

Maidstone Borough Council

Water Cycle Study - Outline Report
June 2010



Halcrow Group Limited



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1

Executive Summary

This Water Cycle Study has been commissioned by Maidstone Borough Council, to feed into the evidence base for the Maidstone Borough Council Local Development Framework (LDF).

The Water Cycle Study (WCS) was carried out in accordance with the Environment Agency's (EA) document "Water Cycles Study Guidance", with the aim of examining the impact on each element of the aquatic environment of the proposed level of new development in the study area.

The study area covers the whole of the Maidstone Borough area. In addition to the town of Maidstone, the study examined potential development locations in the other settlements including Headcorn, Marden, Staplehurst, Coxheath, Harrietsham, Yalding and Lenham. The level of new development was considered for the development plan period 2006 to 2026. During this time, provision for 10,000 new jobs needs to be made, in line with employment targets derived from the South East Plan and Maidstone Borough Council's Economic Development Strategy, as well as the building of 11,080 new dwellings, in line with government housing targets also set out in the South East Plan. The study concentrated on potential development sites within this area as identified in the Maidstone Strategic Housing Land Availability Assessment (SHLAA).

This Outline WCS study broke the water cycle down into its component parts to establish the existing situation and provide assessment of environmental and infrastructure capacity with respect to planned development.

The study identifies sewerage as the key issue which, without additional investment, is likely to limit development in and around Maidstone town. There is limited spare capacity in some of the key existing sewers running through the centre of Maidstone town, which has the potential to restrict the number of new homes which can be provided to the south and east of Maidstone town. There is also restricted capacity at Allington Sewage Pumping Station, which pumps sewage from Maidstone town for treatment at Aylesford Wastewater Treatment Plant. These constraints can be overcome through investment in the sewerage system; potential solutions to these problems, could involve either increasing the capacity of the existing sewers, or providing new pumping stations and rising mains which

could bypass existing sewers. However, the need for such investment will have cost and timing implications for potential new development, particularly in the south-east area adjacent to Maidstone town. A more detailed technical study would be needed to assess the feasibility, cost, and timing of these solutions.

Providing that the sewerage network problems can be overcome, wastewater capacity is not expected to be a significant issue for the town of Maidstone, as Aylesford Wastewater Treatment Plant has capacity of expansion if required. However, environmental capacity could be a limiting factor on potential development in some of the other settlements considered in the study, especially Headcorn, and to a lesser extent Harrietsham and Yalding.

Availability of water resources is another important factor that needs to be considered in the planning of future development. According to South East Water, they will have sufficient water resources available to meet the expected increase in demand from the proposed levels of development, and indeed they have a statutory duty to do so. However, in August the Environment Secretary called for a public inquiry to examine South East Water's draft Water Resources Management Plan (dWRMP), which sets out their strategy for maintaining security of water supply for the next 25 years. The public inquiry will commence in May 2010.

Until the dWRMP has been finalised, there will remain a question mark over the level of additional water resources available for new development in the area of Maidstone Borough Council. Therefore, it is recommended that the findings of this study be reviewed in the light of the Inspector's Report and final decision by the Secretary of State.

While the study has not indicated that water resources will be a limiting factor on development, it will still be advisable to consider water demand in the planning of new developments. As this is one area in which Maidstone Borough Council can influence the effect of new development on the water cycle, we have included guidance on how to reduce water demand from new development in section 4.

This study has identified that some of the potential sites for development that were identified in the SHLAA lie within functional flood plains. This will limit the types of development that are suitable for those sites. Sequential testing in accordance with PPS25 will be needed to sequentially allocate sites in areas of less flood risk first.

Surface water drainage has not been identified as a critical issue, apart from the fact that surface water contributes to the overloading of the sewerage network in Maidstone town. The suitability of use of Sustainable Urban Drainage techniques should be considered for all major developments so as to lessen the risk of surface water flooding in the future.

The most critical constraint on development that has been identified by this Water Cycle Study is the limitations on the capacity of the existing sewerage network in Maidstone town centre. This will have cost and timing implications on new developments, particularly those in the Maidstone Urban Extension. There are potential solutions to these restrictions which would involve the upgrading of existing sewerage infrastructure or the provision of new pumping stations and pipelines. A more detailed technical study will be required to assess the possible options. We recommend that the Stage 2 Detailed Water Cycle Study should focus on this issue.

2

Introduction

2.1

Study Area

Maidstone Borough was designated as a Growth Point in 2006. It is a requirement of this status that the Council should undertake a water cycle study. This Water Cycle Study has been prepared in accordance with this requirement and covers the Maidstone Borough Council area.

Maidstone Borough Council is the local authority for the town of Maidstone and the surrounding area. The Maidstone Borough Council area is bordered to the north by Medway Unitary Authority, to the west by Tonbridge and Malling, the south by Tunbridge Wells, to the south-east by Ashford, and to the north east by Swale.

Maidstone is the most significant town in the study area. Other significant settlements in the study area include Coxheath, Staplehurst, Marden, Headcorn, Lenham, and Harrietsham. According to Kent County Council population figures, the population of the Maidstone Borough Council area in 2006 was 142,800, and this is predicted to increase to 167,600 by 2026.

The South East Plan requires provision of 11,080 additional homes in Maidstone Borough Council between 2006 and 2026. The regional spatial strategy indicates 90% of new housing at Maidstone should be in or adjacent to the town.

The Maidstone Strategic Housing Land Availability Assessment identifies sites with development potential which, together with new properties completed since 2006, and sites with existing consent and probable windfalls, provide a total potential yield of 16,391 new homes. This is approximately 50% greater than the provision of 11,080 new dwellings in the South East Plan, indicating that not all the sites identified in the SHLAA need to be developed. Identified sites are located not only in-and-around Maidstone town, but also in other settlements in the borough. This study has considered each of the sites identified in the SHLAA on a non-prioritised basis, to assess the impact that the potential level of development might have on the various aspects of the water cycle.

2.2

What is a Water Cycle Study?

2.2.1

EA Water Cycle Study Guidance

According to the Water Cycle Study Guidance published by the Environment Agency in January 2009, a water cycle study is:

- A method for ensuring that the most sustainable water infrastructure is provided where and when it is needed;
- A risk based approach ensuring that town and country planning makes best use of environmental capacity, adapts to environmental constraints and makes best use of environmental opportunities;
- A way of ensuring that all stakeholders have their say, preventing any unexpected infrastructure constraints that could delay or prevent development;
- The process that brings all the available knowledge and information together to help make better, more integrated, risk based planning decisions; and
- A way of ensuring compliance with Department of Business Enterprise and Regulatory Reform "Regulator's Compliance Code" to ensure that risk assessment precedes and informs all aspects of their approaches to regulatory activity.

This study was undertaken to identify the environmental and water services infrastructure opportunities and constraints in the study area based on the development proposals.

Most of the data and information used in a water cycle study already exists within the organisations that have responsibility for operating, regulating and managing the water environment. This highlights one of the key benefits of a partnership approach to a WCS which is unlocking this understanding and information and making it readily available.

Figure 2-1 shows the main elements that comprise the Water Cycle. Although the methods of dealing with these may change, the basic requirements will remain the same. Rain will fall, clean water will be needed for life, and sewage treatment will be needed for public health. Apart from climate change (which can only be modelled crudely as no-one yet knows the full impacts), the variables that are most difficult to estimate are water quality and average water consumption.

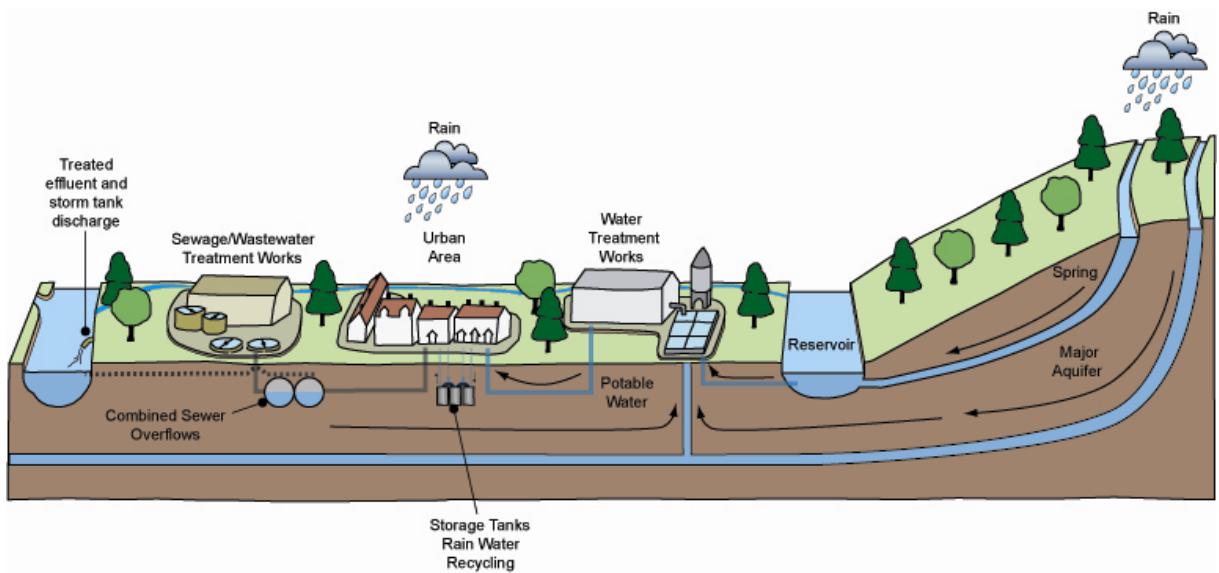


Figure 2 1 - The Water Cycle

2.2.2

A Strategic Approach

It is of critical importance to the delivery of the growth programme that the stakeholders not only address the provision of water services infrastructure in a strategic manner, but also that they demonstrate commitment to this provision by embedding the principles into the formal planning processes.

An integrated WCS provides an ideal means by which to address this need. It will identify the demands of the agreed levels of growth on existing water services infrastructure and establish the infrastructure's ability to deal with it. It will consider the key areas of flood risk management, water resources and supply, foul drainage and wastewater treatment, and other relevant aspects such as demand management, wetlands ecology and guidance for developers.

The purpose of this outline study is to:

- Identify environmental risks and constraints, as well as opportunities.
- Identify if environmental resources can cope with further development or if environmental capacity would be exceeded.
- Identify whether there are any particular issues associated with the Medway Valley between Wateringbury and Tovil.
- Identify if development would overload existing infrastructure.
- Identify if major new systems or infrastructure are needed to allow development.
- Help establish if there is water cycle capacity for new development without needing to build major new infrastructure.

- If major new infrastructure is required, identify likely location and scale that could be delivered to mitigate development impacts, including recommendations for water management and efficiency measures.
- Provide the evidence base for the local planning authority's Core Strategy.
- Identify whether a Detailed Study is required and, if so, what issues would need to be addressed.

An Outline Study is often, but not necessarily, followed by a Detailed Study. A Detailed Water Cycle study will:

- Identify what water cycle management measures and infrastructure are required, and where and when they are needed;
- Identify who is responsible for providing the systems, and by what deadline, and;
- Guide planners and developers on site specific requirements (for example SuDS requirements).

The Water Cycle Study assesses the impacts of development on the flood risk management, water resources and supply, water quality and ecology. These identify the environmental and water services infrastructure constraints and opportunities.

A WCS is of benefit to stakeholders involved in the planning of development, those responsible for managing water related assets and infrastructure, and those responsible for the protection and enhancement of the environment.

2.3

Scoping Stage of Water Cycle Study

The EA Water Cycle Study Guidance recommends a three stage approach to carrying out a WCS:

1. Scoping Study
2. Outline Study
3. Detailed Study

In this case, the Scoping Study was incorporated into the Outline Study stage. The EA Guidance identifies the purpose of a scoping study as being the following:

- set up a water cycle steering group: confirm the relevant partners and their responsibilities;
- define the study area;

- identify what studies have already been carried out and what data is available;
- confirm development scenarios and planning data;
- identify the objectives of the WCS and which plans and strategies it will be used to inform and draw from;
- identify if further work is needed to inform strategic planning decisions;
- agree a project scope and project plan for further work if needed;
- identify sources of funding for future phases of work if needed, and;
- assess the flexibility of development plans regarding location and other options.

In this study, these objectives were met by means of a WCS Workshop which was held on 5th August 2009 in Maidstone town. The workshop was attended by the main stakeholders in the WCS, including Maidstone Borough Council, Environment Agency, Kent County Council, Southern Water, and South East Water (Natural England had been invited but were unable to attend). The output from the workshop was a definition of the study area and the development options to be considered, and a scope for this Outline Study.

3

Planning Background

3.1

Regional Planning Strategy

Maidstone Borough was designated as a Growth Point by the Government in 2006, recognising the potential of the town of Maidstone to support a significant number of new houses. This has been reflected subsequently in the regional planning strategy.

The final South East Plan was published in May 2009. The document sets out the long term spatial planning framework for the south-east of England in the period 2006-2026. In order to meet the challenges facing the region in terms of housing, the economy, transport and environmental protection, the plan proposes that new development should be focussed on a limited number of regional hubs.

Maidstone is the county town of Kent and serves as the focus for administrative, commercial and retail activities. It was designated as a hub under Policy SP2 of the South East Plan as it is well related to strategic rail and road networks and serves as an interchange point between intra and local rail services. It also offers opportunities for some new housing development. **Policy AOSR6** identifies that within the Maidstone Hub, provision should be made for an additional 11,080 new houses between 2006 to 2026 (an average of 554 per annum). An indicative 90% of new housing at Maidstone should be in or adjacent to the town. Associated infrastructure to support growth should include the South East Maidstone Relief Route and Maidstone Hub package.

The following policy (**Policy AOSR7**) sets out the spatial strategy for Maidstone hub.

SOUTH EAST PLAN - POLICY AOSR7: MAIDSTONE HUB

The local development framework at Maidstone will:

1. make new provision for housing consistent with its growth role, including associated transport infrastructure
2. make new provision for employment of sub-regional significance, with an emphasis on higher quality jobs to enhance its role as the county town and a centre for business. The concentration of retail, leisure and service uses at the centre will allow close integration between employment, housing and public transport
3. confirm the broad scale of new business and related developments priority to completion of the major employment sites in the town
4. make Maidstone the focus for expansion and investment in new further or higher education facilities
5. support high quality proposals for intensifying or expanding the technology and knowledge sectors at established and suitable new locations
6. ensure that development at Maidstone complements rather than competes with the Kent Thames Gateway towns and does not add to travel pressures between them
7. avoid coalescence between Maidstone and the Medway towns conurbation.



3.2

Local Development Framework

At present (September 2009) the Local Development Framework contains the following documents:

- Statement of Community Involvement
- Local Development Scheme
- Annual Monitoring Report
- Development Plan Documents
- Supplementary Planning Documents
- Saved Local Plan Policies

Spatial Vision

“To increase the economic, social and environmental well being of Maidstone Borough through spatial planning policies and allocations of land for development, which will:

- create a prosperous Borough
- provide an adequate number, range and mix of housing
- provide a full range of social, leisure and retail facilities

This will be done in a manner that enhances and protects the environment and locates development in a sustainable pattern and gives a choice of travel mode in order to minimise congestion and pollution. This is dependent on the timely provision of the proper strategic and local infrastructure raising standards of service delivery and environmental management and managing development to achieve balanced economic and housing growth

This will enable Maidstone to have a distinct identity as the 21st Century County Town at the centre of Kent”

3.2.1

Housing

The Core Strategy Preferred Options document was published for consultation in January 2007. The Core Strategy Preferred Options assessment of housing land availability was based on the known planning commitments at that time together with an Urban Capacity Study. The Government now promotes the use of a Strategic Housing Land Availability Assessment (SHLAA) as a key part of a robust evidence base for the LDF. The SHLAA assesses the likely level of housing that could be provided through unimplemented planning permissions and areas of land (including previously developed and greenfield sites) that have development potential for housing. The SHLAA is not a policy making document, but is an important tool in revealing the capacity of the Borough to accommodate the necessary housing growth. The SHLAA has confirmed the analysis that the substantial proportion of future housing growth for the Borough should be accommodated in and adjacent to the Maidstone Town urban area, which includes an urban extension to the east/south east of Maidstone town. The rural settlements would accept only a small percentage of the total development.

In total, the SHLAA identified a net potential yield from completions, consents, sites with development potential identified in the SHLAA and windfall assessment of 16,391 dwellings i.e. 5,311 dwellings in excess of the regional spatial strategy allocation of 11,080. The SHLAA does not seek to prioritise sites, and nor does this WCS.

The Core Strategy Preferred Options document was published for consultation in January 2007. After the implementation of existing commitments and allowing for development within the urban areas, the broad distribution of development proposed in this document sees the greatest proportion of the housing requirement being met through the regeneration of Maidstone town and sustainable development on potential sites in the south-east area adjacent to Maidstone town.

At a strategic level options for defining future spatial development within Maidstone Borough Council can be categorised in terms of:

- The urban/rural split of new development and
- The proportion of new housing to be built on the potential development sites in the south-east area adjacent to Maidstone town

The regional spatial strategy indicates a 90:10 split between urban and rural sites. Notwithstanding this, at the WCS Inception meeting, Maidstone Borough Council indicated a desire to test options and sensitivities associated with development scenarios between a 90:10 and 80:20 split.

The potential yield of the potential sites in the south-east area adjacent to Maidstone town is dependent on construction of essential supporting transport infrastructure.

While recognising that there is still some uncertainty about the timing and location of potential development, in order to assess the impacts on the water cycle, we have had to make some assumptions about where and when additional new homes will be provided. We took the figures from the SHLAA and grouped individual sites together into wider geographical areas. This allowed us to simply review different development scenarios. The figures listed in the following Table 3.1, were discussed at the WCS Workshop on 5 August 2009 and agreed to represent a realistic estimate. See the plan in Appendix B for a graphical representation of the figures in the table.

Table 3.1 – Assumed levels of development

		Number of New Homes			
		2008-2013	2013-2018	2018-2025	Total
Maidstone Town					
Potential sites in the south-east area adjacent to Maidstone town	<i>South East</i>	0	1000	3000	4000
Peripheral Areas	<i>West</i>	480	610	210	1300
	<i>South West</i>	425	352	0	777
	<i>South East</i>	338	770	0	1108
	<i>North East</i>	160	30	0	190
Urban Infill	<i>Town Centre</i>	515	176	0	691
	<i>Sub-Total</i>	1918	2938	3219	8066
Rural service centres					
Headcorn		265	470	40	775
Marden		185	385	0	570
Staplehurst		165	320	0	485
Coxheath		88	280	20	388
Harrietsham		286	60	0	346
Yalding	<i>Village</i>	30	30	0	60
	<i>Syngenta site</i>	70	125	0	195
Lenham		63	70	0	133
Other villages					
Boughton Monchelsea		46	0	0	46
Hollingbourne		0	35	0	35
Kingswood		23	0	0	23
Leeds		13	0	0	13
Langley Heath		10	0	0	10
Loose		10	0	0	10
Detling		7	0	0	7
Total		3179	4713	3270	11162

Based on data from Maidstone Strategic Housing Land Availability Assessment,, Final report April 2009

3.2.2

Employment

Maidstone Borough Council's Economic Development Strategy prepared in 2008, sets the an overall target of provision of 10,000 new jobs within the Borough to the year 2026; the target being considered to be the right balance between aspirations for growth and deliverability in light of Growth Point housing targets and the economic opportunities and constraints.

Policy AOSR7 identifies that growth should be focused in and around the town centre (which is recognised as a Primary Regional Centre) to benefit from retail, leisure and service provision as well as transport connections.

(a) Employment Land Review

In September 2009, GVA Grimley published an update of Employment Land Review for Maidstone Borough Council. The purpose of the update was to take into account the impact of the recession and the adopted Maidstone Economic Development Strategy (November 2008). The review found a net employment land demand of up to 30.3ha based on the high growth scenario under the Economic Development Strategy, conversely under a low growth scenario, the demand falls to 17.75ha. This is divided into the following uses:

ELR 2009, Table 28 – Net Employment Land Demand

Scenario		Floor space (sqm)		Land requirement (ha)	
		Low	High	Low	High
Economic Development Strategy	Office	-11,000	14,110	-1.37	1.76
	General	15,439	21,415	3.86	5.35
	Industry				
	Warehouse	76,351	116,131	15.27	23.23
	Total			17.75	30.34

Extract from ELR 2009, p 21

The Valuation Office Agency (VOA) provides a guide to the stock of commercial floorspace within the Borough at a point in time. The data reflects the amount of actual office, general industrial and warehousing stock which is rateable, therefore it does not include planned or permitted developments which are not yet complete. The figures represent total stock and therefore include both occupied and vacant floorspace within the Borough. The data for 2008 (the most recent data release) indicates that there is a total stock of 1,053,000sqm of employment floorspace within Maidstone Borough.

VOA, 2008, Table 4 – Employment Floorspace in Maidstone Borough (2008)

Premises type	Floorspace (sqm)	Percent of stock
Office	279,000	27%
General Industry	332,000	31%
Warehouse	442,000	42%
Total	1,053,000	100%

Source: VOA, 2008

Comparing trends since 2005 (the most comparable period given the revaluation process undertaken in 2005) shows that the stock of office premises has increased by 3% in floorspace terms. General Industrial floorspace has decreased by 9% over the same period, with a significant decrease between 2005 and 2006 of some 20,000sqm. This appears to be the result of a number of small-medium sized developments being lost to other uses rather than one single large closure or relocation. The stock of warehouse floorspace has decreased by 3% since 2005.

This strategic view of changes in floorspace is largely supported by GVA Grimley's targeted field survey which demonstrated no significant changes in the overall supply of commercial premises within the majority of employment sites surveyed. Where changes have occurred these have broadly reflected the trend of marginal increases in office provision, and limited loss of general industrial and warehouse space.

(b) Retail Needs Assessment

In August 2009, Maidstone Borough Council and Kent County Council published an updated Retail Needs Assessment Report. Due to uncertainties over future economic growth, the predicted requirement for additional retail space in Maidstone town by 2026 covers a very wide margin.

Extract from Retail Needs Report

Table 4: Potential retail capacity by goods type (before committed schemes)

Sq m gross	comparison goods			convenience goods		
	Baseline	Scenario 1	Scenario 2	Baseline	Scenario 1	Scenario 2
2011	7,400	15,500	650	1,350	1,850	250
2016	22,450	41,250	11,650	3,550	3,450	1,300
2021	41,650	80,000	25,500	6,050	5,400	2,500
2026	63,000	126,250	40,200	8,850	7,450	3,750

All figures shown are rounded to the nearest 50 sq m and are cumulative
Comparison Goods – Comparison goods can be described as goods that consumers buy at infrequent intervals and normally would compare prices before buying e.g. TV, Fridges, clothes etc
Convenience goods – Widely distributed and relatively inexpensive goods, which are purchased frequently and with minimum of effort such as groceries, newspapers and fuel.

The results of the retail need forecasts for comparison goods vary significantly from 40,200 sq m gross by 2026 (scenario 2) to 126,250 sq m gross (scenario 1). This is a difference of 86,050 sq m.

Convenience goods vary from 3,750 sq m gross by 2026 to 8,850 sq m gross. Both the baseline and scenario 1 show similar results.

The requirement in the short term for convenience goods is modest. The floor space requirements to 2011 are 1,750 sq m (baseline scenario) and 1,850 sq m gross (scenario 1). This amount of floor space would accommodate a small supermarket or several extensions. In the longer term, requirements are of sufficient scale to suggest significant convenience goods capacity.

For scenario 2, the impact of consumers spending more money on-line has a significant impact on the amount of floor space required. In the short term, requirements are only sufficient to support the equivalent of an extension (250 sq m gross). Requirements remain modest to 2026 with 3,750 sq m gross identified by 2026, half the amount forecasted in the baseline scenario and scenario 1.

Table 5: Potential Retail Capacity by goods type (after development which as planning consent)

Sq m gross	comparison goods			convenience goods		
	Baseline	Scenario 1	Scenario 2	Baseline	Scenario 1	Scenario 2
2011	-350	7,750	-7,100	-2'850	-2,300	-3,900
2016	14,700	33,500	3,900	-600	-700	-2,850
2021	33,900	72,250	17,750	1,900	1,250	-1,650
2026	55,250	118,500	32,450	4,650	3,300	-400

(c) Implications for water cycle study

Due to uncertainties over future economic growth, the predicted requirement for additional retail space in Maidstone town by 2026 covered a very wide margin, ranging from a low estimate of 32,050 m² to a high estimate of 121,800 m².

Based on the above data, we have assumed:

- 95% of new jobs (9,500) located in or adjacent to Maidstone town (town centre, Parkwood, Eclipse or 2020 business parks)
- 5% of new jobs (500) located in the rural service areas – notably Lenham, Staplehurst and Marden
- The majority of new jobs will be provided in the service or retail sectors
- None of the new jobs will be in water intensive industries

For the purpose of water demand predictions, we have assumed that each new job will have a water requirement of between 6l/hd and 20l/hd, thus imposing an additional demand of 0.06Ml/d to 0.2Ml/d on available water resource. The implication of this additional demand and options to minimize its impact are discussed in section 4.1.

3.2.3

Strategic rail freight interchange

In October 2007 Kent International Gateway (KIG) Limited (the applicant) applied for outline planning permission for a rail freight interchange with associated warehousing and subsidiary commercial space to a site on the east side of Maidstone, to the south of the M20 immediately to the west of Junction 8. If developed the rail freight interchange would provide significant additional employment opportunities.

Development of the KIG proposal would impose a localised demand on the water supply and sewerage systems. However, considering the Borough as a whole, the impact of additional employment is relatively small compared to the impact of new housing; the water consumption of an additional employee being approximately 7% of that of a new dwelling.

3.3

Environmental Context

3.3.1

Introduction

Appendices A and C include a plan showing the river catchments and areas on environmental designations within the Maidstone Borough Council area respectively.

The vast majority of the potential sites identified for development, and in particular the major development areas around the periphery of Maidstone town, will not affect any of the environmentally designated areas. Having said that, the new developments and specifically any related flood mitigation measures, may offer opportunities for local environmental and ecological improvements. With this in mind, we have included in this section an overview of the current environmental and ecological status of the study area. Reference should also be made to Maidstone's Biodiversity Project Plan:

“The strategy and action plan for biodiversity allows the council to be strategic in determining where to apply its own resources in delivery. The development of the Maidstone’s Draft Biodiversity Action Plan Phase 1: 2009-2014 is a leading and novel approach at local authority level, in that it clearly defines a programme of

projects that cover a range of work including research, monitoring, protocol development and capital one-off site projects. These projects show how the Council will lead and be directly involved in protecting and enhancing the borough's biodiversity and raising awareness of the issues. Maidstone's Draft Biodiversity Action Plan Phase 1: 2009-2014 clearly describes the localness of our approach as a governing body in the biodiversity framework highlighting our innovative approach to delivering better services to local people.” ref: Biodiversity Project Plan

3.3.2

Environmental Designated Areas

One site of Special Area of Conservation (SAC) lies within the site boundaries of Maidstone Borough Council, namely North Downs Woodland which comprises of a combination of broad-leaved deciduous woodland, coniferous woodland and dry grasslands, which in this case is characterised by beech hangars, yew woodland and semi-natural calcareous grassland respectively. These sites are of **international** significance for their nature conservation value.

Nine Sites of Special Scientific Interest (SSSIs) lie within the boundaries of Maidstone Borough Council. These are: three quarry sites (Allington Quarry, Lenham Quarry, and Spot Lane Quarry); Hollingbourne Downs, which is a section of the North Downs escarpment supporting a variety of habitats characteristic of calcareous soils; Marden Meadows near Marden, the best example in the county of unimproved neutral grassland); Oaken Wood, Barming a key geomorphological site; River Beult, Low Weald which is one of only a few clay rivers in England retaining its characteristic flora and fauna; Woulsdham to Detling escarpment – a 10km stretch of the chalk escarpment which runs to the north of Maidstone town; and Purple Hill, Detling, which is an area of chalk grassland, scrub and woodland. SSSIs are statutory sites, notified under the Wildlife and Countryside Act 1981 (WCA). These sites are of **national** significance for their nature conservation value.

Fifty seven Sites of Nature Conservation Importance (SNCIs) occur within the study area. These include a wide range of habitats, and some urban/semi-urban sites. SNCIs are not currently recognised under national designation, and are thus non-statutory, but are wildlife sites which have been identified as being of conservation importance at the **county** level. These sites are therefore not legally protected, but nonetheless need to be considered within the planning process.

The area also includes the Vintners Valley Park and Boxley Warren Local Nature Reserves (LNRs), and the proposed River Len LNR which is a major tributary of the River Medway. LNRS are statutory sites under Section 21 of the National Parks and Access to the Countryside Act 1949, and are of value at the **local** level.

Kent Downs Area of Outstanding Natural Beauty (AONB) also partially lies within the boundaries of Maidstone Borough Council. The primary purpose of AONB designations is to conserve and enhance the natural beauty of the landscape which is of **national** significance.

3.3.3

Overview of biodiversity baseline within the boundaries of Maidstone Borough Council

The key biodiversity interests are located to the south of the study area, namely the River Beult SSSI, which is notified from Smarden to the Medway confluences but excludes the upper river which is ditch-like with an impoverished flora and fauna. The River Beult has a characteristically diverse clay-river flora, with many emergent plant species and a smaller number of submerged or floating plants. The river also provides suitable habitat for two nationally scarce invertebrates one of which is the hairy dragonfly, with the bare clay banks providing nesting sites for kingfisher. Breeding birds are also abundant in the thick emergent fringes providing cover and breeding sites for birds such as reed warbler and reed bunting.

The proposed River Len Local Nature Reserve (LNR) is located to the east of Maidstone town centre. The Len, which is also a tributary of the River Medway, enters the town of Maidstone south of Bearsted. Its waters feed the lake in Mote Park and it enters the River Medway c1.25 miles (2 km) beyond.

The potential effects of any development on aquatic and wetland biodiversity features should consider both on-site features and sensitive off-site features. These may be affected by water resource exploitation, wastewater treatment and disposal, surface water management and flood and coastal risk management. Effects may be positive or negative, and might be the direct result of water cycle changes or may arise indirectly (in particular through water quality changes (as indicated in the previous section) or through hydromorphological changes to the nearby estuary / river system).

England as a whole has been divided into 120 'Natural Areas' which are individually identified by their characteristic wildlife and distinctive features. Within the Maidstone Borough Council area there are five natural areas:

- 68: *North Kent Plain* – essentially an area of land that is dominated by open, low and gently undulating land.
- 69: *North Downs* - comprises of calcareous soils which support an outstanding variety of wildlife.
- 70: *Wealden Greensand* – Lowland heath is the most characteristic habitat of this Natural Area which includes parts of several river valleys and supports a series of wetland habitats including alluvial grazing meadows with drainage ditches, marshy grassland, reedbeds and woodland.
- 72: *High Weald* - this area lies at the core of the Wealden anticline of south-east England and is geologically complex, the River Medway flows through steep-sided valleys which is a fundamental component of the overall landscape character and,
- 73: *Low Weald and Pevensy* – is a predominantly low-lying region dominated by wet, heavy clay soils, the area includes major parts of the valleys of several of the principle rivers of the region including the Medway.

Low-lying land and river valleys are key wildlife features as they include examples of several UK Biodiversity Action Plan (BAP) priority habitats including floodplain grazing marsh, wet woodland, standing open water and reedbeds. This diversity of wetland habitats can support a rich fauna and flora, including many nationally rare and scarce species.

The footprint of the potential development sites in the south-east area adjacent to Maidstone town are mainly brownfield sites with no designated nature conservation interest. However, some aquatic and wetland biodiversity interests are in the vicinity and are likely to require further consideration for example the proposed River Len LNR and the River Medway although the River Medway is not designated at this point.

Smaller potential developments in the villages of Marden, Staplehurst, Harrietsham, Headcorn, Lenham, Coxheath and Yalding are located on a combination of brownfield and greenfield sites. A number of these sites are within the immediate vicinity of nationally and locally designated nature conservation sites. The River Beult SSSI flows immediately south of Headcorn with the River Sherway and associated ponds and pasture SNCI running along the eastern boundary of the town. The River Beult SSSI also flows through the town of Yalding. The River Len Alder Carr SNCI lies to the south of Harrietsham although the Channel Tunnel Rail Link lies between the village and the SNCI. However, the

Chalk stream SNCI, a very clean, unpolluted chalk stream and tributary is located immediately north of the town. This river flows south from springheads at the base of the chalk downs through pasture located close to Harrietsham.

The Maidstone Borough Council development sites are a mix of brownfield and greenfield sites, each with their own specific character and consequently each will have its own particular environmental constraints depending on the character of the site and its previous uses.

3.3.4

Overview of biodiversity baseline of the River Medway

The River Medway which is located almost entirely in Kent and flows for 70 miles (113km) from just inside the West Sussex borders to the point where it enters the Thames estuary. It has a catchment area of 930 square miles with its major tributaries including the River Beult and the River Len.

The Medway itself initially flows in a west-east direction south of the North Downs; at the confluence of the River Beult. Then it turns northerly and breaks down through the North Downs at the Medway Gap, a steep and narrow valley near Rochester before its final section to the sea.

The majority of the river is not designated as a nature conservation site however between Holborough, just to the north-west of Aylesford and the Thames estuary there are 4 SSSI's which are of national importance and 2 sites of international importance, which are the Medway Estuary and Marshes Ramsar Site and Special Protection Area sites (SPA's) which provide the largest area of intertidal habitats within Kent. A complex area of priority BAP habitats of mudflats and saltmarsh is present with areas of grazing marsh intersected by dykes and fleets behind the sea walls. The area holds internationally important populations of wintering and passage birds and is also of importance for its breeding birds and plant species.

Holborough to Burham Marshes SSSI lies immediately downstream of Aylesford wastewater treatment works. This site lies along the floodplain of the River Medway which is still tidal at this point providing a variety of habitats including BAP priority habitats such as reedbeds, open water and fen habitats. It also supports a wide variety of breeding birds and is important for wintering wildfowl and waders. A number of scarce wetland plants also occur along with a number of rare invertebrate species.

The River Medway is also important for fish; over 20 different species have been recorded along the stretches of the river including sole, eels, flounder, brown shrimps, sea trout, whiting and the occasional salmon. There is also a known breeding population of barbel and important spawning ground within the stretch below Ashurst Weir.

There is also, potentially, a need to consider aquatic and wetland biodiversity sensitivities associated with any water body that might be exploited to meet the future public water supply demand. The Kent Local Biodiversity Action Plan (LBAP) has identified 28 priority habitats including coastal & floodplain grazing marsh, coastal saltmarsh, mudflats, reedbeds, and standing open water as habitats within the county that are required to be maintained, enhanced, restored and new habitats created as part of their individual action plans along with 85 priority species which also have action plans to stop their decline including water vole, otter and freshwater white-clawed crayfish of which all have been recorded in the River Medway.

As part of the works to ensure the targets of the local habitat and species action plans are met, Biodiversity Opportunity Areas (BOA) have been developed to indicate where the delivery of the Kent BAP targets should be focused in order to secure the maximum biodiversity benefits. For example the Medway and Low Weald Wetlands and Grasslands BOA area includes long stretches of Kent's rivers including the River Medway and its tributaries where key targets are to pursue opportunities for creation of wider river floodplains with riparian corridors around natural drainage channels and opportunities for the establishment by 2020, of a new landscape-scale, freshwater wetland complex.

3.4

Water Framework Directive

The European Water Framework Directive (WFD) was published in December 2000 and transposed into English law in December 2003. It introduces the concept of “good status” that is far more rigorous than current water environment quality measures. Local planning authorities can help to deliver WFD objectives by identifying the water management issues that are relevant to spatial planning and including policies on sustainable water management in their development plans.

The directive requires the preparation and implementation of River Basin Management Plans (RBMPs) which provide a holistic roadmap for protecting and improving the water environment.

The River Medway and its tributaries form part of the Thames river basin. The river basin management plan is currently a draft stage.

The draft plan identifies elevated nutrients as a prime cause of concern for the River Medway, with the majority of nutrients deriving from sewage treatment works. The high nutrient levels in the River Medway mean that it is defined as eutrophic sensitive. The national programme to address these problems will see phosphate stripping at key sewage treatment works across the catchment.

Other identified actions in the catchment include:

- Promotion of good practice to avoid pollution from construction sites in the Loose and Somerhill stream
- Establishment of a "Regional Better Rivers Programme" to improve habitat and ecology in rivers such as the Beult, Len and Loose stream
- Pollution prevention campaigns around groundwater abstractions
- South East Water to investigate abstraction from the Greensand Sources in the Leybourne and Bourne as part of their Periodic Review Process

3.5

Habitat Directive

Under the provisions of the Habitat Directive, Local Planning Authorities must apply a number of tests when considering any development proposal that would jeopardise the protection afforded to European protected species. In such circumstances, development should only be granted if:

- There is "no satisfactory alternative"
- The proposal would "not be detrimental to the maintenance of the populations of the species concerned at a favourable conservation status in their natural range"
- The proposal is "in the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment".

Where the Secretary of State receives a licence application for a development with planning permission, that will affect a member of a European protected species, the Local Planning Authority will be asked for supporting information demonstrating that the above required tests have been met.

3.6

Sustainability Standards

The Maidstone LDF includes a Sustainable Construction Supplementary Planning Document adopted in July 2006. This document encourages the implementation of water saving measure and Sustainable Urban Drainage Systems.

A Sustainability Appraisal and Strategic Environmental Assessment Report was published by Scott Wilson in January 2007. That report includes a number of recommendations, including one that Maidstone Borough Council need to strengthen sustainable construction requirements.

An overwhelming wealth of new and forthcoming legislation, best practice guidance and policy exists which is starting to move the UK water industry toward a more sustainable approach, for example; Future Water, Integrated Urban Drainage, draft River Basin Management Plans, the draft Flood and Water Management Bill, Code for Sustainable Homes, new building regulations, etc. The general steer is toward greater environmental sustainability and more efficient use of natural resources. In order to achieve any move in this direction, it is crucial that water services infrastructure that we are building on the ground now looks to the future, taking account of projected climate change impacts to help factor in resilience. This infrastructure will be with us for many years to come and what shape it takes now will influence how quickly and effectively we can move toward addressing the issues raised by this wealth of policy and best practice. Whilst it is not realistic to expect overnight change, the legacy of the infrastructure that we build now will determine the future of our water environment.

In broad terms water services infrastructure scenarios could range from current best practise to very ambitious as illustrated to the right.

Each scenario will comprise a combination of measures each with individual impacts but which should be assessed as a whole using multi-criteria analysis for similar. For



Scenario	Description
Baseline	- Business as usual - PR09 Business Plan
Baseline Alternative	- Business as usual + different benefits
Water Vision	Technically feasible but policy/regulatory barriers
Water Vision +	Technically difficult and policy/regulatory barriers

example rainwater harvesting may have the benefit of reducing water abstraction and the potential for surface water flooding but at the cost of a greater carbon footprint.

The selection and relative importance of criteria should be agreed between stakeholders. For guidance, a check list of questions for testing the sustainability of options is given in Appendix G. .

Selected sustainability standards should reflect the aims and objectives of the South East Plan. Recognising the national and international importance of much of the South East Region in terms of nature conservation and landscape value, sustainable natural resource management is a key theme of the South East Plan. This is reflected in the cross-cutting policies of the Plan. Key policies relevant to the water cycle are as follows:

NRM1: Sustainable water resources and ground water quality

This policy charges local authorities to:

- identify circumstances where, in order to protect aquifers and surface waters from over abstraction, new developments should be supported by water efficiency standards exceeding Building Regulations
- set out where sustainable drainage solutions should be incorporated into new development
- direct new development to areas where an adequate water supply can be provided from existing or potential water infrastructure

NRM2: Water Quality

In summary this policy requires local authorities to ensure adequate wastewater and sewerage capacity is provided to ensure development does not breach relevant environmental quality objectives and standards

NRM4: Sustainable flood risk management

Local authorities should undertake a Strategic Flood Risk Assessment to provide a comprehensive understanding of the flood risk and put in place a framework for applying the PPS25 sequential approach

NRM5: Conservation and improvement of biodiversity

Local planning authorities are charged with avoiding a net loss of biodiversity and actively pursuing opportunities to achieve a net gain.

Further studies are required to define in detail infrastructure requirements, capital and running costs and sources of funding associated with different scenarios before options for moving away from baseline to aspirational standards can be fully tested. . It is noted that Ofwat, the economic regulator who controls charges levied by Southern Water and South East Water, requires water companies to develop the most cost effective solutions to identified constraints i.e. the water companies may not be able to levy charges to recover the cost of aspirational standards.

Policy NRM1 raises the most significant questions, in particular should Maidstone Borough Council specify water efficiency measures more stringent than those specified in the Building Regulations and/or take positive action to reduce water consumption of existing residents. These issues are discussed in section 4. With the exception of the Lower Greensands, existing water resources can be considered as being on the borderline of being over abstracted. They are currently designated as over licensed, and thus could become over abstracted if all licensed allocations were fully utilised. The Lower Greensands are already considered to be over abstracted at low flows.

4

Water Cycle

4.1

Water Resources and Supply

4.1.1

Introduction

Water supply services in Maidstone Borough are provided by South East Water.

The importance of an adequate source of freshwater can not be over emphasized. We rely on it for sustaining life, supporting economic activity and maintaining the environment in which we live. Whilst we live in a temperate climate with reasonably high levels of rainfall, freshwater resources are finite and the combination of relatively low rainfall, comparatively high per capita consumption and high population density has led to some areas in Kent being classified as water stressed (i.e. over utilised).

Development of significant numbers of new properties in the vicinity of Maidstone Borough, with associated new employment, has the potential to further stress available resources. Water resources must be managed carefully to ensure that people have access to affordable and safe drinking water and sanitation, without depleting water reserves or damaging ecosystems.

The Environment Agency is the competent authority charged with long term management of water resources.

Other key stakeholders include:

- neighbouring water service providers including Southern Water, Folkestone and Dover Water (now known as Veolia South East), and Sutton and East Surrey Water, as in practice water resources in the South East are highly interconnected
- Ofwat – the water industry regulator
- existing and new water customers: residential, public and industrial users whose attitude towards public conservation can have a significant effect on water demand

With the exception of a small area between the M2 and M20 corridors, Maidstone Borough Council lies in the Medway River Catchment and South East Water's water resource zone 6.

4.1.2

National and international policy

European policy

The Water Framework Directive (WFD) provides the overarching framework for management of water bodies throughout Europe. One of its key objectives is to promote the sustainable use of water together with:

- enhancing the status and preventing further deterioration of aquatic ecosystems and associated wetlands, which depend on the aquatic ecosystems
- reducing pollution of water, especially by 'priority' and 'priority hazardous' substances
- ensuring progressive reduction of groundwater pollution

The WFD promotes a single system of water management by river basin i.e. regardless of administrative or political boundaries. For each river basin district - some of which traverse national frontiers - a "river basin management plan" has to be established and updated every six years. One of the innovations of the Directive is that it provides a framework for integrated management of groundwater and surface water at European level.

The WFD sets out common objectives for improving water quality. It introduces a general requirement for ecological protection, and a general minimum chemical standard for all surface waters.

For groundwater there is a presumption that it should not be polluted at all. For this reason, only a very few groundwater quality standards have been established at European level for particular issues (nitrates, pesticides and biocides) and these must always be adhered to. For general protection, the WFD takes an essentially precautionary approach. It comprises a prohibition on direct discharges to groundwater, and (to cover indirect discharges) a requirement to monitor groundwater bodies so as to detect changes in chemical composition and to reverse any upward pollution trend caused by human activity.

Quantity is also a major issue for groundwater since there is only a certain amount of recharge into a groundwater each year, and of this recharge, some is needed to support connected ecosystems (whether they be surface water bodies, or terrestrial systems such as wetlands). Therefore the Directive limits abstraction to a sustainable quantity.

The WFD came into force on 22 December 2000, and was transposed into UK law in 2003. Amongst its specific provisions Article 9 of the Directive requires member states to take account of the principle of recovery of the costs of water services, including environmental and resource costs, in accordance with the polluter pays principle.

Member States shall ensure by 2010 that water-pricing policies provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives of this Directive.

Government policy

Average total potable water demand in the UK is approximately 290 l/hd, the greatest single component of which is domestic use (150 l/hd). Many factors affect domestic water consumption including:

- household size
- method and level of charging for water
- household income and standards of living
- ownership of water consuming appliances such as washing machines dishwashers and power showers
- general cultural behaviour

Over the past 25 years, per capita water consumption has risen steadily at an annual rate of approximately 1%. This trend is seen as unsustainable and hence the introduction of a number of different water policies, regulations and guidance that have to be adopted, voluntarily or compulsorily, to ensure a balance between environmental needs and those of the user, taking into account current and future way of life.

In their Water Strategy for England, Future Water, the Government sets out a vision of reducing household water consumption (from an existing average of 150l/hd) to no more than 130l/hd by 2030 and ideally no more than 120l/hd.

Furthermore, building regulations are to be amended to require new buildings to achieve a calculated average whole building performance standard of no more than 125l/hd. It is also mandatory for new homes to be rated against the Code for Sustainable Homes. The code sets out three water use levels as follows:

- Level 1/2 – 130l/hd
- Level 3/4 - 105l/hd
- Level 5/6 – 80l/hd

For offices and other workplaces, assuming no residential use, building regulations set a whole building performance standard of 20 litres per full time employee (FTE).

BREEAM assessment code for sustainable buildings sets out three water use levels as follows:

- 1 credit: 4.5m³ to 5.5m³ per FTE per year (19 to 23 litres per FTE per day)
- 2 credits: 1.5m³ to 4.4m³ per FTE per year (6 to 18 litres per FTE per day)
- 3 credits: less than 1.5m³ per FTE per year (less than 6 litres per FTE per day)

Note: equivalent daily water use have been calculated assuming 235 working days per year.

Where the building is used for residential purposes (e.g. hospital) or for a water consuming industrial process, average water use would be expected to be higher.

Water neutrality

The concept of water neutrality has been developed as a measure or goal for water efficiency of new developments. It is an aspiration, not a requirement.

Water neutrality as defined by the Government and the Environment Agency is: “for every new development, total water use across the wider area after the development must be equal or less than total water use across the wider area before the development”.

The concept of water neutrality is to be applied over an appropriate geographical area. Additional water demand from the development can be offset by reducing demand in the surrounding areas.

4.1.3

Availability of fresh water - natural water resources of the Medway catchment

Geology

The Medway catchment, which encompasses most of Maidstone Borough Council, lies on the northern side a dome of variably eroded Cretaceous rocks, which were originally deposited within or at the edge of a sub-tropical sea some 65 to 142 million years ago.

To the south-west of Maidstone town, the River Medway rises in the High Weald area. This generally hilly area with steeply incised valleys fed by innumerable springs, is formed of the Hastings Beds, comprising Ashdown Sand, Wadhurst Clay and Tunbridge Wells Sand. The area includes an Area of Outstanding Natural Beauty and the Ashdown Forest, the latter being the largest open access area in the South East.

The High Weald gives way to the Vale of Kent, a relatively low lying vale formed of Wealden Clay, which is characterised by extensive agricultural land use. The rivers Eden and Beult both rise in this area.

The Lower Greensands, including the Hythe Beds, Sandgate Beds and Folkestone Beds, form a distinctive ridge to the north of the Vale of Kent, which rise to 120m AOD to the south of Maidstone town. A narrow strip of lowland formed of Lower Greensand with overlying Gault Clay separates the Greensand Ridge from the North Downs Chalk escarpment.

Groundwater resources

There are three significant aquifers in the Medway catchment, namely:

- Chalk North Downs,
- Lower Greensand and
- Hastings Beds.

The Chalk aquifer of the North Downs is of national importance and one of the most heavily exploited aquifers in the United Kingdom. Within the Medway catchment, it provides 97% of the groundwater resource and just over half of the total resource. Recharge is dominated by winter rainfall and occurs over the majority of the chalk outcrop. Groundwater flows in a broadly northerly or north north-easterly direction, with springs and surface flows occurring where the water

table intersects the land surface. Over much of the area the aquifer is unconfined. The natural groundwater quality is good. However, the groundwater is vulnerable to pollution as evidenced by high nitrate concentrations (mainly from diffuse agricultural sources) and the occasional detection of pesticides and organic solvents.

The Lower Greensand aquifer is locally important for public water and industrial water supply and for providing base flow to the headwater streams of the Upper Medway and River Teise.

The Hastings Beds aquifer is classified as a minor aquifer providing less than one percent of the total resource of the Medway catchment. The beds are important for providing base flow to the water features in the Upper Medway catchment.

Surface water resources

The River Medway rises in the High Weald of East Sussex and drains north east through Maidstone town to discharge to the Thames estuary close to Sheerness, Kent. It has a relatively steady base flow derived from springs from the chalk and sandstone aquifers. This is supplemented by surface water runoff from the Wealden Clay.

Fast runoff from the clay causes flashy flows in the river's tributaries and in extreme events can cause flooding, notably from the River Beult which has little natural storage.

The average annual runoff from the catchment is in excess of 400 Ml/d. Flows naturally vary significantly with higher flows being recorded in winter and spring. In part, the natural regime of the river has been regulated for the purpose of public water supply and flood control.

There are three public water supply reservoirs in the Medway catchment:

- Bewl Water located on the headwaters of the River Bewl a tributary of the River Teise
- Bough Beech: located on a tributary of the River Eden, this reservoir is an important water source for Sutton and East Surrey Water
- Weir Wood, completed in 1953, owned by Southern Water, an online reservoir on the Medway

The largest reservoir is Bewl Water with a capacity of approximately 31,300 Ml. The impounding dam was built by Southern Water between 1973 and 1975 for the purpose of securing water supplies in Kent.

The reservoir forms an integral part of the Medway water supply scheme - a strategic pumped storage scheme. Water from the Medway at Yalding and the Teise at Smallbridge is pumped into storage at Bewl Water and released as required to allow authorised abstractions from the downstream watercourses. Facilities also exist to allow water from Bewl to discharge to the Darwell reservoir and hence serve the needs of the Hastings area.

Medway catchment, within which Maidstone Borough is located, has significant natural surface and ground water resources.

4.1.4

Existing water abstraction from the Medway catchment

Existing authorised abstraction from the Medway catchment averages approximately 669 Ml/d of which some 63% comes from surface water sources and 75% is used for public water supply (see figure 4.1). Abstraction from surface water sources is more seasonal than from groundwater due to the greater use of surface water for agricultural purposes.

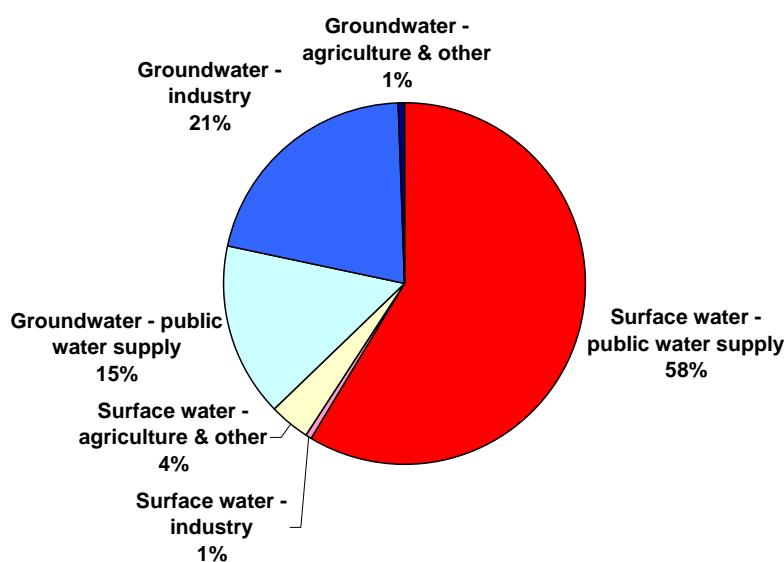


Figure 4.1: Authorised abstractions from Medway catchment by source and use

4.1.5

Existing potable water consumption

South East Water's water resource zone 6 encompasses the area of Maidstone Borough Council and also includes the neighbouring settlements of Ditton, East Malling and Snodland. In total the zone has an estimated population of 227,000 of which approximately two thirds are resident within the Maidstone Borough Council area. Existing water consumption in water resource zone 6 is approximately 67Ml/d.

Existing average domestic per capita is estimated to be 164l/hd (weighted average of 175l/hd and 140l/hd for metered and unmetered users respectively). Figure 4.2 illustrate existing domestic water usage by component. Flushing of toilets is the greatest single component of demand accounting for 25% and 29% of total unmetered and metered demand respectively. Comparison between metered and unmetered consumption shows metered consumers use significant less water per head for bathing and miscellaneous purposes.

A simple comparison of existing metered to unmetered demand indicates the application of volumetric charges results in a 20% reduction in demand (i.e. metered households use a average of 35l/hd than unmetered households). Given that at present only about 30% of households are metered, this would imply that universal metering could generate a significant reduction in domestic demand.

Existing metered and unmetered per capita demand (as estimated from data for water resource zone 6) are higher than the industry averages for England and Wales of 133l/hd and 153l/hd respectively. Average per capita consumption in England and Wales is itself higher than that in many other European countries, see figure 4.3, indicating that a significant reduction could be achieved without compromising standards of living.

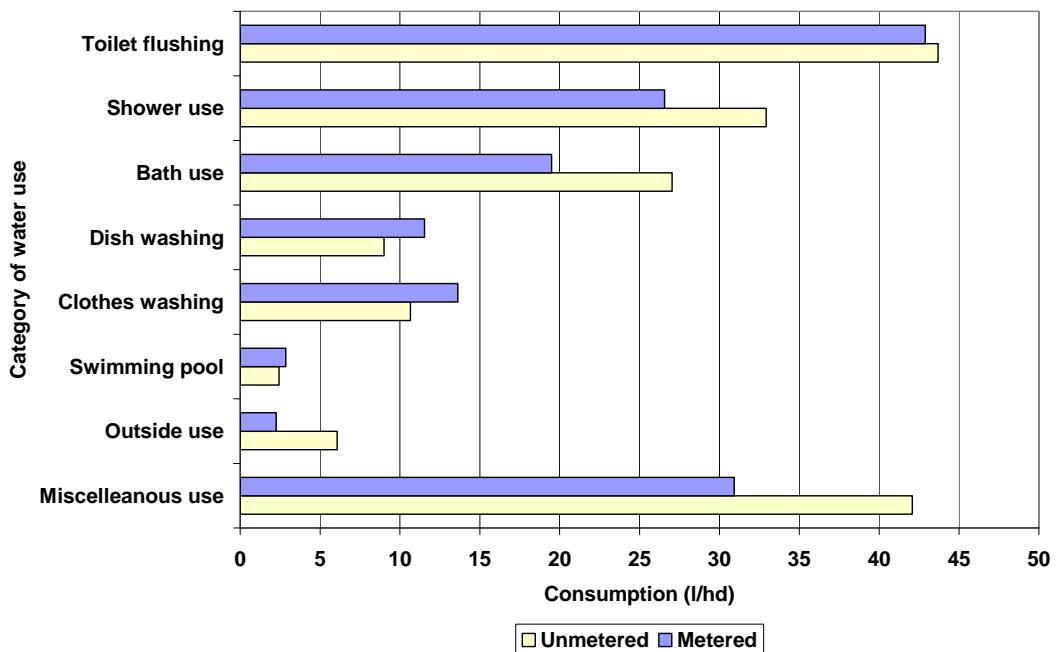


Figure 4.2 – Water use by component, metered and unmetered demand

Source: dWRMP, South East Water, May 2008

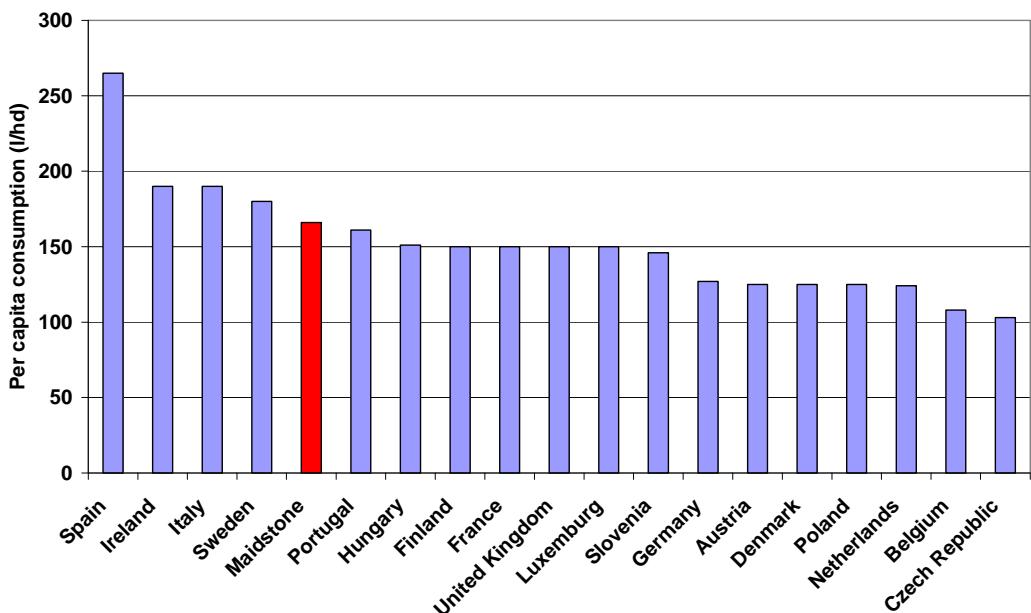
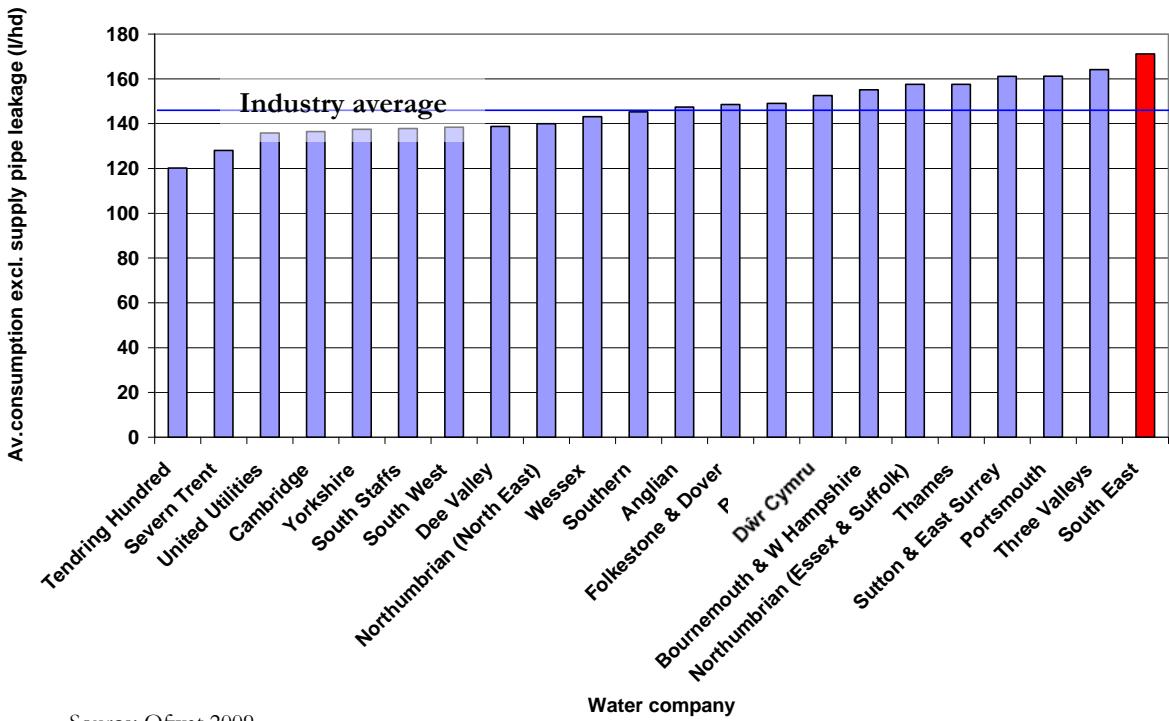


Figure 4.3 – Comparative per capita consumption with other European Countries



Source: Ofwat 2009

Figure 4.4 – Comparative per capita consumption with other water companies in England and Wales

Existing household potable water consumption is higher than the national average. Evidence indicates suggests that a significant reduction in demand could be achieved through metering without a significant reduction in standards of living.

Trends in water consumption

Over the past 25 years, per capita consumption has risen steadily at an annual average of approximately 1% per annum. This is due in part to the trend for smaller household sizes – as smaller households tend to use more per head than bigger ones, but also the greater ownership and use of high water consuming devices such as power showers.

More recently the rate of increase has reduced to 0.5%. In response to regulatory pressures, and to reflect the introduction of water saving devices (such as lower flush volumes) South East Water have adopted a lower figure of 0.3% per annum

change in per capita consumption in their dWRMP. This implies that by 2035 metered and unmetered per capita consumption will have increased to 170 l/hd and 195 l/hd respectively. South East Water have evidence that residents of newly built homes consume significantly less than existing residents and have adopted an initial figure of 127l/hd for this group of residents rising to 140 l/hd by 2035 (see figure 4.5).

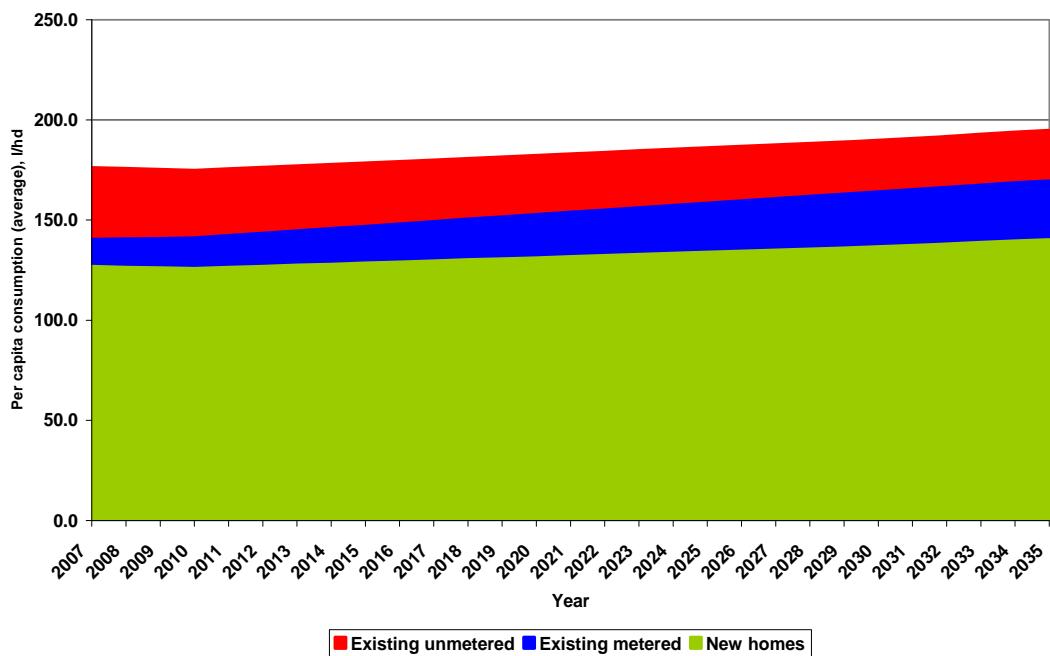


Figure 4.5 – Projected average per capita consumption

In their base year projections (i.e. prior to implementing any options to maintain this supply demand balance) South East Water forecast no significant change in leakage and small rise in non domestic water use.

4.1.6

Projected water demand of proposed development in Maidstone Borough

Given the level of uncertainty attached to many of the factors that influence water consumption, projected water demand of the proposed new developments has been estimated for a number of scenarios as summarised in table 4.1 and illustrated in figures 4.6 and 4.7.

For all scenarios water losses have been added at an equivalent of 60l/prop.d

The proposed developments areas are substantially greenfield sites which means that they have negligible existing water consumption.

Figures 4.6 and 4.7 illustrate the expected increase in water demand arising from the potential levels of new development in Maidstone Borough. Five different potential scenarios are illustrated, each varying according to the level of water usage and the sustainability criteria used in the new developments.

Table 4.1 – New developments, proposed demand scenarios

Scenario	Domestic water consumption		Industrial water consumption	
	Description	Use (l/hd)	Description BREEAM	General use (l/hd)
1	Business as usual, pcc as final planning given in dWRMP	140l/hd to 170l/hd	1 credit	20
2	Projected pcc for new houses, as given in dWRMP	127l/hd to 140l/hd	1 credit	20
3	New Building Regulations	125l/hd	1 credit	20
4	CSH level 3/4	105	2 credits	12.5
5	CSH level 5/6	80	3 credits	6

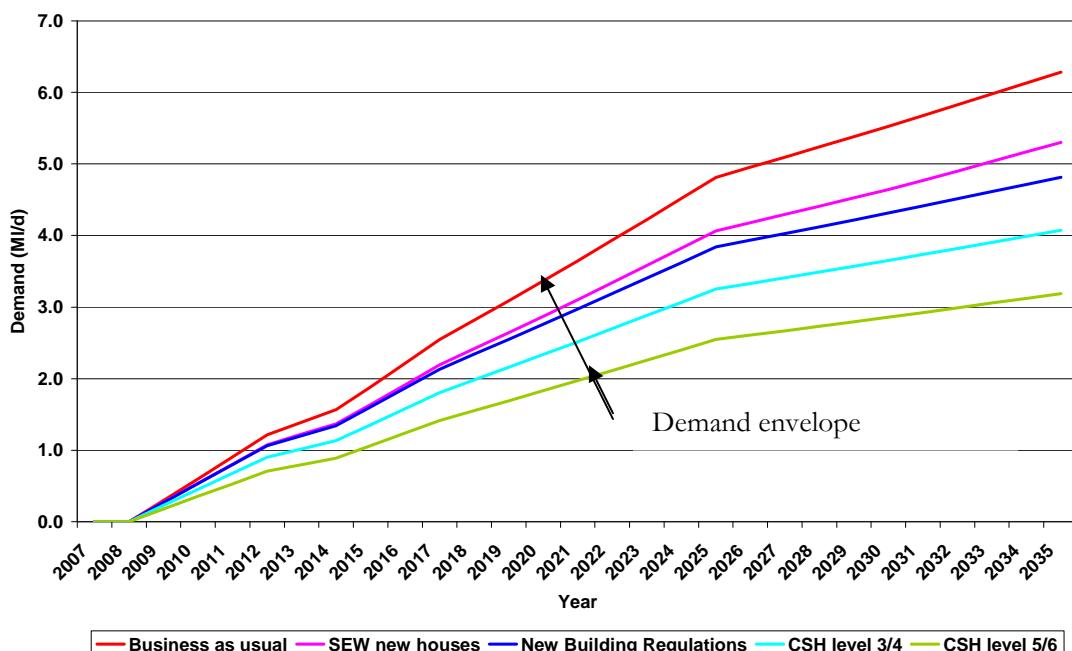


Figure 4.6: Projected water demand of potential development

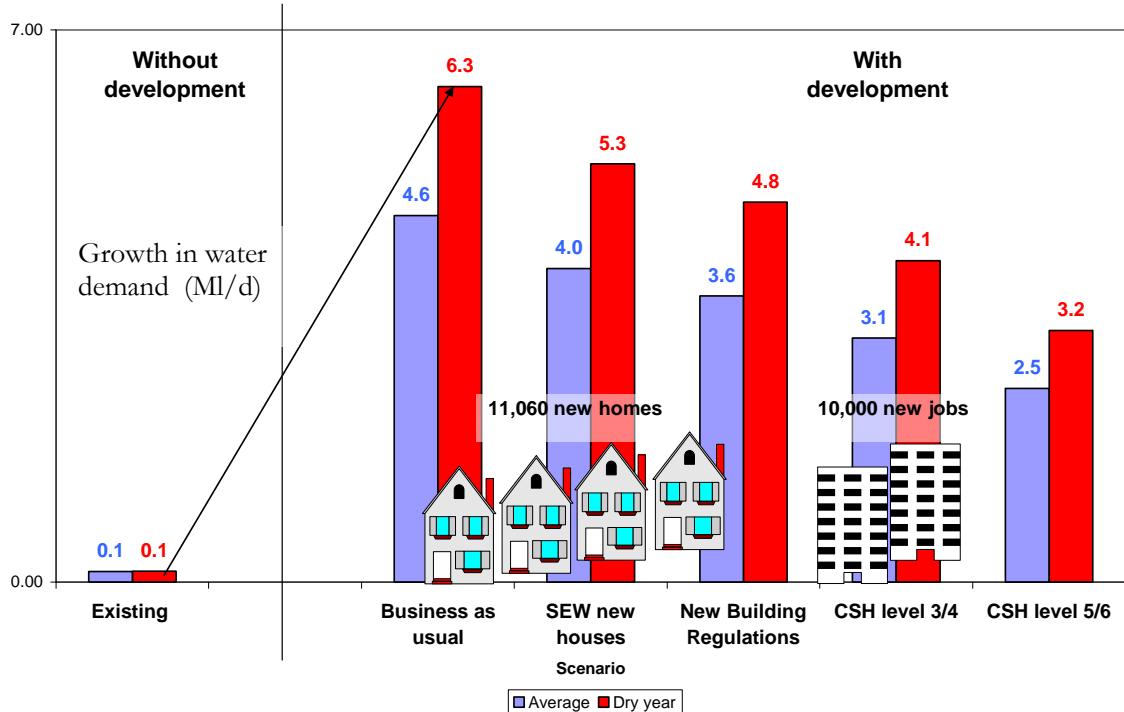


Figure 4.7 Comparative water demands, with and without new development

Proposed new development is likely to increase potable water demand in Maidstone Borough by some 2.4ML/d to 6.2l/d depending on water efficiency measures employed.

4.1.7

Capacity to increase abstraction

The Environment Agency, as the organisation responsible for long term management of the water resources, has prepared a Catchment Abstraction Management Plan for the Medway catchment. The plan investigates the current status of existing water resources and identifies strategies for their future management.

The supply-abstraction balance of each aquifer has been assessed through consideration of:

- natural recharge and inflow (Test 1);

- summer base flow or groundwater outflow (Test 2):
- long term trends in groundwater levels (Test 3)
- any available evidence of groundwater resource problems based on long term trends (test 4) or
- local knowledge (test 5)

To determine surface water resource availability, flow duration curves have been defined for three situations:

- Benchmark flow: used to provide a reference for setting ecological river flow objectives. This flow is an estimate of what the flow would have been in the absence of upstream artificial influences (abstractions and discharges).
- Licensed scenario flow: provides an estimate of flow assuming that the full authorised volume is being abstracted.
- Recent actual scenario flow: provides an estimate of flow whereby upstream influences are at ‘current’ or ‘recent actual’ levels.

The North Downs aquifer and the River Medway for the majority of its length have been assessed to as being over licensed. This indicates that if all licences were simultaneous fully utilised, environmental damage would result.

To date such damage has been limited by the fact that the water companies’ deployable outputs (i.e. the amount they can physically abstract given existing infrastructure) is some 15% to 30% less than their licensed abstraction (figure 4.8).

The Lower Greensand aquifer is deemed to be already over abstracted at low flows.

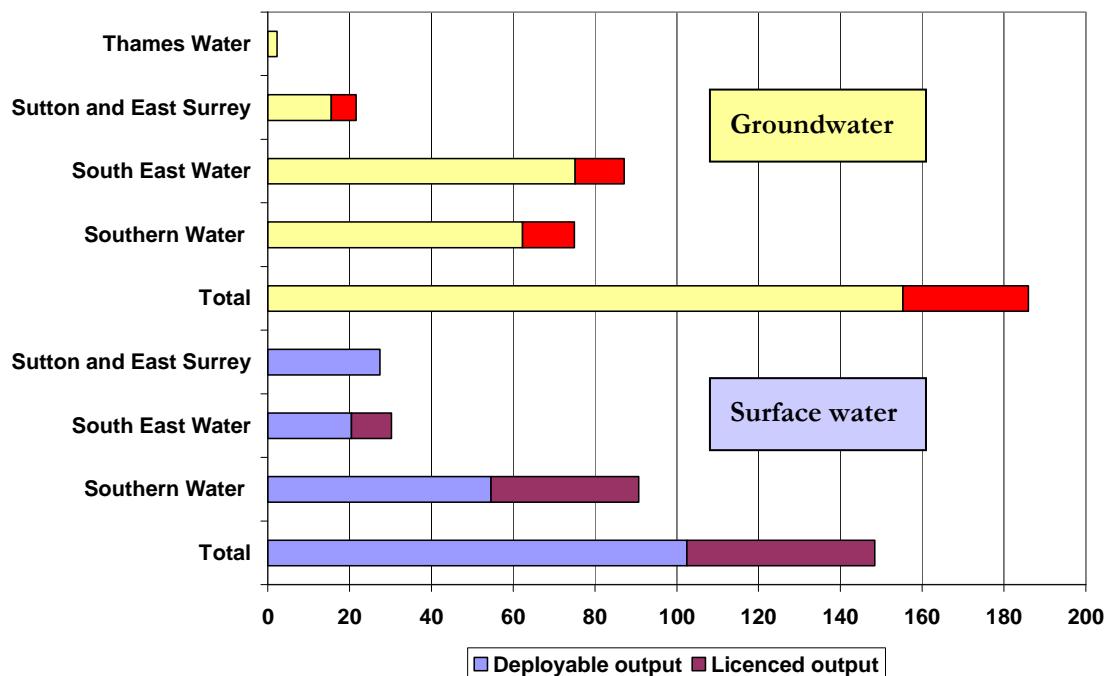


Figure 4.8: Deployable and licenced abstractions from Medway Catchment

Key proposed actions to protect the environment include (see Appendix E for further details):

- “hands-off flow” for much of the River Medway and
- review of licences for the major aquifers (Chalk North Downs and Lower Greensand)

Key water resources are deemed to be over abstracted or licensed, therefore there is a presumption against allowing increased abstraction.

4.1.8 *South East Water's proposed plan for ensuring adequate water resources* Water resources management plan

South East Water have a duty to ensure the provision of a safe and reliable water supply to residents of Maidstone Borough. South East Water seeks to provide a level of service such that hosepipe bans are not required for droughts of less than 1 in 10 years and closer to 1 in 40 years for non essential use ban.

At present, water resources zone 6 is served by 21 sources, 20 of which are groundwater sources abstracting from the Chalk and Lower Greensands aquifers. South East Water's sole surface water source serving the zone is a pumped offtake from the Medway at Burham (which is effectively part of the larger Medway scheme). In addition South East Water receives water from Southern Water's Matts Hill source (see appendix E for further details).

Whilst this section is focussed on water resource zone 6, it is important to be aware that there is a high degree of interdependency between different water resource management zones and neighbouring water companies in South East England as illustrated in figure 4.9.

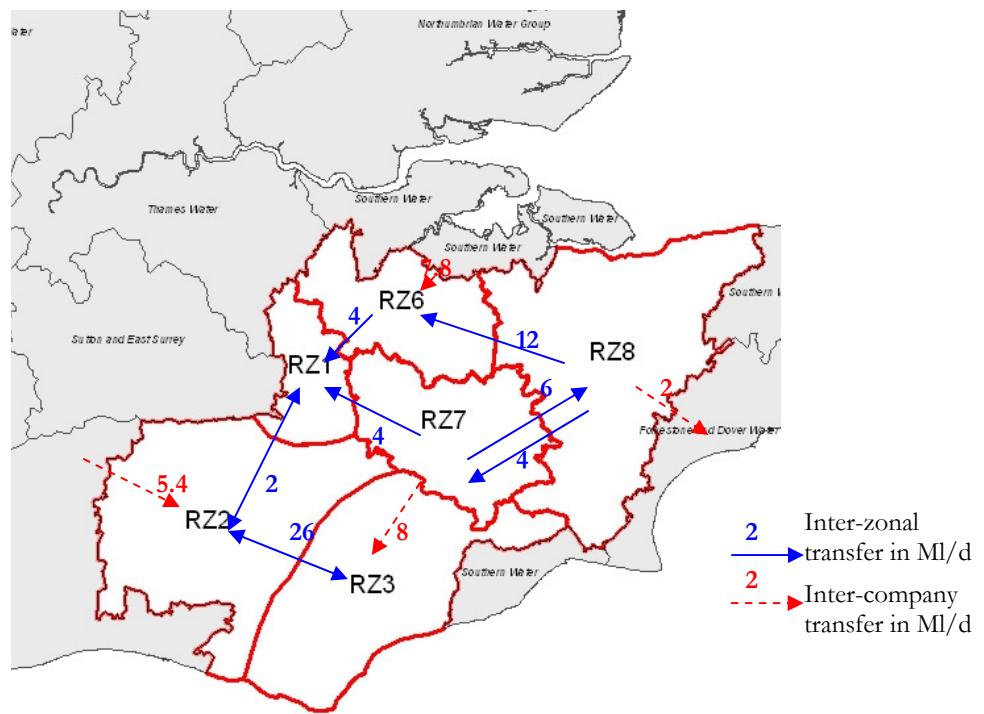


Figure 4.9 – Interconnectivity between South East Water water resource zones

Under the terms of the Water Act 2003, it is the duty of water companies to prepare and maintain water resources management plans and drought plans.

South East Water's dWRMP was published in May 2008. Taking into account factors such as housing growth, increased water usage and climate change, the plan assesses the adequacy of existing water resources to meet projected demand to the year 2035. The plan also identifies and compares options to meet shortfalls where necessary.

South East Water base line water supply demand balance is given in figure 4.10. This has been developed for a dry year annual average on the basis of:

- an increase in population of 37,000 to 262,600
- decrease in household size from 2.34 to 2.14
- per capita domestic demand as given in figure 4.5
- 6.8Ml/d increase in non domestic demand to 31.5Ml/d
- constant leakage rate of 11.8Ml/d

When compared with available water resource, and allowing for a small headroom, this indicates that the zone will go into deficit in about the year 2022 – see figure 4.10.

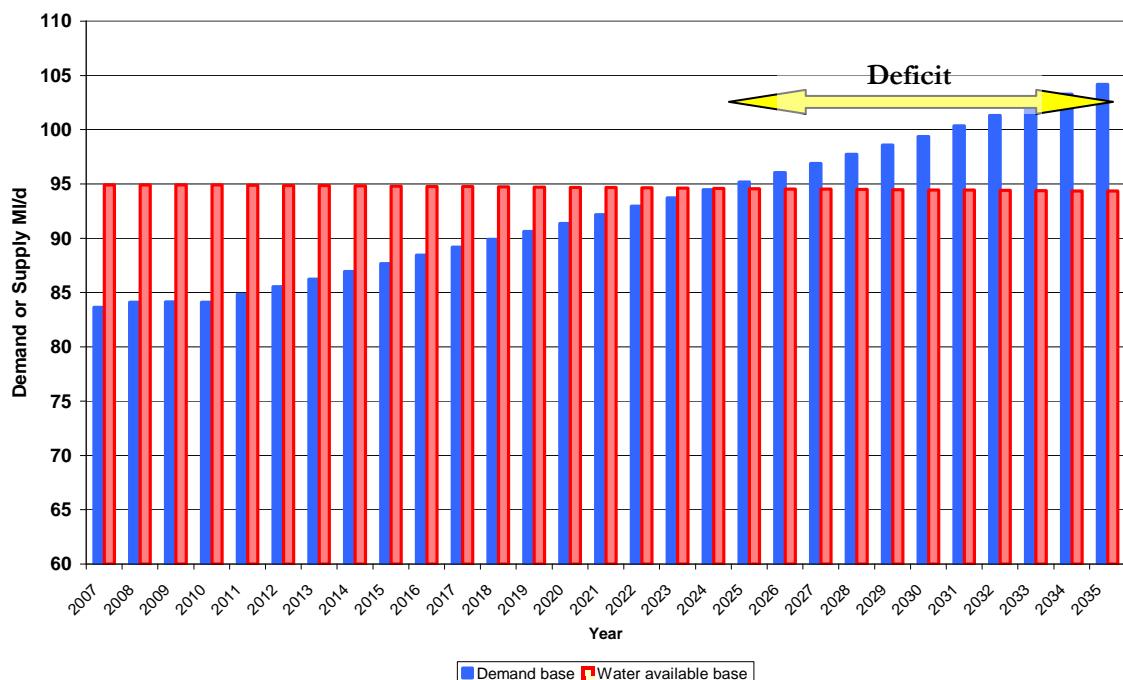


Figure 4.10: Baseline, projected water demand- supply balance

South East Water have considered a number of options to maintain a positive water supply demand balance, including:

- increased water metering
- water audits including retro fitting dual flush cisterns
- water audits only
- trigger gun vouchers
- leakage reduction (3 sub options)
- licence change at Borough Green group
- deep borehole at Stockbury
- new production borehole and treatment facilities at Thurnham
- new abstraction, treatment facilities and bankside storage at Fostal
- Southern Water transfer at Matt's Hill
- transfer from zone 8 (Canterbury zone to Maidstone zone) following resource development for zone 8.

Following discussions with the Environment Agency, South East Water's preferred strategy includes:

- universal metering
- leakage reduction
- licence change at Borough Green group
- new production borehole and treatment facilities at Thurnham
- transfer from zone 8 (Canterbury zone to Maidstone zone) following resource development for zone 8.

This twin track approach of demand management and source development ensures an adequate supply of water with a suitable headroom (margin of safety) for a 1 in 10 year drought and the proposed measures were included in South East Water's next 5 year business plan.

Note: the proposed licence change at Borough Green would increase allowable peak abstraction whilst maintaining annual average allowable abstraction at current levels.

Current status of plan

In accordance with the statutory process, draft reports were issued for consultation. Statutory consultees included the Environment Agency, Ofwat, the Consumer Council for Water, and Natural England.

At the beginning of August 2009, the Environment Secretary, Hilary Benn announced that South East Water's dWRMP would be subject to further public scrutiny i.e. it will be the subject of a public inquiry. This decision was made on the grounds of:

- failure to follow direction
- relatively low level of service when estimating deployable output; South East Water considered a 1 in 50 year dry period whilst Southern Water, with whom they share the resource, adopted a 1 in 100 year dry year
- insufficient options considered for maintaining the supply-demand balance
- the overall strategy for water resource management in South East England not adequately taken into account
- adopted per capita consumption out of alignment with other water companies.

The public inquiry started in May 2010, and is ongoing as of the date of issue of this report. Once the hearing is complete and the inspector has reported, the Environment Secretary will write to the companies with his decision.

The conclusions of the public inquiry into South East Water's dWRMP may result in some adjustment to proposed measures to maintain the supply-demand balance. This Water Cycle Study has been prepared on the basis of best available information and should be reviewed on completion of the inquiry.

Notwithstanding this, the plan illustrates options that are available to meet the water demand of existing and future customers in Maidstone Borough given predicted levels of per capita consumption. The Secretary of State considers adopted per capita consumption out of alignment with other water companies (i.e. too high). Any outcome of the inquiry which results in a reduction in per capita consumption will make the supply-demand balance more favourable.

Business Plan

Water companies are required to prepare 5 year business plans to inform the process by which Ofwat, the economic regulator sets maximum charges for customers.

The business plan consider all aspects of the water companies' business and sets out a justified programme of investments required to operate their systems and undertake necessary investments to meet legal and regulatory obligations. Where appropriate, the Water Resources Management Plan helps to inform investment requirements included in the business plan. Plans are subject to review by independent technical audits and Ofwat before any final price determination is made.

The water companies' business plans are reviewed by the industry's economic regulator, OFWAT, who in consultation with government, the Environment Agency and consumer organisations amongst others, determines the prices water companies can charge for their services given approved investments. This consultation process is known as the Periodic Review (PR). In November 2009, following review of South East Water's business plan for 2010 to 2015, Ofwat announced maximum prices for the same period. The price determination, which allows South East Water to invest £393 million over the 5 year period has been accepted by South East Water.

Emergency planning – drought plan

South East Water has also prepared and implements a drought plan. The Plan provides a decision making framework for dealing with an impending drought situation. It addresses the balance between supply and demand, and details the proposals by South East Water for maintaining a continuous water supply to customers during drought conditions. The drought plan also provides further details of a schedule of interventions to be implemented based on an analysis of the risk that the supply-demand balance may be compromised.

Key components of the action plan include:

- Monitoring of operational records such as rainfall, recharge data
- Supply side management, including optimising existing sources and transfers

- Demand side management, including hose pipe bans and ultimately a ban on non essential use

The drought plan is complementary to and consistent with the water resources management plan. South East Water seek to ensure the availability of sufficient water resources to ensure that hose pipe bans are required no more frequently than once in ten years and non essential use bans no more than once in forty to fifty years.

Climate change

There are indications that climate change is already having an impact on rainfall which in turn is putting further stress on available water resources.

South East Water's dWRMP takes account of the impact of climate change both the supply side, (i.e. the impact on the deployable output of sources of supply) and the demand side (i.e. the forecast increased in demand for water due to longer, drier, warmer summers).

On the supply side, three possible scenarios were considered:

- ‘wet’ scenario which may result in increases in the volume of Deployable Output available for water supply by 2020.
- a ‘mid’ scenario resulting in some reductions in the volume of Deployable Output available for water supply 2020
- a ‘dry’ scenario resulting in further reductions in the volume of Deployable Output available for water supply by 2020

Given the uncertainty that exists around climate change, the wet and dry scenarios were included as ranges and components of uncertainty in Target Headroom assessment.

On the demand side the adopted underlying per capita consumption growth rate of 0.3% per year includes the projected growth in per capita consumption resulting from climate change (estimated to be 2% by 2020 and 4% by 2040).

South East Water's dWRMP presents a number of options for ensuring the adequacy of future water supplies – including the projected demand of new development at Maidstone. Their plan is currently the subject of a public inquiry to be held in May 2010. One of the specific issues being addressed by the inquiry is the relatively high adopted projected per capita consumption. Any revision which leads to a reduction in per capita consumption will improve the supply-demand balance

4.1.9

Summary of drivers and constraints

Based on the above assessment of the existing situation, drivers for change, opportunities and constraints (or potential barriers to change) have been identified as summarised below:

- Maidstone Borough Council has a duty to provide additional housing
- unless positive action is taken population and employment growth will lead to increased water demand
- existing water resources in the area are already over licenced, there is a general presumption against allowing any additional consumptive licenses
- the water companies have identified preferred strategies to ensure existing and future residents have an adequate supply of potable water
- proposed developments are substantially on green field sites and water neutrality cannot be achieved without a reduction in demand from adjacent settlements

4.1.10

Options

Maidstone Borough Council can influence the impact of the proposed new development on water resources by:

- water efficiency standards imposed on new developments and
- working with other stakeholders to encourage water efficiency measures

Option 1 – Baseline sustainability standards

Key components:

- Water consumer of new dwellings is limited to 125l/hd (as new Building Regulations)
- South East Water implement their dWRMP as published

All existing and new residents in Maidstone Borough Council would receive an adequate water supply. However, the proposed new development within

Maidstone Borough would impose an additional demand of approximately 3.5Ml/d (average year) to 4.7Ml/d (Ml/d) on the system. In part this would be balanced by actions taken by South East Water to reduce consumption of existing consumers by increased metering and also a reduction in water losses. However, the developments would still impose a net increase in demand on the system and in the longer term South East Water propose to increase supply through resource augmentation.

A water consumption of 125l/hd for new dwellings is achievable with provision of water efficient fixtures and fitting.

A wide variety of water efficiency devices available to reduce water consumption including:

- Cistern displacement device, Low flush toilet, Dual flush toilet, Retrofit dual flush valve
- Push-on taps, Aerated tap (bathroom), Flow restrictors, Aerated shower head
- Contoured low volume bath
- Shower timer
- Flow recirculation
- Low water use washing machine

Achieving 125l/hd (New Building Regulations) should incur the developer in little additional cost since water efficient fittings are generally available as standard. White goods are not normally included as standard in new homes. It is estimated that provision of low water use washing machine and dishwasher would cost in the order of £1200 per property

In 2005 South East Water established, in partnership with Kent County Council (KCC), a best practice document setting guidance for water efficient fittings and fixtures for new homes (including UK suppliers of such goods). The document was later incorporated into KCC's Kent Design Code (KDC).

South East Water, in partnership with Kent County Council, the Environment Agency and a local housing developer Hillreed Homes, have been trialling the KDC in a new development in Ashford.

Option 2 – Moving towards aspirational sustainability standards for new build.

Key components:

- Water consumer of new dwellings is limited to 115 l/hd or 105l/hd
- South East Water implement components of their dWRMP as published

Given that existing water resources in the area of Maidstone Borough are already over abstracted, there is a strong argument for reducing the impact of the development by requiring a more stringent water efficiency design.

A water consumption of 115l/hd for new dwellings is achievable with provision of water efficient fixtures and fitting. A calculated water use of 105l/h/d (CSH 3&4) is achievable with provision of water efficient fixtures and fitting plus direct grey water recycling or rainwater harvesting.

Designing for a calculated water use of 80l/h/d (CSH 5&6) is not recommended. It would be relatively difficult to achieve and require either grey water recycling with treatment or rainwater harvesting with treatment, or the introduction of a carefully targeted tariff structure and levels.

The additional provision of greywater recycling would incur an additional average cost of £2,500 per property. Rain water harvesting for individual properties has been discounted on cost grounds. Providing facilities common to 3 or 4 properties is estimated to attract a saving of 30 to 40 %. However, it would be difficult to regulate use of such facilities and hence the cost to individual householders of make-up water.

A reduction in water consumption of residents of new dwellings to 105 l/hd would reduce the impact of new development by approximately 0.5Ml/d and 0.6Ml/d in a normal and dry year respectively.

Option 3 – Moving towards water neutrality

Water resources in the study area are classified as being “over licensed” or “over abstracted at low flows” indicating that existing abstraction may cause unacceptable damage to the environment at low flows. Therefore, it is considered

appropriate to look at the viability of achieving a water reduction such that the proposed developments do not exert a net increase in water demand over and above that of the existing Maidstone Borough as projected by South East Water i.e. the proposed new developments should have a neutral affect on available water resource headroom (i.e. water available – water demand). This is not something that Maidstone BC could implement on their own – it would also require the active participation of South East Water.

The definition of water neutrality adopted by the Government and Environment Agency allows the increased water demand of a new development to be balanced against a reduction in total water use across the wider area.

The term “wider area” is sometimes applied to the water resource zone in which the development is located. However, the geographically large size of water resource zone 6 and the requirement that any water demand reductions should be directly associated with, and linked, to the new developments, appropriate areas for the study have been limited to the area of Maidstone Borough.

Water neutrality can be achieved by

- Limiting the water consumption of new dwellings to 125l/hd and reducing the water consumption of existing residents in the Borough by 27l/hd or
- Limiting the water consumption of new dwellings to 105l/hd and reducing the water consumption of existing residents in the Borough by 23l/hd.

South East Water routinely undertakes the following water efficiency activities:

- providing access to water saving devices (CDDs, water butts etc).
- providing information via correspondence and company websites.
- provision of water saving tips
- carrying out water audits on request
- running education programmes in schools
- working with key stakeholders to promote water efficiency
- promote free meter option
- provide free or subsidised customer supply pipe repairs/replacements

In addition South East Water have a number of ongoing trials notably in Ashford including seasonal tariffs and retrofitting into existing housing.

South East Water is supporting Kent County Council's initiative to explore a retrofit programme of existing homes in Ashford. The Council is keen to understand the benefits such a policy can deliver, and the role it could play in supporting the council's future water neutrality initiatives.

The project covers one specific neighbourhood and is offering free to the 539 South East Water households:

- a domestic water survey by a qualified plumber
- advice on which water saving devices would be best suited in each household
- selected water saving devices
- installation at a time convenient to the household

Actions taken by South East Water can be supplemented by community wide “soft” measures broadly designed to change water use behaviour and practices and create a water saving and efficiency culture. Provision of clear information about water use and the impact on the environment is of paramount importance if householders are to make informed decisions on water saving.

Water conservation messages can be quite difficult to market, encouraged by the perception of plentiful rainfall and the prevalence of flat rate pricing for water. Public awareness campaigns need to target long term changes in individual behaviour through:

- Creating awareness and interest
- Educating
- Providing necessary skills to effect change.

Components could include:

Young persons' campaigns: young people are agents of change. Engaging and making them interested in protecting water resources will help and impact the change of behaviour and habits from an early stage on. With the help of information and education materials, interactive games, cartoons, outdoor activities, etc. the young generation can learn about the importance of water in its

different environments. Emphasis can also be placed on creative work incorporating water into different means of expression e.g. photographs, videos, theatre plays

Adult campaigns: these can include lectures, small workshops, exchanges with experts, public exhibition, water audit for typical household, water saving devices, details of cost and expected savings, provide details (with model?) of raw water sources used for public water supply and potential impact of over abstraction, public visits to headworks and treatment facilities, articles in local papers, lorry with volume of water consumed by typical household

Self or water company led home water audits: water audits provide householders with a complete picture of how and where water is used in the home and hence provides necessary information to be able to assess opportunities to save water.

Water company led audits can provide more easily accessible information on areas of high consumption or waste and the payback period of water conserving equipment. There is some merit in undertaking water audits with energy audits since reducing hot water consumption also reduces energy use.

Raising the profile of aquatic environment: the objective of these measures would be to engage existing residents in the local environment and in particular the aquatic environment, and hence increase their desire to protect and conserve it. Actions could include making sure all community areas are attractive, well maintained, with low water requirement; increasing access to the environment by for example, constructing attractive activity park(s) in areas of less ecological value – aerial runway, mountain bike tracks, café etc, regular events to shout about the local natural environment, kids after school activities e.g. green gym, local competition for best wildlife or natural environment photo

Green labelling: clear labelling of the water efficiency of plant such as washing machines, dishwashers. Labelling is a simple and direct way of communicating information about a product to purchasers. There are a number of different green labelling schemes including Waterwise's Marque.

The Marque is awarded annually to products which reduce water wastage or raise the awareness of water efficiency. 27 Marques have been awarded across a broad spectrum of products including



dishwashers, showerheads, water storing gels for the garden, toilets and urinals, drought resistant turf, domestic water recycling products, water butts, a waterless carwash, tap flow restrictors, a shower timer and devices to reduce the amount of water used when flushing your toilet, amongst others.

The Councils could be proactive in encouraging all retailers to 1) display green labels and 2) provide information on the different schemes where appropriate.

Green plumbers: council maintained and advertised register of plumbers having attended an accredited training programme on their role in protecting the environment.

Installation of water saving devices may be encouraged by provision of subsidies. Local councils can lead the way by auditing their own premises and installing water saving devices and also encouraging the installation of such devices in social housing.

Proposed actions by the Council should be co-ordinated with South East Water

4.1.11

Water supply and distribution

Overview of existing system

For the purpose of system management and leakage control, South East Water's supply and distribution system is divided into a number of water into supply zones (WISZ) and district meter areas (DMA). District metered areas are defined areas of the distribution network which are isolated from adjacent areas, typically by closed valves. Quantities of water entering and leaving the DMA metered for the purpose of estimating water losses from the underground pipe network. Water into supply zones are formed of a number of DMAs which are all supplied from the same water source.

The concept of DMA management was first introduced to the UK water industry in the early 1980s. A DMA is an area of a distribution system which is specifically defined, e.g. by the closure of valves, and in which flow into the district are metered

The principal town of Maidstone plus surrounding villages and smaller conurbations in the immediate vicinity of Maidstone town are supplied by Maidstone WISZ whilst the periphery of the Borough is supplied by:

- Weald WISZ: areas to the south and west
- North Downs WISZ: areas to the east, and
- Stanstead and Burnham WISZ areas to the north

The water distribution system of Maidstone WISZ is complex with multiple sources, treated water reservoirs and pumping stations to serve consumers at ground levels that range from 5mAOD along the Medway river valley though the town centre to over 190m AOD on the North Downs to the north of Maidstone town. An east-west ridge also exists to the south of Maidstone with its highest point at Coxsheath (at 130mAOD).

The principal water sources for Maidstone town of Hockers Lane, Boxley, Forstal and imports from Matts Hill are located to the north of the town centre. As a result, the trunk main network is well developed to the north of the town (providing hydraulic interconnection between the sources) with secondary mains feeding south into the town centre.

Water from Southern Water's Matt's Hill source feeds into Broader Lane Reservoir. The latter supplies properties situated on top of the North Downs around the Detling showground area and lower down as far as Detling Village and also supplies water to both Detling and Boxley Reservoirs. The Boxley and Detling sources feed to separate DMA systems within Maidstone town. The Forstal system supplies the western side of the Maidstone WISZ.

Linton Park Reservoir is gravity fed from Hockers and controls a small local area. Loose Reservoir is gravity fed from Boxley Reservoir and the supply is subsequently boosted to feed the higher elevations within Linton Park. Hermitage Reservoir is supplied from a pumped source at Forstal and boosted to feed Aylesford Reservoir in Burham WISZ where water is boosted again to feed the higher elevation DMAs in Barming and west of Maidstone town.

Hollingbourne Reservoir has the highest elevation and is therefore used to supply villages, such as Coxheath, along the southern ridge.

Planning for development

In developing their 5 year business plans, South East Water assesses the needs of new developments at “high level” only. Given best available information on projected future growth, they seek to ensure:

- adequate source and treatment capacity to serve predicted demand and
- sufficient trunk main capacity to move water round the zone.

Consistent with this approach, South East Water's plan for the Maidstone WISZ has been developed assuming an even distribution of growth across the DMAs.

South East Water do not assess the capacity of secondary and tertiary mains until such time as a specific inquiry is received from a developer. The need to upgrade secondary and tertiary mains is considered on a case by case basis and the associated cost (if any) is borne by the developer.

If there is a reasonable probability that in the future there will be additional development in the same area, South East Water will consider installing a larger main than required simply to serve the immediate development. In this case, they would seek to recover the marginal cost from the future developer, although financing the additional marginal cost of the main until such time as the future development takes place can be difficult.

Relative ease of serving identified development sites

Maidstone town is a nett importer of water. Key source/treatment facilities are located to the north and east. A 12"/10" trunk main interconnects Forstal, Hockers Lane and Thurnham with 10"/12" trunk mains transferring water southwards to supply the centre of Maidstone town. Given this strong hydraulic link to the north and east to the town, any development on potential sites in the south-east area adjacent to Maidstone town would be relatively easy to serve.

The most costly location for new development would be on the south limit of Maidstone WISZ or northern limit of Weald WIZ. There is a lack of trunk mains in this area with a limited network of small diameter mains feeding south from Maidstone and similarly north from Weald but no major interconnectivity. South East Water are working to improve supplies in this area and a trunk main has recently been laid to serve Coxheath (which previously suffered low pressure).

Mains serving Sutton Road, Marden and Staplehurst have limited capacity for future development. Additional housing in these areas would be relatively costly to supply although technically feasible.

Infrastructure requirements

South East Water have declined to give any details of specific works required to support development. These are confidential and are not revealed even to Ofwat. Providing such details often results in the proposed works being set in stone, whereas South East Water prefer to be flexible, adapting and adjusting their programme of works to suit development as it comes on stream.

4.1.12

Conclusions

South East Water has confirmed their commitment to provide a safe and reliable water supply to residents of their service area.

Existing water resources are designated as over abstracted at low flows or over-licensed.

Water consumption of existing residents is relatively high by national and international standards. Scope exists to reduce per capita consumption through demand management techniques to “free up” available water for other users including new residents.

South East Water’s water supply system has a high degree of interconnectivity between water resource zone, thus allowing water available from neighbouring zones to be transferred into Maidstone Borough if required.

South East Water have developed a plan for provision of adequate water services to the area of Maidstone Borough given projected growth in housing and changes per capita water consumption. This plan includes demand management through increased metering and leakage control plus source augmentation.

South Eat Water’s dWRMP is currently the subject of a public inquiry, the outcome of which may change the preferred strategy. One of the issued to be considered by the inquiry is the relatively high level of per capita consumption adopted by South East Water in their plan. Any reduction in projected per capita consumption resulting from the inquiry will improve the supply-demand balance and reduce the requirement for resource augmentation.

A calculated water consumption of not more than 125l/hd (as New Building Regulations) is achievable at relatively low cost through provision of water efficient fixtures and fittings. In order to achieve water neutrality, a reduction in existing demand of 3.5Ml/d (equivalent to 27 litres per head per day) would need to be achieved.

Given the current status of water resources in the area it is recommended that Maidstone Borough Council specify water efficiency standards at 115l/hd (the lowest level that can be readily achieved without need for grey water recycling). Consideration should also be given to encouraging water conservation by existing residents and in public buildings.

For water distribution, developments located on the southern and eastern periphery of Maidstone town will be relatively easy to serve as there are good existing trunk mains in the area. Conversely, developments located in the rural areas on the southern extremity of the Borough will be more challenging to serve as existing trunk main capacity here is limited. New housing could be located in such areas; however, it would be more costly and time consuming to provide necessary infrastructure reinforcements.

Appendix E also includes a Developer Checklist which can serve as an aide memoire to help ensure that sustainability is considered in discussions with potential developers about the standards to be adopted for new homes.

4.2

Wastewater Treatment and Collection

The wastewater assets in the Maidstone Borough Council area are owned, operated and maintained by Southern Water.

Southern Water is responsible for the operation and maintenance of the existing foul sewerage system. It is also responsible for the surface water drainage from roofs, driveways and hard standings relating to properties, if they are connected directly to the public sewer system or if the surface water system has been adopted by SWS. It is not responsible for soakaways, land drainage, highway drainage, Sustainable Urban Drainage (SUDS) or private water systems.

The main wastewater treatment works (WwTW) serving the Maidstone Borough Council area is Aylesford WwTW which serves the town of Maidstone. Many of the smaller settlements in the Maidstone Borough Council area have their own smaller WwTWs. This study assesses those WwTWs that have been identified in the

SHLAA as having potential to receive significant additional housing growth above typical windfall development rates.

The future expansion potential of a wastewater treatment works with respect to water quality is determined by assessing the discharge consent, set by the Environment Agency. This consent is based on the ecological sensitivity of the receiving watercourse and specifies a maximum flow and a minimum effluent quality that the WwTW has to achieve to meet water quality targets without causing environmental damage.

As the population connected to a sewage treatment works increases, the amount of treated wastewater (or effluent) being discharged to the receiving water generally increases in proportion to the population increase. When this increased population causes the treatment works to exceed the consented maximum discharge volume allowed by the EA consent, improvements are likely to be required to the treatment works to improve the standard of treatment and prevent failure of water quality targets.

4.2.1

Aylesford WwTW

Sewage from the town of Maidstone drains to the Aylesford Wastewater Treatment Works, which is located to the north-west of Maidstone town, and is actually situated across the local authority boundary in the Tonbridge and Malling Borough Council area. Aylesford WwTW is one of Southern Water's largest wastewater treatment works in the region. In addition to providing treatment for wastewater from Maidstone town and the surrounding area, it is also a regional sludge treatment and recycling centre.



Aylesford Wastewater Treatment Works

According to Southern Water's June 2009 return to OFWAT, Aylesford WwTW currently treats sewage effluent from a population equivalent of 114,200 people. This figure relates to actual population plus an additional allowance for trade and industrial effluent discharges to the sewerage system. Provision of 10,000 new homes in Maidstone town (approximate population equivalent of 23,600) would represent an increase of approximately 20% in the hydraulic and biological load on Aylesford WwTW.

Aylesford WWTW discharges to the River Medway, and currently has a consent from the Environment Agency to discharge effluent with up to 40 mg/l of Biochemical Oxygen Demand (BOD) and 60 mg/l of Suspended Solids (SS). Currently, there is no limit imposed on the level of Ammonia (NH_3) or Phosphorus (P) in the discharged effluent. This discharge consent is not particularly onerous for a wastewater treatment works, and according to Southern Water the works does not have any difficulty in meeting the consent.

According to the River Basin Management Plan, the Medway suffers from high nutrient levels and therefore is defined as a eutrophic sensitive area. Currently, only 16 km of river length (4% of waterbodies) in the Medway catchment are achieving good ecological status/potential.

If a tighter discharge consent were to be imposed on Aylesford WwTW in the future (most likely as a consequence of the Water Framework Directive), then the technology exists to improve the level of treatment accordingly, and there is also space available within the existing site boundary to provide additional treatment units if required. In a separate study conducted earlier this year, Halcrow has assessed Aylesford WwTW as being of low/moderate risk of failure under the Water Framework Directive, mainly because there is scope to tighten the existing discharge consent if necessary.

In addition to the treatment capacity of Aylesford WwTW, it is also necessary to consider the hydraulic capacity of the treatment plant and its volumetric discharge consent. According to Southern Water, Aylesford WwTW currently has dry weather flow capacity for an additional 4,000 households within the catchment. During the coming AMP5 period (2010-2015) this is programmed to increase to 10,000 households. This should be sufficient headroom to treat the additional flows from the proposed new development in and around Maidstone town. However, there is an additional hydraulic constraint on Aylesford WwTW in that all flows from Maidstone town must pass through Allington Pumping Station

which pumps the flow from Maidstone town under the M20 and the River Medway to the treatment works. Restrictions on the flow through Allington PS are discussed in the following section on Sewerage. (Note: Southern Water plan expenditure on sewerage and wastewater treatment infrastructure improvements in 5 years periods. No information is currently available on planned expenditure post 2015).

4.2.2

Maidstone town – Sewerage Network

The sewerage system in the historic centre of Maidstone town dates from the period 1875 to 1880. Older sections of the system are substantially combined, i.e. they collect both foul water and surface water runoff, with sewerage serving more recent development being separate i.e. collecting foul water only. Combined sewers can present a pollution risk if they include Combined Sewer Overflows (CSOs) because they become overloaded during heavy rainfall and overflow. There are approximately ten Combined Sewer Overflows or Emergency Overflows recorded in Maidstone town by Southern Water.

Southern Water have an Infoworks model of the Maidstone town sewerage network which they use to simulate the effect of additional flows added from new development connected to the sewerage network at any point. The model is tested for 1:30 year storm event (equivalent to 4,000 l/property/day entering the sewerage network) in accordance with Sewers for Adoption recommendations, one of the most common water industry standards. The model shows that there is very limited spare capacity in much of the sewerage network, particularly in the sewers passing through central areas of the town. The main sewers which currently restrict capacity would be difficult to upgrade due to depth and the town-centre location.

The predictions of the sewerage network model are backed up by the fact that there have been quite a lot of reported sewer flooding problems in the centre of Maidstone town. Southern Water have records of 212 reported hydraulic flooding incidents in the town since 1988. Furthermore, there are currently 45 properties in the town on the DG5 register of properties at risk of flooding from sewers. Southern Water have a duty to protect the homes on the DG5 register, and before allowing any new properties to be connected to the sewerage network, they must check and ensure that the new connections will not have a detrimental effect on the DG5 register properties.

In general, the sewerage network in Maidstone town drains towards the north-west of the town into Allington pumping station, from where the sewage is pumped

under the M20 and River Medway to Aylesford WwTW. Wastewater from development sites located to the east and south of Maidstone town, if simply connected into the existing sewerage network, would have to pass through the sewers in the town centre, to reach the pumping station. Given that these sewers have no spare capacity to accept additional flow, the system would need to be upgraded before such development could take place. (Depending on their specific location, some small infill developments could be connected locally to the sewerage network without the need for upgrading). Two main options for upgrading the scheme would be:

- Option 1 - Increase size of existing sewers between connection point and Allington PS
- Option 2 - Construct a new local pumping station as part of the new development and build a new dedicated rising main to pump additional flows directly to Allington PS (or alternatively directly to Aylesford WwTW)

The size and location of the specific development site will determine which option is the more economic. Increasing the sizes of the existing sewers would be technically very difficult in some streets, and in some cases could take several years to plan and execute. Provision of a new pumping station and rising main would probably be the quicker and easier option for large developments. In either case, the bulk of the cost of the new sewerage infrastructure would be borne by the developer.

Southern Water can provide guidance on the design standards to be used for sewer networks constructed to serve new development areas. They will require that any new development should include separate provision for foul drainage and for surface water drainage (i.e. new sewers should not be “combined-type”). In response to a call for consultations on Maidstone Borough Council’s planning documents, Southern Water identified three ways in which the planning authority can assist in achieving efficient and sustainable wastewater infrastructure:

- a coordinated whole-site approach to large and/or mixed ownership sites will promote sustainable sewerage networks, and prevent the proliferation of smaller, less efficient networks
- separation of surface water to separate sewers or drainage systems provides more efficient use of the foul sewer, and reduces the risk of foul water flooding,

- on-site and off-site sewers serving new developments of ten or more dwellings should be constructed to adoptable standards, to ensure that they operate effectively in the long term.

In summary, given the size and location of some of the potential development sites in the south-east area adjacent to Maidstone town, the limited capacity of the existing sewerage infrastructure in the town will act as a significant constraint.

4.2.3

Allington Pumping Station

Allington Pumping Station is located in the north-west of Maidstone town, and receives all of the flow from the Maidstone town sewerage network. Allington PS then pumps the incoming flow under the M20 and the River Medway to Aylesford WwTW.

The rising main between Allington PS and Aylesford WwTW is 42-inch diameter (approximately 1070 mm).

The consented capacity of Allington pumping station is 671 l/s, and the pumps are configured to pump up to this flow. The pumping station also has some storm water storage capacity, and has a storm pump capacity that allows it to handle incoming flows of up to 1159 l/s. Incoming flows above this pass to an emergency overflow.

Southern Water has recently completed an upgrade of the pumping station. According to the team responsible for that work, the 42" main to Aylesford WwTW has some spare capacity and there are a number of ways in which the pumping station could be reconfigured for greater flows. However, new development of the size considered for Maidstone would have a significant impact on Allington PS, and would require a change in the consent issued by the EA. Southern Water were unable to confirm exactly how much headroom the existing pumping station has, or what would be the trigger point for a new consent or upgrade of the pumping station. A technical investigation of the existing pumping station and rising main would be needed to determine these values.

If Allington PS reaches its maximum capacity (either in terms of EA consent, pump capacity, or rising main capacity), an alternative option to increasing the capacity might be to bypass Allington and pump some flows directly to Aylesford. This option should be considered if the developer has to provide a new pumping station and rising main anyway to overcome restrictions in the sewerage network –

in this case the rising main would have to cross under the M20, although this might be compensated by avoiding the need to cross under the River Medway to reach Allington PS.

4.2.4

Other WwTWs in Maidstone Borough

This study assesses those wastewater treatment works that have been identified as likely to receive significant additional housing growth above typical windfall development rates. According to the Strategic Housing Land Availability Assessment report prepared by Baker Associates in April 2009, there are significant numbers of potential sites in the following settlements:

Table 4.2 – Main settlement WwTWs in Maidstone Borough Council Area

Treatment Works	Current population equivalent	Potential new homes	Available headroom (households)	Discharge Consent (BOD/SS/NH3/P)	Receiving Watercourse
Headcorn	6920	775	0 (currently) 200 (AMP5)	20/30/10/2	Beult
Marden (Horsmonden WwTW)	6990	570	1700	30/40/10/-	Medway
Staplehurst	5220	485	800	20/30/10/2	Beult
Coxheath	7560	388	1000	10/20/3/-	Loose stream
Harrietsham	1700	346	300	15/30/5/-	Len
Yalding (Wateringbury WwTW)	9670	255	250	40/60/-/-	Medway
Lenham	3050	133	350	10/15/3/-	Len

The available headroom in the above table is based on estimates from Southern Water based on the consented DWF flow for each WwTW. The figures assume that there will be no increase in flows generated by existing connected populations, and allow for 500 l/household/d returned to the sewer from each new household. According to Southern Water, there are no serious problems with the treatment processes on any of these treatment works, and all meet their current consents.

Marden, Staplehurst and Lenham have been identified as the three potential locations for new employment development. According to the figures received from Southern Water, there should be sufficient available treatment capacity at

each of these WwTWs for the planned number of new jobs providing that none of the new employment is in water intensive industries.

The above figures indicate that there may be some constraint on development at Harrietsham and at Yalding due to the capacity of the existing treatment works. Yalding is served by Wateringbury WwTW which discharges to the River Medway, so there may be some scope for the Environment Agency to grant a higher consented DWF if required. Space is restricted at Harrietsham WwTW site, and it would be difficult to increase the capacity of the treatment works even if this was permitted by the EA. There is also a possibility that the EA might object to an increase in discharges from Staplehurst WwTW given that it discharges to the River Beult, which is designated as an SSSI along part of its length.

The main issue that has been identified is the limited capacity of Headcorn WwTW. Currently, there is no available headroom at Headcorn WwTW to accept increased flows, although improvement works planned in the AMP5 period (2010-2015) should allow the treatment works to accept flows from 200 new homes. This treatment works has a very tight Phosphorus consent, and at the WCS Workshop on 5 July, the Environment Agency confirmed that they would not want to see any significant increase in the sewage loads on Headcorn WwTW. Furthermore, space is restricted on the Headcorn WwTW site, and it would be difficult to increase the treatment capacity even if it was allowed by the EA. This will place a serious restriction on the number of new homes that can be constructed in Headcorn, and it would not be possible to develop all of the potential sites identified in the SHLAA unless an alternative location for discharge of the additional treated effluent from sewage treatment is found.

Together with Southern Water's sewerage network modeling department, we checked the capacity of the existing sewerage networks in each of these areas. Southern Water has Infoworks models for each sewerage catchment apart from Harrietsham and Lenham. The following table 4.3 lists the number of reported sewer flooding incidents in each sewerage catchment area since 1988, and also the number of properties in each catchment on the DG5 register of properties at risk of sewer flooding.

Table 4.3 indicates that each of the catchment areas has at least some known problems with sewer flooding. This means that Southern Water will have to check their network model before agreeing to any new connection to the existing sewerage network. The model should indicate if the expected flows from the new

development will worsen existing flooding problems or cause new flooding. They will also look carefully at any potential impact which a new development might have on any of the properties on the DG5 register.

Table 4.3 – Sewerage in main village catchments

Sewerage Catchment	Number of reported sewer flooding incidents since 1988	Number of DG5 Register properties at risk of flooding
Headcorn	31	5
Marden	38	7
(Horsmonden)		
Staplehurst	83	13
Coxheath	58	5
Harrietsham	14	6
Yalding	71	6
(Wateringbury)		
Lenham	19	6

An overview of the models indicated that there is at least some spare capacity in at least some areas of the catchment. However, Headcorn was identified as a potential problem area, mainly because almost all flow must pass through Moat Road pumping station which has hydraulic restrictions on its capacity.

4.2.5

Conclusions

The limited capacity of the existing sewerage network will constrain future development in Maidstone on the scale that is planned. The two main problems are that flows from the potential development sites in the south-east area adjacent to Maidstone town must pass through the centre of Maidstone town where there is limited spare sewer capacity, and also that all flows from the town pass through Allington pumping station where the available headroom capacity is unknown.

There are potential solutions to the sewerage constraints in Maidstone town, but a more detailed technical study would be needed to assess the feasibility and cost of these solutions. Once the sewerage problems in Maidstone can be overcome, there should be sufficient spare treatment capacity at Aylesford WwTW to treat the additional flow.

Outside of Maidstone town, the main constraint on development is in Headcorn. Both Southern Water and the Environment Agency advise that that Headcorn WwTW is already close to its maximum capacity and that it is unlikely that the capacity can be increased because there is no additional environmental capacity in the receiving water. There is also a potential restriction on the capacity of the pumping station that transfers flow to the treatment works. Both of these constraints will limit future development in Headcorn, unless excess flows are discharged elsewhere.

Harrietsham and Yalding are the other two locations where potential restrictions on wastewater treatment capacity have been identified. However, the restrictions are not as serious as at Headcorn, and solutions could probably be found if necessary.

Sewer flooding within new proposed development needs to be addressed in consultation with Southern Water. Surface runoff from new development needs to ensure that sewer flooding is not increased as a result of additional flows entering indirectly into the sewer system.

4.3

Flood Risk Management

4.3.1

This section is based on information provided in the Maidstone Strategic Flood Risk Assessment (SFRA) and as a result of workshops/meetings and discussions with the Environment Agency undertaken as part of this study.

4.3.2

Sources of Flooding and Main Implications

The main source of flooding in the district is mainly from the River Medway and its tributaries as listed below:

- River Beult
- River Teise
- River Lesser Teise
- River Len (downstream from Spot Lane, TQ 7919 5456)
- River Loose (downstream from Bockingford Lane, TQ 7569 5367)

Development will be mainly constrained by flood risk originated form the above watercourses. Flood risk from other sources is covered in Section 4.4.

4.3.3

Flood Risk Constraints on Proposed Development Areas

This Section identifies which development areas are located within the Flood Zones and which ones could be too restricted to allow them to be developed. Appendix D includes a map of the sites indicating the flood risk areas. This map uses potential site data from the SHLAA and flood risk data from the SFRA (Note that we have not verified the accuracy of either data set).

Of the 293 potential development sites identified at the beginning of the SHLAA process, this study identified 42 which are at least partially within the floodplain. Details of these 42 sites are included in Table 4.4.

The SHLAA process rejects 27 of these initial potential development sites (shaded in grey). The remaining sites which are at least partially within the floodplain are located in Maidstone town, Headcorn, Yalding, with one site in Marden affected.

PPS 25 provides a risk based approach to the management of flood risk. Through the classification of land according to flood risk, it aims to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Classifications used in Table 4.4 are consistent with those given in PPS25 and are reproduced in Table 4.5 for ease of reference.

Ideally development should take place first on land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).i.e. having a classification of Zone 1. Where this is not available land in Zone 2 should be used as a second preference, then land in Zone 3a.

PPS25 makes recommendations for appropriate uses according to following classifications (see Table 4.6 for details of Flood Risk Vulnerability Classification):

- Essential Infrastructure
- Highly Vulnerable
- More Vulnerable
- Less Vulnerable
- Water Compatible.

Two of the potential sites (site ref 26 and 274) have 50% of their area within Zone 3b and only water compatible uses and critical infrastructure that has to be there should be permitted in this area. Essential infrastructure in this zone should pass the Exception Test defined in PPS 25.

Consistent with the findings of the previous SFRA, more detailed flood risk assessment would be needed for each site before the start of any development, including the undertaking of the Sequential Test of PPS25, to sequentially allocate sites in areas of less flood risk first.

We understand from Maidstone Borough Council that some concern has been expressed locally about the potential increased risk of flooding due to new development in the Medway valley area to the south-west of Maidstone, including the Tovil area. The Strategic Flood Risk Analysis which was published by Mott MacDonald in May 2008 does not indicate any specific flood risk in this area. However, the potential impact of new development (either in the immediate area or upstream or downstream) would have to be assessed on a case by case basis.

4.3.4

Conclusion

A number of proposed development sites have been assessed as having an annual probability of river flooding greater than 1 in 1000 in any year (i.e. lying in Flood Zones 2, 3a or 3b). Priority should be given to using sites outside of these areas. However, where other constraints dictate or additional land is required, land should be considered sequentially in order of probability of flooding (i.e. lower probability first). Development in Zones 2, 3a and 3b should be appropriate and accompanied by a detailed FRA.

Appropriate uses by flood zone are defined in PPS25 – development and flood and is reproduced given in Table 4.5 for ease of reference

Table 4.4 – List of Potential Development Sites within Flood Zones 2, 3a and 3b

Site Ref	Location	Site Address	Site Area (Ha)	Type of site	Current or previous landuse	%within FZ2	%within FZ3A + Climate Change	%within FZ3B + Climate Change	%within FZ3B
24	Rejected	Unit 1, Hart Street	0.30	Brownfield	Unknown	12%	100	0	0
26	Maidstone	Land at Cross Keys and Roundwell, Bearsted	4.64	Greenfield	Unknown	44%	50	50	50
41	Rejected	Car park north of railway line, St Peter Street	0.28	Brownfield	B2-7 Industrial	100%	100	60	60
56	Marden	MAP Depot and adjoining field	5.25	Greenfield	Agriculture	16%	5	5	4
62	Rejected	Headcorn Primary School, Kings Road	0.39	Brownfield	Unknown	78%	100	95	80
71	Headcorn	Land between Millbank and Ulcombe Road	11.33	Greenfield	Agriculture	22%	22	22	20
77	Rejected	Land in the village of Laddingford	4.14	Greenfield	Unknown	100%	10	1	0.5
79	Headcorn	Gibbs Hill Farm	4.26	Greenfield	Agriculture	32%	34	34	32
89	Rejected	Wickham Field, Pattenden Lane, nr Marden	0.35	Greenfield	Unknown	90%	1	1	5
137	Rejected	Nortons Industrial Estate, Collier Street	0.80	Brownfield	Unknown	0%	1	0.5	5
140	Rejected	Barradale Farm, Maidstone Road, nr Headcorn	5.84	Greenfield	Unknown	6%	10	10	8
144	Maidstone	Land at Gore Court	150.87	Greenfield	Agriculture	3%	4	4	3
161	Maidstone	Langley Park Farm West, Sutton Road	32.90	Greenfield	Agriculture	1%	0.5	0.5	0.5
165	Headcorn	Land at Kings Road	3.52	Greenfield	Unknown	12%	13	12	10
177	Rejected	Rectory Farm	7.61	Greenfield	Unknown	17%	15	15	12
180	Rejected	Land at Bearsted	1.67	Greenfield	Unknown	2%	3	3	3
206	Rejected	Granada cinema, Lower Stone Street	0.18	Brownfield	Unknown	100%	100	100	100
212	Yalding	Former Syngenta site	32.34	Mixed	B2-7 Industrial	100%	85	40	25
213	Rejected	Hart Street	0.33	Greenfield	Unknown	100%	95	95	85
215	Rejected	St Peter Street	0.56	Brownfield	Unknown	70%	3	2	5
219	Rejected	Land north of Fire Service HQ, Cave Hill				0%	5	5	5
222	Rejected	The Courtyard, Pudding Lane	0.23	Brownfield	Unknown	9%	10	10	0
225	Maidstone	Maidstone East Station	2.66	Brownfield	Sui Generis	4%	0	0	0
226	Rejected	Rear of 91-94 High Street	0.89	Brownfield	Unknown	86%	60	60	60
228	Rejected	46-56 Gabriels Hill and 2 Granada Street	0.18	Brownfield	Unknown	100%	100	100	100
229	Rejected	Rear of 91 and 94 High Street	0.07	Brownfield	Unknown	8%	0	0	0
231	Rejected	Sovereigns Way	0.16	Brownfield	Unknown	14%	0	0	0
252	Rejected	South of Hart Street, Lockmeadow	4.51	Brownfield	Unknown	93%	95	20	15
253	Rejected	Land at Wharf Road	0.62	Brownfield	Unknown	87%	95	95	95
254	Rejected	Land at Beaconsfield Road	0.10	Brownfield	Unknown	100%	90	70	100
255	Maidstone	KEF site, Eccleston Road	1.22	Brownfield	Unknown	93%	100	30	15
258	Rejected	Land adjacent to Rose Cottage, Lees Road	0.21	Brownfield	Unknown	100%	100	75	95
270	Rejected	Land adjacent to Allington Castle	7.72	Greenfield	Unknown	6%	3	3	3
271	Rejected	Land south of Bridge Mill Way	3.56	Greenfield	Unknown	11%	8	8	5
274	Headcorn	Cold Storage facility, Smarden Road	1.34	Brownfield	Not Known	81%	78	78	75
277	Rejected	Powerhub Centre, St Peter Street	1.16	Brownfield	Not Known	89%	80	5	5
278	Maidstone	Laguna Bikes, Clifford Way	0.27	Brownfield	Not known	100%	80	50	45
281	Yalding	Former Syngenta site, Yalding	1.32	Brownfield	Unknown	93%	10	2	2
035A	Maidstone	Land at Rumwood Nursery, Sutton Road	31.65	Greenfield	Unknown	3%	2	2	1.5
067A	Rejected	Museum of Kent Life, Forstal Road, Alyesford	8.80	Brownfield	Unknown	27%	30	30	20
067B	Rejected	Museum of Kent Life, Forstal Road, Alyesford	4.95	Brownfield	Unknown	12%	50	50	40
MUE B	Maidstone	Langley Park Farm West, Sutton Road	104.00	Greenfield	Agriculture	4%	4	4	3

Table 4.5 – Flood zones

Zone 1 Low Probability

Definition

This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).

Appropriate uses

All uses of land are appropriate in this zone.

FRA requirements

For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a FRA. This need only be brief unless the factors above or other local considerations require particular attention.

Policy aims

In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage techniques

Zone 2 Medium Probability

Definition

This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.

Appropriate uses

The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure in Table 4.6 are appropriate in this zone. Subject to the Sequential Test being applied, the highly vulnerable uses in Table 4.6 are only appropriate in this zone if the Exception Test is passed.

FRA requirements

All development proposals in this zone should be accompanied by a FRA.

Policy aims

In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques

Zone 3a High Probability

Definition

This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

Appropriate uses

The water-compatible and less vulnerable uses of land in Table 4.6 are appropriate in this zone. The highly vulnerable uses in Table 4.6 should not be permitted in this zone. The more vulnerable and essential infrastructure uses in Table 4.6 should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.

FRA requirements

All development proposals in this zone should be accompanied by a FRA.

Policy aims

In this zone, developers and local authorities should seek opportunities to:

- i. reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques;
- ii. relocate existing development to land in zones with a lower probability of flooding; and
- iii. create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage

Zone 3b The Functional Floodplain

Definition

This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes).

Appropriate uses

Only the water-compatible uses and the essential infrastructure listed in Table 4.6 that has to be there should be permitted in this zone. It should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows; and
- not increase flood risk elsewhere.

Essential infrastructure in this zone should pass the Exception Test.

FRA requirements

All development proposals in this zone should be accompanied by a FRA.

Policy aims

In this zone, developers and local authorities should seek opportunities to:

- i. reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques; and
- ii. relocate existing development to land with a lower probability of flooding

Source: PPS25

Table 4.6 – Flood risk vulnerability classification

Essential Infrastructure	<ul style="list-style-type: none"> Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.
Highly Vulnerable	<ul style="list-style-type: none"> Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding. Emergency dispersal points. Basement dwellings. Caravans, mobile homes and park homes intended for permanent residential use. Installations requiring hazardous substances consent
More Vulnerable	<ul style="list-style-type: none"> Hospitals. Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels. Non-residential uses for health services, nurseries and educational establishments. Landfill and sites used for waste management facilities for hazardous waste. Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan
Less Vulnerable	<ul style="list-style-type: none"> Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non-residential institutions not included in 'more vulnerable'; and assembly and leisure. Land and buildings used for agriculture and forestry. Waste treatment (except landfill and hazardous waste facilities). Minerals working and processing (except for sand and gravel working). Water treatment plants. Sewage treatment plants (if adequate pollution control measures are in place). Flood control infrastructure. Water transmission infrastructure and pumping stations. Sewage transmission infrastructure and pumping stations. Sand and gravel workings. Docks, marinas and wharves. Navigation facilities. MOD defence installations. Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. Water-based recreation (excluding sleeping accommodation). Lifeguard and coastguard stations. Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.
Water-compatible Development	

Source PPS25

4.4

Surface Water Drainage

4.4.1

Surface Water Drainage

The previous section on Flood Risk Management concentrated primarily on flooding from water courses. However, flooding can also result from a number other sources, including surface water flooding from heavy rainfall, sewer flooding, and groundwater flooding. These types of flooding are difficult to analyze. The analysis of flood risk from these sources is for mostly based on reported flood incidents. Records of flooding incidents are generally incomplete and can often be misleading as the cause of the flooding can be misdiagnosed.

Rainfall is disposed of in a variety of ways - either by flowing into water courses, draining to a sewerage network, or by soakage into the ground. Surface water flooding occurs when excess rainwater does not drain away quickly enough. If rainfall is intense enough, then surface water flooding can occur just about anywhere, but lower lying areas at the bottom of slopes are particularly vulnerable.

In general, surface water flooding is perceived to be more of a problem in urban areas, partly because it is more likely to be reported and recorded in urban areas, and also because urban areas can flood quicker due to higher proportion of impermeable surfaces.

The Strategic Flood Risk Assessment completed by Mott MacDonald in 2008 included a map of reported surface water flooding incidents in the Maidstone Borough Council area, and an analysis of the likely reasons.

The SFRA highlighted the importance of surface water management in Maidstone town: *"Any further development in Maidstone Town needs to have a sufficient sewer and surface water drainage system implemented to cope with current, and future, discharges, and if possible help to reduce the stress on the current system. It is also essential that maintenance of existing and new drainage systems is carried out to ensure flooding caused by blockages is reduced; this will fall under the responsibility of Southern Water and the owners of the new developments. Development must include the implementation of SUDS where possible to help reduce surface water run-off".*

As already mentioned in the section on Wastewater Treatment and Collection, many of the older sewers in Maidstone town are of the combined type, which drain both surface water as well as foul sewage. Therefore the problem of limited sewer capacity is closely linked to the issue of surface water drainage. Any further investigation that tries to solve the problem of limited sewer capacity on Maidstone

town must also consider the impact of surface water drainage on the capacity of the sewers.

As part of the Government response to Sir Michael Pitt's review into the summer 2007 floods, Defra has proposed that local authorities will be given responsibility for coordinating the management of surface water flooding in their area in partnership with other relevant authorities. A key aspect of this co-ordination will be management of data relating to surface water flood events; such data will form the basis of future decisions regarding risk management and mitigation measures.

Pitt's proposals were reflected in the draft Flood and Water Management Bill which was published for consultation in April 2009 and included in the Queen's Speech in November 2009. It is currently being read by the House of Lords.

The Bill is designed to:

- deliver improved security, service and sustainability for people and their communities;
- make clear who is responsible for managing all sources of flood risk;
- protect essential water supplies by enabling water companies to control more non-essential uses of water during droughts;
- modernise the law for managing the safety of reservoirs;
- encourage more sustainable forms of drainage in new developments; and
- make it easier to resolve misconnections to sewers

It places responsibility on the “lead local flood authority” to develop, maintain, apply and monitor a strategy for local flood risk management in its area , where the lead local flood authority” in relation to an area in England means—

- (a) the unitary authority for the area, or
- (b) if there is no unitary authority, the county council for the area

The vehicle for this strategy is the preparation of Surface Water Management Plans (SWMP). In August 2009, the Government made initial funding available to a number of local authorities to prepare SWMPs in their areas. It is expected that further funding will be made available on an ongoing basis, and that local authorities will be able to bid for this funding to help investigate and find solutions for surface water flooding issues in their areas. Given that sewerage capacity in

Maidstone town is acting as a barrier to development, it may be that Maidstone Borough Council could qualify for SWMP funding in the future.

Localized surface water flooding can occur anywhere. Continued monitoring of local flood events (date, location, extent, damage caused etc) is recommended in order to provide hard data on which to base any future surface water management strategy.

Newly developed areas with high proportions of impermeable surfaces are particularly vulnerable. In such areas, there is less permeable surface area to allow rainfall to soak through, and rainfall is also transferred more quickly to the sewer system and local watercourses, increasing the risk of other types of flooding.

The risk of surface water flooding in new development areas can be greatly reduced by the consideration of drainage in the planning process, and particularly by the incorporation of Sustainable Urban Drainage Systems into the design of new developments.

4.4.2

Groundwater flooding

In relation to groundwater flooding, the SFRA indicates: “There have been few reports of groundwater flooding, but incidents that have occurred are located in band across the centre of the borough in settlements such as Yalding, Loose, Boughton Monchelsea, Leeds, Ulcombe and Harrietsham”

Groundwater flooding is not likely to be a main constraint for development, but it is recommended that proposed developments are designed to withstand high groundwater levels. In particular, it is advisable to make provision for the disposal of surface water which cannot infiltrate due to high groundwater levels. This can be done using SUDS techniques.

4.4.3

Sustainable Urban Drainage Systems (SUDS)

Traditional approaches to urban drainage comprise underground tank and pipe networks. More recently the benefits and opportunities to use Sustainable Drainage Systems (SUDS) have been realised and encouragement to use such systems is found throughout flood risk management policy at all levels, such as PPS1: Delivering Sustainable Development and PPS25: Development and Flood Risk. SUDS techniques encompass a variety of approaches to managing surface water in a way which is more sympathetic to the natural and human environment than conventional piped drainage systems. SUDS techniques are often designed to

mimic natural systems, with the overall aim of reducing the rate and volume of discharge from urban sites.

As well as managing flood risk, SUDS can offer additional benefits of pollution reduction, and landscape and wildlife enhancement, which increase the sustainability of the SUDS devices.

In addition to proprietary systems, a number of SUDS techniques can be used:

- Attenuation ponds – whilst these require a large land area, they provide large storage volumes and with suitably planted wet ponds (e.g. reed beds) can provide water quality improvements and an attractive landscape. Their outlet control systems can be active, e.g. controlled from remote river/ sea level monitors.
- French drains, gravelled areas and other permeable surfaces. As well as providing attenuation, the gravel/ stone in these acts as a filter, providing ‘mechanical’ and biological filtration of the runoff.
- Swales and similar systems, where runoff from roads or car parks flows over (normally dry) grass before entering the piped surface water drainage system. The grass traps sediment, oils and other pollutants. There is a risk of long-term build up of pollutants in the grassed areas, if the ratio of grass to paved surface is too small.
- Small reed beds or similar planted wetlands. Given appropriate varieties of reeds/ plants, they can treat limited amounts of oils and other pollutants. However, quite large areas of reeds are needed to break down relatively small amounts of oils.
- Green roofs, although these usually have limited benefit, as the runoff from roofs is rarely of poor quality.

It should be noted that all the SUDS techniques require maintenance of one type or another, and are not a ‘maintenance free’ alternative to conventional road gullies, oil interceptors etc. However, they can be incorporated into general landscaping to also provide landscaping benefit, and for example the maintenance for swales is similar to that for other grassed areas.

SUDS techniques offer an opportunity for an integrated approach to townscape design incorporating SUDS and green areas to achieve sustainability synergies and biodiversity benefits such as improved surface water runoff quality and additional habitats.

There are no proposed or potential sites that could not incorporate some aspect of sustainable drainage at a level appropriate to the scale of development. Small developments can use systems such as rain water harvesting, whilst larger developments can consider incorporating additional measures or larger scale, development-wide systems.

If designed correctly, with a restricted discharge from the site, sustainable drainage can prevent new development from exacerbating existing flood risk issues and thus help to ensure that the requirements of PPS25 are met.

It is important for all new development to ensure that sustainable drainage possibilities are investigated concurrently with design development, starting from outline stages. Detailed information should be provided in the planning application, with a statement to the effect that ‘detailed sustainable drainage schemes will be confirmed at detailed planning’ or ‘sustainable drainage options subject to site investigation’.

4.4.4

Pollution Control

Surface runoff from car parks and trafficked areas has a potential to carry pollutants into the receiving waters. The Environment Agency’s Pollution Prevention Guidance Note 3 (PPG3) recommends that oil separation systems should be used for:

- car parks typically larger than 800m² in area or for 50 or more car parking spaces
- smaller car parks discharging to a sensitive environment
- areas where goods vehicles are parked or manoeuvred
- vehicle maintenance areas
- roads
- industrial sites where oil is stored or used
- refuelling facilities
- any other site with a risk of oil contamination.

There are several means of oil separation. The first is trapped road gullies, which retain both floating oils and heavy matter such as road grit/ decayed leaves, if the road gullies are regularly maintained. If the oils and heavy matters are not removed from gullies regularly, the gullies will block from the heavy matter or the oils will be flushed through the gully.

The other ‘conventional’ method of oil control is the use of oil interceptors. PPG3 recommends the use of Class 1 bypass type interceptors for sensitive receiving waters. Class 1 interceptors have a design discharge concentration of 5mg/l of oil, Class 2 interceptors 100mg/l. Bypass interceptors are designed to treat the flows resulting from rainfall of up to 6.5mm/hr, and bypass flows above this around the separator system to prevent the interceptors being unreasonably large.

4.4.5

Opportunities for Ecological Enhancement

The provision of some types of sustainable drainage provisions can offer opportunities for enhancement of the environment and provision of improved ecological habitats. Examples can include maintenance of drainage ditches, provision of green corridors, and creation of new ponds or wetlands.

Appendix F includes a checklist which can be used to ensure that Environment Agency advice is considered in the appraisal of potential development proposals. Items 35 to 44 relate to issues of ecological conservation or enhancement. Use of this type of checklist should help ensure that opportunities for such enhancements are not overlooked in the assessment of each development. The Developer Checklist has been prepared by Halcrow and agreed with the Environment Agency but not specifically for Maidstone. It is more focussed on issues related to the water cycle than the SEEDA sustainability checklist or integrated regional framework.

4.4.6

Co-ordination with Green Infrastructure

It is recognised that provision of an interconnected network of green and blue spaces that intersperse and connect our towns and villages has many benefits including making an area generally more attractive, providing valuable recreational areas, and providing climate change mitigation. There are also a range of additional benefits including improvements to the general health and well-being of residents and people working in these areas.

Components of green and blue infrastructure such as parks, allotments, areas of wetlands, open natural watercourses can play an important role in sustainable drainage, reducing the risk of flooding by providing a slower, more natural runoff response to rainfall. Conserving natural river corridors in particular can help to absorb fluctuating water volumes and provide an important natural corridor through a town or city. Access to the blue environment can also play an important role in raising public awareness of the importance of the aquatic environment and help promote water efficiency.

Surface water drainage strategies should be co-ordinated with Green Infrastructure planning. Some benefits of blue-green infrastructure may be hard to quantify in monetary terms. However, it is recommended that they be taken into account, albeit in a subjectively, in comparing options.

4.4.7

Conclusions

Separate surface water drainage should be provided to areas of new development. Any increase in paved area associated with new development has the potential to increase the risk of localised surface water flooding. It is important that sustainable urban drainage techniques, co-ordinated with provision of green infrastructure, be used where possible. (Prevailing soil conditions may limit the use of infiltration techniques in some areas). Oil traps should be provided to protect receiving waters from pollutants carried in surface runoff from car parks and other trafficked areas.

As many of the existing sewerage network in Maidstone town is of the combined type, surface water drainage is an integral part of the sewerage capacity problem which has the potential to limit development in and around the town. Maidstone Borough Council should consider the possibility of bidding for Government funding to prepare a Surface Water Management Plan, which would investigate alternative ways to deal with surface water drainage in the town and reduce the amount of surface water entering the town's sewer network

5

Conclusions and recommendations

5.1

Key Issues

5.1.1

Summary

The most critical constraint on development that has been identified by this Water Cycle Study is the limitation on the capacity of the sewerage network in Maidstone town. There are potential solutions to these restrictions which would involve the upgrading of existing sewerage infrastructure or the provision of new pumping stations and pipelines.

The limited capacity of the wastewater treatment plant at Headcorn will restrict the number of new homes that can be provided there. There may also be similar restrictions at Yalding and Harrietsham.

5.1.2

Water Resources

Water Supply in the area is provided by South East Water from a combination of groundwater and surface water sources.

South East Water have plans to ensure the adequacy of water supplies given predicted future development in Maidstone Borough and elsewhere and also during times of drought. Key components of their water resource management plan includes demand management through increased metering and leakage control plus resource augmentation.

In August the Environment Secretary called for a public inquiry to examine South East Water's dWRMP, which sets out their strategy for maintaining security of water supply for the next 25 years. Until the dWRMP has been finalised, there will remain a question mark over the source of funding for measures proposed within the plan. A date has for the public inquiry has been set for May 2010.

Notwithstanding this however, water resources in the area of Maidstone Borough are considered to be relatively robust and the adequacy of water resources to supply the proposed new development is not considered to be a major risk.

The existing water supply system is supplied by a combination of ground and surface water resources. The Chalk aquifer, which is of national importance, provides good natural resilience to periods of drought and the system is further

reinforced by the high degree of interconnectivity between neighbouring water source.

South East Water have an obligation to provide an adequate water supply and they have indicated their commitment to meeting this obligation.

Water consumption of existing consumers is relatively high. **Given the current status of water resources in the area it is recommended that Maidstone Borough Council take positive action to reduce the impact of the proposed new development on the environment by:**

- **Requiring developers to design low water use properties with an average water consumption of 115l/hd**
- **Supporting South East Water in their proposals for increased metering and water loss reduction**
- **Complementing South East Water's efficiency programme by instigating an action plan promote water conservation.** Illustrative components include:

A. Pride in our community campaign

Objective – engaging existing residents, making them proud of Maidstone's natural and built environment. Target – making Maidstone one of the most sought after place in Britain to live!!

Action: review existing community facilities, are they good enough can they be improved? Brain storm additional facilities and events to improve quality of life.

Examples: make sure all community areas are attractive, well maintained, with low water requirement. Construct attractive activity park – aerial runway, mountain bike tracks, café etc. Introduce regular events to shout about Maidstone's natural environment, kids after school activities e.g. green gym. Local competition for best wildlife or natural environment photo.

B. Importance of water campaign

Objective – engage existing residents on the need to conserve water

Action: - review existing community facilities and implement measures to reduce water, e.g. spray taps, grey water recycling, rainwater harvesting; advertise action taken and results achieved.

Education programmes in school. Public exhibition, water audit for typical household, water saving devices, details of cost and expected savings, make spray taps, flow restrictors, water butts etc available at subsidised cost. Provide details (with model?) of underlying aquifers. Public visits to treatment facilities. Articles in local papers. Lorry to tour with volume of water consumed by typical household

C. Water use audit of all public buildings and social housing

Objective: reduce water consumption

Action: structured audit of all public buildings. Measures implemented where appropriate to reduce consumption. Advertise successes in local paper etc.

5.1.3

Water supply

South East Water's have a 5 year development plan for upgrading water supply and distribution infrastructure to meet future demands. The plan considers primarily the adequacy of storage and trunk main capacity rather than the capacity of secondary and tertiary mains. The latter is considered at such time as a specific inquiry is received from a developer. The need to upgrade secondary and tertiary mains is considered on a case by case basis and the associated cost (if any) is borne by the developer.

South East Water have indicated that given their current system configuration any development on potential sites in the south-east area adjacent to Maidstone town would be relatively easy to serve. The most "difficult" location for new development would be on the south limit of Borough; there is a lack of trunk mains in this area with a limited network of small diameter mains feeding south from Maidstone and similarly north from Weald but no major interconnectivity. Furthermore mains serving Sutton Road, Marden and Staplehurst have limited capacity for future development. Additional housing in these areas would also be relatively "difficult" to supply although technically feasible. Although the word difficult has been used in this context, provision of water to new housing in these areas would be technically feasible but of greater cost and requiring a greater lead-in time to ensure South East Water have new infrastructure in place in a timely manner.

It is recommended that Maidstone Borough Council liaise closely with South East Water to allow the water company to tailor their capital programme to meet the needs of proposed developments if required.

5.1.4

Wastewater Treatment and Collection

The study identifies sewerage as the key issue which, without additional investment, is likely to limit development in and around Maidstone town. There is limited spare capacity in some of the key existing sewers running through the centre of Maidstone town, which has the potential to restrict the number of new homes which can be provided to the south and east of Maidstone town.

There is also restricted capacity at Allington Sewage Pumping Station, which pumps Maidstone sewage for treatment at Aylesford Wastewater Treatment Plant. These limitations will be most acute for the potential new development in the south-east area adjacent to Maidstone town. There are potential solutions to these problems, which could involve either increasing the capacity of the existing sewers, or providing new pumping stations and rising mains which could bypass existing sewers. A more detailed technical study would be needed to assess the feasibility, cost, and timing of these solutions.

Providing that the sewerage network problems can be overcome, wastewater capacity is not expected to be a significant issue for proposed developments within and on the periphery of Maidstone town, as Aylesford Wastewater Treatment Plant has capacity for expansion if required. The number of new homes that could be provided in Headcorn will be limited by the capacity of the local wastewater treatment plant. Wastewater treatment capacity could also be a limiting factor on potential development in some of the other settlements considered in the study, such as Harrietsham and Yalding, although there is some headroom for development at these locations.

It is recommended that a more detailed technical study is undertaken be needed to assess the feasibility, cost, and timing of solutions to identified bottlenecks in the sewerage system.

5.1.5

Flood Risk Management

The surface water flooding database developed as part of the SFRA should be regularly reviewed and maintained.

Fifteen of the proposed development sites lie, either partly or totally, within functional flood plains. This will limit the type of development on each affected site.

It is recommended that more detailed flood risk assessment is undertaken for each site at risk of flooding before the start of any development, including the undertaking of the Sequential Test of PPS25, to sequentially allocate sites in areas of less flood risk first.

5.1.6

Surface Water Drainage

As many of the existing sewerage network in Maidstone town is of the combined type, surface water drainage is an integral part of the sewerage capacity problem which has the potential to limit development in and around the town. Maidstone Borough Council should consider the possibility of bidding for Government funding to prepare a Surface Water Management Plan, which would investigate alternative ways to deal with surface water drainage in the town and reduce the amount of surface water entering the town's sewer network.

Surface water flooding is essentially a localised problem which can affect any of the potential development sites, particularly any that are located at the bottom of sloping ground. The effects of surface water flooding can be reduced by ensuring that mitigation measures such as SUDS are incorporated into the design of the development.

Some forms of mitigation measures can offer the opportunity for environmental and ecological enhancement.

5.2

Progression of the Water Cycle Study

This study has identified a need for a more detailed technical study to examine options for increasing sewerage capacity in Maidstone town. If a solution is not found for this issue, there will be a serious restriction placed on the number of new homes that can be provided in and around Maidstone town, particularly on potential sites in the south-east area adjacent to Maidstone town. The detailed technical study will inform the Infrastructure Delivery Plan, preparation of which is required for delivery of a sound LDF

A detailed (phase 2) Water Cycle Study is one of the ways in which the issue of sewerage capacity in Maidstone town could be examined. The detailed WCS would include the following:

- identification and assessment of potential technical solutions,
- identification of what new infrastructure is required, and where and when it is needed;
- preparation of cost estimates for provision of the required new infrastructure;
- identification of who is responsible for providing the infrastructure, and by what deadline,
- provide guidance to planners and developers on site specific requirements.

Preparation of a detailed (phase 2) Water Cycle Study would also allow the findings of the current report to be updated following publication of the results of the ongoing public inquiry into South East Water's draft Water Resources Management Plan.

Appendix F includes a Developer Checklist which can serve as an aide memoire to help Maidstone Borough Council meet the policy objectives of the SEP for sustainable development and ensure that sustainability is considered in discussions with potential developers about the standards to be adopted for new homes.

Appendices

List of Appendices

Appendix A – Plans of Study Area

Appendix B – Plan of Potential Development Areas

Appendix C – Plan of Areas with Environmental Designations

Appendix D – Plan of Potential Flood Risk Areas

Appendix E – Water Resources

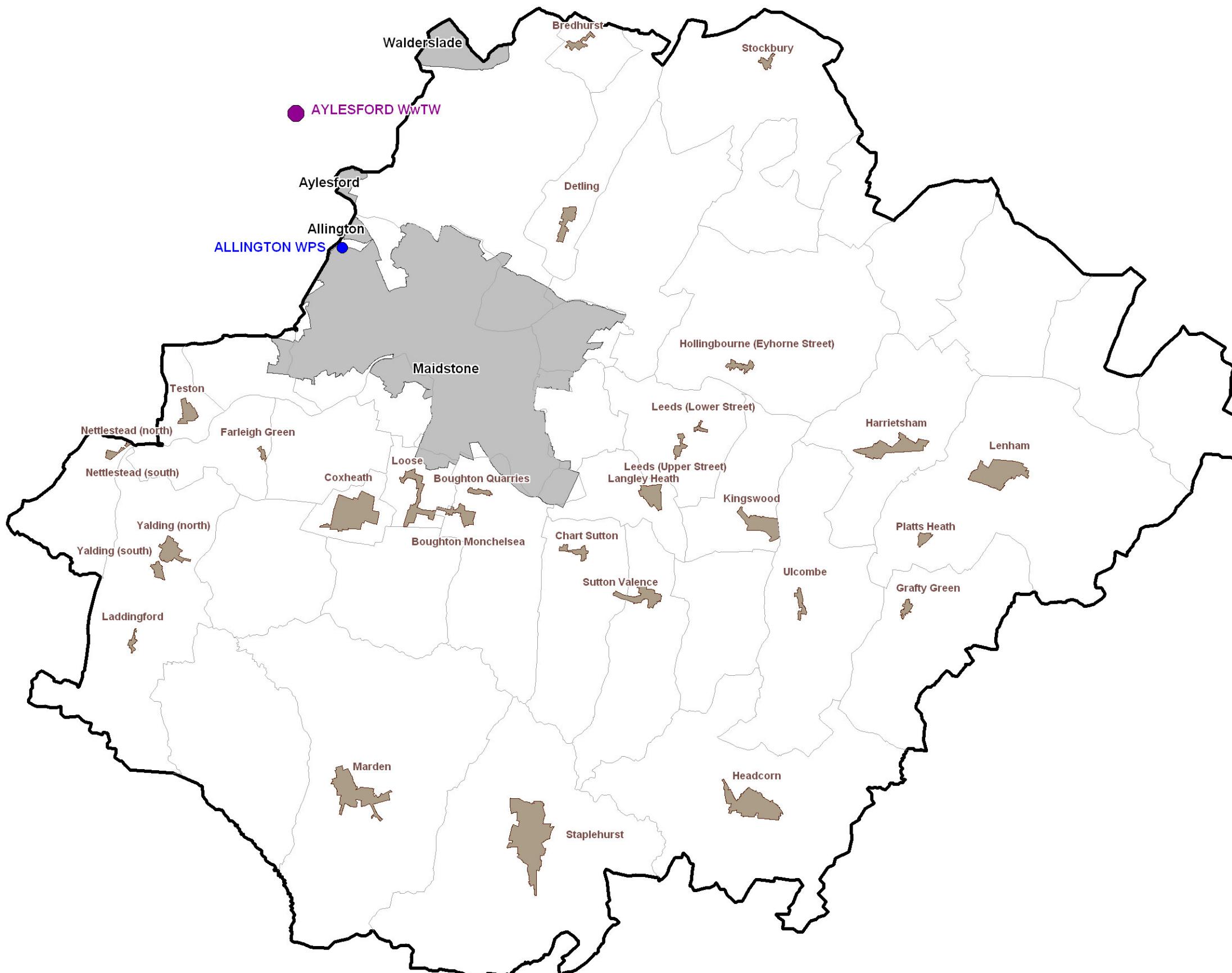
Appendix F – Developer Checklist

Appendix G – Assessing the Sustainability of Options

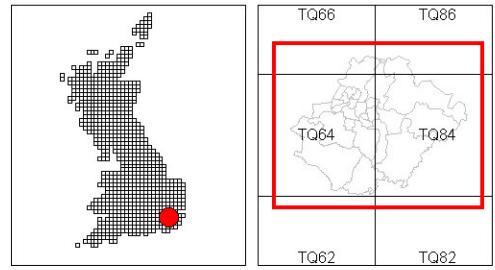
Appendix H – Glossary of Key Terms

Appendix A - Plans of Study Area

N



Location Plan :

**Legend**

- Sewage pumping stations
- Waste water treatment works
- Maidstone Borough Council boundary
- Parish boundaries
- Urban boundary
- Village boundary

0 2.5 5
kilometers

Rev.	By	Date	Description

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Project :

MAIDSTONE WATER CYCLE STRATEGY

Drawing :

**FIGURE 1:
STUDY AREA**

Drawn By : DJ	Date : 21 September 2009
Checked By : BV	Date : 21 September 2009
Approved By : PM	Date : 21 September 2009

Drawing No. : WE/WEMWCS/ Figure 1

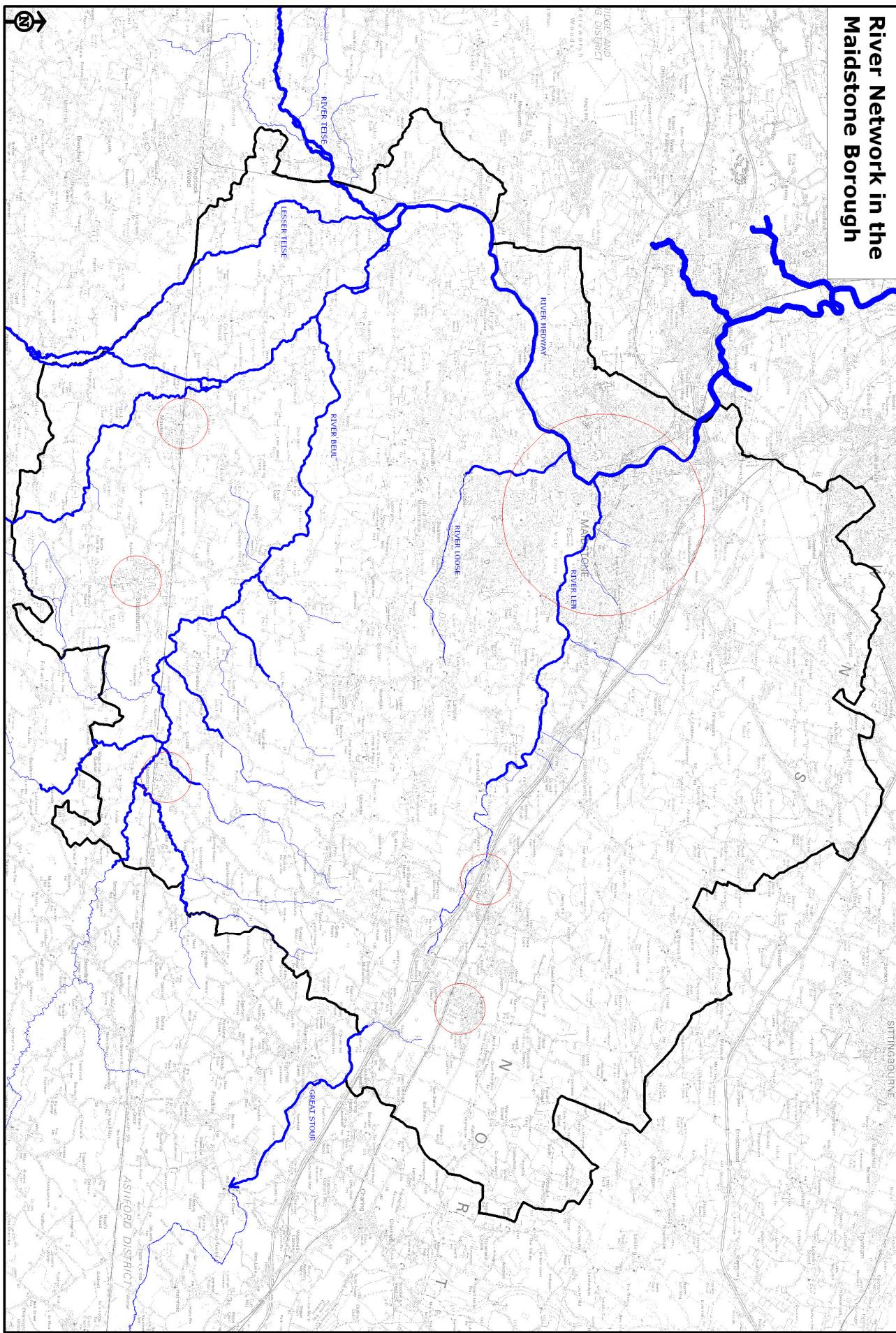


Revision : A

Drawing Scale : 1:100,000

Plot Scale : 1:100,000 @ A3

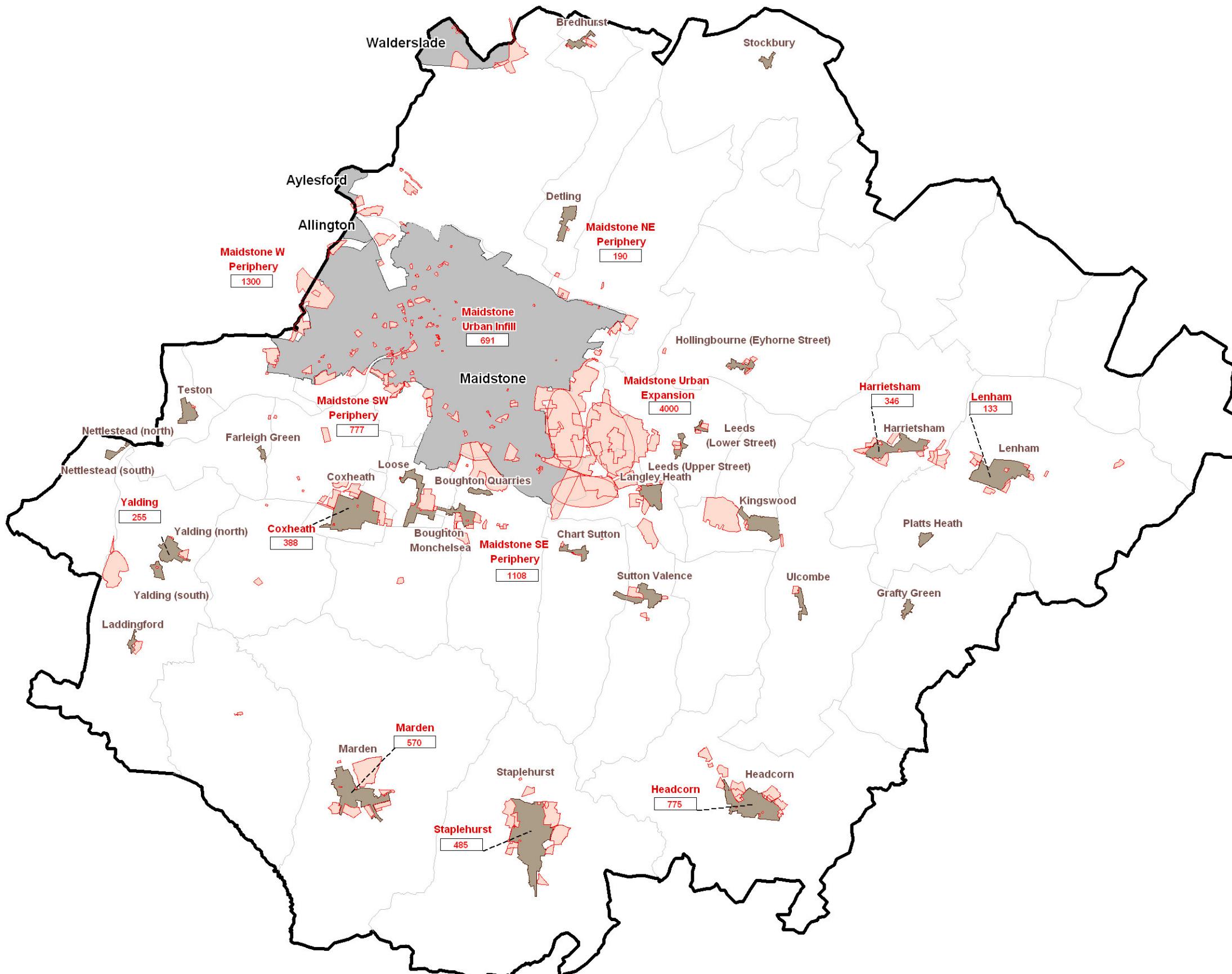
River Network in the Maidstone Borough



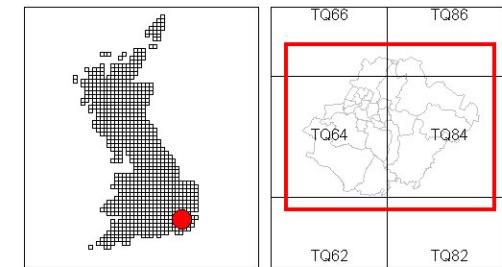
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Appendix B - Potential Development Areas

N



Location Plan :

**Legend**

- Maidstone Borough Council boundary
- Parish boundaries
- Urban boundary
- Village boundary
- Potential developments
- Maximum number of potential sites identified in SHLAA

0 2.5 5
kilometers

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Borough Council

Project :

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Drawing :

**FIGURE 2:
POTENTIAL DEVELOPMENT AREAS**

Drawn By : DJ	Date : 21 September 2009
Checked By : BV	Date : 21 September 2009
Approved By : PM	Date : 21 September 2009

Drawing No. : WE/WEMWCS/ Figure 2

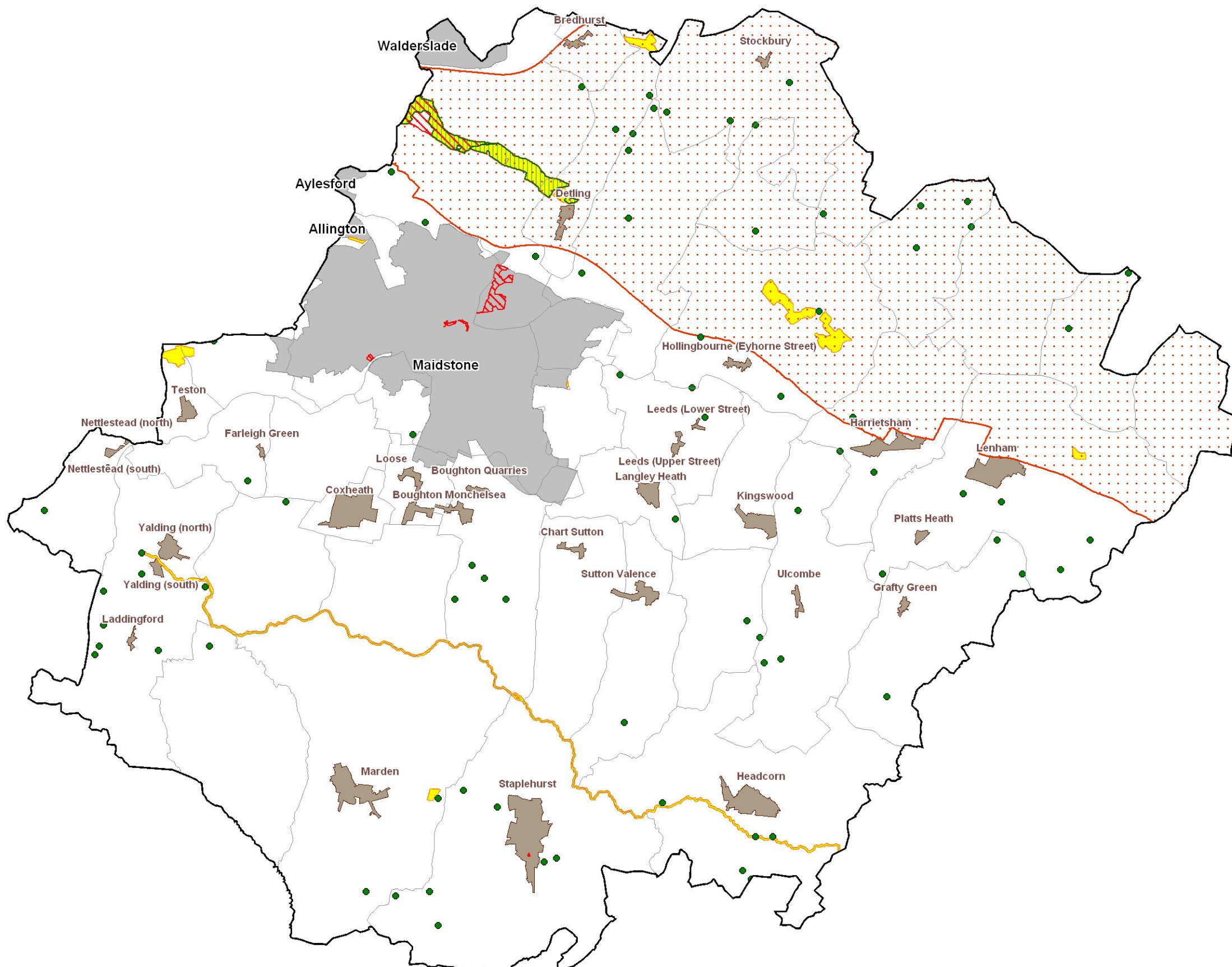
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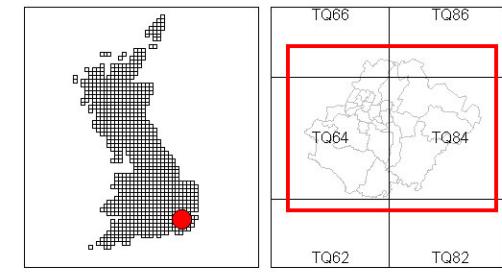
Plot Scale : 1:100,000 @ A3

Appendix C - Areas of Environmental Designations

N



Location Plan :

**Legend**

- Maidstone Borough Council boundary
- Parish boundaries
- Urban boundary
- Village boundary
- AONB
- LNR
- SSSI
- SAC
- SNCI

0 2.5 5
kilometers

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Drawing :

**FIGURE 3:
AREAS OF ENVIRONMENTAL DESIGNATIONS**

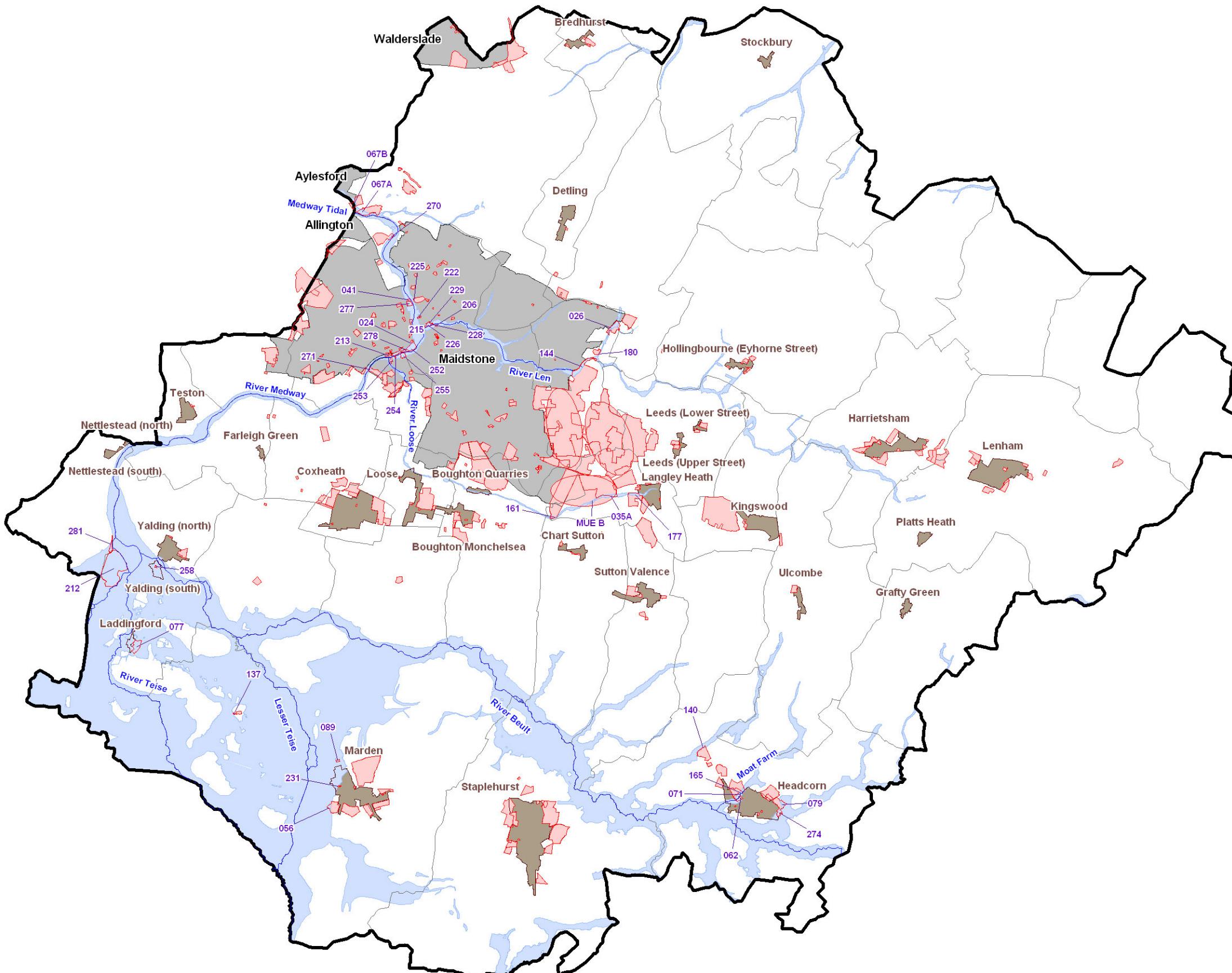
Drawn By :	DJ	Date :	21 September 2009
Checked By :	BV	Date :	21 September 2009
Approved By :	PM	Date :	21 September 2009
Drawing No. :	WE/WEMWCS/ Figure 3		
Revision :	A		

Drawing Scale : 1:100,000

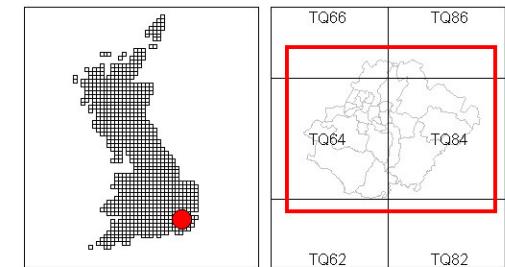
Plot Scale : 1:100,000 @ A3

Appendix D - Flood Risk

N



Location Plan :

**Legend**

- Maidstone Borough Council boundary
- Parish boundaries
- Urban boundary
- Village boundary
- SFRA flood risk area
- Potential development site from SHLAA

0 2.5 5
kilometers

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**FIGURE 4:
FLOOD RISK**

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Approved By : PM	Date : 21 September 2009

Drawing No. : WE/WEMWCS/ Figure 4

Revision : A

Drawing Scale : 1:100,000

Plot Scale : 1:100,000 @ A3

Appendix E - Water Resources

Table E.1 – Status and proposed actions for water resource management units (WRMU) in Medway Catchment

Water resource management unit	Existing status	Target status	Proposed action
1- Upper Medway	No water available	No water available	n/a
2 – Headwater streams	Over licensed	Over licensed	Actively enforce MedCon hands-off flow (HOF) condition Investigate the appropriateness of using local HOF conditions on the Rivers Eden, Bourne and Teise
3 – Middle Medway	Over licensed	Over licensed	Actively enforce MedCon hands-off flow (HOF) condition Assessments of the water availability of the penned section of the Middle Medway
4 – River Beult	No water available	No water available	n/a
5 – River Len	No water available	No water available	n/a
6 – Major aquifer	Over abstracted	Over licensed	Encourage conjunctive uses of group sources Conduct licence review Assessment of appropriateness of RAM results and improve understand the WRMU
7 – Major aquifer	Over licensed	Over licensed	Conduct licence review assessment of appropriateness of RAM results and improve understand the WRMU
8 – Minor aquifer	No water available	No water available	n/a

Ref: Medway CAMS, section 3.3.2

Table E.2 Water resource zone 6, deployable output

Source	Type	Dry year deployable output (Ml/d)	Critical period deployable output (Ml/d)	Annual licensed quantity (Ml/d)	Comment
Borough Green	GW	1.3	1.3	14.8	see note 1
Hartley Chalk	GW	4.3	4.55	10.24	see note 2
Hartley Greensand	GW	2.2	2.2	2.27	
Nepicar Lane	GW	1.5	2.8	14.8	see note 1
Ridley	GW	1.2	2.8	10.24	see note 2
Ryarsh	GW	2	2	14.8	see note 1
Stansted	GW	0	0	10.24	see note 2
Trosley	GW	6.2	9.8	14.8	see note 1
Paddlesworth	GW	1	3.1	14.8	see note 1
Boxley Greensand	GW	2.2	2.2	11.59	see note 1
Boxley Well	GW	2.1	2.3	3.73	
Cossington Greensand	GW	0.95	1.1	11.59	see note 3
Cossington Springs	GW	1.5	1.44	3.16	
Forstal	GW	7.2	11.2	11.59	see note 3
Hockers Lane	GW	2.3	2.3	11.84	see note 4
Thurnham	GW	8.4	10	11.84	see note 4
Boarley Springs	GW	0	0	2.35	
Greenway Court	GW	0	0	11.84	see note 4
Halling Greensand	GW	3	4	3.04	
Halling Chalk	GW	2.2	3.5	2.23	
Burham WTW	SW	12.4	14.6	14.6	see note 5

Note 1: Complex Licence arrangement, see licence 9/40/2/220/G documentation for details

Note 2: 9/40/1/146, 9/40/1/148/a & 9/40/1/161/GR aggregate annual licence quantity of 10.24 Ml/d (Daily licence quantities: Stansted 3Ml/d, Hartley Chalk 6Ml/d, Ridley 5Ml/d)

Note 3: Licence 9/40/2/250/G provide aggregate Annual Licence quantity of 11.59Ml/d, although sources daily aggregate licence is 17.7 Ml/d

Note 4: Licence 9/40/3/555/G provides aggregate annual licence quantity of 11.8 Ml/d, although sources daily aggregate licence is 21 Ml/d

Note 5: Licence 2/114 for the River Medway Scheme. shares 25% of Output with Southern Water.

Appendix F - Developer checklist

Appendix F - Developer Checklist

The key tool for assessing whether developments comply with the principles of this water cycle strategy is the Developer Checklist. This summarises best practice with respect to the water cycle, bringing together Environment Agency guidance into a simple checklist which guides Developers in the assumptions to make and the data to be provided.

It is recommended that Developers' proposals are assessed against the information available within this Study. This list, although not exhaustive, will give Developers a useful reference to ensure Environment Agency advice is incorporated into site design.

This Developer Checklist has been prepared by Halcrow and agreed with the Environment Agency but not specifically for Maidstone. It is more focussed on issues related to the water cycle than the SEEDA sustainability checklist or integrated regional framework.

	Checklist Items	Completed Y/N?
	Flood Risk Management	
1	Is a Flood Risk Assessment (FRA) submitted with the application in accordance with Annex E of PPS 25, Planning Policy Guidance Note 25: Development and Flood Risk?	Y/N
2	Is development proposed within flood zone 2 or 3? (Refer to the flood maps published on the Environment Agency website)	Y/N
3	If yes, is the Sequential test applied? (See Annex D of PPS 25)	Y/N
4	Have the three elements of the Exception test been passed? (See para. D.9, Annex D of PPS 25)	Y/N
5	Does the FRA assess all possible sources of flooding? Is the development located outside flood flow routes? The risks may be from groundwater, overtopping or breach of flood defences, surface water, overland flow, breached reservoirs or sewer flooding. (See Annex C, PPS 25)	Y/N
6	Does the FRA assess the implications of climate change and suggest ways the impact can be minimised? (See Annex B of PPS 23)	Y/N

	Checklist Items	Completed Y/N?
7	Provide evidence confirming whether there will be a reduction in flood risk to upstream or downstream communities?	Y/N
8	Confirm that the development allows adequate access for maintenance of watercourses in accordance with the byelaw margin.	Y/N
9	Is evidence provided for dry access/egress for residents in the event of flooding? (See Annex G of PPS 25)	Y/N
10	Provide outline details of any proposed flood resilience and resistance measures to reduce damage to your development? (See Annex G of PPS 25)	Y/N
11	If the development involves the raising of ground levels within flood zones 2 and 3, provide details of any proposed compensatory flood storage areas.	Y/N N/A
	Surface water run off	
12	Is the site over 1 ha? If so an FRA is required to comply with PPS 25.	Y/N
13	Confirm the previous use of the site, stating the extent of impermeable areas both before and after development.	% before % after
14	Provide evidence that the surface water run-off rate will be restricted to 2 l/s/ha, or demonstrate that the existing greenfield run off rate will be maintained or reduced.	Y/N
15	Confirm that any river flow estimates, and the sizing of balancing facilities, are in accordance with guidance in Preliminary Rainfall Run Off Management for Developments, Revision C. (Calculations must include adequate sensitivity tests to determine the effect of changing parameters).	Y/N
16	Confirm that any surface water storage measures are designed for the varying rainfall events, up to and including, a 1 in 100 year + climate change event.	Y/N
17	Provide layout plans, cross section details and long section drawings of attenuation measures, where applicable.	Y/N
18	Provide justification for any new crossings over watercourses and confirm that they are of clear span design. Any river crossings or weed screens to be designed to minimise risk of blockage. For further advice please refer to your local area Environment Agency office guidance.	Y/N or N/A
19	The number of outfalls from the site should be minimised. Any new or replacement outfall designs should adhere to standard guidance form SD13, available from the local area Environment Agency office.	Y/N
	Sustainable Drainage Systems (SuDS)	

	Checklist Items	Completed Y/N?
20	Provide detail of any SuDS proposed with supporting information, for example, calculations for sizing of features, ground investigation results and soakage tests. See CIRIA guidance for more information.	Y/N
21	Where practical, quantify the percentage of surface water to be controlled through SuDS.	%
22	Confirm whether driveways and other hard surfaces are to be constructed from permeable paving.	Y/N
23	Confirm whether the proposed SuDS are to be adopted as part of public open space, or by a wastewater undertaker and provide supporting evidence. Alternatively, provide details of the maintenance contributions to be provided over the life of the development.	Y/N
24	Provide details of any proposed measures to encourage public awareness of SuDS and increase community participation.	Y/N
Water Consumption		
25	Confirm that the development can meet a water consumption target of 120l/h/d (substitute 105l/h/d or 80l/h/d where appropriate) and enclose supporting details (e.g. proposals for measures such as rainwater harvesting, low/dual flush toilets and water saving tap and shower fittings).	Y/N
26	Confirm whether the development will utilise rainwater harvesting (minimum tank size 2.5m ³ per house, see Environment Agency Guidance).	Y/N
27	Has a practicable alternative strategy been included for the supply of water for fire fighting?	Y/N
28	Confirm whether grey water recycling is to be utilised and provide details.	Y/N
29	Provide details of any proposed measures to increase public awareness and community participation.	Y/N
Pollution prevention		
30	Provide details of measures to minimise pollution to watercourses during construction.	Y/N
31	Provide details of pollution prevention measures for the life of the development, such as oil and silt interceptors. Consider whether permeable pavement areas are protected from siltation.	Y/N
Water Supply and Sewage Treatment		
32	Provide evidence to confirm that water supply capacity is available, and that demand can be met.	Y/N
33	Provide evidence to confirm that sewerage and wastewater treatment capacity is available, and that demand can be met.	Y/N
34	Confirm that on-site and off-site sewers serving ten or more dwellings are constructed to adoptable standards in accordance with the current edition of "Sewers for Adoption", published by WRc.	Y/N
Conservation / Enhancement of Ecological Interest		
35	Confirm that the green infrastructure, such as the surface water system, links	Y/N

	Checklist Items	Completed Y/N?
	to the neighbouring green infrastructure to assist the creation and maintenance of green corridors?	
36	Confirm that at least 25% of flood attenuation ponds/wetlands will be designed for multifunctional uses, such as providing access, footpaths, cycleways, recreational uses, and submit outline details.	Y/N
37	Confirm that an environmental assessment, proportional to the size and nature of the development, has been undertaken. This should identify any impacts on wildlife habitats (include surveys) and detail suitable mitigation measures, where necessary.	Y/N
38	Confirm whether buffer zones are provided adjacent to watercourses and other sensitive zones, such as wetland areas.	Y/N
39	Confirm the development will not sever or disconnect any areas of damp grassland of importance to wintering birds	Y/N
40	Confirm all ponds within 500m of the site boundary have been surveyed for presence of great-crested newt populations.	Y/N
41	Identify whether opportunities for increasing the area of damp grassland (using surface drainage/grey water) has been explored to benefit wintering birds, where practicable.	Y/N
42	Identify opportunities for creating or improving watercourse habitats for water vole, white-clawed crayfish or otter, where practicable.	Y/N
43	Confirm whether the Local Biodiversity Action Plan (LBAP) has been consulted and whether any habitats or species detailed within the LBAP are present or near the development site.	Y/N
44	Confirm whether any County Wildlife Sites are present or near to the development area.	Y/N

Appendix G - Assessing the sustainability of options

Appendix G - Assessing the sustainability of options

Sustainability theme 1 – Biodiversity, fauna and flora

- 1a. Does this option maximise green infrastructure?
- 1b. Does this option minimise surface water runoff?
- 1c. Does this option encourage or improve recreational use of water?
- 1d. Does this option improve river hydromorphology?
- 1e. Does this option improve river quality?
- 1f. Does this option improve wetland habitat?
- 1g. Is this option compatible with wet and dry seasons?

Sustainability theme 2 – Land and water resources

- 2a. Does this option reduce land surface erosion?
- 2b. Does this option reduce river bed erosion?
- 2c. Does this option maximise use of existing water resources?
- 2d. Does this option minimise potable water consumption?
- 2e. Does this option promote water reuse?
- 2d. Does this option control rainwater as close to the source as possible?
- 2e. Does this option make best use of natural land resources?
- 2f. Does this option make enough space for water?

Sustainability theme 3 – Pollution, air and climatic factors

- 3a. Does this option make most efficient use of non-renewable energy?
- 3b. Does this option minimise Maidstone Borough's carbon footprint?
- 3c. Does this option reduce the risk of accidental pollution of water?
- 3d. Does this option reduce the risk of contamination of land?
- 3e. Does this option reduce the number of properties at risk of flooding in Maidstone Borough?

Sustainability theme 4 – Inclusive communities

- 4b. Is this option consistent with ease of access for mobility impaired?
- 4c. Does this option encourage the involvement of the local community?

Sustainability theme 5 – Healthy communities

- 5a. Does this option provide enough clean water for drinking and sanitation?
- 5b. Does this option decrease the risk of foul flooding?
- 5c. Does this option decrease the risk of casualty from xxxx (eg risk of drowning in attenuation ponds etc)?

Sustainability theme 6 – Development and growth

- 6a. Does this option make maximum use of existing infrastructure?
- 6b. Does this option increase capacity in the existing infrastructure?
- 6c. Does this option improve chemical water quality?
- 6d. Does this option improve ecological river quality?
- 6e. Is this option compatible with climate change (UKCIP2) scenarios?

Sustainability theme 7 – Conservation and heritage

- 7a. Does this option enhance the built environment?
- 7b. Does this option enhance the aesthetic environment?
- 7c. Does this option preserve areas of the natural environmental of historical interest?

Sustainability theme 8 – Economic development and employment

- 8a. Does this option cause disruption to the existing community?

- 8b. Does this option facilitate economic growth?
- 8c. Will this option enhance tourism?

Appendix H – Glossary of Terms

Appendix H - Glossary of Key Terms

Acronym	Meaning
AMP	Asset Management Plan
BAP	Biological Action Plan
BREEAM	Building Research Establishment Environmental Assessment Method
CAMS	Catchment Abstraction Management Strategy
CLG	Communities and Local Government
Comparison Goods	Comparison goods can be described as goods that consumers buy at infrequent intervals and normally would compare prices before buying eg. TV, Fridges, clothes etc
Convenience goods	Widely distributed and relatively inexpensive goods, which are purchased frequently and with minimum of effort such as groceries, newspapers and fuel
CSH	Code for Sustainable Homes
CSO	Combined Sewer Overflow
DMA	District metered area
DMRB	Design Manual for Roads and Bridges
DPD	Development Plan Document
DWF	Dry Weather Flow – the minimum or baseflow in a sewer network in dry weather conditions
ELR	Employment Land Review for Maidstone Borough Council, published by GVA Grimley
EO	Emergency Overflow
FEH	Flood Estimation Handbook
Flood Risk	The percentage probability of a flood occurring which causes significant damage or disruption within a given year
Flood zones	Zone 2 has a flood risk probability of between 1 in 100 and 1 in 1,000 (1% - 0.1%). Zone 3 has a probability of greater than 1 in 100 (1%)
FRA	Flood Risk Assessment
IDB	Internal Drainage Board
IPG	Interim Planning Guidance
IUD	Integrated Urban Drainage
l/hd	Litres (of water) per head of population per day
LDF	Local Development Framework

Acronym	Meaning
LNR	Local Nature Reserve
LPA	Local Planning Authority
Lpcd or l/cd or l/c/d	Litres (of water) per capita per day
Maidstone Hub Package	Package of infrastructure improvement works to support planned growth of Maidstone town, in line with the Growth Point agenda
Ml/day	Mega-litres per day. 1Ml = 1,000,000 litres.
MUSCO	Multi Utility Services Company
pcc	Per Capita Consumption (litres per head per day)
PPG3	(Environment Agency) Pollution Prevention Guideline 3
PPS1	Planning Policy Statement 1: Delivering Sustainable Development
PPS22	Planning Policy Statement 22: Renewable Energy
PPS25	Planning Policy Statement 25: development and flood risk (Note that revised version was published 29 March 2010)
PR09	Periodic Review 2009 (Water company infrastructure planning)
RE1	River Ecosystem 1
RQO	River Quality Objectives
SAC	Special Area of Conservation
SDA	Strategic Development Area
SEEDA	South East England Development Agency
SFRA	Strategic Flood Risk Assessment
SHLAA	Strategic Housing Land Availability Assessment
SPA	Special Protection Areas
SPD	Strategic Planning Document or Supplementary Planning Document
SSSI	Site of Special Scientific Interest
SoP	Standard of protection: The probability of a flood occurring which causes the existing flood defences to be overtapped or fail
SUDS	Sustainable Urban Drainage Systems
UHPS	Urban Housing Potential Study
VOA	Valuation Office Agency
WCS	Water Cycle Study or Water Cycle Strategy
WFD	Water Framework Directive

Acronym	Meaning
WISZ	Water into supply zone
dWRMP	Draft Water Resource Management Plan