

Crawley Borough Council

Water Cycle Study Update and Review of Policy Implications

Final Report



AMEC Environment & Infrastructure UK Limited

October 2013

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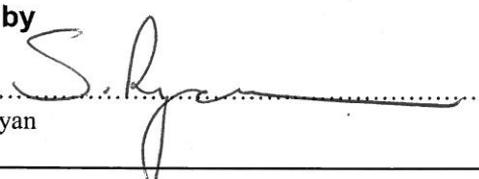
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Executive Summary

Purpose of this Report

In 2011 AMEC completed a water cycle study for the Gatwick sub-region, including the Crawley Borough Council area. The conclusions from that study were taken by the Council to inform the policies within the emerging Local Plan. Since 2011 development levels have been lower than anticipated and there have been substantial changes in planning policy and legislation, including the introduction of the National Planning Policy Framework and the abolition of the Regional Spatial Strategies. Current estimates indicate that projected housing growth will be less than the levels examined within the previous study. The council has continued to develop its evidence base and has refined the amount of housing and employment land that will be delivered over the plan period (2014 – 2030).

At the same time it is recognised that the position of Crawley's water utility providers may have changed since 2010/11 as they have developed and published their new draft Water Resource Management Plans.

The Council is required to confirm and publish its Local Plan including its range of policies which include Environment, Infrastructure, and over arching sustainability. These policies must be stringent, appropriate, and justifiable based on the best available evidence.

This report is not intended to replace the previous 2011 water cycle study. This report contains the quantified evidence to support the commentaries on the continuing relevance of the policies within the Local Plan.

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1. Introduction

1.1 Changes in Housing and Employment Development Plans

Crawley Borough Council has revised its housing growth projections for the “Crawley Local Plan 2030”. A housing trajectory has been produced for the current year (2013/14) and the period up to 2029/30 (at the moment there are no development figures for the last two years of the plan). The new plan, based on the results of a supply-led model, anticipates 4035 residential units will be created over this period¹. This is a reduction of 3465 from the previous estimate of 7500 which was applied to the assessments in the previous water cycle study (AMEC, 2010).

As well as an overall reduction the main changes in the proposed strategy are:

- Reduced number of units on the strategic sites;
- A number of sites no longer feature in the development plans; and
- A number of sites not previously included now feature in the development plans.

The key housing sites will be generally located at Bewbush (Breezehurst Drive and Bewbush West), the Town Centre, and the North East sector. The Council has provided a map of key proposed site allocations where development would consist of 30 or more housing units, and these are shown in Figure 1.1. Appendix A clarifies the change in housing numbers since the previous study (data submitted by Crawley Borough Council). All housing figures are indicative.

1.2 Policies under Review

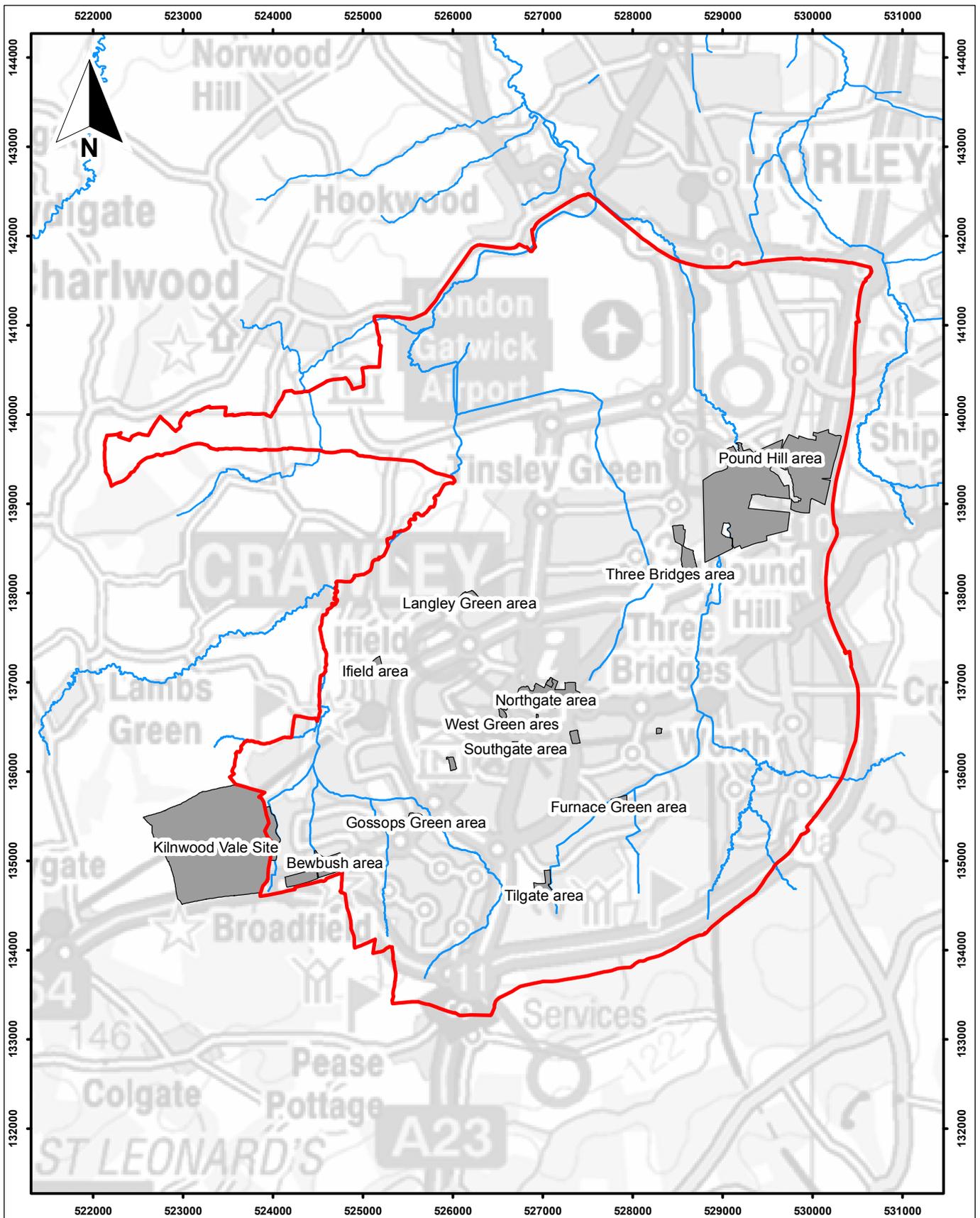
A review by the Council of the draft policies indicates that the policies most likely to be affected by updates to the housing growth plans and the water utilities’ plans for water infrastructure provision are:

- ENV11: Development & Flood Risk;
- ENV12: Water Management;
- IN1: Infrastructure Provision; and
- IN5: The location and provision of new infrastructure.

There are also a number of policies that may impact upon, or could be influenced by the local water environment and infrastructure. All of the policies in the consultation Local Plan have been reviewed in light of the revised water resource, wastewater water quality, and flood risk assessment. A small number of policies have been

¹ Incoming Housing Trajectory. Base Date 30th June 2013.

highlighted as requiring some element of modification and these are presented in Section 3. More generally, there are a number of policies which whilst the authors of this report consider the wording to be appropriate, have been highlighted in the concluding sections of the assessment chapters. These sections flag issues relating to the nature of water utility infrastructure that may have the potential to contravene policies on design and landscaping etc but which may be avoided through timely dialogue with the water company involved.



Key:

- Crawley Study Area
- Strategic Sites
- Main Rivers

Crawley District Council Water Cycle Study Update

Figure 1.1
Key Proposed Housing Sites

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Kilometers

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1.3 Scope of Environment Assessment

The emphasis of this review is to assess the validity of the Local Plan policies that refer to the water supply and wastewater infrastructure and services in the area. The demand for water supply is reforecast using data and assumptions aligned with those of the water utilities' supplying the area, and the growth plans are re-evaluated within the context of the Environment Agency's updated water stress assessments, and the water utilities' most recent revisions to their supply and demand forecasts.

All of the existing and proposed housing and employment growth demand for wastewater treatment will be served by Thames Water's Crawley WwTW. The capacity and headroom at this treatment works was assessed in the original study. Information from Thames Water is used to clarify the capacity situation and plans to upgrade the treatment works, but an overhaul of the modelling involved to test the capacity constraints is beyond the scope of this review.

The previous study examined the potential constraints to growth imposed by the sewerage network and concluded that there were no major issues. Constraints in the sewerage network are therefore not included in this review. Flood risk is a major issue for local planning and the previous study completed a comprehensive assessment of the existing risks, and the impact on potential flooding that new development could cause. This review re-examines the evidence that was developed in the original study to confirm the level of flood risk affecting the new housing growth plans.

1.4 Mini Glossary

The technical nature of the water cycle assessments use reference to a number of abbreviations and acronyms. A complete glossary was provided in the original study and a selection of the terms relevant to this update are provided below:

AMP	Asset Management Period. An AMP is a block of five years in which water companies plan and implement investment activities. 2015-2020 will be AMP6.
Key water supply terms:	
l/h/d*	Litres/head/day (per person demand for water). Also known as l/p/d.
l/hh/d	Litres/household/day
MI/d	Megalitres per day. 1 Megalitre is 1,000,000 litres
PCC	Per capita consumption. The PCC metric is often litres/head/day (l/h/d).
WAFU	Water Available For Use
Target headroom	an allowance to cover calculated uncertainties in the forecasts
FTE	Full Time Equivalent
Key wastewater terms:	
DWF	Dry Weather Flow
PE	Population Equivalent (unit of per capita demand for wastewater service, i.e. wastewater loading).

Wastewater treatment headroom	Spare hydraulic or flow capacity volume at a wastewater treatment works
WwTW	Wastewater treatment works (also known as Sewage Treatment Works – STW)
Key flood risk term:	
FRA	Flood Risk Assessment
*Incorrectly described as litres/household/day in the original study glossary.	

2. Revised Review of Constraints

2.1 Water Supply Update

2.1.1 Water Stress

The original study made reference to the severity of water stress in the region within which Crawley is located but this was implicit via reference to the water supply deficits forecast by the water supply companies and the type of options that they were considering within their resource plans (i.e. South East Water proposing desalination from 2025). In 2007 the Environment Agency developed its first water stress classification for England and Wales (Environment Agency, 2007) and that report identified Southern Water, Sutton and East Surrey Water, and South East Water, as operating in areas of 'Serious' water stress.

The Environment Agency has recently reviewed the method to define water stress and has updated its water stress map of England and Wales (Environment Agency, 2013). The new report re-confirms, via an improved methodology, that these areas remain under "Serious" water stress and that this will continue into the future.

The Environment Agency is advising the Secretary of State that the areas classified as 'Serious' should be designated as 'Areas of serious water stress' for the purposes of Regulation 4 of the Water Industry (Prescribed Condition) Regulation 1999 (as amended). This is to support decisions about metering. However, Southern Water reports that 92 per cent of its customers in this area already have a water meter. The Serious water stress designation also supports other policies aimed at actively managing demand for water.

2.1.2 Water Resources and Supply Situation

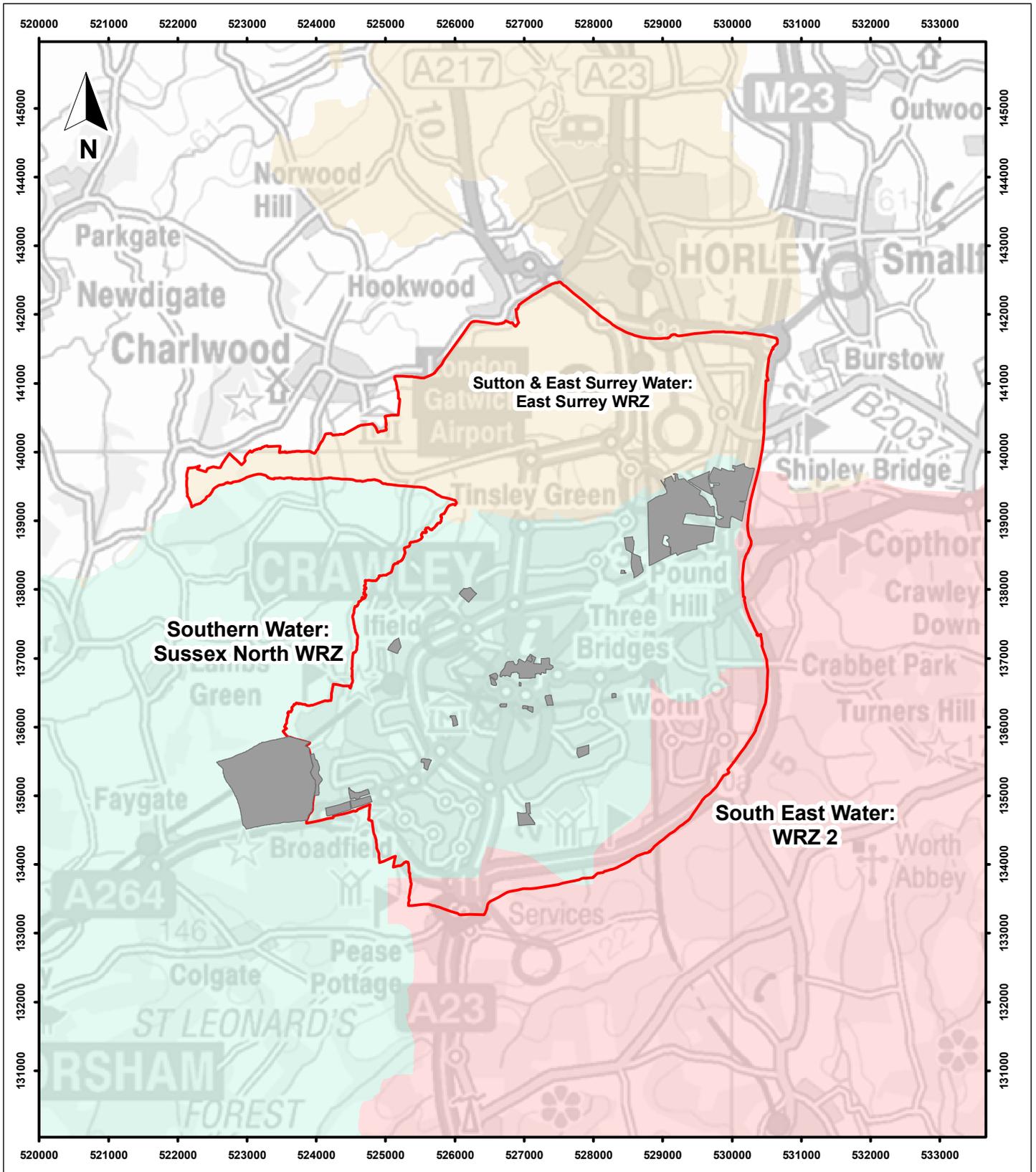
Three water companies provide water supplies to customers in the Crawley Borough Council area. These are the same three companies identified in the original Gatwick sub-regional study. The water resource zones have been added to the map showing the development plan sites and these are shown in Figure 2.1.

Sutton and East Surrey Water supplies the northern third (32 per cent) of the area (specifically within the East Surrey Water Resource Zone). Ordnance Survey maps show that a large part of this area is taken up by Gatwick Airport (and the Gatwick safeguarding area²). None of the Crawley development plan sites are located here.

Almost two thirds (58 per cent) of the Council area (and the majority of household customers) lies within Southern Water's Sussex North water resource zone. All of the development plan sites are located in this zone (Figure 2.1). A small part along the south and eastern council boundary areas (10 per cent) is supplied by South East Water (WRZ 2).

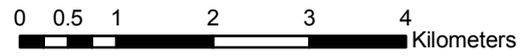
² Crawley Borough Council. Crawley local Plan. Consultation November 2013.

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Key:

- Crawley District Council
- Proposed Development Sites
- S&ESW East_Surrey WRZ
- SEW WRZ2
- SWS Sussex North WRZ



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Crawley District Council Water Cycle Study Update

Figure 2.1
Water Resource Zones Supplying Crawley

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2.1.3 Water Supply and Demand Forecasts in the 2009 and 2013 Plans

In 2013 the water companies submitted their draft Water Resource Management Plans to cover the period 2015-16 to 2029-40. These plans have recently been subject to a statutory consultation period and the water companies will be in the process of responding to the consultations and developing their final Water Resource Management Plans due to be published during 2014. The Council's timescales to progress the Local Plan cannot wait until the Final WRMP's are published next year, although these should be in place by the time the Local Plan is adopted. A review of the three relevant water company plans show that there have been changes in how much water the companies forecast they will have available for supplies and also how much demand for water there will be. These changes arise due to more up-to-date information on the impact of climate change, regulatory controls on abstractions to protect habitats, as well as revisions to the various methodologies used to calculate yields, water availability, and demand forecasts.

The main water company of interest is Southern Water, as all of the proposed strategic development is planned in the area of Crawley that is supplied by Southern Water. A summary of the main differences between Southern Water's plans from 2009 and 2013 is provided in Table 2.1. Whilst none of the strategic sites identified are located in areas that would be supplied by either Sutton & East Surrey, or South East Water, there may be smaller scale development in those areas and the policies should take into account the water supply situation. Tables 2.2 and 2.3 summarise the differences in Sutton and East Surrey, and South East Water's plans respectively.

Southern Water

The main issue is that during a dry year, Southern Water is forecasting a deficit, with demand exceeding supply across the planning period. **This was not forecast previously.** A deficit was only expected within the Critical Period (Southern Water's critical period is the summer months of June, July, and August). The emergence of a baseline deficit throughout a dry year indicates a less secure situation and has driven Southern Water to develop a plan to resolve this. It therefore remains important that Council development plans recognise the water stress and supply-demand deficit context in which Southern Water operates. This situation justifies the Council promoting sustainability in development, particularly measures to enable long-term sustainable demand for water by residents and commercial occupants in Crawley.

Sutton and East Surrey

Sutton and East Surrey has proposed a more secure supply forecast (the deficit has been pushed back by ten years and is slightly smaller in size) and this is clearly linked to revised assumptions that per capita consumption during the critical period of the year will be just under 20 per cent less than previously forecast. At the Water Resource Zone level the company is assuming similar (slightly higher) population levels than in its previous plan and so pcc is the key element that has to be under control if deficits are to be avoided, particularly in the longer term. The water resource situation is under "Serious" stress and it should be noted that in order to secure supplies in the Sutton part of the company area, a major transfer of water will continue to be made from the East Surrey zone (Sutton and East Surrey, 2013).

South East Water

South East Water has stated that its' revised supply-demand balance through to the middle part of the planning period is broadly similar to its 2009 plan (South East Water, 2013 Chapter 6: Supply Demand Balance). The size of the deficit is slightly smaller in the revised forecast.

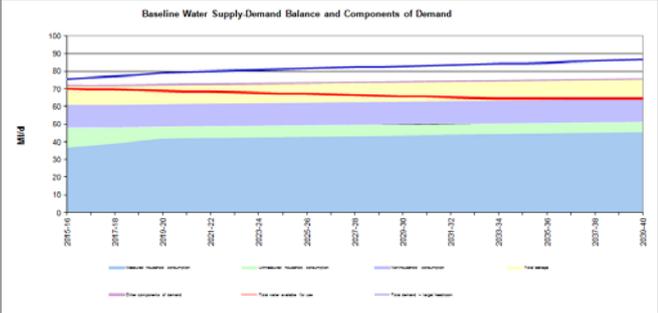
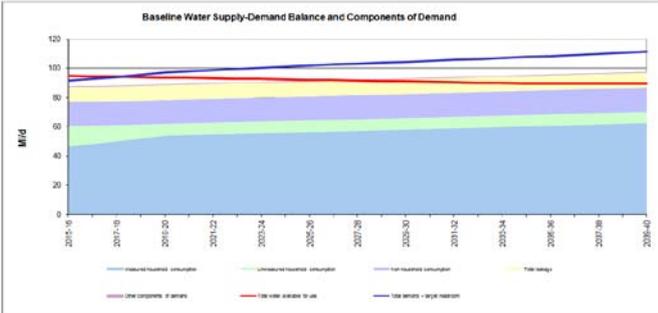
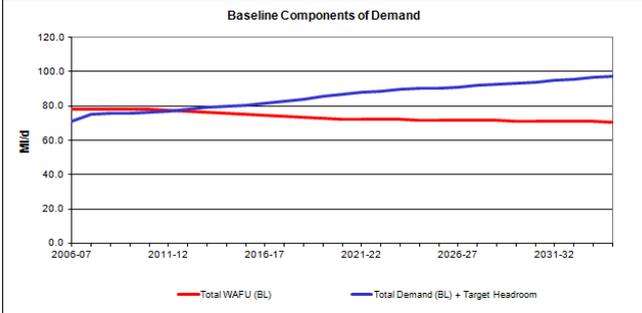
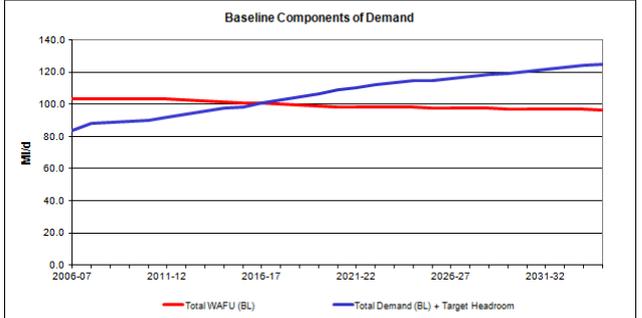
Table 2.1 Southern Water’s Sussex North Water Resource Zone 2013 compared to 2009

2013 Draft Plan - Revised Water Supply Situation	2009 Final Plan – Water Supply Situation
<p>Dry year: baseline supply-demand balance forecast: (demand exceeds supply)</p> <p>For dry years, the revised forecasts indicate a deficit throughout the year, not just in the critical period. The deficit is currently approximately 5MI/d and is forecast to grow to 20MI/d. Demand is forecast to exceed supplies that are available during the critical period from 2022.</p> <p>Critical period: supply-demand balance forecast</p> <p>The company has a plan of options to remove these deficits.</p> <p>Dry year solution supply-demand balance forecast:</p> <p>2014 draft plan solution:</p> <ul style="list-style-type: none"> • An existing transfer from the Sussex Worthing zone; • Three supply options to make better use of the water available to the company; • Reducing leakage. <p>There are no specific plans to target pcc but the company dry year forecasts are based on the assumption that average household pcc will reduce from 148 l/h/d in 2015/16 to 141 l/h/d in 2039/40. Metering is already widespread in the area, 92% of customers are metered and this is forecast to remain stable.</p>	<p>Dry year: baseline supply-demand balance forecast (supply matches demand):</p> <p>Critical period: supply-demand balance forecast (demand exceeds supply)</p> <p>A deficit forecast across the entire planning period (2010-11 to 2034-35), in the critical period. An immediate deficit of -7MI/d in the critical period scenario starting in 2010-11. The size of the deficit reduced to 2018-19, before increasing again.</p> <p>2009 proposed solution:</p> <p>Universal metering, a transfer from a neighbouring WRZ, a bulk supply from Portsmouth Water, developing ground water sources, and a new abstraction from the River Arun.</p>

Table 2.2 Sutton & East Surrey Water’s East Surrey Water Resource Zone 2013 compared to 2009

2013 Draft Plan - Revised Water Supply Situation	2009 Final Plan – Water Supply Situation
<p>Dry year baseline supply-demand balance forecast (no deficit)</p> <p>Critical period (peak week) baseline supply-demand balance forecast:</p> <p>According to the company’s main report, the East Surrey WRZ remains in surplus throughout the planning period. However, according to the published draft tables a small deficit is forecast from 2033-34 (reaches -4MI/d by 2039-40).</p> <p>2014 draft plan solution: None required</p> <p>The water company still intends to increase output at Bough Beech treatment works (to 70MI/d from 2020).</p>	<p>Supply-demand balance forecast:</p> <p>A deficit in the critical period scenario starting in 2023-24 and increasing to -7MI/d by 2034-35.</p> <p>Assumed average pcc of 320 l/h/d declining to 300 l/h/d. Total population of 354,000 increasing to 400,000.</p> <p>2009 proposed solution:</p> <p>90% hh metering by 2025, leakage reduction and mains replacement, Increase capacity at Bough Beech treatment works to get more water into supply, Increase peak output from 'Reservoir A' to 70MI/d</p>

Table 2.3 South East Water’s Water Resource Zone 2, 2013 compared to 2009

2013 Draft Plan - Revised Water Supply Situation	2009 Final Plan – Water Supply Situation
<p>Dry year: baseline supply-demand balance forecast:</p>  <p>The baseline deficit is broadly similar to the 2009 plan, although it is slightly smaller at -22M/d by 2039-40.</p> <p>The critical period deficit is forecast to be delayed by two years although the size of the deficit remains similar to the previous forecast</p>  <p>2014 draft plan solution:</p> <p>Options to resolve this include using treated effluent to support flows in the River Ouse for subsequent re-abstraction, a range of imports, leakage reduction, and distribution of water efficiency devices.</p>	<p>Dry year: baseline supply-demand balance forecast:</p>  <p>A deficit was forecast from 2012-13 and increased in size to -27M/d by 2034-35.</p> <p>A critical period deficit was also forecast from 2016-17</p>  <p>2009 proposed solution:</p> <p>Universal metering; water efficiency measures; leakage reduction; increase abstraction at Eridge; develop a new winter storage reservoir; develop clay Hill reservoir; introduce desalination from 2025.</p>

2.1.4 Catchment Abstraction Management Strategies

Neither Southern Water nor South East Water have included options to further increase the amount of water they abstract in order to resolve the deficits that they face. This is largely due to abstraction licensing constraints reflecting the lack of additional water that is available to abstract. As Crawley is served by the same three water resource zones that were relevant to the wider original study, the same Catchment Abstraction Management Strategies are also relevant (in terms of the impact they have on the options available to the water companies).

All of the Catchment Abstraction Management Strategies relevant to the water resource zones supplying Crawley (with the exception of the Thames Corridor) have recently been revised and republished (March 2012). The more recent supply forecasts in the draft WRMPs take into account the updated resource assessments.

Summary of Updated CAMS Assessments

- **The Arun and Western Streams:** The central part of Southern Water's Sussex North water resource zone taps into the far North-Eastern extent of this catchment. The water bodies in this area are defined by the CAMS as 'heavily modified or discharge rich' which means they are most likely artificially managed by reservoir releases. The groundwater body around Horsham does have some water available for licensing. Across the catchment there are nineteen water bodies in which recent actual flows have fallen below the Environment Flow Indicator (EFI) and eleven waterbodies where fully licensed flows might fall below the EFI. The abstraction licences within these water bodies that cause these issues have been identified by CAMS and are being investigated as part of the RSA programme.
- **The Adur and Ouse:** South East Water (WRZ 2) has access to the water bodies in the north of this catchment, all of which have no water available for licensing at low flows (Q90 and Q70), although there is some groundwater available for licensing. The tip of Southern Water's Sussex North water resource zone extends over part of the catchment which is defined as 'heavily modified or discharge rich'. Across the Adur & Ouse catchment there are seven water bodies in which recent actual flows have fallen below the EFI and six waterbodies where fully licensed flows might fall below the EFI. The abstraction licences within these water bodies that cause these issues have been identified by CAMS and are being investigated as part of the RSA programme. Southern Water's Sussex North Zone is not supplied from this catchment.
- **The Mole:** Crawley itself lies within the southern part of the Mole catchment, and the apex of all three water resource zones is here. Most of this catchment has some water available to licence which means that new licences can be considered depending on impacts on other abstractors and on surface water. However, the Mole is a tributary of the River Thames and all catchments that contribute to the River Thames must take into account the Thames' water resource availability, which is 'over abstracted' in its upper and lower reaches.
- **The Medway:** South East Water's WRZ 2 is the only one of the three resource zones that is partially in the Medway. All of the waterbodies in this area have no water available for licensing (even at Q30, the flow level which is exceeded only 30 per cent of the time). Most of the water available for public water supply in this catchment is taken from the three strategic reservoirs: Bewl, Bough Beech, and Weirwood, none of which supply water to WRZ2.

2.1.5 Crawley Specific Water Demand Forecasts

Household Demand

As the proposed housing growth numbers are lower than previously anticipated, it is inherently assumed that the population increase in Crawley will also be lower, and therefore the increase in demand for water will not be as large. The original study presented demands at the Gatwick sub-regional scale. Four growth rate scenarios were examined in the original study. Of these, Scenario 2 was the closest (but still significantly in excess) to the revised figure (7028 homes over 17 years between 2010/11 and 2026/27, compared to 4732 over the same period).

Under the former growth plans, and the former demand assumptions, household demand for water from within Crawley (excluding West of Bewbush) has been re-calculated and would increase by 2 million litres a day (17.9 MI/d in 2010/11 to 19.9MI/d in 2026/27). Household demand has also been recalculated applying revised demand

assumptions (baseline per capita consumption rates, and household occupancy rates) to the reduced growth plan figures (excluding Kilnwood Vale which would also be supplied by the Sussex North water resource zone). Under the updated assumptions demand in Crawley is forecast to remain relatively static at 17.1MI/d.

Domestic-type Demand in New Non-domestic Buildings (i.e. employment demand)

Water is also used by industry for industrial processes and for domestic type use in commercial properties. Information provided by the Council suggests that there will be a minimum of 16,440 new employment positions (B Class: offices, light industrial) generated across Crawley between 2013/14 and 2026/27. The BREEAM assessment methodology for offices³ specifies the baseline demands of the individual components in offices and light industrial buildings, and the more water efficient levels at which BREEAM credits can be obtained. Applying these baseline demands to usage factors the average baseline demand per FTE in a B Class building is approximately 36 litres per day (24 per cent of the average daily per capita consumption).

Table 2.4 Demand Components in B Class Developments and FTE Consumption Rates

Component	Unit	Baseline Consumption ³	'Ownership' among FTE	No of Uses per FTE/Day	Litres/FTE/Day	Litres/16,440/Day
WC	Effective flush	6	100 %	3	18	295,920
hand basin	l/min	12	100%	3x15 sec	9	147,960
Shower	l/min	14	10%	1x3 min	4.2	69,048
Urinal 2+	l/bowl/hr	7.5	0.8%*	7.5	0.47	7,706
Kitchen tap	l/min	12	25%**	1x1min	3	49,320
Domestic sized dishwasher	l/cycle	17	6%***	1	1.02	16,769
Total					35.7	586,723

*50% of 16440 are male. Up to 60 male FTE per every two urinal installations (British Standard 2006)

**Arbitrary assumption. A quarter of workers use a kitchen tap for one minute at 12 l/min.

***Assumes 1 dishwasher load per 15 FTE

³ BREEAM New Construction Non-domestic buildings. Technical Manual 2011 SD 5073 2.0 2011.
http://www.breeam.org/breeamGeneralPrint/breeam_non_dom_manual_3_0.pdf

The total FTE demand arising from Crawley's proposed employment increase is approximately 587,000 litres. This is driven by domestic type use in non-domestic buildings and so a proportion of this should be absorbed in to the general household daily demand to avoid double counting.

There is no data to indicate how many of the new employment jobs that would be created in Crawley would be taken by existing Crawley residents (or people who live within the wider extent of the three water resource zones (Figure 2.1) and therefore how much 'domestic-type' demand relating to those jobs is already taken account of in the water companies' demand forecasts. There are areas to the north-east and north-west of Crawley District that are relatively close to the potential employment developments and so it is reasonable to assume a proportion of the employment jobs will generate demand in one or all of the three resource zones beyond that which has been forecast by the companies. Table 2.5 presents the additional demand that could be generated in the Crawley district based on varying proportions of jobs being taken by people not currently living in any of the three water resource zones.

Table 2.5 Sensitivity Test Impact of New Jobs on Demand for Water

Proportion of New Jobs Taken by People outside of the WRZs	FTE Equivalent	Daily FTE Demand	Estimated Litres Per Day Demanded
10%	1644	36 litres	59,184 (0.06MI/d)
20%	3288	36 litres	118,368 (0.1MI/d)
50%	8220	36 litres	295,920 (0.3MI/d)

These demands would be reduced if the new non-domestic buildings are built to standards which are more water efficient, and to standards at which BREEAM credits can be achieved.

2.1.6 Key Conclusions

The original study concluded that water resources in the areas supplying Crawley are in short supply and the water resource constraint was assessed by AMEC as being Moderate. There are some changes within the detailed assessments. The reduction in Crawley housing figures has coincided with lower forecasts of per capita consumption by the water companies.

However, whilst the updated (draft) baseline forecasts for Sutton and East Surrey, and South East Water are slightly stronger than in their previous plans, the overriding issue is that Southern Water (supplying the majority of existing and forecast household customers) is now forecasting a supply deficit, even though it has projected a lower volume of per capita consumption of water. This deficit is largely driven by climate change and environmental constraints on abstraction. Due to the emergence of a significant baseline deficit, even assuming lower rates of per capita consumption, and the limited options to secure additional supplies from traditional water resource methods, the resource constraint may now reasonably be considered Moderate-High.

This creates extra impetus for the Crawley Local Plan to recognise and incorporate the need for all new developments to be built to meet high water efficiency levels. If actual demand turns out to be higher than forecast then this could have significant implications for water supplies in dry years going forward. The Environment Agency's 'Serious' water stress designation supports policies aimed at actively managing demand for water. Therefore, **it is recommended that the Council's proposed policies relating to household demand for water are retained.**

It is unlikely that Southern Water would seek a planning application to develop a major new water resource option within the Crawley Borough Council area. However, the company may need to develop smaller scale assets to facilitate improved water distribution and transfer of water, e.g. pumping stations. The Local Plan focuses on the development of housing and commercial buildings rather than infrastructure assets. If any such requirements were to be needed then the water company would need to submit a planning application for consultation. The proposed policies in the Local Plan cover most of the issues that would likely be of concern (i.e. visual impact, air quality, noise etc).

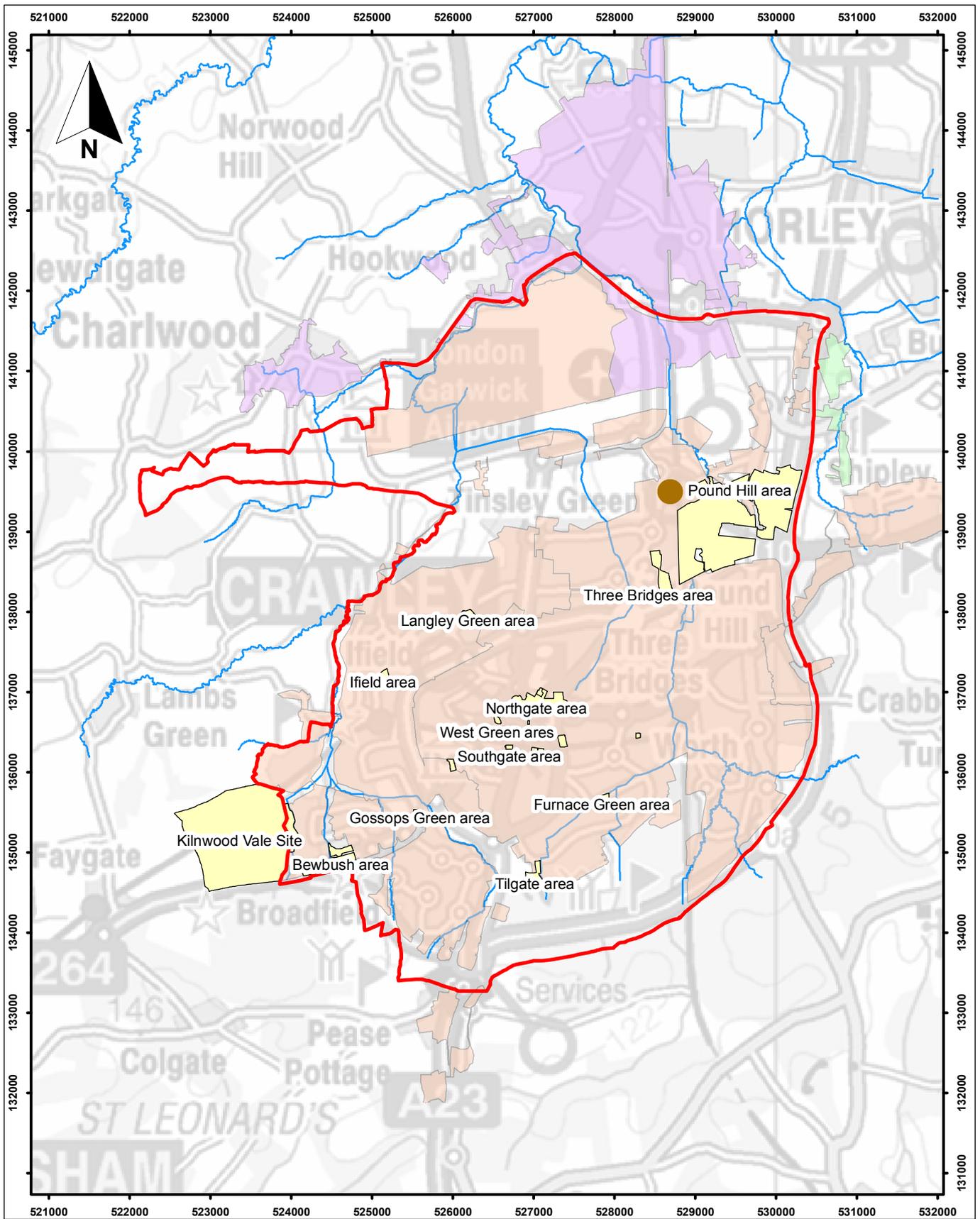
2.2 Wastewater Capacity Update

2.2.1 Crawley Wastewater Treatment Works

The majority of Crawley area is served by the Crawley WwTW, which has a catchment area of approximately 3000ha. A small area in the north is served by Horley WwTW (approximately 120 ha). Following agreement by Crawley Borough Council on the proposed phasing of housing growth, and the likely site locations it was confirmed that all housing growth tested in this updated capacity assessment would be served by Crawley WwTW, and therefore no other WwTW within Crawley area are included in this assessment.

Approximately 154,500 homes (at the end of AMP 4) are served by Crawley WwTW, with a current DWF discharge consent of 27,842m³/d (Personal Comms with Thames Water). Figure 2.2 shows the catchment area of Crawley WwTW and the main urban areas it serves.

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Key:

- Crawley District Council
- Proposed Development Sites
- Crawley WwTW Catchment
- Burstow WwTW Catchment
- Horley WwTW Catchment
- Approximate location of Crawley WwTW
- Main Rivers

Crawley District Council Water Cycle Study Update

**Figure 2.2
Crawley WwTW Catchment**

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Conclusions of the Previous Study

The previous study (Entec, 2011) confirmed that Crawley WwTW had very little capacity to accommodate an increase in flow volume (based on a comparison of the consented flow volume and the observed flow volumes in 2008). Thames Water advised that it intended to upgrade Crawley WwTW during AMP5 (between 2010 and 2015). However, discussions with Thames Water as part of the Outline Water Cycle Study identified that the upgrade work was only designed to accommodate growth to 2021; therefore, additional growth beyond 2021 would not be accommodated by the upgrade work and is likely to require additional capacity.

For the original study Thames Water had advised that planned upgrades at Crawley WwTW would allow the works to accommodate a total of approximately 167,000 population equivalent (PE) by 2021, approximately equal to an increase of 7,666 new homes between 2010 and 2021. It also noted that any additional growth beyond the 167,000 PE would require additional capacity at the WwTW.

Thames Water has confirmed that this work has now been completed with the installation of pre precipitation chemical dosing, increased capacity of the TT disc filters, upgrades to various elements of air distribution pipework, blowers, DO control and RAS pumps, provision of new digested sludge dewatering & cake storage, new primary sludge thickening, and sludge liquor balancing systems (Personal Comms). Crawley WwTW is now able to accommodate approximately 169,024 population equivalent by 2021, equal to an increase of around 6,150⁴ new homes between 2010 and 2021. This was an increased PE at the works of 14,524.

The new PE following the upgrade at Crawley WwTW (169,024) is greater than the PE estimated in the Outline Water Cycle study (167,000), and would therefore be thought to have the capacity to accommodate more new houses. However Thames Water estimates capacity for approximately 6,150 new homes, compared to the 7,666 houses estimated in the Outline Water Cycle Study. In the case of the Outline Water Cycle study the estimated numbers were based on a 'baseline' condition of 148,600 PE to which the estimated upgrade was added. The 'baseline' conditions used in the more recent assessment by Thames Water is based on a PE of 154,500 (capacity at end AMP 4), which assumes zero available capacity prior to the upgrade. This indicates that more of the existing capacity at Crawley WwTW was taken up prior to the upgrade than estimated in the previous Outline Water Cycle Study.

Implications of Housing Growth on Crawley WwTW

While the Kilnwood Vale area identified in Figure 2.2 falls outside the catchment area of Crawley WwTW, discussions with Crawley Borough Council confirm that the site will be connected to the sewerage network for Crawley WwTW. These 2500 dwellings are included in this assessment.

⁴ PE for Wastewater treatment works is estimated rather than calculated as treatment capacity figures can be affected by a variety of factors including for example, population change, housing stock levels, climate, industrial water use activity, retail water use activity, trade effluent levels etc. Therefore, the 6,150 properties figure is a ball park figure (Thames Water)

Including housing just outside the WwTW catchment and windfall sites, in total there are approximately 6,487 new dwellings planned between 2013/14 and 2026/27, that will need to be served by Crawley WwTW. This compares to a range of between 5,901 and 6,847 identified for the same time period in the scenarios of the Outline WCS for Crawley WwTW. The updated phasing of housing shows generally lower numbers of housing planned in the earlier years up to 2018, while beyond 2021 the housing number are sometimes as much as double those to be received by Crawley WwTW in the original study .

The revised assessment of the capacity available at Crawley WwTW suggests that following the upgrade work the works is now able to serve the estimated 5,047 new houses up to 2020/21. However the upgrade work was only designed to accommodate growth to 2021 and so at the moment there is no guarantee that the planned housing beyond 2021 will be able to be served without further investment and upgrade.

Updated Wastewater Treatment Constraint Assessment

Thames Water has advised that based on a PE of 169,024, a Dry Weather Flow (DWF) consent limit of 28,610m³/d would be available at the works based on the new infrastructure. However approaching this level would trigger the requirement for a higher consent (Personal Comms.), which is likely to require further investment at the WwTW, but Thames Water do not envisage growth reaching these levels. The updated housing numbers provided by Crawley Borough Council suggest approximately 5,047 houses would be built between 2010/11 and 2020/21 and up to 2,185 houses may also be built between 2021/22 and 2026/27.

Compared to the 6,150 new homes identified by Thames Water, to be accommodated by Crawley WwTW based on the new upgrade, it is clear that Growth to 2021 could be accommodated at the WwTW. However, as was also concluded in the original study, growth beyond 2021 is unlikely to be able to be served by Crawley WwTW unless further upgrade work is undertaken.

Based on conclusions of the original study there are two main options to further increase capacity beyond 2020/21; to either upgrade the works with treatment processes which take up less space, to or purchase additional land to make space for additional units of the existing treatment technologies. Due to additional WFD requirements on receiving water quality there is also likely to be increased pressure on Thames Water to improve the quality of the WwTW discharge, particularly as volumes increase.

Thames Water note that the calculation of PE assumes that the discharge from Gatwick airport lagoon (that discharges to Crawley WwTW) remains at (or below) the current agreed maximum daily load (Personal Comms.). However Thames Water highlight that the airport is seeking to increase the flow of de-icer that it discharges to Crawley WwTW which will be possible providing either i) the de-icer is pre-treated (in the lagoon, or by another means) such that the overall load to Crawley WwTW remains within the current limits, or ii) Crawley WwTW is extended further to allow it to treat any additional de-icer loads. This will potentially reduce the available capacity at the WwTW to accommodate Crawley Borough Council housing plans. Timescales of Gatwick Airport plans for this will be important.

In the original study, treatment capacity at Crawley WwTW was calculated by comparing the volume of treated effluent that the works is permitted to discharge (its 'Consented Dry Weather Flow') with the volume that it

currently discharges, plus the volume that would be generated by additional housing. However, more recent discussion with Thames Water has highlighted uncertainty surrounding the DWF and PE calculations. This is because flows can be significantly influenced by rainfall variations throughout the year, and also by the volume of water entering the treatment works from other non-household customers (e.g. increased discharges from Gatwick Airport to the treatment works). Therefore, it is important that Thames Water, Environment Agency, and Crawley Borough Council keep in close communication and are proactive to monitor and keep informed about increasing demands on the existing headroom at Crawley WwTW.

2.2.2 Sewerage Network Update

The original study concluded that there was no absolute constraint identified in terms of the sewerage network, but Thames Water advised that it is likely that significant network upgrades will be required to serve any of the strategic sites around Crawley with those furthest from the WwTW being the greatest.

Recent discussions with Thames Water confirm that they do not install network upgrade speculatively and, having had no awareness of any developer contact to discuss network needs to serve development in Crawley, no development specific upgrades have been undertaken (Personal Comms). Therefore the conclusions of the original study are still valid.

2.2.3 Receiving Water Quality

Water quality can constrain development as it directly affects the discharge consents that the Environment Agency will grant. The overarching issue is the requirement by the Water Framework Directive that waterbodies reach good ecological status (or potential, if heavily modified) and there is a requirement of 'no deterioration'. The status assessments are based on a large number of biological, chemical, and physical parameters and from these River Basin Management Plans (RBMP) and consequent water quality standards are set. The previous RBMP was completed in 2009 (in advance of the original Gatwick Outline study) and since then no updates have been made.

Conclusions of the original study identify that the water quality the receiving watercourses do not meet the WFD target of Good Status within the original study, and high levels of growth could therefore potentially be constrained if additional treatment cannot be provided to meet standards required by the Environment Agency because of the limit on treatment technology.

Crawley WwTW discharges into the River Mole and the river status is currently "Moderate Potential" (it is a Heavily Modified Water Body), further downstream this changes to "Poor" status (Thames RBMP, 2009). These classifications are related to levels of Phosphate and DO seen within the reaches (Thames RBMP, 2009). While the RBMP identifies that no clear sources have been identified, WwTWs are often a major source of phosphorus, which is a costly investment at a WwTW in terms of adding phosphorus removal. Due to further investigation and monitoring, the objectives of the WFD require all these reaches to be of "Good" status by 2027 (Thames RBMP, 2009).

The revised wastewater treatment assessment concludes that Crawley WwTW will need to undergo further upgrades to meet projected growth beyond 2020/21 (or earlier if windfall developments and Gatwick Airport

demands increase). Any future requirement for higher consents to increase the volume of water to be discharged will be constrained by the pressure for the River Mole to reach “Good Status” as part of the WFD, and any additional investment required at the WwTW. This was the conclusion of the original study and remains valid.

2.2.4 Key Conclusions

All the wastewater conclusions as part of the original study remain valid:

- Crawley WwTW does not currently use Best Available Technology (BAT) and so there is potential to improve the quality of the effluent that it discharges into the Mole (this will be necessary to maintain and improve water quality, especially if effluent volumes increase);
- In order to increase treatment levels to Best Technology Known Not Exceeding Excessive Cost (BTKNEEC) additional infrastructure would probably be required on-site. Additional land around the existing site would be needed to accommodate this;
- Options to increase capacity at Crawley WwTW beyond 2020/21 are uncertain. Organic growth in the area served by Crawley WwTW could diminish the forecast capacity and headroom levels, and the discharge consent could be tightened by the Environment Agency to drive “Good Status” in the River Mole by 2027;
- There are likely to be constraints posed by the existing sewerage network capacity, which would need to be addressed in response to housing site development;
- In addition to the recommended changes in policy wording it is strongly recommended that the council maintains a proactive dialogue with Thames Water and the Environment Agency (in addition to surrounding district councils such as Horsham) to ensure that all parties remain up to date regarding development, to monitor utilisation levels at Crawley treatment works, and for all parties to be informed of further development plans so that these can be incorporated into investment plans and environmental assessment programmes. It is possible that increased demand for wastewater treatment arising from windfall developments and/or increased passenger numbers at Gatwick Airport could diminish the headroom capacity at Crawley **before** 2020/21. All parties need to be aware of such incremental increases in demand;
- The situation will clearly be subject to change, influenced by many external factors, and so Thames Water and the Environment Agency should be encouraged to work together to monitor and re-model the water quality and dry weather flow conditions in light of expected development plans. Dialogue should be ongoing so that information is available as required by the various planning processes that the Councils and the water industry operate within;
- From 2020/21 Thames Water is highly likely to need to upgrade Crawley WwTW again to meet the demand going forward. At the moment there are two main options 1) to extend the land footprint of the works to accommodate additional treatment processes; 2) to upgrade to an even higher level of treatment to process higher volumes of flow to standards that can be accommodated with the water quality elements of the discharge consent. A number of the council’s policies relate to supporting development subject to various conditions.

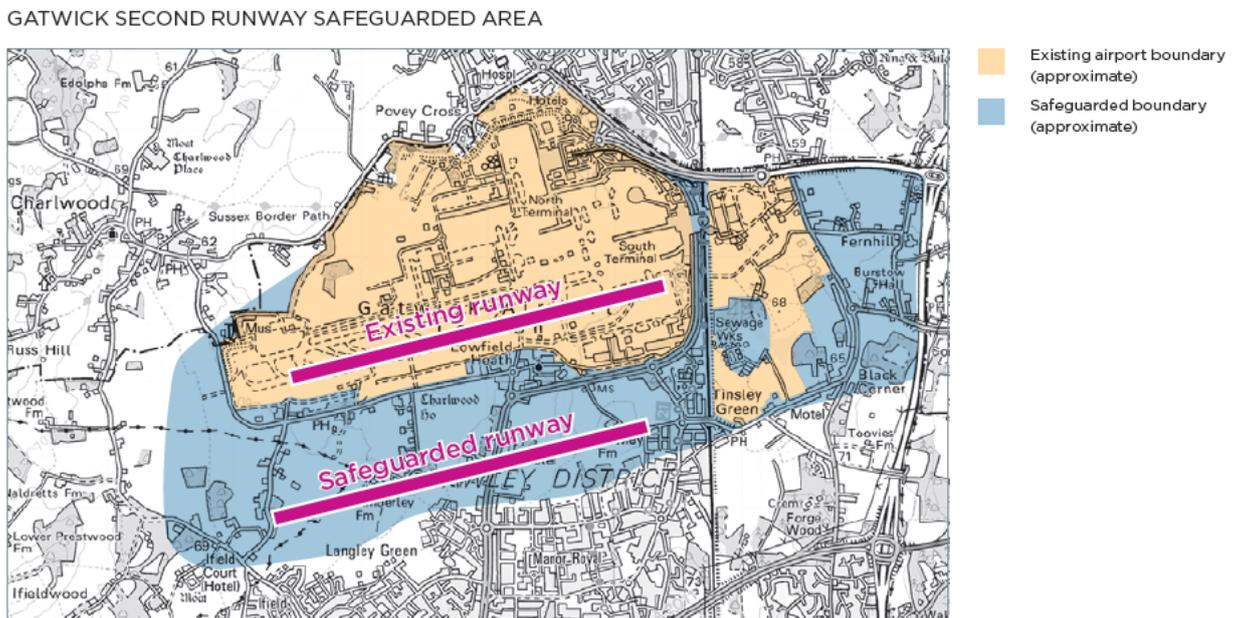
Policy SD1: Presumption in Favour of Sustainable Development includes a requirement for development to progress Crawley’s commitment to carbon neutrality, and Policy ENV7 requires that

all new non-domestic buildings must achieve carbon emission requirements. At the moment more intensive wastewater treatment technologies tend to have higher energy requirements and thus typically, a higher carbon footprint. Research continues to explore treatment technologies, including seeking to eliminate this trade-off. This is an issue the council may wish to keep up to date with.

The alternative to increase the spatial footprint of Crawley WwTW may have the potential to contravene policies on Urban Design (CH2) or Efficient Use of Land (CH4). Crawley WwTW is sited in area to the south east of Gatwick Airport and there is currently undeveloped land around the existing site. According to the Key Diagram in the Local Plan consultation document, Crawley WwTW is sited within the boundary defined as ‘Gatwick Safeguarding’. Policy GAT2: Safeguarded Land states that “land which will be safeguarded from development which would be incompatible with the expansion of the airport.....Minor development, such as small scale building works...will normally be acceptable”.

This potential conflict of needs should be raised and discussed with the relevant parties to determine if and how land in this area may need to be safeguarded to meet the needs of both service providers. It is recommended that the Council discuss the potential implications of future upgrades at Crawley WwTW with Thames Water, in the context of the requirement by Gatwick Airport to safeguard land in the area for airport expansion. This is particularly important considering the expansion proposal submitted to the Airports Commission in July 2013.

Figure 2.3 Crawley WwTW in the Gatwick Safeguarded Boundary



Source: Figure 1 (Gatwick Airport, July 2013).

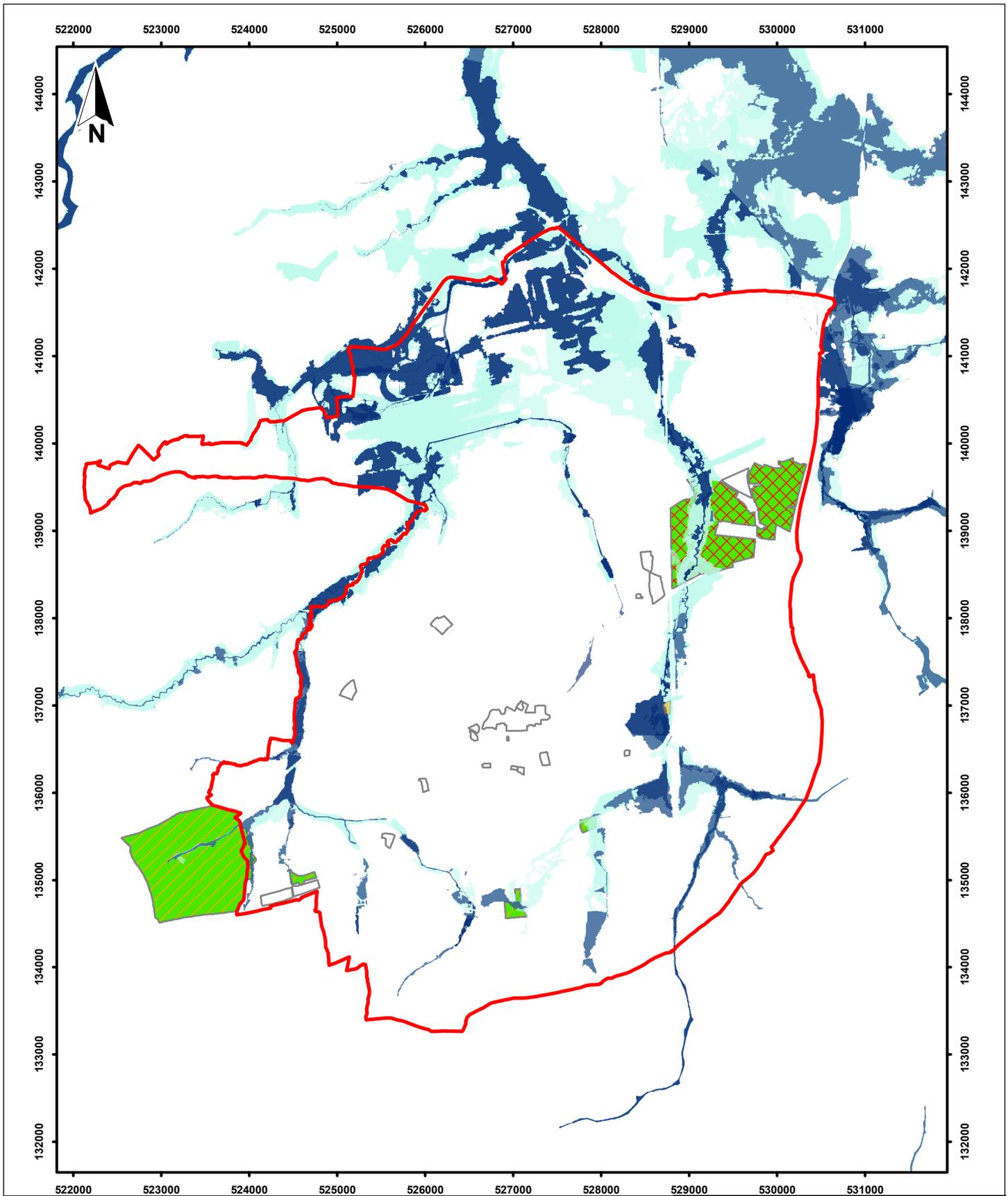
Policy EC1: Sustainable Economic Growth confirms that land is scarce across the borough but the council may wish to consider ‘ring-fencing’ this for later essential infrastructure development. The council may also wish to discuss the landscaping and other visual aspect requirements that Thames Water could need to consider if a planning application to extend were required.

Policy EC3: Economic Growth in Main Employment Areas, highlights forecast growth at Gatwick Airport. There may be a slight risk that development of Gatwick Airport could affect Thames Water's ability to increase the size of the works at Crawley WwTW. Thames Water's likely requirement to extend in this area should be a factor when considering other development proposals in the area.

Policy CH3: Normal requirements of all new development. This policy includes reference to developments not causing "*unreasonable harm to the amenity of the surrounding area ...for example due to noise, smells, and/or vibration*". Similarly, Policy ENV16: Air Quality could be relevant to plans to extend the size and capacity of the treatment works. Again, the risks from further extensions to Crawley WwTW should probably be considered by both the council and Thames Water in advance of an application being required.

2.3 Flood Risk Update

The original study referred to the Level 1 SFRAs that had previously been completed for each council. At that time none of the identified or potential development locations were in areas categorised as being at risk of flooding. However, Section 1.1 confirms that a number of sites not previously included now feature in the development plans for Crawley and so these locations have been cross-checked against the flood risk maps (Figure 2.4).



Key:

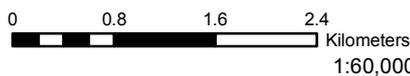
-  Crawley District Council
-  Development Sites

Strategic Sites:

-  Sites in Flood Zone 3b
-  Sites in Flood Zone 3
-  Sites in Flood Zone 2

Flood Zones:

-  Flood Zone 3
-  Flood Zone 2
-  Flood Defences



Crawley District Council Water Cycle Study Update

Figure 2.4
Flood Zones and Development Sites
Crawley

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(based on 27879-b10 wrobf/pitkl)



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In addition to the previously identified ‘at risk’ sites, the following new sites are also located in ‘at risk’ areas:

- WSCC Professional Centre (almost the entire site is in Flood Zone 2);
- The Bewbush West playing fields (Flood Zone 3 runs through the proposed site); and
- The enlarged proposal at the land adjacent to Desmond Anderson, Tilgate (north eastern corner of the site is in Flood Zone 3).

The Council has already consulted with the Environment Agency on the feasibility of these sites for development. The Environment Agency has responded reiterating the requirements of the National Planning Policy Framework (NPPF) with regard to development and flood risk. Specific development proposals will need a Flood Risk Assessment (FRA) to confirm the flood risks.

The EA has commented that *“the site at Bewbush has already been partly developed... This site is located at the very top of the Douster Brook so close to the start of its Main River reach.*

“A major area that would need to be covered in the FRA is surface water disposal. [The Environment Agency] would push very strongly for [sustainable drainage systems] and a clear demonstration of a reduction in the run-off rate. This is likely to be a Greenfield site and so [the Environment Agency] would certainly seek to cap run-off at the Greenfield rate, or below. The Bewbush site is mostly FZ1, hence most [of the Environment Agency’s subsequent] comments would be concerned with surface water runoff. The Environment Agency is of the opinion that at this site it should be easy to keep all development out of the flood risk area (sequentially ensuring that all development on the site is all in FZ1). As the Douster Brook splits the site, the [Environment Agency will] seek to keep development as far back from the watercourse as possible.

“If the future development plans will entail a structure for crossing the brook (for access) the Environment Agency would be concerned about potential culverting and bridge soffit levels. Detailed comments would be made at the planning stage, which would then lead to Flood Defence Consent (FDC) for any structure.

The Environment Agency has commented that *“more of the Bewbush West site is at risk”,* and they expect this site *“to have parts that are classified as FZ3a (maybe even FZ3b if it is classed as Greenfield), as well as FZ2 and FZ1. Any development should follow the sequential approach, placing highest risks into Zone 1, then appropriate uses through FZ2 and FZ3. A FRA would be even more critical at this site, not only for layout but to ensure there would be no loss of flood storage, that adequate surface water drainage proposals (sustainable drainage) are included, and that there will be no increase in the rate of run-off (preferably a reduction). The Spruce Hill Brook is a Main River, so again there could be a trigger for a Flood Defence Consent.”*

Any development in Flood Zone 3a must be subject to the Exception Test. Land in Flood Zone 3b is characterised by 1:20 year flood incidents and performs a vital role in flood management. For this reason Flood Zone 3b must not be developed in.

New sites not located in at risk areas are the Tinsley Lane / Summersvere Close development; Langley Green Primary school; 15-29 Broadway; Fairfield House; Russell Way site; Brighton Road, Zurich House; Longley Building; and the Goffs Park site.

3. Review of Policies

In section 2 the revised water supply and wastewater situations are presented and the implications for relevant policies are highlighted. This section lists all of the policies for which modified wording is recommended, or policies which have been highlighted in the assessments as potentially generating the need for proactive discussion with the water companies.

Policy SD1: Presumption in Favour of Sustainable Development – for consideration

This policy includes a requirement for development to progress Crawley’s commitment to carbon neutrality (see Policy ENV7).

Policy CH3: Normal Requirements of All New Development - for consideration

c) The likely need to increase the size and capacity of Crawley WwTW from 2020/21 (possibly sooner) may conflict with the items pertaining to noise, smells, and/or vibration. The likely impacts of an increased site should be discussed with Thames Water.

Policy CH4: Comprehensive Development and Efficient Use of Land - for consideration

It is recommended that the council consider whether an extended treatment works, as an alternative to the implementation of more advanced treatment technologies (which in the future may still have carbon footprint implications) would be a problem.

Policy CH7: Important Views - for consideration

The council may wish to consider, in advance of an application by Thames Water, whether expansion of the existing site could conflict with this policy.

Policy EC1: Sustain Economic Growth - for consideration

This policy confirms that land is scarce across the borough but the council may wish to consider ‘ring-fencing’ this for later essential infrastructure development. The council may also wish to discuss the landscaping and other visual aspect requirements that Thames Water would need to consider when preparing a planning application to extend (see Policy GAT2 for potential conflict).

Policy EC3: Economic Growth in Main Employment Areas – for consideration

This policy highlights forecast growth at Gatwick Airport. There may be a slight risk that development of Gatwick Airport could affect Thames Water’s ability to increase the size of the works at Crawley WwTW. Thames Water’s likely requirement to extend in this area should be a factor when considering other development proposals in the area.

Policy H1: Housing Provision – recommended additional text

Flood zone 3 areas do not constitute a ‘reasonable opportunity’ for developments highly vulnerable to flooding, i.e. housing development. Opportunities in these areas should be viewed cautiously, as ‘possible opportunities’ and subject to detailed site specific Flood Risk Assessments and then developed in line with the Sequential Approach.

Policy ENV7: Ensuring a Low Carbon Future - for consideration

The council may wish to consider the implications of a proposal by Thames Water to increase capacity at Crawley WwTW. Extending to accommodate additional treatment processes will have operational energy and carbon implications.

Policy ENV8: Improving Existing Homes and Reducing Fuel Poverty – recommended additional text

...upgrade the existing building fabric so that it uses less energy (this could include measures to reduce hot water wastage), and sources the energy it does need in an environmentally friendly way.

Policy ENV11: Development and Flood Risk – recommended additional text

Add in: Proposals for developments that would be highly vulnerable to flood risk must not be located in flood risk 3 zones.

Policy ENV12: Water Management – recommended modification to existing text

All development should minimise its impact on the already “**Serious**” water stress in the region, and on the natural water cycle. This will protect receiving waters from pollution, minimise the risk of flooding, and **be sensitive to the resource constraints in this area of serious water stress.**

All development, must where technically feasible:

- i. **Incorporate appropriate SuDs techniques into water drainage systems to prevent rainfall run-off draining into public sewers, and to reduce and slow down run-off into watercourses at rates characteristic of the undeveloped site.** These should be....[no further changes].
- ii. **Demonstrate opportunities to use rainwater harvesting and /or greywater recycling systems to reduce demand for potable water for non-potable uses;**
- iii. Achieve all of the run-off requirements from both roofs and hard surfaces as set out in the Code for Sustainable Homes or BREEAM ‘Surface Water Run Off’ credits unless it can be proven that this is not technically feasible or financially viable. **Opportunities to utilise rainwater harvesting and surface water attenuation systems (where appropriate) to reduce surface water run-off must be demonstrated;**

All new buildings....[no further changes]. The requirement demanding ambitious water efficiency levels is more valid than ever considering Southern Water’s revised supply-demand balance and the designation of the region as Seriously water stressed.

Policy GAT2: Safeguarded Land – for consideration

A policy to safeguard land within the zone identified on the map in the Local Plan has the potential to conflict with Thames Water's potential future need to extend the size of its' Crawley WwTW. It is recommended that the Council discuss the implications of this on the future needs at Crawley WwTW with Thames Water.

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Appendix A

Comparison of Development Figures

Crawley District Council has revised its proposed development sites and unit numbers across the district. Table A.1 lists all the proposed development sites from the previous plan as well as those included in the revised plan. It shows the number of units for each site in each plan, as well as clarifying which proposals were examined in the scenarios of the original Gatwick sub-regional study. These data have been transposed into a development trajectory (Appendix B).

Table A.1 Revised Housing Strategy compared to 2010 Plan

Site	No of Units (2010 plan)	Scenario 1	Scenario 2	Scenario 3a	Scenario 3b	Current Strategy	No. of Units
WITHIN CRAWLEY:							
North East Sector	2500	✓	X	X	X	✓	1900
Leisure Centre Site, Haslett Avenue	784	✓	✓	✓	✓	X	
Lucerne Drive	107	✓	✓	✓	✓	X	
Ifield Community College	170	✓	✓	✓	✓	✓	125
Thomas Bennett School	200	✓	✓	✓	✓	✓	100
Dorsten Square, Bewbush	143	✓	✓	✓	✓	/	21
Stone Court, Balcombe Road	31	✓	✓	✓	✓	X	
Haslett Avenue/Telford Place	100	✓	✓	✓	✓	✓	95
West of Peglar Way (southern Counties Site)	218	✓	✓	✓	✓	✓	150

Site	No of Units (2010 plan)	Scenario 1	Scenario 2	Scenario 3a	Scenario 3b	Current Strategy	No. of Units
Station Way (Crawley Station)	100	✓	✓	✓	✓	✓	33
Land East of Tinsley Lane	150	✓	✓	✓	✓	?	
Three Bridges Station	100	✓	✓	✓	✓	X	
Town Centre North	400	✓	✓	✓	✓	✓	90
Land East of Brighton road	<i>up to 600</i>	X	X	X	X	X	
Russell Way, Three bridges	expired pp 237 homes	X	X	X	X	✓	40
FAIRFIELD HOUSE, WEST GREEN LANE						✓	93
WSCC PROFESSIONAL CENTRE						✓	76
BRIGHTON ROAD						✓	48
BREEZEHURST DRIVE						✓	112
KILNMEAD CAR PARK						✓	30
BROADWAY						✓	57
Land Adj to Langley Green Primary School, Langley Drive						✓	48
Zurich House, East Park						✓	59
Goffs Park Depot						✓	30
BEWBUSH WEST PLAYING FIELDS						✓	48

Site	No of Units (2010 plan)	Scenario 1	Scenario 2	Scenario 3a	Scenario 3b	Current Strategy	No. of Units
BREEZEHURST DRIVE PLAYING FIELDS						✓	100
Longley Building, East Park						✓	48
Land Adj to Horsham Road & South of Silchester Drive						✓	52
OUTSIDE OF CRAWLEY:							
West of Ifield	1150/1917	X	X	✓	✓	X	
West of Bewbush(Kilnwood Vale)	2500	?	✓	?	?	✓	2500
Crabbet Park	2500	X	✓	X	X	X	
Horley Northeast	710	?	?	?	?	✓	
Horley Northwest	1570	?	?	?	?	✓	
Horley Centre	371	?	?	?	?	✓	

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Appendix B

Development Trajectory

Table B.1 Revised Housing Trajectory

Category	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Trajectory	409	384	202	79	68	289	559	416	325	356	265	354	419	330
Windfalls	0	0	0	0	0	20	20	20	20	20	0	0	0	0
Kilnwood Vale	0	0	0	80	120	160	220	220	280	280	290	300	275	275
Annual Total	409	384	202	159	188	469	799	656	625	656	555	654	694	605

Category	2023/24	2024/25	2025/26	2026/27	Total
Trajectory	190	187	177	32	4632
Windfalls	0	0	0	0	100
Kilnwood Vale	0	0	0	0	2500
Annual Total	190	187	177	32	7232

Figure B.1 Revised Housing Trajectory

