753	83,541	89,402	68,420	652	76,626	82,487
2024	1,997	65,067	577	73,718	79,579	74,669	740	84,281	90,142	68,420	641	77,266	83,127
2025	2,027	65,067	585	74,303	80,164	74,669	751	85,031	90,892	64,358	650	73,854	79,715
2026	1,909	65,067	551	74,854	80,715	74,669	707	85,739	91,600	64,358	612	74,466	80,327
2027	1,886	60,759	540	71,087	76,948	74,669	699	86,437	92,298	63,795	600	74,504	80,365
2028	1,821	60,759	521	71,608	77,469	74,669	674	87,112	92,973	63,795	579	75,083	80,944
2029	1,801	60,759	516	72,123	77,984	74,669	667	87,779	93,640	63,795	573	75,656	81,517
2030	1,809	60,759	518	72,641	78,502	74,669	670	88,449	94,310	63,329	575	75,765	81,626
2031	1,709	60,759	489	73,131	78,992	74,669	633	89,082	94,943	63,329	544	76,309	82,170
Change from 07	39,004	-12,564	12,371	-192		1,341	14,413	15,755		-9,998	12,980	2,982	

Source: SBC analysis. Trade waste held static at 5861m^3 over period 2007-2031 as per assumption in 2009 WCS

Table K: Year on year total wastewater treatment demand with even phasing of PCC savings (base case))

Year	Total
2007	78,944
2008	79,775
2009	80,292
2010	80,592
2011	80,867
2012	82,604
2013	82,723
2014	82,795
2015	82,881
2016	82,612
2017	81,564
2018	81,300
2019	81,092
2020	80,837
2021	80,713
2022	80,210
2023	80,049
2024	79,877
2025	79,715
2026	80,233
2027	80,178
2028	80,664
2029	81,144
2030	81,626
2031	82,045

Alternate scenario calculations

Table L: Additional dwellings in Rye Meads catchment for wastewater calculations

Authority	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Broxbourne	62	90	44	14	46	26	7	101	138	190	176	171	109
East Herts	393	366	311	168	264	471	252	720	933	933	933	933	933
Epping Forest	*41*	*42*	*42*	*41*	*42*	*42*	*41*	*42*	*42*	*41*	*42*	*42*	*41*
Harlow	145	259	107	116	389	152	136	341	440	485	465	440	504
North Hertfordshire	253	154	62	26	2	0	-1	208	277	250	501	559	317
Stevenage	386	366	233	300	190	85	172	223	367	182	375	558	595
Welwyn Hatfield	*336*	*147*	*27*	*92*	*137*	*69*	*111*	213	203	364	314	301	163
Total	**1,616**	**1,424**	**826**	**757**	**1,070**	**845**	**718**	**1,848**	**2,400**	**2,445**	**2,806**	**3,004**	**2,662**

Authority	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total 2007-31	Total 2015-31
Broxbourne	109	109	109	109	109	109	109	109	109	124	124	2,403	2,114
East Herts	1,035	1,035	1,035	1,035	1,035	1,035	1,035	1,035	1,035	1,035	1,035	18,995	16,770
Epping Forest	*42*	*42*	*41*	*42*	*42*	*41*	*42*	*42*	*41*	*42*	*42*	1,000	709
Harlow	504	504	504	504	504	504	504	505	505	505	505	9,527	8,223
North Hertfordshire	317	317	317	317	317	317	317	317	317	320	320	6,101	5,605
Stevenage	662	563	550	513	543	426	402	336	317	317	217	8,878	7,146
Welwyn Hatfield	271	271	271	271	271	271	271	271	271	271	271	5,458	4,539
Total	**2,940**	**2,841**	**2,827**	**2,791**	**2,821**	**2,703**	**2,680**	**2,615**	**2,595**	**2,614**	**2,514**	**52,362**	**45,106**

Sources: Local authority AMRs / local plan consultations / SBC analysis. For period 2008-2014, dwellings attributed to Rye Meads catchment by SBC where information allowed. 2015-2031 proportion of anticipated future development within Rye Meads calculated (see Section 3) and applied to overall authority figures in Table A

Note: Household sizes, calculations for existing dwellings and PCC rates as per current scenario. See Tables E, F, G and I above.

Table M. Year on year water supply calculations

Year	New dwellings in year	Best			Worst			Base		
		Existing	New	Total	Existing	New	Total	Existing	New	Total
2007		121,853		121,853	121,853		121,853	121,853		121,853
2008	2,946	121,853	866	122,719	121,853	884	122,736	121,853	866	122,719
2009	2,303	121,853	677	123,396	121,853	691	123,427	121,853	677	123,396
2010	1,711	121,853	503	123,899	121,853	513	123,940	121,853	503	123,899
2011	1,874	121,853	551	124,450	121,853	562	124,502	121,853	551	124,450
2012	2,100	121,216	630	124,443	124,320	630	127,599	124,320	630	127,547
2013	1,648	121,216	494	124,938	124,320	494	128,093	124,320	494	128,041
2014	1,312	121,216	393	125,331	124,320	393	128,487	124,320	393	128,435
2015	2,925	121,216	877	126,208	124,320	877	129,364	123,025	877	128,017
2016	3,649	121,216	1,094	127,303	124,320	1,094	130,458	123,025	1,094	129,112
2017	3,883	112,433	1,015	119,534	124,320	1,164	131,623	121,825	1,015	128,926
2018	4,473	112,433	1,169	120,703	124,320	1,342	132,964	121,825	1,169	130,095
2019	4,706	112,433	1,230	121,933	124,320	1,411	134,376	121,825	1,230	131,325
2020	4,622	112,433	1,208	123,141	124,320	1,386	135,762	114,494	1,208	125,202
2021	5,073	112,433	1,326	124,466	124,320	1,521	137,283	114,494	1,326	126,528
2022	4,975	104,285	1,163	117,481	124,320	1,492	138,775	113,782	1,292	127,108
2023	4,962	104,285	1,160	118,641	124,320	1,488	140,263	113,782	1,289	128,397
2024	4,924	104,285	1,151	119,792	124,320	1,477	141,740	113,782	1,279	129,675
2025	4,955	104,285	1,158	120,950	124,320	1,486	143,226	107,026	1,287	124,206
2026	4,838	104,285	1,131	122,081	124,320	1,451	144,677	107,026	1,257	125,463
2027	4,813	96,027	1,116	114,939	124,320	1,443	146,120	106,132	1,239	125,808
2028	4,750	96,027	1,101	116,040	124,320	1,425	147,545	106,132	1,223	127,031
2029	4,731	96,027	1,097	117,136	124,320	1,419	148,964	106,132	1,218	128,250
2030	4,730	96,027	1,096	118,233	124,320	1,418	150,382	105,356	1,218	128,692
2031	4,607	96,027	1,068	119,301	124,320	1,382	151,764	105,356	1,187	129,879
Change from 07	91,506	-25,826	23,274	-2,552	2,467	27,444	29,911	-16,497	24,523	8,026

Source: SBC analysis

Table N. Year on year wastewater treatment demand calculations

Year	New dwellings in year	Best				Worst				Base			
		Existing	New	Total domestic	Total	Existing	New	Total domestic	Total	Existing	New	Total domestic	Total
2007		73,323		73,323	79,184	73,327		73,327	79,188	73,327		73,327	79,188
2008	1,616	73,323	587	73,910	79,771	73,327	587	73,914	79,775	73,327	587	73,914	79,775
2009	1,424	73,323	517	74,427	80,288	73,327	517	74,431	80,292	73,327	517	74,431	80,292
2010	826	73,323	300	74,727	80,588	73,327	300	74,731	80,592	73,327	300	74,731	80,592
2011	757	73,323	275	75,001	80,862	73,327	275	75,006	80,867	73,327	275	75,006	80,867
2012	1,070	72,741	396	74,816	80,677	74,669	396	76,743	82,604	74,669	396	76,743	82,604
2013	845	72,741	313	75,129	80,990	74,669	313	77,056	82,917	74,669	313	77,056	82,917
2014	718	72,741	266	75,395	81,256	74,669	266	77,322	83,183	74,669	266	77,322	83,183
2015	1,848	72,741	684	76,079	81,940	74,669	684	78,007	83,868	73,891	684	77,229	83,090
2016	2,400	72,741	889	76,968	82,829	74,669	889	78,896	84,757	73,891	889	78,118	83,979
2017	2,445	68,718	789	73,735	79,596	74,669	906	79,801	85,662	73,175	789	78,191	84,052
2018	2,806	68,718	906	74,641	80,502	74,669	1,039	80,841	86,702	73,175	906	79,097	84,958
2019	3,004	68,718	970	75,610	81,471	74,669	1,113	81,953	87,814	73,175	970	80,067	85,928
2020	2,662	68,718	859	76,469	82,330	74,669	986	82,939	88,800	68,772	859	76,523	82,384
2021	2,940	68,718	949	77,418	83,279	74,669	1,089	84,028	89,889	68,772	949	77,472	83,333
2022	2,841	65,067	820	74,587	80,448	74,669	1,052	85,081	90,942	68,420	911	78,032	83,893
2023	2,827	65,067	816	75,403	81,264	74,669	1,047	86,128	91,989	68,420	907	78,938	84,799
2024	2,791	65,067	806	76,209	82,070	74,669	1,034	87,162	93,023	68,420	895	79,834	85,695
2025	2,821	65,067	814	77,023	82,884	74,669	1,045	88,207	94,068	64,358	905	76,676	82,537
2026	2,703	65,067	780	77,803	83,664	74,669	1,001	89,208	95,069	64,358	867	77,543	83,404
2027	2,680	60,759	767	74,263	80,124	74,669	993	90,200	96,061	63,795	852	77,833	83,694
2028	2,615	60,759	749	75,012	80,873	74,669	969	91,169	97,030	63,795	832	78,665	84,526
2029	2,595	60,759	743	75,755	81,616	74,669	961	92,130	97,991	63,795	825	79,490	85,351
2030	2,614	60,759	748	76,503	82,364	74,669	968	93,098	98,959	63,329	831	79,855	85,716
2031	2,514	60,759	720	77,223	83,084	74,669	931	94,030	99,891	63,329	800	80,655	86,516
Change from 07	52,362	-12,564	16,463	3,900		1,341	19,361	20,702		-9,998	17,326	7,328	

Source: SBC analysis. Trade waste held static at 5861m^3 over period 2007-2031 as per assumption in 2009 WCS