

**South East England Regional Assembly
Water and the South East Plan**

**Paper for EiP Data Session on Water
17 October 2006**

Purpose of this note

To summarise and describe the work undertaken by the Environment Agency in cooperation with the region's water companies and the Regional Assembly to assess the implications of housing growth across the region on public water supply-demand balance and sewage treatment capacity.

I. Background

- I.1 Ensuring adequate public water supplies are provided to existing and new houses and businesses, and that waste water is treated and disposed of, while ensuring that the environment is protected and enhanced, is a key challenge facing the region to be addressed by the South East Plan. The challenge is exacerbated by additional demand created by new households, changing lifestyles, legislative requirements, and a changing climate.
- I.2 The Environment Agency has been collaborating with the region's water companies to provide advice to the Assembly on public water supply-demand balance under a range of scenarios involving different levels of housing growth, efficiency savings, and development of new water resources over the period of the South East Plan. Reports were provided to the Assembly in September 2004 and April 2005 to inform the development and appraisal of the South East Plan.
- I.3 Further analysis and modelling was undertaken by the Environment Agency following publication of the draft South East Plan in 2006, that assessed the impact of housing provision and distribution proposed in Policy H1 and the sub-regional strategies. These reports are available from the Assembly's website at: http://www.southeast-ra.gov.uk/meetings/advisory/nat_res.html
- I.4 The reports indicate that increased demand from new development proposed can be accommodated, but only through a combination of demand and supply-side activities. These include a greater level of water efficiency in all new development than occurs as standard at present, plus development of new water resources including new and expanded reservoirs. New resources provide security of supply but will require funding and planning permission. These are often lengthy and difficult processes.

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- 1.5 The Environment Agency, Thames Water and Southern Water have also been assessing the implications of the housing provision proposed in the South East Plan on waste water treatment capacity and ability of receiving waters to accept increased discharges. This work has focused on existing sewage treatment infrastructure and water quality standards, identifying sewage treatment catchments in the region where there may be limits to the amount of new development that can be accommodated. Ongoing work is also identifying options and associated investment that may be needed to accommodate growth while protecting the environment.

2. Water Resources - Scenarios and Modelling

- 2.1 The Environment Agency and the water companies have undertaken a series of modelling exercises at different stages of the development of the South East Plan. The water supply data used to inform the scenarios was drawn from the water companies' final water resource plans (April 2004) submitted in April 2004 to OFWAT. A technical group including representatives of the Environment Agency, each water company and the Regional Assembly – the Water Resources South East group - agreed the reports.

2.2 Report 1 (September 2004)

- 2.2.1 This report examined the impact of alternative housing growth scenarios on water resources and water supplies. The scenarios presented in the September 2004 report were:

Housing Growth:

- Housing development as estimated in water company plans (broadly equivalent to RPG9) rolled forward;
- Medium scenario (RPG9 plus growth areas = 800,000 houses between 2002/3 and 2030, 650,570 by 2025); or
- High growth scenario (medium scenario plus universal 30% across the region).

Water Efficiency:

- No new water efficiency in new housing above current standard build;
- Additional 8% savings in each new dwelling (expected to be delivered through review, and implementation of Building Regulations); or
- Additional 21% savings in each new dwelling (agreed as upper practicable level).

New Water Resources:

- New resources only to 2010 (committed to and agreed by OFWAT) or
- New resources to 2030 (including resources not yet permitted or funded).

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Sustainability reductions:

These include the potential loss of reliable abstraction due to the need to protect sites/water courses of concern – usually protected by the EU Habitats Directive or other Directives. Reductions are uncertain and in future will be influenced by the need to deliver Good ecological status as required by the Water Framework Directive, and so two variants have been modelled:

- Reductions already implemented or highly likely by 2009/10;
- Possible further reductions implemented by 2012/13.

2.3 Report 2 (April 2005)

2.3.1 This report updated the previous work to reflect the proposals in the consultation draft of the South East Plan published in January 2005. This included new housing growth scenarios and distribution across the sub-regional areas.

2.3.2 Two alternatives of the six new housing growth scenarios were modelled: 25,500 dwellings per annum; and the 32,000 dwellings per annum “sharper focus”. All other assumptions were the same as those used in the previous report.

2.3.3 The twin-track approach underpinning the work assumed that 76% of projected deficits are met by new resource development, and 24% by demand management.

2.4 Report 3 (May 2006)

2.4.1 Following submission of the draft South East Plan to government in March 2006, the WRSE group has undertaken additional modelling, assessing the implications of the scale and distribution of housing proposed in Policy H1 of 28,900 dwellings per annum. This level of growth is similar in total number of new houses to the representation of “spatial option ii” modelled in the May 2005 report and the “medium” scenario of the September 2004 report. However, the distribution of this growth to districts has changed in some cases.

2.4.2 The approach taken is essentially the same as used for previous reports, using the same data to represent the supply-demand balance as for our previous work. However, the work has gained in sophistication in terms of the range of scenarios considered, the quality of the data, and its presentation.

2.4.3 Additional scenarios that have been included within the modelling work include:

Water efficiency:

In addition to the 8 and 21% water efficiency saving scenarios examined in previous work, additional water efficiency levels in new plus a proportion of existing homes have also been modelled:

- 47% water efficiency savings applied to new homes.

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- Per capita consumption of 80, 100 & 120 l/h/d applied to new homes.

The 47% savings scenario reflects the highest defined standard for internal water use (less than or equal to 30m³ per bedspace per year) in the ODPM consultation paper 'Proposals for introducing a Code for Sustainable Homes'. These water efficiency scenarios have been applied to new homes and to 0%, 20% or 40% of existing homes.

Resource Development:

The following scenarios were applied:

- Baseline resources (no resource development beyond that approved and expected by 2009/10);
- Further resources to 2030 as proposed in companies' PR04 final water resource plans;
- An "integrated" resource scenario in which existing resources are more closely related to where there are deficits (developed by the Environment Agency to investigate the effect of greater integration and transfers of resources between water resource zones across the region). This has been developed as the total resource development proposed in the water company plans totalling 430 million litres/day (MI/d) is more than is needed for the region. This scenario assumes that 65% of future increased demand is met through resource development and 35% through water efficiency savings.

2.4.4 The estimated effects of climate change have been quantified through assuming a reduction in available output from existing sources of up to 50 MI/d and an increase in demand and headroom of a further 50 MI/d. Sustainability reductions (to protect the environment) are also quantified as 112 MI/d reduction in available supply.

2.4.5 To place this in context, it is helpful to consider that the region has a dry year demand of 2500 MI/d including headroom. A city the size of Brighton and Hove has a daily consumption of around 35 MI/d. Current reliable available resources for the region are 2700 MI/d, although this is not evenly distributed. Growth in housing of 28,900 dwellings per annum is estimated to increase the total regional dry year average demand by 299MI/d by 2025/26.

3. Water Resources - Results and Messages

3.1 The reports produced in 2004 and 2005 informed the development and appraisal of the policies of the South East Plan. The Environment Agency and water companies were also involved in consultation with the Principal Authorities in preparing the sub-regional strategies.

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- 3.2 The results of the latest modelling (May 2006) are set out, as previously, in an extensive report and illustrated graphically (spreadsheets and maps) http://www.southeast-ra.gov.uk/meetings/advisory/nat_res/water_resources-may06.pdf. Overall the conclusions do not differ significantly from previous reports.
- 3.3 The report concludes that housing growth of 28,900 dwellings per annum can be accommodated in the supply-demand balance, subject to assumptions about water efficiency and resource development. Only the Milton Keynes area experiences some residual deficit in headroom in 2026 in low water efficiency scenarios.
- 3.4 It also concludes that the distribution of housing proposed in Policy H1 should be manageable in terms of water resources and provision of water supplies, and the distribution is more compatible with water company plans than an even distribution of the growth across the region. However, it should be recognised that there are risks associated with both aspects of the twin-track approach (water efficiency and new resources). Water efficiency requires enabling mechanisms (such as improved building regulations, financial incentives) and behaviour change. Development of new resources has a long lead time and must satisfy statutory planning requirements.
- 3.5 The report concludes that it remains important, for planning purposes, to highlight within the planning framework the main strategic resource developments that may be needed. Of the available options, it is the potential reservoir schemes that are most significant for the South East Plan because of their spatial implications. The following options remain important, as noted in previous reports:
- An Upper Thames reservoir by 2019/20
 - Enlargement of Bewl reservoir by 2014/15
 - Broad Oak reservoir by 2019/20
 - Clay Hill reservoir by 2014/15
 - Havant Thicket reservoir by 2020/21
- 3.6 The enlargement of Darwell reservoir, East Sussex and a strategic option in north-west Sussex (possibly a reservoir near Hardham) are also options thought worthy of recognition within the planning framework.
- 3.7 Not all of these reservoirs may be required and the indicated timings may change as further investigations progress. Equally, other alternatives may yet be determined. For example, effluent reuse or desalination schemes.
- 3.8 The overall conclusions are the same as previous reports, that with the twin-track approach of increased demand management and water efficiency combined

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with timely development of new water resources, the housing proposed in the Plan can be accommodated. They support the approach set out in Policies NRM1 and NRM2 of the South East Plan.

- 3.9 Higher levels of housing (up to 40,000 dwellings per annum) were also modelled. This produced deficits in several resource zones at 2016 unless higher (21%-47%) levels of water efficiency (8% is not sufficient) or a greater degree of supply integration is achieved.

4. Water Treatment and Quality - Modelling

- 4.1 In addition to the work on water resources described above, the Environment Agency has been working with the Regional Assembly and the water companies (Thames Water and Southern Water) to identify locations where there is a risk that the sewage treatment works will be unable to treat sewage from proposed new housing to the standards required to protect water quality. Work is ongoing and a revised report will be available for discussion at the EiP, but the latest publicly available report is on the Assembly's website at: http://www.southeast-ra.gov.uk/southeastplan/publications/research/wq_and_growth-report.pdf
- 4.2 This work is not as complete or refined as that undertaken on water resources, in part due to lack of previous assessments at the regional or even sub-regional scale, and also due to the complexities and variables involved. These include the specific location of new development, the capacity and technology at individual sewage treatment works, water quality standards, the impact of future legislation, available treatment technology, and effects of current investment programmes.
- 4.3 Models have been used to predict the effects of additional housing on river water quality. This has examined the chemical effects of increased sewage effluent. Further studies may be required to assess the impact on river ecology that could arise from significant increases in volumes of sewage effluent at a few locations and further investigative work is planned. Early indications do not suggest any river flooding problems will be caused by the proposed increases in sewage effluent flows.
- 4.4 This analysis assesses the impact of accommodating additional sewage from new housing through expansion or upgrade of existing sewage treatment works (STWs). Other solutions, such as local treatment, new sewage treatment works or discharging sewage effluent at different locations, will need to be fully investigated.
- 4.5 Increased urbanisation may also have additional effects on water quality, such as diffuse pollution from road run-off. This report has not considered this impact. However, it is assumed that general pollution prevention policies contained

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within the draft South East Plan, such as those relating to sustainable drainage systems (SuDS), will help to address these impacts.

- 4.6 Screening criteria were used to identify the sewage treatment works and associated catchments most vulnerable to the effects of new housing development. The criteria were based on the standards required in STW discharge consents¹, that is an indicator of limited dilution and/or a sensitive watercourse. Out of a total of 523 STWs in the region the screening exercise identified a potential issues with 63. The vast majority of existing STWs are therefore unlikely to have a problem in accommodating new development.
- 4.7 Computer models were built for the 63 locations identified for further study. These have been used to examine the impact of the projected housing growth to 2026, drawing on housing numbers and distribution set out in Policy H1 and the sub-regional strategies in the draft South East Plan.
- 4.8 As part of the exercise the Environment Agency have estimated the number of additional houses² that could be connected to each STW without failing effluent standards that could be met using currently established technology. The 'load' on the environment was assessed in terms of biochemical oxygen demand (BOD), Ammonia, Nitrogen and Phosphorus.
- 4.9 The South East Plan is not generally locationally-specific and so the numbers of new houses that may be proposed in the vicinity, or that may be expected to be connected to, the STWs of concern was estimated. The Assembly and Environment Agency have consulted with the principal authorities on the distribution of the development where this is known in order to help improve the accuracy of the modelling.

5. Water Quality – Results and Messages

- 5.1 The modelling work has focused on the 63 STWs identified through the screening exercise as requiring further study.
- 5.2 Most of the 63 STWs identified are able to accommodate the housing growth proposed in the South East Plan, although stricter discharge consents may be required to protect water quality. Upgrades to the sewage treatment facilities will be needed to meet these tighter standards. The water companies have provided an initial estimate of indicative costs.

¹ The Environment Agency issues a discharge consent for all discharges of sewage to controlled waters.

² Calculated from additional flow by assuming house occupancy of 2.5 people and a population equivalent flow of 200 litres per person per day.

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- 5.3 However, the modelling has identified 6 existing STWs (Table I below) where the Environment Agency advises that the housing allocation in the South East Plan is likely to exceed the amount of additional housing that can be connected to the STW due to difficulty in meeting effluent standards using currently established technology.

Table I: Sewage Treatment works where the Environment Agency recommends that limits should be placed on new connections from additional housing

Sewage treatment works name	Capital costs for wastewater treatment	Allowable number of additional houses
Chickenhall (Eastleigh)	Already funded under AMP	4,000
Hailsham North	Already funded under AMP	2,960
Hailsham South	Already funded under AMP	2,460
Hogsmill Valley	Already funded under AMP	3,522
Horsham	Already funded under AMP	3,768
Newbury	Already funded under AMP	2,686

- 5.4 For these catchments, further work is proposed to identify possible alternative options for treatment and effluent discharge, and the likely costs of such measures.
- 5.5 In addition, further studies are currently underway for a number of other catchments including those in the Blackwater Valley (7 individual STWs), Basingstoke, and Maple Lodge in Buckinghamshire.
- 5.6 Integrated Water Cycle Studies involving investigation of all aspects of water management are also proposed and at least partially funded at Aylesbury, Basingstoke and Crawley.
- 5.7 The Environment Agency anticipates that the results of the studies in the Blackwater Valley and at Aylesbury, Basingstoke and Maple Lodge will be available before the Examination in Public of the South East Plan. The work at Crawley is unlikely to have concluded in time for the EiP.
- 5.8 The modelling has identified one STW (Fullerton in Andover) where growth beyond that already connected to the sewage treatment works is likely to cause unacceptable levels of phosphorous in the River Test and failure to comply with water quality standards. To prevent further deterioration in water quality the Environment Agency, Southern Water and the local planning authority will need to develop an agreed solution, as an increase in discharge flow has been permitted through decisions made in the previous Asset Management Plan (AMP4) process.
- 5.9 The modelling also considered higher housing provision of up to 40,000 dwellings per annum using a pro-rata increase in district numbers set out in H1. An additional two STWs emerged as potentially presenting a constraint to future

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housing development in these locations, although this is not believed to be insurmountable. More significantly, it was concluded that at a growth rate of 40,000 dwellings per annum it is likely that growth will exceed capacity at a greater number of STWs earlier.

6. Conclusions

- 6.1 The collaborative and sometimes ground-breaking work with the Environment Agency and the region's water companies has provided valuable information to inform and appraise the South East Plan.
- 6.2 The water resources modelling has enabled assessment of the availability of water resources and actions necessary to meet future demand due to the growth proposed in the South East Plan while protecting the environment. This is reflected in Policies NRM1 and NRM2. This has included quantified assumptions about future water demand, demand management measures, resource development, climate change and sustainability reductions (reductions in available supply) that have enabled a robust set of scenarios to be developed.
- 6.3 The water quality modelling is perhaps more complex and has not been undertaken in such a thorough, systematic and collaborative way before. As such progress has been slower and results are only now emerging. These indicate that there are a relatively small number of existing STW catchments where the scale and distribution of housing proposed in the South East Plan is likely to cause significant management issues.
- 6.4 Ongoing studies will provide an indication of the scale and timing of investment required in different locations to support housing growth proposed in the South East Plan, and thus inform the ongoing development of the Implementation Plan.
- 6.5 This work is also essential in ensuring that the water companies and the Environment Agency are informed on likely levels and distribution of growth at an early stage, and so better able to assess the investment requirements for new infrastructure. This will inform the preparation of business plans and the next Periodic Review, and the role of the regulator OFWAT will be crucial to delivery of necessary infrastructure to support growth.
- 6.6 In the process of undertaking this work, new issues have arisen in some areas where further work is required. Further in-depth studies of the whole water cycle (supply, drainage, treatment, and flooding) are proposed for Aylesbury, Basingstoke, and Crawley by the Environment Agency in partnership with the local authorities and other stakeholders.