Maidstone BC

Water Cycle Study - Outline Report
Non technical summary
June 2010

Halcrow Group Limited

Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1	-	Draft for Consultation	25/11/09	SAW
2	-	Final	11/2/10	SAW
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Contents




1 Introduction

1.1 Need for a Water Cycle Study

KEY MESSAGE
Maidstone Borough is a designated Growth Point The South East Plan requires Maidstone Borough Council to provide 11,080 new homes and 10,000 new employment opportunities in the period from 2006 to 2026 It is important to ensure development does not have a detrimental impact on the water environment. As a region, South East England has the lowest rainfall in the UK but the greatest water demand. **Actions must be carefully planned to ensure increased water use for water supply and wastewater discharge is balanced with environmental protection and necessary infrastructure is in place. There is a need for wide recognition and co-operation to overcome issues faced**.

The importance 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.

There is a recognised shortage of housing in South East England and Maidstone Borough Council has been identified as an appropriate area for significant new development namely, in the period from 2006 to 2026:

- 11,080 new homes and
- 10,000 new employment opportunities.

As part of their planning process, Maidstone Borough Council appointed Halcrow Group Ltd to undertake an Outline Water Cycle Study. This document presents a non technical summary of their findings.




1.2 What are Water Cycle Studies

Water Cycle Studies are designed to facilitate an integrated approach to the question:

How can we best plan new development, taking into consideration water environment and infrastructure constraints, thus achieving more sustainable urban development?

Water Cycle Studies are typically carried out in three stages: scoping, outline and detailed. The scoping and outline stages aim to bring together existing information and knowledge and identify and key constraints and/or opportunities for development.

This outline water cycle study covered the area of Maidstone Borough Council. Key stakeholders included:

- Maidstone Borough Council, local planning authority
- South East Water, water company responsible for providing potable (drinking) water
- Southern Water, water company responsible for collecting, treating and disposing of wastewaters
- The Environment Agency, watchdog charged with long term management of water resources
- Natural England, government's advisor on the natural environment, public champion of England's natural environment
- Kent County Council, providing the upper tier of local government in Kent

1.3 Water Company Planning

Because of the long lead-in time for construction of new water supply and/or wastewater infrastructure, it is important that the water companies have best available information of likely housing and/or commercial developments to help them in their business planning.

There are two water companies with a stake in this water cycle strategy. Southern Water who are responsible for providing sewerage and wastewater treatment and South East Water who are responsible for providing wholesome drinking (potable) water.

There is often a significant lead-in time between identifying the need for new water or wastewater infrastructure and completion of its construction. This is particularly true of new water resource schemes such as construction of a new dam and reservoir. Therefore water companies must plan well in advance.

Water companies prepare:

- Water resource management plans, this plan looks forward over a 25 year period and considers whether the company has sufficient water resources to meet projected demand for drinking water; if not, it assesses options for meeting the shortfall
- Business plans, these plans are prepared every 5 years. They consider all aspects of the water companies' business and identify the funding necessary to operate the water supply and wastewater systems and undertake necessary investments

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, Ofwat announced maximum prices for the period 2010 and 2015 and the water companies are currently assessing how this will affect their investment plans.

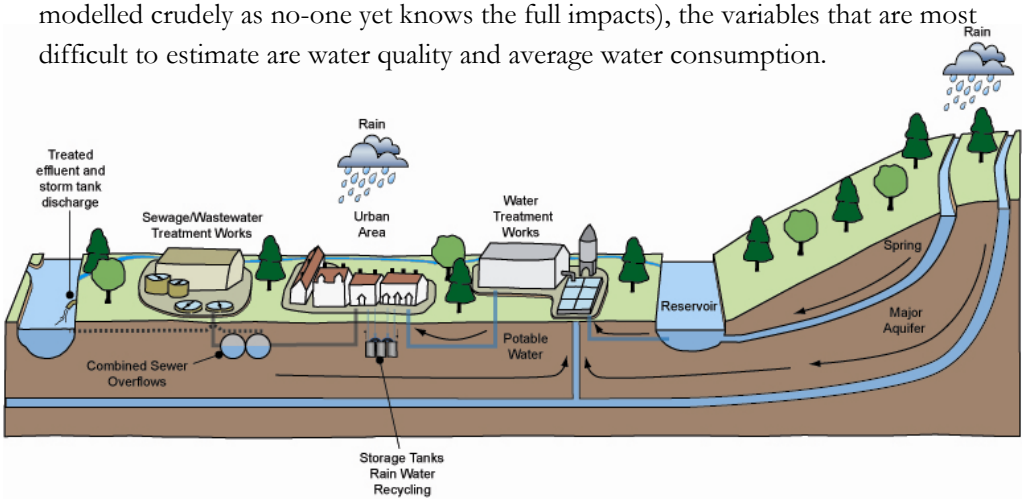
2 Elements of the water cycle

2.1 Introduction

KEY MESSAGE

- More development means more water: more potable water demand, increased flows to the sewage treatment works and a greater risk of flooding as rainwater runs off new houses, driveways and roads.
- This study has considered all these elements and how they interact. It has looked at measures to ensure that water is properly managed and that new developments do not compromise existing ones.
- Secretary of State for the Environment has decided that South East Water's water resource management plan, which sets out the company's proposals for ensuring available water resources are sufficient to meet projected demand should be subject to further public scrutiny. A public inquiry commenced in May 2010

The main elements that comprise the Water Cycle are shown below. 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.



2.2 Water resources

South East Water have prepared a plan to ensure sufficient water is available to supply the demand of existing and new residents of the Borough to the year 2035. The plan is subject to public inquiry which started in May 2010. The findings of the inquiry may have implications on South East Water's proposals, perhaps by placing greater emphasis on reducing current levels of water consumption.

Maidstone Borough lies in the Medway river catchment. There are good natural water resources in the area including large aquifers (natural underground reservoirs of water) beneath the Chalk North Downs and the river Medway and its associated tributaries.

Existing water resources are heavily utilised with over 75% of the 669,000 cubic metres of water abstracted per day being for the public water supply systems (i.e. drinking water).

On average residents in Maidstone Borough use approximately 164 litres of water every day. This is higher than the national average and significantly higher in other parts of Europe. If residents of the proposed new dwellings were to consume the same amount, South East Water would have to increase the amount of water abstracted from the aquifers or river Medway by some 4.6 million litres every day.

The Environment Agency has assessed the existing water resources in the Medway catchment as being over licensed. That is to say, if all organisations allowed to abstract water took the full amount permitted under the terms of their licences, then environmental damage would occur. In practise, the capacity of the infrastructure designed to abstract the raw water is less than the full amount of the licence so to date no such environmental damage has occurred. Notwithstanding this, the Environmental Agency is unlikely to licence any additional abstraction.

In 2008, South East Water prepared a plan setting out their preferred strategy for ensuring sufficient water resources were available to supply the needs of Maidstone and other settlements in their service area over the next 25 years. The plan took into consideration trends in water use, proposed new developments etc; options for meeting any short fall were assessed in order to identify the most cost effective strategy.

The Government has raised some concerns over South East Water's plan and decided it should be subject to further public scrutiny. The public inquiry started in May 2010, and is ongoing as of the date of issue of this report. Notwithstanding this however, South East Water have indicated that they will meet their duty to provide a safe and adequate water supply to residents in their service area.

One of the areas of concern raised by the Government was the average daily water use assumed by South East Water. New building regulations will require that newly built homes should be designed to consume no more than the equivalent of 125 litres per person per day. The Code for Sustainable Homes sets standards for water use between 120litres and 80 litres per person per day. The Government has a long term "aspirational target" that all residents (i.e. including those living in older properties) should use on average no more than 130litres per day.

For new developments, the Government and Environment Agency use the concept of water neutrality as a measure of the sustainability. Water neutrality is defined as: "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.

For the Borough of Maidstone water neutrality could 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

Since existing water use in Maidstone Borough is high by both national and international standards a reduction of the order of 23litres to 27 litres per person per day should be achievable, by the introduction of volumetric charging and water efficiency measures without any significant loss in quality of living.




The prime responsibility for ensuring that residents have an adequate water supply rests with South East Water. However, Maidstone Borough Council could reduce the impact of proposed development on water resources as follows:

- By ensuring as a minimum all new properties are designed to use an equivalent of no more than 125 litres per person per day
- Given that existing water resources are already over-licensed, there is a case for imposing tighter standards on new developments, say 115 or 105 litres per person per day. The 115 l/hd level should be achievable through water efficient design and provision of water efficient fixtures and fittings without the need for grey water recycling, whereas the 105 l/hd level may require the additional use of some form of grey water recycling
- The Borough Council could move towards water neutrality by initiating a water efficiency campaign including for example: awareness campaigns, green labelling, register of green plumbers.

2.3 Water distribution

The need to build new infrastructure to distribute drinking water is addressed in South East Water's five year business plan. It is not seen as a constraint but could affect the timing of new developments. Developments located on the south and eastern periphery of Maidstone town will be relatively easy to serve and therefore could be developed earlier some rural locations.

Once abstracted and treated, drinking water is distributed to properties through a complex network of reservoirs, pumping stations and pipes. South East Water have a 5 year business plan, which identifies where improvements are needed in the main distribution network (i.e. reservoirs, major pumping stations and trunk mains), to ensure water can be adequately distributed around their service area. The plan does not include secondary and smaller diameter mains. The adequacy of these pipes is only assessed once an inquiry has been received from a developer.

Due to commercial confidentiality South East Water have not made available the details of their business plan. However, they have advised that, any new




developments located on the south and eastern periphery of Maidstone town will be relatively easy to serve as there are good existing trunk mains in these areas. Conversely, developments located in the rural areas on the southern extremity of the Borough would be more challenging 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 additional pipes etc.

2.4 Wastewater collection and treatment

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. 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 BC area is Aylesford WwTW which serves the town of Maidstone. Many of the smaller settlements in the Maidstone BC area have their own smaller WwTW.

The capacity of the existing wastewater treatment works serving Maidstone is not considered to be a constraint. Southern Water have plans to increase spare capacity at the plant to 10,000 dwellings by 2015. This is expected to be sufficient to allow the planned expansion of Maidstone to proceed as proposed.

Treated wastewater discharges to river Medway which currently has poor ecological status. The Environment Agency may require Southern Water to meet more onerous quality standards before discharge in order to meet the objectives of the Water Framework Directive. Should this occur, Southern Water are familiar with the necessary processes and sufficient land is available to construct necessary

The capacity of Aylesford WwTW is not considered to be a constraint to development. At present it has sufficient spare capacity to accept wastewater from an additional 4,000 dwellings. During the period 2010 to 2015 Southern Water expect to undertake improvement works- at the plant to allow it to accept wastewater from a further 6,000 dwellings i.e. an additional 10,0000 in total. This

combined with available capacity at the smaller settlement should be adequate to serve the proposed new developments.

Once treated, wastewater from Aylesford WwTW is discharged into the river Medway. At present much of the river Medway suffers from high levels of nutrients and has poor ecological status. The treatment works at Aylesford contributes to such nutrient levels in the river, and there is a risk that the Environment Agency may require Southern Water to improve standards of treatment. Such an event should not represent a major constraint as tried and tested solutions for nutrient removal are available and there is sufficient land available at Aylesford for construction of the necessary works.

The sewerage system (i.e. piped collection network) 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 wastewater and rainwater runoff, with sewerage serving more recent development being separate i.e. collecting foul wastewater only.

Southern Water has undertaken a detailed analysis of the capacity of the sewerage system. The analysis confirmed that the system has little or no spare capacity to accept additional flow 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. Due to the location of the treatment work to the north west of the town, wastewater from many of the potential development sites, notably on the south and east periphery of the town would naturally drain through these parts of the system. Therefore this lack of capacity in the sewerage system represents a significant constraint to development. Whilst technical solutions exist to overcome these problems, they will be costly and time consuming to implement.

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Small treatment works also exist at Headcorn, Marden, Staplehurst, Coxheath, Harrietsham, Yalding and Lenham. Only at Headcorn does the treatment works represent a major constraint to development. The works at Yalding and Harrietsham may become a constraint as the proposed levels of development would use up all of the available treatment capacity at these works. The sewerage networks in all these settlements are known to have localised deficiencies. Further studies would be required to identify the scope of upgrading works required before development could take place.

2.5 Flood Risk Management and Surface Water Drainage

Development of some sites located within the functional floodplain will be restricted.

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)
- River Loose (downstream from Bockingford Lane)

Fifteen sites potential development sites fall within Flood Zone 2, 3a and/or 3b (see table below). Two of the potential sites (site ref 26 and 274) have at least half of their area within the functional floodplain. Land use in these zones would be restricted to water compatible uses and/or construction of critical infrastructure.

Site Ref	Location	Site Address	Site Area (Ha)	Type of site	%within FZ2	%within FZ3B
26	Maidstone	Land at Cross Keys and Roundwell, Bearsted	4.64	Greenfield	44%	50
56	Marden	MAP Depot and adjoining field	5.25	Greenfield	16%	4
71	Headcorn	Land between Millbank and Ulcombe Road	11.33	Greenfield	22%	20
79	Headcorn	Gibbs Hill Farm	4.26	Greenfield	32%	32
144	Maidstone	Land at Gore Court	150.87	Greenfield	3%	3
161	Maidstone	Langley Park Farm West, Sutton Road	32.90	Greenfield	1%	0.5
165	Headcorn	Land at Kings Road	3.52	Greenfield	12%	10
212	Yalding	Former Syngenta site	32.34	Mixed	100%	25
225	Maidstone	Maidstone East Station	2.66	Brownfield	4%	0
255	Maidstone	KEF site, Eccleston Road	1.22	Brownfield	93%	15
274	Headcorn	Cold Storage facility, Smarden Road	1.34	Brownfield	81%	75
278	Maidstone	Laguna Bikes, Clifford Way	0.27	Brownfield	100%	45
281	Yalding	Former Syngenta site, Yalding	1.32	Brownfield	93%	2
035A	Maidstone	Land at Rumwood Nursery, Sutton Road	31.65	Greenfield	3%	1.5
MUE B	Maidstone	Langley Park Farm West, Sutton Road	104.00	Greenfield	4%	3

Surface water flooding i.e. flooding from direct rainfall runoff is a localised problem and without careful planning could occur on any of the potential development sites. The risk of surface water flooding should be mitigated by provision sustainable drainage systems i.e. systems that mirror as closely as possible the natural path of rainfall runoff.

3 Summary and recommendations for further study

3.1 *Summary*

The proposed development of 11,080 new dwelling plus creation of 10,000 new employment opportunities in Maidstone Borough in the period from 2006 to 2026 can be accommodated by the water environment. The outline water cycle study has identified the following issues:




- Available water resources in Medway catchment are limited. They are considered by the Environment Agency to be over-licensed i.e. environmental damage would occur if all abstractors took the full amount of water allowed under their licenses
- Greater use of water demand techniques is required to reduce the impact of the developments on available water resources. New building regulations required that new homes be designed to deliver water efficiency of 125 l/hd. Given the stress on water resources in the Maidstone area, it is recommended that Maidstone BC aim for the lower target of 115 l/hd from new developments where possible.
- South East Water's water resources management plan which sets out their proposals for supplying water to existing and new residents over the next 25 years is the subject of a public inquiry which started in May 2010. The findings of this inquiry may impact on their proposals, perhaps by requiring more ambitious targets for reducing future levels of water consumption in the area
- South East Water's 5 year Business Plan includes investments needed in the trunk main system to distribute water to new developments. However, the lead-in time needed to complete these investments may influence the allowable timing of developments
- Southern Water plan to upgrade the existing wastewater treatment works serving Maidstone in the period 2010 to 2015, following which it should have adequate capacity to accept additional wastewater from the proposed new developments
- The ecological status of the river Medway into which treated wastewater is discharged is poor. The Environment Agency may require Southern Water to increase the standard of treatment provided. Southern Water fully understand the necessary treatment processes to achieve this and existing land is available at the treatment works site for construction of associated infrastructure
- The capacity of the existing sewerage system to accept additional flows is limited. Significant new investment will be required to allow wastewater from new developments to be transferred to the treatment works. Such works will be costly and time consuming to implement
- The location of some sites in the functional floodplain will limit permissible development

3.2 *Recommendations*

The report makes the recommendations:

- 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
- Maidstone Borough Council should work with Southern Water to address wastewater issues; 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
- a more detailed flood risk assessment is undertaken for each site at risk of flooding before the start of any development
- the Water Cycle Study should progress to detailed stage, focusing on solutions to the limited sewerage system capacity in Maidstone town. The preparation of a detailed study would also allow the water resources section of this report to be updated to reflect the results of the public inquiry into the South East Water draft Water Resources Management Plan.




Annex 1 – Definition of flood zones




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a) **Zone 1 Low Probability**
b) **Definition**
c) 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%).
d) **Appropriate uses**
e) All uses of land are appropriate in this zone.
f) **FRA requirements**
g) 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.
h) **Policy aims**
i) 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
j) **Zone 2 Medium Probability**
k) **Definition**
l) 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.
m) **Appropriate uses**
n) 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.
o) **FRA requirements**
p) All development proposals in this zone should be accompanied by a FRA.
q) **Policy aims**
r) 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
s) **Zone 3a High Probability**
t) **Definition**
u) 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.
v) **Appropriate uses**
w) 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.
x) **FRA requirements**
y) All development proposals in this zone should be accompanied by a FRA.
z) **Policy aims**
aa) In this zone, developers and local authorities should seek opportunities to:
bb) 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;
cc) ii. relocate existing development to land in zones with a lower probability of flooding; and
dd) 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




ee) Zone 3b The Functional Floodplain

ff) Definition

gg) 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).

hh) Appropriate uses

ii) 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:

jj) – remain operational and safe for users in times of flood;

kk) – result in no net loss of floodplain storage;

ll) – not impede water flows; and

mm) – not increase flood risk elsewhere.

nn) Essential infrastructure in this zone should pass the Exception Test.

oo) FRA requirements

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

qq) Policy aims

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

ss) 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

tt) ii. relocate existing development to land with a lower probability of flooding

Source: Planning Policy Statement 25: development and flood risk